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GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A Central University established by the Central Universities Act, 2009)
Phone 07752-260207, fax 07752-260154 Website www.ggu.ac.in

Tender Notice No 01/Engg./2013, Dt 08/01/2013

TENDER-FORM

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कार्य का नाम–	rkykc lqn<hdj.k ,oa lkn;hdj.k dk;Z ¼02 rkykc½
कार्य की लागत–	84.50 लाख
अमानत राशि–	1,70,000/-
कार्य की अवधि–	04 माह

Name Of Contractor ……..

Due date of receipt of Tender 05/02/2013

Up to 3.00 p.m.

(Only by Registered post/speed post)

Cost of Tender Form
Rs.1,000/-
(कृपया निविदाकर्ता प्रत्येक पेज पर सील लगावें एवं हस्ताक्षर करें)

x# ?kklhnkl fo'ofo|ky;] fcykliqj N-x-
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
केंद्रीय विश्वविद्यालय अधिनियम 2009 के अंतर्गत स्थापित विश्वविद्यालय
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Tender Notice No 01/Engg./2013, Dt 08/01/2013

CERTIFICATE OF TENDER FORM

It is hereby certified that:

01- This tender form contains 60 of pages from SI. No. 01 to 60 including this page.

02- The last date & time for issue of the tender form from the office to the eligible contractor according to notification 01/ Engineering/2013/dated 08/01/13 of this tender form is 05/02/2013 up to 5:30 PM

03- Sealed tenders should reach the office of the Registrar latest by 3:00 p.m. on dated 05/02/13 and shall be opened on the same day at 4.00 p.m.

04- No word /sentence is being corrected/inserted, omitted or overwritten in these tender documents.

I/c. UNIVERSITY ENGINEER (Civil)
Guru Ghasidas Vishwavidyalaya
Bilaspur (C.G.)

REGISTRAR (Acting)
Guru Ghasidas Vishwavidyalaya
Bilaspur (C.G.)

x# ?kkl hnkl fo'ofo|ky;] fcykliqj N-x-
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
केंद्रीय विश्वविद्यालय अधिनियम 2009 के अंतर्गत स्थापित विश्वविद्यालय
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क. 01/यां./2013 बिलासपुर, दिनांक 08/01/2013

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गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) की ओर से निम्नलिखित कार्य हेतु दिनांक 05/2/13 को 3.00 बजे तक रजिस्टर्ड/स्पीड पोस्ट के माध्यम से मुहरबंद निविदा आमंत्रित की जाती है। निविदा प्रपत्र दिनांक 16/1/13 से 31/1/13 तक किसी भी कार्यालयीन दिवस पर विश्वविद्यालय यंत्री, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) के कार्यालय में आवेदन पत्र के साथ आयकर, वाणिज्यकर, उपयुक्त श्रेणी में ठेकेदारी पंजीयन, अनुभव प्रमाण पत्र एवं रूपये 1000.00 का डी0डी0 प्रस्तुत कर प्राप्त किया जा सकता है। निविदा प्रपत्र वि0वि0 की वेबसाइट www.ggu.ac.in से भी प्राप्त की जा सकती है, परंतु ऐसे डाउनलोड निविदा प्रपत्र का मूल्य रू0 1000.00 डी.डी. (वापसी योग्य नही) कुलसचिव, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) के पदनाम से देय बैंक ड्राफ्ट के रूप में निविदाकर्ता को निविदा के साथ जमा कराना होगा। निविदा दिनांक 05/2/13 को 4.00 बजे प्रशासनिक भवन सभागार में खोली जावेगी। निविदा से संबंधित अन्य जानकारी वि0वि0यंत्री कार्यालय से प्राप्त की जा सकती है।

क	कार्य का नाम	ठेके की अनु.राशि (रूपये)	अमानत राशि (रूपये)	समय अवधि	ठेकेदार की श्रेणी
1	बैरक विस्तार एवं रिनोवेशन कार्य (द्वितीय आमंत्रण)	17.35 लाख	38,000/-	02 माह	CPWD/CGPWD/ CSEB /MES/ BSNL / RAILWAY भारत सरकार के अन्य सार्वजनिक उपकमों (PSU) में उचित श्रेणी में पंजीकृत तथा पात्र ठेकेदार
2	तालाब सुदृढ़ीकरण एवं सौंदर्यीकरण कार्य (दो तालाब)	84.50 लाख	1,70,000	04 माह (वर्षा ऋतु छोड़ कर)	जल संसाधन विभाग (राज्य/केंद्र शासन/ भारत सरकार के अन्य सार्वजनिक उपकमों (PSU) में उचित श्रेणी में पंजीकृत तथा पात्र ठेकेदार

कुलसचिव

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GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
केंद्रीय विश्वविद्यालय अधिनियम 2009 के अंतर्गत स्थापित विश्वविद्यालय
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NOTICE INVITING TENDER

1. **Percentage rate** tenders are invited on behalf of the Registrar, G.G.V.Bilaspur from the approved and eligible contractors of CPWD and those of approved list of BSNL, M.E.S., Railways, C.G.State P.W.D. and C.G.State W.R.D. and other PSUs under Govt of India for the work of : rkykc lqn<hdj.k ,oa lkSan;hdj.k dk;Z ¼02 rkykc½ **at G.G.V. campus.**

ठेकेदारों का पंजीकरण निविदाओं की बिक्री की अंतिम तिथि को वैध होना चाहिए । यदि केवल निविदाओं की बिक्री की अंतिम तिथि बढ़ायी जाती है, तो ठेकेदार का पंजीकरण निविदाओं की बिक्री की मूल तिथि को वैध होना चाहिए। यदि आवेदन प्राप्ति की अंतिम तिथि एवं निविदाओं की बिक्री की तिथि, दोनों बढ़ायी जाती है, तो ठेकेदार का पंजीकरण दोनों तिथियों में से कोई यानी निविदाओं की बिक्री की मूल तिथि या निविदाओं की बिक्री की बढ़ायी गई तिथि, को वैध होना चाहिए ।

The enlistment of contractors should be valid on the last date of sale of tender. In case only the last date of sale of tender is extended, the enlistment of contractor should be valid on the original date of sale of tenders. In case both the last date of receipt of application and sale of tenders are extended, the enlistment of contractor should be valid on either of the two dates i.e. original date of sale of tender or on the extended date of sale of tenders.

1.1 कार्य की अनुमानित लागत :- 84-50 yk[k है तथापि, यह अनुमानित लागत मोटे तौर पर एक मार्ग निर्देश मात्र है।
The work is estimated to cost **Rs. 84.50 lakhs, though** this estimate is only the guiding amount.

1.1.1 मिश्रित लागत वाली निविदा आमंत्रण सूचना को अनुमोदित करने वाला तथा मुख्य डिसिप्लेन का सक्षम प्राधिकारी, निविदाएं मंगवाने के लिए निविदा आमंत्रण सूचना का समेकन करेगा और वह विश्वविद्यालय को भी नामित करेगा जो निविदाएं आमंत्रित करने से संबंधित सभी मामलों को डील करेगा।
The authority competent to approve NIT for the combined cost and belonging to the major discipline will consolidate NITs for calling the tenders. He will also nominate University which will deal with all matters relating to the invitation of tenders.

1.1.2 मिश्रित निविदा के मिश्रित अनुमान की लागत को दर्शाने के साथ–साथ प्रत्येक घटक की अलग–अलग अनुमानित लागत का उल्लेख भी किया जाए । निविदादाता की पात्रता, विभिन्न घटकों की लागत को मिलाकर मिश्रित अनुमानित लागत के अनुरूप होगी ।
For composite tender, besides indicating the combined estimated cost put to tender, should clearly indicate the estimated cost of each component separately. The eligibility of tenderer will correspond to the combined estimated cost of different components put to tender.

1.2 Tender will be issued to eligible contractors of CPWD and those of approved list of BSNL, M.E.S., Railways, C.G.State P.W.D., C.G.State W.R.D., other PSUs under Govt of India and CPWD contractor registered in class II shall be eligible provided they produce definite proof from the appropriate authority, which shall be to the satisfaction of the competent authority, of having satisfactorily completed similar works of magnitude specified below:-

Three similar works each of value not less than **40% of estimated cost or** two similar works each of value not less than **50% of estimated cost** or one similar work of value not less than 80% **of estimated cost** in the period of last seven years ending **31.12.2012** (Similar work' means 'pitching work & Stone) The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum, calculated from the date of completion to the last date of receipt of applications for tender.

2. सफल निविदाकारो के साथ, निर्धारित निविदाकार उक्त प्रपत्र जो करार का हिस्सा होगा, निविदाकार उक्त प्रपत्र जो करार का हिस्सा होगा के विभिन्न निबंधन एवं शर्तों के अनुसार अपनी दरें बतायेगा।
Aggreement shall be drawn with the successful tenderer on standard form. Tenderer shall quote his rates as per various terms and conditions of the said form, which will be part of agreement.

3. दर की वैधता अनुबंध की तिथि से 12 माह के लिये होगी।
validity of rate is for 12 months from date of aggrement.

4. कार्य हेतु कार्य स्थल उपलब्ध है ।
The site for the work is available.
अथवा Or
कार्य हेतु कार्यस्थल नीचे लिखे अनुसार भागों में उपलब्ध करा दिया जाएगा :–
The site for the work shall be made available in parts as specified below:-

5. प्रपत्र जारी करने हेतु आवेदन 16/01/2013 (शाम 5.30 बजे तक) प्राप्त किए जाएंगे तथा निविदा दस्तावेज 31/01/13 तक जारी किए जाएंगे । वि वविद्यालय की वेब साइट से फार्म प्राप्त करने के लिये कोई अंतिम तिथि नही है।
Applications for issue of forms shall be received by 16/01/2013 (5.30 PM) and tender documents shall be issued by 31/01/2013 There is no last date for downloading tender form from University website.

रेखांक, विनिर्देश, कार्य के विभिन्न वर्गो के लिए मात्राओं की अनुसूची के सहित निविदा कागजात एवं ठेके की भार्तो का सैट जिनका उस ठेकेदार द्वारा अनुपालन किया जाना है, जिसकी निविदा स्वीकृत हो जाए तथा अन्य आव यक कागजात 16@01@13 से **31/01/13** तक रविवार एवं सार्वजनिक छुट्टियों को छोड़कर, प्रतिदिन कार्यालयीन दिवस के बीच विश्वविद्यालय यंत्री, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) के कार्यालय मे देखे जा सकते है । मानक प्रपत्र को छोड़कर, निविदा कागजात उक्त कार्यालय से ऊपर निर्दिष्ट समय के दौरान निविदा की लागत के तौर पर रू. 1,000/ की डी.डी. (वापसी योग्य नही)से भुगतान कर प्राप्त किए जा सकेंगे।
Tender documents consisting of plans, specifications, the schedule of quantities of the various classes of work to be done and the set of terms & conditions of contract to be complied with by the contractor whose tender may be accepted and other necessary documents can be seen in the office of the University Engineer, Guru Ghasidas University, Bilaspur (C.G.) between working hours from 16/01/2013 to 31/01/2013 everyday except on Sundays and Public Holidays. Tender documents, excluding standard form, will be issued from his office, during the hours specified above, on payment of Rs. **1,000/-** by demand **draft** (non-refundable) as cost of Tender.

6. The tender and the earnest money shall be placed in separate sealed envelopes each marked- "Tender" and "Earnest Money" respectively.
The tenderer who takes the tender form from website, shall put the DD of Rs. 1,000/- & EMD along with the required documents in first sealed envelope & the filled tender form in 2nd sealed envelope. First sealed envelope marked- DD, EMD & Documents, 2nd sealed envelope marked- Tender. Without proper submission of Documents, DD & EMD, the tender may not be considered.

7. The contractor, whose tender is accepted, will be required to furnish performance guarantee of 5% (five percent) of the tendered amount within the period specified in schedule 'F'. This guarantee shall be in the form of cash (in case guarantee amount is less than Rs. 10,000/-) or Deposit at call receipt of any scheduled Bank / Banker's cheque of any scheduled Bank / Demand Draft of any scheduled Bank / Pay order of any scheduled bank (in case guarantee amount is less than Rs.1,00,000/-) or Government Securities or Fixed Deposit Receipts or Guarantee Bonds of any Scheduled Bank or the State Bank of India in accordance with the prescribed form. In case the contractor fails to deposit the said performance guarantee within the period as indicated in Schedule "F" including the extended period if any, the Earnest Money deposited by the contractor shall be forfeited automatically without any notice to the contractor.

8. कार्य का व्यौरा इस प्रकार है ।
The description of the work is as follows तालाब सुदृढ़ीकरण एवं सौंदर्यीकरण कार्य (02 तालाब)

निविदाकारों द्वारा जॉच के लिए कार्यो से संबंधित अन्य नक्शों तथा कागजातों की प्रतियां उपर्युक्त अधिकारी के कार्यालय मे खुली रहेगी
Copies of other drawings and documents pertaining to the works will be open for inspection by the tenderers at the office of the above mentioned officer.

निविदाकारों को सलाह दी जाती है कि वे निविदा प्रस्तुत करने के पहले कार्यस्थल एवं उसके आस पास की जगह, जमीन की प्रकृति एवं अनमृदा (जहां तक व्यवहार्य हो), कार्य स्थल का रूप एवं प्रकृति, कार्य स्थल तक पहुंचने के साधन, स्थान जो उन्हें चाहिए उसका निरीक्षण व जॉच कर लें तथा जोखिम, आकस्मिकता एवं अन्य परिस्थितियों से, जो निविदा को प्रभावित कर सकती है, संबंधित आवश्यक जानकारी स्वयं प्राप्त कर, संतुष्ट हो ले। यह माना जायेगा कि निविदाकार को कार्यस्थल के बारे में पूरी जानकारी है, चाहे उसने इसका निरीक्षण किया हो या नही, तथा बाद में किसी भ्रॉति या अन्य बातों के लिए कोई अतिरिक्त प्रभार अनुमत्य नहीं होगा। कार्य निष्पादन हेतु सभी प्रकार की सामग्री, औजार एवं संयंत्र, जल, बिजली लाने के साधन, कामगारों के लिए सुविधाएं तथा अन्य अपेक्षित सेंवाओं का प्रबन्ध करने तथा उनके रख रखाव का उतरदायित्व स्वयं निविदाकार का होगा, जब तक अन्यथा विशेष रूप से करार में इसका उल्लेख न किया गया हो। निविदाकार द्वारा निविदा प्रस्तुत करना यह सूचित करता है कि उसने इस सूचना एवं अन्य सभी करार–दस्तावेजो को पढ़ लिया है तथा उसे किए जाने वाले कार्य का अभिप्राय एवं विनिर्देशों, शर्तो व दरें जिन पर सरकार द्वारा उन्हें सामान, औजार एवं संयंत्र आदि दिए जाएगें तथा स्थानीय स्थितियां और अन्य कारक जो कार्य में निष्पादन पर प्रभाव डालें, के बारे में पूरी जानकारी है ।

Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed. The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant. etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

9. विश्वविद्यालय न्यूनतम या किसी अन्य निविदा को स्वीकार करने के लिए अपने आप को आबद्ध करता हैं और प्राप्त हुए किसी भी निविदा या सभी निविदाओं को बिना कारण बताए अस्वीकार करने का अधिकार अपने पास सुरक्षित रखता हैं । ऐसी सभी निविदाओं को जिनमें विहित शर्ते पूरी नहीं की गई हों अथवा निविदाकार द्वारा स ार्त छूट दिए जाने सहित किसी शर्त को रखा गया हो, अस्वीकार कर दिया जाएगा ।

The GGV does not bind itself to accept the lowest or any other tender, and reserves to itself the authority to reject any or all of the tenders received without the assignment of any reason. All tenders, in which any of the prescribed conditions are not fulfilled or any condition including that of conditional rebate is put forth by the tenderer shall be summarily rejected".

10. निविदाओं के मामले में किसी भी प्रकार के प्रत्यक्ष या अप्रत्यक्ष प्रेरण का पूर्णतया निषेध है तथा उन ठेकेदारों की निविदाएं, जो प्रेरण का सहारा लेंगे, अस्वीकार कर दी जाएंगी।

Canvassing whether directly or indirectly, in connection with tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection.

11. विश्वविद्यालय पूरी निविदा या उसके किसी भाग को स्वीकार करने का अधिकार अपने पास सुरक्षित रखते है तथा निविदाकार, कथित दर पर निष्पादन के लिए बाध्य होगा।

The GGV on behalf of the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rate quoted.

12. ठेकेदार को विश्वविद्यालय में, (उद्यान /नर्सरी कैटेगरी के ठेकेदारों के लिये –डिवीजन) जो ठेके देने और उसके निष्पादन के लिए उतरदायी है। जिसमें उसका नजदीकी रिश्तेदार मंडल लेखाकार या अधीक्षण इंजीनियर एवं कनिष्ठ इंजीनियर (दोनों को मिलाकर) की श्रेणियों के बीच किसी भी हैसियत के अधिकारी के रूप मे तैनात हो, कार्यो के लिए निविदा देने की आज्ञा नही होगी। यह उन व्यक्तियों के नामों को भी सूची देगा जो किसी भी हैसियत में उसके साथ कार्य कर रहें हों या जिन्हे उसके द्वारा बाद में भर्ती किया गया हो तथा जो केन्द्रीय लोक निर्माण विभाग या भाहरी विकास मंत्रालय में कार्यरत किसी राजपत्रित अधिकारी के नजदीकी रिश्तेदार हो । यदि ठेकेदार इस शर्त को भंग करेगा तो उसका नाम इस विभाग की ठेकेदारों की अनुमोदित सूची से हटा दिया जाएगा।

The contractor shall not be permitted to tender for works in the CPWD Circle (Division – in case of contractor of Horticulture / Nursery category) responsible for award and execution of contracts in which his near relative is posted as Divisional Accountant or as an officer in any capacity between the grades of Superintending Engineer and Junior Engineer (both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives to any gazetted officer in the Central Public Works Department or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractors of this Department.

13. भारत सरकार के किसी इंजीनियरी विभाग में इंजीनियरी या प्रशासनिक कार्यो में लगे हुए राजपत्रित रैंक के किसी इंजीनियर को या किसी अन्य राजपत्रित अधिकारी को सरकारी नौकरी से सेवा मुक्त होने पर एक साल तक, भारत सरकार की पूर्व लिखित अनुमति बिना ठेकेदार की हैसियत से काम करने की अनुमति नहीं है । यदि किसी समय यह पाया गया कि ठेकेदार या उनका कोई कर्मचारी, ऐसा व्यक्ति है जिसने निविदा प्रस्तुत करने से पहले या ठेकेदार की सेवा में लगने के पहले भारत सरकार से अनुमति नहीं ली थी, तो यह ठेका रद्द किया जा सकता है।

No Engineer of gazetted rank or other Gazetted officer employed in Engineering or Administrative duties in an Engineering Department of the Government of India is allowed to work as a contractor for a period of one year after his retirement from Government service, without the previous permission of the Government of India in writing. The contract is liable to be cancelled if either the contractor or any of his employees is found any time to be such a person who had not obtained the permission of the Government of India as aforesaid before submission of the tender or engagement in the contractor's service.

