

CIRCULARS

(ગુજરાત સરકારશ્રીના માર્ગ અને મકાન વિભાગના પરિપત્ર ક્રમાંક : આરજીએન : ૬૦૨૦૦૬ (૩૫)
સ. તા. ૩૧-૦૫-૨૦૦૭)

:: કરારની ખાસ શરતો ::

ડામર કામની ચકાસણી માટે કોરકટીંગ મશીન વસાવવા તથા રૂા .૧૦૦.૦૦ લાખની ઉપરના કામ માટે ઈજારદારશ્રી દ્વારા કુલ ટાઈમ ક્વોલીટીફાઈડ ઈજનેર રાખવા અંગે નીચેની શરતો દાખલ કરેલ છે.

શરતો :-

(૪) " ૫૦ મીમી થી વધુ ડામર કામની સંયુક્ત જાડાઈ (બી.એસ.જી.,બી.એમ.સિવાય) હોય તેવા રસ્તા ના કામમાં દર ૨૫૦ મીટર દીઠ એક કોસ સેક્શન પર ડામર કામની પહોળાઈ અનુસાર બે થી ચાર કોર સેમ્પલ ઈજારદારે પોતાના કોર કટીંગ મશીન વડે સંબંધીત નાયબ કાર્યપાલક ઈજનેરની હાજરીમાં મેળવી આપવાનાં રહેશે અને આ સેમ્પલ સીલ કરી માન્ય લેબોરેટરી મારફત થીકનેશ, ડેન્સીટી તથા બીટ્યુમીનસ કન્ટેન્ટનાં પરીક્ષણ કરાવી પરીણામો મેળવવાના રહેશે. સંતોષકારક પરીણામો આવ્યા સુધી ડામર કામની ચુકવવાપાત્ર રકમના ૫% રકમ વીથહેલ્ડ રાખવામાં આવશે. જે રકમ સંતોષકારક પરીણામો મળ્યા બાદ જ છુટી કરાશે. પરંતુ સંતોષકારક પરીણામો નહિ મેળવવાના કિસ્સાઓમાં કરાર ની અન્ય શરતો અનુસાર કાર્યવાહી થઈ શકશે."

(૫) "કરાર હેઠળના કામ પર ઈજારદારે કુલટાઈમ ક્વોલીટીફાઈડ એન્જીનીયર નિયુક્ત કરવાનો રહેશે જે અંગે કામનો વર્ક ઓર્ડર મળ્યે દિન-૧૫ માં કાર્યપાલક ઈજનેરશ્રીની જાણ હેઠળ, નાયબ કાર્યપાલક ઈજનેરશ્રીને નિયુક્ત ઈજનેરના નામ, ક્વોલીટીફિકેશન, માર્કશીટ, સર્ટીફિકેટ, કલર ફોટોગ્રાફ, નિયુક્તિનો હુકમ વગેરે વિગત રજુ કરવાની રહેશે તથા કામપર હાજર થયા અંગેનો રીપોર્ટ આપવાનો રહેશે. જે અનુસાર કરાર હેઠળના કામપર ક્વોલીટીફાઈડ ઈજનેરની ઉપરોક્ત શરત મુજબ નિયુક્તિ થાય તથા સ્થળપર ખરેખર કામગીરી ન સંભાળે ત્યાં સુધીના સમયગાળા તેમજ કામચાલુ રહે તે સમય દરમિયાન નિયુક્ત કરેલ ઈજનેર કામગીરી સંભાળશે નહિ તો તે સમયગાળા માટે રૂા. ૧૫૦૦૦ /- પ્રતિ માસ લેખે બિલમાંથી કપાત કરવામાં આવશે. જે નોન રીફંડેબલ રહેશે.

SPECIAL CONDITION OF CONTRACT

7) Setting up of adequate laboratory & deployment of quality engineer.

The contractor shall have to set up the laboratory with adequate equipment. Till the setting up of adequate laboratory is completed & reported of this to the engineer (subject to due verification by engineers representative) by contractor in writing, Rs. 2,00,000/- shall be withheld. The qualified quality engineer shall be deployed exclusively for this contract by the contractors. If quality engineer is not deployed by contractor within one month after the date of work order, the amount equivalent to Rs. 15,000.00 per month shall be recovered till the actual deployment of quality engineer. The amount so recovered towards the deployment of quality engineer shall not be refunded.

8) Asphalt work will have to be cross checked as per G.R. No. RGN / 60 / 2006 / 35 / C Dtd. 31-05-07 before final bill is paid.

9) If consultant is appointed by the R. & B. Department then the work will be supervised by him and shall be carried out according to the instructions given by him.

Executive Engineer,
Panchayat R. & B. Division
D.B. Dwarka

Note – 1 Contractor shall give only rebate in tendered amount mentioned above and contractor shall state 'NIL' percentage, if no reduction is offered.

Note – 2 All work shall be carried out as Public Works Department Hand Book and other specification of Division or as directed.

Note – 3 All the column in Schedule should be in ink and the total of the entire in the last column should be struck by the contractor under his signature.

Note – 4 Rate quoted include clearance of site (Prior commencement of work and at its close) in all respects and hold good for work under all conditions, site, measure, weather etc.

Note – 5 To be continued on additional sheet, if found necessary.

નોંધ – ૧ ઉપર જણાવેલ ટેન્ડર રકમમાં ઈજારદારશ્રીએ ફક્ત ઘટાડો જ દર્શાવવાનો રહેશે અને જો ટેન્ડર રકમમાં ઘટાડો ન કરતા હોય તો પણ 'શુન્ય' ટકાનો ભાવ ઘટાડો દર્શાવવાનો રહેશે.

નોંધ – ૨ બધુ જ કામ બાંધકામ વિભાગની પુસ્તિકા અને ડિવિઝનની બીજી ખાસ વિગત મુજબ સુચના પ્રમાણે કરી આપવાનું રહેશે.

નોંધ – ૩ અનુસૂચિમાં બધા પાનાની વિગતો સહીથી ભરવી અને છેલ્લી પાનાની નોંધનો સરવાળો કરી કોન્ટ્રાક્ટરે પોતાની સહી કરવી.

નોંધ – ૪ ટાંકેલા દરમાં સ્થળની (કામના આંભે અને પુરુ થાય તે વખતે) દરેક રીતે સાફ સુફી કરવાનો સમાવેશ થાય છે અને તે દર તમામ પરિસ્થિતી, સ્થળ, ભેજ, હવામાન વગેરે હેઠળ કામ માટે અમલમાં રહેશે.

નોંધ – ૫ જરૂર જણાય વધારા કાગળો જોડી ચાલુ રાખવું.

રસ્તા અને પુલોનાં કામોમાં ઈજારદારના
માલ સામાનનો સ્રોત, રોયલ્ટીની
ચકાસણી, વેટમીક્ષમેકાડમની
કામગીરીમાં વિશેષ કાળજી, ડામર
કામમાં સ્ટાર રેટનું ચુકવણું બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક:-પરચ.સી/૫૫/૨૦૧૫/૧૦/
સચિવાલય, ગાંધિનગર
તા ૨૦૧૫/૧૧/૦૪.

પ્રસ્તાવના

માર્ગ અને મકાન વિભાગનાં રસ્તા અને પુલોનાં કામો ટેન્ડરથી કરવામાં આવે છે તેમાં ડામર કામવાળા કામોમાં સ્ટાર રેટનું ચુકવણું તથા વેટમીક્ષમેકાડમની આઈટમ હોય, તેવા કામોમાં વિશેષ કાળજી લેવાની બાબત તથા બી-કારના ક્લોઝ ૨-૧૮ મુજબ સાઈટ ઉપર ઈજારદારનાં ઈજનેરની હાજરી બાબત તેમજ રસ્તા પુલોના કામો માટે ક્વોરી આધારીત માલ સામાનનો સ્રોત મંજૂર કરી તેની રોયલ્ટીની ચકાસણી બાબત વિચારણા હેઠળ હતી.

પરિપત્ર

પ્રસ્તાવનામાં જણાવેલ બાબતોએ પુખ્ત વિચારણાને અંતે નીચે મુજબની વધારાની શરતો ટેન્ડરમાં સમાવેશ કરવાનો રહેશે.

૧. ડામર કામવાળાં કામો માટે હવેથી સ્ટાર રેટનો તફાવત ચુકવતા પહેલાં ડામર જે રીફાઈનરીમાંથી ખરીદવામાં આવેલ હોય, ત્યાં ઈજારદાર દ્વારા રજુ કરવામાં આવેલા ડામરના ગેટ પાસની જે તે રીફાઈનરી દ્વારા જ ગેટ પાસેઈસ્યુ કરવામાં આવેલ છે, તે ખરાબ રીફાઈનરી પાસેથી કર્યાબાદ જ સ્ટાર રેટનો તફાવત ચુકવવામાં આવશે જે કામોમાં આયાતી (ઇમ્પોર્ટેડ) ડામર વાપરવામાં આવેલ હોય તેવા કિસ્સામાં જે બંદર પર ડામર આય (ાત કરવામાં આવેલ હોય તે ઓથોરાઈઝ્ડ ઇમ્પોર્ટરના તમામ સાધનિકકાગળો ચકાસી, ઓથોરાઈઝ્ડ ડીલર દ્વારા ઇમ્પોર્ટર પાસેથી ખરીદ કર્યાની વિગતોનો ચકાસણી કર્યાબાદ જ સ્ટાર રેટનો તફાવત ચુકવવામાં આવશે.
૨. જે કામોમાં વેટમીક્ષમેકાડમની આઈટમ સ્પેસીફિકેશન પ્રમાણે પ્લાન્ટમાં મીક્સીંગ કરવાની હોય છે, તેમાં હવેથી પ્લાન્ટમાંથી જે મટીરીયલ સાઈટ ઉપર મોકલવામાં આવે તેને ડામરનાં હોટમીક્ષ પ્લાન્ટ માટેનાં કામોમાં જે રીતે ગેટ પાસમાં નોંધ થાય છે તે મુજબ ગાડીનું ખાલી અને ભરેલ વજન, વાહન નિકળવાનો સમય વગેરે લખીને મોકલવાનું રહેશે કામનું ચુકવણું કામના સ્પેસીફિકેશનને ધ્યાને રાખી ગેટ પાસ આધારીતન કરતાં

વોલ્યુમેટ્રીકપદ્ધતિથીકોમ્પ્રેસેડડેન્સિટીને ધ્યાને રાખી નિયત ધારાધોરણ મુજબના જો ઈજારદાર દ્વારા ડેન્સિટીટેસ્ટ લઈ થીકનેસ ચકાસી તે મુજબ કરવામાં આવશે વેટમીક્રોમેકાડમનુંમીક્ષીંગસાઈટ ઉપર કરવામાં આવશે તો તેનું ચુકવણું કરવામાં આવશે નહીં અને કરારના ભંગ બદલ તેઓ સામે પગલાં લેવાનાં રહેશે .

૩. રસ્તાપુલોનાકામોમાટેલ /, કપચી, ગ્રીટ, રેતી વિગેરેના વપરાશ માટે સંબંધિત કાર્યપાલક ઈજનેરશ્રી દ્વારા આ મટીરીયલ માટેનાં સ્ત્રોત મંજૂર કરવાની જોગવાઈ છેદરેક કામમાં . વપરાતામેટલ, કપચી, ગ્રીટ, માટી, રેતી વગેરેનો સ્ત્રોત કામની શરૂઆતમાં મંજૂર કર્યા અંગેનો હુકમ કાદ્દારા કરવાનો રહેશે તથા કામના ચુકવણા કરતા પહેલા કામમાં .શ્રી.ઈ. વાપરવામાં આવેલ મટીરીયલમંજૂર કરેલ સ્ત્રોતમાંથી જ લેવામાં આવેલ છે તેની ખરાઈ જ તે મટીરીયલના રોયલ્ટી પાસ આધારીતબીલનુંચુકવણું કરવામાં આવશે.
૪. બી-કરારના ક્લોઝ ૨-૧૮ માં રૂ. ૧ કરોડથી વધુ રકમનાં કામો માટે સાઈટ ઉપર ઈજારદારનાં ઈજનેરની હાજરી ફરજિયાત છે, તેમજ આ ક્લોઝમાંઈજારદારનાં ઈજનેર નોટીસ આપવાં છતા પણ સાઈટ ઉપર હાજર રહેતા ન હોય, તો ઈજારદારનુંરજીસ્ટ્રેશન રદ કરવાની પણ ક્લોઝમાં જોગવાઈ છેકરારના આ ક્લોઝનુંચુસ્તપણે પાલન થાય તથા દરેક કામ માટે ઈજારદારે રાખેલ ઈજનેરનું નામ અને અન્ય વિગતો તથા અન્ય કામ ઉપર તેઓની નિમણૂક નથી તેવું નોટરાઇઝડ સર્ટીફિકેટ સાથે વર્ક મોનીટરીંગ સીસ્ટમમાંઅધતન રાખવાની રહેશે.
૫. રસ્તાનાકામોમાં આયાતી ડામરનો ઉપયોગ કરવાનીપરવાનગી પ્રથમ વિભાગના તા :ના પરિપત્ર ક્રમાંક ૨૦૦૮/૦૯/૦૨.એસટીઆરહ અને /૮/૧૫૭૭/૧૦૨૦૦૬/ : નો સુધારેલ પરિપત્ર ક્રમાંક ૨૦૦૮/૧૨/૦૮.ત્યારબાદ આ પરિપત્ર સંદર્ભે તા એસટીઆરવિભાગ દ્વારા થી આપવામાં આવેલ છે/૮/૧૫૭૭/૧૦૨૦૦૬/વારા હવે પેનીટ્રેશનગ્રેડના સ્થાને વિસ્કોસિટી ગ્રેડ ડામર વાપરવાની જોગવાઈ ટેન્ડરમાં કરવામાં આવે છે, જેથી વપરાશમાં લેવામાં આવતા ડામર અંગે વિભાગના તાના ૨૦૦૮/૧૨/૦૮. પરિપત્રમાં જણાવ્યા મુજબની શરતોનુંચુસ્તપણે પાલન થાય અને જે આયાતી ડામરનોવપરાશ કરવામાં આવે તે Specificationમુજબનોવિસ્કોસિટીગ્રેડનાધારાધોરણને અનુરૂપ છે કે નહીં તેની ચકાસણી કરીને જ તેનો ડામરના કામમાં વપરાશ કરવાનો રહેશે . વધુમાં એવા બનાવો કે જે કામોમાં આયાતી ડામર વાપરવા માટે લાવવામાં આવેલ હોય અને તે પરીક્ષણોમાંવિસ્કોસિટી ગ્રેડ નહીં પરંતુ પેનીટ્રેશન ગ્રેડ મુજબનો જણાય તેવા કિસ્સામાં તે રીજેક્ટ કરી આવા ડામરનાસપ્લાયરની સામે પગલા લેવાની ભલામણ સહ તે બાબતની જાણ અત્રે કરવાની રહેશે .

