



नेशनल ऑटोमोटिव टेस्ट ट्रैक्स

NATIONAL AUTOMOTIVE TEST TRACKS

Tender Document

For

NATRAX पीथमपुर (म.प्र.) में कैंटीन भवन में मरम्मत कार्य का कार्य/

Repairing work in Canteen building at NATRAX Pithampur (M.P.)

At

NATRAX

PITHAMPUR, DIST. DHAR (Madhya Pradesh)

Tender No. - NATRAX/PROC/C&I/23/55

National Automotive Test Tracks (NATRAX)/ नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (NATRAX)
A unit of National Automotive Board (NAB)/ राष्ट्रीय मोटर वाहन बोर्ड (एनएबी) की एक इकाई

NH-52, Old Agra- Mumbai Highway/ NH-52, पुराना आगरा-मुंबई राजमार्ग,

Next to Pithampur Flyover/ पीथमपुर फ्लाईओवर के बगल में,

Post Khandwa (Near Pithampur)/ पोस्ट खंडवा (पीथमपुर के पास)

Dhar District, Madhya Pradesh-454774/ धार जिला, मध्य प्रदेश -454774

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1. General Instructions:

नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (NATRAX) नेशनल ऑटोमोटिव बोर्ड (NAB) के तहत एक ऑटोमोटिव टेस्टिंग एंड सर्टिफिकेशन सेंटर है, जो भारी उद्योग मंत्रालय, भारत सरकार द्वारा गठित एक स्वायत्त निकाय है। NATRAX को लगभग 3000 एकड़ भूमि पर पीथमपुर, जिला धार, (मध्य प्रदेश, भारत) के पास, सभी प्रकार के ऑटोमोबाइल के व्यापक परीक्षण और मूल्यांकन के लिए स्थापित किया गया है।/National Automotive Test Tracks (NATRAX) is an Automotive Testing & Certification Centre under NATRiP Implementation Society (NATIS)/National Automotive Board (NAB) which is an autonomous body constituted by Ministry of Heavy Industries, Government of India. NATRAX has been set up on approx. 3000 acres of land for comprehensive testing and evaluation of all types of automobiles, near Pithampur, Dist. Dhar, (Madhya Pradesh, India).

नेशनल ऑटोमोटिव टेस्ट ट्रैक्स (NATRAX), इस बोली में निहित नियमों और शर्तों पर कार्य करने, निष्पादित करने और कार्य करने के लिए निर्धारित प्रोफार्मा में सीमित निविदा पूछताछ (LTE) के तहत पंजीकृत, योग्य और अनुभव से पासवर्ड संरक्षित कोटेशन / बोली आमंत्रित करता है। दस्तावेज़। कार्यों का संक्षिप्त विवरण और एनआईक्यू की समय-सीमा नीचे दी गई तालिका में संक्षेप में दी गई है।/The National Automotive Test Tracks (NATRAX), invites Password Protected Quotation/Bid from the registered, qualified and experience under Limited tender enquiry (LTE) in the prescribed Proforma for performing, executing and implementing the works on the terms and conditions contained in this Bid document. Brief Description of works and the timelines for NIQ are summarised in the table below:

कार्य का वर्णन /Description of Work	अनुबंध की अवधि /Period of Contract	निविदा के फ्लोटिंग की शुरुआत की तिथि / Date of start of floating of tender	बोली जमा करने की अंतिम तिथि / Last date for submission of Bid	बोली खोलने की तिथि और समय / Date & Time of Bid opening
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Tender No. -NATRAX/PROC/C&I/23/55

NATRAX पीथमपुर (म.प्र.) में कैटीन भवन में मरम्मत कार्य का कार्य/Repairing works in Canteen building at NATRAX Pithampur (M.P.)	आगे बढ़ने के लिए नोटिस (एनटीपी) जारी होने की तारीख से 30 दिनों के भीतर।/ within 30 days from the date of Issue of Notice to Proceed (NTP).	21 st Sept 2023	29 th Sept 2023 at 1500 Hrs	29 th Sept 2023 at 1530 Hrs
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बोलीदाता (आईटीबी) के निर्देशों में उल्लिखित न्यूनतम पात्रता मानदंड (एमईसी) को पूरा करने वाले बोलीदाता बोली प्रक्रिया में सफलतापूर्वक बनने के पात्र हो सकते हैं। जेवी/कंसोर्टियम के रूप में बोली लगाने वालों को अनुमति नहीं है।/ The Bidder(s) who meet the Minimum Eligibility Criteria (MEC) as mentioned in the Instructions to Bidder (ITB) may be eligible to become successfully in the Bidding process. **The bidder(s) in the form of JV/Consortium is not permitted.**

2. कोटेशन/बोली प्रस्तुत करने का विवरण/ Quotations/Bid Submission details:

बोली का प्रकार- तकनीकी-वाणिज्यिक बोली (तकनीकी एवं वित्तीय बोली एक लिफाफे में)/ Type of bid called- Techno-comercial bid (Technical & Financial Bid in single envelope)

- a. पासवर्ड से सुरक्षित बोली/कोटेशन बोलीदाता द्वारा निम्नलिखित ईमेल आईडी पर उपरोक्त समय और तारीख के बाद या पूर्व सूचना पर अगली सुविधाजनक तारीख और समय के रूप में प्रस्तुत किया जाना है। (पासवर्ड सुरक्षा विवरण के लिए कृपया इस दस्तावेज़ का अनुबंध IV देखें)।/ Password protected Bid/Quotation is to be submitted by the Bidder at the following email ID's not later than the aforesaid time & date or as next convenient date & time on pre-intimation. (for Password protection details please refer Annexure IV of this document).





Tender No. -NATRAX/PROC/C&I/23/55

mail to: a.prabhakar@natrip.in, anuj.kumar@natrip.in,

OR

मोहरबंद बोलियां/कोटेशन भी पूर्वोक्त तिथि और समय पर NATRAX हब कार्यालय में सीलबंद लिफाफों में हार्ड कॉपी में जमा किए जा सकते हैं। हालांकि, मौजूदा कोविड महामारी को देखते हुए बोलीदाताओं को इलेक्ट्रॉनिक मोड के माध्यम से बोली लगाने के लिए प्रोत्साहित किया जाता है/ Sealed Bids/quotations may also be submitted in the hard copy in **sealed envelopes at NATRAX Hub office** in the aforesaid date and time. However, Bidders are encouraged to Bid/quote through electronic mode considering the ongoing Covid pandemic.

- b. उक्त तिथि एवं समय के बाद कोई बोली स्वीकार नहीं की जायेगी। हालाँकि, असाधारण मामलों में, NATRAX के पास बोली खोलने से पहले बोली जमा करने के समय/अंतिम तिथि को अगली सुविधाजनक तिथि/समय तक बढ़ाने का अधिकार सुरक्षित है।/ No Bids will be accepted after the aforesaid date and time. However, on exceptional cases, NATRAX reserves the right to extend the time/last date of submission of Bid to a next convenient date/time before opening of the Bids.
- c. टेलीग्राफिक रूप से या ट्रांसमिशन के अन्य माध्यमों (टेलीफैक्स, आदि) के माध्यम से भेजी गई बोलियां जो पासवर्ड से सुरक्षित नहीं हैं, उन्हें दोषपूर्ण, अमान्य माना जाएगा और खारिज कर दिया जाएगा।/ Bids sent telegraphically or through other means of transmission (telefax, etc.) which are not Password Protected shall be treated as defective, invalid and shall stands rejected.

3. NATRAX गैर-प्राप्ति/गैर-वितरण/या किसी तकनीकी त्रुटि या गलत प्राप्तकर्ता के कारण किसी भी देरी के लिए जिम्मेदार नहीं होगा। बोलीकर्ता NATRAX से अपनी बोली प्रस्तुत करने की प्राप्ति की पुष्टि कर सकते हैं/ NATRAX shall not be responsible for any delays for non-receipt /non-delivery/or any technical errors or due to wrong addressee. Bidders may confirm the receipt of their Bids submission from NATRAX.

4. Disclaimer/ अस्वीकरण:

NATRAX reserves all rights to accept/ reject/modify/split any or all proposals without assigning any reasons. Bidders shall not have any cause of action or claim against NATRAX for any of its decisions.

NATRAX बिना कोई कारण बताए किसी या सभी प्रस्तावों को



Tender No. -NATRAX/PROC/C&I/23/55

स्वीकार/अस्वीकार/संशोधित/विभाजित करने के सभी अधिकार सुरक्षित रखता है। NATRAX के किसी भी निर्णय के लिए बोलीदाताओं के पास कार्रवाई का कोई कारण या दावा नहीं होगा।

This tender document/NIQ has been prepared in both the languages (English & Hindi) with due care, however, in case of any discrepancy the English Language will prevail.

यह निविदा दस्तावेज/एनआईक्यू दोनों भाषाओं (अंग्रेजी और हिंदी) में उचित देखभाल के साथ तैयार किया गया है, हालांकि, किसी भी विसंगति के मामले में अंग्रेजी भाषा प्रबल होगी।

For NATRAX

For Head Procurement & Stores/

हेड प्रोक्योरमेंट एंड स्टोर्स के लिए

अनुलग्नक I/ANNEXURE I

A. बोलीदाताओं के लिए निर्देश (आईटीबी)/ INSTRUCTION TO BIDDERS (ITB)

1. बोलीदाताओं को ईमेल के विषय पर "निविदा संख्या NATRAX/PROC/C&I/23/55 के लिए बोली" नामक पासवर्ड संरक्षित पीडीएफ प्रारूप में अपनी बोलियां जमा करनी होंगी, जिसमें पासवर्ड संरक्षित पीडीएफ दस्तावेज शामिल है, जैसा कि नीचे दिया गया है . पासवर्ड से सुरक्षित बोलियां बोली जमा करने की तिथि/समय के बंद होने से पहले उल्लिखित ईमेल आईडी पर प्रस्तुत की जाएंगी।/ Bidders are required to submit their Bids in a **Password Protected PDF format**, named as "**Bid for Tender No. NATRAX/PROC/C&I/23/55**" on the **subject of the email, containing Password Protected PDF document**, as given below. The **Password Protected** bids shall be submitted at the mentioned email ID's before the closure of bid submission date/time.

OR

मोहरबंद बोली/कोटेशन तकनीकी बोली और वित्तीय बोलियों वाली हार्ड कॉपी में उपरोक्त तिथि और समय पर NATRAX कार्यालय में एक सीलबंद लिफाफे में भी प्रस्तुत किया जा सकता है। हालांकि, कोविड महामारी से बचने के लिए बोलीदाताओं को इलेक्ट्रॉनिक मोड के माध्यम से बोली/बोली लगाने के लिए प्रोत्साहित किया जाता है/ Sealed Bid/quotation may also be submitted in the hard copy containing Technical bid and financial bids in single sealed envelope at NATRAX office in the aforesaid date and time. However, Bidders are encouraged to Bid/quote



through electronic mode in order to avoid Covid pandemic.

ऑनलाइन बोली प्रस्तुत करने के मामले में, बोली खोलने के समय बोलीदाता द्वारा दस्तावेज़ का पासवर्ड प्रस्तुत किया जाएगा। / In case of online Bid submission, the password of the document shall be submitted by the Bidder at the time of the opening of Bid.

2. बोली खोलना:/ Bid Opening:

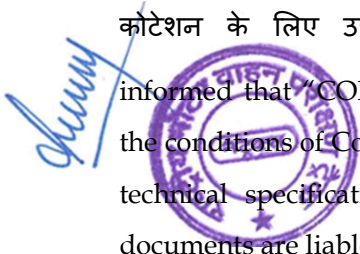
आगे की जांच, मूल्यांकन, रैंकिंग और आदेश देने के लिए बोली लगाने वाले (यदि उपलब्ध हो) की उपस्थिति में NATRAX अधिकारियों की समिति द्वारा बोली खोली जाएगी।/ The bid shall be opened by the committee of NATRAX Officials in the presence of bidder (if available) for further scrutiny, evaluation, ranking & placement of order.

a) तकनीकी बोली मूल्यांकन प्रक्रिया के दौरान, NATRAX बोलीदाता से ई-मेल के माध्यम से या उनके तकनीकी प्रस्तावों की पुष्टि और समेकन के लिए लिखित रूप में स्पष्टीकरण मांग सकता है।/ During the technical bid evaluation process, NATRAX may ask clarifications to the bidder through E-mail or in writing for confirming and consolidating their technical offers.

b) NATRAX द्वारा निर्दिष्ट समय के भीतर ऐसे सभी स्पष्टीकरणों का उत्तर बोलीदाता द्वारा ई-मेल द्वारा दिया जाना आवश्यक है / All such clarifications are required to be answered by the bidder by E-mail, within the time specified by NATRAX.

3. अनुबंध इस निविदा दस्तावेज़ में निर्दिष्ट नियमों और शर्तों द्वारा शासित होगा, जिसमें संशोधन, कार्य आदेश आदि शामिल हैं।/ The Contract shall be governed by the terms and conditions specified in this tender document including amendments, work order etc., .

4. सभी बोलीदाताओं को एतद्वारा स्पष्ट रूप से सूचित किया जाता है कि अनुबंध की शर्तों से "सशर्त प्रस्ताव" या "विचलन के साथ प्रस्ताव", न्यूनतम योग्यता मानदंड, तकनीकी विनिर्देश, या निविदा दस्तावेज़ों में निर्धारित किसी भी अन्य आवश्यकताओं को पूरा नहीं करने वाले कोटेशन के लिए उत्तरदायी हैं। "अस्वीकृत" हो।/ All Bidders are hereby explicitly informed that "CONDITIONAL OFFERS" or "OFFERS WITH DEVIATIONS" from the conditions of Contract, the quotation not meeting the minimum eligibility criteria, technical specifications, or any other requirements as stipulated in the Tender documents are liable to be "REJECTED".



5. बोलीदाता को अपनी तकनीकी सुदृढ़ता का विवरण देना चाहिए और सरकारी विभागों/उपक्रमों/सार्वजनिक/निजी क्षेत्रों/स्वायत्त आदि में समान प्रकृति के पिछले कार्यों के ग्राहकों/ग्राहकों की सूची प्रदान करनी चाहिए/ Bidder should give details of their technical soundness and provide list of customers/client of previous works of similar nature in Government Departments/ Undertakings/ Public / Private sectors/Autonomous etc.,
6. न्यूनतम पात्रता मानदंड: - बोली लगाने वाले को निम्नलिखित दो (ए या बी) में से किसी एक को पूरा करना चाहिए/ Minimum Eligibility Criteria: - The bidder should fulfill either of the following two (A OR B):
- A. बोलीदाता के पास विक्रेता पंजीकरण के तहत NATRAX के साथ वैध पंजीकरण होना चाहिए / The bidder should have valid registration with NATRAX under vender registration.
- Or
- B. बोली लगाने वाले को निम्नलिखित मानदंडों को पूरा करना चाहिए/ The bidder should meet the following criteria:
- i. **Legal valid entity:** - it shall be valid legal entity in form of Proprietor/partnership/LLP/Pvt. Ltd company/Govt. entity/Limited Company/autonomous body etc, and should have valid registration with appropriate governing authority. To supporting this, proof should have to be submitted along with quotation.
- कानूनी वैध इकाई:** - यह प्रोपराइटर/साझेदारी/एलएलपी/प्राइवेट लिमिटेड कंपनी / सरकारी इकाई/सीमित/ कंपनी/स्वायत्त निकाय आदि, के रूप में वैध कानूनी इकाई होगी और उचित शासकीय प्राधिकरण के साथ वैध पंजीकरण होना चाहिए। इसके समर्थन में कोटेशन के साथ प्रमाण प्रस्तुत करना होगा.
- ii. **Turnover:** it should have minimum turnover of **Rs. 5 Lac** during last 3 FY (2019-20, 2020-21, 2021-22), to supporting this, bidder have to submit a copy of balance sheet/CA Certificate clearly indication the turnover and UDIN should also mandatorily mentioned on the same,



along with quotation.

टर्नओवर: इसका पिछले 3 वित्तीय वर्ष (2018-19, 2019-20, 2020-21) के दौरान न्यूनतम टर्नओवर रुपये 5 लाख होना चाहिए। इसका समर्थन करने के लिए, बोली लगाने वाले को उद्धरण के साथ बैलेंस शीट/सीए प्रमाणपत्र की एक प्रति जमा करनी होगी जिसमें स्पष्ट रूप से टर्नओवर का संकेत हो और यूडीआईएन का भी अनिवार्य रूप से उल्लेख किया जाना चाहिए।

iii. **Experience:** it should have minimum 3 years' experience in similar work*/ अनुभव: इसे समान कार्य* में कम से कम 3 वर्ष का अनुभव होना चाहिए।

iv. Similar works* - successfully completed Works pertaining to **"Civil repairing /maintainence work OR civil work including plumbing works"** for any Govt Dept.,/Reputed firm Private Institution/Academic Institutions, copy of valid LOA/Agreement/work order & completion certificate should be submitted with quotation. In case, work order & completion certificate issued by other than Govt. entity, NATRAX reserve the rights to seeking the 26AS or TDS certificate for the relevant period for authenticity of said order & certificates.

समान कार्य*-किसी भी सरकारी विभाग/प्रतिष्ठित निजी फर्म या संस्थान/शैक्षिक संस्थानों के लिए **"सिविल मरम्मत/रखरखाव कार्य या प्लंबिंग कार्य सहित सिविल कार्य"** से संबंधित सफलतापूर्वक पूर्ण किए गए कार्य, वैध दस्तावेज के रूप में एलओए/अनुबंध/कार्य आदेश और पूर्णता प्रमाण पत्र की प्रति होनी चाहिए। कोटेशन के साथ प्रस्तुत किया गया। **कार्य आदेश और पूर्णता प्रमाण पत्र , सरकार के अलावा अन्य संस्था द्वारा जारी किया गया है तो इस मामले में, NATRAX उक्त आदेश और प्रमाणपत्रों की प्रामाणिकता के लिए प्रासंगिक अवधि के लिए 26AS या TDS प्रमाणपत्र प्राप्त करने का अधिकार सुरक्षित रखती है।**

Exemption: valid MSME/Startups registered firms shall be exempted from above B (ii & iii) subject to submission of valid registration certificate and supporting documents for technical competency. In this regard NATRAX Reserve the rights to have interaction with the bidder for understand the technical specification and quality of the work.

छूट: वैध एमएसएमई/स्टार्टअप पंजीकृत फर्मों को ऊपर बी (ii और iii) से छूट दी जाएगी, जो वैध पंजीकरण प्रमाण पत्र और तकनीकी योग्यता के लिए सहायक दस्तावेज जमा करने के

अधीन है। इस संबंध में NATRAX कार्य की तकनीकी विशिष्टता और गुणवत्ता को समझने के लिए बोली लगाने वाले के साथ बातचीत करने का अधिकार सुरक्षित रखता है।

7. **Opening & Evaluation of Quotations:** the bids shall be opened by the committee of NATRAX officials, and shall be evaluated in following mannar:

कोटेशन खोलना और मूल्यांकन करना: बोलियां NATRAX अधिकारियों की समिति द्वारा खोली जाएंगी और निम्नलिखित तरीके से उनका मूल्यांकन किया जाएगा:

7.1. If the bidder is registered vender of NATRAX the quotations shall be accepted for comparission of quoted rates. If bidder is not registered vender of NATRAX than the evaluation shall be done as per below:

यदि बोलीदाता NATRAX का पंजीकृत विक्रेता है तो उद्धृत दरों की तुलना के लिए कोटेशन स्वीकार किए जाएंगे। यदि बोलीदाता NATRAX का पंजीकृत विक्रेता नहीं है तो मूल्यांकन नीचे के अनुसार किया जाएगा:

- i. **First-** the quotations shall be evaluated as per the MEC defined as above 6 (B).

प्रथम- कोटेशन का मूल्यांकन उपरोक्त 6 (बी) के रूप में परिभाषित एमईसी के अनुसार किया जाएगा।

8. The Bidders are expected to carefully examine all the contents of the Tender documents including instructions, conditions, terms, specifications, drawings (if any) and may inspect the Site with prior notice to NATRAX and at Bidders own cost, to acquaint himself with all local conditions, means of access to the work, nature of the work and all matters pertaining thereto & take them fully into account before submitting their offer. Failure to comply with the requirements as detailed in these documents shall be at the Bidder's own risk. Bids which are not responsive to the requirements of the Tender will be rejected.

बोलीदाताओं से निर्देशों, शर्तों, शर्तों, विनिर्देशों, आरेखण (यदि कोई हो) सहित निविदा दस्तावेजों की सभी सामग्री की सावधानीपूर्वक जांच करने की अपेक्षा की जाती है और NATRAX को पूर्व सूचना देकर और बोली लगाने वालों की अपनी लागत पर, सभी स्थानीय चीजों से खुद को परिचित कराने के लिए साइट का निरीक्षण कर सकते हैं। जैसे शर्तें, कार्य तक पहुंच के साधन, कार्य की प्रकृति और उससे संबंधित सभी मामले और अपना प्रस्ताव प्रस्तुत करने से पहले उन्हें पूरी तरह से ध्यान में रखें। इन दस्तावेजों में वर्णित आवश्यकताओं के अनुपालन में विफलता बोलीदाता के अपने जोखिम पर होगी। निविदा की आवश्यकताओं के प्रति उत्तरदायी नहीं होने वाली बोलियों को अस्वीकार कर दिया जाएगा।

9. While all efforts have been made to avoid errors in drafting of the Tender documents, the Bidder is advised to check the same carefully. No claim on account of any errors

detected in the Tender documents shall be entertained.

जबकि निविदा दस्तावेजों के प्रारूपण में त्रुटियों से बचने के लिए सभी प्रयास किए गए हैं, बोली लगाने वाले को सलाह दी जाती है कि वे सावधानीपूर्वक इसकी जांच करें। निविदा दस्तावेजों में पाई गई किसी भी त्रुटि के कारण किसी भी दावे पर विचार नहीं किया जाएगा

10. The Bidder shall carry out all the work strictly in accordance with Specification, Standard Practices and instructions of NATRAX or NATRAX's representative and deviation on any account will not be permitted. If in the opinion of NATRAX, changes have to be made in the design and it desires the Bidder to carry out the same. The decision of NATRAX in such cases shall be final and shall not be open to arbitration.

बोलीदाता विशिष्टता, मानक प्रथाओं और NATRAX या NATRAX के प्रतिनिधि के निर्देशों के अनुसार सभी कार्य करेगा और किसी भी खाते में विचलन की अनुमति नहीं दी जाएगी। यदि NATRAX की राय में, डिजाइन में बदलाव किए जाने हैं और वह बोली लगाने वाले को ऐसा करने की इच्छा रखता है। ऐसे मामलों में NATRAX का निर्णय अंतिम होगा और मध्यस्थता के लिए खुला नहीं होगा।

11. The successful Bidder is bound to carry out associated work necessary for the completion of the job even though such items are not included in the quantities and drawings to achieve end results and deemed to be priced in the other items. No claim on this account shall be entertained.

सफल बोलीदाता कार्य पूरा करने के लिए आवश्यक संबंधित कार्य करने के लिए बाध्य है, भले ही ऐसी वस्तुओं को अंतिम परिणाम प्राप्त करने के लिए मात्राओं और रेखाचित्रों में शामिल नहीं किया गया है और अन्य मदों में मूल्य के रूप में समझा जाता है। इस खाते पर किसी भी दावे पर विचार नहीं किया जाएगा।

12. The successful Bidder should make his own arrangement to obtain all materials required for the work.

सफल बोलीदाता को कार्य के लिए आवश्यक सभी सामग्री की व्यवस्था स्वयं करनी होगी।

13. Addendum / Corrigendum (if required) to the Tender may be issued prior to the date of opening of the Bid to clarify or to intimate any changes/modifications etc. All such addendum / corrigendum shall be treated as an integral part of the Tender.

निविदा के लिए परिशिष्ट / शुद्धिपत्र (यदि आवश्यक हो) को स्पष्ट करने या किसी भी परिवर्तन / संशोधन आदि को सूचित करने के लिए बोली खोलने की तारीख से पहले जारी किया जा सकता है। ऐसे सभी परिशिष्ट / शुद्धिपत्र को निविदा के अभिन्न अंग के रूप में माना जाएगा।

14. Any effort by a Bidder to influence NATRAX or any of its functionaries in the process

of examination, clarification, evaluation and comparison of tenders and in decisions concerning award of contract, may result in rejection of the Bid.

बोली लगाने वाले द्वारा NATRAX या इसके किसी भी अधिकारी को परीक्षा, स्पष्टीकरण, मूल्यांकन और निविदाओं की तुलना और अनुबंध देने से संबंधित निर्णयों की प्रक्रिया में प्रभावित करने के किसी भी प्रयास के परिणामस्वरूप बोली को अस्वीकार किया जा सकता है।

15. In order to afford prospective bidders, reasonable time for preparing their Quotes after taking into account such amendments, NATRAX may, at its discretion, extend the deadline for submission of bids.

संभावित बोलीदाताओं को वहन करने के लिए, इस तरह के संशोधनों को ध्यान में रखते हुए, उनके उद्धरण तैयार करने के लिए उचित समय, NATRAX अपने विवेक से बोलियां जमा करने की समय सीमा बढ़ा सकता है।

16. Information relating to the examination, clarification, evaluation and comparison of bids and recommendations concerning the award of Contract shall not be disclosed to Bidders or other persons not officially concerned with such process.

परीक्षा से संबंधित जानकारी, स्पष्टीकरण, मूल्यांकन और बोलियों की तुलना और अनुबंध प्रदान करने से संबंधित सिफारिशें बोलीदाताओं या अन्य व्यक्तियों को प्रकट नहीं की जाएंगी जो ऐसी प्रक्रिया से आधिकारिक रूप से संबंधित नहीं हैं।

17. NATRAX reserves the right to accept / reject or modify any bids, and to annul the Tender process and reject all quotations, at any time prior to award of Contract, or to divide the Contract between/amongst Bidders without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the grounds for NATRAX's action. Any bidder not following ITB stands rejected.

NATRAX किसी भी बोलियों को स्वीकार/अस्वीकार या संशोधित करने, और निविदा प्रक्रिया को रद्द करने और सभी कोटेशनों को अस्वीकार करने का अधिकार सुरक्षित रखता है, अनुबंध प्रदान करने से पहले किसी भी समय, या बिना किसी दायित्व के बोलीदाताओं के बीच/बीच में अनुबंध को विभाजित करने के लिए प्रभावित बोलीदाता या बोली लगाने वालों या NATRAX की कार्रवाई के लिए प्रभावित बोली लगाने वाले या बोली लगाने वालों को सूचित करने का कोई दायित्व। आईटीबी का पालन नहीं



करने वाले किसी भी बोलीदाता को खारिज कर दिया जाता है

18. **Quoted Rates:** The rate should be quoted both in words and figures on NATRAX prescribed format duly signed & stamped by the Bidder, incase any discrepancy, rate quoted in word will be preferred. All statutory deductions shall be applicable while releasing payments. All corrections and overwriting should be initialed by the Bidder.