14. कार्यो के लिए निविदा, निविदाओं के जमा होने की अंतिम तारीख से 90 दिन तक स्वीकृति हेतु खुली रहेगी। यदि निविदाकार उक्त अवधि के पहले या स्वीकृति पत्र जारी होने के पहले, जो भी पहले हो, से पहले अपनी निविदा वापिस ले लेता है या निविदा की शर्तो और निवंधनों में कोई संशोधन करता है जो विभाग को स्वीकार्य नहीं है, तो विश्वविद्यालय किसी अन्य अधिकार या उपचारी उपाय पर प्रतिकूल प्रभाव डाले बिना ऊपर किए गए उल्लेख के अनुसार उक्त धरोहर राशि का 50 का प्रतिशत जब्त करने के लिए स्वतंत्र होगी। इसके अतिरिक्त, निविदाकार को पुनः निविदा प्रक्रिया में भाग लेने की अनुमति नहीं दी जाएगी ।

The tender for the works shall remain open for acceptance for a period of Ninety days from the date of opening of Tenders. If any tenderer withdraws his tender before the said period or issue of letter of acceptance which ever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the department, then the University shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money as aforesaid. Further, the tenderer shall not be allowed to participate in the retendering process of the work.

15. यह निविदा आमंत्रण सूचना, करार दस्तावेज का एक हिस्सा होगी। सफल निविदाकार/ठेकेदार, स्वीकरकर्ता प्राधिकारी द्वारा निविदा स्वीकार किए जाने के बाद कार्य प्रांरम्भ किए जाने की निर्धारित तिथि से 15 दिनों के भीतर निम्नलिखित को भाामिल करते हुए संविदा पर हस्ताक्षर करेगाः–

This Notice inviting tender shall form a part of the contract document. The successful tenderer/contractor, on acceptance of his tender by the Accepting Authority, shall within 15 days from the stipulated date of start of the work sign the contract consisting of :-

क) निविदा आमंत्रण सूचना, अतिरिक्त शर्तो सहित सभी कागजात, विनिर्देश एवं नक्शे, यदि कोई हों, जो निविदा आमत्रण के समय निविदा के रूप में जारी किए गए हों तथा इस बारे में किए गए किसी पत्राचार सहित इसकी स्वीकृति।

a) The notice inviting tender, all the documents including Particular specifications & special conditions and drawings, if any, forming the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.

ख) मानक प्रपत्र लागू होगा।

Standard format will be applicable.

fefJr lfonkvk dk fy,

For Composite Tenders

16.1.1: The tender document will include following three components:

Part A :- NIT including schedule A to F for major component of the work, Standard General Conditions of Contract for CPWD 2008 or latest addition as applicable with all amendments / modifications.

Part B:- General/specific conditions, specifications and schedule of quantities applicable to major component of the work.

16.1.2 : The tenderer must associate with himself, agencies of the appropriate class eligible to tender for the minor components individually.

16.1.3 : The eligible tenderers shall quote rates for all items . It will be obligatory on the part of the tenderer to sign the tender document for all the components (The schedule of quantities, conditions and special conditions etc.) in appropriate page % above/ at per/below of SOR.

16.1.4 : After acceptance of the tender by competent authority, the Registrar GGV shall issue on behalf of Vishwavidyalaya.

16.1.5 : Entire work under the scope of composite tender including major and all minor components shall be executed under one agreement.

16.1.6 : Security Deposit will be worked out for estimated cost. The Earnest Money will become part of the security deposit of the major component of work.

17 **In respect of percentage rate tenders:-** contractor should quote his separate tender **percentage rate** above or below or at par the following schedule of rates.

(a) Building Work: including water supply & Sanitary fittings - The Schedule of rates issued by **E-in-C PWD. Raipur** in force from 2009and amended up to the date of 18/02/2012.

(b) Bridge works: - the Schedule of rates issued by the E-in-c, PWD Raipur in force with effect from **2009** and amendments issued up to 18/09/2012.

(c) Pond work:- The schedule of rates issued by the E-in-C WRD Raipur inforce with effect from 01/08/2010.

18 : **Deviatioin / Variation Extent and Pricing:** The Engineer Incharge shall have power (i) to make alteration in omissions from , addition to or substitutions for the original specification, drawings. Designs and instruction that may appear to him to be necessary or advisible during the progreress of the work and (ii) to omit a part of the in case of non- availability of a portion of the site or for any other reasons and the contractor shall be bounf to carry out the work in accordance with any instructions given to him in writing singed by the Engineer-in-charge and such originally. Omission. Adition or substitutions shall from part of the conractor as if originally provided therein and any altered, additional or substituted work which the contractor may be directed to do in the manner specified as part of the work, shall be carried out by the contractor on the same condition in all including price on which he agreed to do the main work except as hereafter provided.

18.1 The time for completion of the work shall, in the event of any deviations resulting in additional cost over the tendered value sum being order, be extended, if requested by contractor, as follows:

i) In the proportion which the addition cost of the altered, additional or substituted work , bear to the original tendered value plus.

ii) 25% of the time calculate in (i) above or such further additional time as may be considered reasonable by the Engineer-in-charge.

18.2 Rater of such altered, additional or substituted work shall be determined by Engineer-in-charge as follows:

i) In the rate for altered, additional or substituted item of work is specified in the schedule or rate , the contractor shall carryu out the altered, addition or substituted item at the same rate. Accepted tendr rate shall be applied for it.

ii) If the rate foe any altered, additional or subatituded item of work is not specified in the schudle of rate, the rate for that items shall be derived from the rate the nearest similar iten specified therein. Accepted tender shall be applicable for it.

iii) If the rate for any altyered, additional or substituted item of work cannot be determined in the manner specified in sub- paras (i) & (ii) above, the contractor shall within 15 days of the date or receipt of the order to carry out the said work, inform the Engineer-in-charge or the rate which he proposed to claim for such item of work, supported by analysis mounth thereafter, after giving due consideration to the rate claimed by contractor , determines the rate on the basis of market rates. In the event of the contractor failing to inform the Engineer-in-charge within the stipulated period of time, the rate which he propose to claim, the rate which he proposed to claim, the rate for such item shall be determined by the Engineer-in-charge on the basis of market rates. Tender percentagerate shall not be applicable on this determined rate. The university authority has right to accept finally the above said rates based on the rate analysis as given.

19 विश्वविद्यालय द्वारा वि0वि0 हित में निविदा में दी गई नियम व शर्त में आंशिक सशोधन करने, एवं किसी नियम / शर्त को शिथिल करने का पूर्ण विशेषाधिकार विश्वविद्यालय के पास सुरक्षित रहेगा एवं निविदाकर्ता पर बंधनकारी रहेगा।

20 कार्य की गुणवत्ता (Quality) सिंचाई विभाग जल संसाधन विभाग के स्पेशीफिकेशन अनुसार होगी।

21. वि0वि0 के पास यह अधिकार सर्वथा सुरक्षित रहेगा कि निविदा में उल्लेखित किसी भी कार्य को संपादित करावे अथवा बिना कोई कारण बताये वि0वि0 हित में ऐसे किसी भी कार्य को कराने से मना कर देवे । साथ ही वि0वि0 के पास यह भी अधिकार सर्वथा सुरक्षित रहेगा कि निविदा में उल्लेखित किसी भी कार्य को बिना कोई कारण बताये कराने से मना कर देवे ।

22 किसी भी विवाद की स्थिति में पहली अपील dy lfpo] गुरू घासीदास विश्वविद्यालय बिलासपुर (छ.ग.) को विवाद उत्पन्न होने की तिथि के एक सप्ताह के अंदर तथा द्वितीय अपील दो सप्ताह के अंदर dyifr egkn;] को किया जा सकेगा । माननीय कुलपति, गुरू घासीदास वि0वि0, बिलासपुर (छ0ग0), निर्णय हेतु प्रकरण को किसी भी आरबीट्रेटर के पास भेज सकेगे (आर बी ट्रेशन एक्ट के अनुसार)। ऐसे प्रकरण में कुलपति जी के स्वयं का निर्णय या आरबीट्रेटर का निर्णय सर्वमान्य होगा ।

23 न्यायालयीन विवाद की स्थिति में बिलासपुर (छ0ग0) न्यायालय का क्षेत्राधिकार ही मान्य होगा ।

सहायक यंत्री

प्र0वि0वि0यंत्री

x: ?kklhnkl fo'ofo|ky;] fcykliqj ¼N0x0½

GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR(C.G.)

dk;k dh fy, izfr'kr nj fufonk
Percentage Rate Tender & Contract for Works

(A) कार्य के लिए निविदा :
Tender for the work of rkykc lqn<hdj.k ,oa lkbZn;hdj.k dk;Z ¼02 rkykc½

(i) क) दिनांक 05@02@13 को 3.00 बजे तक कुलसचिव, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) में प्रस्तुत की जानी है ।
To be submitted by 3.00 pm hours on 05@02@13 to Registrar GGV. Koni, Bilaspur (C.G.)
(time) (date)

(ii) ख) उन निविदाकारों के समक्ष खोली जांएगी जो दिनांक 05@02@13 को 4.00 बजे प्रशासनिक भवन सभागार, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) के कार्यालय में उपस्थित रहेगे।
To be opened in presence of tenderers who may be present at 4.00 pm- hours on 05@02@13 in the office of the conference hall, Adm. Building, Guru Ghasidas University, Bilaspur (C.G.)

सेवा में प्रेषित Issued to :_____ _____
(ठेकेदार) (Contractor)

कागजात जारी करने वाले अधिकारी के हस्ताक्षर :

Signature of officer issuing the documents _____

in Designation

विश्वविद्यालय यंत्री, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0)

University Engineer, GGU Bilaspur (C.G.)

जारी करने की तारीख Date of Issue : _____

Registrar(Acting)
GGV. Bilaspur (C.G.)

fufonk **T E N D E R**

मैंने/हमने कार्य के लिए निविदा आमंत्रण सूचना, अनुसूची क,ख,ग,घ, ड., और च, लागू विनिर्देश, नक्शे एवं डिजाइन, सामान्य नियम एवं निर्देश, ठेके के उपबंध, विशिष्ट शर्तो, दर अनुसूची एवं अन्य कागजात तथा ठेके की शर्तो, में दिए गए नियम तथा निविदा कागजात में उल्लिखित अन्य बातों को पढ़ व जांच लिया है।

I/We have read and examined the notice inviting tender, schedule, A,B,C,D,E & F, specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work.

मै/हम, एतत् द्वारा भारत के राष्ट्रपति के लिए अनुसूची 'च' में विनिर्दिष्ट समय के भीतर विनिर्दिष्ट कार्य, यथा–मात्राओं की अनुसूची तथा सभी संबंधित विनिर्देशों, डिजाइनों, नक्शे के अनुरूप तथा सामान्य नियमावली के नियम–1 और ठेके की शर्तों के खंड–11 में उल्लिखित लिखित अनुदेशों एवं ऐसी सामग्रियों, जो प्रदान की जाती है और उसके संबंध में, ऐसी शर्तें जो लागू हो, के अनुरूप निष्पादन हेतु निविदा देता हूं/देते हैं ।

I/We hereby tender for the execution of the work specified for the President of India within the time specified in Schedule 'F', viz., schedule of quantities and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule-1 of General Rules and Directions and in Clause 11 of the Conditions of contract and with such materials as are provided for, by, and in respects in accordance with, such conditions so far as applicable.

हम निविदा को, इसके जमा होने की निर्धारित तारीख से 90 दिनो के लिए खुला रखा जाने के लिए सहमत है।

We agree to keep the tender open for Ninety (90) days from the due date of its opening.

:- **1,70,000=00** की धनराशि, धरोहर राशि के रूप में नकद/ ट्रेजरी चालान रसीद/अनुसूचित बैंक की मांग जमा रसीद/ अनुसूचित बैंक की सावधी जमा रसीद /अनुसूचित बैंक का डिमांड ड्राफ्ट/ अनुसूचित बैंक द्वारा जारी बैंक गारंटी के रूप में इसके साथ भेजी जा रही है। यदि मैं / हम निर्धारित निष्पादन गारंटी को निर्धारित समय अवधि में प्रस्तुत करने में असफल रहते हैं तो मैं/ हम यह मंजूर करते है कि कुलसचिव, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) या उनके कार्यालय के उत्तराधिकारी किसी अन्य अधिकार या उपचारी उपाय पर प्रतिकूल प्रभाव डाले बिना उक्त धरोहर राशि जब्त करने के लिए पूर्णतया स्वतंत्र होंगे । इसके अलावा, यदि मैं/हम विनिर्दिष्ट कार्य प्रारंभ करने में असफल रहते हैं तो मैं/ हम यह मंजूर करते हैं कि कुलसचिव, गुरू घासीदास विश्वविद्यालय, बिलासपुर (छ0ग0) या उनके कार्यालय के उत्ताधिकारी कानून में उपलब्ध किसी अन्य अधिकार या उपचारी उपाय पर प्रतिकूल प्रभाव डाले बिना उक्त धरोहर राशि, तथा निष्पादन गारंटी जब्त करने के लिए पूर्णतया स्वतंत्र होंगे अन्यथा उक्त धरोहर रा ि। निविदा कागजात के अनुसार उसमें निहित शर्तों व निबंधनों के अनुसार कार्यो के निष्पादन एवं आदिष्ट विचलनों को अनुसूची 'च' में वर्णित प्रतिशत से अनधिक व निविदा प्रपत्र के खण्डों 12.2 व 12.3 में निहित प्रावधानों के अनुसार निश्चित की जाने वाली दरों पर उस सीमा से अधिक के विचलनों के करने के लिए उनके द्वारा प्रतिभूति–निपेक्ष के रूप में रोक ली जाएगी। इसके अतिरिक्त मैं/हम सहमत हैं कि बयाना राशि या बयाना राशि तथा उपर्युक्त निष्पादन गारंटी जब्त हो जाने के मामले में मुझे/हमें कार्य की पुनः निविदा प्रक्रिया में भाग लेने से रोक दिया जाएगा ।

A sum of **Rs.**1,70,000=00 is hereby forwarded in cash/receipt treasury challan / deposit at call receipt of scheduled bank / fixed deposit receipt of scheduled bank / demand draft of a scheduled bank/bank guarantee issued by a scheduled bank as earnest money. If I/We fail to furnish the prescribed performance guarantee within prescribed period, I/we agree that the said Registrar, GGV, Bilaspur (C.G.) or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I/We fail to commence work as specified, I/We agree that Registrar, GGV or his successors in office shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carry out such deviations as may be ordered, upto maximum of the percentage mentioned in Schedule 'F' and those in excess of that limit at the rates to be determined in accordance with the provision contained in Clause 12.2 and 12.3 of the tender form. Futher, I/we agree that in case of forfeiture of earnest money or both earnest money and performance guarantee as aforesaid, I/We shall be debarred for participation in the re-tendering process of the work.

मैं/हम एतत् द्वारा घोषणा करते है कि मै/हम निविदा कागजातों, नक्शे और कार्य से संबंधित अन्य अभिलेखों को गुप्त/गोपनीय कागजात के रूप में रखेगे और उनसे प्राप्त/ली गई जानकारी किसी अन्य को, जिन्हें मैं/हम सूचित करने के लिए प्राधिकृत हो, से भिन्न किसी को, नहीं बताएगें या जानकारी को किसी ऐसे रूप में प्रयोग नही करेंगे जो राज्य की सुरक्षा के लिए प्रतिकूल हो।

I/We hereby declare that I/we shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived therefrom to any person other than a person to whom I/We am/are authorised to communicate the same or use the information in any manner prejudicial to the safety of the State.

I/we have done myself/ourself fully satisfied to read & examine the notice inviting quotation, general conditions contract, all specials conditions & specifications of work, applicable specifications, drawings, designs, applicable schedule of rates, descriptions, all the rules in respect of contract and all other contents in the notice and here by agreed for execution of the said specified work for the University Authority within the time period in accordance with that at the rate

(in figures) ……..……...……..

(in words) ……..……..

Percent below/at par/above of Schedule of Rates C.G.

Dated…… Signatures of the contractor

Postal Address:

Witness:

Address:

Occupations:

नीचे दिए गए पत्र इस ठेका करार का हिस्सा होंगे।

The letters referred to below shall form part of this contract Agreement:-

a)

b)

c)

d|y lfpo ¼iHkkj½
Registrar (Acting)

हस्ताक्षर Signature .....
तारीख Dated .....

vuqlfp;k **SCHEDULES**
FOR (CIVIL) COMPONENT

vuqlph ^d* **SCHEDULE 'A'**
मात्राओं की अनुसूची (संलग्न)

Schedule of quantities (Enclosed)

vuqlph ^[k* **SCHEDULE 'B'**
ठेकेदार की निर्गत की जाने वाली सामग्रियों की अनुसूची
Schedule of materials to be issued to the contractor.

क्रम. सं. S.No.	मद विवरण Description of item	मात्रा Quantity	जिस दर पर सामग्रियां ठेकेदार को प्रभारित होगी वह दर अंकों एवं भाब्दों में Rates in figures & words at which the material will be charged to the contractor	निर्गत स्थान Place of Issue
1	2	3	4	5

------- NIL --------

vuqlph ^x*
SCHEDULE 'C'

ठेकेदार को भाड़े पर दिए जाने वाले औजार एवं संयत्र
Tools and plants to be hired to the contractor

क्रम सं. Sl. No.	विवरण Description	भाड़ा प्रभार प्रतिदिन Hire charges per day	निर्गत स्थान Place of Issue
1	2	3	4

------- NIL --------

vuqlph ^?k* **SCHEDULE 'D'**
कार्य के लिए वि शेष अपेक्षाएं/दस्तावेज, यदि कोई हों, की अतिरिक्त अनुसूची

Extra schedule for specific requirements/documents for the work, if any.

-----Nil-----

vuqlph ¼M½ **SCHEDULE 'E'**

मूल्य वृद्धि के लिए सीमेंट, इस्पात, अन्य सामग्री आदि के घटकों की अनुसूची–
Schedule of component of other materials, Labour POL etc. for price escalation –
Note- No Escalation shall be given by GGV., Neither any claim for the escalation will be entertain.

Clause 10 CC --- This clause is not applicable.

Component of civil (Except materials covered under clause 10 CA) /Electrical construction materials expressed

as percent of total value of work	**Xm**	**30%**
Component of labour expressed as percent of total value of work.	**'Y'**	**25**%
Component of P.O.L. expressed as percent of total value of work.	**'Z'**	**Nil**%

vuqlph ^p* **SCHEDULE 'F'**

ठेके की सामान्य शर्तों का संदर्भ
Refrence to General Conditions of contract.

कार्य का नाम Name of work	:	rkykc lqn<hdj.k ,oa lkbZn;hdj.k dk;Z ¼02 rkykc½
कार्य की अनुमानित लागत Estimated cost of work	:	**Rs. 84.50 lakhs**
(i) धरोहर राशि Earnest money:	:	**Rs 1,70,000/-**
(ii)निष्पादन गारंटी Performance guarantee निविदित मूल्य का 5 प्रतिशत	:	5% of tendered value**.**
(iii) प्रतिभूति निक्षेप: Security Deposit निविदित मूल्य का 5 प्रतिशत	:	5% of tendered value.

lkekU; fu;e ,oa fn'kk funsZ'k
General Rules & Directions:

निविदा आमंत्रण करने वाला प्राधिकारी
Officer inviting tender - **Registrar GGV Bilaspur**

कार्य की मदों की मात्रा के लिए अधिकतम प्रतिशत जिससे अधिक निष्पादित मदों के लिए दरों का निर्धारण खण्ड 12.2 और 12.3 के निम्नानुसार होगा।
Maximum percentage for quantity of items of work to be executed beyond which rates are to be determined in accordance with Clauses 12.2 & 12.3. see below

Definitions:

2(v) वि0वि0यंत्री
University Engineer, GGV.Bilaspur (C.G.)
For Civil: GGV. Bilaspur (C.G.)
For Electrical GGV. Bilaspur (C.G.)

2(viii) स्वीकारकर्ता प्राधिकारी
Accepting Authority **Registrar, GGV, Bilaspur(C.G.)**

2(x) अतिरिक्त और लाभों को पूरा करने के लिए श्रम एवं सामग्रियों की लागत पर प्रतिशतता
Percentage on cost of materials and labour to cover all overheads and profits. **15%**

2(xi) दरों की मानक अनुसूची
Standard schedule of Rates
Schedule of rates,WRD 2010 issued by E-in-c CGWRD Raipur (C.G.)