ગુજરાત રાજ્યના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે,

(મિસ્ટ્રી.એન.એ)

ઉપસચિવ (૨.૨૧)

માર્ગ અને મકાન વિભાગ

પ્રતિ,

- (૧) સર્વે અધિક્ષકઈજનેરશ્રીઓ, (માપાટનગર /આલેખન/વર્તુળો (અને મ .
એક્સપ્રેસવે વર્તુળ સહિત/યોજના
- (૨) સર્વે અધિક્ષકઈજનેરશ્રી, પંચાયત .વર્તુળો (.મ.મા)
- (૩) નિયામકશ્રી, ગુજરાત ઈજનેરી સંશોધન સંસ્થા, વડોદરા
- (૪) સર્વે કાર્યપાલક ઈજનેરશ્રી, માવિભાગ.મ.
- (૫) સર્વે તાંત્રિક અધિકારીઓ વિભાગ .મ.મા (શ્રી ઓ સહિત.ઇ.કા.બધા ના)
- (૬) સર્વે પ્રોજેક્ટ શાખા, માવિભાગ.મ., સચિવાલય, ગાંધિનગર.
- (૭) સીલેક્ટ ફાઇલ ૨૦૧૫-

ડોક્યુમેન્ટ રજુ કરવા અંગે

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
પરિપત્ર ક્રમાંક : પરચ - ૧૦૨૦૦૮ -૫-સ(પાર્ટ ફાઈલ)
સચિવાલય, ગાંધીનગર
તા. ૨૭/૧૧/૨૦૦૮

વંચાણે લીધો : તા. ૧૮/૦૧/૨૦૦૮ નો પરિપત્ર ક્રમાંક : પરચ - ૧૦૨૦૦૮-૫-સ

પરિપત્ર :-

માર્ગ અને મકાન વિભાગમાં હાલમાં ટેન્ડરો ઇ-ટેન્ડર પદ્ધતિથી સ્વીકરવામાં આવે છે. તે અન્વયે સમાન ક્રમાંકન તા.૧૮/૦૧/૨૦૦૮ ના પરિપત્રમાં ટેન્ડર ફી અને બાનાની રકમ જે તે કાર્યપાલક ઇજનેરને ખરેખર ચુકવવા માટે દિન-૭ માં અસલ માં રજીસ્ટર્ડ પોષ્ટ એ.ડી. થી મોકલવાની તેમજ અસલમાં ડીમાંડ ડ્રાફ્ટ નહિ મોકલનાર સામે શિક્ષાત્મક પગલા લેવાની જોગવાઈ હતી.

ઉપરોક્ત પરિપત્રમાં નીચે મુજબ અંશતઃ સુધારો કરી આ શરતનો સમાવેશ ટેન્ડર નોટીસ / ટેન્ડરનાં મુસદ્દામાં Through **R.P.A.D. so as to reach to E.E.Division- Within 7 days from the last date of uploading**ને બદલે“ **to S.E. at the time of tender opening or send the same through R.P.A.D. so as to reach to E.E. Division – Within 7 days from the last date of opening.**”સુધારો કરવામાં આવે છે. તેમજ ખરેખર ટેન્ડર ફી તેમજ બાનાની રકમ નિયત સમયમાં ઇજારદાર ન ભરે તો ઇજારદારની નોંધણી એક વર્ષ માટે એબેન્સમાં રાખવાની કાર્યવાહી કરી ઇ-ટેન્ડરીંગનો કોડ એક વર્ષ માટે રદ કરાશે.

ગુજરાત રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે

(આર. કે. ચૌહાણ)
ખાસ ફરજ પરના અધિકારી
માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
પરિપત્ર ક્રમાંક : એસ.એસ.આર. - ૧૦૨૦૦૪ -આઈબી-૪૧(૨૪)સ,
સચિવાલય, ગાંધીનગર
તા. ૦૨/૧૨/૨૦૦૬

વિભાગ : મકાનો અને અન્ય બાંધકામના કામદારોના કલ્યાણ સેસ. એક્ટ ૧૯૮૬ હેઠળ ૧% સેસ ગુજરાત બિલ્ડીંગ એન્ડ અધર કન્સ્ટ્રક્શન વર્કસ વેલફેર બોર્ડ માં જમાં કરાવવા અંગે.

સંદર્ભ : (૧) શ્રમ અને રોજગાર વિભાગ, સચિવાલય, ગાંધીનગરનો ઠરાવ ક્રમાંક : સીડબલ્યુએ - ૨૦૦૪ ૮૪૧ એમ -૩, તા.૩૦-૦૧-૨૦૦૬.
(૨) શ્રમ અને રોજગાર વિભાગ, સચિવાલય, ગાંધીનગરનો ઠરાવ ક્રમાંક : સીડબલ્યુએ - ૨૦૦૪ ૧૮૩૧ - એમ - ૩, તા. ૦૮-૧૨-૨૦૦૫.

પરિપત્ર :-

ઉપરોક્ત વિષયના સંદર્ભમાં દર્શાવેલ શ્રમ અને રોજગાર વિભાગ, સચિવાલય, ગાંધીનગર તા. ૩૦/૦૧/૦૬ તથા તા. ૦૮/૧૨/૦૫ના ઠરાવો (નકલ સામેલ છે.) તરફ સર્વે સંબંધિતોનું ધ્યાન દોરતાં આથી જણાવવામાં આવે છે કે મંજૂર કરાતા ડ્રાફ્ટ ટેન્ડર્સ પેપર્સમાં 'સેસ' અંગે જોગવાઈ કરીને ઈજારદારોના દર મહીને કરેલ કામના બિલના ચુકવણા માંથી ૧(એક) ટકો સેસ કાપીને તે રકમ ગુજરાત બિલ્ડીંગ એન્ડ અધર કન્સ્ટ્રક્શન વર્કસ વેલફેર બોર્ડના સંદર્ભે (૨) હેઠળના ઠરાવથી નિયત કરેલ હેડ - સબહેડ ખાતે સંબંધિત કાર્યપાલક ઈજનેરશ્રી દ્વારા જમા કરવવાની રહેશે. હવે પછી થી જે નવા અંદાજો મંજૂર કરવામાં આવે તેવા અંદાજની દરેક આઈટમના ભાવોમાં ૧% વધારો કરીને વધારેલ ભાવ મુજબ અંદાજો મંજૂર કરવાના રહેશે. તથા ડ્રાફ્ટ ટેન્ડર્સ પેપર્સમાં તે મુજબ રકમ મુકવાની રહેશે. મોટા અને સુવાચ્ય અક્ષરે યતખ માં બિલમાંથી કપાત થનાર બધાંજ પ્રકારના ટેક્સ / સેસ વિગેરેનો ઉલ્લેખ કરવાનો રહેશે.

આ સુચનાઓનો અમલ ચુસ્ત પણે થાય તેની દરેક દરેક સંબંધિતોએ નોંધ લઈ તે મુજબ કાર્યવાહી અચૂક રીતે હાથ ધરવાની રહેશે.

ઉપસચિવ
માર્ગ અને મકાન વિભાગ

બાનાની રકમ ની અવેજીમાં બેંક ગેરંટી

રજુ કરવાની પ્રથામાં ફેરફાર કરવા બાબત

ગુજરાત સરકાર,

માર્ગ અને મકાન વિભાગ,

ઠરાવ ક્રમાંક : ટીએનસી - ૧૦૯૦ / ૧૦૦ / ૪ / સ

સચિવાલય, ગાંધીનગર

તા. ૦૪/૧૧/૨૦૦૦

સંદર્ભ :

- (૧) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીઓસી - ૧૩૭૧/૯૫૩૬૬/૨૦/સ, તા.૨૪/૦૨/૯૬
- (૨) સરકારશ્રીના ઠરાવ ક્રમાંક : પીડબલ્યુડી - ૪૦૪૯/૧૦૫/ભાગ - ૧/૧૦૫, તા.૨૦/૦૧/૮૧
- (૩) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૦૧/૦૭/૮૧
- (૪) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.
- (૫) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૨૫/૦૬/૮૨
- (૬) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૨૩/૦૧/૮૪
- (૭) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૨૧/૦૩/૮૪
- (૮) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૩૧/૦૩/
- (૯) સરકારશ્રીના ઠરાવ ક્રમાંક : ટીએનસી - ૧૩૭૧/૯૫૩૬૬/૨૦૯/સ, તા.૩૧/૦૭/૯૦
- (૧૦) સરખા ક્રમાંકનો ઠરાવ, તા.૦૪/૧૨/૯૧
- (૧૧) સરખા ક્રમાંકનો ઠરાવ, તા.૨૭/૦૭/૯૯

આમુખ :

સરકારશ્રીના તા.૦૪/૧૨/૯૧ ના ઠરાવ અનવ્યે બાનાની રકમ રોકડેથી - ફીક્સ ડીપોઝીટની રૂા. ૫૦,૦૦૦ /- હજાર ભરવાનું અને બાકીની રકમ બેંક ગેરંટી સ્વરૂપે સ્વીકારવાનું ઠરાવવામાં આવેલ છે.

ઠરાવ :

પુખ્ત વિચારણાને અંતે સરકારશ્રી આથી ઠરાવે છે કે રૂા. ૫૦ લાખ ની ટેન્ડર અંદાજી રકમ સુધી ૧% લેખે રૂા.૫૦,૦૦૦ /- સુધીની અર્નેસ્ટમની ભરવાની હોય ત્યાં સુધી રોકડેથી અથવા રાષ્ટ્રીયકૃત બેંક અથવા સીડ્યુલ બેંક અથવા નર્મદા / શ્રીનિધિની એફડીઆરથી તથા બાકીની રકમ બેંક ગેરંટી સ્વરૂપે ભરવાની રહેશે અને ટેન્ડર ફોર્મ બી.૧/બી.૨ ના પાના-૮ ના ક્રમાંક-૪ અને નોટિસ ઈન્વાયરીંગ ટેન્ડરના અનુક્રમ-૧૪ માં એફડીઆરની જગ્યાએ " રાષ્ટ્રીયકૃત બેંક અથવા શીડ્યુલ બેંક અથવા નર્મદા/શ્રીનિધિની એફડીઆર દર્શાવીને જ કોરા ટેન્ડર ફોર્મ ઈસ્યુ કરવાના રહેશે.

તા.૨૭-૭-૯૯ ના સરખા ક્રમાંકના ઠરાવથી ઠરાવેલ બાના મુક્તિ પ્રમાણપત્રની જોગવાઈ યથાવત રહેશે.

આ હુકમો આ વિભાગની રખા ક્રમાંકની ફાઈલ પર નાણા સલાહકારશ્રી મા.મ.ની તા.૨૯-૭-૨૦૦૦ તથા સચિવશ્રી (જ.સં.) ની તા.૨૫-૯-૨૦૦૦ની નોંધથી મળેલ સંમતિથી બહાર પાડવામાં આવેલ છે

ગુજરાત રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે,

આર.બી.પંડિત,

ઉપ સચિવ,

માર્ગ અને મકાન વિભાગ
ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
પરિપત્ર ક્રમાંક : ટીએનસી - ૧૦૮૯ / ૪ / સ
સચિવાલય, ગાંધીનગર.
તા. ૨૧/૧૦/૨૦૦૫

પરિપત્ર :-

વિષય :- કોન્ટ્રાક્ટરોને સરકારી કામના ટેન્ડરમાં શેડ્યુલ-એ હેઠળ સરકારી વિભાગો દ્વારા સિમેન્ટ તથા લોખંડ પુરા પાડવાની પ્રથા રદ કરવાને કારણે પ્રાઈસ એસ્કેલેશનનાં હુકમોમાં સંબંધિત સુધારો કરવા બાબત

(ક્લોઝ ૫૯-૫૯.એ (બી-૨) અને ક્લોઝ ૬૦-૬૦.એ(બી-૧))

સંદર્ભ :- (૧) સરકારી ઠરાવ ક્રમાંક : સીસીએ-૧૫૭૪-સી-૧૭૪૧-(૩૬)-સ, તા.૩૧-૮-૮૧.

(૨) સરકારી ઠરાવ ક્રમાંક : સીસીએ-૧૫૭૪-સી-૧૭૪૧-(૩૬)-સ, તા.૦૭-૪-૮૩.

(૩) સરકારી ઠરાવ ક્રમાંક : ટીએનસી-૧૦૮૯(૪)-સ, તા.૩૧-૮-૮૧.

(૪) સરકારી ઠરાવ ક્રમાંક : ટીએનસી-૧૦૮૯(૪)-સ, તા.૦૫-૧૦-૮૧.

(૫) સરકારી પરિપત્ર ક્રમાંક : ટીએનસી-૧૦૮૯(૪)-સ, તા.૦૭-૦૪-૮૨.

(૬) સરકારી પરિપત્ર ક્રમાંક : ટીએનસી-૧૦૮૮-આઈબી-૨૨૦-(૧૮)-સ, તા.૩૧-૩-૦૫.

સરકારશ્રીનાં ઉપર સંદર્ભ-૩ માં દર્શાવેલ તા.૩૧-૮-૮૧ નાં ઠરાવથી ટેન્ડર ફોર્મનાં ક્લોઝ ૫૯-૫૯એ (બી-૨) તે મજ ક્લોઝ ૬૦-૬૦એ (બી-૧) માં સુધારો કરવામાં આવેલ. ઉપર સંદર્ભ-૬ માં દર્શાવેલ તા.૩૧-૩-૦૫ ના પરિપત્ર થી સરકારી કામના ટેન્ડરોમાં શેડ્યુલ-એ હેઠળ સરકારી વિભાગો દ્વારા સિમેન્ટ તથા લોખંડ પુરા પાડવાની પ્રથા રદ કરવામાં આવેલ.ઉપરોક્ત સંદર્ભ-૩ માં દર્શાવેલ તા.૩૧-૮-૮૧ નાં ઠરાવથી કરેલ ફેરફાર ફક્ત. ૧૫.૦૦ લાખથી વધુ રકમનાં કામો માટે હતા. પ્રસ્તુત બાબતમાં પુખ્ત વિચારણાને અંતે હવે રૂા .૧૫.૦૦ લાખથી નીચેની કોઈપણ રકમના કામોમાં પણ સ્ટાર રેઈટની જોગવાઈ રાખવા નિર્ણય થયેલ છે.

આ પરિપત્ર અમલ તે રવાના થયાની તારીખથી કરવાનો રહેશે.

આ હુકમનો આ વિભાગની ફાઈલ ક્રમાંક : ટીએનસી-૧૦૮૮-આઈબી-૨૨૦-(૧૮)-સ, પર સરકારશ્રીની તારીખ ૧૨-૦૭-૦૪ નાં રોજ મળેલ સંમતીથી બહાર પાડવામાં આવેલ છે.

ગુજરાત રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે,

(એ.ડી.પંડ્યા)

ઉપ સચિવ,

માર્ગ અને મકાન વિભાગ

કોન્ટ્રાક્ટરોને સરકારી કામના ટેન્ડરોમાં શેડ્યુલ 'એ'
હેઠળ સરકારી વિભાગો દ્વારા સિમેન્ટ તથા લોખંડ
પુરા પાડવાની જે પ્રથા છે તે રદ કરવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
ઠરાવ ક્રમાંક : ટીએનસી/૧૦૮૮/આબી-૨૨૦-(૧૮)-સ,
સચિવાલય, ગાંધીનગર,
તા.૩૧/૦૩/૨૦૦૫

સંદર્ભ :

- (૧) સરખા ક્રમાંકનો તા.૧૭/૧૨/૮૮નો સરકારી ઠરાવ.
- (૨) સરખા ક્રમાંકનો તા.૨૦/૦૭/૮૦નો સરકારી ઠરાવ.
- (૩) સરખા ક્રમાંકનો તા.૧૫/૦૧/૮૧નો સરકારી ઠરાવ.
- (૪) સરખા ક્રમાંકનો તા.૧૮/૦૫/૮૧નો સરકારી ઠરાવ.
- (૫) સરખા ક્રમાંકનો તા.૧૩/૧૧/૮૧નો સરકારી ઠરાવ.

આમુખ :

માર્ગ અને મકાન વિભાગના ઉપર સંદર્ભ-(૫)માં જણાવેલ તા.૧૩/૧૧/૧૯૮૧ના ઠરાવથી વિભાગ દ્વારા હાથ ધરતાં કામોમાં ટેન્ડરની અંદાજી કિંમત રૂ.૫.૦૦ લાખથી વધારે હોય તો તે બધા જ કામો માટે ખાતા દ્વારા શીડ્યુલ-અ માં લોખંડ તથા સિમેન્ટની જોગવાઈ કરવાની પ્રથા અમલમાં આવેલ હતી. રૂ. ૫.૦૦ લાખથી ઓછી અંદાજી કિંમતના કામોમાં પણ લોખંડ અને સિમેન્ટ ઠેકેદાર જ પુરો પાડે તેવી વ્યવસ્થા કરવાનું સરકારશ્રીની વિચારણા હેઠળ હતું.