कोट की गई दरें: दर शब्दों और अंकों दोनों में NATRAX निर्धारित प्रारूप पर बोली लगाने वाले द्वारा विधिवत हस्ताक्षरित और मुहर लगी होनी चाहिए, किसी भी विसंगति के मामले में, शब्द में उद्धृत दर को प्राथमिकता दी जाएगी। भुगतान जारी करते समय सभी वैधानिक कटौतियां लागू होंगी। सभी सुधारों और ओवरराइटिंग पर बोलीदाता द्वारा आद्याक्षर किया जाना चाहिए।

- a) The bidder needs to fill the rates against each item in word as well as in figures as mentioned in BOQ (Financial bid). In case of any discrepancy, the rate provided in word shall prevail and correct the amount against the item. All the prices should be inclusive of all taxes and GST.

बोली लगाने वाले को बीओक्यू (वित्तीय बोली) में उल्लिखित प्रत्येक वस्तु के सामने शब्दों के साथ-साथ अंकों में दरें भरने की आवश्यकता है। किसी भी विसंगति के मामले में, शब्द में प्रदान की गई दर प्रबल होगी और मद के लिए राशि सही होगी। सभी कीमतें सभी करों और जीएसटी सहित होनी चाहिए।

- b) The amount stated in the Letter to Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, the bid will be rejected.

लेटर टू बिड में बताई गई राशि त्रुटियों के सुधार के लिए उपरोक्त प्रक्रिया के अनुसार नियोक्ता द्वारा समायोजित की जाएगी और बोली लगाने वाले के लिए बाध्यकारी मानी जाएगी। यदि बोलीदाता बोली की सही राशि को स्वीकार नहीं करता है, तो बोली को अस्वीकार कर दिया जाएगा

19. **Contract negotiations:** If required, NATRAX reserve the right to negotiate with the bidder before the issuance of work order/Letter of Acceptance/ Notification of Award. The negotiation shall conclude with a revised offer letter from the successful



bidder, affecting the discounts if any and accepted by NATRAX.

अनुबंध वार्ता: यदि आवश्यक हो, तो NATRAX कार्य आदेश जारी करने/स्वीकृति पत्र/अवार्ड की अधिसूचना जारी करने से पहले बोली लगाने वाले के साथ बातचीत करने का अधिकार सुरक्षित रखता है। बातचीत सफल बोलीदाता से संशोधित प्रस्ताव पत्र के साथ समाप्त होगी, यदि कोई छूट हो तो उसे प्रभावित करेगी और NATRAX द्वारा स्वीकार की जाएगी।

20. **Award of Work:** Prior to the expiry of the period of Bid validity prescribed, NATRAX will issue to the Successful Bidder, the Work Order. The Successful Bidder shall return one copy of the Work Order to NATRAX duly acknowledged and signed by the authorized signatory, within two [2] days of receipt of the same by him.

कार्य प्रदान करना: निर्धारित बोली वैधता की अवधि समाप्त होने से पहले, NATRAX सफल बोलीदाता को कार्य आदेश जारी करेगा। सफल बोलीकर्ता कार्य आदेश की एक प्रति उसके द्वारा प्राप्त होने के दो [2] दिनों के भीतर अधिकृत हस्ताक्षरकर्ता द्वारा विधिवत स्वीकृत और हस्ताक्षरित NATRAX को वापस कर देगा।

21. **Validity of bids: / बोलियों की वैधता:** The rate quoted should be valid for a minimum period of 60 days from the last date of Submission of Quotation. No claim for escalation of rate will be considered at any point of time./ उद्धृत दर कोटेशन जमा करने की अंतिम तिथि से कम से कम 60 दिनों की अवधि के लिए वैध होनी चाहिए। दर में वृद्धि के किसी भी दावे पर किसी भी समय विचार नहीं किया जाएगा

22. Bidders requiring any clarification of the Tender may write to a.prabhakar@natrip.in; anuj.kumar@natrip.in, / निविदा के किसी भी स्पष्टीकरण की आवश्यकता वाले बोलीदाता a.prabhakar@natrip.in anuj.kumar@natrip.in,को लिख सकते हैं;

The Bids / related correspondences shall be made in English language.

23. **Special Terms & Conditions/ विशेष नियम एवं शर्तें:**

a.	Scope of work / कार्य का वर्णन	Repairing works in canteen building at NATRAX Pithampur (M.P.)
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Tender No. -NATRAX/PROC/C&I/23/55

b.	Time for Completion of Work/ कार्य पूर्ण होने का समय	Within 30 days from the date of Issue of NTP, failing which LD of 0.1% per day Maximum by 10% of contract value shall be deducted from payment, by NATRAX.
c.	The Defects Rectification Period	Six months.
d.	Engineer In charge (EIC)/ प्रभारी अभियंता (ईआईसी)	Shall be notified to successful bidder.
e.	Payment, Mode and Retention/ भुगतान, मोड और प्रतिधारण	<ul style="list-style-type: none">• 90% of completed and certified value of executed work will be paid towards RA bill on receipt of original tax invoice.• Remaining payment shall be released on completion of DLP/Warranty period of 6 months.• Payment will be made on actual measurement basis• Payment shall be processed only after due certification by Engineer-in-Charge.• Payments shall be made within 15 days from the submission of tax invoice at site.• The GST/Taxes & duties of Govt. will be reimbursed on actual basis upon the submission of original receipt / documentary evidence.• All the payments shall be made through RTGS only.
f.	Electricity/ बिजली	Free of cost
g.	Insurance / बीमा	Labour Insurance
h.	Project Facility / Place of Installation/delivery परियोजना सुविधा / स्थापना / वितरण का स्थान	NATRAX NH-52, Old Agra- Mumbai Highway, Near to Pithampur Flyover, Post Khandwa (Near Pithampur), Dhar District, Madhya Pradesh-454774
i.	Safety / सुरक्षा	Safety of labour and supervisors shall be in the scope of contractor.
j.	Tools, Tackles, Scaffolding, tools & other arrangements उपकरण, टैकल, मचान, उपकरण और अन्य व्यवस्थाएँ	Arranged by Vender
k.	Maximum Liquidated Damages	Maximum 10% of the final Contract Price.



Tender No. -NATRAX/PROC/C&I/23/55

l.	Variation quantities	of	This tender is based upon the drawings enclosed with technical specifications and BOQ. NATRAX reserves the right to vary any individual item to any extent either positive or negative within the scope of work as defined. The decision as to items are within the scope of work shall be of NATRAX which is final & binding. Therefore, in case of variation in quantity as given in BOQ either positive or negative no rate revision is applicable.
m.	Valuation Changes	of	New Rate or Price shall be derived from any relevant rates or prices in the Contract. New rate or price shall be derived from the MP SOR for building work 2022 & latest MPSOR for Road & Bridges rates and MPSOR 2022 for Electrical Works(E&M) which ever applicable. In case the rates are not available in MP SOR for building work 2022 & latest MPSOR for Road & Bridges rates and MPSOR 2022 for Electrical Works(E&M) rates, the same shall be derived from the competitive market quotes. The contractor's profit and overheads together shall be taken as 10% only.
n.	Mode of Payment		<i>By account Payee Cheque, payable at par or RTGS/NEFT</i>
o.	Currency of Payment		Indian Rupees Only.
P.	Taxes		The rates quoted by the contractor shall be deemed to be inclusive of the Goods and Service Tax (GST)
q.	Integrity Pact		An Integrity pact on the stamp paper of Rs. 100/- shall be signed by bidder on issuance of work order.

24. The bidder should give the following, duly signed and sealed, failing to which the bids will be summarily rejected:/ बोली लगाने वाले को विधिवत हस्ताक्षरित और मुहरबंद निम्नलिखित देना चाहिए, जिसके विफल होने पर बोलियों को सरसरी तौर पर खारिज कर दिया जाएगा:

25. **DECLARATION:**




(To be executed on Bidder's letter head)

I/We having acquainted with the content & requirement of this Tender No. NATRAX/-----
-----, dated _____ and do hereby accept to furnish the same in compliance



Tender No. -NATRAX/PROC/C&I/23/55

with all terms & conditions. I/we have not tampered/modified the tender in any manner and breach of any such, will result in rejection of Tender and / or prosecuted.

I / We hereby declare that the firm/company has not been blacklisted or debarred in the past by any other Government organization from taking part in Government tenders.

In case the above information found false or in case of breach of any of terms and conditions at any stage of Tender or Contract, I/We are fully aware that the Tender/ Contract will be rejected / cancelled by NATRAX and Payments (for completed/partially completed), Retention, Bid Security (EMD), Performance Security, etc., shall be forfeited.

Signature of the Bidder: _____

Name and Designation: _____

Address: _____

Contact details: _____

Place:

Date:

Seal of the Bidder's Firm

25. घोषणा:

(बोलीदाता के लेटर हेड पर निष्पादित किया जाए)

मैं/हम इस निविदा संख्या NATRAX/-----

-----वाय मुकाबले संबंध में विषय-वस्तु

और आवश्यकता से परिचित हो गई हूं/हैं और एतद्वारा सभी के अनुपालन में इसे प्रस्तुत करने के लिए

स्वीकार करती हूं/करते हैं। नियम एवं शर्तें। मैंने/हमने किसी भी तरीके से निविदा में कोई छेड़छाड़/संशोधन

नहीं किया है और ऐसा किसी भी उल्लंघन के परिणामस्वरूप निविदा को अस्वीकार कर दिया जाएगा

और/या मुकदमा चलाया जाएगा।

में/हम एतदद्वारा घोषणा करते हैं कि फर्म/कंपनी को पूर्व में किसी भी अन्य सरकारी संगठन द्वारा सरकारी निविदाओं में भाग लेने से काली सूची में नहीं डाला गया है या प्रतिबंधित नहीं किया गया है।

यदि उपरोक्त जानकारी झूठी पाई जाती है या निविदा या अनुबंध के किसी भी चरण में किसी भी नियम और शर्तों के उल्लंघन के मामले में, मैं/हम पूरी तरह से जानते हैं कि NATRAX द्वारा निविदा/अनुबंध को अस्वीकार/रद्द कर दिया जाएगा और भुगतान (पूर्ण/ आंशिक रूप से पूर्ण), प्रतिधारण, बोली सुरक्षा (ईएमडी), प्रदर्शन सुरक्षा, आदि को जब्त कर लिया जाएगा।

बोलीदाता के हस्ताक्षर: _____

नाम और पदनाम: _____

पता: _____

संपर्क विवरण: _____

स्थान:

तारीख:

बोली लगाने वाले की फर्म की मुहर




ANNEXURE - II/ अनुबंध - II

DETAILED TECHNICAL SPECIFICATIONS FOR CIVIL & STEEL STRUCTURE WORK

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1. EARTH WORK
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12. ALUMINIUM STRUCTURAL GLAZING & CLADDING WORK
13. ALUMINIUM WINDOWS & VENTILATORS
14. M.S. GRILLS/RAILING
15. FLASE CEILING WITH GYPBOARD AND G.I. F



DETAILED TECHNICAL SPECIFICATION

1.EARTH WORKS

SITE PREPARATION

1.1 Site Investigation

The contractor shall carefully examine the site and make all inspections necessary in order to determine the full extent of the work required making the completed work conform to the drawings and specifications. The contractor shall satisfy himself as to the nature and location of the work, conditions, the conformation and condition of the existing ground surface, and the character of the existing ground surface.

1.2 Site Clearance

The site shall be cleared of rubbish / debris of all kinds, loose rocks, small trees, not exceeding 30 cm in girth (measured at one meter above ground level), shrubs, stumps, grass, brush wood, undergrowth and any other vegetation, superficial earth etc.as directed by the Engineer-in-Charge. The site clearance shall be done twenty meters around the periphery of the proposed construction. Such site clearance shall be done in advance of the earth work and excavation operations and shall not be paid for. All materials arising from site clearance shall be the property of the Corporation and shall be disposed off by the Contractor at his own cost, as herein provided. All serviceable materials shall be temporarily stacked in separate lots at the site, at places as directed by the Engineer-in-Charge.

1.3 Site Grading

The levels and measurement of the existing site, as shown on the drawings are believed to be correct but the contractor shall verify them and also examine the nature of the ground as no claim or allowance whatever will be entertained thereafter on account of any errors or omissions in the levels of the description of the ground turning out different from that expected or shown on the drawings. Existing surface, after removal of all unwanted and unsuitable material shall be graded to the levels and slopes indicated in the contract drawings. Such grades and levels shall facilitate the intent of design

1.4 Existing utilities

Where existing utilities are encountered and found to interfere with the construction activity in this contract, they shall be removed if not required to be maintained or relocated to avoid interference or protected, supported and maintained during the construction phase, the exact dependent on the instruction of the Engineer.

1.5 Disposal

All rubbish and unwanted materials including unusable soil as they accumulate from time to time during the progress of the works and at completion including that of subcontractors shall be cleared and carted away and all materials condemned by the Engineer are to be removed from the works, within forty eight hours.

1.6 Classification of soils

All materials encountered in excavation will be classified in the following groups irrespective of mode of excavating the materials and the decisions of the Engineer-in-Charge in this regard shall be final and binding to the contractor.

Classification of Soils

1.6.1 Ordinary Soil - Generally any material which yields to the ordinary application of shovel like turf, sand, loam, soft shale, mixture of sand & clay or any mixture of these soils.

1.6.2 Hard Soil - Material requiring the application of pick such as stiff clays mixed with moorum etc.

Soil Mixed with Boulders - This shall consists of moorum, gravel or hard clay intercepted with boulders not larger than 30 cm cube which in the opinion of Engineer-in-charge do not require blasting and which shall be removed by iron, bars and shovel.

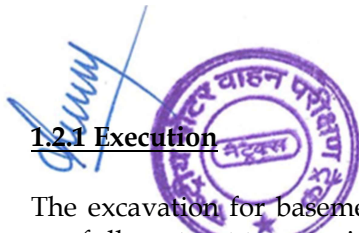
1.6.7 Black Cotton Soil- Black Cotton Soil is dangerous for buildings on accounts of its volumetric changes with the change of atmospheric conditions. It swells excessively when wet and shrinks excessively when dry. This soil has a great affinity for water. The differential settlement of the structure, caused by the moment of ground on account of alternate swelling and shrinkage, results in formation of cracks. The cracks thus formed are some times 15 to 20 cm. wide and 2.5 to 4 m deep.

1.2. EXCAVATION

The contractor shall notify the Engineer-in-charge before starting excavation and before the ground is disturbed, to enable him to take existing level for the purpose of measurements. The ground levels shall be taken at 5 to 15 metres intervals in uniformly sloping ground/Natural Ground and at distance where local mounds, pits, or undulations are met with, as directed by the Engineer-in-charge. The ground levels shall be recorded in field books and plotted on plans, which shall be signed by the Contractor and the Engineer-in-charge, before the earthwork is actually started and a copy of the same shall be submitted to NATRAX . be described as excavation over areas. Excavation exceeding 1.5m in width as well as 10sqm. on plan but not exceeding 30cm. in depth shall be described as surface Excavation.

1.2.1 Execution

The excavation for basements, foundations, footings, trenches, pavings, walkways, etc shall be carefully got out to net width and depth as shown on the drawings. "Battering" or "Benching" to the sides of excavation shall have the prior approval of the Engineer. Extra excavation (i.e.



excavation beyond the limits required by the drawings), carried out without prior approval of the Engineer will not be measured and such extra excavation will be filled in at the contractor's expenses with concrete (mix specified by the Engineer) well rammed in position and brought upto the required level. Any water that may accumulate in the excavation, due to any cause, is to be bailed or pumped out. Adequate pumping or other facilities shall be employed to keep all the excavations clear of water constantly, glare any damage to buildings or other property or cause inconvenience in the property. The contractor shall take care to avoid damage to water mains or other underground utilities pipes cables, etc. during excavation work; when met with during excavation, they should be properly supported. level.

1.2.2 Excavation in all sorts of soils & murram

The item shall include dry or wet excavation and removal of excavated material and its stacking and disposal in a manner hereinafter specified. The water met with if any shall be bailed or pumped out by the contractor as necessary at his own cost. The contractor shall provide all materials and all labour necessary for the excavation and completion of the works in accordance with the drawings and specifications and the intent there of. The contractor shall provide necessary protection to labour, materials equipment etc. to ensure safety against risk and accident. The ISI standard in this regard shall be followed (IS : 3764-1966). The contractor shall be liable to pay compensation for injury to life, and damage to property, if any,

1.2.9 Surplus Excavated Material

The Contractor shall be responsible for making all arrangements for the disposal of surplus excavated material arising on any part of the Site to the place as directed by the EIC

1.2.10 Fencing / lighting

The contractor shall make all proper provisions for protecting the work by fencing and by watching and lighting at night, or otherwise as may be directed by the Engineer-in-Charge. In the event of contractor not fully complying with the provisions of fencing, lighting, watching the Engineer may with or without notice to the contractor put up a fence, improve the lighting and adopt such other measures as he may deem necessary for the safety and all costs of such works including penalty to the contractor. The contractor shall also provide and display special boards painted with fluorescent paints indicating the progress of the work.

1.4 FILLING OPERATIONS

1.4.1 Backfill material-Excavation Material

Excavated material used for backfilling, shall be free from debris or other contamination, shall be suitably graded to obtain the required compaction and shall not contain stones, rock or concrete fragments larger than 10cm in the largest dimension. Two thirds of the backfill shall consist of well graded material not exceeding 3 cm in the largest dimension.

1.4.2 Importing Material

Where material from excavation is neither adequate in quantity nor satisfactory in quality, backfill material may be imported. Borrow pits for this purpose shall be identified by the contractor in the vicinity of the site approval from the Engineer - in - Charge shall be obtained for the satisfactory quality of the material. Borrow material used for backfilling shall be sound, clean,



uncontaminated granular material free from organic and deleterious material and shall not contain more than 10 percent by weight of clay or silt, individually or in combination.

1.4.3 Execution Deposition of fill

Fill materials shall be deposited in layer of not more than 20 cm in loose thickness for compaction by heavy equipment and not more than 12 cm loose thickness for hand compacted fill, so as to meet suitable extent of compaction. The contractor is responsible for the arrangement and payment for all embankment material and the material selected shall meet the approval of the Engineer - in - Charge.

1.4.4 Backfilling of trenches

No backfilling shall be carried out until all debris and other objectional materials have been removed from the trench and until the Engineer - in - Charge has inspected and approved the pipe installations and bedding. Backfilling shall be carried out in layers as defined below and in such a way that it does not disturb alignments, grades or stability of pipes. Backfilling shall only be carried out with approved materials.

1.4.5 Backfilling around structures and foundations

Backfilling around completed foundation and wall shall be done to the line and level shown on the drawing. This will be done with selected and approved earth from excavation material approved by Engineer-in-Charge. Backfilling around liquid retaining structure shall be done only after testing of structures against leakage and approval by Engineer-in-Charge. No separate payment will be made for backfilling. Rate quoted for excavation should include backfilling also.

1.4.6 Filling in foundations

Sub grades for concrete slabs shall be sand or gravel which have been tamped such that it is well compacted. The finish shall be with a 3cm tolerance when measured with a 3 m straight edge in any direction or location.

2. CONCRETE WORKS

General

This section covers the requirements for concrete works and placing procedures, finishing and curing procedures for both cast-in-site and pre-cast cement concrete and including reinforced concrete. The Engineer strictly requires that at no time whatsoever will the mixer operator or those supervising or inspecting the works be permitted to alter the quantity of water specified by the Engineer of mixing the concrete. Batching shall be accurate and as specified by the Engineer.

2.1 Water / Cement Ratio : The water/cement ratio will be determined after mix trials by the Contractor in the presence of the Engineer or his Representative. If batching is by volume, the Contractor shall be required to fabricate such volumetric batchers and water containers as the Engineer may determine and require so as to simulate the ideals of the trial mix without recourse to assessments by site staff and workmen.

2.2 Weighing : The Contractor shall make available always a weighing machine if so required by these documents, guaranteed by the Contractor for its accuracy, for weighing cement and batches of aggregate as and when the Engineer or his Representative or his assistant may require. The



machine shall be capable of weighting up to 75 Kilograms and shall be accurate to half (+0.5) Kilogram.

2.3 Compaction : All concrete shall be thoroughly compacted and fully worked around the reinforcement by vibration just sufficiently so that the appearance of laitance is kept to a minimum and in such manner as directed by the Engineer's Representative. Under no circumstances shall concrete be compacted by trowels or the like.

2.4 Transport and Placing : Fresh concrete from the mixer shall be transported to formwork where required by the quickest and most efficient means so as to prevent pre-set or segregation or any loss of ingredients and maintaining the required workability. Any laitance from previous mixes shall be removed.

2.5 Testing of Materials

Materials shall be tested as hereinafter specified and unless specified otherwise all sampling and testing shall be performed by Employer-approved Testing Laboratory, at the Contractor's expense.

2.6 Cement : Cement shall comply with the requirements of IS : 269, IS : 8041, IS : 455, IS : 8112, IS : 8043, IS : 6909 IS 1489, IS : 12269. The testing laboratory at the discretion of the Engineer, shall perform such tests as are deemed necessary. Cement bags or bulk silos shall be tagged for identification at location of sampling. Tests will include tensile tests and weighing the cement supply to check for net weight received at site and used in the works.

2.6.1. On arrival at the site, cement shall be stored in weather proof silos designed for the purpose or in dry weather - tight and properly ventilated structures with floors raised 15 to 20 cm above ground level, 30 cm away from walls and with adequate provision to prevent absorption of moisture or flooding. All storage facilities shall be subject to approval by the Engineer and shall be such as to permit easy access for inspection and identification. Each consignment of cement shall be kept separately and the Contractor shall use the consignments in the order in which they are received. Any cement in drums or bags which have been opened shall be used immediately. Different types of cement shall be kept in clearly marked separate storage facilities. Not more than 15 bags shall be stacked vertically in one pile. Cement shall be stored in double locking arrangement, so that cement transactions can be with the knowledge of supervisory staff. Daily account of cement shall be maintained by Contractor in the prescribed register and shall be made available to inspecting authorities for store verification.

2.6.2. The Contractor shall provide from each consignment of cement delivered to the site such samples as the Engineer may require for testing. Any cement which is, in the opinion of the Engineer, lumpy or partially set shall be rejected and the contractor shall promptly remove such cement from the site.

2.6.3. Cement which has been stored on the site for more than ninety (90) days and cement which in the opinion of the Engineer is of doubtful quality shall not be used in the works until it has been retested and test sheets showing that it complies in all respects with the relevant standard have been delivered to the Engineer.

2.7 Water for Concrete Mixing & Curing : Water shall be clean, reasonably clear and free from injurious quantities of salt, traces of oil, acids, alkalis, organic matter and other deleterious materials. The sources of water shall be approved by the Engineer and the containers for conveyance, storage and handling shall be clean. If necessary, standard cement tests shall be

conducted using the water intended to be used, in comparison with those adding distilled water to check quality of water. Water shall meet the requirement of 4.3 of IS 456 - 78. Generally potable water is fit for mixing and curing.

2.7 Aggregate

The fine and coarse aggregates shall be measured separately either by volume in gauge boxes made as hereinafter specified or by weight using machines with weighbatching attachments. For high grade concrete the fine aggregate shall be measured singly or cumulatively by weight. The Engineer will rule on this requirement.

2.7.1 Aggregates for Concrete

Aggregates shall comply with the requirements of IS : 383 : 1970

2.7.2 Fine Aggregate : Sand for concrete work shall be clean, well graded and shall consist of strong, dense, durable gritty particles, free from veins injurious amounts of disintegrated pieces, alkali, vegetable matters and other deleterious substances and shall be approved by the Engineer. Maximum size of particle shall be restricted to 5 mm minimum being 0.15 mm.

2.7.3 Coarse Aggregates

The coarse aggregate shall generally be cubical in shape broken generally from best trap granite / quartzite / gneiss stones as available and generally used in the region. It shall be hard, strong, dense, durable, clean and of proper gradation, veins, free from skin and coatings and weathered aggregates shall not be permitted for use. The maximum size of coarse aggregate shall be as large as possible but not greater than 1/4 of the minimum thickness of concrete member provided that in case of R.C.C. the size presents no difficulty to surround the reinforcement thoroughly and fill up the corners properly. In plain cement concrete, the maximum size may be 80mm subject to above limitations in absence of any special provisions. For heavily reinforced beams the maximum size shall be restricted to 5 mm less than minimum lateral distance between the bars. Generally for R.C.C. works 20 mm nominal size of aggregate shall be satisfactory. Aggregates will be tested before and after concrete mix is established and whenever character or source of material is changed. Tests will include a sieve analysis to determine conformity with limits of gradation.

2.6.7.1. Samples of aggregates 50g. in weight will be taken by the Contractor at source of supply and submitted to the Engineer before placing orders. These samples if approved shall remain preserved in the Engineer's care for reference and the type of aggregate used in the works may not be altered without the Engineer's prior approval.

2.6.7.2. Aggregates shall be obtained from an approved source and shall conform to the requirements of IS : 383. For fine aggregate grading in table of IS : 383 : 1970 shall be applicable. Aggregates shall not be flaky scoriaceous or elongated particles, defined as particles having a maximum dimension greater than five times the minimum dimension. Aggregate shall have a water absorption not exceeding two percent when tested in accordance with IS.

2.6.7.3. The Contractor shall sample and carry out analysis in the presence of the Engineer's representative, of the fine aggregate and each nominal's size of coarse aggregate in use employing the methods described in IS : 383 and 2386 at least once in each week when concreting

is in progress and at such more frequent intervals as the Engineer may require. The grading of all aggregates shall be within the respective limits specified in the codes, aggregate vary more than IS from the approved fineness mouldes, the Engineer may instruct the Contractor to alter the relative proportions of the aggregates in the mix to allow for such difference, or may require further trial mixes.

2.6.7.4. Storage of aggregates shall be provided at each point where concrete is made such that each nominal size of coarse aggregate and the fine aggregate shall be kept separated at all times. Contamination of the aggregates by the ground or other foreign matter shall be effectively prevented at all times, and each heap of aggregate shall be capable of draining freely. The Contractor shall ensure that graded coarse aggregates are dumped, stored and removed from store in a manner that does not cause segregation.

2.6.7.5. Wet fine aggregate shall not be used until, in the opinion of the Engineer, it has drained to a constant and uniform moisture content, unless the Contractor with the knowledge of the Engineer measure the moisture content of fine aggregate and adds water in each batch of concrete mixed to allow for the water contained in the fine aggregate.