2(xii) विभाग
Department **GGV, Bilaspur (CG)**

9(ii) विश्वविद्यालय मानक के ठेका फार्म
Standard Form University Standard contract Form

[k.M **Clause 1**

(i) स्वीकृति पत्र जारी होने की तारीख से निष्पादन गारंटी के प्रस्तुतीकरण के लिए अनुमत समय
Time allowed for submission of performance guarantee from the date of issue of letter of acceptance : 20 days दिन

(ii) (उपर्युक्त प) में दी गई अवधि के पश्चात् अधिकतम अनुमेय एक्सटेंशन
Maximum allowable extension beyond the period as provided in (i) above : 10 days दिन

[k.M **Clause 2**

खण्ड 2 के तहत प्रतिकार निश्चित करने वाला प्राधिकारी
Authority for fixing compensation under clause 2 **Building Committee**, GGV

[k.M **Clause 2A**

क्या खण्ड 2 क लागू होगा
Whether clause 2A shall be applicable **Yes**

[k.M **Clause 5**

कार्य आरंभ की तारीख की गणना के लिए स्वीकृति पत्र के जारी होने की तारीख से दिनों की संख्या
No. of days from the date of issue of letter of acceptance for reckoning date of start **22 days.**

y{; uhp nh xb lkj.kh d vuqlkj
Milestone(s) : - as per Table given below

y{; ¼ehy&iRFkj½ lkj.kh &

कार्य निष्पादित करने के लिए अनुमत्य समय
Time allowed for execution of work **04 (four) Months**

Authority to decide

(i) Extension of Time — Registrar/ competent authority Guru Ghasidas University, Bilaspur (C.G.)

(ii) Rescheduling of mile stones — University Engineer/ Asstt. Engineer, Guru Ghasidas University, Bilaspur (C.G.)

खंड लागू–(6 या 6 क) Clause applicable **6 A**

[k.M **Clause 7**

अंतरिम भुगतान के लिए पात्र होने के लिए अंतिम ऐसे भुगतान के बाद कुल भुगतान एकत्रित सामग्रियों के अग्रिमों के समायोजन सहित किया जाने वाला कुल कार्य
Gross work to be done together with net payment/adjustment of advances for- material collected, if any since the last such payment for being eligible to interim payment **Rs. 21.13 Lakhs**

[k.M 10 **d Clause10A**

कार्यस्थल प्रयोगशाला में ठेकेदार द्वारा उपलब्ध कराये जाने परीक्षण उपकरण की सूची
List of testing equipment to be provided by the Contractor at site lab. **See P 41 Para 11.0 (Part – B)**

[k.M **Clause10B(ii)**

क्या खण्ड 10 ख (ii) लागू होगा

Whether clause 10B (ii) shall be applicable **Yes /** gk

[k.M **Clause10C**

Component of labour expressed as25% **(Twenty five per cent)** Percent of value of work

[k.M **Clause10CA**

Material covered under this clause	Nearest materials (Other than cement, reinforcement bars and structural steel) for which All India Whole Sale Price Index is to be followed.	Base Price of all materials covered under clause 10 CA *
1 Cement 2 Steel reinforcement 3 Structural steel	NA NA NA	1. Rs. 5000.00 per MT 2. Rs.31304.00 per MT 3.Rs. 31009.00 per MT

[k.M

Clause 10 CC : **Not Applicable**

खण्ड 10 ग, ग उन संविदाओं पर लागू होगा जिसमें कार्य समापन की अवधि, अगले कालम में दर्शाई गई अवधि से अधिक अनुबंधित है।

Clause 10CC to be applicable in contracts with stipulated period of completion exceeding the period shown in next column **04 months**

[k.M Clause 11

कार्य निष्पादन के लिए अनुपालन

For Civil : Specification for Irrigation Projects, Nov. 1991, Volume – 1, Section – II

Specifications to be followed for execution of work **with correction slips upto date of receipt of tender.**

[k.M Clause 12

12.2 & 12.3

विचलन सीमा जिसके परे खण्ड 12.2 तथा 12.3 भवन निर्माण कार्य के लिए लागू होंगे

Deviation limit beyond which clauses 12.2 & 12.3 shall apply for building work **30%**

12.5 वह विचलन सीमा जिसके परे खण्ड 12.2तथा 12.3 नींव कार्य के लिए लागू होंगे

Deviation limit beyond which clauses 12.2 & 12.3 shall apply for foundation work **100%**

[k.M Clause 16

घटी हुई दरे निर्धारित करने की लिए सक्षम प्राधिकारी

Competent Authority for deciding Reduced rates. Registrar/Building committee.

[k.M Clause 18

कार्यस्थल पर ठेकेदार द्वारा लगाये जाने वाली अनिवार्य मशीनरी औजार एवं सयंत्रों की सूची :–

List of mandatory machines, tools and plants to be deployed by the contractor at site. **See P 40 Para 9.0** (Part – B)

[k.M **Clause 36(i)**

"Requirement of Technical Representative(s) and Recovery Rate

SNo	Minimum Qualification of Technical Representative	Discipline	Designation (Principal Technical / Technical representative)	Minimum experience	Number	Rate at which recovery shall be made from the contractor in the event of not fulfilling provision of Clause 36(i)	
						Figures	Words
1	Graduate Engineer	CIVIL	Principal Technical Representative	10-years	ONE	Rs.20000/- PM.	Rupees Twenty Thousand Per Month each
2	Graduate Engineer	CIVIL	Technical Representative	5-years	ONE	Rs.15000/- PM.	Rupees fifteen Thousand Per Month each
3	Graduate Engineer Or Diploma Engineer	CIVIL	Technical Representative	Nil Or 5-years	TWO Or TWO	Rs.10000/- PM.	Rupees Ten Thousand Per Month each
4	Graduate Engineer Or Diploma Engineer	ELECTRICAL	Technical Representative	Nil Or 5-years	ONE Or ONE	Rs.10000/- PM.	Rupees Ten Thousand Per Month each

सरकारी सेवा से सेवानिवृत्त वे सहायक अंभियंता जो डिप्लोमाधारक हों, ग्रेजुएट अंभियंता के बराबर माने जाएंगे।

"Assistant Engineers retired from Government services that are holding Diploma will be treated at par with Graduate Engineers."

[k.M **Clause 42**

I) क) सीमेन्ट इत्यादिके लिए जल संसाधन विभाग द्वारा जारी दर सूची 2010 के आधार पर मात्रा निर्धारित करने के लिए अनुसूची/विवरण

I) (a) Schedule/statement for determining on the basis of Schedule of Rate for WRD 2010 theoretical.

II) अनुमानमूलक मात्राओं में अनुमत्य विचलन
Variations permissible on theoretical quantities.

क) सीमेन्ट जिन कार्यो के लिए निविदा में अनुमानित मूल्य रू. 5 लाख से अधिक न हो — 3 प्रतिशत जमा/घटा

a) Cement for works with estimated cost put to tender not more than Rs. 5 lakhs — 3% plus/minus.

जिन कार्यो के लिए निविदामें अनुमानित मूल्य रू. 5 लाख से अधिक हो — 2 प्रतिशत जमा/घटा

for works with estimated cost put to tender more than Rs. 5 lakhs — 2 % plus/minus.

ग) इस्पात प्रत्येक व्यास, कोट और श्रेणी के लिए पूनर्वलन और संरचनात्मक इस्पात काट — 2 प्रतिशत जमा/घटा

c) Steel Reinforcement and structural steel sections for each diameter, section and category. — 2% plus/minus

घ) सभी अन्य सामग्रियां — शून्य

d) All other materials — Nil.

vuqeR; fopyu l vf/kd dh ek=kvk d fy, olyh nj

RECOVERY RATES FOR QUANTITIES BEYOND PERMISSIBLE VARIATION

क्रम सं. Sl	मद विवरण Description of item	अंको और शब्दों में वह दर जिस पर ठेकेदार से वसूली की जाएगी Rates in figures and words at which recovery shall be made from the Contractor	
		अनुमत्य विचलन से अधिक आधिक्य Excess beyond permissible variation	अमुमत्य विचलन से अधिक उपयोग घटाया Less use beyond the permissible variation
1.	lhesUV Cement	NIL	Rs.6000.00 per MT
2.	Reinforcement steel	NIL	Rs. 50000.00 per MT

---------- Two items only ----------

P A R T I C U L A R S P E C I F I C A T I O N

&

S P E C I A L C O N D I T I O N S (CIVIL)

1. GENERAL

1.1 The contractor shall work according to the programme of work as approved by the **Registrar/ Competant authority of GGV** for which purpose; the contractor shall submit a tentative programme of the work within 15 days from the stipulated date of start of the work.

1.2 The contractor shall take instructions from the University Engineer/ Asstt. Engineer for stacking of materials at site. No excavated earth or building materials shall be stacked on areas where the buildings, roads, services or compound walls are to be constructed.

1.3 If as per municipal / GGV. rules the huts for labour are not to be erected at the site of work by the contractors, the contractors shall provide such accommodation at such locations as are acceptable to local bodies/ GGV, for which nothing shall be payable to the dwelletrs or the contractor.

1.4 Unless otherwise provided in the Schedule of quantities, the rates tendered by the contractor shall be all inclusive and shall apply to all heights, lifts, leads and depths of the building and nothing shall be payable to him on this account. However, payment for centering, shuttering, if required to be done for floor heights greater than 3.5m, shall be admissible at rates arrived at, in accordance with clause 12 of the agreement, if not already specified otherwise.

1.5 The working drawings appearing at para 8.1(iii) of conditions of contract in the form prescribed form shall mean to include both architectural and structural drawings respectively. The structural and architectural drawings shall be properly correlated before executing the work. In case of any difference noticed between architectural and structural drawings, final decision, in writing of the University Engineer shall be obtained by the contractor before proceeding further.

1.6 Samples for particular items of work shall be prepared, for prior approval of the University Engineer/ assistant engineer of GGV before taking up the same on mass scale and nothing shall be payable on this account.

1.7 Some restrictions may be imposed by the security staff etc. on the working and for movement of labour, materials etc. The contractor shall be bound to follow all such restriction / instructions and nothing extra shall be payable on this account.

1.8 The contractor shall make his own arrangements for obtaining electric connections, if required, and make necessary payments directly to the University.

1.9 Other agencies may also be executing simultaneously on some other related works such as- electrical cable laying, street lighting and horticulture works for the same project. The contractor shall extend necessary co-operation to them without any claim on this account.

1.10 Cast iron pipes and fittings without ear shall be used. However, pipes and fittings with ears may be accepted without any extra payment. In such cases, clamps are not required and no extra payment shall be made for fixing the pipes in a different manner.

1.11 Any cement slurry added over base surface for bond or for continuation of concreting, its cost shall be deemed to have been included in the respective items, unless specified otherwise and nothing extra shall be payable nor extra cement shall be considered in the cement consumption on this account.

1.12 Stacking of materials and excavated earth including its disposal shall be done as per the directions of the University Engineer. Double handling of materials or excavated earth if required shall have to be done by the contractor at his own cost.

1.13 No claim for idle establishment & labour, machinery & equipments, tools & plants and the like, for any reason whatsoever, shall be admissible during the execution of work as well as after its completion.

2.0 WATER PROOFING TREATMENT

The water proofing items shall be got done through the firms approved byUniversity or other wise as directed by University.

2.1 GUARANTEE FOR WATER PROOFING TREATMENT

The contractor shall give Ten years performance guarantee in the prescribed proforma for the water proofing treatment. In addition 10% (Ten percent) of the cost of these items shall be retained as security, to watch the performance of the work executed. However, half of this amount (withheld) shall be released after five years, after the completion of the work, if no defect comes to notice. If any defect is noticed during the guarantee period, it shall be rectified by the contractor within Seven days and, if not attended to, the same shall be got done through other agency at the risk and cost of the contractor. In any case the guaranteeing firms during the guarantee period shall inspect and examine the treatment once every year and make good any defect observed. However, the 10 % security deposit referred above can be replaced with bank guarantee of equivalent amount for relevant period.

3.0 ACP CLADDING AND STRUCTURAL GLAZING.

3.1 scope of work:

The scope of work includes structural analysis and design, preparation of shop drawings, setting out, lubrication, supply, installation, aligning, fixing and protection of the curtain glazing and aluminium composte panel cladding etc. It also includes performance testing and guarantee for the works as described above, for the system, materials and performance requirements, for a period of **not less than** 10 years from the date of completion of the work.

The **rates of work under this section** includes cost of all inputs of labour, materials including wastages, T&P, equipments, cranes or cradles, scaffolding, other enabling temporary structures and services and all other incidental charges, if any, not specifically mentioned here, but as required for complete design, engineering, fabrication, assembling, delivery, anchorage, installation, protection of curtain glazing, aluminium composite panel cladding etc. and making the curtain glazing, aluminium composite panel cladding etc. water tight, all complete, and all in accordance with the true intent and meaning of the specifications and the drawings taken together, regardless of whether the same may or may not be particularly shown in the drawings and/or described in the specifications provided that the same can be reasonably inferred therefrom.

The curtain glazing, aluminium composite panel cladding shall have framing which shall be structurally and mechanically designed to achieve the architectural elevations as well as performance parameters specified herein. Anchorage shall include all supporting bracket & anchor fasteners, as required to rigidly secure the structural framing to the RCC/Masonry/structural steel members of the building.

STANDARDS:

3.2 Materials and workmanship shall, in general, comply with the latest editions of the following standards as a minimum.

ANSI	Z97.1	Safety Glazing materials used in Buildings
ASTM	C1036	Specification for float glass
ASTM	C1172	Specification for Laminated Architectural Glass
ASTM	C864	Specification for compression Seal Gaskets
ASTM	C1115	Specification for Silicone Rubber Gaskets
ASTM	C920	Specification for Sealants
ASTM	C509	Specification for sealing material
CPSC16	CFR 1201	Specification for Safety Glass
BSCP 118		Structural use of Aluminium
AS 1664		--Do—

3.3 International Standards

In general, the Contractor shall follow the latest Indian/International Standards issued by BIS. Other specification relevant to this item of work like ASTM, SAA, AAMA, BSS, ISO & SSIR can also be adopted if particular standards are not available in BIS codes. The contractor shall also state reasons for adopting particular standards/codes. Nothing in this clause shall relieve the contractor of his obligatons to provide high standard of quality and workmanship as required.

3.4 The contractor shall also submit guarantee in the enclosed format for replacement of glass during the guarantee period of not less than 10 years from the date of completion of work**. All the Guarantees shall be submitted before final payment is released after the date of the completion of work and shall not in any way limit any other rights, which the University Engineer may have under the Contract.**

3.5 If any defect is noticed during the guarantee period, itshall be rectified by the contractor within seven days of issue of notice to the contractor, (at least temporarily if it requires specialized materials and equipment for such rectification works which may entail some more time), to the satisfaction of the University Engineer, till the permanent rectification of the defects/replacement of defective materials is carried out by the contractor, in maximum four months period.

If not attended to, the same shall be got done by the University Engineer through other agency at the risk and cost of the contractor and the cost, which shall be final and binding on the contractor, shall be recovered from the amount withheld towards the guarantee as mentioned above or any other amount due to the contractor.

3.6 Scope of Shop Drawings

a) Shop drawing shall incorporate scaled and dimensioned plans, elevations, sections and complete size details for all the works.

a. The shop drawings shall indicate the required dimensional profiles and modules, function, design and performance standards and in general cover all dimensions and details required to fabricate and install the curtain wall at site.

b) The contractor shall verify and co-ordinate the shop drawings with all applicable and inter-related trades, drawings and specifications.

c) All dimensions/modules, etc. shall be field checked and the drawings shall be modified, if required, based on actual measurements at site.

d) Details shall show and specify all metal sections, types of finishes, areas to be sealed and sealant materials, gaskets, applicable construction materials including fasteners and welds, all anchorage assemblies and components, fabrication and erection tolerances for the work.

e) All details shall be subject to the approval of the University Engineer, after incorporating all the modifications as suggested by the University Engineer or otherwise.

4.0 **Stainless Steel Railing/Handrails**

4.1 Supply and installation of satin finish stainless steel railing (Ozone or equivalent) having 50 mm dia OZBF-SS-ACC-HR-50-SS-P (PIPE) 1.6 mm thick tube handrail modular and component based system having unified stem keys as connector, centre rod 12 mm @ 300 c/c including a\end caps for railing & centre rod, SS balustrade

OZBF –WS-11 members to be fixed on top of stair steps or floor edge at a minimum distance of 1000 mm to be complete with all necessary bends and joints and erected with chemical grouts of approved make or equivalent as per drawing and instruction of University Engineer (Height 1000 mm as per sketch)

4.2 GENERAL

The contractor shall apply all materials, labour, tools, ladders, scaffolding and other equipments necessary for the completion and protection of all stainless steel work.

4.3 MATERIAL

All stainless steel pipes and plates shall conform to AISI 304 in 18/8 composition 18 will be chromium and 8 will be Nickel and carbon content will be 0.03 maximum and the relevant clauses associated with this grade of steel to be followed.

4.4 SURFACE FINISH

Surface finish of all the stainless steel materials will be in 240 grit satin finish / matt finish.

4.5 ACCESSORIES

Fixing will be done by stainless steel expansion bolts of approved size and make as per University Engineer and welding to be done by using organ welding rods and the surface being duly finished and cleaned by K2 passivation, which is nitric acid plus floric acid solution treatment by which the chances of corrosion will be eliminated and any burn out makes on the metal will also be eliminated.

4.6 COATING MASS

All stainless steel material will have to be coated by a solution of Inox to avoid finger in prints and avoidance of settlement of environment / atmospheric dust.

4.7 MEASUREMENT

All the stainless steel finished parts shall be weighed correct to a gram and paid on weight basis.

4.8 RATE

The rate shall include the cost of all the materials, machinery and labour involved in all the operations described above including cartage, lifts and all taxes like Sales Tax / VAT, Excise duty, Octroi etc. as applicable.

Any incidental additional requirements for execution of this item to the satisfaction of University Engineer shall also be treated as included in the item and shown in attached drawing and nothing extra will be paid for such extra work.

5.0 PAINT BROUGHT BY THE CONTRACTOR

5.1 The contractors shall bring sufficient quantity of paint of brand & shade approved by University Engineer prior to the commencement of work & keep it in his stores at site of work under double lock & key.

5.2 The paint shall be issued to the contractor from time to time according to requirements for the work in the same manner as followed for issue of cement

5.3 Empty containers shall not be removed without the written permission of the University Engineer.

6.0 CONDITION FOR CEMENT :-

6.1 The Contractor shall procure 43 grade Ordinary Portland cement (conforming to IS : 8112) or Portland slag cement (conforming to IS : 455) or Portland Pozzolana Cement (PPC) (Fly ash based) – conforming to IS : 1489

(Part-I) as required in the work, from reputed manufactures of cement, having a production capacity of one million tonnes or more, such as ACC, L&T, JP REWA, Vikram, Shri Cement, Birla Jute, Prism, Ambuja, Lafarge and Cement corporation of India etc. i.e. agencies approved by Ministry of Industry, Government of India, and holding license to use ISI certification mark for their product. **The tenderers may also submit a list of names of cement manufacturers which they propose to use in the work. The tender accepting authority reserves right to accept or reject name(s) of cement manufacture(s) which the tenderer proposes to use in the work. No change in the tendered rates will be accepted if the tender accepting authority does not accept the list of cement manufactures, given by the tenderer, fully or partially.** Supply of cement shall be taken in 50 Kg bags bearing manufacture's name and ISI marking. Samples of cement arranged by the contractor shall be taken by the University Engineer and got issue in accordance with provisions of relevant BIS codes. In case test results indicate that the cement arranged by the Contractor does not conform to the relevant BIS codes, the same shall stand rejected and shall be removed from the site by the Contractor at his own cost within a week's time of written order from the University Engineer to do so.