ઠરાવ :

પુખ્ત વિચારણાના અંતે હવે વિભાગ દ્વારા હાથ ધરતાં કામોમાં શીડ્યુલ-એમાં વિભાગ દ્વારા સિમેન્ટ અને લોખંડ પુરું પાડવાની જોગવાઈ આથી રદ કરવામાં આવે છે. હવેથી તમામ ટેન્ડરોમાં જરૂરી લોખંડ તથા સિમેન્ટ ઠેકેદાર પોતે જ પુરો પાડે તે રીતે જોગવાઈ કરવાની રહેશે.

વિભાગનાં કામોમાં ઠેકેદાર દ્વારા લાવવામાં આવતાં લોખંડ તથા સિમેન્ટની ગુણવત્તા બરાબર જળવાય તે માટે ક્ષેત્રિય અધિકારીઓએ બાંધકામના દરેક તબક્કે આવા માલસામાનની ચકાસણીની વ્યવસ્થા ગોઠવવાની રહેશે. માલસામાનની ગુણવત્તા અંગે ગેરી / એન્જીનીયરીંગ કોલેજ / પોલીટેકનીક / એન્જીનીયર્સ ઇન્સ્ટીટ્યુટ લી. તથા ડી.જી.ટી.ડી. વગેરે જેવી સ્વતંત્ર અને સક્ષમ સંસ્થાઓ કે જેમની પાસે મામુલી ખર્ચ વસુલ લઈને આવા માલસામાનની ગુણવત્તાની ચકાસણી માટે જરૂરી સગવડ ઉપલબ્ધ હોય તેમની સેવાઓ લેવા માટે ટેન્ડરમાં જરૂરી જોગવાઈ કરવી.

ગુજરાત રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(એ.ડી.પંડ્યા)
ઉપ સચિવ,
માર્ગ અને મકાન વિભાગ

મશીન કસ્ટ સ્ટોન એગ્રીગેટના ફ્લેકીનેશ અને
ઈલોન્ગેશન ઈન્ડેક્સના સંયુક્ત ધોરણો અપનાવવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
પરિપત્ર ક્રમાંક : એસઓઆર-૧૦૨૦૦૬ /૧૦૪ / સ.૧
સચિવાલય, ગાંધીનગર,
તા.૨૫/૦૧/૨૦૦૭

પ્રસ્તાવના :

મશીન કસ્ટ સ્ટોન એગ્રીગેટ એ બાંધકામમાં વપરાતું મુખ્ય મટીરીયલ્સ છે. આ મટીરીયલ્સ માટેનાં ગુણવત્તાનાં વિવિધ ધોરણો પૈકીનો એક ફ્લેકીનેશ અને ઈલોન્ગેશન ઈન્ડેક્સ(સંયુક્ત) છે. જે મીનીસ્ટ્રી ઓફ રોડ ટ્રાન્સપોર્ટ એન્ડ હાઈવેઝ (એમ.ઓ.આર.ટી.એચ.) દ્વારા પ્રકાશીત સ્પેશીફિકેશન ફોર રોડ એન્ડ બ્રીજ વર્કની ચોથી આવૃત્તિમાં દર્શાવ્યા અનુસાર ૩૦% થી વધુ ન હોવા જોઈએ. જ્યારે અગાઉ મીનીસ્ટ્રી ઓફ સરફેસ ટ્રાન્સપોર્ટની બીજી આવૃત્તિમાં ફક્ત ફ્લેકીનેશ ઈન્ડેક્સનું ધોરણ વધુમાં વધુ ૩૫% સુધીનું હતું. આમ સંશોધન / અનુભવ તેમજ અદ્યતન મશીનરીની ઉપલબ્ધીનો વ્યાપ / સરતા તેમજ આર્થિક પાસાઓને ધ્યાને લઈને ગુણવત્તાના ધોરણોમાં પણ નવા સુધારા / વધારા કરવામાં આવે છે. અગાઉના ફ્લેકીનેશ ઈન્ડેક્સના ધોરણોમાં હવે ઈલોન્ગેશન ઈન્ડેક્સ પણ જોડી સંયુક્ત ધોરણ દાખલ કરવામાં આવેલ છે.પરંતુ હાલ ગુજરાત રાજ્યમાં આવેલ કશર યુનિટો પૈકીના મોટા ભાગના યુનિટો પરંપરાગત પદ્ધતિથી કાર્યરત છે. તેમાંથી નવા સંયુક્ત ધોરણો પરિપૂર્ણ કરે તેવા ઉત્પાદિત માલ મળી શકતો નથી. જે એક વ્યવહારીક મુશ્કેલી છે. પરંપરાગત પદ્ધતિના કશરમાં આ પ્રકારની મુશ્કેલીઓ આવે છે. તે બાબતનો ઉલ્લેખ ટેકનીકલ જર્નલમાં પ્રસિધ્ધ થતા ટેકનીકલ પેપર્સમાં પણ થયેલ છે. આથી સંયુક્ત ધોરણો મેળવવા હાલના કશર યુનિટોમાં સારા એવા પ્રમાણ સ્થાપના કરવા આવશ્યક બને તેમ છે. જેમા વધારાનું નાણાકીય રોકાણ પણ કરવું પડે તેમજ સમય પણ વ્યતિત થાય આથી ફ્લેકીનેશ તેમજ ઈલોન્ગેશન ઈન્ડેક્સનાં સંયુક્ત ધોરણોનો અમલ કરવા (ઈજારદારોને) પૂરતો સમય આપવો પણ જરૂરી છે. તે ધ્યાને લઈ નીચે મુજબની સુચનાઓ આપવામાં આવે છે.

મીનીસ્ટ્રી ઓફ રોડ ટ્રાન્સપોર્ટ એન્ડ હાઈવે દ્વારા પ્રકાશીત સ્પેશીફિકેશન ફોર રોડ એન્ડ બ્રીજ વર્કની સને ૨૦૦૧ની ચોથી આવૃત્તિ અનુસાર મશીન કસ્ટ સ્ટોન એગ્રીગેટ માટે ફ્લેકીનેશ તેમજ ઈલોન્ગેશન સંયુક્ત ઈન્ડેક્સની મહત્તમ ૩૦%ની મર્યાદાનું ધોરણ અપનાવવાનું નક્કી કરવામાં આવે છે.

માર્ગ અને મકાન વિભાગ હસ્તક ચાલતા કામોમાં પ્રવર્તમાન સ્પેશીફિકેશન અને ઈલોન્ગેશન સંયુક્ત ઈન્ડેક્સની મહત્તમ મર્યાદા ૩૦% રાખવામાં આવે છે.

ગુજરાત રાજ્યમાં મોટા ભાગના કશીંગ મશીનોમાં જરૂરી યાત્રીક સુધારા વધારા તા.૩૦/૦૮/૦૭ સુધીમાં કરવામાં આવે તો જ તા.૦૧/૧૦/૦૭ પછીથી માર્ગ અને મકાન વિભાગના રસ્તાઓમાં વપરાતા એગ્રીગેટની ગુણવત્તાધારા ધોરણ મુજબની મળી રહે. આથી નીચે મુજબની સુચનાઓ આપવામાં આવે છે.

- (અ) માર્ગ અને મકાન વિભાગમાં ચાલતાં કામોના ઈજરદારોએ જે તે કશીંગ યુનિટોમાં જરૂરી યાંત્રીક સુધારા વધારા થઈ ગયેલ છે અને ધારા ધોરણ મુજબની ગુણવત્તાનો એગ્રીગેટ મળી રહે છે. તેવું પ્રમાણપત્ર અધિક્ષક ઈજનેરશ્રી (યાંત્રીક) અમદાવાદ મા.મ.વર્તુળ, અમદાવાદનું હોય તેની પાસેથી જ માલસામાન ખરીદ કરવાનો રહેશે. આ પ્રમાણિત થયેલ કશીંગ યુનિટ સિવાયના કોઈપણ કશર પાસેથી માલસામાન સપ્લાય ન થાય તેની કાળજી લેવાની રહેશે. અ.ઈ.શ્રી (યાંત્રીક) દ્વારા સર્ટીફાઈડ ન થયેલ કશીંગ યુનિટ પાસેથી આવેલ ધારાધોરણ વગરનો માલસામાન આ. ટરાઈટ રીજેક્ટ કરવામાં આવશે.
- (બ) માર્ગ અને મકાન વિભાગના એસ.ઓ.આર.માં તથા અંદાજોમાં એગ્રીગેટના ભાવમાં જરૂરી સુધારા વધારા કરીને તા.૦૧/૧૦/૦૭ થી અમલમાં લાવવાના રહેશે.
- (ક) દરેક વિભાગીય કચેરીઓએ તેઓના તાબામાં જે જે ઈજારદારોની નોંધણી થયેલ છે. તેઓને સદરહું સુચનાનો અમલ કરવા માટે લેખીત જાણ કરવાની રહેશે તથા ખાનગી કશીંગ યુનિટોની પણ આની લેખીત જાણ કરવાની રહેશે. સદરહું સુચનાના અમલ માટે ખાનગી કશર યુનિટો તેમજ ઈજારદારો સાથે દરેક વિભાગીય કચેરીએ એક સંયુક્ત બેઠક કરીને સમજ આપવાની રહેશે. જેથી તા.૦૧/૧૦/૦૭ પછી માર્ગ અને મકાન વિભાગ હસ્તક ચાલતા કોઈપણ કામોમાં ધારાધોરણ મુજબની ગુણવત્તા સિવાયનો માલસામાન વાપરવામાં ન આવે તેની તકેદારી રાખવાનો રહેશે.

ઉપરોક્ત સુચનાઓ નો અમલ ચુસ્તપણે કરવાનો રહેશે.

(એસ.એ.ભટ્ટ)

ઉપસચિવ, મુ.મ:

માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : એસ.એસ.આર.-૧૦૯૧-આઇ.બી.-૧૨૯-૧૦.સ.
સચિવાલય, ગાંધીનગર.

વિષય :રસ્તાના કામોમાં વપરાતાં માલસામાનનાં પરિક્ષણો બાબત.
સંદર્ભ :સરખા ક્રમાંક નો પરિપત્ર તા. ૨૪/૧૦/૯૪

પરિપત્ર :

ઉપરોક્ત વિષયનાં સંદર્ભ હેઠળના પરિપત્રથી રસ્તાના/પેવરના કામો માટે કયા માલસામાનનાં કેટલા પરિક્ષણો કરવા તે નિયત કરવામાં આવેલ છે.અને તે મુજબ યુસ્તપણે કાર્યવાહી કરવા સર્વે સંબંધીતોને જણાવવામાં આવેલ છે. સરકારશ્રીનાં ધ્યાનપર આવેલ છે કે અમુક કિસ્સાઓમાં માલસામાન એક જ ક્વોરીમાંથી આવતો હોવાથી તેની ગુણવત્તા એક સરખી જ હોય છે તેમ જણાવીને પરિક્ષણોની કાર્યવાહીમાં યુસ્તપણે અમલ કરવામાં આવતો નથી. જે યોગ્ય નથી કેમ કે કુદરતી રીતે મળતા માલસામાનનું નિર્માણ અને પ્રક્રિયાઓ દ્વારા થતું હોવાના કારણે તેમાં એકવીધતા હોતી નથી. અને આ બાબતે ક્વોરીમાંથી નીકળતા માલસામાનને સ્પર્શતો હોઈ હવે પછી બાંધનાર રસ્તાઓનાં સ્પેશીફિકેશનનાં નિયત કરેલ પરિક્ષણોનો સમાવેશ કરીને દર્શાવવામાં આવે અને તે મુજબ જ માલસામાનનાં પરિક્ષણોની કાર્યવાહી હાથ ધરવામાં આવે અને યોગ્ય ગુણવત્તા ધરાવતો માલસામાન રસ્તાઓના બાંધકામોના ઉપયોગમાં લેવામાં આવે તેને સંબંધીત અધિકારી / કર્મચારીએ ખાસ ધ્યાન રાખવું.

આ સુચનાઓનો અમલ યુસ્તપણે કરવામાં આવે તે જોવા દરેક સંબંધકર્તા / કર્મચારીઓને આથી સુચના આપવામાં આવે છે.

(ઝેડ. એમ. પટેલ)
ઉપ સચિવ
માર્ગ અને મકાન વિભાગ.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : એસ.એસ.આર.-૧૦૯૨-આઇ.બી.-૧૨૯-૧૦.સ.
૧૪/૨ સરદાર ભવન,
સચિવાલય, ગાંધીનગર.
તા. ૨૪-૧૦-૯૪

પરિપત્ર :

રાજ્યમાં ચાલતાં રસ્તાનાં/પેવરનાં કામો માટે ગુણવત્તા નિયમનનાં મેન્યુઅલમાં માલ-સામાનની ગુણવત્તા માટે ક્યાં માલ-સામાનનાં કેટલાં પરિક્ષણો કરવા તે નિયત કરેલાં છે. તેનાં અનુસંધાને સરકારશ્રીને મળેલ સુચનાંને આધારે આવા પરિક્ષણોની સંખ્યામાં ફેરફાર / સુધારો કરવાનું નક્કી કરેલ છે. તેથી હવે પછી આવા પરિક્ષણોની સંખ્યામાં આ સાથે રાખેલ પરિશિષ્ટમાં દર્શાવ્યા પ્રમાણે રહેશે અને આ સુચનાઓનો અમલ યુસ્તપણે કરવામાં આવે તે જોવા દરેક / સંબંધકર્તાને આથી જાણ કરવામાં આવે છે. અધિક્ષક ઈજનેરશ્રીઓ આ સુચનાઓ ને સર્વે તાંત્રીક અધિકારીઓનાં ધ્યાન પર આવે તેવી વિનંતી છે.

બિડાણ :પરિશિષ્ટ

સહી -
પં. ર. ચોક્સી
ખાસ ફરજપરનાં અધિકારી,
માર્ગ અને મકાન વિભાગ.

બાંધકામના મટીરીયલ તેમજ કોમ્પોનેન્ટસ સેમ્પલની
ગુણવત્તા માટેના પરીક્ષણ પૈકીના ૮૦% પરીક્ષણ સ્થળ
પર તથા ૧૦% પરીક્ષણ સરકાર માન્ય લેબોરેટરી / ગેરી
દ્વારા તથા ૧૦% ગેરી લેબોરેટરીમાં કરાવવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : ૫૨૪/૧૦૨૦૦૭/૨૮/સ
સચિવાલય, ગાંધીનગર.
તા. ૩૧-૧૨-૨૦૦૯

પરિપત્ર :

બાંધકામના મટીરીયલ્સ તેમજ કોમ્પોનેન્ટસના સેમ્પલની ગુણવત્તા માટેના પરીક્ષણ હાલ ગેરી સરકાર માન્ય સંસ્થા (લેબોરેટરી) મારફતે કરવામાં આવે છે, કામોની પ્રગતિની સમીક્ષા દરમિયાન ક્ષેત્રીય અધિકારીઓ તરફથી જાણવા મળેલ છે કે ઉક્ત હયાત પ્રક્રિયામાં ટેસ્ટીંગ પરિણામો વિલંબથી મળે છે, જેમાં સમય ખુબ વ્યતિત થાય છે. ઈજારદાર એસોસિયેશન તરફથી આવી રજુઆતો મળે છે, આથી આ મુશ્કેલી ધ્યાને લેતાં ઈજારદારશ્રી દ્વારા જે તે કામ માટે સ્થાપવામાં આવતી લેબોરેટરીમાં સ્થળ પર જ પરીક્ષણ કરવામાં આવે તો વિલંબ નિવારી શકાય તે બાબત વિચારણા હેઠળ હતી, પુખ્ત વિચારણાના અંતે નીચે મુજબની નીતિ હાલના તબક્કે અનુસરવા નક્કી કરવામાં આવ્યું છે.