2.8 Classes of concrete

All cement concrete whether used in R.C.C. work or plain cement concrete work shall be designed in grades (by strength at the age of 28 days). M10, M15, M20 and M25 Where M refers to the mix and the number 10, 15 20 and 25 represent the specified 28 days works cube compressive strength of the mix under reference, expressed in N/mm³. The proportions of cement, aggregate water for ordinary cement concrete shall be as per relevant standard. The cement concrete shall be tested for compressive strength at the age of 28 days of 15 cm. cubes in accordance with the latest IS : 516.

2.9 Strength requirement of Concrete

Grade of concrete in all RCC work shall not be less than M20 with a minimum cement content of 432 Kg/Cu.m and with a maximum water cement ratio of 0.45. For quick result the contractors shall carry out compression tests on representative 15 cm cubes cast in accordance with relevant IS 516 at 7 days in addition to the normal 28 days compressive strength. However, the 28 days compressive strength alone shall be the criteria for acceptance or rejection of the concrete. Suitable water cement ratio for the different mixes an use shall be determined in consultation with the Engineer and shall generally not be exceeding 0.45 (i.e 4 percent by weight). The exact value being fixed after taking into account all relevant factors such a strength required, weather condition, water absorbed material, workability and slump required consistant with the work requirements, methods of compaction, etc.

2.10 Admixtures : Admixtures shall mean material added to concrete materials during mixing for the propose of altering properties of normal concrete mixes. If NATIS recommends to use admixtures the contractor shall first obtain the written permission of the Engineer in-charge. The methods of use and the quantities of use shall be subject to the approval of the Engineer in Charge. The methods of use and the quantities of admixture used shall subject to the Engineer's approval, which approval or other shall in no way limit the Contractor's obligations under the contract to produce concrete with the specified strength and workability. Concrete of any class containing an admixture shall be separate designed and have separate preliminary tests and trial mixes and tested for approval by the Engineer as if it were a separate class of concrete.

2.11 Concrete Mix Design

Procedure for designing concrete mixes shall be as per IS : 10262 - 82. Recommended guidelines for concrete mix design.

2.12 Mix Design

Mix design is normally a prerequisite to any concreting job and will be required on all major works. If required by the Documents, an approved testing laboratory shall, at the contractor's expense, design a mix for each class of concrete and shall submit full details of the mix designs to the Engineer for his approval. The Engineer's representative and the Contractor shall clearly code each approved mix with a number and date, and file all details for identifying and reproducing exactly the same mix.

Each mix design shall be such that the aggregate shall comprise fine aggregate and coarse aggregate of the size specified and the combined aggregate grading shall be continuous. Aggregate shall be calculated by weight, and batching procedures shall be established. The cement content by weight shall not be outside the minimum and maximum limits calculated from the minimum and maximum dry aggregate to cement ratios. The mixes shall be designed to produce an average concrete strength at twenty-eight days after manufacture not less than trial mix test strength specified. The water/cement ratio shall be in the region of 0.45 to 0.55 and shall never exceed 0.60.

The proportions of cement, aggregate water determined by the Contractor in his mix design shall be preliminary mix of concrete made and tested for strength work-ability under laboratory conditions observing the appropriate requirements. These preliminary mixes shall be repeated adjusted proportions as necessary until concrete mixes meeting requirements of the preliminary and trial mix tests specified with the workability defined herein have been produced. If at time during construction of the works, the source of cement aggregates is changed, or the grading of the aggregate alters, further preliminary mixes shall be undertaken.

After the Engineer's approval the preliminary concrete design for each class of concrete and during or following carrying out of the preliminary tests the Contractor shall prepare a trial mix of each class in the presence of the Engineer. The mixes shall be mixed for the same time and handled by means of same plant that the Contractor proposes to use in the works proportion of cement, aggregates and water shall be care determined by weight in accordance with the approved mix (or modified mix design after preliminary tests) and sieve analysis shall be made, by approved methods of the fine aggregate and nominal size of coarse aggregate used.

2.24 Binding : As ordered by the Engineer, or as shown on the drawings the formation surfaces on which concrete is to be placed shall be covered with either blinding concrete not less than 75 mm thick, or waterproof building paper, or polythene sheeting immediately after completion of the final trimming of the excavation.

2.25 Inspection

Concrete shall not be placed until the Engineer has inspected the formwork and the reinforcing steel, and taken necessary measurements of the latter, and has approved the surfaces upon which the concrete is to be placed.

2.26 Transporting : Fresh concrete shall be transported from the mixer to its place in the works as quickly and as efficiently as possible by methods which will prevent pre-set or segregation. If



segregation has nevertheless occurred in any instance the materials shall be remixed or discarded at the option of the Engineer.

2.26 Placing : Fresh concrete shall be placed and compacted before initial set has occurred and, in any event, not later than thirty minutes from the time of mixing. Concrete shall be carefully placed in horizontal layers which shall not be allowed to slide or flow down sloping surfaces but shall be placed in its final position from skips, or similar devices. If this is impracticable, it shall be shovelled into position care being taken to avoid segregation. No concrete shall be dropped more than 1.5 m. If greater drops are necessary approved chutes may be used. If the concrete abuts against earth or any other material liable to become loose or to slip, care shall be taken to avoid falls of materials on to the surface of the wet concrete. As far as possible concrete for any particular portion shall be done in one continuous operation leaving construction joints, if specified by drawing. Before commencing subsequent concrete on the one left incomplete all the loose particles, laitance etc. shall be removed and surface shall be covered with thick cement slurry. The concrete compacted manually shall be laid in layers not more than 15 to 20 cm. The successive layer shall follow within 30 minutes or earlier.

2.28 Compaction

All concrete placed in-situ shall be compacted with power drive or pneumatic internal type vibrators unless otherwise approved by the Engineer in writing, and shall be supplemented by hand spading and tamping where required. Vibrating screen type vibrators may be used for thin slabs. There shall be sufficient and spare vibrators of adequate capacity to compact the work in hand.

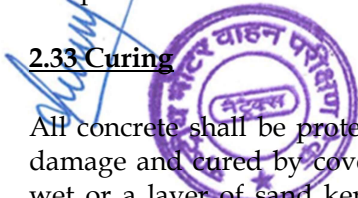
2.29 Vibration : Vibrators shall be inserted into the uncompacted concrete vertically and at regular intervals. Where the uncompacted concrete is in a layer above freshly compacted concrete the vibrator shall be allowed to penetrate vertically for about 75 mm into the previous freshly compacted layer. The vibrators shall not be allowed to come into contact with the reinforcement or formwork nor shall they be withdrawn weekly from the mass of concrete but shall be drawn back slowly while in motion so as to leave no voids. Internal type vibrators shall not be placed in the concrete in any arbitrary manner nor shall concrete be moved from one part of the work to another by means of the vibrators. The vibrators shall have minimum 3600 (and preferably 5000) impulses per minute.

2.30 Duration : The duration of vibration shall be limited to that required to produce satisfactory compaction of the concrete without causing segregation. Vibration shall on no account be continued after the appearance of water or grout on the surface.

2.31 Hand Compaction : This shall be permitted exceptionally for small jobs by the Engineer. In such cases, compaction shall be attained by means of rodding, tamping, ramming and slicing with suitable tools. The thickness of concrete layers will also be suitably reduced when hand compaction is resorted to.

2.33 Curing

All concrete shall be protected from the effects of sunshine, rain, running water or mechanical damage and cured by covering with jute, hessian or similar absorbent material kept constantly wet or a layer of sand kept covered with water is also permissible for a continuous period of fourteen days at least from the date of placement. Should the Contractor fail to water concrete



continuously, the Engineer may provide labour, materials required for watering and recover the cost from the Contractor.

2.34 Finishing

Immediately after removal of forms any undulations, depressions, cavities, honey combing, broken edges or corners high spots and defects shall be made good and finished with cement mortar 1:2 but the necessity of such finishing must be exceptional and total surface requiring finishing shall not exceed 1%. Where concrete surface is to receive plaster, the surface shall be roughened immediately after removal of forms and within a day thereof to secure a hold for the plaster. The rate of concrete is inclusive of this roughening and finishing. Concrete after finishing shall be cured for the full period. The concrete surfaces, where plastering is not required shall be finished to smooth surface with a carbarndum stone rubbing as required by the engineer.

2.35 Joints

Construction joints are defined as joints in the concrete introduced for convenience in construction at which special measures are taken to achieve subsequent continuity without provision for further relative movement.

2.42 Submittal : No concreting shall be started until the Engineer has approved the method of placing, the positions and form of the construction joints and the size of lifts.

2.36 Jointing : The face of a construction joint shall have all laitance removed and the aggregate exposed prior to the placing of fresh concrete. The laitance shall wherever practicable be removed by spraying the concrete surface with water under pressure and brushing whilst the concrete is still green. Where the laitance cannot be removed whilst the concrete is green, the while of the concrete surface forming part of the joint shall be hacked to expose the aggregate. Where aggregate is damaged during hacking, it shall be

removed from the concrete face by further hacking. All loose matter shall be removed and the exposed surface thoroughly cleaned by wire brushing, and washing down, and the surface to which fresh concrete is applied shall be lean and damp.

2.37 Expansion Joints

Expansion joints are defined as joints intended to accommodate relative movement between adjoining parts of a structure special provision being made where necessary for maintaining the water tightness of the joint.

A. The joint location and type will be as indicated in the drawing.

B. Jointing : The surface of set concrete shall not be disturbed and concrete shall be placed against the dry finished surface.

2.39 Protection of Concrete

Concrete placed below ground level shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances, shall be kept free from contact with such ground and with water draining there during placing for a period of three days or as otherwise instructed thereafter. No load of any kind, however light, shall be allowed on concrete which has not adequately set,



and unless it has been pronounced fit by the Engineer. Immediately after the compaction of the concrete has been completed contractor shall ensure that it is adequately protected from the weather. Protective materials shall be kept continuously damp and in position for a minimum period of fourteen days or such other time as the Engineer may direct. Where large sections of concrete are poured special precautions as approved by the Engineer shall be taken to reduce and dissipate the heat generated by the setting and hardening of the concrete.

The contractor shall set up a mini lab for conducting cube strength etc. The contractor shall provide such details along with the tender.

3. REINFORCEMENT

Reinforcement shall be FE 500 as per the requirement as indicated and specified. Supply and delivery of reinforcing bars and mesh, bending, wire brushing and cleaning, steel fixing and the attendance of the fitter during concreting, to inspect fixed reinforcing bars and maintain bars in correct position at each locations. Whenever mention of I.S. codes is made, the latest editions thereof shall be applicable. All continuous inspections shall be performed by the Engineer's representative or his authorised assistant or a specialist called by the Owner or the Engineer. Reports as required by code or authorities concerned shall be prepared and submitted to the owner and such authorities.

3.1 Cleanliness of Reinforcement : The Contractor shall ensure that all reinforcing bars are thoroughly wire brushed and cleaned free of loose mill scale loose rust, coats of paints oil mud or other coating.

3.2 Concreting Operations : During concrete placing, a fitter shall be in attendance to inspect fixed reinforcing bars and maintain bars in correct positions at each pour locations.

Drawings : The Engineer will supply detailed drawings of reinforced concrete works. Working drawings and bar bending schedules shall be prepared by the Contractor from drawings supplied to him by the Engineer.

3.3 Samples : At least one month in advance of placing an order by him the Contractor shall submit four samples of reinforcing bars which he intends ordering in case the steel is to be supplied by the Contractor. The samples shall conform to IS : 10790 Part 2 - 1984. The Engineer may carry out any test he may require, to satisfy that the steel to be brought by the Contractor complies with the test specifications. The Engineer reserves the right to shortlist the vendors and the contractor shall procure only from such sources.

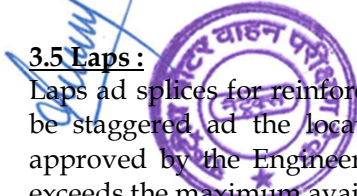
3.4 Reinforcing Bars

Reinforcing Bars shall either be supplied by the Owner or shall have to be brought by the Contractor as laid down in the tender conditions.

3.5 Laps

Laps and splices for reinforcement shall be shown in the drawings. Splices, in adjacent bars shall be staggered at the locations of all splices, except those specified on the drawing shall be approved by the Engineer-in-charge. The bars shall not be lapped unless the length required exceeds the maximum available length of bars at site.

3.6 Bending



All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/ bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and rebent in a manner that will injure the materials. Bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 25mm in diameter which may be bent hot if specifically approved by the Engineer-in-charge. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 645°C) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and rebending be such as shall not, in the opinion of the Engineer-in-charge injure the material. NO reinforcement bar shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having links or bends other than those required by design shall not be used.

Unless otherwise indicated or specified, bars shall be bent and fixed in accordance with the provisions of IS : 2502. All bending shall be done cold with the use of an approved bending machine. Incorrectly bent bars shall not be permitted to be used by re-bending.

3.7 Bending at Construction Joints :

Where reinforcement bars are bent at construction joints and afterwards bent back into their original position, care should be taken to ensure that no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

3.8 Fixing / Placing and Tolerance on Placing :

Reinforcement shall be accurately fixed by any approved means maintain in the correct position as shown in the drawings by the use of blocks, spacer and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete.

3.9 Welded Wire Mesh

Mesh reinforcement, where specified shall conform to IS : 1566 - 1982.

3.10 Binding Wire

Binding wire shall be 0.90 mm (20 SWG) diameter annealed wire conforming to IS 280.

3.11 Supports and Accessories

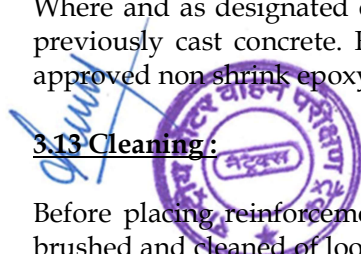
Spacers for reinforcement shall be provided as per 7.80 of IS: 2502. The cover blocks as per 7.3 of IS: 2502 shall be made so as to provide the exact specified cover to reinforcement. Stays, blocks, ties spacers or other supports as approved by Engineer shall be provided at appropriate intervals to avoid sagging of bars between supports. Broken stones, brick pieces, wooden blocks shall not be allowed for the purpose under any circumstances.

3.12 Dowels

Where and as designated on the drawings, steel bar dowels shall be provided for anchorage to previously cast concrete. For anchorage where shown or required to existing construction, an approved non shrink epoxy type grout or approved deferred bolting devices shall be used.

3.13 Cleaning:

Before placing reinforcement and again before concrete is placed, reinforcement shall be wire brushed and cleaned of loose mill scale, oil, or other coating that might destroy or reduce bond.





3.114 Concrete Cover :

Cover over reinforcing bars shall be as indicated. Correct concrete cover to reinforcement shall be maintained with the aid of approved cover blocks. Top reinforcement in slabs shall be maintained in position by means of chairs made out of mild steel, the diameter and quantity being sufficient to ensure security of the reinforcement in shape and position.

3.15 Securing Place :

All reinforcement shall be securely and accurately fixed in positions shown on the drawings, care being taken to prevent contact with coated shutterings and forms, by using approved support or spacer blocks, or chairs where necessary. All intersections of bars shall be secured with approved clips or with wire, the ends being turned into the body of the concrete. The Contractor shall ensure that all reinforcement is maintained in position at all times, particular care being taken during placing of the concrete.

3.16 Splices :

Shall be wired contact lap splices unless otherwise indicated or approved. Splices at points of maximum tensile stress shall be avoided and shall be staggered elsewhere. The lap length and other provisions shall conform to 25.2.5 IS : 450-78.

3.18 1. Vertical Bars : Splicing of vertical bars in concrete shall be at approved positions.

3.18.2. Horizontal Bars : Unless otherwise shown, lap splices shall be made with at least one continuous bar between adjacent splices. Where double mats of bars occur in walls, lap splices in opposite mats shall be offset at least 1.5 m.

3.17 Welding :

Welding of reinforcing bars is not permitted unless indicated or approved by the Engineer in writing in each case. Where permitted in writing, reinforcement which is specified to be welded shall be welded by any process after which the Contractor can demonstrate by bend and tensile tests that the strength of the parent metal is not reduced and that the weld possesses a strength not less than that of the parent metal. The welding procedure established by successful test welds shall be maintained and no departure from this procedure shall be permitted. Welds in positions other than those shown on the drawings shall not be permitted. Welding shall be carried out only by qualified welders with experience of similar works. The standard for welding will be those required by IS : 2751 - 79 code of practice for welding of mild steel bars used in reinforced concrete construction and IS : 9417-1989 Recommendations for welding cold worked steel bars for reinforced concrete construction.

3.19 Additional Reinforcement : Additional reinforcing bars shall be provided at sleeves and openings as indicated or required. Where additional bars are not shown for such locations, Engineer's instructions shall be obtained and additional bars provided as directed.

3.20 Welded Wire Mesh : All necessary supports and chairs shall be provided to hold in place during concrete pours. Care shall be taken to prevent contact between the mesh and coated shutters. Mesh shall be straightened to lay in flat plane before placing it and mesh shall be bent as shown or required to fit the work. Laps shall be as per 25.5.1 IS : 456.

3.21 Access : Where reinforcing mats have been fixed, access for concreting purposes shall, where necessary, be provided by timber benches or similar approved devices supported by the falsework. Under no circumstances shall such access ways be supported by reinforcement bars or mats.

3.22 Substitution : In case sizes of bars other than specified ones are permitted to be used, the C/S area of steel shall have an area not less than designed area provided further that bond stress is not exceeded and criteria for minimum and maximum spacing of bars as per IS : 456 is not violated.

4.FORM WORK

4.1 All formwork shall be constructed of timber, sheet metal or other approved material. It shall be firmly supported, adequately strutted, braced and tied to withstand the placing and vibrating of concrete and the effects of weather. Design of structures shown on the Engineer's drawings does not include any allowance or consideration for imposed construction loads. Standards and Tolerances : All formwork shall be fabricated in compliance with the best modern practice, so that the finished surface is even, unblemished free of fins and true to line, level and shape as shown by the drawings. The forms shall comply with the requirements of IS : 456.

i. Faces of formwork in contact with concrete shall be free from adhering foreign matter, projecting nails and the like, splits or other defects, and all form work shall be clean and free from standing water, dirt, shavings, chippings or other foreign matter. Joints shall be watertight to prevent the escape of mortar and cement slurry or the formation of fins or other blemishes on the face of the concrete.

.Metal spreaders may be used to provide accurate spreading of forms. Construction of forms shall be such that there will be no sagging, leakage or displacement occurring during and after pouring of concrete. Forms shall be coated with specified coating material; and coating material shall not come into contact with reinforcing bars.

4.13.1. Slopes

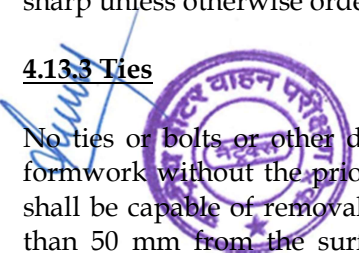
Formwork shall be provided for the top surfaces of sloping work where the slope exceeds fifteen degrees from the horizontal (except where such top surface is specified as spaded finish) and shall be anchored to enable the concrete to be properly compacted and to prevent flotation, care being taken to prevent flotation, care being trapped.

4.13.2 Chamfers

All exterior horizontal angles on the finished concrete of 90 degrees or less along the tops of walls shall be given 20 mm chamfers ; columns are required to have chamfers on vertical angles, which run out 125 mm from the bottom and top of the column ; other exterior angles shall be left sharp unless otherwise ordered by the Engineer.

4.13.3 Ties

No ties or bolts or other device shall be built into the concrete for the purpose of supporting formwork without the prior approval of the Engineer. The whole or part of any such supports shall be capable of removal so that no part remaining embedded in the concrete shall be nearer than 50 mm from the surface in the case of reinforced concrete and 150 mm in the case of unreinforced concrete. Holes left after removal of such supports shall be neatly filled with 1:3



drypack mortar which shall contain just sufficient water to make it plastic. It shall be well rammed into the hole and finished flush.

4.13.4 Form Windows

Windows shall be provided in the formwork wherever directed or necessary for access for concrete placement and vibration. Windows shall be of size adequate for tremies and vibrators, spaced at maximum 1.8 m centres horizontally, and shall be tightly closed and sealed before placing higher concrete.

4.13.5 Cleanouts and Cleaning

Temporary openings shall be provided in wall, column and slab formwork for cleaning and inspection. Prior to pouring, all forms and surfaces shall be cleaned and coated to receive concrete.

4.13.6 Re-use

Form material shall be cleaned and reconditioned before re-use.

4.14 Embedded piping, conduits and anchors

All trades which require openings for the passage of pipes, electrical conduits, and other inserts shall be consulted and the necessary pipe sleeves, anchors, or other required inserts shall be properly and accurately installed. Openings required by other trades shall be reinforced as indicated and required. Conduits or pipes shall be located so as not to reduce the strength of the construction, and in no case shall pipes other than conduits be placed in a slab 4 1/2" (11.4 cm) or less in thickness. Conduit buried in a concrete slab shall not have an outside diameter greater than 1/3 of the thickness of the slab not be placed below bottom reinforcing steel or over top reinforcing steel. Conduits may be embedded in walls provided they are not larger in outside diameter than 1/3 the thickness of the wall, are not spaced closer than three diameters on the centre, and do not impair the strength of the structure. Electrical conduits shall be placed with due regard to allowable bend radii continuity in its length from outlet to outlet, and shall be equipped with a pull cord. The outlets shall be temporarily plugged to totally avoid ingress of concrete or grout.

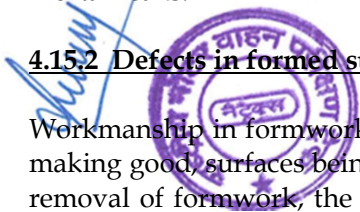
4.15 Field Quality Control

4.15.1 Control during concrete placement

Devices of the tell-tale type shall be installed on supported forms and elsewhere as required to detect formwork movements and deflection during concrete placement. Required slab and beam cambers shall be checked and correctly maintained as concrete loads are applied on forms. Workmen shall be assigned to check forms during concrete placement and to promptly seal any mortar leaks.

4.15.2 Defects in formed surfaces

Workmanship in formwork and concreting shall be such that concrete shall normally require no making good, surfaces being perfectly compacted and smooth. If any blemishes are revealed after removal of formwork, the Engineer's decisions concerning remedial measures shall be obtained immediately. These measure may include but shall be limited to the following :





1. Fins, pinhole bubbles, surface discolouration and minor defects may be rubbed down with hacking immediately the formwork is removed.
2. Abrupt and gradual irregularities may be rubbed down with carborundum and water after the concrete has been fully cured. These and any other defects shall be remedied by methods approved by the Engineer which may include using a suitable epoxy resin or, where necessary cutting out to a regular dovetailed shape at least 75mm deep and refilling with concrete over steel mesh reinforcement sprung into the dovetail.

4.15.3. Removal of Forms and Shoring

Formwork shall be so designed as to permit easy removal without resorting to hammering or levering against the surface of the concrete. The periods of time elapsing between the placing of the concrete and the striking of the formwork shall be as approved by the Engineer after consideration of the loads likely to be imposed on the concrete and shall in any case but not less than the periods shown below, depending on the ambient temperature. Location of Form Time for striking using ordinary Portland cement (days) Seem sides, walls and columns 3 Slab Soffits 7 to 14 Beam Soffits 14 to 21 Not with standing the foregoing the Contractor shall be held responsible for any damage arising from removal of formwork before the structure is capable of carrying its own weight and any incidental loading. The contractor shall be wholly responsible for repairing or reconstruction as directed by the Engineer the section of the Works so affected.

4.15.4 Sharing and Falsework Removal

In retaining wall construction Sharing and falsework shall not be removed until 21 days after concrete placement or until concrete has attained at least 90 percent of the 28 day design compressive strength as demonstrated by control test cylinders, whichever is the earlier.

4.15.5 Restriction

Construction equipment, or permanent loads shall not be imposed on columns, supported slabs, or supported beams until concrete has attained the 28 day design compressive strength as demonstrated by control test Cylinders.

4.15.6 . Concrete curing during removals

Concrete shall be thoroughly wetted as soon as forms are first loosened and shall be kept wet during the removal operations and until curing media or sacking is applied. Potable water supply with hoses or buckets shall be ready at each removal location before removal operations are commenced.

5. STRUCTURAL STEEL

This specification are for the supplying, fabricating and erecting in position mild steel structures such as beams, monorail, platform, M.S.ladders, stairs and M.S.grating etc. from angles channels, flats, plates etc. including cost of steel, cutting to required size, rivetting, bolting or welding, fixing in the line and level, painting with two coats, of red oxide primer and two coats of approved enamel paint. Requirements specified in this section will form a part of detailed specifications for item of works falling under this category. Indian standards shall apply as if included herein. Design of structure shall be compliance with Indian Standards (IS) viz. for rivets IS:1148-1954 for bolts IS:1148- 1964 and IS:1962 for structural fabrication IS:800-1962, and its latest edition.

Structural steel members, steel joints, plates and connections, steel chair assemblies, pipe supports for piping in all locations, ladders and stairs and miscellaneous metal work for water supply and sewerage and disposal installations. Unless otherwise specified all work specified herein and shown on the drawing shall conform to the applicable requirements of the following specifications and codes. Fabrication and erection of structural steel shall be in accordance with IS:800-962 and amendments issued.

This work shall include the furnishing and installation of all structural steel and miscellaneous metal work and related supports, tanks, manhole steps, equipment guards, anchors and other appurtenances and any other work shown on the drawings or herein specified. All materials shall be new, sound and of the best quality available.

5.0 STANDARD MATERIAL SPECIFICATIONS

1. STRUCTURAL
2. FASTENERS
3. NON-METALS
4. PAINT
5. WALL & ROOF PANELS
6. STANDARD ACCESSORIES
7. SKETCHES

i) Structural

Built-up sections are made from hot rolled plates conforming to ASTM A-572 Gr50 (345 MPa) steel. The plates are joined together on one side of the web by a continuous automatic submerged arc welding process to produce the section required. Hot rolled sections except beams are mill sections complying with IS:2062 (240 MPa) steel.

ERW pipes, sections and crane beams are mill formed sections conforming IS 2062 for 240 MPa yield. Black (non coated) cold formed sections of thickness 1.6 mm, 2.0 mm and 2.5 mm are made of hot rolled sheet to ASTM A607 Gr50(345 Map) steel.

Bracing rods and sag rods are made of steel bars conforming to IS:2062 with a minimum yield strength of 240MPa. Alum/Zinc coated (Galvalume) alloy sheets are 0.47 mm nominal thickness, cold roll formed from a cold rolled coil conforming to ASTM A-792 M, Grade-80 with a minimum yield strength of 550 MPa. These sheets are hot dip coated with a 55% Aluminium and 45% Zinc alloy.