If Portland Pozzolana cement or Portland slag cement is used, suitable modification in deshuttering time etc. shall be done if need be as per specifications and standards and as directed by University Engineer and nothing extra shall be payable on this account.

No extra payment / deduction shall be made from the payment to the contractor for using any of the above type of cement.

6.2 The cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the University Engineer.

6.3 For each grade / type, cement bags shall be stored in two separate godowns, one for tested cement and the other for fresh cement (under testing) constructed by the contractor at his own cost as per sketch shown in General conditions of contract for Vishwavidyalaya with weather proof roofs and walls. The size of the cement godown is indicated in the sketch for guidance only. The actual size of godown shall be as per site requirements and as per the direction of the Engineer in charge and nothing extra shall be paid for the same. The decision of the University Engineer regarding the capacity required/needed will be final. However, the capacity of each godown shall not be less than 30 tonnes. Each godown shall be provided with a single door with two locks. The keys of one lock shall remain with University Engineer or his authorized person and that of other lock with the authorized agent of the contractor at the site of work so that the cement is issued from godown according to the daily requirement with the knowledge of both the parties. The account of daily receipt and issue of cement shall be maintained in a register in the prescribed Proforma and signed daily by the contractor or his authorized agent in token of its correctness.

6.4 The cement shall be got tested by University Engineer and shall be used on the work only after satisfactory test results have been received. The contractor shall supply free of charge the cement required for testing including its transportation cost to testing laboratories. The cost of tests shall be borne by the contractor / Department in the manner indicated below :-.

(a) By the contractor, if the results show that the cement does not conform to relevant BIS codes.

(b) By the Department, if the results show that the cement conforms to relevant BIS codes.

6.4.1 All other charges of sampling, packing and transportation of sample shall also be borne by the contractors.

6.5 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained separately for each type of cement, as provided in clause 10 of the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in Clause 42 of the contract and shall be governed by conditions laid therein. However, for consumption lesser beyond permissible theoretical variation recovery shall be made in accordance with conditions of contract at Schedule A to F (CPWD-8), without prejudice to action for acceptance of work/item at reduced rate or rejection as the case may be.

6.6 For non-schedule items, the decision of the Superintending Engineer regarding theoretical quantity of cement, which should have been actually used, shall be final and binding on the contractor.

6.7 Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the University Engineer.

7.0 CONDITIONS FOR REINFORCEMENT STEEL:-

7.1 The contractor shall procure TMT bars of Fe500 grade as per BIS 1786 – 2008 from primary producers such as SAIL or TISCO or RINL as approved by Ministry of Steel. In case of non-availability of steel from primary producers, Superintending Engineer, Bhopal Central Circle may permit use of TMT reinforcement bars procured from secondary producers.

a. The secondary producers must have valid BIS licence to produce HSD bars conforming to IS 1786: 2008. In addition to BIS licence, the secondary producer must have valid licence from either of the firms Tempcore, Thermex, Evcon Turbo & Turbo Quench to produce TMT Bars.

b. The TMT bars procured from primary producers shall conform to manufacture's specifications.

c. The TMT bars procured from secondary producers shall conform to the specifications as laid by Tempcore, Thermex, Evcon Turbo & Turbo Quench as the case may be.

d. TMT bars procured either from primary producers or secondary producers, the specifications shall meet the provisions of IS 1786 : 1985 pertaining to Fe 415 grade of steel as specified in the tender.

Samples shall also be taken and got tested by the University Engineer as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications as defined under para (c) & (d) above, the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time or written orders from the University Engineer to do so.

In case contractor is permitted to use TMT reinforcement bars procured from secondary producers then:

(i) The base price of TMT reinforcement bars as stipulated under schedule 'F' shall be reduced by Rs. 6000/- MT.

(ii) The rate of providing & laying TMT reinforcement bars as quoted by the contractor in the tender shall also be reduced by Rs. 7.35 per kg.

7.2 The steel reinforcement shall be brought at site in bulk supply of 25 tonnes or more as decided by the Engineer in charge.

7.3 The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.

7.4 For checking nominal mass tensile strength bend test re-bend test etc. specimen of sufficient length shall be cut from each size of the bar at random at frequency not less than that specified below:

Dia of bar	For consignment below 100tones	For consignment above 100tones
Under 10 mm	One sample for each 25 tonnes or part thereof	One sample for each 40tonnes or part thereof
10 mm to 16mm	One sample for each 35 tonnes or part thereof	One sample for each 45tonnes or part thereof
Over 16mm	One sample for each 45 tonnes or part thereof	One sample for each 50tonnes or part thereof

7.5 The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the contractor / Department in the manner indicated below :-

(a) By the contractor, if the results show that the steel does not conform to relevant BIS codes.

(b) By the Department, if the results show that the steel conforms to relevant BIS codes.

7.6 All other charges of sampling, packing and transportation of sample shall also be borne by the Contractor.

7.7 The actual issue and consumption of steel on work shall be regulated and proper accounts maintained as

provided in clause 10 of the contract. The theoretical consumption of steel shall be worked out as per procedure prescribed in clause 42 of the contract and shall be governed by conditions laid therein.

7.8 Steel brought to site and remaining unused shall not be removed from site without the written permission of University Engineer.

7.9 (i) Reinforcement including authorized spacer bars and lappages shall be measured in length of different diameters as actually (not more than as specified in the drawings) used in the work nearest to a centimeter. Wastage and unauthorized overlaps shall not be measured.

(ii) The standard sectional weights referred to shall be as in Table 5.4 in para 5.3.4 in CPWD specifications 2009 will be considered for conversion of length of various sizes of TMT bars in to standard weight.

(iii) Record of actual sectional weights shall also be kept dia wise and lot wise. The average sectional weight for each diameter shall be arrived at from samples from each lot of steel received at site. The decision of the University Engineer.shall be final for the procedure to be followed for determining the average sectional weight of each lot. Quantity of each diameter of steel received at site of work each day will constitute one single lot for the purpose. The weight of steel by conversion of length of various sizes of bars based on the actual weighted average sectional weight shall be termed as Derived Actual Weight.

(a) If the derived weight as in sub-para (iii) above is less than the standard weight as in sub-para (ii) above, then the Derived Actual Weight shall be taken for payment.

(b) If the derived actual weight is found more than the standard weight, than standard weight as worked out in sub para (ii) above shall be taken for payment nothing shall be paid extra for the difference in Derived/ Actual Weight and standard weight.

7.10 TMT bars of Fe 500 grade as per BIS : 1786: - 2008 from primary producer may also be permitted by University Engineer for which neither deduction shall be made nor extra shall be paid to the contractor. However, every care should be taken to avoid mixing different types of grades of bars in the same structural members as main reinforcement to satisfy relevant clause of IS: 456. In case of buildings, wherever the situation necessitates, the change over shall be made only from any one level onwards. In case of foundations, all foundation elements (footings and grade beams) shall have the same kind of steel. In the case of columns, all structural elements up to the level of change, where the change over is taking place should have the same kind of steel as those in columns.

7.11 The reinforcing steel brought to site of work shall be stored as per CPWD specification 2009.

8.0 REINFORCED CEMENT CONCRETE WORK

8.1 To ensure proper cover, only factory made round type cover blocks will be used to avoid displacement of bars in any direction.

8.2 For the execution of centering and shuttering, the contractor shall use propriety "Reebole" chemical mould release agent of “FOSROC" or equivalent as shuttering oil as recommended by the manufacture and nothing extra shall be paid on this account.

8.3 DESIGN MIX CONCRETE

8.3.1 The RCC work shall be done with Design Mix Concrete unless otherwise specified. In the nomenclature of items wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. For the nominal mix in RCC, CPWD Specifications shall be followed. The Design Mix Concrete will be designed based on the principles given in IS: 456-2000. The contractor shall design mixes for each grade of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting requirements specified. In case of use of admixture and or white cement, the mix shall be designed with these ingredients as well. The specification mentioned here-in-below shall be followed for Design Mix Concrete.

8.3.2 The concrete mix design will be carried out by the contractor through one of the following laboratories / Test houses and ready mix concrete shall conform to accepted design mix.

1. NIT, Raipur.
2. G.E.C., Bilaspur.
3. MANIT Bhopal
4. G.E.C. Ujjain
5. MITS Gwalior.
6. National Council for Cement & Building materials, Ballabhgarh.
7. IT GGV, Bilaspur, (C.G.)

8.3.3 In the event of all the above laboratories being unable to carry out the requisite design / testing the contractor shall have to get the same done from any other laboratory with prior approval of the University Engineer.

8.3.4 The contractor shall submit the mix design report from any of above approved laboratories for approval of University Engineer within 45 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the mix design is approved.

In case of white Portland cement and the likely use of admixtures where CC/RCC is done with concrete pumps in concrete with ordinary Portland/white Portland cement, the contractor shall design and test the concrete mix by using trial mixes with white cement and /or admixtures also, for which nothing extra shall be payable.

In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, a revised laboratory mix design report conducted at laboratory established at site shall be submitted by the contractor as per the direction of the University Engineer.

The Mix shall be designed to produce the grade of concrete having required workability and characteristic strength not less than as specified.

The mix design for a specified grade of concrete shall be done for a target mean compressive strength T ck = F ck + 1.65 s

Where,

F ck = Characteristic compressive strength at 28 days.

S= Standard deviation

The standard deviation for each grade of concrete shall be calculated separately.

The degree of quality control for this work is “Good” for which the standard deviation (s) obtained for different grades of concrete shall be as follows:-

Grade of Concrete	For “Good” quality of control
M 20	4.0
M 25	4.0
M 30	5.0
M 35	5.0

Out of the six specimen of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days. All cost of mix designing and testing connected therewith including charges payable to laboratory shall be borne by the Contractor.

8.3.5 The samples of cement, aggregate (fine & coarse) to be sent to the laboratories shall be sealed in the presence of the University Engineer and shall have his signature and cost of packaging, sealing, transportation, loading, unloading, cost of samples and the testing charges for Mix design in all cases shall be borne by the contractor.

8.3.6 Notwithstanding the approval granted by University Engineer in aforesaid manner, the contractor shall be fully responsible for quality of concrete including input control, transportation and placement etc.

8.3.7 The University Engineer reserves the right to exercise control over the : ingredients, water and

admixtures, purchased, stored and to be used in the concrete including conducting of tests for checking quality of Materials fit or unfit for use in production of mix.

8.3.8 The Contractor shall submit the test data of the material used for concrete mix-design in the laboratoroies, so the material being used at site be compared with those data / size etc.

8.3.9 In case of change of parameters of ingradients (sand, cement, coarse aggregate) fresh concrete mix-design to be done as mentioned in para 8.3.2 above and got approved from the University Engineer before execution.

8.3.10 The contractor shall make arrangement to install a mini laborarory at site for accelerated testing of design mix concrete as per IS : 9013. The department reserves right to take samples of design mix concrete from the mass production of the concrete for testing and compare with the laboratory's results.

8.3.11 Nothing shall be paid extra for installation and cost of batching plant and other arrangement for making necessary test of desing mix concrete.

8.3.12 The rate for item of design mix cement concrete shall be inclusive of all the ingredients including admixtures if required, labour, machinery T & P etc. (except shuttering which will be measured & paid for separately) required for a design mix concrete of required strength and workability. The rate quoted by the agency shall be net & nothing extra shall be payable on account of change in quantities of concrete ingredients like cement and aggregates and admixtures etc. as per the approved mix design. Cost adjustment at the rate of Rs. 600/- per quintal shall be made for less use of cement in design mix than specified in the item.

8.3.13 Concrete shall be handled from the place of mixing to the place of final deposit / placement by methods, which prevent segregation, or loss of any ingredients and contamination.

8.3.14 Where concrete is conveyed by chutes, the chute shall be made of metal or fitted with metal lining. The approval of the University Engineer shall be obtained for the use of chutes in excess of 3 metres length and in such cases the concrete shall be remixed if so required by the University Engineer or closed bottom buckets shall be used. If concrete is placed by pumping, the conduit shall be primed properly. Once pumping is started, it shall not be interrupted as far as possible. Concrete shall not be dropped into place from a height more than 1.5m.

8.3.15 Concreting of any portion of the work shall be done in presence of the representative of the University Engineer and shall be done only after approval of the University Engineer.

8.3.16 Concreting shall be carried out continuously between constructions joints shown on the drawings or as agreed by the University Engineer. The contractor shall closely follow the sequence of concreting where it is specified in the drawings. If concreting is interrupted before reaching the predetermined joint an approved construction joint shall be provided. Construcion joints shall be minimized as far as possible. These shall be set at right angles to the general direction of the member. The surface film of the first places concrete should preferably be removed while the concrete is still green to expose the aggregate and leave a sound irregular surface. However care shall be taken not to disturb the concrete already laid.

8.3.17 **Admixtures :** Wherever required, admixtures of approved quality shall be mixed with concrete as specified. The admixtures shall conform to IS: 9103. The chloride content in the admixture shall satisfy the requirements of BS: 5075. The total amount of chlorides in the admixture mixed concrete shall also satisfy the requirements of IS 456-2000.

8.3.18 Use of ready mixed concrete (RMC) may also be permitted, with prior approval of University Engineer, without any extra payment. Separate account of design mix concrete and RMC shall however be kept. The ready mixed concrete shall conform to the requirement of durability, workability and strength laid down for design mix concrete.

9.0 EQUIPMENTS AND PLANTS (Refer Clause 18 of Schedule 'F')

9.1 The contractor should capable of deploying necessary tools & plants as when required in apropriate as below required numbers to ensure smooth & timely execution of work, at his own cost & risk as per the requirement of work at different stages. The decision of University Engineer shall be final regarding use of particular T&P(s) at a particular time(s) & the contractor has to adhere the same strictly:

I.	Steel centering and shuttering.	7000 Sqm.
II	Excavator Cum Loader.	1 No.
III	Builders Hoist / Tower crane	1 No.
IV	Concrete mixer with hopper. (Diesel + Elect.)	1 Nos.
V	Needle Vibrator. (Diesel / Petrol + Elect.)	5 Nos.
VI	Bar Bending Machine.	1 No.
VII	Bar Cutting Machine.	1 No.
VIII	Truck / Tipper	1 Nos.
IX	Floor grinding machine	10 Nos.
X	Welding machine	2 No.
XI	Chase cutter.	2 Nos.
XII	Water Pump	1 Nos.
XIII	DG set (Diesel)	1 No.
XIV	Pile rig for 300 mm dia pile	1 No.
XV	Hydralic Excavator 0.9 cum, bucket capacity	1 No.
XVI	Power Road Roller, 8 to 10 ton	1 No.
XVII	Water Tanker	2 No.
XVIII	Front Loader, 1 cum bucket capacity	1 No.

9.2 To achieve the progress of work as per programme the contractor must bring at site the shuttering materials required for cement concrete and RCC work etc. within 7 days from the date of start of work. Work shop facilities for fabrication/addition and alterations, and other allied works shall be arranged by the contractor at his own cost.

9.3 In addition to these, machinery / equipment as required shall be arranged by the contractor in case the requirement at any stage exceeds as per the programme finalized at his own cost and nothing extra whatsoever on this account shall be paid.

9.4 All the equipment, T&P and machinery shall be kept in good condition.

10.0 SAFETY MEASURES AT CONSTRUCTION SITE

In order to ensure safe construction, following shall be adhered for strict compliance at the site:-

(i) The work site shall be properly barricaded.

(ii) Adequate singnages indicating ‘Work in Progress – Inconvenience caused is regretted’ or Diversion Signs shall be put on the sites conspicuously visible to the public even during night hours. These are extremely essential where works are carried out at public places in use by the public.

(iii) The construction malba at site shall be regularly removed on daily basis.

(iv) All field officials and the workers must be provided with safety helmets, safety shoes and safety belts.

(v) Proper MS pipe scaffoldings with work – platforms and easy-access ladders shall be provided at site to avoid accidents.

(vi) Necessary First-Aid kit shall be available at the site.

The above provisions shall be followed in addition to the provisions of General Condition of Contract, CPWD sfety code and CPWD specifications for which nothing extra shall be paid except otherwise provided.

11.0 LIST OF EQUIPMENT FOR SITE LABORATORY(Ref. Clause 10A of Schedule 'F')

A. **Laboratory testing instruments**.

(1) Balances

i. 7 Kg. to 10 Kg. capacity, semi-self indicating type – accuracy 10 gm.-1 No.

ii. 500 gm. Capacity, semi-self indicating type – accuracy 1 gm.- 1 No.

iii. Pan balance – 5 Kg. capacity – accuracy 10 gms.-1 No.

(2) Sieves : as per IS 460 – 1962.

a. I.S. sieves – 450 mm internal dia, of sizes 100 mm, 80 mm, 63 mm, 50 mm, 40 mm, 25 mm, 20 mm, 12.5 mm, 10 mm, 6.3 mm, 4.75 mm, complete with lid and pan. – 1 Set

ii. I.S. sieves - 200 mm internal dia (brass frame) consisting of 2.36 mm, 1.18 mm, 600 microns, 425 microns, 300 microns, 212 microns, 150 microns, 90 microns, 75 microns with lid and pan. – 1 Set

(3) Equipment for slump test – slump cone, steel plate, tamping rod, steel scale, scoop.- 2 Nos.

(4) Graduated measuring cylinders 200 ml capacity – 2 Nos.

B. Field testing instruments.

(1) Steel tapes – 3 m. – 2 Nos

(2) Vernier Calipers. - 1 Nos.

(3) Micrometer screw 25 mm gauge. – 1 Nos.

(4) A good quality plumb bob. – 2 Nos.

(5) Spirit level, minimum 30 cms long with 3 bubbles for horizontal vertical.- 2 Nos.

(6) Wire gauge (circular type) disc. – 1 Nos.

(7) Foot rule – 2 Nos.

(8) Long nylon thread – 2 Nos.

(9) Magnifying glass – 1 Nos.

(10) Screw driver 30 cms long – 1 Nos.

(11) Ball pin hammer, 100 gms. – 1 Nos.

(12) Plastic bags for taking samples – 1 Nos.

12.0 SPECIFICATIONS FOR CEMENT BASED FLY ASH BRICKS

12.1 Quality of Raw Materials

12.1.1 **ASH :** Fly ash shall meet the requirement of Grade 2 of IS : 3812. Fly ash should preferably be collected form 1^{st} / 2^{nd} field of ESP.

12.1.2 **Sand / Stone dust :** Deleterious materials such as clay and silt in sand / stone dust shall not be more than 5%.

12.1.3 **Cement :** Portland cement conforming to IS : 269, IS : 8112 or IS : 12269 (latest revision) shall be used.

12.1.4 **Storage :** All raw materials shall be stored in covered sheds and suitably protected from the rains.

12.1.5 **Proportioning of raw materials :** The following mix proportion shall be adopted for manufacturing fly ash, sand and cement bricks

Fly ash	50-60%
Sand / Stone dust	32-40%
Cement	8-10%

(a) The contractor has to fix reflecting information board, size 120 cms X 90 cms. One at starting point of the road and another from end point of the road describing the details of work as instructed by E. E. at his costs.

(b) In case of conflict between "General condition of contract- and the special condition" the terms of special condition s shall prevail.

12.1.6 **ACCEPTANCE CRITERIA :**

12.1.6.1 **Compressive Strength**: Minimum average compressive strength of brick shall not be less than 7.5 N/sq.mm when tested as per IS -3495 (Part-I) : 1976. The compressive strength of any individual brick shall not fall below the minimum average compressive strength by more than 20%. In case any test result of compressive strength exceeds 10.0 N/sq.mm, the same shall be limited to 10.0 N/sq.mm for the purpose of averaging.