નીચે જણાવેલ પરીક્ષણોમાં પ્રવર્તમાન પદ્ધતિમાં ફેરફાર કરી ફીક્વન્સી અનુસાર જરૂરી પરીક્ષણો પૈકી ૧૦% સરકાર માન્ય લેબોરેટરી / ગેરી તથા ૧૦% ગેરી લેબોરેટરી અને ૮૦% ફીલ્ડ લેબોરેટરી દ્વારા કરાવવાના રહેશે. પરંતુ ગેરીમાં નીચેના દરેક પૈકી ઓછામાં ઓછું ૧(એક) પરીક્ષણ ગેરી લેબોરેટરીમાં કરવાનું રહેશે. જેમાં નીચે દર્શાવેલ પરીક્ષણો સ્થળ પર કરવાના રહે છે.

એ	એગ્રીગેટ	(૧) ગ્રેડેશન (૨) ફ્લેકીનેશ અને ઈલોગેશન વેલ્યુ (૩) ઈમ્પેક્ટ વેલ્યુ (૪) વોટર અબસોર્પશન
બી	માટી	(૧) ફિલ્ડ એક્ઝીડીડી અને એક્ઝેમસી (૨) સીવ એનાલીસીસ
સી	રેતી	(૧) ગ્રેડેશન
ડી	ઈંટો	(૧) ડાયમેન્શન અને ટોલરન્સ ટેસ્ટ (૨) વોટર અબસોર્પશન
ઈ	કોંક્રીટ	(૧) નોન ડીસ્ટ્રીક્ટીવ ટેસ્ટ (એલ્ટ્રા સોનીક ટેસ્ટીંગ પદ્ધતિથી) (૨) સ્લમ્પ ટેસ્ટ (૩) કોમ્પ્રેસીવ સ્ટ્રેન્થ
એફ	બીટ્યુમીનસ મીક્સ	(૧) ડામરની ટકાવારી
જી	ડ્રાય મીક્ષ મટીરીયલ	(૧) ગ્રેડેશન

શરતો :

૧. ઈજારદારે કામની ગુણવત્તા માટે ધારાધોરણ પ્રમાણેની અને ઉપર જણાવેલ પરીક્ષણો માટે પ્રમાણિત થયેલ જરૂરી તમામ સાધનો સહિતની ફિલ્ડ ટેસ્ટીંગ લેબોરેટરી સ્વ ખર્ચે કામના સ્થળે યોગ્ય જગ્યા

ઉપર સ્થાપવાની રહેશે. રસ્તાના કામ માટે લાગુ પડતા પ્લાન્ટના સ્થળને કામનું સ્થળ ગણી શકાય. પરંતુ કામનું સ્થળ લેબોરેટરીથી દુર હોય તો ઈજારદારશ્રી દ્વારા મોબાઈલ લેબોરેટરીની જરૂરી વ્યવસ્થા રાખવાની રહેશે.

૨. કા.ઈ.શ્રી જ્યારે સ્થળ પર તેઓનું ચેકીંગ કરવા જાય ત્યારે ટેસ્ટીંગ તેઓએ તેમની રૂબરૂમાં પણ કરાવવાનું રહેશે.
૩. ધારાધોરણ પ્રમાણેના પરીક્ષણોની સંખ્યા પૈકી ૮૦% પરીક્ષણ ફીલ્ડ લેબોરેટરીમાં ઈજારદારના અધિકૃત ક્વોલીફાઈડ ઈજનેર કે જેઓને સંબંધિત કાર્યપાલક ઈજનેરશ્રીએ ઓળખ પત્ર આપેલ હોય તેમના દ્વારા ખાતાના ના.કા.ઈ./મ.ઈ./અ.મ.ઈ. ની હાજરીમાં જ કરવાના રહેશે અને પરિણામોમાં સંયુક્ત સહીઓ કરવાની રહેશે જ્યારે ૧૦% પરીક્ષણ ગેરી / સરકારી માન્ય લેબોરેટરી (ઓછામાં ઓછું એક પરીક્ષણ) અને ૧૦% ગેરી લેબોરેટરી (ઓછામાં ઓછું એક પરીક્ષણ) મારફતે કરાવવાના રહેશે.
૪. કુલ પરીક્ષણોના ૮૦% પરીક્ષણ એક જ સ્થળે એક જ સમયે એક જ તબક્કામાં નહીં કરતાં કામની પ્રગતિ મુજબ જે તબક્કાએ જે તે કામગીરીને અનુરૂપ જે મટીરીયલ્સ વાપરવાનું થતું હોય તદઅનુસાર શરૂઆતના તબક્કામાં રાખવું વચ્ચેના તબક્કામાં તેમજ આખરી તબક્કામાં કરાવવાનું રહેશે. આમ છતાં આ બાબતે સ્થાનિક કક્ષાએથી ના.કા.ઈ.શ્રીએ જરૂરીયાત મુજબ તબક્કાવાર પરીક્ષણો નક્કી કરવાના રહેશે.
૫. ગુણવત્તા નિયમન ધારાધોરણ પ્રમાણેના બધા જ રજીસ્ટર નિયમીત રીતે નિભાવવાના રહેશે, અને તે જે સ્થળે લેબોરેટરીમાં ઉપલબ્ધ રહે તેમ રાખવાના રહેશે.
૬. જો કોઈ કારણસર ટેસ્ટીંગના સાધન અપ્રાપ્ય હોય અથવા વસાવવામાં સમય જાય તેમ હોય કે વ્યવહાર ન હોય (જેમ કે ઇલેક્ટ્રોમેટ્રિક બેરીંગ) તો આવા પરીક્ષણો ગેરી / સરકાર માન્ય સંસ્થાઓમાં કરાવી શકાશે. અને આ બાબતનો નિર્ણય સંબંધિત કા.ઈ.શ્રી / ના.કા.ઈ.શ્રીએ કરવા નો રહેશે. ગેરીમાં ન થઈ શકે તેવા ટેસ્ટ સરકાર માન્ય લેબોરેટરીમાં કરાવી શકાય.

૭. વિભાગના ક્ષેત્રીય તાંત્રિક સ્ટાફે ના.કા.ઈ / મ.ઈ. / અ.મ.ઈ. એ તેમજ ઈજારદારના તાંત્રિક સ્ટાફ દ્વારા ગેરીમાં પરીક્ષણ જાતે કરવાનો સંતોષકારક અનુભવ મેળવી આ બાબતનું ગેરીનું પ્રમાણપત્ર પણ મેળવવાનું રહેશે. જે તે જિલ્લા / પ્રાદેશિક સ્તરે ગેરીની લેબોરેટરીમાં કોર્ષ કન્ડક્ટ કરવા માટે જરૂરી ફી જે તે વિભાગના કા.ઈ.શ્રીએ ચુકવવાની રહેશે અને આ કાર્યવાહી સમયબદ્ધ પૂર્ણ થાય તે માટે સંબંધિત અ.ઈ.શ્રીએ આ કામગીરીની વખતોવખત સમીક્ષા કરવાની રહેશે.
૮. આ પરિપત્રથી ઉપર જણાવેલ પરીક્ષણો પૈકી ૮૦% પરીક્ષણો ક્ષેત્રીય લેબોરેટરીમાં કરવાનો સમય તા.૧/૧/૨૦૧૦ થી કરવાનો રહેશે.
૯. ગેરીમાં ટેસ્ટીંગ કરાવતાં સમયે ગેરીનો ટેસ્ટીંગ ચાર્જ ત્વરીત ભરવાનો રહેશે. જેથી પરીક્ષણના પરીણામો સમયસર મેળવી શકાશે.

(આર. કે. ચૌહાણ)

ખાસ ફરજ પરના અધિકારી (વિ.યો.)

માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : પરચ/૧૦૨૦૦૫/-૩૩-ભાગ-૨/સી
સચિવાલય, ગાંધીનગર.
તા. ૧૮-૦૯-૨૦૧૦

વિષય : બાંધકામોમાં વપરાતા માલસામાનના પરિક્ષણો માટે ખાનગી લેબોરેટરીઓને આપેલ માન્યતા બાબત.

સંદર્ભ : નડીયાદ મા.મ. વિભાગનો તા.૧૮/૦૧/૨૦૧૦ ના પત્રક ક્રમાંક : એબી-ટેન્ડર-૩૦૩ થી એબી-ટેન્ડર-૩૨૨.

પરિપત્ર :

ઉપરોક્ત વિષયે સંદર્ભ હેઠળના પત્રથી માન્યતા આપેલ ખાનગી લેબોરેટરીઓમાં બધી લેબોરેટરીમાં ટેસ્ટીંગ થઈ સકે તે માટે આજ્ઞાઅનુસાર નીચે મુજબ સુચના આપવામાં આવે છે.

માન્ય ખાનગી લેબોરેટરીમાં પરીક્ષણો કરવામાં આવે ત્યારે એક જ વિભાગીય કચેરી હેઠળ ના એક કે બધા કામના પરીક્ષણો એક જ ખાનગી લેબોરેટરીમાં ન થાય તે જોવું અને સૌથી નજીકની એક થી વધુ માન્ય લેબોરેટરીમાં રેટેશનથી પરીક્ષણો કરવામાં આવે છે.તે અચુક જોવનું રહેશે.

સંદર્ભ હેઠળના પત્રોથી અન્ય તમામ શરતો યથાવત રહેશે તથા જે લેબોરેટરી જે પરિક્ષણો માટે માન્ય હોય તે પરિક્ષણો જ તે લેબોરેટરીમાં થાત તેની કાળજી અચુક લેવાની રહેશે.

(પારસ સંઘવી)

ઉપ સચિવ

માર્ગ અને મકાન વિભાગ

ટેન્ડરમાં ભરેલ અસામાન્ય ઉંચાભાવોના સંદર્ભે
કામપર પડતાખર્ચ પર નિયંત્રણ રાખવા
તથા કામની નાણાકીય પ્રગતિ ભૌતિક પ્રગતિ
સાથે સુમેળમાં રહે તે માટે જરૂરી જોગવાઈ
કરવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : પરચ/૧૦૨૦૦૮/ (૬૧) /સ
તા.૨૭/૧૧/૨૦૦૮

પરિપત્ર :-

ટેન્ડરમાં અસામાન્ય ઉંચા કે નીચા ભાવો ઇજારદારશ્રીઓ ઘણી વાર ભરાતા હોવાનું સરકારશ્રીનાં ધ્યાન પર આવેલ છે. આવા કિસ્સાઓમાં કામની નાણાકીય પ્રગતિ અને ભૌતિક પ્રગતિનો સુમેળ ન રહેવાની સંભાવના રહેલી છે. આથી કામની ભૌતિક પ્રગતિ પ્રમાણે નાણાકીય પ્રગતિ પ્રમાણે રહે કે જેથી સરકારશ્રી પર સમય પહેલા અયોગ્ય નાણાકીય બોજ ન પડે તે માટે નીચે મુજબની જોગવાઈ ટેન્ડરમાં કરવાનો નિર્ણય કરવામાં આવેલ છે. આ જોગવાઈ તમામ કામોના આ પરિપત્રની તારીખ પછી મંજૂર થતા ડી.ટી.પી.માં અચુક પાળે કરવાની રહેશે.

જોગવાઈ :-

જે કોઈ આઈટમનો ભરેલ ભાવ તે આઈટમનાં ટેન્ડરમાં મૂકેલ અંદાજી ભાવ કરતા ટેન્ડરમાં મૂકેલ અંદાજી રકમથી સમગ્ર ટેન્ડર જેટલા ટકા ઉંચુ કે નીચુ મંજૂર થયુ હોય ટકાવારીથી ૧૦%થી વધુ ઉંચો રહેતો હોય તેવી આઈટમનું ચૂકવણું રનીંગ બિલ વખતે તે આઈટમબનાં અંદાજી ભાવ રૂા ./- મંજૂર ટેન્ડરની ટકાવારી Xતે આઈટમનાં અંદાજી ભાવના ૫% ની મર્યાદામાં કરવામાં આવશે. આ રીતે વીથહેલ્ડરાખેલ રકમ કામ સંતોષકારક રીતે પૂર્ણ થયે ફાઇનલ બિલ મંજૂર કરતી વ્યાજ ભારણ વગર છૂટી કરવામાં આવશે.

ઉદાહરણ :-

ઉક્ત જોગવાઈની સ્પષ્ટ સમજણ માટે આ સાથે આપેલ ઉદાહરણ ધ્યાને લેવું.

૧	ટેન્ડરમાં મુકેલ અંદાજી રકમ	રૂા. ૧૦૦/-
૨	મંજૂર થયેલ ટેન્ડરની રકમ	રૂા. ૧૧૦/-
૩	ટેન્ડરમાં મુકેલ અંદાજી રકમ સામે ખરેખર મંજૂર થયેલ ટેન્ડરની ટકાવારી	૧૦%
૪	ટેન્ડરની એક આઈટમનો ટેન્ડરમાં મુકેલ અંદાજી ભાવ	રૂા. ૧૦/-
૫	તે આઈટમનો ભરેલ ભાવ	રૂા. ૧૪/-
૬	તે આઈટમમાં ભરેલ ઉંચા ભાવની ટકાવારી	૪૦%
૭	તે આઈટમ માટે રનીંગ બિલ વખતે ચૂકવવાપાત્ર ભાવ	રૂા. ૧૦ કોલમ - ૩ પ્રમાણે ૧૦% ઉંચા અંદાજીભાવનાં ૫% ૧૧.૫૦ રૂા.
૮	ફાઇનલ બિલ વખતે વ્યાજ ભારણ વગર ચૂકવવાપાત્ર થતો વીથહેલ્ડ રાખેલ	રૂા. ૧૪.૦૦ - ૧૧.૫૦
	ભાવ	રૂા. ૨.૫૦

(આર. કે. ચૌહાણ)
ખાસ ફરજ પરના અધિકારી (વિ.ચો.)
માર્ગ અને મકાન વિભાગ

પરફોર્મન્સ બોન્ડ તથા જામીન અનામત
પેટે બેન્ક ગેરેન્ટી મેળવવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : ટીએનસી-૧૦-૨૦૧૩-૩-(ભાગ-૧)/સ
સચિવાલય, ગાંધીનગર.
તા. ૧૯-૧૧-૨૦૧૩

વંચાણે લીધો પરિપત્ર ક્રમાંક :- ટીએનસી-૧૦૯૧/આઇબી/(૧૦)/(૧૧)/સ તા.૩૧/૩/૧૯૯૯

આમુખ :-

વંચાણે લીધેલ પરિપત્ર મુજબ કલ્લમાં ૧૫ લાખ કે તેથી વધુ રકમની કામોમાં ઇજારદારશ્રી પાસેથી પરફોર્મન્સ બોન્ડ લેવાની જોગવાઈ છે. પરંતુ હવે મોટા ભાગના કામો ૧૫ લાખથી વધુ રકમના હોય છે અને ચાલુ મરામતના કામો પણ હવે ૧૫ લાખથી વધુ રકમના હોય છે. આ બાબતે કોન્ટ્રાક્ટર્સ એસોસિએશન તરફથી પણ પરફોર્મન્સ બોન્ડ માટે કામની રકમની મર્યાદા વધારવા માટેની રજુઆત કરવામાં આવેલ છે. આથી વહિવટી સરળતા અને અનુકુળતા જળવાય તે હેતુસર પરફોર્મન્સ બોન્ડ માટે કામની રકમમાં ફેરફાર કરવાનું સરકારશ્રીની વિચારણા હેઠળ હતું.

પરિપત્ર :-

પુખ્ત વિચારણાને અંતે નક્કિ થયેલ છે કે હવે રૂા. ૧૫ લાખ કે તેથી વધુ રકમને બદલે રૂા. ૩૦ લાખ કે તેથી વધુ રકમના સરકારી કામોમાં ઇજારદારશ્રી પાસેથી પરફોર્મન્સ બોન્ડ લેવાના રહેશે.