Pre-painted sheets are 0.5 mm nominal thickness, coated with a baked silicon polyester finish on top of an Alum/ Zinc alloy finished steel sheet (as per the specification above).

The paint finish film thickness is 20 microns of silicon polyester on the exterior face and 10 microns of polyester on the interior face.

ii) Fasteners

Primary structural connection are made with electro galvanized (silver) high strength bolts Gr. 8.8 steel conforming to IS 3757 **Purlins and girts** are connected to their supporting members by machine bolts Gr. 4.6 steel conforming to IS 1363 electro-galvanized (yellow). Anchor bolts are made of rods conforming to ASTM F1554 with a minimum yield strength of 250 MPa. Roof and wall panels are fastened by No. 12 carbon steel self-drilling screws hot-dip galvanized with polymer coated finish with an integral washer head to which an EPDM elastomer layer is bonded.

iii) Non-Metals

Sky and wall lights are made of translucent white acrylic modified, Ultra Violet stabilized, fiber glass panels. Panels shall be of 3.9 Kg/m² nominal weight and provide same coverage as panel



width with a maximum length of 3250 mm. Profile of light panels matches that of the roof / wall panel.

Closure strips shall match the sheeting profile, and be made of XLPE or similar material.

Adhesive sealing tapes are made of an elastomeric butyl rubber based extruded sealant on silicon release paper. End lap sealant is nutrized silicon sealant.

Fiberglass insulation is as per IS 8183, 50 / 100 mm thick, with a vapor barrier (foil scrim Kraft/ reinforced white vinyl/reinforced white metalized film scrim kraft facing). Density shall be no less than 16 Kg/m³. No wire mesh is required under the insulation.

iv)Paint

a.Shop Primer

Primary steel shall be cleaned to Specification St2. One shop primer coat of Red Oxide Zinc Chromate shall be applied with an average dry film thickness of 25 microns on all red steel. Shop primer provides protection for elements while in transit and construction, and is not intended to be for permanent protection.

b. Wall and Roof Panel

Exterior and interior finishes on the roof panel and walls shall be Tracked Aluminium/Zinc alloy with modified silicon polyester (SMP) paint with colour selected from the standard Colour Guide. Interior finish coat of wall panels shall be polyester paint, Light-Grey colour.

The coil manufacturer shall apply colour coating after proper hot dipped metallic coating and priming has been applied. Finish coats of paints shall be applied and baked on the surface as per the coil manufacturer's standards.

v)Standard Accessories

a. Louvers

S-type fixed louvers shall be manufactured out of 0.5mm silicon polyester coated Galvalume sheet in white colour with insect screen and is supplied in standard modules of 1500 mm wide x 1000 mm high. Special sizes can be manufactured on request.

b. Vents

Gravity flow Ridge Vents shall be 300 mm, 500 mm or 600 mm throat, in 3000 mm long units manufactured out of 0.5mm silicon polyester coated Galvalume sheet in white colour.

c. Roof Extensions

Sidewalk Roof Extensions shall be 900 mm cantilevered roof members located at the eave and sloped at the same pitch as the main structure roof slope. End wall Roof Extension shall be 900 mm cantilevered "C" and "Z" sections which are continuous span extensions of the main building end bay purlins and eave struts. Roof Extensions structural members (except rafters) shall be completely concealed when optional soffit panel is specified.

d. Structural Canopy

Side wall Canopies shall be 1500 mm cantilevered rafters attached at the eave, or at any point below the eave, supporting 200/250 mm deep "Z" purlins. Optional soffit panel shall conceal only canopy purlins, leaving rafters exposed, unless other wise specified.

e. Fascia's and Parapets

Vertical and Curve line fascia's shall be of the bracket mounted type.

f. Vertical fascia's shall consist of hot rolled "I" section or cold formed "C" section fascia posts supported by a hot rolled section bracket that is cantilevered from the rigid frames columns at side walls and from the end well posts at end walls, with cold formed 200/250 mm deep "Z" and "C" sections as top and bottom girts respectively. An intermediate "C" grit oriented vertically shall be supplied to support valley gutters when required. Vertical fascias



shall project 600 mm from the steel line. The height of the fascia shall vary depending on actual requirements.

Fascia cladding shall be of 0.5 mm thick (nominal) pre-painted Hi-Rib panels. Soffit panels and back side panels are provided only when specified.

g. Curveline Fascias shall consist of the same type of construction as vertical fascias but shall be supplied with curved steel panels having the same corrugation profile as the Hi- Rib panel and shall be available in three types:

Type-I shall have a circular panel at the bottom of the fascia only.

Type-II shall have a circular panel at the top and bottom of the fascia.

Type-III shall be single panel profile curved at the mid height of the fascia.

h. A parapet shall be made from the same construction as the vertical fascia but without the cantilever. The building's wall sheeting shall continue to the top of the parapet.

i. Trims and Liner Panels

Trims shall be made of pre-painted Al-Zn steel, 0.5 mm minimum thickness. All trims shall be White except for corner trims and fascia trims which shall match the panel colors.

Gutters shall be nominal channel made of 0.5 mm Al-Zn steel, pre-painted White.

Downspouts shall be in 100mm square in 0.5mm alum/zinc steel pre-painted in white.

Liner panel shall be 0.5 mm galvanized steel pre-painted with White finish Hi-Rib panels.

All liner trims shall match the liner panel color.

i) Foundation and Anchorage

Foundation and horizontal ties and concrete floor slabs shall be designed by NATIS/Its representatives. Design shall be based on job site soil conditions. Anchor bolts shall be set in strict accordance with IS Standards and best practices.

Vii) Colour Shade

The colour shade for the roof and wall cladding sheets shall be selected from the standard Colour Shade Card depending upon availability subject to prior sale.

- Doors shall be of 35mm thick and flush
- Single leaf doors shall be 915mm x 2135mm
- All doors shall be prepared for cylindrical locks/ mortise locks/ aldrops
- Glass, when supplied shall be 5mm thick clear tampered, factory installed
- Each door leaf shall have 4(four) 100mm long hinges
- Rolling shutters shall be manually or electrically chain operated as per the requirement in accordance to relevant standards.

5.1 Material Steel rolled sections, plates and bars shall conform to the latest editions of IS:226, 808, 1730, 1732 & 3954. Pipes used for columns or other structural purposes shall conform to IS:1161-1968. Iron for castings shall conform to IS:210.

5.2 Steel Chequered Plate

Plates shall be of regular quality carbon steel of the thickness shown on the drawings. The raised legs shall be diamond shaped and have an angle and opposed pattern.

The chequered plate (size, location and type) shall be as shown in the drawing. Steel chequered plate and frame shall be galvanized after fabrication unless noted otherwise. All assemblies shall be reinforced on concealed faces as necessary to support the service loads required. Aluminium shall be isolated from dissimilar metals, concrete, masonry and plaster to prevent electrolytic deterioration.

5.3 Common Bolts

Bolts and nuts shall conform to IS:1363-1967. The bolts exposed to liquid surfaces shall be of Stainless Steel or Brass.

5.4 Welding Electrodes

The electrodes shall conform to the requirements of IS:814 latest edition.

5.5 Shop Painting

Structural steel not designated to be galvanised shall be stop-coated using priming coat of red lead as specified in painting section of these specifications. The portion of steel to be embedded in concrete shall not be painted.

5.6 Miscellaneous Structural Works

Steel fabricated components, unit and assemblies for various equipment for waste water treatment plant to be installed shall be fabricated as per drawings and conforming to various standards codes of manufacture as specified and applicable.

5.7 Execution

Erection shall include the installation and erection of all structural steel as called for the section. The contractor shall verify correctness before starting erection. As erection progress, the work shall be securely bolted up to take care of all dead-load, wind and erection stresses. No final bolting or welding shall be done until each portion of the structure has been properly aligned and plumbed. Bolts shall be drawn up tight and threads set so that nuts cannot become loose.

5.8 Damaged Members

During erection, members which are bent, twisted or damaged shall be straightened or replaced as directed. If heating is required in straightening, a heat method shall be used which will ensure uniform temperature throughout the entire member. Members, which in the opinion of the Engineer are damaged to an extent impairing their appearance, strength or serviceability, shall be removed and replaced with new members.

5.9 Bearing Plates

Bearing plates shall be provided under beams and columns resting on walls or footings. Bearing plates may be attached or loose and aligned on steel wedges or shims. After the supported members have been plumbed and properly positioned and the anchor nuts tightened, the entire bearing area under the plate shall be dry packed solidly with bedding mortar. Wedges and shims shall be cut off flush with edge of bearing plate, and shall be left in place.

5.10 Substitutions

Unless otherwise directed, the exact sections, shapes, thickness, sizes, weights and the details of construction shown for the structural steel work shall be furnished. However, the Contractor, because of his stock or shop practices, may suggest changes if the net area of section is not thereby reduced, if the section properties are at least equivalent and if the overall dimensions are



not exceeded. All substitutions or other deviations from drawings and/or specifications shall be specifically noted or "clouded" on the shop drawing submittals.

5.11 Flame Cutting

Flame cutting by the use of a gas cutting torch in the field for correcting fabrication errors will not be permitted on any major member in the structural framing. The use of flame-cutting torch will be permitted only on minor members, when the member is not under stress, and only after the approval of the Employer has been obtained.

5.12 Storage of Materials

Structural material, either plain or fabricated, shall be stored above ground upon platforms, skids, or other supports. Material shall be kept free from dirt, grease and other foreign matter and shall be protected from corrosion.

5.13 Steel Stairs

To be fabricated true to size and details and provided complete with all attachments, steel pipe rails and handrails, checker plate-nosed grating type treads and landings. Shop and setting drawings shall be submitted beforehand for approval of the Engineer.

5.14 Anchors Bolts and Anchors

Anchors bolts and anchors shall be properly located and built into concrete to work. Bolts and anchors shall be present by the use of templates or such other methods as may be required to locate the anchors and anchor bolts accurately. Embedded anchor bolts that are submerged in process water or pump room floors, or are in enclosed tanks or spaces exposed to process gas or moisture, shall be of stainless steel bolts, a non-oxidising lubricant greases will be applied before bolting.

5.15 Ladders

- i. Contingent upon designated requirements for different locations, galvanised steel unit will be fabricated conforming to requirements. Rails where indicated will be provided.
- ii. M.S. Ladders with strings as specified and the steps of M.S. bars of specified dia shall be provided. The handholds shall be curved. The size and dimensions shall be as specified or as shown in the drawings.

5.17 Stair Abrasive Safety Nosings

Extended nosing's to within 150mm of wall or stringer and equip each with embedded anchorage of secure attachment. Finish flush with concrete at all cast inplate concrete stairs, except or otherwise designated.

5.18 GI Piping Railing

Hand railing shall be with 40 mm of GI pipe in double row with 40mm of GI pipe uprights at a spacing not more than 1.5 m and of one metre clear height. Hand railing shall be painted with two coats of enamel paints over a coat of red oxide primer. Hand railing shall be provided all around sumps/tanks, platforms, ladders and walkways.

5.19 C.I. Steps

C.I. Steps for wet well shall be as per IS:5455. The steps shall be clean, well-cast and shall be free from oil and sand holes, wrappings etc. The C.I. steps shall be PVC consulted heavy duty type having size 300 x 150 x 25 mm. The portion of the step which projects from the wall of the wet well shall have a raised chequered design to provide an adequate non-slip grip. Minimum weight of each step shall be as per IS. The step shall be coated with approved bituminous paint.

5.20 Welding Electrodes

Finishing with Enamel paint (two or more coats) at all locations prepared and applied as per manufacturer's specifications including appropriate priming coat, etc. complete on steel work.

5.21 Galvanising

All metal work shown or specified to be galvanised shall be zinc coated as per IS : 2629. The zinc coating should be free from defects and shall have uniform thickness of coating.

a. Galvanised coatings marred or damaged during erection or fabrication shall be repaired by any approved process as directed by the Engineer.

5.22 Test Reports

Certified physical and chemical mill test reports shall be furnished by the Contractor for material used for major structural members.

5.23 Shop Drawings

Five sets of shop drawings shall be submitted to the Engineer for approval before fabrication of any of the work. In approving shop drawings, the Engineer does not assume responsibility for accuracy of the work or work relative to other plant components as constructed.

5.24 Anchor Bolts

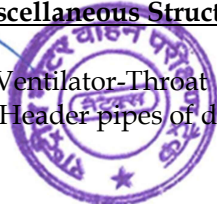
Shall be galvanised and shall be fabricated as shown, or specified by the equipment manufacturer. Suitable expansion bolts may be used in lieu of anchor bolts at certain locations. It shall be the responsibility of the Contractor to request the substitution and obtain the Engineer's approval regarding type and location of expansion bolts proposed to be used prior to pouring concrete.

5.25 Steel Grating

Seat angles and anchors shall be of steel. Grating and support shall be galvanised. Gratings to be supplied and installed as detailed in the drawings.

5.26 Miscellaneous Structural Works

Gravity Ventilator-Throat 600mm & 3.00 mts length shall be executed as per NATIS/standard practice. Header pipes of different diameters shall be executed as per NATIS standards.



Steel fabricated components, units and assemblies for various equipment for water supply and sewage treatment installation shall be fabricated as per drawings and conforming to various standard codes of manufacture as specified and applicable.

6. MASONRY

Brick Masonry

6.1 Manufacture

Common burnt clay building bricks shall conform to the requirements of IS : 1077 and shall be of quality not less than class 50 with moisture absorption rate not exceeding 15 percent as defined in IS : 1077. The bricks shall be chamber burnt and shall not be damaged in any manner and sizes shall conform to the works sizes specified with tolerates as given in 6.2 of IS : 1077.

6.2 Samples

The Contractor shall deliver samples of each type of brick to the Engineer, and no orders shall be placed without the written approval of the Engineer. All the bricks used in the works shall be of the same standard as the approved samples. The samples shall be preserved on site, and subsequent deliveries shall be checked for uniformity of shape, colour and texture against the samples. If in the opinion of the Engineer any deliveries vary from the standard of the samples, such bricks shall be rejected and removed from the site.

6.3 Uniformity

The bricks selected for exposed pointed brickwork walls shall be of uniform colour, deep cherry red or copper colour and uniform texture. Only such bricks as are permitted by the Engineer shall be used.

6.4 Testing

Samples of the bricks shall be tested in accordance with IS : 3495 by the Contractor for compliance with the aforesaid, before any order is placed, and soon after receipt of a consignment. Tests shall be carried out as and when required by the Engineer on samples selected by the Engineer's representative.

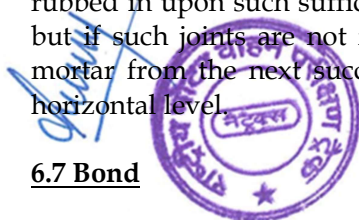
6.5 Brick Work

All exposed brickwork shall be constructed in accordance with the provisions of IS : 2212

6.6 Laying

Brickwork shall be uniformly bedded, bricks being laid upwards. Each brick shall be floated and rubbed in upon such sufficient quantity of mortar that the mortar is squeezed up into the joints, but if such joints are not filled with mortar by this process they shall be flushed up with the mortar from the next succeeding bed. The courses shall be laid truly and strictly to line and horizontal level.

6.7 Bond



Brickwork courses shall be alternatively laid in stretcher bond and header bond. Damaged bricks shall not be used. The greatest care shall be taken to prevent mortar dropping on to or in any other way disfiguring or discoloring the bricks, and all edges and sides shall be kept strictly plumb and square, in-line, and flush with the required finished face. As the work proceeds, it shall be continuously checked with a 2 m long straight edge and spirit level.

6.8 Construction

Walls shall be carried up in a uniform manner and no one portion raised more than 1 m above another at any one time, the open end being racked out. Over-hang work shall in no case be permitted. Brickwork shall be cleaned down after each day's work and newly laid brickwork shall be protected by suitable means.

6.7 Dry Weather

In dry weather the suction rate of clay bricks shall be adjusted by wetting as necessary before use. Bricks shall be stored in a free draining area and protected from rain.

6.8 Lintels

Where brickwork rests upon lintels or supporting ribs of concrete, the bricks shall be cut as necessary and carefully bedded so that proper support to the outer leaf of brickwork is obtained.

6.9 Pointing

At the time of laying, all joints of exposed brickwork shall normally be raked out neatly and pointed to 15 mm depth.

6.10 Approval

All workmanship shall be strictly in accordance with the foregoing. The Engineer or the Engineer's representative reserves the right to reject any of the work on grounds of shabby workmanship. Such rejected work shall be removed and rebuilt to the Engineer's satisfaction.

7.FLOORING

Scope of work :

The work covered under this specification consists of providing and laying at levels and floors, flooring of different types, strictly in accordance with these specifications and relevant drawings.

7.1 Cement Concrete Flooring (Indian Patent Stone) :

Materials :

The specifications for materials, grading, mixing and the quantity of water to be added shall generally conform to their relevant specifications described under plain and reinforced concrete. The maximum size of coarse aggregate shall be 10mm. The fine aggregate shall consist of properly graded sand. Concrete shall be mixed preferably by machine, and hand mixing shall be avoided as far as practicable.

7.1.1 Preparation of Base :

The base concrete surface shall be thoroughly chipped to remove laitance, caked mortar, loose sand, dirt etc. cleaned with wire brush and washed clean and watered until no more water is



absorbed. Where the base concrete has hardened so much that roughening the surface by wire brushes is not possible, the same shall be roughened by chipping or hacking at close intervals. The surface shall be soaked with water for atleast 12 hours and surface water removed and dried before laying the topping. Before laying the concrete, cement slurry at 2.75 kg/ sqm. Of surface shall be applied before laying the topping. Before laying the concrete, cement slurry at 2.75 kg. / sqm. of surface shall be applied for better bond, / flush as per drawings. The edge of each panel into which the floor is divided shall be supported by wooden or metal strips duly oiled to prevent sticking. The panels shall be of uniform size and, unless otherwise specified, no dimension of panel shall exceed 2 m. and the area of a panel shall not be more than 2 sqm. However, the exact size of panel shall be decided by the Engineer-in-charge to suit the size of the room. The joints in the floor finish shall extend through the borders a skirting/ dado. The border shall have mitred joints at the corners of the room. Where aluminium dividing strips are proposed to be provided, the same shall be fixed in cement mortar 1:2 @ 1200 mm. centers or as specified in the schedule for full depth of the finished floor. The depth of dividing strips shall be the thickness as proposed for the finished floor in the item. In the case of flush joints, alternate panels only may be cast on same day. Atleast 48 hours shall elapse before the concreting of adjacent bay is commenced.

7.1.2 Mixing :

The topping concrete shall be of mix of one part of cement, two parts of sand and 4 parts of well graded stone chips of 10mm maximum size. the ingredients shall be thoroughly mixed with just sufficient water to the required plasticity, having water cement ratio not more than 0.4

7.1.3 Laying :

The free water on the surface of the base shall be removed and a coat of cement slurry to the consistency of thick cream shall be brushed on the surface. On this fresh grouted base, the prepared cement concrete shall be laid immediately after mixing. The concrete shall be spread and leveled carefully. The concrete shall be compacted and brought to the specified levels by means of a heavy straight edge resting on the side forms and down ahead with a sawing motion in combination with a series of lifts and drops alternatively with small lateral shifts, either mechanically or manually as directed by the Engineer-in-charge. While concreting the adjacent bays, care shall be taken to ensure that the edges of the previously laid bays are not broken by carelessness or hand tamping. Immediately after laying the concrete, the surface shall be inspected for high or low spots and correction needed shall be made up by adding or removing the concrete and whole surface is again leveled. When the layer is made even, the surface shall be completed by ramming or beating ad then screed to a uniform line and level. Before the initial set commences, the surface shall be sprinkled directly or empty gunny bags spread over the surface of the concrete to absorb excess water coming on top due to floating.

7.1.4 Finishing the surface :

After the concrete has been fully compacted, it shall be finished by troweling or floating. Finishing operations shall start shortly after the compaction of concrete an shall be spread over a period of one to six hours depending upon the temperature ad atmospheric conditions. The surface shall be trowelled intermittently at intervals for several times so as to produce a uniform and hard surface. The satisfactory resistance of floor to wear depends largely upon the care with which trowelling is carried out. The object of trowelling is to produce as hard and close knit a surface as possible. The time interval allowed between successive trowelling is very important. Immediately after laying only just sufficient trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided as this tends to work a layer rich in cement to the surface, some time. After the first trowelling, the duration depending upon the temperature, atmospheric conditions d the rate of setting of cement used, the surface shall be retrowelled many times at intervals to close any pores in the surface shall be retrowelled many times at intervals to

close any pres in the surface, and to bring to surface and scrap off any excess water in concrete or laitance (it shall not be trowelled back into the topping). The final trowelling shall be done well before the concrete has become too hard but at such a time that considerable pressure is required to make any impression on the surface. Trowelling of rich mix of dry cement and fine aggregate on to the surface shall not be permitted. Trowel marks should not be seen on the finished surface. Where broom finish is specified, after the concrete has been thoroughly compacted, and when most of the surface water has disappeared, the surface shall be given broom finish with an approved type of brass or M.S. Fiber. The broom shall be pulled gently over the surface from edge to edge in such a manner that corrugation shall be uniform in width and depth, the depth shall be not more than 1.5 mm. Brooming shall be done when the concrete is in such a condition that the surface will not be torn or unduly roughened by the operation. Coarse or long bristles which cause irregularities or deep corrugation shall be timed out. Brooms which are worn or otherwise unsatisfactory shall be discarded. After the concrete in the bays has set, the joints of the panels should be filled with cement cream and neatly floated smooth or jointed. Care should be taken that just the minimum quantity of cream for joint is used and excess spilling over the already finished surface shall be removed when the cream is still green. In case of wide joints the same shall be filled with pigmented cement concrete (1:2:4) using approved pigment and the joint shall be finished in perfectly straight line.

7.1.5 Steel Trowel Finish :

Areas where marble tiles are proposed to be used are required to have base concrete finished smooth by steel trowel.

7.1.6 Curing :

The completed flooring shall be protected from sun, wind and rain for the first two days and movement of persons over the floor is prohibited during this period. The finished surface shall be covered and cured continuously from the next day after finishing, at least for a period of 7 days. Bunding with murrum for curing is prohibited as it will leave permanent stain on the finished floor. Cure shall be done by spreading sand and kept damp throughout the curing period of seven days minimum. The surface shall be protected from any damage to its whatsoever. The surface shall then be allowed to dry slowly. All corners, junctions of floor with plastered wall surface shall be rounded off when required at no extra cost.

7.4 Kotah Stone Flooring / Skirting / Facia / Shelves

7.4.1 Materials :

Hand cut, machine cut for exposed edges and machine polished kotah stone shall be of the best quality and of the specified thickness, size and the shade which shall be got approved by the Engineer-in-charge. The size given in schedule of qualities are tentative and can vary only slightly as per the availability in the market. The thickness of the slab after it is dressed shall be 20,25,30 or 40 mm as specified in the item. Tolerance of + 2 mm shall be all allowed for the thickness. In respect of length & width, tolerance in length and width shall be permissible upto + 5mm for hand cut slabs and + 2 mm for machine cut slabs. At its thinnest, no stone shall be thinner than the specified thickness. The stone shall be hard, sound, durable, resistant to wear, rectangular or square in shape and as directed by the Engineer-in-charge. Uniformity of size shall generally be maintained for the stones used in any one room. The stone shall be without any soft, veins, cracks or flaws and shall have uniform colour. They shall have natural surface free from broken flakes on top and the exposed surface shall be machine polished to a smooth, even and true plane and the edges hand cut and dressed true and square. The evenness of the surface of slabs and edges of the slab shall not be marred by careless dressing or handling and no patching up shall be allowed for the slab. The edges shall be quite straight. The under face may be left as required or rough dressed. Before taking up the work, samples of stone slabs to be used and their

dressing and polishing shall be got approved by the Engineer-in-charge and will keep them in his office for reference and the stone slabs to be used shall conform to the approved sample.

7.4.2 Bedding / Backing coat :

In case of flooring as well as of skirting / dado, mortar bedding shall be cement mortar of thickness and mix specified in the schedule of item.

7.4.3 Construction Details :

Cement mortar as specified for bedding shall be uniformly mixed. The amount of water added shall be the minimum necessary to give just sufficient plasticity for laying and satisfactory bedding. Care shall be taken in preparing the mortar to ensure that there are no hard lumps that should interfere with the even bedding of the stones. Before spreading the mortar, the sub-floor or base shall be cleaned of all dirt, set mortar scum or laitance and of loose materials by hacking and brought to original levels and then well wetted without forming pool of water on surfaces.

7.4.4 Fixing the stone slab / tile :

Before laying the stone shall be thoroughly wetted with clean water, neat cement grout (2.75kg/sqm.) of honey like consistency shall be spread on the mortar bed over as much areas as could be covered with the slabs within half an hour. The specified type of stone shall be laid on the neat cement coat and shall be evenly and firmly bedded to the required level and slope in the mortar bed. Each stone shall be gently tapped with wooden mallet so it is firmly and properly bedded. There shall be no hollows left. If there is a hollow sound on gently tapping off the slab, such slab shall be removed and reset properly. The joints shall be routed with matching cement slurry. Approved pigment shall be used in cement slurry to match with shade of stone. Pigment required to match the shade of stone shall be supplied by the contractor at no extra cost. The stone adjoining the wall shall go about 12mm (about 1/2 ") under the plaster, skirting or dado for the wall. All stone slabs, tiles shall be so laid as to have continuous lines from various rooms to the corridors. No change of lines shall be permitted at junction between rooms and corridors. Only one piece machine cut, Kota stone shall be used for treads and risers.

7.4.5 Curing :

The flooring shall be kept well wetted with damp and or water for seven days.

7.4.6 Polishing and cleaning :

When the bedding and joints have completely set and attained required strength, the surface shall be machine polished to give smooth, even and true plane to the flooring. All flooring shall be thoroughly sealed and handed over free from any mortar stains etc.

7.4.7 Skirting and dado / Facia :

The quality and type of stone shall be same as mentioned for flooring except of their weight and thickness or backing coat which shall be as mentioned in item schedule. The backing shall conform to the specifications for cement mortar specified in item of terrazzo tiles. Contractor should take into consideration the fact that touching up of the plaster at the junctioning skirting / dado is invariably done after the skirting /dado/facia work is completed and quote rates accordingly. No extra for this touching up will be entertained. Fixing, curing, polishing and cleaning shall be as specified herein before under cement / terrazzo tile skirting, polishing may be done by hand, but a smooth surface and fine polishing shall be obtained. Joints shall be done in neat matching cement slurry. The junction of plaster and the upper edges of the dado / skirting shall be finished smoothly as directed by the Engineer-in-charge without any extra cost.