12.1.6.2 **Water absorption**: The bricks when tested in accordance with the procedure laid down in Is: 3495 (Part-2) : 1976 after immersion in cold water for 24 hours, shall have water absorption not more than 20%.

12.1.6.3 **Drying Shrinkage**: The average drying shrinkage of the bricks, when tested by the method described in IS : 4139 : 1989 being the average of the three units, shall not exceed 0.15 percent.

12.1.6.4 **Efflorescence Test** : The bricks when tested in accordance with the procedure laid down in IS : 3495 (Para-3) : 1976 shall have the rating of efflorescence not more than 'Moderate'.

13.0 Specification for Irrigation Projects, Nov. 1991, Volume – 1, Section – II

CHAPTER - 4 EXCAVATION & EARTHWORK And CHAPTER - 21 SPECIAL ITEMS OF EARTH/MASONRY DAM & CANALS

4.1 REFERENCES:-

IS : 2720 (Pt. ll) - 1973	:	Determination of Water content (second revision)
IS : 2720 (Pt. XIV)- 1983	:	Determination of Density index (relative density) of cohesionless soils
IS : 8237 - 1985	:	Code of practice for protection of slope for reservoir embankment (first revision)
IS : 8826 - 1978	:	Guide lines for design of large Earth and Rockfill dams
IS : 9429 - 1980	:	Code of practice for drainage system for Earth and rockfill dams
IS: 9556- 1980	:	Code of practice for design and construction of Diaphragm walls.
IS : 12200 - 1987	:	Code of practice for provision of Water stops at transverse contraction joints in masonry and concrete dams
	:	Specification for Irrigation projects in M. P. (1980)
	:	USR of Irrigation Works in M. P. & C.G. in force form 01.08.1984/
	:	Bombay PWD Specifications
	:	Specifications for Tawa Project.
	:	Specifications for Kolar Project
	:	CWC Specifications for masonry & earth dam of Rajghat Dam

4.2 TERMINOLOGY:-

Anchorage - Anchorage is a structure used to carry the lateral thrust of a wall. Ties to a series of concrete blocks or a continuous RCC beam, vertical or battered piles, inclined rock or soil anchors are generally used for this purpose.

Bentonite - A clay formed by alteration of volcanic ash and rich in montmorillonite clay mineral. Bentonite has exchangeable irons on the surface of particles. It swells in the presence of water and its suspensions are thixotropic.

Borrow area - The source of construction material required for earth and rockfill

dam. **Casing -** All zones other than the core in a zoned earth dam; also called

shall or shoulder. **Core -** A zone of impervious earth within zoned earth or

rockfill dam.

Cut- off- A barrier to reduce seepage of water through foundation and abutments

(A) Full cut - off - A Cut - off taken to an impervious stratum.

Positive Cut - off - A full cut- off in the form of an open excavated trench and back filled with compacted impervious material.

NOTE - Full cut- offs also provided in the form of sheet piles, plastic diaphragm, concrete diaphragm, grouted cutoff, cutoff wall, etc.

(B) Partial Cut - off - A Cut - off which does not go down to impervious stratum.

Diaphragm wall - A wall constructed in situ by special trenching machines to act as cut - off wall or serve as a structural member. The standard widths rare 100-800 mm for cut - off wall, 450 to 1200 mm for structural member.

Guide wall - walls of shallow depth built on both sides of the centre line of a diaphragm wall to guide the rabbing or boring tool for trench making in order to prevent collapse or trench panels and contain bentonite slurry.

Horizontal filter - A layer of uniform or graded pervious materials placed horizontally.

Impervious blanket - An upstream impervious soil layer laid over a relatively pervious stratum and connected to the core.

Inclined or vertical filter - A layer of uniform or graded pervious materials, placed inclined or vertical.

Inner longitudinal drain - A trench filled with filter material and laid along the downstream toe of the core of dam to collect seepage from core of the dam.

Inner cross drain - A trench filled with filter material to collect seepage from inner longitudinal drain and carry it to toe drain.

Panel - Unit trench/ wall excavated or cast at a time.

Primary Panel - Panels made along the main axis of the wall in the first series; and leaving suitable gaps for other (secondary) panels. Primary panels are usually cast with two stop and pipes for inter locking with the secondary panels.

Secondary Panel - Panels made along the main axis of the wall inter locked with the panels to form an effective and reasonably leak proof joint resulting in a continuous diaphragm wall.

Riprap - It is the protection to the embankment material against erosion due to wave action, velocity of flow, rain wash, wind action etc., provided by placing a protection layer of rock fragments or manufactured materials. Riprap may be placed on slope either by hand or it may be simply dumped.

Trenching - Excavation for a panel carried out in situ. Use of drilling mud may be necessary to prevent collapse of sides.

Turfing - it is a cover of grass grown over an area to prevent erosion of soil particles by rain wash

Wale - This is a horizontal member fixed to the wall. Its function is to transfer the horizontal thrust of the wall to the tie rods / struts.

4.3 GENERAL SPECIFICATION:

4.3.1 Bench Marks:

4.3.1.1 Before starting any work, a permanent bench mark, reference line and check profiles at convenient positions approved by the Engineer - in - charge shall be erected. The Benchmarks shall be as per Type Design 6 and 8 of Department. The words "B.M" with R. L. shall be conspicuously carved and painted on the benchmark. The reference line shall comprise of a base line properly dog belled on the ground with number of masonry pillar. The check profiles shall be of such materials and shall be located at such places as to ensure execution of all slopes; steps and excavation to the profile or profiles indicated in the approved drawings or as directed by the Engineer - in - charge.

4.3.1.2. The Sub - Divisional Officer on behalf of the Engineer - in - charge shall himself lay out all important levels, all control points with respect to this bench mark and reference line and correlate all levels and locations with this bench mark and the reference line. Important levels shall be checked by the Executive Engineer. All assistance shall be given for the same by the agency executing the work.

In the case of spread out works, several bench marks, reference lines and check profiles may be necessary and shall be constructed as directed by the Engineer - in - charge.

4.3.1.3. Except the mathematical and surveying instrument which shall be provided by the department all materials and labour for setting out works including construction of bench marks, reference lines, check profiles and survey required for setting out works as may be required at the various stages of the construction works shall be supplied or made by the agency executing the work.

4.3.2. Cross Section

4.3.2.1. Immediately prior to the beginning of the work, cross - section of the existing ground level at suitable intervals, normal to the axis of the dam., canal alignment and other channels, sluice waste weir or other masonry structures , etc., shall be taken over the base and seating of the dam ,channels or other structures, etc. for sufficient distance outside the limits. Levels on this cross section shall be taken at suitable interval not exceeding 6 m or as directed by the Engineer - in-charge.

4.3.2.2. These cross - sections shall be taken and plotted in ink by the Departmental agency. These cross sections shall form the basis of all future measurements and payments on the area.

4.4 CLASSIFICATION OF STRATA:

4.4.1 Soft or Ordinary Soil - Generally any soil which yields to the ordinary application of pick and shovel or to spade, rake or other digging implement, such as vegetable or organic soil, turf, gravel, sand, silt, loam, clay pear etc.

4.4.2. Hard Soil - Includes all materials which can be removed with shovel or spade after loosening with pick axe such as clay soil mixed with lime kanker, black cotton soil for earthen bond, soft moorum etc.

4.4.3. Hard Moorum and Moorum mixed with boulders - Generally any material which required the close application or picks, jumpers or scarifies to loosen such as hard and compact moorum and soft shale. Moorum or soil mixed with small boulder not exceeding 25 % in quantity and each less than 0.014 cum (300 mm dia) but more than 0.004 cum in size

Note - Boulder is rock fragment usually rounded by weathering, disintegration or abrasion by water or ice, found lying loose on the surface or embedded in river bed, soil talus, slope wash and terrace material of dissimilar origin.

4.4.4. Disintegrated Rock - Includes such strata which requires the close application of crow bars, picks, grating tools, scarifiers in suitable combination for its excavation such as soft laterite, soft conglomerate, hard shale, soft copra, hard and compact moorum mixed with small boulders exceeding 25% in quantity but each not exceeding 0.014 cubic metre in size.

4.4.5. Soft Rock - Soft rock comprises of the following: -

(i) Boulders (not greater than 0.5 cum. in volume) hard laterite, hard copra and hard conglomerate or other rock which may be quarried or split with crowbars with casual blasting, if required, for loosening of strata.

(ii) Any rock which in dry state may be hard, requiring blasting but when wet becomes soft and manageable by means other than blasting.

4.4.6. Hard Rock (Requiring blasting) - Any rock or boulder (more than 0.5 cum. in volume), which requires the use of mechanical plant or blasting for excavation or splitting.

4.4.7. Hard Rock (blasting prohibited) - Hard rock requiring blasting as described under 4.4.6 but where blasting is prohibited for any reason and excavation has to be carried out by chiseling, wedging or any other agreed method.

4.4.8. Authority For Classification - The classification shall be decided by the Executive Engineer and his decision shall be final.

4.5 CLEARING, GRUBBING AND PREPARATION OF WORKS AREA -

(i) All excavation areas and dam embankment area including a 6 m wide strip measured beyond and contiguous to the limit line of the area as shown on the drawing shall be cleared and any roots etc. completely removed as specified. All trees down timbers, fencing, bush, rubbish; other objectionable materials and vegetation shall be cleared. All stumps and roots shall be excavated and removed. All roots over 50 mm. in diameter shall be removed to a depth of 90 cm below the original ground surface or as directed by the Engineer - in - charge. Materials thus removed will be burnt or completely removed from the site. All felled timber and fuel shall be properly stacking and handed over to the department when asked for by the Engineer
- in - charge. Piling for burning shall be done in such a manner and in such location as to cause the least fire risk. All burning shall be thorough so that the materials are reduced to ashes. Special precautions shall be taken to prevent fire form spreading to the areas beyond limits or the areas specified and suitable equipment and supplies for preventing and suppressing fire shall be available at all times.

(ii) No trees shall be cut from outside of areas designated unless instructed in writing by the Engineer - in - charge and all trees designated outside of the areas actually occupied by the works shall be protected carefully from the damage.

4.6 STRIPPING AND BENCHING UNDER DAM EMBANKMENT:

(i) The entire area of embankment including a 3 m wide strip beyond and continuous with the area of embankment proper as showing in the drawing shall be stripped or benched to a sufficient depth as directed to remove all unsuitable materials. The unsuitable material to be removed shall include loose rock, vegetation, topsoil, sod, and organic silt swamp material and rubbish and any other objectionable materials below the ground surface.

(ii) At location where a river or stream crossed the embankment site, loose sand and gravel and loose boulders shall also be removed as directed.

(iii) Stripped materials shall be disposed off in a manner as may be directed by the Engineer - in - charge and in such a way as not to detract from the finished appearance of the project.

4.7 EXCAVATIONS OF CUT - OFF OR PUDDLE TRENCH UNDER DAM EMBANKMENT:

4.7.1. Procedure for Excavation - A cut off trench or puddle trench as shown in the drawings shall be excavated in the foundation of the dam at the location indicated. This trench shall be excavated to a depth of 0.6 m to 1.2 m. into rock (depending upon the permeability of the rock) or into other impervious stratum as may be approved by the Engineer - in - charge. Accurate trimming of the slopes or the excavation will not be required but the cutting in general shall follow lines as specified in drawings. The area to be excavated shall be unwatered. The water level shall be maintained below the level of excavation in the area and none of the excavation shall be performed in standing water.

4.7.2. Utilisation or Excavated Materials - Trench excavation shall preferably be started after the whole base of the dam or at least the substantial part of it is cleared, grubbed, benched or stripped as required by specifications so that suitable material out of trench excavation can be directly utilised for forming the bank, to maximum possible extent .

4.7.3. Blasting of Rock - No blasting of rock would be permitted for the excavation in hard rock when the excavation reaches within about 60 cm of final levels, if in the opinion of the Engineer - in - charge, such blasting will shatter and disturb the rock below foundation. He may also put similar restrictions, in cases, where damage is apprehened to works in neighbouring area existing or under construction. In such cases rock excavation shall be completed by chiselling and wedging etc.

4.7.4. Material received from Cut- Off Trench or Puddle Trench:

4.7.4.1. The materials, excavated form the trench shall, if suitable, be used in the embankment either immediately or after stock piling as convenient and directed by the Engineer - in - charge. The suitability or otherwise of the material and zone of the embankment in which it is to be placed will be specified by the Engineer - in - charge on the basis of laboratory tests.

4.7.4.2. Materials excavated from the trench shall not be placed in the embankment till foundation for the embankment has been cleared, stripped and prepared as specified and adequate arrangements made for watering and rolling the layers of earth fill in the embankment.

4.7.4.3. Materials excavated from the trench shall be subjected to the same degree of embankment control as material obtained from borrows pits.

4.7.4.4. The material excavated from the trench which are not suitable for use in the embankment shall be disposed off in a manner as may be directed by the Engineer - in - charge and in such a way as not to detract from the finished appearance of the project.

4.7.5. Cut - Off Trench Filling - Cut off trench shall be back filled with impervious material of the same specification and in the same manner as for the impervious hearting zone of the embankment of the dam in accordance with specifications under para 4.9 But before back filling is started foundation grouting in accordance with specification of Chapter 22 may be completed, where required, unless the Engineer - in - charge directs otherwise.

4.7.6. Puddle Filling:

4.7.6.1. Puddle:

4.7.6.1.1. The puddle shall consist of good retentive clay of best quality free from organic or other foreign material. It should be clean and tough and should be available near the sits as for as possible. The most suitable clay is of the description used for tile making Soft sludgy, peaty sandy, salt or puffy clay should be rejected.

4.7.6.1.2. The clay is to be worked out into puddle before use by turning it over and over again with phowras, watering and treading with men's feet into one plastic homogeneous mass of the toughest consistency until it gets plasticity.

4.7.6.2. Laying of Puddle.

4.7.6.2.1. The puddle shall than be made into balls and thrown into the trench or in any other position required. No more than 15 cm in thickness of puddle shall be deposited in the place at one time and it must at once be thoroughly kneaded by men's feet and incorporated with mass below it so that the whole will be uniform and not in layers.

4.7.6.2.2. The top of puddle shall be kept as level and uniform as possible and shall on no account be allowed to dry. If the surface cracks at any time it shall be dug up and puddle remade.

4.7.6.2.3. Vertical joints across the puddle wall and steps to its side shall be avoided. All joints shall be made by long inclined faces overlapping each other.

4.7.6.2.4. The whole width of puddle trench excavated shall be filled with puddle only so that the puddle gets thoroughly into the interstices of trench walls. The joint near the wall shall be thoroughly kneaded with men's heels.

4.7.6.2.5. On holidays and other days, when works are stopped, labour should be specially employed to keep the surface of puddle wet by sprinkling of water.

4.7.6.3. The puddle filling shall not be done in standing water. Water level in trench shall be kept below the working level by means of pumps, if required.

4.7.6.4. As the surface of the puddle layer dries up, it should be thoroughly consolidated with rammers before a new layer of puddle is laid the surface or the previous layer, if not newly made, should be lightly sprinkled with water by means of watering pots and kneaded.

4.7.6.5. When puddle is finished, it should be immediately covered up in the work or when, this is not possible, it should be covered with approved hearting soil and kept moist.

4.7.6.6. The surface soil if not conforming to approved hearting soil, is to be removed on both sides of the puddle trench for a breadth equal to that of the top of the trench, and for 0.60 m deep, and refilled with selected clay or other material used for the hearting and consolidated in the same way.

This filling is to be carried up with the puddle wall to a height of 0.6 m above ground level and joined with the hearting.

4.8 BORROW AREAS:

4.8.1. All materials required for the construction of impervious, semi pervious or pervious zones of embankment and backfill for cut off/ puddle trench which are not available form cut off/ puddle trench excavation or other compulsory excavation, shall be obtained from designated borrow areas as shown in drawings or as designated by the field laboratory.

The limits of each borrow areas to be used in the various zones of embankment shall be flagged in the field and materials from each borrow areas shall be placed only in the zones for which it has been specified.

The depth of cut in all borrow areas will be designated by the Executive Engineer and the cuts shall be made to such designated depths only. Shallow cuts will be permitted in the borrow areas, if unstratified material with uniform moisture contents are encountered. Each designated borrow area shall be fully exploited before switching over to the next designated borrow pits. Haphazard exploitation of borrow area shall not be permitted. The type of equipment used and the operations in the excavation of materials in borrow areas shall be such as will produced the required uniformity of mixture of materials for the embankment.

Borrow pits shall not be opened within a distance of ten times the height of the dam embankment from the upstream and downstream toes. Borrow pits shall be operated so as not to impair the usefulness or mar the appearance of any part of the work or any other property. The surface of wasted materials shall be left in a reasonably smooth and even condition. Care should be taken in working of the borrow areas in tank basin to ensure that existing impervious blanket material is not completely removed and porous strata exposed.

4.8.2. Preparation of Borrow Areas - All areas required for borrowing earth for embankment shall be cleared off all trees and stumps, roots, bushes, rubbish and other objectionable material. Particular care shall be taken to exclude all organic matter from the material to be placed in the dam embankment. All cleared organic materials shall be completely burnt to ashes or disposed off as directed. The cleared areas; shall be maintained free of vegetable growth during the progress of work.

4.8.3. Stripping of borrow Areas - Borrow area shall be stripped of top soil, sod and any other matter which is unsuitable for the purpose for which the borrow area is to be excavated. Stripping operations shall be limited only to designated borrow areas. Materials from stripping shall be disposed off in exhausted borrow areas or in the approved adjacent areas, as directed.

4.8.4. Borrow Area Watering - Borrow area watering if needed based on laboratory tests will be done by the department as decided by the Engineer - in - charge.

The placement moisture content for proper compaction of earth work should be as near as practicable to optimum moisture content as decided by laboratory tests. However, depending upon the site condition, the nature of the earth of the borrow area, the season of the year, the moisture content of the earth of borrow area will vary over a wide range. Thus it would be necessary to add water to bring the moisture content of borrow area earth to as near OMC as practicable. In Irrigation Projects, watering in borrow areas may be done where watering at the place of fill does not yield required results. Wherever practicable and specially during dry months periodical watering of the borrow area by tankers and mobile units may be done to the extent possible as decided by Engineer - in - charge.

4.9 Dam Embankment:

4.9.1. General - Certain instruments for measuring the performance of the dam during construction and afterwards are proposed to be installed by the department at locations as specified in the drawing or as decided by the Engineer - in - charge. Necessary facilities for the installation and observation of these instruments shall be extended by the agency executing the work. For installation and observation of instruments and for necessary soil tests near the installed instruments, necessary time shall be allowed within placement schedule.

The embankment shall be constructed (exclusive of pitching and backing of chips of filter below pitching) generally to the lines and grades shown on the drawings, but increased by such heights and widths determined as necessary to allow for settlement or shrinkage as specified in para .4.9.9. Also in order that proper compaction can be done upto the edges of the designed section duly increased for settlement and shrinkage as stipulated above, section will be further widened by 45 cm.. Subsequently after compaction it will be dressed by trimming the slopes to proper section so that the surface on the slopes is
also as firm and compact as the top of embankment. The earth thus trimmed could however, be used in the embankment fill. Any material that is lost by rains weathering or other cause shall be replaced.

The dam embankment is divided into zones within which fill materials having different characteristics are to be placed. Placement of fill within these zones as shown in the drawings shall be performed in an orderly sequence and in efficient and workman like manner, so as to produce within each zone, fills having such qualities of density, strength and permeability as will ensure the highest practicable degree of stability and performance of the whole dam embankment.