આ પરિપત્ર વિભાગની સરખા ક્રમાંકની ફાઇલ પરની નોંધ પર નાણાં વિભાગની તા. ૨૨/૦૯/૨૦૧૩ ના રોજથી મળેલ સંમતિથી બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(આર. કે. ચૌહાણ)

ખાસ ફરજ પરના અધિકારી (વિ.ચો.)

માર્ગ અને મકાન વિભાગ

બાંધકામના કોન્ટ્રાક્ટર પાસેથી સીક્યુરીટી
ડીપોઝીટ સ્વીકારવાની પ્રથામાં અંશતઃ ફેફાર
કરવા બાબત.

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : ટીએનસી-૧૦-૨૦૧૩-૩-(ભાગ-૨)/સી
સચિવાલય, ગાંધીનગર.
તા. ૨૦-૧૧-૨૦૧૩

વંચાણે લીધો પરિપત્ર ક્રમાંક :- ટીએનસી-૧૦૮૮/આઇબી/૧૮/(૧૩) /સ તા. ૩૧/૮૧૯૯૪

આમુખ :-

કોન્ટ્રાક્ટરોને આપવામાં આવતા કામોમાં સિક્યુરીટી ડીપોઝીટ અંગેની હાલની પદ્ધતિ પ્રમાણે એગ્રીમેન્ટ સમયે ૫ % પરફોર્મન્સ બોન્ડ બેંક ગેરેન્ટી સ્વરૂપે, ૨.૫% સિક્યુરીટી ડીપોઝીટ નર્મદા બોન્ડ અથવા એન.એસ.એસ. સ્વરૂપે લેવામાં આવે છે. તેમજ ૨.૫% રકમ ઇજારદારશ્રીના રનીંગ બીલમાંથી કપાત સ્વરૂપે વસુલ કરવામાં આવે છે. કોન્ટ્રાક્ટર્સ એસોસિએશન દ્વારા નાણાકિય સરળતા રહે તે માટે ૨.૫ % લેખે કાપવામાં આવતી સિક્યુરીટી ડીપોઝીટની રકમ બેંક ગેરેન્ટી સામે છુટી કરવાની રજુઆત કરવામાં આવેલ હતી. જે બાબત વિચારણા હેઠળ હતી.

ઠરાવ :-

પુખ્ત વિચારણાને અંતે સરકારી કામોના કોન્ટ્રાક્ટ માટે સીક્યુરીટી સ્વીકારવાની હાલની પ્રથામાં નીચે મુજબનો ફેરફાર કરવામાં આવે છે.

૧. હાલમાં પ્રથમ તબક્કે લેવામાં આવતી ૨.૫% સિક્યુરીટીની રકમ નર્મદા બોન્ડ / અથવા એન.એસ.એસ. સ્વરૂપે

લેવાની જોગવાઈ છે, તે હવે નર્મદા બોન્ડ / એન.એસ.એસ. તેમજ શીડ્યુલ્ડ બેંકની એફ.ડી.આર. સ્વરૂપે પણ લઈ શકાશે.

૨. રનીંગ બીલમાંથી કપાત થતી ૨.૫% સિક્યુરીટી ડીપોઝીટની રકમ ઇજારદારશ્રી દ્વારા શીડ્યુલ્ડ બેંકની બેંક ગેરેન્ટી રજુ કરેથી નીચે જણાવ્યા મુજબ રીલીઝ કરવાની રહેશે.

ક્રમ	નાણાકીય પ્રગતિ	રનીંગ બીલમાંથી ૨.૫ % લેખે સીક્યુરીટી ડીપોઝીટ પેટે કાપવામાં આવેલ રકમમાંથી છુટી કરવા પાત્ર રકમ	બેંક ગેરેન્ટીની રકમ
૧	ટેન્ડરની રકમના ૨૫%	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા કામની અંદાજીત કિંમતના ૦.૬૨૫% બે માંથી જે ઓછી રકમ હોય તે	રીલીઝ કરવા આવેલ રકમ જેટલી
૨	ટેન્ડરની રકમના ૫૦%	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા કામની અંદાજીત કિંમતના ૧.૨૫ % બે માંથી જે ઓછી રકમ હોય તે	રીલીઝ કરવા આવેલ રકમ જેટલી
૩	ટેન્ડરની રકમના	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા	રીલીઝ કરવા આવેલ

	૭૫%	કામની અંદાજીત કિમતના ૧.૮૮ % બે માંથી જે ઓછી રકમ હોય તે	રકમ જેટલી
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ઉપરોક્ત બેંક ગેરેન્ટીની મુદત કામ પૂર્ણ થવાની ખરેખર તારીખથી ૬(છ) માસ વધુ સમયની લેવાની રહેશે તથા ઇજારદારપાસેથી બાંધરીપત્ર મેળવવાનો રહેશે કે, જો કામ પૂર્ણ કરવાની સમયમર્યાદામાં વધારો થશે તો વધારેલ સમયમર્યાદાની તારીખથી ૬ માસ વધુ સમયમર્યાદા વાળી બેંક ગેરેન્ટી તેઓશ્રી દ્વારા પુરી પાડવામાં આવશે.

કામ પૂર્ણ થાય ત્યાં સુધી ઇજારદારશ્રી પાસેથી લેવાની થતી ૧૦% સીક્યોરીટી ડીપોઝીટનું પ્રમાણ કોઈ પણ સ્વરૂપે જળવાઈ રહે તેની અચૂક કાળજી રાખવાની રહેશે.

આ ઠરાવ વિભાગની સરખા ક્રમાંકની ફાઇલ પરથી નોંધ પર નાણાં વિભાગની તા.૪/૧૦/૧૩ના રોજથી મળેલ સંમતિ બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(આર. કે. ચૌહાણ)

ખાસ ફરજ પરના અધિકારી (વિ.ચો.)

માર્ગ અને મકાન વિભાગ

ટેન્ડરમાં ભરેલ અસામાન્ય ઉંચા ભાવોના સંદર્ભે કામ પર પડતા ખર્ચ પર નિયંત્રણ રાખવા તથા કામની નાણાંકીય પ્રગતિ સાથે સુમેળમાં રહે તે માટે જરૂરી જોગવાઈ કરવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : પરચ/૧૦૨૦૦૮/ (૬૧) /સી
તા.૦૩/૦૫/૨૦૧૩

વંચાણે લીધો પરિપત્ર ક્રમાંક :- ટીએસી-૧૦૯૧આઈબી/ (૧૦)/ (૧૧)/સ તા.૩૧/ ૩/ ૧૯૯૯

આમુખ :-

ટેન્ડરમાં ઇજારદારશ્રીઓ દ્વારા ભરાતા **Imbalance** ભાવોવાળા ટેન્ડરના કિસ્સાઓમાં ઇજારદારશ્રીઓ દ્વારા ઉંચા ભાવની આઈટમોની કામગીરી કર્યા બાદ નીચા ભાવની આઈટમોની કામગીરી ન કરવામાં આવે તેવી પરીસ્થિતિ પર નિયંત્રણ રાખવા માટે તા.૨૭-૧૧-૨૦૦૮નો પરિપત્ર જરૂરી જોગવાઈ સાથે બહાર પાડવામાં આવેલ. આ પરિપત્ર અંગે વિવિધ સ્તરોએ થયેલ રજુઆતોને ધ્યાને લેતાં અને તેના પર પુખ્ત વિચારણાના અંતે આ પરિપત્રના બીજા ફકરાની છેલ્લી લીટી “આ રીતે વીથહેલ્ડ રાખેલ રકમ કામ સંતોષકારક રીતે પૂર્ણ થયે ફાઇનલ બીલ મંજૂર કરતી વખતે વ્યાજભારણ વગર છુટી કરવામાં આવશે.” તેની જગ્યાએ નીચે મુજબનો સુધારો કરવામાં આવે છે.

સુધારો :-

“ આ રીતે વીથહેલ્ડ રાખેલ રકમ અસાધારણ નીચા ભાવભરેલ હોય તેવી આઈટમની નાણાંકીય પ્રગતિનાં પ્રમાણસર રનીંગ બીલમાંથી છુટી કરવાની રહેશે. જે કિસ્સામાં અસાધારણ નીચા ભાવ કરેલ કોઈપણ આઈટમ ન હોય તેવા કિસ્સામાં અસાધારણ ભાવો ભરેલ આઈટમની સામે વીથહેલ્ડ રાખેલ રકમ બાકી રહેતી કામગીરી થાય તેના પ્રમાણસર રનીંગ બીલમાંથી છુટી કરવાની રહેશે.”

વધુમાં વંચાણે લીધેલ પરિપત્રના ઉદાહરણમાં દર્શાવેલ ક્રમાંક ૮ રદ કરવામાં આવે છે.

ઉપરોક્ત સુધારાનો અમલ આ પરિપત્રની તારીખ પછી મંજૂર થતાં ડી.ટી.પી. માં અચૂકપણે કરવાનો રહેશે.

(આર. કે. ચૌહાણ)
ખાસ ફરજ પરના અધિકારી (વિ.યો.)
માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
ક્રમાંક : એસ.એસ.આર./૧૦૯૯/આઇ.પી.-૯૧/(૯)/ સ,
૧૪/૨, સરદાર ભવન,
સચિવાલય, ગાંધીનગર.
તારીખ:-૨૦-૦૧- ૨૦૦૭

વિષય :- ડામરના પરિક્ષણની ફીકવન્સી તથા ડામર ઉપર પરિક્ષણ બાબત.

સંદર્ભ :- તા. ૦૫-૧૦-૯૮ ની બેઠકમાં દક્ષિણ ગુજરાતનાં તાંત્રિક અધિકારી /કર્મચારીઓની રજુઆત.

પરિપત્ર :-

દક્ષિણ ગુજરાતનાં તાંત્રિક અધિકારીઓ /કર્મચારીઓને સ્થળ પર પડતી મુશ્કેલીની રજુઆતના અનુસંધાને હોત મીક્ષ પ્લાન્ટ અને પેવરથી કરવાના કામમાં ડામરના ટેસ્ટીંગમાં પડતીમુશ્કેલીઓ અને તે અંગેનાં સુચનોનીબાબત સરકારશ્રીની વિચારણામાં હતી, આથી સર્વે હોત મીક્ષ પ્લાન્ટથી કરવાના ડામર કામમાં પરિક્ષણ કરવા સ્થળ ઉપર યોગ્ય માળખાકીય સવલતો ઉપલબ્ધ કરવામાં આવે તો ડામર પરીક્ષણની કામગીરી ક્ષેત્રીય કચેરીમાં /પ્લાન્ટ સાઇટ ઉપર થાઇ શકે, તે માટે વિચારણા હાથ ધરવામાં આવેલ છે.

પ્રવર્તમાન પબ્તી મુજબ ડામરના કામના ટેન્ડરોમાં ઇજારદારે પ્લાન્ટ પર ડામર લાવીને કામો કરવાની જોગવાઇ થયેલ હોઇ નવા ડામરનો ટેસ્ટ થયા બાદ જ ઉપયોગ કરવો જરૂરી બનેલું છે. આથી સર્વે સંબંધિતોને સૂચનાઓ પાઠવવામાં આવે છે કે પ્લાન્ટ સાઇટ પર ડામરના પરિક્ષણની જોગવાઇ હવે પછીથી ડામરના કામના ટેન્ડરમા અવશ્ય રાખવાની રહેશે. વધુમાં સ્થળ પરની ટેસ્ટ કામગીરી માટેનું જ્ઞાન દરેક મદદનીશ ઇજનેર /અધિક્ષક ઇજનેર/ નાયબ કાર્યપાલક ઇજનેર/કાર્યપાલક ઇજનેરએ પાળવાની રહેશે. પ્લાન્ટ સાઇટ ઉપર ડામરનાં પરીક્ષણોનું રજીસ્ટર સંબંધીત ક્ષેત્રિય ટેન્ડરમાં જોગવાઇ રાખવાની રહેશે.

(૧) માળખાકીય સવલત :

સ્થળ ઉપર આશરે ૨૫ ચો.મી. ના ક્ષેત્રફળની પાકા બાંધકામવાળી લેબોરેટરી જરૂરી પાણી તથા લાઇટની સુવિધા સહિત બનાવવાની રહેશે.

(૨) સાધનોની સવલત :

ડામરકામના નીચે દર્શાવેલ જુદા જુદા પરીક્ષણો માટે તેની સામે દર્શાવેલ આઇએસ મુજબનાં સાધનો ઉપલબ્ધ કરાવવાનાં રહેશે.

(૧) પેનીટ્રેશન ટેસ્ટ : આઇએસ-૧૨૦૩

(૨) ઓફનીંગ પોઇન્ટ ટેસ્ટ : આઇએસ ૧૨૦૪

(૩) કંડટીલીટી ટેસ્ટ : આઇએસ-૧૨૦૮

(૪) વીસ્કોસીટી ટેસ્ટ : આઇએસ-૧૨૦૬

(૫) સ્પેશીફીકેશન ગ્રેવીટી ટેસ્ટ : આઇએસ-૧૨૦૨

ઉપરોક્ત સાધનો આઇ.એસ.પ્રામાણીક હોવા જોઇએ તેમજ તેને વિષમીત રીતે કેલીબ્રેટ કરાવી કાર્યરત હાલતમાં રાખવાનાં રહેશે.

(૩) પરીક્ષણોની સંખ્યા :-

એમ.ઓ.એસ.ટી સ્પેધીફિકેશન સેક્શન ૯૦૦ મુજબ ડામર કામાં સ્વોલીટી ઓફ બાઇન્ડરના તેસ્ટની સંખ્યા એઝરીકવાયર્ડ દર્શાવેલ છે. તે જોતાં દર બે ટેન્કર દીઠ એક નમુનાના ત્રણ પરીક્ષણ પ્લાન્ટ સાઇટ ઉપર કરાવવાના રહેશે તદ્દપરાંત હવે પછીથી નીચેના ટેબલનાં સંદર્ભ-૩ અને ૪ માં દર્શાવ્યા પ્રમાણે પરીક્ષણો ગેરીમાં પણ કરાવવાનાં રહેશે. આઇ.એસ.-૧૨૦૧૧૯૭૮ પરીક્ષણો કરવાની સુધારેલ સંખ્યા

ટેન્કરની સંખ્યા	પરીક્ષણની સંખ્યા	ટેન્કરની સંખ્યા	પરીક્ષણની સંખ્યા
૧	૨	૩	૪
૧	૧	૧થી૧૦	૧
૨થી૧૫	૨	૧૧થી૨૦	૨
૧૬થી૫૦	૩	૨૧થી૫૦	૩
૫૧થી૧૫૦	૫	૫૧થી૧૦૦	૪

બાકી દરેક ૫૦ ટેન્કર દીઠ ૧

ઉપર મુજબના ડામરના સાઇટ તેમજ 'ગેરી'માં પરીક્ષણો કરાવવાની જોગવાઇ હવે પછીની દરેકે દરેક

ડામરના ટેન્કરોમાં અવશ્ય રાખવાની રહેશે.

આ સુચનાઓમાં અમલ યુસ્તપણે થાય તેવું દરેકે દરેક ક્ષેત્રિય અધિકારીઓએ અવશ્ય ધ્યાન રાખવું.

સી.એમ.ભઇ

નાયબ સચિવ

માર્ગ અને મકાન વિભાગ

ડામર કામની ચકાસણી માટે કોર કટીંગ
મશીન વસાવવા તથા રૂા. ૧૦૦.૦૦
લાખથી ઉપરનાં કામ માટે ઇજારદારશ્રી
દ્વારા કુલ ટાઇમ ક્વોલીટીફાઇડ ઇજનેર
રાખવા અંગે.

ગુજરાત સરકાર

માર્ગ અને મકાન વિભાગ

પરિપત્ર ક્રમાંક : આરજીએન/૬૦૨૦૦૬(૩૫)/સ,

સચિવાલય, ગાંધીનગર.