7.4.8 Mode of measurements :



Flooring, skirting and dado/ fascia shall be same as that for terrazzo cement tile, flooring / skirting / dado. Sometimes shall be paid on area basis in sqm. calculated to two places of decimal, where length and breadth shall be measured inclusive of bearing correct to a cm. The permissible tolerance in the specified thickness shall be (+) 2mm.

Note : Wastage in obtaining the required machine cut, hand cut sizes as specified from the commercial sizes available in market shall have been taken into consideration by contractor shall quoting the rate for work to be measured as above and no extra claim on this account will be entertained.

7.5 Glazed / Unglazed / Vitrified tile Flooring, Dado / Skirting / Facia

7.5.1 Materials

Tiles :

The tiles shall be of approved make as specified and shall generally conform to relevant Standards. They shall be flat and true to shape free from cracks, crazing spits, chipped edges and comes. The glazing shall be of uniform shade. The tiles shall be as specified in the schedule of quantity or drawings. The length of all four sides shall be measured correct to 0.1mm and average length breadth shall not vary more than +0.8 mm from specified dimensions. The variation of individual dimensions from average value of length/breadth shall nor exceed +0.5 mm. Tolerance in thickness shall be (+) 0.4mm. The thickness of the tile shall not be less than as specified in the items and shall conform to in all respects. Samples of tiles shall be got approved by the Engineer-in-charge before use on the work.

7.5.2 Preparation of Surface and laying of vitrified Tiles :

Sub grade concrete or RCC slab or side brick wall / or plastered surfaces on which tiles are to be laid shall be thoroughly hacked, cleaned of all mortar scales, concrete lumps etc. brushed, washed with water to remove mud, dirt etc. from the surface, wetted and mopped. 20/12 mm thick plaster of CM 1.3 shall be applied d allowed to harden minimum for 48 hours. The plaster shall be roughened with wire brushes or by scratching diagonal lines 1.5mm deep at 7.5 mm center both ways. The back of tiles shall be buttered with a coat of grey cement slurry paste and edges with white cement slurry and set in the bedding mortar. The tiles shall be tapped and corrected to proper planes ad lines. The tile shall be butt jointed in pattern and joints shall be as fine a possible. The top of skirting /dado shall be truly horizontal ad joints truly vertical. The joints shall be pointed with cementations grout of matching colour of Bal/Roff make. After a period of curing of 7 days minimum, the tiles shall be cleaned and shall not sound hollow when tapped. The surface during laying shall be checked with a straight edge 2m. long. The surface of skirting shall be kept flush with plaster with chipping of brick work / concrete wherever required. After the tiles have been laid, surplus cement grout shall be cleaned off.

7.5.3 Mortar and Bedding :

Cement mortar for bedding shall be of proportion specified in items schedule ad shall conform to the specification for materials, preparation etc. as specified under cement mortar. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed the base shall be cleaned of all dirt, scum or laitance and loose materials and well wetted without forming any pools of water on the surface. The mortar of specified proportion and thickness shall then be even ad smoothly spread over the base by use of screed battens to proper level or slope. Cement mortar of thickness and proportion as specified in the schedule for dado shall be applied to the wall after preparing the wall surface as specified under cement plaster 20mm thick and brought to correct line and plumb and the surface left rough to receive the tiles.

7.5.4 Fixing of other ceramic tiles for flooring :

The tiles before laying shall be soaked in water for atleast 2 hours. The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles. Tiles which are fixed on the flooring adjoining the wall shall be so arranged that the surface on the round edge tiles shall correspond to the skirting or dado. Neat cement mortar grout 1:2, using fine sand (table III, zone IV ad as per IS 383) of honey like consistency shall be spread over the bedding mortar just to cover as much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints, shall be kept as close as possible and in straight line. The joints between tiles shall not exceed 1.00 mm, in width. The joint shall be grouted with white cement slurry. After fixing the tiles, finally in an even place or slope, the flooring shall be covered with wet sand an allowed undisturbed for 14 days.

7.5.5 Fixing tiles for Dado and Skirting / Facia :

The dado work, shall be done only after fixing the tiles/slabs on the floor, the approved glazed tiles before laying shall be soaked in water for at least 2 hours. Tiles shall be fixed when the cushioning mortar is till plastic and before it gets very stiff. The back of the tile shall be covered with this layer of cement mortar 1:3 using fine sand (table III, zone IV, IS383-1963), and the edge of the tile smeared with neat white cement slurry. The tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from bottom of wall upwards without any hollows in the bed of joints. Each tile shall be as close as possible to one adjoining. The tiles shall be jointed tiles shall be arranged out in cushioning mortar so that all tiles faces are in one vertical plane. The joints between the tile shall not exceed 1.00mm in width and they shall be uniform. While fixing tiles in dado work, care shall be taken to break the joints vertically. The top of the dado, shall be touched up neatly with the rest of the plaster above If doors, windows or other openings are located within the dado area, the comers, sills, jambs etc. shall be provide with true right angles without any specials. The contractor will not be entitled to any extra claims on this account for cutting of tiles if required.

7.5. 6 Cleaning :

After the tiles have been laid in a room or the day fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting over shall be washed thoroughly clean, In the case of flooring, once the floor has set, the floor shall be carefully washed clean ad dried. When dry, the floor shall be covered with oil free dry saw dust. It shall be removed only after completion of the construction work and just before the floor is used.

7.5.7 Pointing and Finishing :

The joints shall be cleaned off with wire brush to a depth of 3mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement and floor kept wet for 7 days ad then cleaned. Finished floor shall not sound hollow when tapped with a wooden mallet.

7.5.8 Mode of measurement :

Dado / flooring / skirting shall be measured in sqm correct to two places of decimal. Length and breadth shall be measured correct to 1 cm between the exposed surfaces of skirting or dado. No deductions shall be made nor extra paid for any opening- of area upto 0.1 sqm The rate shall include all the cost of labour and material involved. White - glazed tiles including specials shall be of the approved make and quality and shall conform to IS 777-1961 in all respects. Samples of the tiles shall be got approved by the Engineer and the material brought for use should conform to the approved samples. Mortar : As per specifications for Shahabad stone flooring. White Cement : This shall be of approved quality and make.

7.5.9 Mortar Bedding

The amount of water added while preparing mortar shall be minimum necessary to give sufficient plasticity for laying. Care shall be taken in the preparation of mortar to ensure that there are no hard lumps. Before spreading the mortar bed, the base shall be cleaned of all dirt, scum, and then well wetted without forming any pools of the water. The mortar shall then be evenly & smoothly spread over the base by the use of screed battens of proper level or slope. The thickness of bedding shall not be less than 12 mm and more than 20 mm in any one place. The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles.

7.6 Fixing Tiles

The tiles before laying shall be soaked in water for at least two hours. The tiles which are fixed in the floor adjoining the wall shall be so arranged that the surface of the round edge tiles shall correspond to the skirting. Neat cement grout of honey like consistency shall be spread over the bedding mortar just to cover so much area as can be tiled within half-an-hour. The edges of tiles shall be smeared with neat white cement slurry and fixed in this grout; each tile being well pressed and gently tapped with a wooden mallet to achieve proper levelling with the adjoining tiles. The joints between tiles shall not exceed 1.5 mm wide. The joints shall be grouted with a slurry of white cement. After fixing the tiles in even plane, the flooring shall be covered with wet sand and dust and allowed to mature undisturbed for 14 days.

7.6.1 Cleaning

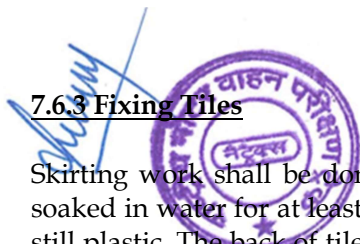
After the tiles have been laid in a room or the day's fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set floor shall be covered with oil free dry saw-dust which shall be removed only after completion of construction work and just before the floor is occupied.

7.6.2 Providing & Fixing White glazed tiles for Skirting Plastering

Cement plaster of about 12 mm for brick walls and 20 mm for stone masonry walls shall be applied to the part of the wall where dado or skirting is to be fixed. The plastering shall be as per specifications of plastering. The proportion of mortar shall be as mentioned in the item.

7.6.3 Fixing Tiles

Skirting work shall be done only after fixing tiles on the floor. The white glazed tiles shall be soaked in water for at least 2 hours before use. Tiles shall be fixed when the cushioning mortar is still plastic. The back of tiles shall be covered with a thin layer of neat cement paste and tiles shall then be pressed in the mortar and gently tapped against the wall with wooden mallet. The fixing



shall be done from the bottom of wall upward. The tiles shall be joined with white cement slurry. Any difference in the thickness of tiles shall be evened out in cushioning mortar so that all tile faces are in vertical plane. Thickness of joints shall not exceed 1.5 mm. While fixing tiles care shall be taken to break joints vertically. After fixing the dado, skirting, etc, they shall be kept continuously wet for 12 days. If doors, windows or other openings are located within the dado area, the sills, jambs, angels etc. shall be provided with white glazed tiles and appropriate specials and such tiled area shall be measured net along with the dado.

7.6.4 Cleaning

After the tiles have been fixed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting work shall be washed thoroughly clean.

8.CEMENT PLASTERING AND POINTING

8.1 Plastering

Specifications here under shall cover plastering concrete, stone or brick masonry surfaces in cement mortar of specified proportion and specified thickness including scaffolding, curing etc. complete as directed.

8.2 Materials

Cement Mortar : Cement mortar shall have the proportion of cement to sand as mentioned in the wording of the item or in the special provisions and shall comply with the following for :

8.3 Cement : Cement shall conform to IS : 269 Ordinary Portland cement shall be used. The weight of ordinary Portland cement shall be taken as 50 kg per bag. The Contractor shall ensure that the cement is of sound and requiring quality before using it. Any cement which has deteriorated, caked or which has been damaged shall not be used. The specifications covered under the section 'Concrete' shall be applicable in addition.

8.4 Water : Water for mixing cement mortar or concrete shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil, acid and injurious alkali, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause aforescence. Sea water shall not be used. Water fit for drinking shall generally be found suitable for mixing cement mortar. Water fit curing mortar or concrete shall not be too acidic or alkaline. It shall have pH value above 6. Sea water shall not be used for curing purpose.

8.5 Fine Aggregate

All fine aggregate shall conform to IS : 383 - 1963 and relevant portion of IS : 515-1959. Sand shall be clean, well graded, hard, strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, sofit or flaky particles, shale, alkali, salts, organic matter loam mica or other deleterious substances and shall be approved by the Engineer. The maximum size of particles shall be limited to 5 mm (about 3/16"). If the fine aggregate contains more than 4 per cent of clay, dust or silt, it shall be washed. The fine aggregate for cement mortar for masonry and first coat of plaster should generally satisfy as per IS standards.

IS : 2116 - 1980 shall generally apply for sand for plaster. The fine aggregate should be stacked carefully on a clean, hard surface so that it will not get mixed up with deleterious foreign materials.

8.6 Proportion

Cement and sand shall be mixed in specified proportions, sand beings measured in measuring boxes. The proportions will be by volume. The mortar may be hand mixed or machine mixed.

8.7 Preparation

In hand mixed mortar, cement and sand in the special proportions shall be thoroughly mixed dry on a clean impervious platform. Fresh and clean water as specified above shall be added gradually and thoroughly mixed to form a stiff plastic mass of uniform colour so that, each particle of sand shall be completely covered with a film of wet cement. The water cement ratio may be as under or as directed by the Engineer.

Machine mixed mortar shall be prepared in an approved mixer. Water cement ratio shall be as per hand mixed mortar. The mortar so prepared shall be within 30 minutes of adding water should be used in the work. The mortar remaining unused after that period mortar which has partially hardened or is otherwise damaged shall not be retempered or remixed. It shall be destroyed or thrown away.

8.8 Scaffolding

Scaffolding required for facility of construction shall be provided by the contractor at his expense. Scaffolding shall be erected with steel sections or pipes, ballies or bamboos of adequate strength so as to be safe for all construction operations. The Contractor shall take all measure to ensure the safety of the work and working people. The Contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Put logholes shall be made good by stones bricks to match the facework when scaffolding is being removed after ensuring that all holes behind are solidly filled in with M-10 cement concrete.

8.9 Preparatory Work

All joints in the facework that is to be plastered shall be raked out to a depth equal to not less than the width of the joints. In case of new works the raking shall be done when the joint mortar is still green. Smooth surfaces of concrete, old plaster etc must be suitably roughened to provide necessary bond for the plaster. In case of stone masonry, bushing on the walls to receive the plaster shall not be more than 12 mm. The surface to be plastered shall be cleared and scrubbed with fresh water and kept wet for 6 hour prior to plastering.

8.10 Gauges

Patches of plaster 15 cm x 15 cm shall be put on about 3m apart as gauges to ensure even plastering in one plane.

8.11 Plastering

In all plaster work the mortar shall be firmly applied with somewhat more than the required thickness and well pressed into the joints and on the surface and rubbed and leveled with a flat wooden rule to give required thickness. All corners must be finished to their true angles or rounded as directed by the Engineer to give neat appearance. The mortar shall adhere to the masonry surface intimately when set, and there should be no hollow sound when struck. The plastering shall be proceeded from top downwards.

8.12 Watering & Curing

All plaster work shall be kept damp continuously for a period of 14 days. To prevent excessive evaporation on the sunny or windward side of the building in hot dry weather, matting or gunny bags may be hung over on the outside of the plaster in the beginning and kept moist. Should the Contractor fail to water the work to the satisfaction of the Engineer, the latter may engage requisite labour, materials and equipment to water the work properly at the cost of the Contractor. If the plastering work is not done as specified above, the plaster shall be removed and redone at the Contractor's expense.

8.13 Cement Plaster in Two Coats

The first coat for Brick Masonry and rubble masonry shall be of 10 mm and 20 mm thickness respectively. In case more thickness is specified, the work shall be carried out in two coats necessarily. The first coat shall be applied as above, but the surface is not floated or polished but roughened to give a key to the second coat of plaster. For this, before the first coat hardens, it shall be combed in wavy lines, 12 mm apart and 3 mm deep. This coat shall be kept damp for 2 days thereafter and then allowed to dry. Before starting to apply the second coat, the surface of the first coat shall be damped evenly and 2nd coat applied. The final surface (either of the 1st 2nd coat) shall be rubbed smooth after floating it with thick coat of pure cement slurry while base coat is still fresh. If neeru finish is specified, floating with neat cement will not be required. The finished surface shall be true and even and present a uniform texture throughout and all joining marks shall be eliminated.

8.14 Plaster in Single Coat.

After coat of plaster is done, the surface shall be rubbed smooth after floating it with thick coat of cement slurry or the neeru finish as the case may be. The finished surface shall be true and even and present a uniform texture throughout and all jointing marks shall be eliminated.

8.15 Cement Pointing

Specifications hereunder shall cover, cement pointing with mortar of specified proportion to stone masonry or brick work including raking out joints, scaffolding, curing, watering etc complete.

Materials Cement mortar for pointing shall be of the specified mix.

8.16 Construction Details

Unless other type of pointing are specified in the item or the special provisions, pointing shall be of the grooved type. The joints in the masonry shall be raked out to a depth not less than the width of the joint when the mortar is green. The joints are to be brushed clean of dust and loose

particles with a stiff brush. The area shall be washed and the joints thoroughly wetted before pointing is commenced. The raked out joints shall be filled with mortar of the specified mix and required consistency and well pressed and rubbed smooth. A semi-circular depression 3 mm dia shall be made in the joint by pressing a clean string with trowel keeping the string exactly horizontal and on the centre line of the joint. The vertical joints shall be similarly marked. These depressed lines will then be immediately rubbed till they become uniformly 6 mm deep 6 mm wide and assume fairly blackish colour. Where joints are not horizontal and vertical as in the case of uncoursed rubble masonry, the pointing shall be made along the centre line of actual joints and the functions of pointing made neatly. The pointing mortar shall not spread over the adjoining stones. Mortar pointing shall be restricted to the width of the joints, and all superfluous mortar shall be removed with a trowel.

8.17 Watering

The pointed face shall be kept continuously wet for 14 days after initial set. Should the mortar perish or deteriorate through neglect of watering or any other default and if the work is not done neatly as specified above, the pointing shall be removed and redone, at the expense of the Contractor.

9. DOORS , WINDOWS & VENTILATORS

9.1 Wood work :

All timber mentioned in the item in schedule of quantities shall be from the heart of a sound tree of nature growth entirely free from sap wood. It shall be uniform in texture, straight in fibre and shall be well and properly seasoned. It shall be free from large, loose dead or cluster knots, wedges, injuries, open shakes, borer holes, rot, decay, discoloration, soft or spongy spot, hollow pockets, pith or center bore and all other defects or any other damages or harmful nature which will affect the strength, durability, appearance and its usefulness for the purpose for which it is required. Only properly seasoned timber shall be used. The samples of species to be used shall be submitted by the contractor to the Engineer-in-charge before commencement of the work. The contractor shall produce cash vouchers and certificate from standard kiln seasoning plant as a proof for having been kiln seasoned by them, failing which it would not be accepted as kiln seasoned. Seasoning of timber shall be judged from its moisture content as laid down in I.S. 287-1960. The seasoning of timber shall conform to IS 1141-1993. Scantling of all type of timber shall be straight. Warped scantling shall not be used. Before use in works, the scantling shall be kept in covered and well ventilated place and shall be got approved.

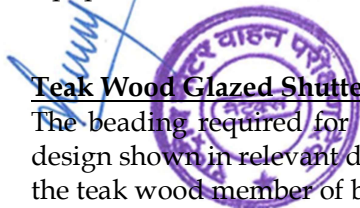
9.4 MEASUREMENTS

9.4.1 Door sub frames shall be measured in cubic metres as detailed in the BOQ.

9.4.2 The price for an item shall include supply of specified quantity and type of timber, sawn, cut, joined, framed and fixed in position including supply and fixing of approved anti-corrosive treated fixtures, straps, bolts, hold-fasts, spikes, nails, screws, etc. supplying glue, coaltar, paint and anti-termite treatment. The items shall also include all materials, labour, scaffolding, use of equipment, etc.

Teak Wood Glazed Shutters :

The beading required for glazing shall be of the best teak wood and shall be fixed as per the design shown in relevant drawing. Any moldings, carvings shown shall be worked out from the teak wood member of bigger size.



9.6 Glazing :

Glazing shall be generally with plain sheet glass of approved make with thickness as mentioned in the schedule of quantities. The detailed specifications for glazing given hereafter shall be followed generally.

9.7 Flush Door Shutters:

Solid core flush door shutters shall be of 5 ply construction and approved make generally conforming to the I.S. specification 2202-1991 (specification for wooden flush door shutter – solid core type). The finished thickness of the shutter shall be as mentioned in the schedule of items.

9.8 Face Veneers :

Commercial face veneers used in flush door shutter shall conform to the requirements laid down in IS 303-1989 specifications for plywood for general purposes (revised) interior grade. Decorative face veneers used in flush door shutters shall be of grad-I and shall conform to the requirements of decorative veneered decorative plywood interior grade. Thickness of veneers shall not exceed 1mm.

9.9 Adhesives :

Phenol formaldehyde synthetic resin (liquid type adhesives) conforming to IS848-1974 specifications for synthetic resins shall be one piece of size not less than 25mm wide and depth equal to the thickness of core. In case of double leaf shutters, the meeting stiles still have lipping of not less than 35mm deep.

9.10 Workmanship and Finish :

All the faces of the door shutter shall be at right angles. The shutter shall be free from twist and warp in its plane. Both faces of the door shutters shall be sanded to a smooth even texture. The workmanship and finish of the face panels shall be in conformity with those specified in I.S. 303-1989 specifications for plywood for general purpose (revised) for commercial type and IS 1659-1990 specification for block boards for decorative type. Department shall be at liberty to inspect the manufacture of shutters in the factory for its quality of materials and workmanship and all facilities shall be extended for such inspection. Cost of visits will be borne by the contractor.

9.11 Tests :

Tests shall be conducted, if required by the Department at contractors cost and acceptance criteria shall be as per IS 2202.

9.12 Tolerance :

Tolerance on nominal width and height shall be (+) 3mm. Tolerance on nominal thickness shall be (+) 1.5mm. The thickness of the individual shutter shall be uniform throughout.

9.13 Miscellaneous :

Wherever mentioned in the Schedule of quantities, vision panels, Venetians, plastic laminates, push slats etc. shall be provided in the flush doors. The vision panels shall be of size mentioned in the drawing and shall be provided with teak wood lipping around the glass. The glass shall be 4mm thick or as specified of best quality or equivalent approved free from defects. Teak wood Venetians or louvers shall generally conform to relevant specifications of timber. Necessary grooves and rebate in frames shall be provided as per drawing. Formica or approved equivalent plastic laminate of required design, required shade and colour shall be provided and fixed on flush door to the required size on any side of the shutter as shown in drawing. It shall be fixed with Fevicol or any other approved adhesive. Fixing shall be done in such a way that there shall not be any air gap, warpage or undulations on the surface. Finished surface of formica shall be cleaned with wax polish. The shutters shall be painted on commercial facing side with two coats of

synthetic / flat oil paint of approved shade ad make over an approved coat of primer. The decorative veneer side of the shutter shall be melamine polished with two or more coats as specified in Schedule of Quantities so as to render a satisfactory surface. The flush doors shall be single leaf or double leaf type as mentioned in the schedule of quantities. In case of double leaf shutters, the meeting of the stiles shall be rebated 20mm. And shall be either splayed door square type and the T.W. lipping around the meeting shall not be les than 35mm deep. The meeting stiles shall be in single piece. Sufficient care shall be taken to prevent any damage and loss of shape during handling, transporting, stacking, fixing etc. The door shutters shall be handled with utmost care to prevent any surface damage, warping etc.

9.12 Mode of measurement :

The work covered under the respective items in schedule and the above specifications shall be measured as follows: The cubic contents for wood work shall be measured for the finished size, limiting to those shown in the drawings or ordered by the Engineer-in-charge. The cross sectional dimensions shall be measured equivalent to nearest enclosing rectangle (least rectangle / square) for wrought and planed sizes. The cubical metre. The frames embedded below finished floor shall not be measured. The square metre areas for shutters shall be measured for the exposed surfaces of shutter between frames from inside or outside whichever is more. The linear dimensions shall be measured upto two places of decimals of a meter. The area for payment shall be worked out correct upto two places of decimals of a square meter. The rate for shutters shall include :

- Cost of supply assembly and erecting in position.
- Cost of polishing, painting, supplying wood preservative, screws, nails, holdfast etc.
- Cost of labour for making adjustments in frames, if required, shutters and also for fixing required fittings and fixtures. In case of flush doors, the rate for individual item mentioned in the schedule of quantities shall include cot of shutters, labour for provision of glass for vision panel, plastic laminate sheet push plate, teak wood louvers etc. transporting charges and labour for fixing of fixtures and fastening except fix

9.13 Doors & Windows

Steel doors, windows, ventilators and rolling shutter. Providing and fixing steel door, windows and ventilators as per IS:1038 including all fixtures and fastening and glazed with 4 mm thick plain sheet glass with three coats of enamel paint over a red oxide primer. Providing and fixing in position approved quality 18 SWG steel rolling shutter push and pull operated of approved make inclusive of all accessories top cover, locking arrangements including 2 coats of approved enamel paint over a coat of red oxide primer.

9.14 General

All steel doors, windows and ventilators shall conform to IS: 1361, and IS:1038 or equivalent as mentioned in specifications and on drawings and as approved by the Engineer-in-Charge. Material used in the fabrication of industrial doors, windows, ventilators etc. shall be the best procurable and conforming to relevant IS specifications. The forms of sections, dimensions, and weight shall conform to relevant IS codes for industrial buildings. The sections shall be cold straightened and finished goods shall be free from dents and other defects. The minimum thickness of glass, if required to be provided shall be 4 mm and 5.5 mm if wired glasses required. It shall be free from flaws, specks, bubbles etc. all panes shall have perfectly squared corners and straight edges. Wood screws M.S.bolts, nuts, screws, washers, peg stays and other oxidised brass

fittings shall be treated for corrosion as recommended by relevant Indian Standards. Putty for glazing shall conform to IS:420.

9.15 Workmanship

Doors, windows and ventilators etc. shall be truly square and flat free from twist and warp. They shall be constructed of sections which have been cut to the required lengths, tenoned and revetted or welded at the corners. The general fabrication shall conform to IS:1038 and 1361. The contractor is required to supply doors, windows, ventilators etc., he shall obtain them from an approved manufacturer. The contractor shall first submit for the approval of the Engineer-in-Charge, the name and address of the manufacturer whose metal casement he intends to use, together with typical drawings and specifications, describing the details of construction for each type of door/window. The doors, windows and ventilators shall be either galvanised/or painted as indicated in drawing or schedule of rates. All steel surfaces shall first be thoroughly cleaned free of dust, scale or dirt and mill with one coat of an approved primer conforming to IS:102 before despatch. Alternatively they may be galvanised as described in IS:1361.

9.16 Glazing

All glazing shall be as per IS:1081. Windows and ventilators shall be designed for putty glazing fixed from outside. Where doors are to be glazed, they shall be designed for glazing from inside. All window casements shall have holes drilled in the frames and shutters respectively at suitable places for inserting spring type glazing clips which shall be supplied by the contractor. All glazing shall be puttied to the shutters or frames with good quality putty in addition to glazing clips. Glass panes shall not be placed directly against the metal. A thin layer of putty shall be very evenly spread over the glazing rebate and the glass pressed firmly against it. The necessary ornamental grill shall be provided in steel window as per the instruction of Engineer-in-charge.

9.17 Fixing

Doors, windows and ventilators shall not be for built in at the time the walls are constructed but shall be subsequently fixed into proper opening, as laid down in IS:1801. Holes to accommodate the fixing lugs are to be left or cut, and the casement fixed after all the rough masonry and plaster work have been finished. The lugs of the casement shall be jammed in cement concrete (M-15 mix) with stone chips (10 mm down) at holding the casement in proper position, in line and level. The width of the clear unfinished opening in the wall should be 25 mm more than the over all width of the door frame to allow for 12.5 mm plaster on each jam. The height of the unfinished opening shall depend upon whether a threshold is required or not. While fixing the door, care shall be taken to see that at least 6 mm space is left between the door and the finished floor.

9.18 Fittings

Hardware shall be fixed as late as possible, preferably just before the final coat of paint is applied. It shall be fitted in workmanlike manner, so that it may not work loose and in such a way that screws and pins are not marked and mutilation by hammers and screw drivers. It shall be tested for correct operation. Where specified, door shall be fitted with a three way bolting device which can be operated from outside similarly be operated from either side or as per drawings. Solid steel bolt handles shall be provided. One on the outside and one on the inside of each shutter. In case of doors provided with service door, the lock shall be fitted on the service doors. All materials shall be the best procurable and shall conform to the relevant IS specifications.