No bushes, roots, sods or other perishable or unsuitable materials shall be placed in the embankment. The suitability of each part of the foundation for placing embankment materials there on and for all materials for use in embankment construction will be determine by the field laboratory.

The difference in elevations between core and shell zones of the dam embankment at any cross - section above the embankment foundation shall not exceed 0.6 m unless specifically authorised by the Engineer - in- Charge. The embankment for each zone shall be maintained in continuous and approximately horizontal layers in the reaches programmed for construction in that season. Where however, due to some constraints the dam has to be constructed in discontinuous portions or reaches, the slopes of the bonding surface parallel to dam axis between the previously completed portions of the dam embankment and the materials to be placed in each zone shall not be steeper than 3 to 1 in core, and 2 and 1/2 to 1 in other zones.

4.9.2. Preparation of foundation - Foundation preparation shall be done subsequent to stripping and excavation, if any. All portions of excavation made for test pits or other subsurface investigations and all other existing cavities found within the area to be covered by earth fill or of core and shall zones, which extend below the established lines of excavation for embankment foundation, shall be filled with earth fill of the corresponding zone of the embankments. All test pits within a distance of 10 times the dam embankment from the upstream toe shall be filled by impervious material. No material shall be placed in any section of the earth fill portion of the dam embankment until the foundation for that section is suitably prepared and has been approved by the Engineer - in - charge.

The surface of each portion of the Foundation immediately prior to receiving any material for the earth fill shall be moist and sufficiently cleaned to obtain a suitable bond with the embankment.

Pools of standing water will not be permitted in the foundation of the embankment and shall be drained out prior to placing the first layer of the embankment.

(a) Rock Foundation - The treatment of the rock surface under the dam shall be so done as to ensure a tight bond between the impervious core and foundation, for which the following procedure shall be followed.

(1) Before the grout curtain is installed, the area of the rock surface which is to be in contact with the impervious core of the dam shall be exposed with rough excavation. Hard rock projections and overhangs shall be removed. If blasting is to be resorted to, care shall be taken to avoid objectionable shocks to foundation rocks and abutments. As far as possible, the whole contact area of foundation rock and abutments after rough excavation shall be exposed at one time to enable examination of rock surface characteristics and planning the method or treatment. Curtain grouting where required shall be carried out in accordance with provision under relevant para of specifications of Chapter 22 " Drilling and Grouting "

(2) Cleaning and Shoveling - After the grouting operations are over, the rock surface shall be thoroughly cleaned. Pockets of sand and gravel and other soils shall be removed by hand shoveling and soft erodible seams and localised decomposition cleared out as deep as possible. Loose rock shall be removed by wedging and hand picking. Layers or grout spilled from grouting operation shall be chipped out and removed. Finally, the hand cleaned surface shall be thoroughly washed with powerful water jets to remove the fines which would have worked into the seams of the rock and obtain a clean surface. Compressed air jets shall be used as a final step in the clean up operation.

(3) Sealing cracks -Deep pot holes or pockets shall be filled with hand compacted soil or concrete. If the rocks surface in the bottom and sides of pot holes is cracked, the cracks should be sealed with cement grout. If the rock surface contains too many closely spaced pot holes, the entire rock surface shall be covered with concrete. A clay paste may be used in the smaller cracks. All the cracks and joints and shear seams or other incompetent materials that are exposed in the cut off trench shall be scooped out to the greatest depth practicable (Not less than twice their width at the surface) with the aid of trowels, bars and cleaned with air water jets and then filled with slush grout. Slush grout shall consist of cement and sand thoroughly mixed in a proportion, 1 part of cement to 2 parts of sand by volume with sufficient water to produce a highly plastic and buttery mix.

Foundation rock which is fairly impervious but has a very rugged surface shall be treated by laying core material at a moisture content slightly above the optimum in thin layers and compacted with mechanical equipment / small tampers to ensure that all irregular depressions in the rock surface have been filled with soil to create an effective / complete bond.

The moisture content and layer thickness shall be specified by the field laboratory. Any open crack in the rock surface shall be specified by the field laboratory. Any open crack in the rock surface shall be sealed with cement grout by appropriate means. Fault zones or larger cracks shall be dug out to a depth as determined by the Executive Engineer and backfilled with concrete.

(b) Soil Foundation - Soil foundation shall be scarified and loosened by means of a plough ripper or other methods to a depth of about 15 cms. to 20 cms. to the satisfaction of the Executive Engineer. Roots or other debris turned up during scarifying shall be removed from the entire foundation area for the fill. It shall then be moistened to slightly above the optimum moisture and compacted by required number of passed of the compaction equipment to the same percentage of compaction as the core. The purpose of higher than optimum moisture is to ensure forcing of the soil into any unseen soft zones just below the surface. The first few lifts of fill for the embankment shall be carefully placed, for the surface will still be rather irregular. If possible, heavy rubber tyred rollers should be used for compaction because they will follow the irregular surface and not bridge over small low areas, as other types of rolling equipment will do. Layers 10 cms to 15 cms thick with

moisture content 1 to 2 percent above optimum moisture content must be used to ensure uniform compaction and a satisfactory intimate bond between the foundation soil and the fill materials especially under the central core. The layers shall be composed of the most impervious materials, under the central core zone.

(C) Sand Foundation - The foundation sand shall be tested for its natural relative density . In reaches where the relative density is less than 70%, the foundation sand shall be densified

by any of the approved methods to obtain a minimum relative density of 70%. Until the foundation has been tested and the relative density found to exceed 70%, earth fill shall be not be allowed to be placed. This is necessary to minimise the effects of any structural readjustments in a loose foundation.

4.9.3. Earthfill Materials - The materials for the respective zones of embankment shall be obtained from borrow areas required for obtaining the desired gradation in the depth of cut in the barrow areas required for obtaining desired gradation in the materials. In general, all materials from a particular borrow area shall be a mixture of materials obtained for the full depth of cut. Where in a borrow area the sub - stratum occurs in well defined layer differing considerably in mechanical analysis, so that mixture is not suitable for any particular zone, the materials shall be excavated layer wise by scrappers or other suitable means and the materials placed in the zone for which it satisfies the requirements. Where it is not practicable to obtain a mixture of materials, the finest and most clayey material shall be placed in the cut- off trench and the central upstream portion of the embankment. The intermediate material shall be placed near the outer slopes of the embankment, No material containing a high percentage of plastic clay shall be used in the embankment without being mixed with coarser material.

Chemical and Physical tests of soils in embankment shall be carried out to ensure that the soil does not contain (a) soluble lime contents (b) soluble salt contents of cohesionless fines, in quantities harmful to the embankments.

4.9.4. Placing earthfill - The distribution and gradation of the materials throughout earth fill shall be as shown on the drawings or as directed. The fill shall be free from lenses, pockets, streaks or layers of materials differing substantially in texture or gradation from the surrounding materials. The combined excavation and placing operations shall be such that the material when compacted in the earth fill will be blended sufficiently to produce the best practicable degree of compaction and stability. Successive loads of materials shall be dumped on the earth fill so as to produce the best practicable distribution of the material. The various zones shall be clearly delineated on the embankment and the materials from the borrow areas placed accordingly.

The clay blanket shall be laid in a manner similar to clay core and compacted to same degree or compaction at optimum moisture content.

Particular care shall be taken to ensure that materials are not so placed as will be conducive to the formation of intermittent relatively impervious blankets in the shall zone, which will interfere with the satisfactory drainage.

No stone, cobbles or rock fragments having maximum dimensions or more that 10 cms. shall be placed in the earth fill (casing only). Such stones and cobbles shall be removed either at the borrow pit or after being transported to the embankment but before the materials in the earth fill are rolled and compacted. Such stone and cobbles shall be used in the riprap or rock toe of the dam embankment, if suitable or wasted as directed. The materials shall be placed in the earth fill in continuous horizontal layers not more than 15 cm in thickness after being rolled as herein specified Higher thickness or layers may also be permitted, if suitable compaction units such as vibratory compactors are used to give required density under optimum moisture content, but in no case the compacted thickness of the layer shall exceed 25 cm. The extent of layers shall be determined in the

field by test section. During construction, a small transverse slope from centre towards edges should be given to avoid pools of water forming due to rains. If in the opinion of the Executive Engineer the surface of prepared foundation or the rolled surface of any layer of earth fill is to dry or smooth to bond properly with the layer of materials to be placed thereon, it shall be moistened or worked with harrow, scarifier or other suitable equipment, in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the next succeeding layer or earth fill materials is placed. If the rolled surface of any earth fill is found to be toe wet for proper compaction of the layer of earth fill materials to be placed thereon, it shall be raked up and allowed to dry, or be worked with harrow, scarifier or any other suitable equipment to reduce the moisture content to the required amount, and than it shall be compacted before the next succeeding layer of earth fill materials is placed. The concrete or masonry surfaces against which earthwork is to be placed shall be cleared and moistened prior to placing of the earth fill, clay leaping of plastic consistency be adopted to ensure proper bond between the earth fill and the concrete / masonry. The foundation adjacent to the concrete structures shall be thoroughly cleared of loose materials and moistened. In placing the earth fill on rock foundation, the foundation shall first be prepared as detailed earlier. Care shall be taken in placing the first layer of the fill that no damage is caused by the hauling machinery, which will get concealed by the spread layer of the fill. The soil for the layer shall be at a moisture content sufficient to enable satisfactory bonding of the fill with the rock surface.

In case the whole length of embankment is not constructed simultaneously and only a portion of the embankment is constructed during one season the following procedure shall be adopted.

The incomplete ends of embankment shall be placed at a slope not steeper than 4:1 to permit satisfactory bonding with the portion of the embankment, which is constructed later. Old surface should be stripped or benched in accordance with the direction of the Engineer- in - charge.

4.9.5. Weather Conditions - The embankment material shall be placed only when the weather conditions are satisfactory to permit accurate control of the moisture content in the embankment materials. During that part of the construction period when the top surface of the embankment may be subject to rainfall causing cessation of work, It shall be graded and rolled with a smooth wheeled rollers to facilitate runoff. Prior to resuming work, the top surface should be slightly scarified and moistened or allowed to dry as necessary and approved by the Engineer- in - charge. If the cessation due to any reason, is for a considerable period, top layer shall be stripped to the required depth as may be directed by the Engineer - in - charge, so as to remove any vegetable growth, loose silt or sand washings or other objectionable matter.

4.9.6. Moisture Control - The water content of the earth fill material prior to and during compaction shall be distributed uniformly throughout each layer of materials between -2 to +1 of the optimum moisture content for casing material and between 0 to +2 for hearting material. Moisture determination of soil as well as needle moisture determination of soil shall be carried out as per IS : 2720 (pt. II) - 1973, Sec. 1 and designation E22 of USBR/ Earth manual 1968 respectively.

Laboratory investigations may impose some restrictions on the lower limits of the practicable moisture contents on the basis of studies on consolidation characteristics of soils in embankment. Hereinafter, the term range of optimum practicable moisture content shall refer to the value as described above. As far as practicable, the materials shall be placed at proper moisture content. If additional moisture is required it shall be added by sprinkling water before rolling of a layer. If the moisture is greater than required, the material shall be spread and allowed to dry before starting rolling. Moisture control shall be strictly adhered to. The moisture content shall be relatively uniform throughout the layer of material. If necessary, ploughing, disking, harrowing or blending with other materials may have to be resorted to, to obtain uniform moisture distribution, if the moisture content is more or less than the range of optimum practicable moisture content, or if it is not uniformly distributed throughout the layer, rolling and adding of further layer shall be stopped. Further work shall be started again only when the above conditions are satisfied.

The moisture content of the earth fill placed against any rock outcrop or any structure shall be slightly above the optimum to allow it to be compacted in to all irregularities of the rock and this shall be determined by the field tests.

4.9.7. Compaction and watering:

4.9.7.1. Compaction Equipments - While the specification below provide that equipment of a particular type & size is to be furnished and used, it is contended that the improved compaction equipment as may be most suited to the prevailing site conditions and the programme of construction shall be used. The broad details of the equipments are given below.

4.9.7.1.1. Tamping rollers / Vibratory compactors shall be used for compacting the earth fill .The sheep foot rollers shall meet the following requirements.

(I) Roller Drums - Each drum of a roller shall have an outside diameter of not less than
150 cm and shall be not less that 120 cm. not more than 180 cm in length. The space between two adjacent drums, When on a level surface shall not be less than 30 cm nor more than 38 cm. Each drum shall be free to pivot about an axis parallel to the direction of travel. Each drum shall be equipped with a suitable pressure relief valve to prevent excessive pressures from developing in the interior of the roller drum.

(II) Tamping Feet - Atleast one tamping foot shall be provided for each 65 sq. cm of drum surface. The space measured on the surface of the drum between the centres of two adjacent tamping feet shall not be less than 230 mm. The cross sectional area of each tamping foot shall be not more than 65 sq.cm. at a plane normal to the axis of the shank, 150 mm from the drum surface and shall be maintained at not less than 45 sq.cm. nor more than 65 sq.cm. at a plane normal to axis of the shank 200 mm from the drum surface.

(III) Roller Weight- The weigh of the roller when fully loaded shall not be less than 7,091
Kg and the ground pressure when fully loaded shall not be less than 40 kg/cm^2. required to obtain the desired
compaction. Tractor used for pulling rollers shall be of 50 H.P. to 65 H. P., power to pull the rollers satisfactorily at a speed of 4 kms/per hour when the drums are fully loaded with wet sand ballast. During operation of rolling, the spaces between the tamping foot shall be kept clear of materials sticking to the drum which cold impair the effectiveness of the tamping rollers.

4.9.7.1.2 Rolling - (i) When each layer of material has been conditioned so as to have the proper moisture content uniformly distributed through the material, it shall be compacted by passing the tamping roller. The exact number of passes shall be designated by the field laboratory after necessary test. The layers shall be compacted in strips overlapping not less than 0.6 m. The rollers or loaded vehicle shall travel in a direction parallel to the axis of the dam. Turns shall be made carefully to ensure uniform compaction. Rollers shall always be pulled.

(ii) If the foundation surface is too irregular to allow the use of large roller directly against any structure or rock out - crop, the roller shall be used to compact the soil as close to the structure or the out crop as possible and the portion of the embankment directly against the rock or the structure shall be compacted with pneumatic hand tampers in thin layers. Sheep foot roller shall not be employed for compaction till the thickness of the layers compacted by other mean is greater by 30 cm than the depth of the foot of the roller drum.

4.9.7.1.3. Tamping -Rollers will not be permitted to operate within 1.00 metre of concrete and masonry structures. In location where compaction of the earth fill material by means of roller is impracticable or undesirable, the earth fill shall be specially compacted as specified herein at the following locations.:-

1. Portions of the earth fill in dam embankment adjacent to masonry structures and embankment foundation designated on the drawing as specially compacted earth fill.

2. Earth fill in dam embankment adjacent to steep abutment and location of instruments.

3. Earth fill at locations specially designated.

Earth fill shall be spread in layers of not more than 10 cm. in thickness when loose and shall be moistened to have the required moisture content as specified. When each layer of material has been conditioned to have the required moisture content, It shall be compacted to the specified density by special rollers, mechanical tampers or by other approved methods and all equipment and methods used shall be subject to approval based on evidence of actual performance and field compaction tests. The moisture control and compaction shall be equivalent to that obtained in the earth fill actually placed in the dam embankment in accordance with the specifications.

4.9.7.1.4. Watering - Watering of earthwork for consolidation shall be carried out by the department or by the contractor as per clubbed item of schedule. The arrangements for storage, pumping equipment and laying of suitable pipe lines of adequate capacity on upstream and downstream of the dam will be made. The connections will be provided at regular intervals in the main pipeline to connect to the off-take lines having valves to control the flow through rubber hoses. The whole system will be such and so laid out that regular flow of water is ensured on the dam at all times. The pipeline will be required to be raised as and when required with the raising of the earthwork on the dam.

4.9.8. Dressing Slopes. The outside slopes of the embankment shall be neatly dressed to lines and grades as placement of fill progress.

All humps and hollows varying more than 15 cm from the neat lines of the embankment shall be regraded. Material used to fill depression shall be thoroughly compacted and bonded to the original surface. Slopes shall be maintained until final completion and acceptance. Any material that is lost by rains, weathering or other cause shall be replaced at the cost of agency executing the work.

4.9.9. Settlement Allowance - In the earth fill embankment watered, rolled and compacted at optimum moisture content and at dry density expressed as percentage or Proctor's maximum dry density as given in Appendix - 1, settlement allowance of 1% and 2% of the designed height for unyielding (rock) and compressible (Soil) foundations respectively shall be provided. The base width of the dam will not be increased to maintain the design slopes indicated in the drawings for the additional height as settlement allowance, but the following procedure will be adopted.

Settlement allowance will be calculated at various levels. Where the slope is to be changed and elevations including settlement allowance will be derived. The embankment width at the designed levels remaining same. The edges of embankment at the increased elevation (including settlement), when joined with the point where the slope has changed earlier below shall give the slope to be adopted for construction.

If the embankment is raised in more than one season, provision for settlement shall be made in the last season's construction by slight steepening of slopes near the top.

4.10 TOE DRAINS -

Pitched toe drains with filter will be provided throughout the length of the dam at the downstream toe of earth dam as indicated in the drawings and as per the details shown therein. The layer of horizontal filter under the casing portion of dam shall be extended in the toe drains to specified thickness. The filter shall be watered and tamped with hand tampers.

The useful excavated material out of the toe drain shall be suitably utilised on the dam as directed by the Engineer - in - charge.

4.11 ROAD SURFACES AND PARAPETS -

(i) Road shall be constructed at the top of the earth dam and other locations as indicated in the drawing. The roadway shall be as indicated in drawing. The construction shall be as specified for the highway by I.R.C. or as directed by the Engineer - in - charge.

(ii) The parapets shall also be constructed after allowing sufficient time for the embankment to undergo the usual post construction settlement in order to avoid cracking of the walls due to differential settlement.

4.12. FILTER:

4.12.1 Base Filter Blankets:

4.12.1.1. Where indicated in the drawings, filter blankets shall be laid on the base under the downstream portion of the earth embankment. The number of layer in the filter blanket or seepage drains and thickness of such layer shall be as specified in the drawing. Filter shall be placed and tamped into place in such a manner that mixing of filter with foundation or backfill materials will not occur.

4.12.1.2. The filter material shall consist of clean, sound and well-graded aggregate. The material shall be free from debris, wood, vegetable matter, decomposed rock and other deleterious matter. The gradation of each filter layer shall meet the following requirements with respect to the material to be protected and also with respect to the adjacent filter layers.

(i) $\dfrac{\text{D - 15 of the filter}}{\text{D - 15 of the base material}} = > 4 \text{ and } < 20$

Provided the filter does not contain more than 5 percent of material finer than 0.07 mm (No. 200 sieve)

(ii) $\dfrac{\text{D - 15 of the filter}}{\text{D - 85 of the base material}} = < 5$

(iii) $\dfrac{\text{D - 50 of the filter}}{\text{D - 50 of base material}} = < 25$

(iv) The grain size curve of the filter shall be roughly parallel to that of the base material. In the above, D-15 is the size at which 15 percent of total soil particles are smaller, the percentage being by weight as determined by mechanical analysis. The D.- 85 size is that at which 85 percent of the total soil particles are smaller. It shall be laid in single layer or in layers as per the drawing if more than one filter layer is required, the same criteria shall be allowed. The finer filter is considered as the base material for selection of the gradation of the coarser filter.

(v)In order to prevent segregation and bridging of large particles, (the maximum) particle size shall not exceed 75 mm .

The requirement for grading of the filter shall be established by the field laboratory on the basis of mechanical analysis of adjacent materials.