તારીખ:-૧૩-૦૪-૨૦૦૭

સંદર્ભ :- (૧) મા.મ. વિભાગના ઠરાવ ક્રમાંક આરજીએન/૬૦૮૦યુઓ-૨૪-(૪૨)સ, તા. ૨૬-૧૧-૮૦

(૨) મા.મ. વિભાગના પરિપત્ર ક્રમાંક આરજીએન/૬૦૨૦૦૬(૩૫)/સ, તા. ૨૬-૫-૨૦૦૬

પરિપત્ર :-

ડામર કામની ગુણવત્તા જાળવવા કોર સેમ્પલ લેવા માટે કોર કટીંગ મશીન ઇજારદારોએ વસાવવાનું ઉપરોક્ત સંદર્ભ (૨)ના પરિપત્રથી ફરજિયાત ઠરાવી નવી નોંધણી તથા રીન્યુલ કરતી વખતે ચકાસણી કરવા નિર્ણય કરેલ છે. ક્ષેત્રિય કક્ષાએ કામો પર સેમ્પલ લેવાય તથા યોગ્ય રીતે ચકાસણી થાય તે માટે ગુણવત્તા નિયમનને પણ વિનંતી કરાયેલ છે. અનુભવે જણાયેલ છે કે ઇજારદારશ્રી દ્વારા આ મશીનનો વ્યાપક પ્રમાણમાં ઉપયોગ કરવામાં આવતો નથી જેનાં કારણે ડામર કામની ગુણવત્તાની ચકાસણી વ્યાપક પ્રમાણમાં થઇ શકતી નથી.

સઘન વિચારણાને અંતે હવે પછી મંજૂર થનાર ભાવમુસદ્દા પત્રમાં નીચે દર્શાવેલ ખાસ શરતો સદાખલ કરવાનું આથી નક્કી કરવામાં આવે છે.

(૧) કોર કટીંગ મશીનનો વ્યાપક રીતે ઉપયોગ થઇ શકે તથા રસ્તાઓનાં ડામર કામની ગુણવત્તાની ચકાસણી વિધિવત રીતે થઇ શકે તે હેતુસર નીચે દર્શાવેલ શરત દાખલ કરવાનું નક્કી કરવામાં આવે છે. “ ૫૦મીમી થી વધુ ડામર કામની સંયુક્ત જાડાઇ (બીએસજી, બીબીએમ સિવાય) હોય તેવા રસ્તાનાં કામમાં દર ૨૫૦મીટર દીઠ એક કોસ સેકશન પર ડામર કામની પહેળાઇ અનુસાર બે થી ચાર કોર સેમ્પલ ઇજારદારે પોતાના કોર કટીંગ મશીન વડે સંબંધીત નાયબ કાર્યપાલક ઇજનેરશ્રીની હાજરીમાં મેળવી આપવાનાં રહેશે અને આ સેમ્પલ શીલ કરી માન્ય લેબોરેટરી મારફત થીક્નેશ, ડેન્સિટી તથા બીટ્યુમીનસ કોન્ટેન્ટના પરિક્ષણ કરાવી પરિણામો મેળવવાનાં રહેશે. સંતોષકારક પરિણામો આવ્યા સુધી ડામર કામની ચુકવવાપાત્ર રકમનાં ૫% ટકા રકમ વીથહેલ્ડ રાખવામાં આવશે.”

(૨) બી-૨ તથા બી-૨ કરાર ફોર્મમાં કામ પર ઇજારદારે એન્જીનીયર રાખવાની જોગવાઇ અસરકારક બનાવવા રૂા. ૧૦લાખ કે તેથી વધુ રકમની તેન્ડરમાં મુકેલ અંદાજી રકમનાં કામો માટે નીચે દર્શાવેલ શરત દાખલ કરવાનું આથી નક્કી કરવામાં આવે છે.

“કરાર હેઠળનાં કામ પર ઇજારદારે કુલટાઇમ ક્વોલીટીફાઇડ એન્જીનીયર નિયુક્ત કરવાનો રહેશે. જે અંગે કામનો વર્ક ઓર્ડર મળ્યે દિન-૧૫માં કાર્યપાલક પાલક ઇજનેરશ્રીને નિયુક્ત ઇજનેરનાં નામ, ક્વોલીટીફિકેશન, માર્કશીટ, સર્ટીફિકેટ, કલફ્રોટેગ્રાફ, નિયુક્તીનો હુકમ વિગેરે વિગત રજુ કરવાની રહેશે તથા કામ પર હાજર થયા અંગેનો રીપોર્ટ આપવાનો રહેશે. જે અનુસાર કરાર હેઠળનાં કામ પર ક્વોલીટીફાઇડ ઇજનેરની ઉપરોક્ત શરત મુજબ નિયુક્તી થાય તથા સ્થળ પર ખરેખર કામગીરી ન સંભાળે ત્યાં સુધીનાં સમયગાળા

તેમજ કામ ચાલુ રહે તે સમય દરમિયાન નિયુક્ત કરેલ ઇજનેર કામગીરી સંભાળશે નહીં તો તે સમયગાળા માટે રૂા. ૧૫૦૦૦ પ્રતિ માસ લેખે બિલમાંથી કપાત કરવામાં આવશે. જે નોનોરીફુંડેબલ રહેશે.

ઉપરોક્ત જોગવાઈનો હવે પછી મંજૂર કરનાર ભાવમુસદ્દા પત્રકમાં તાત્કાલીક અસરથી સામેલ કરવાની આથી સુચના આપવામાં આવે છે. જેનો ચુસ્તપણે અમલ થાય તેની સંબંધિત અધિકારીએ તકેદારી રાખવાની રહેશે.

(અશોક પંડ્યા)

ઉપસચિવ

માર્ગ અને મકાન વિભાગ

કોન્ટ્રાક્ટરોને આયાતિ ડામરનો ઉપયોગ
કરવાની પરવાનગી આપવા બાબત.

ગુજરાત સરકાર
પરિપત્ર ક્રમાંક : એસટીઆર-૧૦૨૦૦૬-૧૫૭૭-૬
માર્ગ અને મકાન વિભાગ
સચિવાલય, ગાંધીનગર.
તારીખ:-૦૨-૦૯- ૨૦૦૮

પરિપત્ર.

માર્ગ અને મકાન વિભાગ દ્વારા રાજ્યના રસ્તાઓનું બાંધકામ અને તેની મરામત માટે જાળવણી અંગેની કામગીરી હાથ ધરવામાં આવે છે. આ રસ્તાઓના બાંધકામ, મરામત અને જાળવણી માટે રાજ્ય અને પંચાયત વિભાગો દ્વારા રિફાઈનરિમાંથી જરૂરી ડામર મેળવવામાં આવે છે. કામોમાં જરૂરી ડામર, ઇજારદાર દ્વારા બારો બાર ભારત સરકારનાં જાહેર સાહસની ઓઈલ કમ્પનીઓ(IOC,HP,વગેરે) માંથી ખરીદી કરી વાપરવામાં આવે છે.

રિફાઈનરિ દ્વારા ડામરનાં વધતા ભાવો, પીક સિઝનમાં ડામર મેળવવામાં થતો વિલંબ તેમજ વધુ કામોને ઓછા સમયમાં પૂર્ણ કરાવાં અર્થે ડામરનો સપ્લાય એક કરતા વધુ એજન્સીઓ દ્વારા થાય તે તે માટે આયાતિ ડામરનાં ઉપયોગની પરવાનગી આપવા બાબત સરકારશ્રીની વિચારણા હેઠળ હતી. આ માટે ગુજરાત કોન્ટ્રાક્ટર્સ એસોસિએશન દ્વારા પણ રજૂવાત કરવામાં આવેલ.

આ બાબતોની સમગ્ર વિચારણાને અંતે એવું નક્કી કરવામાં આવે છે કે માર્ગ અને મકાન વિભાગ દ્વારા રસ્તાઓના બાંધકામ, તેની મરામત અને જાળવણીની કામગીરીમાં આયાતિ ડામરનો ઉપયોગ કરી શકાશે. આ પ્રમાણે ઉપયોગમાં લેવાનાર આયાતિ ડામર માટે નીચે મુજબની શરતો અનુસાર કાર્યવાહી કરવાની રહેશે.

- (૧) આયાતી ડામરની ગુણવત્તા ટેન્ડર સ્પેશીફિકેશન મુજબ હોવી જોઈએ.
 - (૨) આયાતી ડામરના સ્ટાર રેઇટ ભાવ અંગે તફાવત કરારનામાની બી-૧ ફોર્મના કલોઝ- ૬૦(એ) અને બી-૨ ફોર્મના કલોઝ નં-૫૯(એ)માં દર્શાવેલ હાલની તમામ શરતો લાગુ પડશે.
 - (૩) આયાતી ડામરના કિસ્સામાં ભાવ તફાવતની ગણતરી માટે જે તે વખતે ભારતીય પોર્ટ ઉપરથી ખરીદ ભાવ અથવા તે સમયનો Ex.Refinery (ભારત સરકારનાં જાહેર સાહસની ઓઈલ કમ્પનીઓ IOC,HP,વગેરે)વગેરેનો ભાવ એ બે માંથી જેનો ભાવ ઓછો હોય તેની સાથે સ્ટાર રેઇટનો તફાવત ગણી ચુકવવા કે વસુલ કરવાનો રહેશે. આ આદેશોનો અમલ તા.૧-૦૯-૦૮ થી કરવાનો રહેશે. એટલે તા.૦૧-૦૯-૦૮ પછી મંજૂર કરવામાં આવતાં ડી.ટી.પી. માં આયાતી ડામર વાપરવા અંગેના ઉપર મુજબના નિર્ણયો સ્પષ્ટ ઉલ્લેખ કરવાનો રહેશે.આ આદેશો વિભાગની સરખા ક્રમાંકની ફાઇલ ઉપર અધિક મુખ્ય સચિવશ્રી, નાણાં વિભાગની તા.૧૪-૦૭-૦૮ની નોંધથી મળેલ સંમતિ અન્વયે બહાર પાડવામાં આવે છે.
- ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

સહી
(એસ.કે.પરમાર)
ઉપસચિવ,
માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ,
૧૪/૧, સરદાર ભવન,
સચિવાલય, ગાંધીનગર.
તા. ૨૮/૧૦/૨૦૧૦

પ્રતિ,

- (૧) મુ.ઇ. (મા.મ.) અને અ.સ.શ્રી, મા. અને મ. વિભાગ, સચિવાલય, ગાંધીનગર.
- (૨) મુ.ઇ. (પં) અને અ.સ.શ્રી, મા. અને મ. વિભાગ, સચિવાલય, ગાંધીનગર.
- (૩) મુ.ઇ. (પા.યો.) અને અ.સ.શ્રી, મા. અને મ. વિભાગ, સચિવાલય, ગાંધીનગર.
- (૪) મુ.ઇ. (રા.ધો.) અને અ.સ.શ્રી, મા. અને મ. વિભાગ, સચિવાલય, ગાંધીનગર.
- (૫) મુ.ઇ. (પી.પી.યુ.)મા. અને મ. વિભાગ, સચિવાલય, ગાંધીનગર.
- (૬) મુ.ઇ. (ગુજરાત સ્ટેટ રોડ ડેવલપમેન્ટ કોર્પોરેશન) મા. અને મ. વિભાગ, નિર્માણ ભવન, ગાંધીનગર.

વિષય :- બાંધકામની વિગતો તથા સ્પેસીફિકેશન દર્શાવતા બોર્ડ કામના સ્થળે મૂકવા અંગે.

ઉપરોક્ત વિષય પરત્વે સવિનય જણાવવાનું કે,

- (૧) જાહેર બાંધકામો (ખાસ કરીને રૂ. પાંચ લાખથી વધુ કિંમત) ના કામની વિગતો તથા સ્પેસીફિકેશન દર્શાવતા બોર્ડ મુકવા જરૂરી છે.
- (૨) આવા બોર્ડ ઇજારદારશ્રીના ખર્ચે લગાવવાની જોગવાઈ રાખવામાં આવે.,
- (૩) આ બોર્ડમાં સંબંધિત કાર્યપાલક ઇજનેરનું સરનામું, ફોન નંબર, ફેક્સ નંબર પણ જણાવવો જરૂરી છે.
- (૪) ઇજારદારશ્રી નિયત સ્થળે બોર્ડ લગાવીને ફોટોગ્રાફ સહીતનો અહેવાલ ના.કા.ઇ.શ્રીને કા.ઇ.શ્રીની જાણ હેઠળ ન કરે ત્યાં સુધી હગામી ધોરણે અમુક રકમ (૦૨૫% થી ૧% જેટલી) રોકી રાખવાની કરારમાં જોગવાઈ કરવી.
- (૫) મકાન જેવા સીમીત ક્ષેત્રફળ માટે એક બોર્ડ જરૂરી છે. રસ્તા, પુલો, પાણીની પાઇપ લાઇન, ગટર લાઇનજેવાકામોમાં કામનાં વ્યાપ પ્રમાણે તમજ બંને છેડા પર તેમજ વચ્ચે બોર્ડ મુકવા જોઇએ.
- (૬) જાહેર બાંધકામ હાથ ધરતી તમામ સંસ્થાઓ ઉપરોક્ત ભલામણોનો ઉપયોગ કરે.

આપના તાબા હેઠળની તમામ કચેરીઓને આ અંગેની જાણ કરી ઘટીત કાર્યવાહી સત્વરે કરવા જણાવવું.
આપના તાબા હેઠળની કચેરીઓ દ્વારા હાથ ધરવામાં આવેલ કાર્યવાહી તા.૧૦-૧૧-૨૦૧૦ સુધીમાં અત્રે રજુ થાય તે
ખાસ જોવું.

(પી.સી.પુરબીયા)
મુખ્ય ઇજનેર (ગુ.ની) અને અધિક સચિવ,
માર્ગ અને મકાન વિભાગ.

રસ્તા, પુલો તથા મકાનોમાં બાંધકામની વિગતો તથા સ્પેશીફિકેશન અંગેના કામના સ્થળ ઉપર બોર્ડ મુકવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
ઠરાવ ક્રમાંક : ટીએનસી/૧૦૯૦/૨૪ /સ
સચિવાલય ગાંધીનગર.
તા.૨૭/૧૧/૧૯૯૦

સંદર્ભ : જા.બા.વિ.ના પરિપત્ર ક્રમાંક બીડીજી / ૩૨૭૭ /(૧૬૫)ન, તા. ૨૬/૦૪/૭૮

ઠરાવ :-

રસ્તા, પુલો તથા મકાનોમાં બાંધકામની વિગતો તથા સ્પેશીફિકેશન અંગેના કામના સ્થળ ઉપર બોર્ડ મુકવા અંગેની સંદર્ભમાં દર્શાવેલ પરિપત્રથી જરૂરી સુચનાઓ આપવામાં આવેલ છે. આવા કામની વિગત દર્શાવાતા બોર્ડ મુકવા અંગેનો ખર્ચ વિભાગ તરફથી કરવામાં કરવામાં આવતો હતો. કામ પૂર્ણ થયા બાદ આવા બોર્ડ બિન જરૂરી પડ્યા રહેતા હતા. આવો ખર્ચ નીવારવાની બાબત સરકારશ્રીની વિચારણામાં હતી. પુર્નવિચારણા અંગે આથી ઠરાવવામાં આવે છે કે જ્યારે રસ્તા / પુલો / મકાનનું કામ હાથ ધરવાનું નક્કી કરવામાં આવે ત્યારે આવુ બોર્ડ કામ રાખનાર ઠેકેદારે તેમના ખર્ચે મુકવાનું રહેશે. કામ ચાલુ કરવાનો હુકમ કરવામાં આવે તે પહેલા આ બાબતની જરૂરી સંમતી સંબંધીત ઇજારદાર પાસેથી લેખીતમાં મેળવી લેવી. તેમજ કોન્ટ્રાક્ટર દ્વારા આવુ બોર્ડ મુકવામાં આવે તે અંગે પુરતી કાળજી રાખવી.