9.20 Windows & Ventilators



'S' type steel louvers of sheet of thickness specified in connection to steel frame shall be provided in window and ventilators as per relevant IS codes and directions of Engineer-in-Charge. All windows, frame and door shutters etc. shall be painted with 2 coats of approved paint over a priming coat of red oxide.

9.21 M.S.Rolling Shutters

It shall be of approved make, made out of 18 gauges 75 mm black lath either mechanically operated from both inside and outside, by reduction gear type mechanism or manually operated according to sizes as per IS specification. It shall be fitted with two self aligning ball bearing with locking arrangement (both inside and outside) including G.I. hosing, hooks, door suspension shafts and top rolling springs pressed etc. complete. The hood and cowl portions shall be fixed to obtain full head room up to tinted soffit. They shall be provided with locking arrangements for padlocks, pulling hooks, handles, top cover etc. It shall be painted with two coats of approved paint over a coat of approved paint over a coat of red oxide primer. Rolling shutter shall be installed properly by skilled person and shall be adjusted to operate smoothly throughout the full range of operation.

10. PAINTING

10.1 Scope of work :

The work covered under these specifications consist of furnishing the various types of paints and also the workmanship for these items, in strict compliance with these specifications, which are given in detail hereinafter with the item of schedule of quantities.

10.2 Materials :

Paints, oils varnishes etc. of approved brand and manufacture shall be used. Ready mixed paints as recovered from the manufacturer without any admixture shall be used. If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Engineer-in-charge shall be used. Approved paints, oils or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition. The materials shall be brought in at a time in adequate quantities to suffice for the whole work or at least a fortnights work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-charge. The empties shall not be removed from the site for work, till the relevant item of work has been completed and permission obtained from the Engineer-in-charge. The contractor shall associate the chemist of paint manufacturers before commencement of work, during and after the completion of work who shall certify the suitability of the surface to receive painting and the paint before use etc.

10.3 Commencing Work Scaffolding :

Wherever scaffolding is necessary, it shall be erected on double supports ties together by horizontal pieces, over which scaffolding planks shall be fixed. No bellies, bamboos or planks shall rest on or touch the surface which is being painted. Were ladders are used, pieces of old gunny bags shall be ties on their tops to avoid damage or scratches to walls. For painting of the ceiling, proper stage scaffolding shall be erected. Painting shall not be started until and unless the Engineer-in-charge has inspected the items of work to be painted, satisfied himself about their proper quality and given his approval to commence the painting work. Painting, except the priming coat, shall generally be taken in hand after all other builders work, practically finished. The rooms should be thoroughly swept out entire building cleaned up atleast one day in advance of the paint work being started.

10.4 Preparation of Surface :



The surface shall be thoroughly cleaned. All dirt, rust, scales, smoke and grease shall be thoroughly removed before painting is started. Minor patches if any in plastered / form finished surfaces shall be repaired and finished in line and level in C.M/ 1:1 and cracks and crevices shall be filled with approved filler, by the contractor at no extra cost to the Department. The prepared surface shall have received the approval of the Engineer-in-charge after inspection, before painting is commenced.

10.7 Measurement :

Painting, unless otherwise stated shall be measured by area in square metre. Length and breadth shall be measured correct upto two places of decimal of a metre. No deduction shall be made for opening not exceeding 0.05 sqm. and no addition shall be made for painting to the beading, moulding edges, jambs, soffits, sills, architraves etc. of such openings. In measuring painting, varnishing, oiling etc. of joinery and steel work etc. the coefficient as in the following table shall be used to obtain the areas payable. The co-efficient shall be applied to the areas measured flat and not girthed in all cases. In case of painting of door shutter with push plates in plastic laminate, deduction will be made for area of such laminations.

10.8 Precautions :

All furniture, lightings, fixture, sanitary, fittings, glazing, floors etc. shall be protected by covering and stains, smears, splashing, if any shall be removed and any damage done shall be made good by the contractor at his cost.

10.10 Painting, Priming coat on Wood, Iron or Plastered Surfaces Primer

The primer for wood work, iron work or plastered surface shall be as specified in the description of the item. Primer for wood work / Iron & Steel / Plastered / Aluminium surfaces shall be as specified below:

Sl.No. Surfaces Primer to be used

- a) Wood work (hard and soft wood) Pink conforming to IS 3536 - 1966
- b) Resinous wood and ply wood Aluminium Primer
- c) Iron & Steel, aluminium and galvanized steel Work : Zinc chromate primer conforming to IS 104-1962
- d) Plastered surfaces, cement brick work, Asbestos surfaces for oil bound distemper and paint Cement primer The primer shall be ready mixed primer of approved brand and manufacture.

10.10.1 Preparation of Surface Wood work :

The wood work to be painted shall be dry and free from moisture. The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material with same shade as paint shall be used where so desired by the Engineer-in-charge. The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glaziers putty or wood putty (for specifications for glaziers putty and wood putty - refer as mentioned herein before). Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

10.10.2 Iron and Steel Work :

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed. All dust and dirt shall be thoroughly wiped away from the surface. If the surface is wet, it shall be dried before priming coat is undertaken.

10.11 Plastered Surface :

The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of Paris / putty and rubbed smooth.

12.11.1 Application :

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. The painting shall be done by crossing and laying off as described herein before.

10.11.2 Other details :

The specifications for Painting (General) shall hold good so far it is applicable.

10.12 Painting with superior quality and Flat Oil ready mixed paints on new Surface Paint :

Ready mixed paints shall be of approved brand and manufacture and of the required shades. They shall conform in all respects to the relevant IS specifications.

10.12.1 Preparation of Surface Wood work :

The surface shall be cleaned and all unevenness removed as in para 32.10.2 (a). Knots if visible shall be covered with a preparation of red lead. Holes and indentations on the surface shall be filled in with glaziers putty or wood putty and rubbed smooth before painting is done. The surface should be thoroughly dry before painting.

10.13 Painting with synthetic enamel / Semi glossy Paint on new work Paint :

Synthetic enamel / semi glossy paint of approved brand and manufacture and required shade shall be used for the top coat and an under coat of shade to match the top coat as recommended by the manufacturer shall be used. The paint shall be conforming to IS : 1932 1964.

10.13.1 Preparation of Surface :

This shall be as per painting with superior quality ready mixed paint as mentioned herein before.

10.13.2 Application :

The number of coats including the under coat shall be as stipulated in the item.

10.13.3 Under Coat :

The coat of the specified paint of shade suited to the shade of the top coat shall be applied and allowed to dry over night. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface free from brush marks and all loose particles shall be dusted off. All the cracks, crevices, roughness etc. will be filled with approved putty as per manufacturers recommendations.

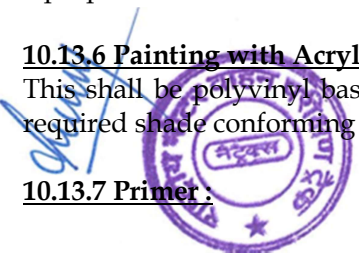
10.13.4 Top coat :

Finishing coats of specified paint of the desired colour and shade shall be applied after the under coat is thoroughly dried. Additional finishing coats shall be applied if found necessary to ensure a proper and uniform semi glossy surface.

10.13.6 Painting with Acrylic Emulsion/Plastic Emulsion Paint

This shall be polyvinyl based Acrylic / plastic emulsion paint of approved manufacture of the required shade conforming to IS 5411-1969.

10.13.7 Primer :





The primer to be used for the painting with acrylic emulsion on cement concrete surfaces, plastered surfaces, A.C. sheets, timber and metal surfaces, if necessary shall be of approved base and as per recommendations of the manufacturers.

10.13.8 Putty :

Plaster filler to be used for filling up (putting) uneven surfaces, small cracks and holes etc. shall be of approved compound and as per recommendations of the manufacturers. No oil based putty shall be used. The putty should be made from a mixture of whiting and plastic emulsion paint or as per manufacturers recommendations.

10.13.9 Finishing coats:

All the finishing coats shall be of matt finish or any other finish as required by the Engineer-in-charge. The number of finishing coats shall be as specified in the item.

10.14 Mode of measurement:

All the measurements for payment shall be taken on net surface area actually painted, unless otherwise specified. Deduction will be made from the areas for fixtures, frills, ventilation, outlets, electrical boxes and such obstructions not painted, if they are individually more than 0.05 sqm. Acrylic emulsion paint is required to be provided on plastered and concrete surfaces in portions of the building. The Department shall reserve the option to delete or increase quantities in full or part from the scope of contract during progress of work. All wood surfaces are to be painted with semi glossy synthetic enamel paint with an approved primer. All shades and colours of paints shall be subjected to review and prior approval of Engineer-in-charge shall be taken before the application.

10.21 Colour Washing :

In the case of colour washing, mineral colours, not affected by lime, shall be added to white wash with proper glue. No colour wash shall be done until a sample of the colour wash to the required tint or shade has been got approved from the Engineer-in-charge. The colour shall be of even tint or shade over the whole surface. It is patchy or otherwise, badly applied, it shall be redone by the contractor, at no extra cost to the Department. For new work, the priming coat shall be of white wash lime or with whiting as specified in the description of the item. Two or three coats, shall then be applied as specified on the entire surface till it represents a smooth and uniform finish. Each coat after applying shall be got approved from the Engineer-in-charge. The finish dry surface shall not be powdery and shall not readily come off on the hand when rubbed. Other specifications as detailed for Whitewashing with lime shall be applicable. Indigo (Neel) shall however, not be added.

10.22 Distemping

10.22.1 Distemper:

Dry distemper (IS 427 - 1965) of approved brand and manufacture, colour and required shade shall be used. The distemper shall be stirred slowly in clean water using 0.6 litre of water per kg. Of distemper or as specified by the manufacturers. Warm water shall preferably be used. It shall be allowed to stand for at least 30 minutes before use. The mixture shall be invariably well stirred before and during use to maintain an even consistency.

10.22.2 Preparation of Surface :

This shall be as for painting work mentioned herein before in so far as it is applicable.

10.22.3 Application :

In case of new work, the treatment shall consist of priming coat followed by the application of two or more coats of distemper till the surface shows an even colour.

10.23 Priming coat:

• Priming coat of whiting shall be applied over the prepared surface. The whiting (ground white chalk) shall be dissolved in sufficient quantity of warm water and thoroughly stirred to form a thin slurry which shall then be screened through a clean coarse cloth. Two kg. Of gum and 0.4 kg. of copper sulphate dissolved separately in hot water shall be added for every cum. of the slurry which shall then be diluted with water to the consistency of milk so as to make a wash ready for used. No white washing coat shall be used as a priming coat for distempering. • The application of each coat as mentioned in the specifications for painting (General) herein before, shall hold good, as far as it is applicable.

10.24 Oil Emulsion (oil bound) Distempering / Acrylic Distemper

10.24.1 Oil bound distemper :

(IS 428-1969) of approved brand and manufacture, colour and required shade shall be used. The primer where used as on new work shall be cement primer or distemper primer as specified in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by manufacture. Only a quality of distemper required for days work shall be prepared.

10.24.2 Preparation of surfaces :

The surface shall be prepared as described herein before for painting work in so far as it is applicable and approved putty / filler shall be applied to the entire area to get uniform and smooth surface before application of primer.

10.25 Application :

The cement primer or distemper primer shall be applied by brushing and not by spraying. Hurried priming work shall be avoided, particularly on absorbent surfaces. New plaster patches in old work before applying oil bound distemper primer. The surfaces shall be finished as uniformly as possible leaving no brush marks, priming coat shall be allowed to dry for atleast 48 hours before oil bound distemper is applied. Before applying distemper, the surface shall be lightly sand prepared to make it smooth for receiving, the oil bound distemper, taking care not to rub out the priming coat. A time interval of atleast 24 hours shall be allowed between consecutive coats to permit the proper drying of the preceding coat. Two or more coats of distemper as are found necessary shall be applied over the priming coat to obtain an even shade.

10.27 Water Proofing Cement based paint

10.27.1 Material :

Cement based paint (IS 5410-1969) of approved manufacture, quality, shade and colour only shall be used.

10.27.2 Preparation of surfaces :

The surface shall be thoroughly cleaned off all mortar dropping, dirt, dust, algae, grease and other foreign matter by brushing and washing the surfaces. The surface shall be thoroughly wetted with clean water before the water proof cement paint is applied. The prepared surfaces shall be got approved before painting is commenced. The water proof cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Water proof cement paint shall be mixed in two stages. The first stage shall comprise of 2 parts of water proof cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the water proof cement paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain liquid of workable

and uniform consistency. In all cases the manufacturers instruction shall be followed meticulously.

10.27.3 Application :

The solution shall be applied on the clean and wetted surface with brushes spraying machine. The solution shall be kept well stirred during the period of application. To avoid direct heat of the sun during painting, the cement based paint shall be applied on the surfaces already treated with white wash, dry or oil distemper, varnishes, paints etc. it shall not be applied on gypsum, wood and metal surfaces.

10.27.4 Mode of measurement for dry distemper, oil bound distemper and water proof cement Paint:

All measurement for payment shall be taken on net surface area actually paint unless otherwise specified and no co-efficient shall be applied for working to areas. Deduction will be made from areas for opening / obstructions not painted, if they are individually more than 0.05 sq.m. Length and breadth shall be taken correct upto two places of decimal of a meter and areas shall be worked out correct upto two places of decimal of a square meter. Corrugated surfaces shall be measured flat as fixed and the area so measured shall be increased by the following percentage to allow the girthed area a) Corrugate asbestos cement sheets - 20% b) Semi corrugated asbestos cement sheets - 10%. The number of coats of each treatment shall be stated in the schedule of quantities. The whole surface shall be applied with approved putty / filler to get uniform and smooth surface at no extra cost to the Department.

10.27.5 Protective Coatings :

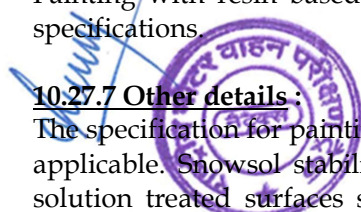
On surfaces such as ferrous metals, brass, copper and phosphor bronze, a protective coating of suitable bituminous compound or chromated redoxide should be given. New wood should be treated with a leafing grade aluminium primer or a water based acrylic emulsion primer. The surfaces with algae growth thoroughly cleaned down to remove as much growth as possible and effective solution of stabilized house hold bleach (calcium hypochloride) of approved quality with approximate 35% chlorine content @ 2 kgs. per 50 litres (or as per manufacturers recommendations) should be used to treat the surfaces. On chalky or friable surfaces after removing the loose materials by stiff brushing or scraping the surface should be treated with one coat of advanced solvent based materials such as snowsol stabilizing solution or other approved equivalent with white spirit.

10.27.6 Application :

The ready mix Sandtex Matt or other equivalent approved resin based there plastic paint shall be applied on clean and wetted surfaces by means of brushes or roller. The solution shall be kept well stirred during the period of application. To avoid direct heat of the sun, the paint shall be applied on the side in shade. On rough and textured, one under coat of cement based paint such as snocem or other equivalent shall be applied before application of undiluted sandtex Matt finish coat. In case of application of two coats of sandtex matt at normal temperatures, the first one shall be diluted by addition of 25% water and the second coat direct. In extremely hot environs, the second coat shall be diluted @ 2.5 litres of water to 20 litres of paint or as directed. Painting with resin based thermo plastic shall be carried out generally as per manufacturers specifications.

10.27.7 Other details :

The specification for painting (general) mentioned herein before shall hold good as far as they are applicable. Snowsol stabilized solution shall not be applied over bitumen. Snowsol stabilized solution treated surfaces shall be left unpainted for more than 2 (two) days. Gypsum based materials shall not be used for filling of exterior cracks while preparation of surfaces.





10.27.8 Mode of measurement :

The painting unless otherwise mentioned shall be measured by area in sqm. upto two places of decimal. Length and breadth shall be measured correct upto two places of decimal of a meter. Deduction will be made from the areas of fixtures, grills, ventilation, outlets individually more than 0.05 sqm. The item shall include removing nails, making good holes, cracks, patches etc. Not exceeding 0.1 sqm each with materials similar in composition to the surface to be prepared.

11 .WATERPROOFING

All waterproofing work shall be carried out by the main contractor through a specialised Waterproofing agency as specified in the tender. The work shall be carried out strictly in accordance with the instructions of the manufacturer of the water proofing materials used in waterproofing treatment and the contractor shall be responsible for the proper production of record of ingredients used and the performance of the waterproofing work done. The entire work shall be covered by a performance guarantee for waterproofing for the period mentioned in the description of item. The guarantee shall also be ensured by retaining 10% of the value of waterproofing work done, including treatment of expansion joints for a period of three years in case of bitumen tarfelt treatment and for five years in case of cement based waterproofing treatment. If there is no leakage noticed during the above specified period, the amount retained shall be returned. The Contractor shall promptly attend to any leakage or dampness see or communicated during the period and satisfy the Dept. that the same has been rectified; if required, by conducting a test by storing 75 mm water over the roof for 10 days. If the Contractor fails to carry out the waterproofing rectification, the dept. will, after giving 10 days notice to the Contractor, get the work carried out by another agency at the Contractor's risk and cost. The Contractor may give a Bank Guarantee in lieu of the amount of 10% referred to above.

11.1 WATERPROOFING PERFORMANCE TEST:

11.2 TREATMENT TO CRACKS:

The work shall be carried out by cutting out cracks to V section , minimum 6 mm wide on top, cleaning out with wire brush, filling with cement and sand slurry (1:1) with approved waterproofing compound mixed with cement by weight as specified by the manufacturer and curing as required. The measurements shall be in running metres measured correct to a centimetre. The rate shall include labour and materials required for all operations described.

11.3 WATERPROOF TREATMENT WITH ACRYLIC BASED CHEMICAL OR CEMENT BASED WATERPROOF AGENT:

11.3.1 Preparation of Surface :

The roof surface shall be cleaned with wire brushes and gunny cloth. All scales, mortar falling, loose material etc. shall be removed to base slab surfaces. All cracks shall be made in to "V" grooves 25 mm wide at top and 12 to 20 mm deep and cleaned.

11.3.2 LAYING:

The entire work shall be carried out as per instructions of the manufacturer of the approved waterproofing agent. A layer of neat cement slurry mixed with waterproof agent shall be laid in convenient lengths and widths. Bricks on edge or broken brick pieces shall be laid in CM 1:4 (1 cement : 4 sand) with waterproof agent. The brick pieces / brick on edge shall be wetted thoroughly before use. Cement Mortar 1:4 shall be filled in the joints and a little above. Waterproofing agent of approved make shall be added at 1% weight of cement in case of acrylic based chemical waterproofing agent in slurry and mortar and properly mixed with cement

specified by the Manufacturer before mixing the same with sand. The brick on edge or brick bat work as above shall be laid to proper levels and slopes as required, directed and / or as shown on drawings. Minimum 25 mm thick jointless water proofing layers of cement mortar 1:4 (1 cement : 4 sand) with waterproof agent, shall be laid over the brick bat work and finished smooth with a layer of neat cement slurry mixed with waterproof agent. If directed, string marks showing 300 mm x 300 mm square shall be marked properly. The slope of the finished terrace shall not be less than 1 in 50, unless a flatter slope is expressly permitted by the EIC in writing. The roof surfaces shall slope from all sides towards the rain-water outlets. The treatment shall be properly rounded at junction of walls, etc. and carried out above 300 mm above the level of waterproofing treatment. The edge of the treatment along parapet shall be tucked into a groove 65 mm deep into the parapet. The treatment shall be continued near rain water outlet etc. The entire treatment shall be properly cured for a period of 2 weeks by ponding method. Normally the proportion of acrylic based chemicals is one percent by weight of OP Cement and for other waterproofing compound 2% by weight of cement. The Contractor shall give complete details of waterproofing treatment proposed by him, including the waterproof compound he proposes to use. These details shall include roof fill materials, waterproofing compound, minimum & maximum thickness of slurry, joints thickness, mortar on top of total treatment. The Contractor shall ensure that sufficient slope for effective drainage is provided within the average thickness of waterproofing treatment proposed by the Contractor. In case the average thickness has to exceed that specified, the fact shall be specifically brought to the notice of the EIC. The entire work shall be covered by a guarantee for waterproofing for a period of 10 years as specified in 2.0 above.

11.4 WATERPROOF CEMENT PLASTER:

The work shall be carried out in correct line and level in CM 1:4 (1 cement:4 sand) minimum 15 mm thick as backing coat with approved waterproofing compound, mixed with cement by weight as specified by manufacturer and finished with 6 mm thick uniform grained sand faced plaster coat including curing with 5 years performance guarantee for terrace parapet or external walls or concrete surfaces.

.Measurements shall be in sq.mtrs.

.Rate shall be including material, labour required to carry out complete work.

11.5 INJECTION / PRESSURE GROUTING WATERPROOF TREATMENT:

13.14.1 SURFACE PREPARATION :

The surface to be treated shall be cleaned of all scales, loose materials, and wire brushed clean. All cracks apparent and construction joints shall be made in to V grooves 25 mm at top and above 20 mm deep and treated with cement slurry 1:1 (1 cement : 1 sand) with approved waterproof compound mixed with cement by weight as specified by the manufacturer of the compound. Holes of about 25 mm dia. to receive funnel or pipe nozzles and 25 to 40 mm deep shall be chiselled at about 1.5 m or less centre to centre as required, in the entire floor and walls to be treated. Nozzles shall then be fixed in these holes and grooves. After the nozzles are set for minimum 24 hours neat cement slurry mixed with waterproofing compound, by weight of cement, as specified by the manufacturer of the compound, shall be injected through these nozzles, by low pressure, gravity for the slurry to run through the minutest cracks and pores in the entire structure. The process shall be continued till the surface to be treated is bond dry and shall not show any dampness at all. The nozzles shall then be removed and the holes properly filled up.

11.6 CEMENT BASED WATERPROOFING TO TOILET / BATHROOM SLABS ETC.

13.18.1 The surface shall be cleaned of all loose scales, mortar, fallings, etc. by wire brushing and gunny cloth. All cracks shall be cut into V form, cleaned and filled in with cement mortar 1:1 slurry with approved waterproofing compound at 2% by weight of cement. A 20mm thick layer of cement mortar 1:3 shall then be laid and gravel or stone aggregate of 12 mm nominal size of fairly uniform size hand set in it while the cement mortar is still green with hand pressure. A



final layer of 25 mm thick cement mortar 1:3 shall then be laid over it, compacted with trowels, finished smooth. In all cement based waterproofing compound, as specified by the specialized waterproofing agency shall be mixed. The whole works shall be cured properly for 10 days. The joints with walls shall be rounded 150 mm above the waterproofing treatment level. This treatment is used in bathrooms, equipment floor, office buildings, etc.

11.18.2 MEASUREMENTS:

Superficial flat area of the treatment carried out shall be measured in sq.mt, correct to two places of decimals, length and breadth being measured correct to a cm. The measurements of rounding shall not be taken along the walls.

11.18.3 RATE :

The rate shall include all materials, labour involved in all the operations described.

4 .The waterproofing treatment shall carry performance guarantee of 10 years.

11.7 POLYSULPHIDE JOINTS:

13.19.1 The top 12 mm thick and 20 mm deep strip in the horizontal and vertical expansion joints in slabs, beams, columns, walls, etc. shall be filled properly with patented polysulphide compound as per manufacturer's instructions.

13.19.2 For expansion joints, the joint filled shall be packed firmly to close all gaps or voids.

13.19.3 APPLICATION :

The resin shall be thoroughly mixed with the curing agent and shall be either directly poured or applied with special gun to fill up the joint. The joints are finished flush with the surface. The expansion joints exposed inside the building at any floor level shall be covered with thin aluminium flat (20 gauge) or asbestos cement strip of min. available thickness or wooden beading etc. as directed by EIC. The width of such covering shall be sufficient to cover the entire joint and allowance for fixing nails / screws. The fixing of such strip shall be at one only to allow for the movement at the joint. Alternatively, the strip can be fixed from both sides but the holes on one side to be oval shape to allow unrestricted movement of structural member and to avoid shearing of the flat. Aluminium angles of suitable size, may also be provided, if the joint is at the corner, but shall be fixed on one side only.

11.19.4 MEASUREMENTS:

Measurements shall be in running metres of the length of polysulphide joint work carried out and measured correct to a cm.

11.19.5 RATE:

Rate shall include all materials, labour etc. required for all operations of work as specified including covering with aluminium, asbestos, wooden members as described in the item.

12.ALUMINIUM STRUCTURAL GLAZING & CLADDING WORK

12.1 STANDARDS

The contractor must comply with all relevant Indian and British Standards Code of practice and technical literature relating to best practice pertaining to structural glazing.. Nothing in this clause shall relieve the contractor of his obligations to provide a higher standard where required and directed.

- (1) IS 3548 Glazing in building
- (2) CP 152 Glazing & Fixing of glass for building
- (3) HE 9 WP (IS 63400 WP) Aluminium Extrusion
- (4) NAAMM Standard FCI - 89, Field check for water leakage of metal external glazing
- (5) NAAMM Standard SG-1-70 Specifications for dense rubber like compression gasket materials.
- (6) A standard specifications for Aluminium Structures - current edition and standard specifications for

aluminium sheet metal work in building construction.

12.1.1 It is the Contractor's responsibility to ensure that the codes adopted in these works are acceptance to local building authority

12.1.2 Any conflict discovered between the above mentioned codes and building regulations must be reported to the NATRAX/Its Representative, for an instruction to be issued, but as a general rule, the more stringent shall apply.

Quality assurance - Single approved source responsibility

12.1.3 Glass - units shall be as detailed in B.O.Q./ of standard specifications

a. Glass for each to be procured shall be from one approved standards manufacture

b Fabricated glass to comply with ASTM C 1038, ASTM C 1046 and ANSIZ 97.I.

c Submit following certificates

1. Manufacturer's letter certifying glass and glazing material's compatibility.

2. Manufacturer's letter certifying sealed insulating glass units meet or exceed specifications.

3. Manufacture's test certificate for quality of glass supplied.

12.1.4 Sealants

a. Sealant used shall be confirming to standard as approved by the NATIS & meet or exceed specifications.

b. Sealant manufacture to confirm compatibility and give certificate for the following:

1. Manufacturer's Certification that Products:

I) Furnished materials for project meet or exceed specified requirements.

II) Assembled for each joints are compatible with each other.

III) Are suitable for indicated use.

2. Manufacture's certification that sealants, primers, and cleaners comply with local regulations controlling use of volatile organic compounds.