The material brought to the site shall be subjected to the aforesaid tests in the laboratories at the project site. The result shall be final and binding and all material not conforming to the requirement so determined shall not be permitted, for use on the said works.

(vi)The following gradation is tentatively suggested but is subject to modifications after further laboratory tests: -

a)	For filter material in contact with foundation or earth fill material	Well graded coarse sand & gravel passing 12 mm screen
b)	For middle layer of filter blanket & for lavers in contact with rock fill	Coarse gravel passing 75 mm screen and retained on 12 mm screen

4.12.1.3 Placing:

4.12.1.3.1. The foundation shall be cleared, stripped as specified in paras 4.5 and 4.6 and SC layers of specified thickness as shown in the drawing shall be laid wherever there is clay in the dam seat, before laying the base filter.

4.12.1.3.2. The filter material shall be deposited in horizontal layers of thickness not more than 15 cm after compaction to achieve relative density not less than 70 % . The thickness of filter layer shall be increased to 30 cm if compaction is performed by treads of crawler type tractors, Surface Vibrators, or similar equipment. Thickness of layer shall, however, not be more that the penetrating depths of the vibrators, if compaction is performed by internal vibrator. During or immediately prior to compaction, the material in each layer shall be thoroughly wetted.

4.12.1.3.3. The relative density of the compacted material shall be not less than 70 % as determined by relative density tests of cohesion less soils as per procedure given in IS: 2720 (Part XIV)-1983.

4.12.1.3.4. Extreme care shall be taken in placing material in the filter zone as to obtain a fill, free form lenses, layers and streaks of segregated materials.

4.12.1.3.5. After compaction of the filter blanket, the earth fill material shall be placed in 10 cm, layers and tamped by hand at optimum moisture or compacted by smooth rollers or power compactors as directed by the Engineer - in - charge. Sheep foot rollers shall not be used till earthwork has been laid and compacted to a thickness of 60 cms over the filter blanket. However, the compaction of the earthfill in the initial 60 cm thickness shall be subject to the same quality control regarding to moisture content and dry density as for the rest of the embankment.

4.12.2. Chimney Filter - Vertical inclined filter of the dimension specified in drawing shall be constructed on the downstream face of impervious core. The thickness of chimney filter shall be as shown in the drawings. Materials used shall be clean, sound and durable and shall be free from silt roots, bush and other impurities. Filter materials shall be laid in 30 cm layers and shall be thoroughly wetted and compacted by pneumatic tyred rollers or other approved equipments. Materials for filter shall be compacted to obtain a minimum relative density of 70 %. The filter shall satisfy the filter criteria as given in para 4.12.1.2. for base filter blankets.

4.12.3. Seepage Drains - The seepage drains shall be excavated to the size and bed grade as shown in the drawings so as to allow for easy flow of seepage from the hearting toe to the open drains. These shall be refilled with layers of sand gravel or broken metal and boulders as shown in the drawings. In this case greatest care will have to be taken to see that filter medial do not get mixed up.

4.13 RIP - RAP ON THE UPSTREAM SLOPE OF MBANKMENT:

4.13.1. Hand Placed Rip - Rap:

4.13.1.1. Rip - rap shall be hand placed on the upstream slope of the dam embankment over backing of specified filter layers .The thickness of Rip - rap layer shall be as indicated in the drawings.

4.13.1.2. Stone for Rip - rap shall be hard and durable and shall not crumble on long exposure to water frost and air.

4.13.1.3. Procedure for Placing Rip - Rap - The hand placed Riprap shall consist of one-man stones laid on edge. Starting at the bottom of the slope the stone shall be laid compactly with a minimum of joints and so matched and inter locked that they shall be keyed together with staggered joint space. Rock fragments and spall shall be driven into interstices to wedge the Riprap in place. The wedging shall be done with the largest chip practicable, each chip being well driven home with a hammer so that no chip can be removed by hand. Very irregular projection shall be knocked off so that the Riprap presents a reasonably uniform surface free of loose stones.

4.13.1.4. Hand placed Riprap should preferably be laid in one course such that the layer thickness is same as the stone size. However at least 80 percent of the area of Riprap should have stones weighing more than 45 kg. Such stone should be spread uniformly in the area, where such stones are not sufficient to cover the entire thickness of Riprap; the same may be laid in two layers.

If two layers of stones are used, header stones extending through both layer and spaced at about

1.5 m. shall be used. Also of the two layers, the top layer shall be of larger stones. The size of the smallest side of the header stone shall not be less than 150 mm and its length shall be equal to the thickness of the Riprap plus 150 mm., so that the header stone would project above the general top surface of the Riprap by about 150 mm.. Such a projection will break the wave force and would also facilitate easy identification of the headers stones. If header stones of full length are not available from the quarry, concrete blocks of necessary size, length and shape may be manufactured for the purpose.

In case, if stone of requisite size are not available and smaller stones / boulders locally available are required to be used; the Riprap should be laid in panels formed by constructing profile walls. A portion of the area between the panels may be grouted by pouring fluid cement mortar worked into the Riprap.

Hand placed Riprap may be laid flat or laid with projections (Needles) .

4.13.1.5. The Riprap shall be placed along with the fill so that a minimum of breakdown will occur during placing and spreading.

4.13.2. Dumped Rip-Rap:

4.13.2.1. The minimum thickness of dumped rock Riprap and average rock size shall be as shown in Table **1.** The thickness of Riprap shall in no case be less than 450 mm.

TABLE 1 : Minimum Thickness of Dumped Rip-Rap

Maximum wave height metre	Minimum average rock size (D_{50})	Minimum Riprap Thickness mm
0 to 1.5	300	600
1.5 to 3.5	400	750
above 3.0	700	1000

4.13.2.2. The most important criteria in Table 1 is the minimum average rock size (D50)of Riprap. For example, for waves of waves of 2 m in height the Riprap should be composed of rocks, half of which by weight are equal to or larger than more or less equidimentional rock with average diameter of 400 mm. The rock used for Riprap shall be well graded from a maximum rock roughly equal to 1.5 times the average size to 50 mm.

4.13.2.3. Procedure for Placing Rip- Rap - Dumped Riprap shall consist of boulders or blasted rock fragments; it shall be dumped in place mechanically on a properly graded filter layer. The full thickness of dumped Riprap shall be dumped in one layer. It shall either be dumped over the upstream face from the embankment level as the embankment is being raised up or after the embankment had been completed. When placed during the construction, the Riprap layer should be kept a few meters lower than the construction surface. When placed after the embankment is completed, the rock should be taken to the crest of the dam in trucks and then lowered down the slope by suitable mechanical device. The rock shall not be allowed to drop down the slope in a cute or be pushed down the slope, since these operations result in excessive segregation. After dumping, the rock should be worked manually with bars or other equipment to achieve a well-packed and tidy surface.

4.13.3. Grade Filter Underneath Rip- Rap -

4.13.3.1. Graded filter shall consist of atleast two layers of filter material (coarse and fine). The thickness of each layer shall be as specified in the drawing.

4.13.3.2. The graded filter shall consist of sand and crushed stone as shown in the drawing Sang used shall be clean sound and durable and shall be free from silt roots, brush wood and other impurities. Sand used shall be of size passing 4.75 mm screen. Crushed stone used for filter shall consist of rock fragments reasonably graded upto 15 cm in maximum dimension.

4.13.3.3. Gradation requirement for the coarse filter material with respect to Riprap material should conform to the criteria that D85 size of the coarse filter material shall not

be less than 1/10 of D15 size of the Riprap material. The gradation requirements for the fine filter with respect to embankment material should conform to the criteria that D15 size of the fine filter material shall not exceed 5 times the D 85 size of the retained embankment material .The two layers of filter shall also satisfy these criteria with respect to each other. Where the embankment material satisfy this criteria with respect to coarse filter fine filter could be omitted.

4.13.3.4. Before placing of filter material, The embankment shall be trimmed neatly to slope and grades as indicated on the drawing .The filter material shall be placed in layers of uniform thickness and care shall be taken to avoid segregation of coarse and fine material in each layer, formation of pockets and mixing of material of one layer with material of another layer or earth fill.

4.13.4. - Tolerance: The tolerance on the nominal thickness of Rip - rap enforced on the performed profile shall be 10 percent.

4.13.5. - Dry Stone Pitching:

4.13.5.1. - The quality stones for pitching shall be in accordance with para 4.13.1.2.

4.13.5.2. - The depth of stones shall be about equal to the specified thickness of pitching and shall generally be not less than 0.014 cum or 0.021 cum as specified in the appropriate item of USR or other sizes as ordered by the Engineer-in-Charge having regard to the nature of stones being quarried. The small size stones/ spalls required for pitching and wedging shall be brought to the site only to the required extent and they shall not to be used in two or more thickness as a substitute for the stones of full thickness. A large amount of the stones for pitching shall be obtained from the required excavation for other parts of the work. Additional rock as required shall be obtained from rock quarries.

4.13.5.3. Placing: -

4.13.5.3.1.- Backing of filter and / or spalls where specified on drawing shall be placed only after the underlying slope shall be trimmed neatly to the slopes and grades established on the drawings .The lowest course of pitching shall be started form the toe wall or the line of pinheaders at the toe of the slopes as may be specified on the drawing and the pitching laid course by course up the slope.

4.13.5.3.2.- Projecting corners shall be knocked off with the hammer so as to make a rough joint at the base. The stone shall be laid on end with broadest base down and length normal to the slope and carefully bonded in all directions and firmly bonded on the backing of filters where provided. The stones shall be packed with hammer of mallet closed against each other, their general line being approximately perpendicular to the slope of the underlying surface.

4.13.5.3.3. - After the stones have been fixed as above, the interstices shall be filled with

well fitting chips driven home.

4.13.5.3.4. - The general face slope of the pitching when completed shall be as specified in the drawing subject to the tolerance as given in para 4.13.5.1. below . The final surface of the pitching shall be clear of all refuge.

4.13.5.3.5. - Tolerance - The provision in para 4.13.4 shall apply.

4.13.6. Grouted Stone Pitching:

4.13.6.1. - The specification of para 4.13.5.1. to 4.13.5.3. shall be followed except for the use of stone chips or quarry spalls as described in para 4.13.5.3.3.

4.13.6.2. - After the pitching stones are laid as described in para 4.13.5.3.2, the Interstices shall be filled with mortar of specified mix. The mortar shall be forced into the joints with the help of 6 mm. rods so as to ensure that the mortar reaches upto the base. The joints shall then be finished flush with the help of trowel.

4.13.6.3. - The surface of the pitching shall be cleaned of all loose mortar droppings, etc., The joints shall be cured for at least seven days after the initial setting time of one day.

4.13.7. Dry Picked Up Boulder Pitching:

4.13.7.1- The boulders used in this type of pitching shall consist of the rolled rock masses directly picked up in their natural form from the river or the nalla beds. The boulders shall be hard dense and resistant to abrasion. The size of the boulders in at least one direction should not normally be less than 22 cm. Also the least dimension of such boulders in any direction should not be less than 10 cm. The smaller size boulders/ gravels required for packing and wedging shall be brought to the site only to the required extent and shall not be used in two or more layers as a substitute for the boulders of full thickness.

4.13.7.2 - Placing:

4.13.7.2. 1. - Over the backing of filter as may be specified in the drawing, the boulders shall be placed such that the direction in which the size of boulder is around 22 cm is placed normal to the surface of under layer. Also the boulders shall be laid with broadest base down and carefully bonded in all directions .

4.13.7.2.2. - After the boulders have been fixed as above, the interstices shall be filled with well fitting smaller size boulders, gravel driven home.

4.13.7.2.3. - The provision of para 4.13.5.3.4. Shall be applicable here also.

4.13.8. Dry Quarried Boulder pitching:

4.13.8.1. - The specification as in para 4.13.6.1. shall be followed except that the boulders of required size shall be obtained by breaking big size boulders.

4.13.8.2. - Placing - The specifications as at para 4.13.6.2.1. to 4.13.6.2.3. shall be followed.

4.13.8.3. - Tolerance -The specifications as at para 4.13.4. shall apply .

4.14. ROCK TOE:

(i) The rock fill shall consist of free draining mixture of rock fragments of sizes from 75 mm to 250 mm. A large amount of material may be obtained from required excavation for other parts of the work. Additional as required shall be obtained from rock quarries.

(ii) Successive loads of material shall be dumped as to secured the best practicable distribution materials. The large rock fragments shall be placed on the outer slopes and the smaller fragment shall be placed towards the earth fill side. In general the downstream toe shall be placed in the manner to be approved by the Engineer - in - charge.

(iii) The rock fill shall be placed in horizontal layers not exceeding 90 cm in thickness. The completed fill shall be stable and no large unfilled spaces shall be present in the fill.

(iv) Large voids, shall be not be allowed on the downstream face of the rock - toe, so as to prevent choking by the spilling of earth, rain cuts etc. during and after construction. Such voids shall be properly packed with stone chips of suitable sizes. The surface of the rock - toe shall be kept clear of all earth and debris so as not to choke its full drainage capacity.

(v) The filter layers to be provided behind and below the rock - toe shall satisfy the requirements of para 4.12.1.2.

4.15 - INSPECTION AND TESTS:

4.15. 1 General - The Executive Engineer shall maintain and exercise thorough check on the quality of fill material delivered to the dam and shall arrange to obtain the data and in-situ proportion of the material after compaction with designed assumptions. To achieve these objectives, a program of fill testing and inspection shall be planned to affect quality control.

4.15.2. Scope of Testing and Inspection Required:

Field control of fill material will require visual and laboratory checks. The checks on the effectiveness of placement and compaction procedure will required to be made by field density - tests at prescribed intervals.

4.15.3. Before Compaction:

Materials delivered to the fill shall be visually examined and their properties estimated by way of inspection. These checks shall include.

(a) Borrow Areas:

(i) Excavation of borrow areas shall be limited in extent and depth as indicated on plans. (ii) Estimation of moisture contents of materials by visual examination and feel.

(iii) Samples shall be taken for laboratory analysis in case the soil is of different characteristics

These inspection checks shall be supplemented by sampling the materials at prescribed minimum intervals and by testing the samples in the laboratory for gradation and moisture content.

(b) Embankment:

(i) Water content tests shall be carried out in the laboratory while placing the fill materials.

(ii) Moisture content shall be controlled by adding water or aerating the soil according to laboratory test.

(iii) It shall be ensured that the methods of dumping, spreading and moisture conditions are such that which results in reducing segregation and or variation of moisture content to a minimum.

4.15.4 During Compaction:

It is intended that the checks on operations during compaction shall verify. (i) That the layer thickness of the materials is as specified.

(ii) That the fill is compacted by the specified number of passes of the specified machinery. (iii) That no excessive rutting, weaving or a scaling of the fill occurs during compaction

4.15.5. After Compaction:

The condition of the fill after compaction shall be observed and recorded particularly with respect of rutting or weaving. However, the properties of materials after compaction shall be determined primarily by field density tests. Dry density attained shall satisfy the compaction standards as per Appendix. I

4.15.6 Frequency of Testing:

4.15.6.1. The frequencies for various tests for earthwork shall be in accordance with Appendix 6.02 of the M. P., W. D. Manual 1983 Vol. Part II.

4.15.6.2 Special attention shall be given to the following locations where insufficient compaction is likely to occur: -

(i) The junction between areas of mechanical tamping and rolled embankment along abutments or cut off walls.

(ii) Areas where rollers turn during rolling operations. (iii) Areas where too thick a

layer is being compacted.

(iv) Areas where improper water content exists in a material.

(v) Areas where less than specified number of roller passes were made.

(vi) Areas where dirt - clogged rollers are being used to compact the materials

(vii) Areas where over sized rock which has been overlooked is contained in the fill.

(viii) Areas where materials have been placed when they contained minor amounts of frost, or at nearly freezing temperatures.

(ix) Areas that where compacted by rollers that have possibly lost part of their ballast. (x) Areas containing materials differing substantially from the average.

4.15.7 Record and Reports - Record of borrow area materials and embankment placing operations be maintained in order to have a continuous check on the suitability and availability of fill materials and quality of the fill. Thus, it will be possible to have complete description of materials in any portion of the embankments. The records shall be maintained in the form specified in Appendix. - II.

4.15.8.Field Test Data - Records of field test data results should be presented in the form of statistical analysis sheets and summary sheets in order to provide control required forenforcement of statistical requirements of the specifications.

The test data summary sheets and inspection reports be used to form the basis of construction control report, which should be issued from the site at fortnightly intervals during construction season The report would contain narrative accounts of the progress and problems of fill construction, statistical analysis of test data and photograph of the fill operations.

4.15.9 Embankment Test Section - Placement of compaction methods specified will have to be verified by test embankment section to be built prior to starting of fill operations or at an early stage of dam construction. The initial stage of dam construction itself could be made to serve the purpose of test embankments. The test sections referred herein shall be used to establish:-

(a) Layer thickness of fills materials.

(b) Optimum practicable moisture content.

(c) Number of passes of the sheep foot roller, or weight of vibratory rollers vis -a vis number of passes for effective compaction.

When an appreciable change in material occurs, additional test sections shall be made during construction. The procedure for construction of the test embankment section is as follows.

(i) Select a location on the embankment where uninterrupted placing operations are being performed. This area 15 m by 30 m should be carefully worked and referenced so that its limits will be easily recognised. In order to expedite the determination of moisture contest to be used, more than one test section may be established on the embankment at the same time.

(ii) During construction of the test section which will most probably continue for several shifts, a complete record of the procedure should be kept . This record should include the number of layers placed, the spread thickness of each layer, the moisture content, at which the materials were rolled, the designated (No. 1, No. 2, etc.) of the rollers used the condition of the rollers (clean or dirty), the action of the materials being rolled (such as wavy under the rollers, the amount of penetration of the roller teeth after different number of roller trips etc.) and the borrow pit location from which the materials came.

(iii) Check the rollers to make certain that they met all the requirements of the specifications.

(iv) Determine the required spread thickness of layer that will compact to the specified thickness after rolling specified number of times and maintain this thickness as long as number of roller passes is kept the same.

(v) Using the available data from borrow pit investigations of the materials to be used in the test section, the optimum moisture content as determined by laboratory tests will be known and 3 percent less than this moisture content should be used in the first 3 or 4 layers rolled.

(vi) After 3 or 4 layers have been placed at 3 percent less than the laboratory optimum moisture content, field density test should be made throughout the section. These tests should be made for atleast each 93 sq.m. of test section area, and should be distributed over the area that they will detect the effects of different compaction conditions encountered during construction. For example, if the section is located near an abutment, certain parts of the area will receive more compaction from track travel than others, hence some tests should be made in the portion compacted only by the rollers and so reported.

(vii) The next step is to compact another 3 or 4 layers at the moisture content slightly higher (1 percent or 2 percent) then the moisture content previously used, maintaining the same rolled thickness of layer and number of roller passes as in above. Field density tests are again made over the test section.

(viii) If the resulting field dry densities (of materials passing the No. 4 sieve) from (vii) above shows an increase, with increase of moisture, again by another 1 percent or 2 percent, repeat the test. If an increase in moisture results in a decrease in field density, then place the next layers slightly dry of the original moisture content used and repeat the test. This procedure is nothing more than developing on the embankment a moisture density relation or compaction curve for a certain roller, thickness of layer, and a given number of roller trips. If special studies during investigation have indicated that, the material being tested should be placed within certain moisture limits, or if the moisture limits to be used have been specified, the procedure outline above should include tests at these moisture contents or at moisture contents both greater and smaller than the specified.

(ix) The roller compaction curve is now compared with the standard laboratory compaction curve If the field density of materials passing the No. 4 sieve (from the roller curve) is greater than the standard compaction density at the

specified moisture content, the test section should be continued decreasing the number of roller trips while maintaining the specific desirable moisture content until the most economical compactive effort is determined. When the roller trips are decreased, the required spread thickness of layer that will compact to the specified thickness of compacted material should be reckone

.(x) All works connected with the embankment test section will be done departmentally and shall be allowed without hindrance.