આ હુકમો આ વિભાગની સરખા ક્રમાંકની ફાઇલ ઉપર નાણાંકીય સલાહકારશ્રીની તા. ૧૫/૨૯૧ ની નોંધથી મળેલ સંમતીથી બહાર પાડવામાં આવેલ છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(પ્ર. ર. ચોકસી)
ખાસ ફરજ પરના અધિકારી
માર્ગ અને મકાન

રસ્તા, પુલો તથા મકાનોમાં બાંધકામની વિગતો તથા સ્પેશીફિકેશન અંગેના કામના સ્થળ ઉપર બોર્ડ મુકવા બાબત.

ગુજરાત સરકાર,
માર્ગ અને મકાન વિભાગ
ઠરાવ ક્રમાંક : ટીએનસી/૧૦૯૨/૨૧/સ
સચિવાલય ગાંધીનગર.
તા.૧૮/૧૧/૧૯૯૧

સંદર્ભ :- સરકારશ્રીની સરખા ક્રમાંકની તા. ૨૦/૧૧/૧૯૯૧ નો ઠરાવ.

આમુખ :-રસ્તા, પુલો તથા મકાનોમાં બાંધકામની વિગતો તથા સ્પેશીફિકેશન અંગેના કામના સ્થળ ઉપર બોર્ડ મુકવા

અંગેની બાબત સરકારશ્રીની વિચારણા હેઠળ હતી.

ઠ રા વ :-

પુખ્ત વિચારણાનાં અંતે આથી ઠરાવવામાં આવે છે કે રસ્તા, પુલો, મકાનો વર્ક ઓર્ડર મળ્યા પછી તુર્તજ કામના સ્થળે કરવાના કામનાં સ્પેશીફિકેશન અંગેનું બોર્ડ કોન્ટ્રાક્ટરે પોતાના ખર્ચે મુકવાના રહેશે. ઉપરોક્ત શરત ટેન્ડરનાં ભાગ તરીકે ગણવાની રહેશે. અને ટેન્ડરમાં તેનો શમાવેશ કરવાનો રહેશે.

આ હુકમનો અમલ હુકમો રવાના થયાના તારીખથી કરવાનો રહેશે.

આ હુકમો આ વિભાગની સરખા ક્રમાંકની ફાઇલ પર નાણાંકીય સલાહકારશ્રીની તા. ૧૮/૦૯/૯૧ ના મળેલ

સંમતીથી બહાર પાડવામાં આવેલ છે. આ હુકમો માર્ગ અને મકાન વિભાગના બધાજ કામોને લાગુ પડશે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(એ.જે. દોશી)
નાયબ સચિવ
માર્ગ અને મકાન વિભાગ

ફી મેઈટેનન્સ ગેરેન્ટી પીરીયડ (ફક્ત રસ્તાના કામ માટે)
અંગેના ટેન્ડર કલોઝ નં.૧૭(બી) ના પેટા કલોઝ નં. ૧૭(બી)
(૩) માં સુધારો કરવા બાબત.

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
પરીપત્ર ક્રમાંક: ટીએનસી-૧૦-૨૦૧૩-૩-(ભાગ-૩)-સી
સચિવાલય, ગાંધીનગર
તા.૧૩-૧૨-૨૦૧૩

આમુખ:-

ફી મેઈટેનન્સ ગેરેન્ટી પીરીયડ (ફક્ત રસ્તાના કામ માટે) અંગેના પ્રવર્તમાન ટેન્ડર કલોઝ નં.૧૭(બી) ના પેટા કલોઝ નં.૧૭(બી) (૩) માં સુધારો કરવા અંગે, કોન્ટ્રાક્ટર્સ એસોસિએશન દ્વારા થયેલ રજુઆત વિચારણા હેઠળ હતી. કોન્ટ્રાક્ટર્સ એસોસિએશને રજુઆત કરેલ કે ભારત સરકાર, વિશ્વબેંક અને એશીયન ડેવલોપમેન્ટ બેંક સહાયિત યોજનાઓના કામોના સ્ટાન્ડર્ડબીડીંગ ડોક્યુમેન્ટમાં પણ રસ્તાના કામોનાં ફી મેઈટેનન્સ ગેરેન્ટી પીરીયડ દરમિયાન હાલના કલોઝ-૧૭(બી) ની જોગવાઈ મુજબ કોઈ રકમ વીથહેલ્ડ કરવાની જોગવાઈ નથી.

હાલમાં ટેન્ડરમાં ફી મેઈટેનન્સ ગેરેન્ટી પીરીયડ અંગેનો પ્રવર્તમાન ટેન્ડર કલોઝ નં. ૧૭(બી) ના પેટા કલોઝ નં.૧૭(બી) (૩) નીચે મુજબનો છે.

"10% of the amount eligible for the payment of bituminous items like shall be withheld till the miscellaneous items like earthwork in embankment / cutting for side shoulders, side gutters, kilometre / indicator / guard stones, sign boards etc. are completed in all respect by the contractor. After completion of the miscellaneous items, the above said 2 % withheld amount shall be released.. "

પુખ્ત વિચારણાને અંતે પ્રવર્તમાન ટેન્ડર કલોઝ નં.૧૭(બી) ના પેટા કલોઝ નં. ૧૭(બી) (૩)માં નીચે મુજબનો ફેરફાર કરવામાં આવે છે.

"2 % of the amount eligible for the payment of bituminous items like shall be withheld till the miscellaneous items like earthwork in embankment / cutting for side shoulders, side gutters, kilometre / indicator / guard stones, sign boards etc. are completed in all respect by the contractor. After completion of the miscellaneous items, the above said 2 % withheld amount shall be released. "

ઉપરોક્ત સુચનાનો અમલ હવે પછી મેળવવામાં આવનાર તમામ ટેન્ડરોના ડ્રાફ્ટ ટેન્ડર પેપર્સમાં કરવા આથી સુચના આપવામાં આવે છે.

(આર. કે. ચૌહાણ)
ખાસ ફરજ પરના અધિકારી(વિ.ચો.)
માર્ગ અને મકાન વિભાગ

બાંધકામના કોન્ટ્રાક્ટર પાસેથી સીક્યુરીટી ડીપોઝીટ
સ્વીકારવાની પ્રથામાં અંશતઃ ફેરફાર કરવા બાબત.

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
પરીપત્ર ક્રમાંક: ટીએનસી-૧૦-૨૦૧૩-૩-(ભાગ-૨)-સી
સચિવાલય, ગાંધીનગર
તા.૨૦-૧૧-૨૦૧૩

વંચાણે લીધો પરીપત્ર ક્રમાંક:- ટીએનસી-૧૦૮૮/આઈબી/૧૮/(૧૩)/સ તા.૩૧/૮/૧૯૯૪

આમુખ:-

કોન્ટ્રાક્ટરોને આપવામાં આવતા કામોમાં સિક્યુરીટી ડીપોઝીટ અંગેની હાલની પદ્ધતિ પ્રમાણે એગ્રીમેન્ટ સમયે ૫ % પરફોર્મન્સ બોન્ડ બેંક ગેરેન્ટી સ્વરૂપે, ૨.૫ % સિક્યુરીટી ડીપોઝીટ નર્મદા બોન્ડ અથવા એન.એસ.એસ. સ્વરૂપે લેવામાં આવે છે. તેમજ ૨.૫ રકમ ઈજારદારશ્રીના રનીંગ બીલમાંથી કપાત સ્વરૂપે વસુલ કરવામાં આવે છે. કોન્ટ્રાક્ટર્સ એસોસિએશન દ્વારા નાણાકેય તરલતા રહે તે માટે ૨.૫ % લેખે કાપવામાં આવતી સિક્યુરીટી ડીપોઝીટની રકમ બેંક ગેરેન્ટી સામે છુટી કરવાની રજુઆત કરવામાં આવેલ હતી. જે બાબત વિચારણા હેઠળ હતી.

ઠરાવ:-

પુખ્ત વિચારણાને અંતે સરકારી કામોના કોન્ટ્રાક્ટ માટે સીક્યુરીટી ડીપોઝીટ સ્વીકારવાની હાલની પ્રથામાં નીચે મુજબનો ફેરફાર કરવામાં આવે છે.

- હાલમાં પ્રથમ તબક્કે લેવામાં આવતી ૨.૫ % સીક્યુરીટીની રકમ જે નર્મદા બોન્ડ / એન.એસ.એસ. સ્વરૂપે લેવાની જોગવાઈ છે, તે હવે નર્મદા બોન્ડ / એન. એસ. એસ. તેમજ શીડ્યુલ બેંકની એફ.ડી.આર. સ્વરૂપે પણ લઈ શકાશે.
- રનીંગ બીલમાંથી કપાત થતી ૨.૫% સિક્યુરીટી ડીપોઝીટની રકમ ઈજારદારશ્રી દ્વારા શીડ્યુલ બેંકની બેંક ગેરેન્ટી રજુ કર્યેથી નીચે જણાવ્યા મુજબ રીલીઝ કરવાની રહેશે.

ક્રમ	નાણાકીય પ્રગતિ	રનીંગ બીલમાંથી ૨.૫ % લેખે સીક્યુરીટી ડીપોઝીટ પેટે કાપવામાં આવેલ રકમમાંથી છુટી કરવા પાત્ર રકમ	બેંક ગેરેન્ટીની રકમ
૧	ટેન્ડરની રકમના ૨૫%	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા કામની અંદાજિત કિંમતના ૦.૬૨૫% બેમાંથી જે ઓછી રકમ હોય તે	રીલીઝ કરવામાં આવેલ રકમ જેટલી
૨	ટેન્ડરની રકમના ૫૦%	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા કામની અંદાજિત કિંમતના ૧.૨૫% બેમાંથી જે ઓછી રકમ હોય તે	રીલીઝ કરવામાં આવેલ રકમ જેટલી
૩	ટેન્ડરની રકમના ૭૫%	રનીંગ બીલમાંથી કાપવામાં આવેલ રકમ અથવા કામની અંદાજિત કિંમતના ૧.૮૮% બેમાંથી જે ઓછી રકમ હોય તે	રીલીઝ કરવામાં આવેલ રકમ જેટલી

ઉપરોક્ત બેંક ગેરેન્ટીની મુદત કામ પુર્ણ થવાની ખરેખર તારીખથી ૬(છ) માસ વધુ સમયની લેવાની રહેશે તથા ઈજારદારશ્રી પાસેથી બાંહેધરીપત્ર મેળવવાનો રહેશે કે, જો કામ પુર્ણ કરવાની

સમયમર્યાદામાં વધારો થશે તો વધારેલ સમયમર્યાદાની તારીખથી ૬ માસ વધુ સમયમર્યાદા વાળી બેંક ગેરેન્ટી તેઓશ્રી દ્વારા પુરી પાડાવામાં આવશે.

કામ પુર્ણ થાય ત્યાં સુધી ઈજરદારશ્રી પાસેથી લેવાની થતી ૧૦ % સીક્યુરીટી ડીપોઝીટનું પ્રમાણ કોઈપણ સ્વરૂપે જળવાઈ રહે તેની અચુક કાળજી રાખવાની રહેશે.

આ ઠરાવ વિભાગની સરખા ક્રમાંકની ફાઈલ પરની નોંધ પર નાણાં વિભાગની તા.૪-૧૦-૧૩ના રોજથી મળેલ સંમતિથી બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે,

(આર. કે. ચૌહાણ)

ખાસ ફરજ પરના અધિકારી(વિ.ચો.)

માર્ગ અને મકાન વિભાગ

કોન્ટ્રાક્ટરો દ્વારા ડામર પુરો પાડવા બાબત.

ગુજરાત સરકાર

માર્ગ અને મકાન વિભાગ

પરિપત્ર ક્રમાંક : એસટીઆર/૧૦૯૭/ ૮૨/ હ,

સચિવાલય, ગાંધીનગર.

તા. ૨૧-૧૧-૯૮

અનુ : આ વિભાગના સરખા ક્રમાંકનો પરિપત્ર તારીખ : ૨૭-૧૧-૯૭

પરિપત્ર :

માર્ગ અને મકાન વિભાગ દ્વારા રાજ્ય રસ્તાઓનું બાંધકામ અને તેની મરામત અને જાળવણીની કામગીરી માટે ઉપયોગમાં લેવાતા ડામર ખાતા તરફથી પૂરો ન પાડતા કોન્ટ્રાક્ટર દ્વારા બારોબાર જે તે ઓછલ કંપનીમાં ડામરના પૈસા ભરી લાવવામાં આવે એવો નિર્ણય લેવામાં અને તે બાબતે જરૂરી સુચનાઓ ઉપરોક્ત અનુસંધાનમાં જણાવેલ પરિપત્રથી બહાર પાડવામાં આવેલ છે. ઉપરોક્ત અનુસંધાનમાં જણાવેલ તારીખ : ૨૭-૧૧-૯૭ ના પરિપત્રની સુચના ક્રમાંક : ૭૨૬ ગણી તેના બદલે નીચે મુજબની સુચનાઓ મુજબ કાર્યવાહી કરવાની રહેશે.

(૧) સુચના ક્રમાંક : (૭)

(અ) રૂા. ૧૫-૦૦ લાખથી વધુ અંદાજીત રકમનાં કામોના ડામર કામોના ટેન્ડરોમાં ડામરનો ભાવ દર્શાવવાનો રહેશે નહીં. તેમજ તેવા કામો માટે ડામરનો ભાવ તફાવત પણ ચુકવવનો / વસુલ કરવાનો રહેશે નહીં.

(બ) રૂા. ૧૫-૦૦ લાખથી વધુ અંદાજીત કિંમતના ડામર કામોમાં ડામરના ભાવ તફાવતની જોગવાઈ નીચે દર્શાવેલ વિગતે કરવાની રહેશે.

૧. ડામરનો જરૂરી સ્ટાર રેઈટ જે માસમાં ડી.ટી.પી. મંજુર થાય તે માસના રીફાઇનરીના ભાવ ટેન્ડરમાં જથ્થા સાથે દર્શાવવાનો રહેશે.

૨. રીઝર્વ બેંકના બુલેટીનમાં ડામરના કોઈ ઇન્ડેક્સ ન હોવાથી ઠેકેદાર વર્ક ઓર્ડર આપ્યા બાદ જે ડામર ખરીદે તે રીફાઇનરીના મૂળ બિલો રજુ કરે અને ખરીદેલ જથ્થા વર્ક ઓર્ડર મુજબના કામમાં વાપરે ત્યારે અને ટેન્ડર મુજબની મૂળ સમય મર્યાદામાં કામ પૂર્ણ કરે ત્યારે બિલોના ખરીદ ભાવ સાથે ઉપરોક્ત (૧)માં જણાવેલ સ્ટાર રેઈટ વચ્ચે તફાવત જણાય તો ચુકવણું / રીકવરી (એડજસ્ટમેન્ટ) કરવાની રહેશે.

૪. ઠેકેદારે ખરીદેલ ડામરના ટેસ્ટીંગના જરૂરી પ્રમાણપત્રો ઠેકેદારે સાદર કરવાનાં રહેશે.

૫. જે કામની અંદાજીત કિંમત રૂા. ૨૫-૦૦ લાખ કે તેથી વધુ હોય અને સમય મર્યાદા ૧૨ માસ કે તેથી વધુ હોય તેવા કિસ્સામાં પ્રાઇઝ વેરીફેશન (લેબર મટીરીયલ પી.આર.એલ.)માં ગણવાની થતી કામની રકમ 'ચ' ડામરની કિંમત તથા ઉપર મુજબનો તફાવત પણ બાદ કરવાનો રહેશે અને મહત્તમ મર્યાદા ગણતીવખતે પણ ડામરને અંદાજમાં લેવાયેલ બેઝીક ભાવથી થતી કિંમત ગણી અંદાજીત રકમમાં થઇ બાદ કરી બાકી રહેલ રકમ પર હાલની પ્રવર્તમાન જોગવાઈ અનુસાર સહમત મર્યાદામાં ગણવાની રહેશે.