3. Contractor's certifications that products are installed in accordance with Contract Documents, based on inspection and testing specified in the Field Quality Control.

c. Authorised Sealant applicator to be employed for work. He shall have minimum five years

12.1.5 Guarantee

Special Warranties: Prepare and submit

1. Warranty jointly signed by manufacture, installer and Contractor agreeing to repair and / or replace assemblies which fall in material or workmanship during warranty period of 10years.

2. Warranty stating insulated glass units to be free from condensation, fogging and construction of vision due to film on internal surface for 10 years.

12.2 SCOPE OF WORK

14.2.1 The contractor shall be responsible for supply, fabrication, installation, test and guarantee of all items including taking all measures that may be required to complete the work as per Architectural concept drawings and specifications details. The specialist contractor shall submit an outline of recent comparable works by the firm/ it's technical partner to illustrate the competence, experience and suitability of the firm.

The Brief scope of work is :

a) Supply of all items of structural glazing system as per drawings, engineering data and prepare test reports for concept of Architectural drawings.

b) Fabrication and installation of structural glazing system.

c) All anchors, fixing, attachments, reinforcements, steel reinforcing for mullions and transoms required for a complete installation, except those specifically indicated as being provided by other trades.

e) Finishes, protection coatings and other support members.

f) Sealing with approved sealants within and around the perimeter.

g) Provisions to receive electrical outlets and outlets for conduits and other electrical work.

h) Co-ordination with the work of main contractor and other trades.

i) Guarantee for 10 years

k) All final exterior and interior cleaning.

12.3. MATERIAL AND FINISHES

14.3.1 Aluminium extrusions shall be designed treated alloy IS 63400 or BS 6063-T5, 6063-T6 or 6061-T6

complying with BS 1474 and aluminium sheet shall be designated alloys 1100, 3003 or 5052 complying with BS 1470. All aluminum work shall be constructed of fully heat-treated aluminium alloy.

14.3.2 The extrusion shall be clean, straight and sharply defined lines, free from distortion and defects impairing appearance, strength or durability. They shall be of suitable wall thickness and profile for rigidity and strength in respect to tensile, shear and bearing stresses, capable of providing local and lateral stability.

14.3.3 Aluminium panel profiles and sizes shall be manufactured in accordance with drawings. No alternation of profile panel sizes and location of joints shall be accepted. The system shall be adopted to meet all structural movement and performance requirements as specified in Indian standards.

12.3.4 Finish

Finish to aluminium framing members shall be micron powder coating of adequate thickness in required shade/ colour as detailed in B.O.Q./ of standard specifications.

12.3.5 Steel

3.2.1 All steel rolled shapes, plates, bars, cold rolled sheet etc. shall comply IS2062 or with the requirements of ASTM A36 or the relevant British Standards.

12.3.6 Separators

Separators between steel and aluminium members and where required shall be rigid type, high impact, smooth both sides Teflon with a minimum thickness of 0.8mm as approved by the NATIS.

12.3.7 Sealant

3.4.1 The compatibility and sequence of installation for all sealant must be carefully considered in all proposals in order to ensure the required cure and optimum performance.

12.3.8 All sealant shall be applied in strict compliance with manufacturer's instructions and recommendations. The contractor shall note that the sealant to be used between glass surfaces, and in adjoining areas shall preferably be supplied by one manufacture.

3.4.3 Gaskets

Structural gaskets shall be EPMD or neoprene with a high resistance to aging and allow joint movements.

12.3.9 Glazing

Glazing shall be as specified in drawing or BOQ or as per design requirement. It shall be Indian / imported hard coated reflective bronze and heat strengthened glass. It shall be of Saint Gobain, float or equivalent approved.

12.4 WORKMANSHIP

12.4.1 General

No materials, equipment or practices shall be used that may adversely affect the functioning, appearance and durability of the completed structural glazing, aluminium cladding and related construction. The work shall be accomplished in compliance with the specified criteria without bucking, opening of welds, cracking of glass, leakage or other harmful effects.



14.4.2 The materials used must be capable of withstanding the effects of in situ installation and allow sufficient tolerance to prevent damage to the finished surface.

14.4.3 Materials, finishes, shapes, sizes, thickness, and joint locations shall conform strictly to those required by the drawings and specifications.

12.4.4 All work shall be of the highest quality, in accordance with best trade practices, and performed by skilled workmen.

12.2.5 All components exposed in the finished work shall be free from warping & oil-cleaning effects.

12.4.6 Manufacturer's Standards Materials, components and system incorporated in the work shall be in compliance with the standards and procedures of the appropriate manufacturers and the standards and codes referred to in this specification.

12.4.7 Storage and Handling

12.4.7.1 Wherever possible all materials shall be stored in dry, well-ventilated conditions prior to fabrication.

12.4.8 Jointing

12.4.8.1 Accurately fit and firmly secure all exposed metal joints with metal to metal hair line contacts.

12.4.8.2 All fastenings into or through aluminium shall be stainless steel, and installed at approved spacings. Fasteners shall not penetrate gutters and drainage system.

12.4.9 All the joints in aluminium framing system and glazed panels as well as joints between aluminium frame with concrete and/ or Masonry meeting surrounds shall be fully sealed and made air, water and weather tight preventing seepage of rain water under heavy wind pressures with provision of adhesive silicone sealant and superior quality approved make EPDM gaskets.

12.4.10 Space at each floor level between the external face of the building frame and the internal face of the building frame and the structural glazing glazed panel shall be sealed air tight by horizontal barrier to prevent of smoke / fire, air conditioned air from one floor level to other floors. There shall be continuous seal for stopping fire and smoke between the structural glazing and the building face.

12.4.11 Sealants

All the joints in glazing shall be air and water tight and capable of preventing leakage of rain water under heavy wind pressure and under heavy weather conditions. Directions of the manufacturer of the sealant shall be strictly followed.

12.5 INSPECTION

All shop and field materials and workmanship shall be subject to inspection by the NATIS at all the times. These inspections shall not relieve the contractor from the obligation to provide materials conforming to all requirements of the contract Document and matching approved samples.

12.6 TESTING

The contractor shall be required to perform necessary test at approved laboratory.

12.6.1 Field Tests

12.6.1.1 NATRAX on completion or during the progress may request the Contractor to carry out such test as required to conform acceptability.

12.6.1.2 In the event that such testing should result in uncontrolled leakage, the Contractor shall eliminate the causes of such leakage at no additional cost to the Employer. Remedial measures must maintain standards of quality and durability and are subject to approval.

12.6.1.3 NATRAX If dissatisfied or on account any reason attributable to the contractor shall neither be eligible for any payment nor shall have recourse to approval. He shall not be eligible for any claim on the employer.

12.6.2 Cost of Test



The contractor shall pay for all cost towards testing. The contractor shall arrange witness of test to NATIS and their representatives at his cost. This shall include all transport, lodging, boarding etc. by the Contractor.

12.7 CLEANING

12.7.1 The contractor shall ensure that all actions are taken during installation to eliminate the effects of corrosive substances on the finishes.

12.7.2 The contractor shall clean both internal and external surfaces to remove corrosive substances, dust or cement/mortar dropping during the installation as may directed and instructed by the EIC.

12.7.3 The internal surfaces of glass and aluminium frame are to be cleaned with compatible cleaning agents prior to installation of the internal protective sheeting.

12.7.4 The contractor shall also make good any physical damage to the structure including scratches, dents, abrasions, pitting, etc. to the satisfaction of the EIC.

12.8 PERFORMANCE GUARANTEE:

The structural glazing contractor shall offer performance warranty on stamp paper of appropriate value for the entire installation carried out. The performance guarantee shall cover for replacement of any or all members and components by the structural glazing contractor at his own cost in case of any deficiency or failure in performance of the structural glazing component as per the design requirement as per the directions of EIC.

12.9 MEASUREMENTS

14.9.1 Measurements shall be as per B.O.Q. in Sq.m of actual area covered.

12.10 RATE

Rate shall include all required labour, material, testing at approved laboratory, breakage, wastage, supervision, protection till hand over and free maintenance during defect liability period etc. complete.

12.11 COMPOSITE ALUMINIUM CLADDING

12.11.1 GENERAL

All Aluminium panel used for the cladding of building shall be 4mm thick or as specified in B.O.Q. Aluminium Composite Panel (ACP) 25 micron or as specified in B.O.Q anodized aluminium sheet as manufactured, treated and supplied by ALPOLIC or equivalent approved.

12.11.2 Work shall include as detail in BOQ, drawings without being limited following

Aluminium cladding system as of APOLIC or equivalent all hardware

All anchors fixing, attachments, reinforcements, sections as required in supports & backing Finishes, protections coatings & treatments

All caulking, sealing, elastomeric and metal flashing, and gasket including seating at junctions with building.

Electrical bonding and earthing of all metal claddings elements.

Provision for electrical contents and conduits and other electrical work.

Scheduling & monitoring of work

Samples, mockups and test units

Co-ordination with the work of other agencies

Testing and verification of component and total assembly.

Storage handling protection and cleaning

Final cleaning interior and exterior prior to handover

Guarantees

Fixing to be done in conjunction with Curtain Wall system.

12.11.3 All work in this section shall comply with the standards, codes, specified and also with local codes requirements and regulation.

12.11.3.1 Codes and Standards followed shall be

Indian standards as published by the Bureau of Indian Standards

British Standards published by British Standard Institution.

12.12 MATERIAL

12.12.1 Aluminium panel shall be of 4mm / 6mm thick sheet or as specified in B.O.Q. Aluminium sheet and plate shall confirm to Bs 6063 - 76 and ASTM B 209-73. Anodising sheet and plate shall confirm to S 1615 AA 20. The finished surfaces shall be factory protected with self adhesive peel-off foil to withstand exposure to local weather condition without losing the original peel of characteristic or causing stain or other damage.

12.12.2. All materials shall be free from any defect that may impair the strength, functioning, durability or appearance of the work.

12.12.3 Materials not specified shall be of the best quality and suitable for the purpose intended and as approved by the NATIS.

12.12.4 Dimensional tolerance Width : + 2.0 mm Length : + 4.0 mm Thickness : + 0.2 mm for 3 mm and 4mm thick panel + 0.3 mm for 6mm thick panel Bow : Maximum 0.5% of the length and / or width Squareness : Maximum 5.0mm Surface defect : The surface shall not have any irregularities such as roughness, buckling and other imperfections.

(a) Anchors and connections shall be provided to fully satisfy their required purpose of adjustability, movement and load transfer. (b) All anchors, connections and fixing outboard of the air seal shall be stainless steel / Hot dip galvanized.

12.12.6 Corrosion Protection

(a) All steel parts shall receive a protective treatment commensurate with their respective functions and locations. The treatment shall be one or more of those described above, and approved by the EIC.

(b) Aluminium surfaces in contact with mortar, concrete, fireproofing, plaster, masonry, or absorptive materials of any kind shall be coated with an anti-galvanic material, impervious to moisture.

12.12.7 Lightning Protection

(a) All metal cladding components, as above shall be connected to building ground by earthing jumper cables and connections.

12.12.8 Storage and Handling

(a) Materials shall be stored in a dry, well ventilated location.

12.13 PERFORMANCE

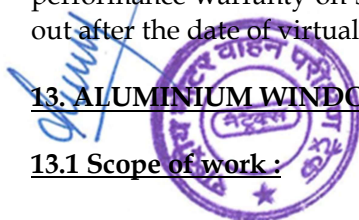
3.1 The Contractor shall demonstrate compliance with Quality Assurance Standards and submit a comprehensive Quality Assurance Programme covering all phases of the work.

12.14 GUARANTEE

The Contractor shall give guarantee against any defects in the workmanship, quality of materials or performance of Contract Works to repair or replace defective workmanship during warranty period. The Contractor shall repair defective work at his own cost. The contractor shall offer performance warranty on stamp paper of appropriate value for the entire contract works carried out after the date of virtual completion as per the directions of EIC.

13. ALUMINIUM WINDOWS & VENTILATORS

13.1 Scope of work :





The scope of work in the tender item includes fabrication supply and installation of anodized matt finished aluminium windows, ventilators, composite units, glazing etc. Strictly in accordance with these specifications and relevant detailed approved shop drawings.

13.2 General :

The contractor shall submit six copies of shop drawings covering all types. Details of work as generally shown in Architectural drawing and envisaged under these specifications before manufacture. The drawing shall show all dimensions, details of construction, installation, fixtures and relation to adjoining and related work. No fabrication work shall be undertaken prior to the approval of the shop drawings from the Engineer-in-charge. The tenderer shall intimate at the time of tendering, the types of sections he proposes to use on the works.

13.3 Materials :

The aluminium alloy used in the manufacture for extruded window section shall correspond to IS 733- 1966 (or any further revision thereof). Extruded sections shall conform to IS designation HE9-WP and Hollow sections shall conform to IS Designation HV9-WP. The frame work, stiles, mullions, beadings, transoms, hinges, pegstays, handles etc. shall be structurally suitable to withstand all the load, the members have to sustain. Contersunk screws, nuts, bolts, washers, rivets and other miscellaneous fastening devices shall be of approved cadmium plated or stainless steel as specified in the approved drawings.

13.4 Fabrication :

The frames shall be manufactured square and flat. The corners of the frames shall be fabricated to true right angles. All the fixed, sliding, openable frames shall be constructed from sections which have been cut to length, mitred and mechanically jointed or welded at the corners. Where hollow sections are used with welded joints, argon arc welding or flash butt welding shall be employed (Gas welding or brazing not to be done). Sub-dividing bars of units shall be tenoned and riveted into the frames. Water bar in aluminium section shall be provided. The dimensions shown in the drawings are overall heights and widths to the outside of frames of aluminium windows. The side hung shutters shall have projected friction type hinges of aluminium alloy. Concealed projected hinges having structural stability and of good quality will also be considered only after the inspection of the sample submitted by the tenderer. The necessary pegstays, handles, windows fasteners etc. shall be of aluminium. The handle shall be mounted on a handle plate riveted to the opening frame. The pegstays shall be 300mm. long or as required complete with peg and locking bracket and shall have holes for keeping the shutters open in three different positions. No field fabrication of frames is permitted. The complete fabricated assembly shall be anodized in approved satin finish with minimum film thickness of 0.015 mm. for the entire surface. A thick layer of clear transparent lacquer based on methacrylate or cellulose butyrate shall be applied on the finished sections for the aluminium windows etc. by the supplier to protect the surface from wet cement, lime, dirt, dust etc. during the installation. This lacquer coating shall be removed after installation is complete, if approved by the Engineer-in-charge and all sections of the windows shall be protected by the Engineer-in-charge and all sections of the windows shall be protected by P.V.C. film covering..

13.5 Hardware :

All cut outs, recesses, mortising or milling and operation required for fixing the hardware shall be accurately made reinforced with packing plate as required to ensure adequate strength of the connection. All the hardware, accessories shall be of best approved type and of anodized finish same as for the frame and other sections. All hardware shall be free from defects which may affect the appearance and serviceability. All hardware shall be fixed after obtaining the prior approval of the Engineer-in-charge. Approved samples of hardware shall be kept in the custody of Engineer-in-charge.

13.6 Fixing :

The window frames shall be accurately fixed in the brick masonry or R.C.C. work. The fixing of the frame shall be done with cadmium plated brass counter sunk screws driven on the teak wood rough grounds if required or fixed to the walls with holdfasts. All aluminium windows shall be fixed in position as per IS 1081-1960 (or any revision thereof): Code of practice for fixing and glazing of aluminium windows. All joints between metal and masonry / rough ground wooden frame shall be fully caulked and mastic or polysulphide compound in order to ensure water tight joints. Joints shall be neatly painted with matching cement and excess materials shall be removed. Hardware shall be fixed in workman like manner all as directed by the Engineer-in-charge.

13.7 Samples :

The sample of different windows shall be submitted to the Engineer-in-charge for approval.

13.8 Glazing :

The glazing shall be of Indian make plain sheet / frosted figured glass of special selected quality and size as mentioned in item description and drawings. The specifications specified herein before shall hold good as far as applicable Glazing will be paid on square metre basis.

13.9 Mode of measurement :

Payment will be made on the basis of weight of fabricated anodized aluminium frames/members/fixtures along with all fittings actually installed in position without any extra allowance for wastage.

13.10 Guarantee :

All materials and workmanship in above work shall be guaranteed for a period of one year (unless otherwise specified) from the date of handing over. Unqualified performance guarantee for smooth operations of the windows, doors, wall spans and precautionary measures against leakages etc. shall be furnished by the contractor on stamped paper. If so specified, in schedule of quantities. Any defect found during the guarantee period shall be replaced / made good to the original conditions/positions entirely at the cost of the contractor.

13.11 Testing:

All windows shall be tested for water tightness. Any leakage found during testing shall be rectified by the contractor without extra charge.

14. M.S. GRILLS/RAILING & ROLLING SHUTTERS

14.1 General :

The contractor shall submit 6 copies of shop drawings shall show all dimension, details of construction, installation relating to the adjoining work.

14.2 Materials :

All structural steel shall conform to IS 226-1963 sections for grills and shall be free from loose mill scales, rusts, pitting or any other defects affecting its strength and durability.

14.3 Fabrication:

The grills shall be fabricated to the design and pattern shown in the drawings. All joints shall be made in best workman like manner with slotting and welding as required to the specified size and shape. The edge of the M.S. flats shall be suitably mitred before welding to get the desired shape. The joints shall be filled to remove excess slag after welding screws, nuts, washers, bolts, rivets and any other miscellaneous fastenings devices shall be of steel and shall be provided by



the contractor. Manufactured M.S. Grills then be fixed in between the posts, balusters, M.S. frame work etc. to correct alignment. Any undulations, bends etc. found shall be rectified by the contractor at his own cost. The complete assembly of rill / railing so fixed shall be firm and there shall not be any lateral movements.

14.4 Samples :

Samples of grill and railings shall be submitted for approval of the Engineer-in-charge and to be got approved before taking up for mass fabrication.

14.5 Installation:

The approved grills shall be fixed in position where specified and shown in drawings including in masonry walls, teakwood frames, hand railings etc. Any damages to walls, frames etc. caused during fixing the grills shall be made good by grouting with cement mortar/packing /repairing properly at the contractors cost.

14.6 Painting :

Painting shall be done as per the specification specified under painting.

14.7 Mode of measurement :

Actual area of M.S. grill manufactured and fixed in position shall only be measured in square metre for payment. All measurements shall be taken to two places of decimal of a metre and area shall be calculated to second place of decimals of a square metre. The rate is to include the cost of all materials, labour, transporting, fabricating, installing, scaffolding if necessary, grouting etc. complete.

14.8 Finishing / Painting/Polishing for railing :

Teak wood hand rail shall be polished with wax polish / French polish / melamine with two or more coats over one coat of wood/primer or painted with two coats of synthetic enamel paint / flat oil paint of approved make and shade over one coat of approved primer. M.S. grills, balusters, etc. also to be painted as per specifications specified under Painting/ Polishing.

14.9 Mode of measurements (hand rails) :

Hand railing shall be measured for payment in running metre. The lengths shall be measured along the top center line of the hand rail and shall be measured between ends of balusters, newels, posts as the case may be upto two places of decimals of a metre. Rates shall include fabrication, leaving suitable pockets, grouting the same, providing an fixing suitable teak wood plugs, fixing, all labour, materials, transport, painting/polishing, finishing and scaffolding if necessary.

15. FLASE CEILING

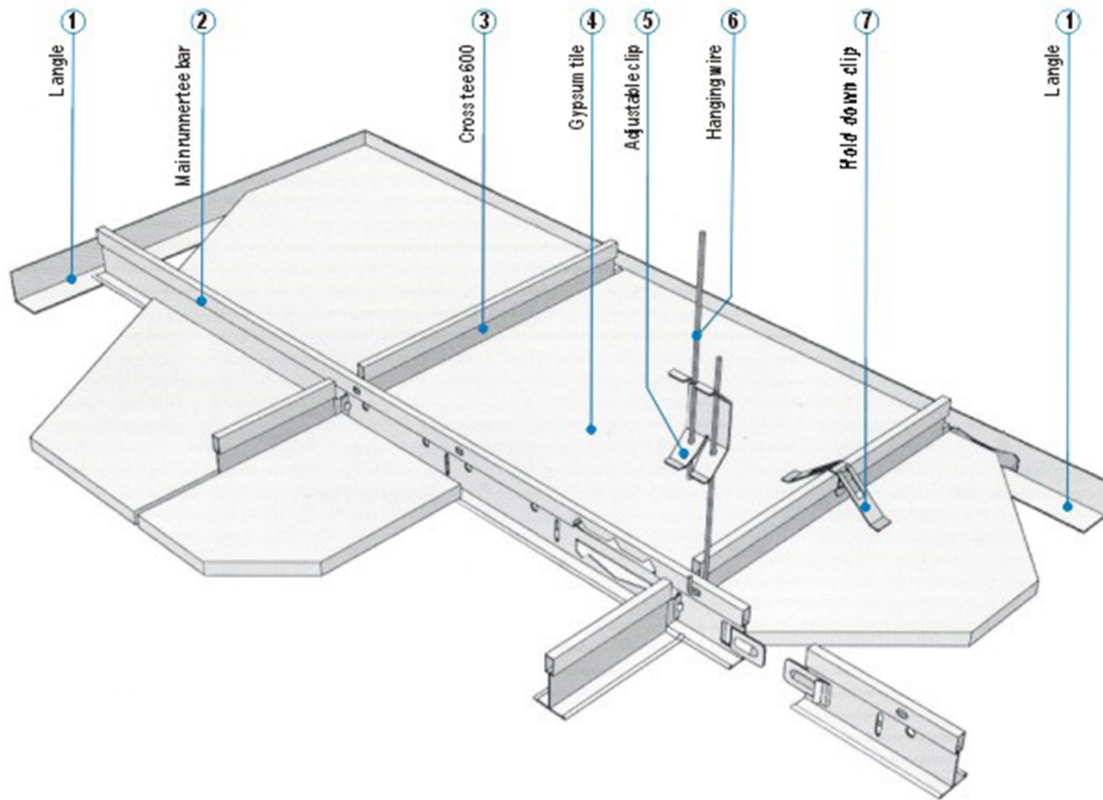
15.1 Scope of work :

The work envisaged under these specifications refer to supplying and fixing in position false ceiling at any floor, any location and at any height.(all materials approved by NATIS)

- a) Providing and fixing suitable aluminium works and grids powder coated to match the colour including adjustable /suspended hangers.
- b) Providing and fixing one layer of 10 mm thk fire proof acrylic aluminium laminated gypsum with fibre tiles , as per standard sizes.
- c) Making necessary cut out for light fitting, A.C. grills diffusers and other necessities. The work shall include horizontal, vertical and inclined surfaces depending upon the various requirements.

15.2 Frame work :

NEXT PAGE



The system is a lay in system which uses acrylic aluminium laminated gypsum panels of size 600x600mm laid on exposed suspended metal ceiling tee bar grid system. Main components and material specifications:

- (1) L angle 24 x 24 x 3000 x 0.35mm (or 0.3mm) Galvanized steel with straight edge
- (2) Main runner tee bar 38 x 24 x 3600 x 0.35mm (or 0.3mm) ; Made of galvanized steel with painted aluminium capping.
- (3) Cross tee 600 Made of galvanized steel with painted aluminium capping.
- (4) Gypsum tile 600 x 600mm, cutting size 595mm.
- (5) Adjustable clip to adjust the ceiling level, made of tempered steel.
- (6) Hanging wire 4mm galvanized wire.
- (7) Hold down clip to fix gypsum tiles.

All the components shall be of standard approved make. The grid work system shall be suspended from the soffit of RCC ceiling using anchor fasteners of approved type and make and connected to soffit cleats and ceiling angle by means of necessary nuts, bolts and washers etc.

15.3 Acrylic aluminium laminated gypsum

Acrylic aluminium laminated gypsum board of plain series 10 mm manufactured by approved makers as prescribed by NATIS shall be used.. The longitudinal edge of the Acrylic aluminium laminated gypsum board shall be of tapered / square edges, so as to have flush joints while fixing. Handling and transporting of Acrylic aluminium laminated gypsum board shall be done carefully and as recommended by the manufacture's. The board should always be kept in a dry and covered place sheltered from rain and to avoid dampness from flow, they should be supported on wooden battens which should not be more than 45cm apart on a flat surface. The material shall be stacked in piles of smaller heights and should not be stacked on edges. The

board which have deformed due to poor stacking should not be used. Cutting of board should be made in faced side of the board by means of retractable knife or by using a normal saw and the edges of the boards shall be planned using proper files.

15.4 Finishing materials:

All jointing compounds, paper tapes, primer and paints shall be with materials manufactured / recommended by EIC.

15.5 Insulation :

Perimeter channels are leveled at the required position of the finished ceiling line and fixed to the wall with the screws and nylon plugs. The remaining grid component are installed to form a regular grid suspended from the soffit of RCC slab using soffit cleats ceiling angle and anchor fasteners as specified. Extra frame for various cutouts of different shapes, light fittings, AC grills, diffusers, smoke detectors and other necessities have to be provided frame work has to be made with perimeter channel of specified size and shall be suitably supported. The line and level of the grid work has to be checked for perfection and prior clearance of the grid work has to be checked for perfection and prior clearance of the grid work has to be obtained from the Engineer-in-charge before the placement of the board. The Gyp board are fixed with bound edges at right angles to ceiling section with all joints staggered/straight.. Details of A.C. grills, diffusers, recessed type electrical fittings to be erected in false ceiling will be as per specifications and as shown in drawings. The quantities indicated are approximate and is likely to vary depending upon the site conditions. Samples of light fittings will be as per the instructions and approval of EIC.

The scope of works includes fixing with screws, fixtures etc. the recessed electrical light fittings in the grid work of false ceiling/ boxing, Marine plywood (6mm thick)/special G.I. sections, if required, shall also be provided at no extra cost. The rate quoted shall include all the above mentioned activities related to the completion of the above job.

15.6 Mode of measurement:

Measurements will be made on flat plan area basis in Sq.m calculated to 2 places of decimal. Length and breadth shall be measured corrected to a cm. No deduction shall be made for cutouts made for A.C. grills, diffusers, electrical fittings, smoke detectors etc.

16 FENCING WORK WITH BARBED WIRE, CHAIN LINK ETC.

The work shall generally be carried out as per these specifications, relevant drawings and as directed by the Engineer-in-charge.

16.1 M.S. Posts and Struts :

All the M.S. posts / struts shall be free from rust, scale, cracks, twists and other defects and shall be fabricated to the required shape and size out of the specified sections. The posts and struts shall be conforming to relevant specifications stipulated hereinbefore under relevant sections. All the posts and struts shall be of sizes and lengths as specified in the tender schedule. The exposed surfaces of the posts and struts shall be painted with two coats of approved primer.