4.16. TURFING -

After the slope has been dressed to line, it shall be slightly roughened to bond and hold a surface dressing consisting of a 150 mm layer of good soil. The layer shall than be raked and lightly rolled with hand roller or hand tamped as directed by the Engineer - in - charge the entire slope surface shall then be covered with a layer of turf sod. The sod shall include a mat of roots and earth atleast 50 mm thick. Sod containing an excessive amount of obnoxious growth shall be excluded. Sods shall be carefully handled in transportation and transplanting so that a minimum amount of earth will be lost from the root mass. The strips of blocks of sod shall be laid on the slope in close contact and then tamped firmly in place so as to fill and close the joints between the blocks. The interval of time between cutting and laying shall be kept to a practicable minimum and sod shall not be permitted to dry out. Immediately after placing, the sodded slope shall be thoroughly wetted and kept moist for 10 days. The sodded slope shall be periodically moistened, if necessary for a sufficient period to re- establish the plant growth. Humus sod shall be transplanted only during an approved season. Alternatively the down stream slopes shall be topped with a 150 mm layer of good top soil and seeded with approved grass seed as directed.

4.17. ADDITIONAL SPECIFICATION FOR CANAL EARTH WORK:

4.17.7 Striping, Benching and furrowing and Ploughing:

4.17.7.1. The ground surface under all canal embankments excepting rock surface, where it is below full supply level in the canal be stripped, benched or furrowed and ploughed as per guidelines given below if not specified otherwise.

4.17.1.1. Benching - Benching should be provided only where the work is to be done on highly undulating stiff ground, steeply sloping ground or on existing canal embankments. Benching shall consist of excavation of triangular trenches with a slope of 1 In 12 with average depth of cutting as 15 cms, longitudinally below the embankment seat or in the form of steps with height of steps not more than 30 cms. The slope of trenches shall be towards the centre from the outer toes of the embankments.

4.17.7.1.2. Stripping and Ploughing and Furrowing - Recommendedtreatment on embankment seat for stripping and ploughing and furrowing under different situation should be as below:

S.No.	Type of vegetable growth on	Depth of stripping for				
		Q <3.0 cumecs		Q > 3.0		
		H> 1.5 m	H< 0.6 m	H >0.6 m	H<0.6 m	H> 3.0 m
1.	Soil Containing grass cover	8 cm.	Nil only ploughing and furrowing	15 cm.	Nil only ploughing and furrowing	15 cm.
2.	Agricultural land	Upto depth of ploughing but not exceeding 15 cms	----do----	15 cm.	----do----	Upto depth of ploughing but not exceeding 15 cms

Note : 1. Where FSL in the channel is below the ground level, neither stripping, nor ploughing and furrowing shall be done.

2. None of the treatments described in the above table shall be done for seat under spoil banks.

3. Where the depth of stripping needed is more than 15 cms, it shall be carried out only after approval by the Engineer - in - charge.

The foundation for canal embankments shall be prepared in accordance with para 4.9.2 (a) to (c) depending upon the nature of foundation materials.

4.17.7.2. Disposal of materials - In all the items of benching / stripping and preparation of base on rocky strata, described in para 4.17.7.1. above, the material from excavation, shall be deposited in specified areas in a manner as may be directed by the Engineer - in - charge and in such a way as not detract from the finished appearance of the work.

4.17.8 Compaction - The dry density shall not be less than 90% of M. D. D. in case of unlined canal more than 3 m height of embankment and lined canal irrespective of the height of embankment. Work of watering, moisture control and compaction shall be done by the contractor, wherever it is so specified.

APPENDIX - 1

CRITERIA FOR CONTROL OF COMPACTED DAM EMBANKMENT

Type of Material	Percentage of No. +4 fraction by dry weight of total	Percentages based on minus No. 4 fraction					
		50 feet or less in height			Greater than50 feet height		
		Minimum acceptable	Desirable average	Moisture limits	Minimum acceptable	Desirable average	Moisture limits
1	2	3	4	5	6	7	8
Cohesive	0-25	D = 95	D = 98	-2 to +2	D = 98	D =100	2 to 0 (Note 2)
Soil	26-50	D=92.5	D = 95		D = 95	D = 98	
Controlled by The	More than 50 (Note	D = 90	D = 93		D = 93	D = 95	
Cohesionle	Fine sands with 0-25	Dd = 75	Dd = 90	Soils	Dd = 75	Dd = 90	Soils

Soils	Mediu m Sands	Dd = 70	Dd = 85	should Be very wet	Dd = 70	Dd = 85	should Be very wet
Controlle d by the relative	Coarse sands and with 0-100	Dd = 65	Dd = 80		Dd = 65	Dd = 80	

Where -

Wo -Wf .... is the difference between optimum water content and fill water content in percent of dry weight of soil.

D .... is fill dry density divided by Proctor maximum dry density in percent .

Dd .... is relative density.

NOTES:

1 Cohesive soils containing more than 50 percent gravel sizes should be tested for permeability of the total material if used as a water barrier.

2 For high earth dams special instruction on placement moisture limits will ordinarily be prepared.

Sampling and Criteria for conformity: Sampling and criteria for conformity of the bricks shall be as given in IS : 5454 : 1976.

14. The University will not pay cost escalation in any case.

15. The tenderer shall be required to submit the tender in two envelop system. Envelop A should contain the earnest money through bank draft of any scheduled bank payable to the Registrar GGV, Bilaspur (C.G.) Envelop B should contain the rate quoted by the contractor/firm of contractors in the prescribed tender form.

16. Envelop 'A' & 'B' will be sealed and then again put in the third envelop which also should be in sealed envelop. It should be clearly mentioned on the top of the envelop that it contains the tender invited by GGV wide tender number **60/Engg./2012 dated 18/09/2012**

17. The GGV reserves the right to award the work order to the 2nd lowest tenderer incase of the first lowest tenderer fails to execute monthly work progress report by canceling the work order given the 1st lowest tenderer.

18. The GGV reserves the right to place the order complete or part of work.

19. The GGV reserves the right to alter. Add or delete any term(s) & condition(s) in the interest of the University without any prenotice and no suit shall lie on the University for the same.

20. Validity of accepted Quoated rates will be for 12 months from the date of agreement. University will give separete order for separate works time to time for some specified time and specified works in the interest of the University.

21. The vanue of arbitration shall be the court at Bilaspur (C.G.)

22. Any other information releted to the tender may be obtained from office of the University Engineer, GGV, Bilaspur(C.G.) during working houres.

LIST OF APPROVED MATERIALS & SPECIALIZED AGENCIES (CIVIL)

Note :

1. The Contractor shall obtain prior approval from the University Engineer before placing order for any specific material or engaging any of the specialized agencies.

2. Wherever applicable, the University Engineer may approve any material equivalent to that specified in the tender subject to proof being offered by the Contractor for equivalence to his satisfaction.

3. Unless otherwise specified, the brand/make of the material as specified in the item nomenclature, in the particular specifications and in the list of approved materials attached in the tender, shall be used in the work.

4. In case of non availability of the brand specified in the contract or ISI marked materials, the Contractor shall be allowed to use alternate equivalent brand of the material subject to submission of documentary evidence of non-availability of the specified brand. Necessary cost adjustments on account of above change shall be made for the material, if required.

	MATERIALS:	**BRAND/MAKE**
1.	White Cement	JK, Birla or equivalent.
2.	Super plasticizer	MC Baucheme, Sika, Fosroc
3.	Water Proofing Compound (Liquid)	Pidiproof Ltd., Cico, Impermo
4.	Stainless Steel	Jindal Stainless Steel, Salem Steel
5.	Galvanized/Stainless Steel Anchor Fasteners	Shakti, Arrow, Hilti, Fischer
6.	PVC Tiles	Arm Strong, LG or equivalent.
7.	Ceramic Tiles	Kajaria, Somany, Nitco, Orient, Bell Ceramic, Johnson
8.	Vitrified /Porcelain Tile	Marbonite, Euro, Somany, diamond of Naveen Granamite of Bell ceramic, Granito, Kajaria, Marbito.
9.	Terrazzo tiles	Mehtab, Nitasha, Nitco, Raj-yesh, Bharat
10.	Chequrred tiles	Mehtab, Nitasha, Nitco, Raj-yesh, Bharat
11.	Acid/Alkali Resistant Tile	Somany, Nitco, Kajariya, Bell Granamite Group, Johnson
12.	Polymer Modified Cementitious grout	Bal Endura, Pidilite or equivalent.
13.	Glass Mosaic Tile	Bissazza, Saon or equivalent.
14.	Hardner	Hard crete of Snowcem India, MC Deritop F.H.
15.	Flush Doors	Kutty flush door, Anchor, Kanara, Kitlam, National, Swastic
16.	FRP Shutters	Fibre Glass Engineers, Raipur, Aashoo Model
17.	PVC Shutter	Rajshri, Sintex or equivelent.
18.	Ply Wood	Archid, Kitply, Green ply, Century
19.	Pre-laminated Particle Board	Novapan, Kitlam or equivelent.
20.	Melamine Polish	Melamine of Asian Paint, Wudfin of pidilite

		Industries Timbertone of ICI Dullex.
21.	Laminate	Marino, Greenlam, Decolam, Century, Formica
22.	Aluminium Composite Panel	Alpolic, Aluco Bond, Reynobond, Euro bond, Al-strong
24.	Aluminium Extrusions	Hindalco, Indalco, Jindal
25.	Hydraulic Floor spring	Hardwyn, Godrej or equivalent.
26.	Hydraulic Door Closer	Hardwyn, Godrej or equivalent.
27.	Annealed Float Glass	Saint Gobain, Modi Guard, Hindustan Pilkington
28.	Synthetic Enamel Paints	ICI(Dulux),Asian (Apcolite),Berger (Luxol),Nerolac (NST)
29.	Structural Silicon Sealant	Dow Corning, Wacker, GE, Du-pont
30.	Epoxy Primer & Paints	Berger, Pidilite or equivalent.
31.	GI Pipe	Tata, Zenith, Jindal
32.	GI fitting	Unik, ICS or equivalent.
33.	Centrifugally Cast Iron Pipe & Fittings	Neco, RIF, SKF
34.	Polyester Powder Coating	Nerolac, Berger, J&N
35.	Gun Metal Gate Valve	Zoloto, Leader, SAINT
36.	PVC Rain Water Pipe & Fitting	Finolax, Classic of Kisan or equivalent.
37.	Primer	Asian, ICI, Berger, Nerolac
38.	Oil Bound Distemper	Asian(Tractor), ICI (Maxi lite),Berger(Bison),Nerolac (NAD)
39.	Acrylic Emulsion Paint	Asian (Royale), ICI (Velvet), Berger (Luxol Silk), Nerolac (Allscapes)
40.	Structural steel section	TATA, SAIL, RINL
41.	Curtain Carrier	Vista levlor or equivalent.
42.	Drapery Rod	Vista Levlor or equivalent.
43.	Vitreous China Wash Basin Rectangular without Pedestal	Hindware / Perryware or equivalent.
44.	Virtuosos China Wash Basin Oval	Hindware / Perryware or equivalent.
45.	Vitreous China Pedestal for Wash Basin	Pedstal of Perryware / Hindware
46.	Vitreous China Floor Mounted European W.C. without cistern	Perryware / Hindware or equivalent.
47.	Vitreous China Floor moulded European with Cistern Compote	Perryware / Hindware or equivalent.
48.	Vitreous China Wall hung W.C. without Cistern.	Perryware / Hindware or equivalent.
49.	Vitreous China Wall Hung W.C. with vitreous Cistern (component)	Perryware / Hindware or equivalent.
50.	Orissa Pan	Perryware / Hindware or equivalent.
51.	Vitreous China Low Level Cistern for European W.C.	Hindware / Perryware or equivalent.
52.	Low Level PVC Cistern Single	Sleek model Cistern of PVC of Hindware or

	flush	Slimline deluxe model of Perryware JINDAL.
53.	Dual Flush	Sleek Dual flush PVC cistern of Hindware or Slimline dual of Perryware.
54.	Vitreous China Half stall Urinal	Model No. 6002 Urinal flat back large of Hindware or magnum of Perryware.
55.	Flush Valve	Aquel, Marc or equivalent.
56.	Solid Plastic Seat Cover for EWC	EWC standard seat cover white of Perryware/Hindware
57.	Jet Assembly for EWC	Perryware, Kamal (Mahendra)
58.	Float Glass	Modi Float, Saint Gobain, Asahi, Sejal
59.	CP Brass Bibcock, Pillarcock, Stopcock, Angle Valve, Concealed Stop Cock.	Marc (oriental series) Jaquar (continental series), Parko, Nova
60.	Plastic Connection Pipe	Perryware/Kamal Delux or equivalent.
61.	CP Waste Coupling	Kamal/Jaquar/Mark/Nova/Parko
62.	CP Bottle Trap	Perryware / Hindware or equivalent.
63.	Waste Pipe	Kamal with brass checknut/Viking
64.	Stainless steel Sink with or without Draining board.	Nirali, Hindware, Frankee, Cobra
65.	Towel Ring/Towel Rod/Towel Rack	Kamal, Marc or equivalent.
66.	Fibre Glass Shelf	Kamal, Bath King or equivalent.
67.	Vitreous China laboratory Sink	Hindware / Perryware or equivalent.
68.	Aluminum Sections	Jindal, Hindalco, Indalco
69.	Textured Exterior wall	Berger, Unitile, Spectrum, Oikos
70	Non asbestos high impact polypropelene reinforced Cement sheet	Everest or equivelent

SPECIAL CONDITIONS FOR ELECTRICAL WORKS TENDERS

1. Main contractor shall have to associate an electrical contractor of appropriate class and category of CPWD for the electrical works for the purpose of execution of job as part of the composite contract.

2. In case the main contractor is himself eligible for sale of tender for the specific electrical component and intends doing the job himself, he may not associate agency for the specific electrical component.

3. Main agency shall have to submit credential of the proposed associated agencies for verification and approval of the department in proforma at Annexure I. Consent letter of such selected agencies for association shall also be enclosed in the prescribed format (Annexure-II). Main agency may propose upto three names of eligible associates. Last date of submission of proposal to University Engineer for electrical works shall be the date fixed for submission of performance guarantee.

4. After obtaining concurrence of department for such association, the main agency shall finalize one associate for execution of the electrical component of the work

5. The main contractor shall be entirely responsible and answerable for all the works done by his associated electrical contractor regarding their quality, adherence to the laid down specification, terms and conditions, warranty/guarantee etc and he shall be liable to bear any compensation that may be levied by the department under any of the clauses of the agreement.

6. The manufacturer's guarantee/warranty for all the electrical accessories shall be for minimum period of 12 months from the date of taking over of the installation by the department. Necessary documents of handing / taking over of the installation will be duly signed by the three parties namely **Registrar/U.E.** the main contractor and the associate contractor. The main contractor will ensure that the maintenance during the guarantee period shall also be carried out by the associate electrical contractor.

7. The main contractor shall also give necessary general power of attorney under the contract to the associated electrical contractor to enable him to receive instructions from electrical engineers of the department at site, sign the site order book, bills MBs for acceptance of measurement and receive stipulated materials etc.

8. The main contractor shall be responsible for coordinating the activities of all the works and will ensure progress of all works as per the laid down programme. The main contractor shall also arrange for proper storage of the electrical accessories at site and will be responsible for their watch and ward.

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Schedule of Quantities

S.O.R ITEM NO	ITEM DESCRIPTION	QTY	UNIT	RATE	AMOUNT
2101	Stripping the seat of embankment of all foreign materials, vegetation and other growth like grass roots etc., and removing the rubbish up to a distance of 50m including dressing but excluding jungle clearance.	650.000	cum	79.20	51480.00
401 (b)	Excavation in hard soil including 50m lead and 1.5m lift with dressing.	120.000	cum	72.00	8640.00
402	Excavation in hard moorum and moorum with boulders including 50m lead and 1.5m lift with dressing.	240.000	cum	85.00	20400.00
2117	Puddle filling of good clay including lead up to 50m including mixing, watering and kneeding by tamping, ramming and laying etc.	360.000	cum	219.00	78840.00

415 (A)	Earth work for bund and for canal banks needing dam specification in hearting or casing with approved soils, including dressing, breaking of clods, laying in layers of maximum 15cm thickness, cutting and finishing U/S & D/S slopes of bunds but excluding watering and compaction for :-				
(i)	All lifts & 50m free lead	19523.540	cum	99.00	1932830.00
417	(a) Compaction of earthwork at optimum moisture content to dry density not below 90% by light rollers i.e. non-powered rollers or sheep foot earth masters or hand rammers (excluding watering).	19523.540	cum	16.00	312377.00
418	a) Watering earthwork for compaction at optimum moisture content with lead of water up to 100 m.	19523.540	cum	23.00	449041.00
502(b)	Collection of hard moorum	885.000	cum	73.00	64605.00
515	Stacking and boxing				
	(a) Moorum or sand	885.000	cum	14.00	12390.00
2002	Moorum or sand spreading including dressing-	885.000	cum	30.00	26550.00
2124	Preparing the surface for turfing including laying 15cm of good soil on top in 7.5 cm layers, surface watering and light ramming etc., complete with 50m, lead and all lift.	15304.600	Sqm	20.00	306092.00
2125	Turfing on prepared surface, including seed or sods.	15304.600	Sqm	8.00	122437.00
2110	Providing filter blanket, horizontally Including laying, spreading, packing etc., in layers of required thickness but excluding excavation of foundation-				
iii	Metal 40 mm nominal size	144.000	cum	531.00	76464.00
x	Sand passing through 4.75 mm screen.	288.000	cum	94.00	27072.00
1006	22 cm thick dry stone pitching (without quarry spall) with individual stones of 22cm depth and minimum size 0.014 cum	2966.560	cum	658.00	1951996.00
1012(a)	a) Providing stone chips under stone pitching	1812.790	cum	248.00	449572.00

2137(a)	Providing chainage-cum-boundary stone made of precast 1:2;4 RCC 20 mm graded metal including formwork, cost of reinforcement, finishing, curing, etc. complete, as per type design 4 of Water Resources Department.	132.000	cum	150.00	19800.00
2137(b)	(b) Fixing chainage-cum-boundary stone (type design 4) in 1:3:6 cement concrete with 40mm graded metal including excavation (any strata) handling and fixing of stone, curing etc. complete.	132.000	cum	394.00	52008.00
2138	Painting chainage-cum-boundary stone (type design 4) with white back ground of enamel paint and figuring and lettering with black paint, including cost of paint brushes etc. complete.	132.000	cum	47.00	6204.00
2902	Transportation of metal when total distance is-				
i	Earthwork lead 0.5 km	10121.770	cum	87.48	885452.00
ii	Stone chips lead 20 km	1956.790	cum	271.40	531073.00
iii	Pitching stone lead 20 km	2966.560	cum	312.11	925893.00
iv	Moorum lead 2 km	885.000	cum	112.05	99164.00
v	Sand lead 5 km	288.000	cum	161.19	46423.00
		TOTAL Rs. 8456803.00			

Note -1. Items other than above schedule for Pond Pitching work will be taken from Shedules of Rates issued by WRD, Raipur (Chhattisgarh) in force from 2010.

2.Preferably the Pitching Stones are to be brought from Ratanpur mine for pitching work under this contract or the quality should be at par and fulfill the quality requirement laid down in this tender.

Sub Engineer
GGV.Bilaspur(C.G.)

Asst. Engineer
GGV.Bilaspur(C.G.)

I/c University Engineer(Civil)
GGV.Bilaspur(C.G.)