16.2 R.C.C Posts and Struts :

All the posts and struts shall be of standard size as specified in schedule. These shall be coated on suitable places / platforms in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5 mm. nominal size) as per relevant specifications stipulated hereinbefore. The reinforcement shall be provided as hereinbefore under relevant sections. To posts and struts shall be free from honeycombing, cracks and other defects. After casting, the posts / struts shall be left at the same place and cured for a minimum period of 7 days. After 7 days curing the same shall be shifted to a leveled ground and stacked for further curing for 14 days. After 21 days of curing

only, the posts/ struts shall be transported to work site without any damage, for fixing in position.

16.3 Spacing of the Posts and Struts :

The spacing of posts shall be as directed by the Engineer-in-charge, to suit the dimensions of the area to be fenced. Every 10th posts, last but one end posts, corner posts, and posts where the level of fencing changes in steps and end post when the fencing changes its direction shall be strutted on both sides or as directed by the Engineer-in-charges. End posts where barbed wire fencing is discontinued shall be strutted on one side only.

18.4 Fixing of M.S./ R.C.C. Posts and Struts :

Pits of size mentioned in the drawings, shall first be excavated centrally in the direction of proposed fencing work, true to line and level to receive the posts. In case of struts, the pits shall be so excavated, as to receive minimum 15cm. concrete cover at any point of the struts to suit its inclination or as shown in the drawing. The pits shall be filled with a layer of 15cm. thick cement concrete of specified mix. The posts and struts shall then be placed in the pits, the posts projecting to the specified height above ground level, true to line, plumb and position, by providing adequate supports temporarily, and cement concrete of specified mix, shall then be filled in so that the posts are embedded in cement concrete blocks of specified sizes. The concrete in foundation shall be watered for at least 7 days to ensure proper curing.






Tender No. -NATRAX/PROC/C&I/23/55

Form for the submission of Financial Bid

Financial Proposal Submission Form

(To be Executed on Letterhead of the Bidder)

[Location, Date]

To:

The Head Procurement
NH-52, Old Agra- Mumbai Highway,
Near to Pithampur Flyover,
Post Khandwa (Near Pithampur)
Dhar District, Madhya Pradesh-454774

Dear Sir,

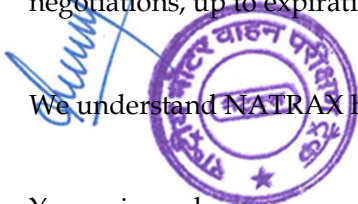
We, the undersigned, offer to provide the equipment & services in accordance with your Tender No. _____, dated _____ and our Technical Bid. Our attached Financial Bid includes the price in the format for financial bid provide as part of tender documents. The total price of our offer is _____ (in figures and words) and includes all the deliverables under this tender as per our Technical Bid.

We hereby declare that all the information and statements made in this Bid is true and complete in all respects and is as per the guidelines and terms & conditions laid down in the tender document. We further understand that any information which is found false or is not as per the guidelines and terms & conditions of the tender document may lead to our disqualification.

Our Financial Bid shall be binding upon us subject to the modifications resulting from Contract negotiations, up to expiration of the validity period of the Bid.

We understand NATRAX has right to accept or reject our Bid as per its discretion.

Yours sincerely,





Tender No. -NATRAX/PROC/C&I/23/55

Authorized Signature [*In full*]: _____

Authorized Signature [*In initials*]: _____

Name and Title of Signatory: _____

Name of Firm: _____

Address: _____.

[*Note : To be signed in blue ink*]




ANNEXURE-III-

Bill of Quantities (BOQ)/Financial Bid

Measurement Sheet

S. no	MPSOR Reference -2022	Description of Item	Unit	Quantity	Rate	Amount in Rs
A-						
1	2.3	Clearing grass and removal of the rubbish upto a distance of 50 m outside the periphery of the area cleared.	Sqm	3		
2	2.6	Earth work in excavation (Removable of BC soil) by mechanical means (Hydraulic excavator) / manual means over areas (exceeding 30cm in depth. 1.5 m in width as well as 10 sqm on plan) including disposal of excavated earth, lead upto 50m and lift upto 1.5m, disposed earth to be levelled and neatly dressed.	Cum	11		
3	4.24.2.1	PCC 1:2:4 (1 Cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size). M15 Grade	Cum	3		
4	5.9.2.2	Centering and shuttering including strutting propping etc and removal of form for	Sqm	28		
5	6.14.1	Providing half brick masonry with well burnt chimney bricks in bull patent trench kiln manufactured by ghol process crushing strength not less than 40 kg /cm ² and water absorption not more than 15% in superstructure above plinth level and up to floor two level.	Sqm	10		
		Cement mortar 1:4 (1 cement : 4 sand) 1:4 CM				
6	6.4.2	Brick work using Fly ash brick with F.P.S bricks of class designation 75 in foundation & plinth work in all shapes and size in 230 mm thick	Cum	1		
7	13.2.2	15 mm cement plaster on the rough side of single or half brick wall of mix 1:6 (1 cement :6 sand)	Sqm	20		





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8	5.30.2	Providing and laying in position cement concrete for reinforced cement concrete work, using cement sand, & aggregate in ratio of 1:11/2:3 , including laying but excluding the cost of cantering, shuttering, finishing and reinforcement, as per direction of Engineer-in-charge. M-25 Grade	Cum	1		
9	5.16.6	Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level. For lintal beam RCC plate form ,floor ans others work TMT ,For stair case RCC work	Kg	126		
10	11.49	Providing and laying Ceramic glazed floor tiles 300x300 mm or more (having thickness 6 to 7mm) of 1st quality conforming to IS : 15622 of approved make in any colours and shade laid on 20 mm thick Cement Mortar 1:4 (1 Cement : 4 sand) including pointing the joints with white cement and matching pigment etc., complete.	Sqm	10		
		(a) Size 300x300 mm thickness 9-10 mm thick floor area (garbage room (Antiskise floor tiles)				
11	11.50	Providing and fixing Ceramic glazed wall tiles 300x450 mm or more (having thickness 6 to 7 mm) of 1st quality conforming to IS: 15622 of approved make in all Colours& shades, except burgundy, bottle green, black laid on 12mm thick bed of Cement Mortar 1:3 (1 Cement: 3 sand)prepad same day when mortar is still green jointed with grey cement slurry @3.3 kg per sqm including pointing the joints with white cement and matching pigments etc., complete.	Sqm	4		
		For toilet and pantry area				
12	22.37	Providing and applying waterproofing treatment in bathroom or tiled balcony area without breaking or removing tiles, by using waterproofing sheets as per manufacturer's data sheet instructions. Permitting use of bathroom/balcony after 24 hours of application of treatment, Complete with materials and labour and gurantee of leakage for a period of 5 year.	Sqm	4		



Tender No. -NATRAX/PROC/C&I/23/55

13	11.30.2.1	Providing and fixing 18 mm thick gang saw cut, mirror polished, premoulded and prepolished, machine cut for kitchen platforms, vanity counters, window sills, facias and similar locations of required size, approved shade, colour and texture laid over 20 mm thick base cement mortar 1:4 (1 cement : 4 coarse sand), joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edges to give high gloss finish & chasing in to the tiles wall etc. complete at all levels. Granite of any colour and shade	Sqm	9		
14	13.41	Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete. (Patches work)	Sqm	46		
15	13.52	Finishing walls by any mechanical or manual means with Premium Acrylic Smooth exterior paint (Premium exterior) of required shade including all scaffolding. New work (Two or more coat applied @1.67ltr/10sqm over and including one coat undiluted exterior waterproofing coating @ 2.39 litre/10 sqm with crack bridging ability of upto 0.5mm on horizontal surfaces with an elongation of 150% and water proofing of upto 3 bars on vertical surface)	Sqm	3		
16	13.46	Wall painting with plastic emulsion paint of approved brand and manufacture to give an even shade: One or more coats on old work.	Sqm	15		
17	13.67.3	With water thinnable cement primer on wall surface having VOC content less than 50 grams/litre.	Sqm	25		
18	14.1	Repairs to plaster	Sqm	1		
19	15.14	Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 metres lead	Each	3		
20	15.51	Dismantling Manhole including RCC Top slab, C.I. Cover (90x90x45)	Each	1		



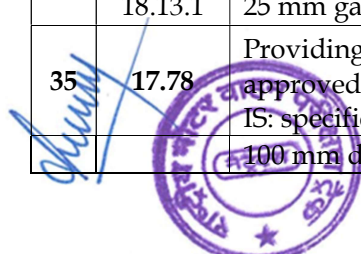
Tender No. -NATRAX/PROC/C&I/23/55

21	15.6.3	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in- Charge	Cum	2		
22	15.3	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer-inCharge.	Cum	1		
23	15.11	Dismantling tile/ Kota stone/ Marble / Granite work in floors/walls and roofs laid in cement mortar including stacking material within 50 metres lead.	Sqm	25		
24	21.5.1	Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body /plate with double spring mechanism and door weight upto 125 kg., for doors, including cost of cutting floors , embedding in	Each	2		
25	10.2	Structural steel work using M.S. flats, angles, channels I-section, H-section etc. riveted, bolted or welded in built up sections, trusses and framed work, including cutting, hoisting, fixing in position and applying a priming coat of approved steel primer all complete.	Kg	71		
26	9.95	Providing and fixing aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1000 mm) with double speed adjustment with necessary accessories and screws etc. complete.	Each	5		
27	14.37	Painting with synthetic enamel paint of approved brand and manufacture of required colour to give an even shade: One or more coats on old work.				
		Painting with synthetic enamel paint (window & ms shead)	Sqm	2		
28	9.108.3	Providing and fixing ISI marked aluminium butt hing				
		100x75x4 mm	Each	9		



Tender No. -NATRAX/PROC/C&I/23/55

29	9.110.2	Providing and fixing ISI marked aluminium Towerbolts				
		300x10mm	Each	8		
30	9.113.1	Alumimium handle				
		125 mm	Each	9		
31	9.114.2	Providing and fixing ISI marked aluminium hanging floor stopper				
		Twin rubber stoper	Each	7		
	Total- A					
B-	SANITORY & PLUMBING					
32	18.7	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, including fixing the pipe withclamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and testing of joints complete as per direction of Engineer in Charge.Internal work - Exposed on wall				
	187.3	25 MM nominal outer dia pipe (External)	Metre	12		
33	18.6	Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clampsat 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc	Metre			
	18.6.1.1	15 mm nominal outer dia Pipes		6		
	18.6.1.3	25 mm nominal outer dia Pipes		6		
34	18.13	CPVC gate valve provid ing and fixing with 25 mm dia	Each			
	18.13.1	25 mm gate valve		4		
35	17.78	Providing and fixing C.P. brass grating of approved quality and make conforming to IS: specification.				
		100 mm dia	Each	10		





Tender No. -NATRAX/PROC/C&I/23/55

36	18.61	Providing and fixing CP SS jet with flexible up to 1.0 meter long with Ssjet tragular plate assembly to including connection etc complete.	Each	5		
37	17.58	Providing and fixing unplasticised Rigid PVC soil and waste pipes conforming to IS: 13592 Type B including jointing with seal ring conforming to IS : 5382 leaving 1	Metre			
	17.58.2	100 mm dia		18		
	17.58.1	75 mm dia		6		
38	18.34	Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved make conforming to IS: 8931. 15 mm nominal bore.	Each	3		
39	14.75	Cleaning and desilting of gully trap chamber, including removal of rubbish mixed with earth etc. and disposal of same, all as per the direction of Engineer- in-charge.	Each	9		
40	19.4	Providing and laying below ground unplasticised PVC pipe to with stand working pressure of 4 kg/cm2 soild waste pipes confirming to IS:13592 and IS:4985 including jointing with seal ring confirming to IS :5282 leaving 10mm gap for thermal expansion all necessary fittings etc. complete. Excavation to be paid seperataly.				
	19.4.1	110 mm PVC down take pipe	Meter	6		
	19.4.3	200 mm diameter OD (min. wall thickness 4.9mm)	Meter	16		
41	17.59	Providing and fixing unplasticised PVC moulded fittings/ accessories for unplasticised Rigid PVC soil and waste pipes conforming to IS: 13592 Type A including jointing with seal ring conforming to IS : 5382 leaving 10 mm gap for thermal expansio				
	17.59.4	Single tee without door	Each			
	17.59.4.1	75x75x75 mm		4		
	17.59.4.2	110x110x110 mm		4		
	17.59.5	Bend	Each			
	17.59.5.1	75 mm		2		
	17.59.5.2	100 mm		8		
42	17.61	Providing and fixing UPVC trap ofself cleaning design complete. Including cost of cutting and making good the wall and floors. 100 mm inlet and 75 mm outle	Each	4		



Tender No. -NATRAX/PROC/C&I/23/55

43	19.7	Providing and fixing squaremouth S.W. gully trap class SP1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70kg as per standard design :	Each	6		
44	19.9	Constructing brick masonry manhole in cement mortar 1:4 (1 cement : 4 sand) R.C.C. top slab with Cement Concrete 1:2:4 mix (1 cement : 2 sand : 4 graded stone aggregate 20 mm nominal size), foundation concrete 1:2:4 mix (1 cement : 2 sand : 4 graded stoneaggregate 20mm nominal size) inside plastering 12mm thick with cement mortar 1:3 (1 cement : 3 sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 20mm nominal size) finished with a floating coat of neat cement complete as per standard design				
	19.9.1	Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions total weight of cover and frame to be notless than 38 kg (weight of cover 23 kg and weight of frame 15 kg)	Each	1		
45	17.72	Providing and fixing CP brass bottle trap of approved quality and make for sink and wash basin.	Each	3		
Total B)						
Total - A+B					Rs.	

Note: above quoted amount should be inclusive of all taxes and duties, delivery charges up to site etc. / नोट: उपरोक्त उद्धृत राशि में सभी कर और शुल्क, साइट तक वितरण शुल्क आदि शामिल होना चाहिए।

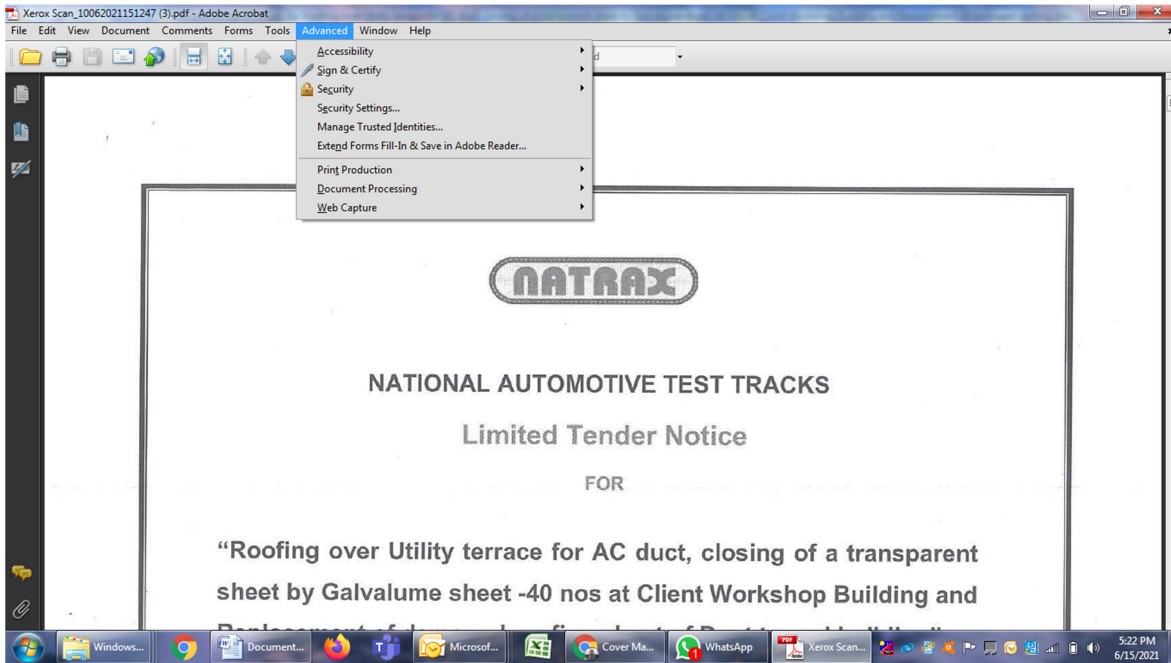


Signature of bidder

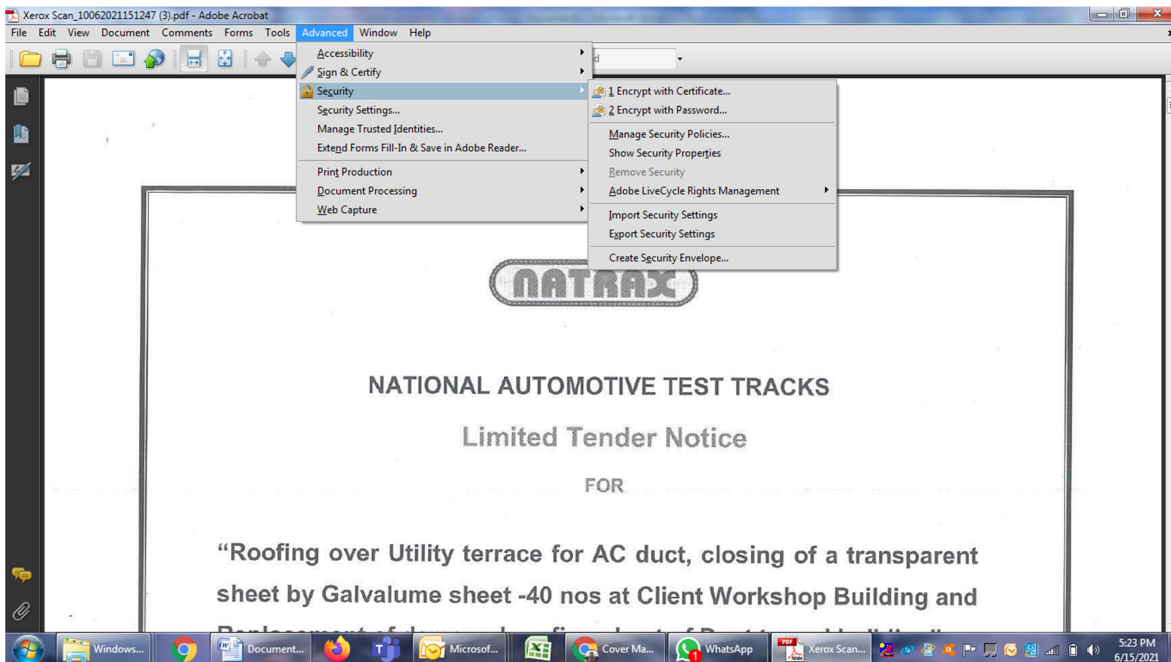


Steps for loading passwords in PDF Files-Method I

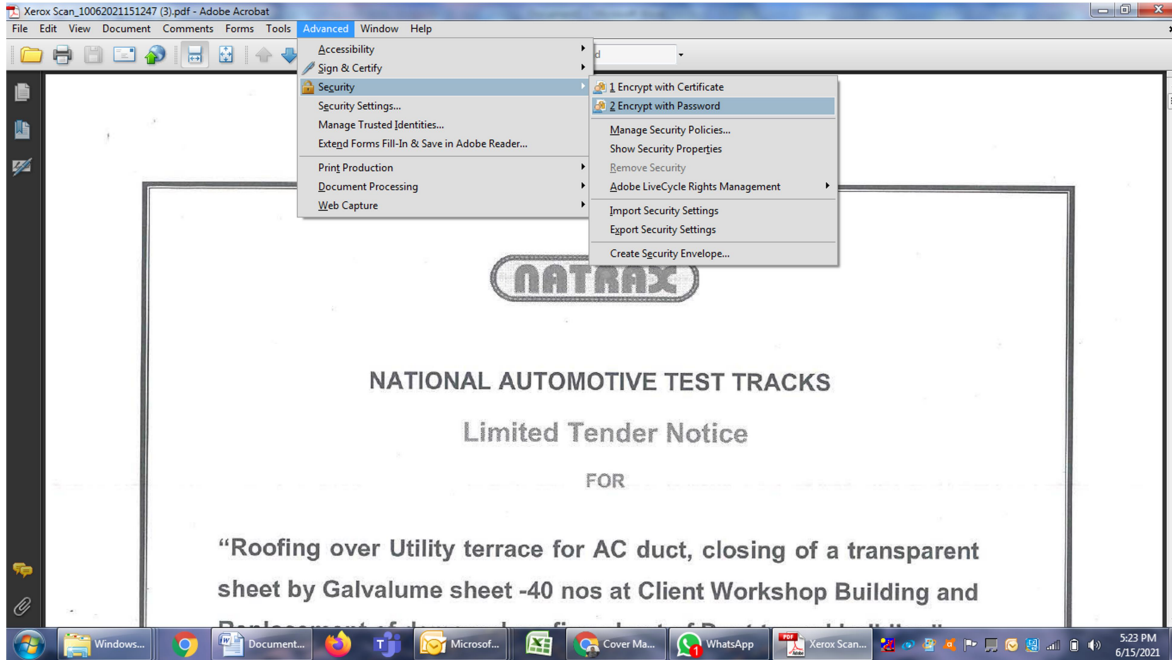
Step 1- please open PDF file and click on "Advance" tab.



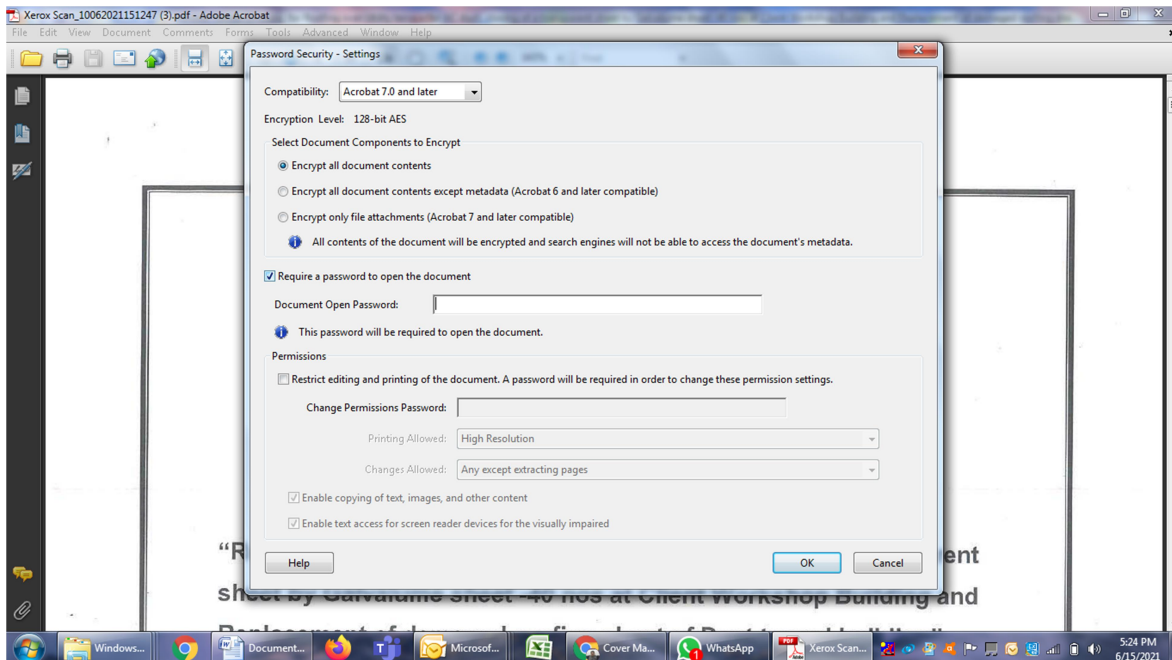
Step 2- in advance tab, please click on "Security" tab.



Step 3- in security tab, please click on "2 Encrypt with Password".



Step 4- after that below window will open, please check in option "Required a password to open the document". Then please fill password and click "ok".

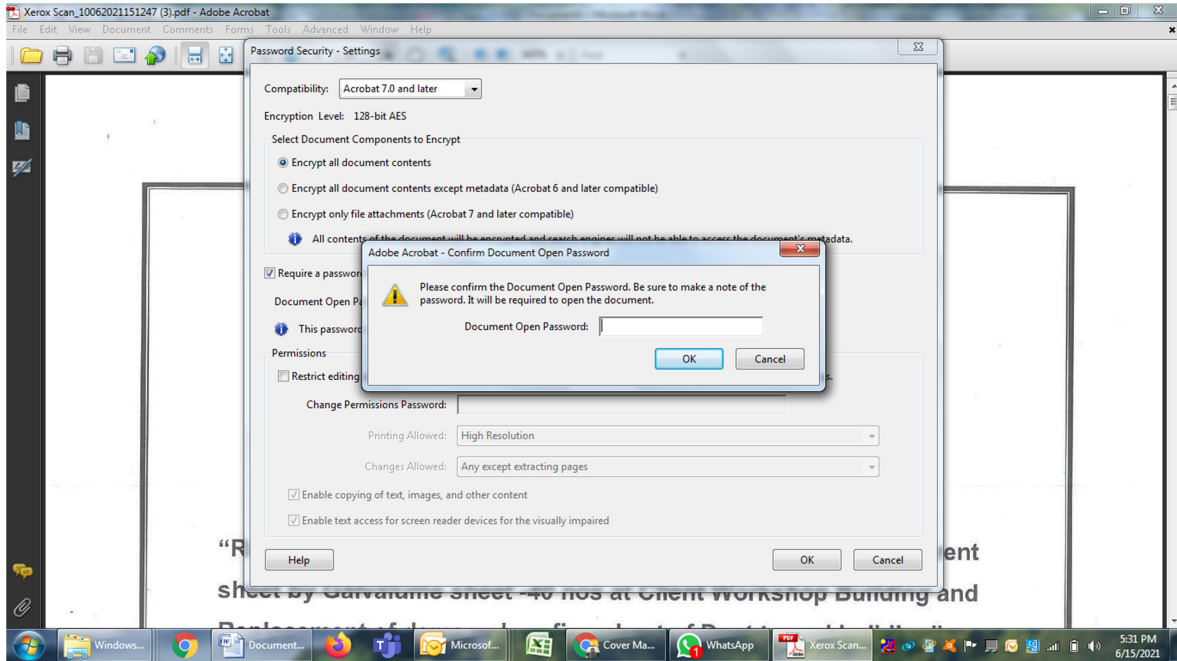


A handwritten signature in blue ink and a circular official stamp in purple ink. The stamp contains the text 'NATRAX' and 'National Automotive Test Tracks Authority' in Hindi.



Tender No. -NATRAX/PROC/C&I/23/55

Step 5- after that below window will be open, please fill same password again, and click "ok".



Handwritten signature