૬. કોન્ટ્રાક્ટરે ખરીદેલ ડામર સાથે વિભાગીય કચેરીએ 'પી'ફોર્મ પુરુ પાડવાનું રહેશે નહીં.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(ડી.આર.માલી)

ખાસ ફરજ પરના અધિકારી

માર્ગ અને મકાન વિભાગ

કોન્ટ્રાક્ટરો દ્વારા ડામર પુરો પાડવા બાબત.

ગુજરાત સરકાર

માર્ગ અને મકાન વિભાગ

પરિપત્ર ક્રમાંક : એસટીઆર/૧૦૯૬/ ૮૨/ હ,

સચિવાલય, ગાંધીનગર.

તા. ૨૭-૧૧-૯૭

પરિપત્ર :

માર્ગ અને મકાન વિભાગ દ્વારા રાજ્ય રસ્તાઓનું બાંધકામ અને તેની મરામત અને જાળવણી અંગેની કામગીરી હાથ ધરવામાં આવે છે. આ રસ્તાઓના બાંધકામ, મરામત અને જાળવણી માટે રાજ્ય અને પંચાયત વિભાગો દ્વારા રીફાઇનરીઓમાંથી ડામર મેળવવામાં આવે છે, ડામરના નાણાં ઓછા કંપનીઓને અગાઉથી ચુકવવાના રહેતા હોય નાણાં નો હિસાબ રાખવામાં મુશ્કેલી પડે છે અને ભવિષ્યમાં ઓડીટ પારા પણ ઉભા થવાની સંભાવના રહે છે. વધુમાં ડામરની માંગ સામે પુરવઠો પ્રમાણમાં ઓછો મળતો હોય છે પરિણામે રીફાઇનરીઓ ઉપર ડામરના ટેન્ડરોની લાઇનો લાગતી હોય છે આ બધી મુશ્કેલીઓને ધ્યાને લેતાં રસ્તાના કામો માટે વપરાતો ડામર જે તે વિભાગ દ્વારા પૂરો પાડવાને બદલે સંબંધીત કોન્ટ્રાક્ટરો દ્વારા પુરો પાડવામાં આવે તે બાબત સરકારશ્રીની વિચારણા હેઠળ હતી.

આમ રસ્તાના કામો માટે ઇજારદારોએ પુરો પાડવાનો થતો ડામર ઇજારદારે નીચેની શરતોએ પુરો પાડવાનો રહેશે.

- (૧) ઇજારદાર ડામર કયાંથી લાવ્યા તે અંગેનું બીલ અસલમાં વિભાગને રજુ કરવાનું રહેશે.
- (૨) રીફાઇનરીના ગેટ પાસે પણ બીલ સાથે સામેલ કરવાના રહેશે.
- (૩) ડામરને જે ટેન્ડરમાં લાવવામાં આવે છે. તે ટેન્ડરનો વાહન નંબર બતાવવાનો રહેશે.
- (૪) ડામર ઉપર ઇજારદારશ્રીને એડવાન્સ પેમેન્ટ સીક્યોર્ડ એડવાન્સ મલી શકશે નહીં.
- (૫) ઇજારદારે રજુ કરેલ ડામરના અસલ બીલમાં ડામરનો ગ્રેડ (ક્વોલીટી અંગે)નો ઉલ્લેખ હોવા જોઈએ. આ અંગે ઇજારદારે ડામરના ગ્રેડ અંગેનું ટેસ્ટ રીઝલ્ટ ગ્રેડ અંગેનું પ્રમાણપત્ર રજુ કરવાનું રહેશે.
- (૬) ઇજારદારે ડામરનો આવક /વપરાશ /બચત અંગેનું રજીસ્ટર પ્લાન્ટ / સાઇટ ઉપર નિભાવવાનું રહેશે.
- (૭) ડામર અંગે વિભાગે ટેન્ડરમાં ઇસ્યુ રેટ બતાવવાનો રહેશે. એક વર્ષના કામની સમયમાર્યાદામાં ડામરા ઉપર ભાવ વધારો કરવાનો રહેશે.

આ આદેશ વિભાગની સરખા ક્રમાંકની ફાઇલ પર સચિવશ્રી (ખર્ચ) નાણાં વિભાગની તા. ૨૦-૧૧-૯૭ ની નોંધથી મળેલ સનદ અન્વયે બહાર પાડવામાં આવે છે.

ગુજરાતના રાજ્યપાલશ્રીના હુકમથી અને તેમના નામે.

(ડી.આર.માલી)

ખાસ ફરજ પરના અધિકારી

માર્ગ અને મકાન વિભાગ

હોટમીક્ષ પ્લાન્ટ અને પેવરથી થતા
ડામર કામો અંગે.

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
ક્રમાંક : એસ.એસ.આર./૧૫૮૬/આઇબી-૧૭૯(૬)/ સ,
૧૪/૨, સરદાર ભવન,
સચિવાલય, ગાંધીનગર.
તા. ૨૦-૦૧- ૨૦૦૭

વંચાણે લીધા :- તા. ૨૮-૧૦-૧૯૮૬ નો સમાંનકી પત્ર

પરિપત્ર :-

હોટમીક્ષ પ્લાન્ટ અને પેવરથી થતાં ડામર કામો અંગે તા.૨૮/૧૦/૧૯૮૬ ના સમાંનકી પરિપત્રથી આપેલ સૂચનાઓમાં ફેરફાર કરવા ગુજરાત કોન્ટ્રાક્ટર એસોસિએશન તરફથી નીચે મુજબની રજુઆત થયેલ.

(૧) પ્લાન્ટ ચલાવવાનો સમય જે સવારના ૮-૦૦ વાગ્યાથી ૪-૦૦ વાગ્યા સુધીનો છે તે સમયમાં વધારો કરવો.

(૨) હોટ મીક્ષ પ્લાન્ટનો અમલ થયો ત્યારે ૨૫૦ ટન / દિવસનો નિયમ હતો તે દુર કરવો.

૨. તા. ૨૮/૧૦/૧૯૮૬ના સમાંનકી પરિપત્રથી આપેલ સૂચનાઓને ઘણો જ સમયગાળો પસાર થયેલ છે. હાલની પરિસ્થિતિમાં હવે ઇજારદારશ્રીઓ દ્વારા અધતન મશીનરીનો ઉપયોગ કરવામાં આવે છે. તેથી કામગીરી ઝડપથી સારી રીતે થઇ શકે તે હેતુસર સદરહુ ઠરાવની સુચના રદ ગણી ઉપ્રોક્ત બાબતે સંબંધિત કાર્યપાલક ઇજનેરશ્રીને પ્લાન્ટ સાઇટ, પ્લાન્ટની ઉત્પાદન ક્ષમતા, કામની સ્થળ સ્થિતિ, વાતાવરણની સ્થિતિ તથા અન્ય અસરકર્તા બાબતો ધ્યાને લઇને કામની ગુણવત્તાને નુકશાન ન થાય તે રીતે નિર્ણય લેવા સક્ષમ ગણવા નક્કી કરવામાં આવેલ છે. તેથી હવે પછી તેને અનુસરવા સર્વેને જણાવવામાં આવે છે.

(અશોક પંડ્યા)

ઉપસચિવ

માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર
માર્ગ અને મકાન વિભાગ
પરિપત્ર ક્રમાંક : આરજીએન/૬૦-૨૦૦૬(૩૫)/સ,
સચિવાલય, ગાંધીનગર.
તારીખ:-૨૬-૦૫- ૨૦૦૬

વિષય :- ખાસ કેટે-૧ (રસ્તા) ત્યાં ખાસ કેટે-૨ (રસ્તા)ની નોંધણીઓના કિસ્સામાં કોર કટીંગ મશીનની જરૂરિયાત બાબત.

પરિપત્ર.

૧. રસ્તાઓના ડામર કામની ગુણવત્તાની ચકાસણી વધુ સારી રીતે થઈ શકે તે માટે રસ્તાઓની કામગીરી કરતા ઇજારદારશ્રીઓ કોર કટીંગ મશીન માલીકીના ધોરણે વસાવે તથા “કોર” સેમ્પલ તેમના તાંત્રીક સ્ટાફ મારફત ખાતાના સંબંધીત અધિકારીશ્રીઓની ઉપસ્થિતિમાં મેળવી આપે તેવી જોગવાઈ કરવાની ઇજારદારોની કામગીરીની ગુણવત્તા બાબતે જાગૃતિ વધશે.

૨ ઉપરોક્ત બાબતોને ધ્યાને લઈ રસ્તાઓના ડામર કામની ગુણવત્તા ચકાસણીને વધુ સુદૃઢ બનાવવા ખાસ કેટે-૧ (રસ્તા)ની નોંધણી ધરાવતા ઇજારદારો ન્યૂનતમ ૨(બે) કોર કટીંગ મશીન માલીકીના ધોરણે તારીખ. ૩૦-સપ્ટેમ્બર-૨૦૦૬ સુધીમાં વસાવે તથા તે કાર્યરત સ્થિતિમાં પ્લાન્ટ સાઈટ ખાતે ઉપલબ્ધ રાખેલ તેમજ કાર્યપાલક ઇજનેરશ્રીએ તેમના હસ્તક નોંધણી ધરાવતા ઇજારદારોને જણાવવું. અને તે મુજબ અમલ થાય તે ખાસ જોવાની આથી સર્વે સંબંધિતોને સુચના પાઠવવામાં આવે છે.

૩. વધુમાં તારીખ ૧/૧૦/૨૦૦૬ બાદ ખાસ કેટે-૧ (રસ્તા) તથા ખાસ કેટે-૨ (રસ્તા)ની નોંધણી માટે નવી નોંધણી, બઢતી કે રિન્યુઅલના જે કોઈ કેસ વિચારણામાં મુકવામાં આવે તે વખતે ઇજારદારે ઉપર દર્શાવ્યા પ્રમાણે કોર કટીંગ મશીન માલીકીના ધોરણે વસાવેલ છે. અને કાર્યરત છે તેની ચકાસણી જે તે સંબંધિત પેટા વિભાગના કાર્યક્ષેત્રમાં પ્લાન્ટ આવતા હોઈ તેના નાયબ કાર્યપાલક ઇજનેર (સ્ટેટ)નું પ્રમાણપત્ર અચુક રજુ કરવાનું રહેશે. ત્યાર બાદ જ જે તે નોંધણી/બઢતી/રિન્યુઅલ આપવાની વિચારણા કરવામાં આવશે, જે ને પણ દરેકે દરેક સંબંધીત અધિકારીશ્રીઓ/કચેરીઓએ અચૂક નોંધ લેવી.

૪. ખાસ કેટે-૧ (રસ્તા) માટે ૨(બે) કોર કટીંગ મશીન તથા ખાસ કેટેગરી-૨ (રસ્તા) માટે ૧(એક) કોર કટીંગ મશીન ફરજિયાત રાખવાની તથા તેનો ઉપયોગ કરી સેમ્પલ ચકાસણી કરવાની જોગવાઈ ટેન્ડર ડોક્યુમેન્ટસમાં કરવાની રહેશે.

૫. આ સૂચનાઓનો અમલ દરેકે દરેક સંબંધીત અધિકારીશ્રીએ ચુસ્ત પણે અમલ કરવાનો રહેશે.

(એ.ડી પંડ્યા)
ઉપસચિવ
માર્ગ અને મકાન વિભાગ

ગુજરાત સરકાર
પરિપત્ર ક્રમક - :PRC-10-2015-55-(Pt-1)-C
માર્ગ અને મકાન વિભાગ
સચિવાલય, ગાંધીનગર
તા. ૦૨-૦૮-૨૦૧૬.

વિષય .ડામરના વપરાશ બાબત (ઇમ્પોર્ટેડ)રસ્તાના કામોમાં આયાતિ :-

સંદર્ભ :- (૧) મામ વિભાગના પરિપત્ર ક.. એસટીઆર.૦૮/૯/૨ .હ તા/૮/૧૫૭૭/૧૦૨૦૦૬/
મ વિભાગના પરિપત્ર ક.મા (૨) . એસટીઆર.૦૮/૧૨/૮ .હ તા/૮/૧૫૭૭/૧૦૨૦૦૬/
પરિપત્ર ક મ વિભાગના.મા (૩) . પરચસી/૫૫/૨૦૧૫/૧૦/ તા.૧૫/૧૧/૪ .

-: પરિપત્ર :-

રસ્તાના કામોમાં આયાતિડામર વાપરવા અંગેની સૂચનાઓ સંદર્ભીત પરિપત્રોથી (ઇમ્પોર્ટેડ) એ બાબત ધ્યાને આવેલ છે કે .આપવામાં આવેલી છે, માવિભાગના જે કામોમાં ઇમ્પોર્ટેડ ડામર .મ. વિભાગના સંદર્ભીત .મ.મા વાપરવામાં આવે છે તેમાંપરિપત્રમાં દર્શાવ્યા અનુસરની સૂચનાઓનો ચૂસ્તપણે અમલ થતો નથી અને આયાતિડામર વાપરવામાં આવે છે તેમાં હજુ પણ (ઇમ્પોર્ટેડ) આથી ઇમ્પોર્ટેડ ડામરના વાપરવા માટે ડામર જે .પેનીટ્રેશન ગ્રેડ ડામર હોવાની સંભાવના રહેલ છે આવેલ છે તે વીસ્કોસીટી રીફાઈનરી માંથી ઇમ્પોર્ટ કરવામાં ગ્રેડનો છે તે મુજબનું રીફાઈનરીનું પ્રમાણપત્ર લેવું જરૂરી બને છે, તેમજ આયાતલાવવામાં આવેલ ડામરનું /કરવામાં (ઇમ્પોર્ટ) પરીક્ષણ ગેરીમાં કરાવી ઇમ્પોર્ટેડ ડામર વીસ્કોસીટી ગ્રેડનો છે તેની ખાતરી કર્યા બાદ જ વાપરવાનો સ્થાને અન્યત્ર અન્ય પદ્ધતિ જે ડામર રીફાઈનરીના .રહેશેધ્ધતિથી મોડીફાઈ કરીને વીસ્કોસીટી ગ્રેડનો દર્શાવવામાં આવેલ હોય તેવું પ્રમાણપત્ર માન્ય રાખવાનું રહેશે નહીં અને તેવો ડામર વાપરવાનો રહેશે નહીંરીફાઈનરી માંથી જ નિયત ગુણવત્તાની ચકાસણી કરેલ હોય તેવો ઇમ્પોર્ટેડ ડામર . આપેલ છે વાપરવાની વિભાગે પરવાનગી, તેનો ચુસ્તપણે અમલ થાય તેનું ધ્યાન રાખવા સર્વે અજો આ બાબતે કોઈપણ પ્રકારની .શ્રીઓ ને આથી જણાવવામાં આવે છે.ઈ.કા.ના/શ્રી.ઈ.કા/શ્રી.ઈ. નિષ્કાળજી દાખવવામાં આવશે તો સંબંધિતો સામે શિસ્ત વિષયક પગલાં ભરવામાં આવશે તેની .છે તમામને નોંધ લેવા આથી તાકીદ કરવામાં આવે

ગુજરાત રાજ્યના રાજ્યપાલશ્રી ના હુકમથી અને તેમના નામે.

(મિસ્ટ્રી.એન.એ)
ઉપ સચિવ (.ર.રા)
માર્ગ અને મકાનવિભાગ

GENERAL TECHNICAL
SPECIFICATIONS
FOR
ROAD WORKS

(A) GENERAL TECHNICAL SPECIFICATIONS CONTENTS

Sr.	Brief Description of Item	Page
No.		No.

(A) General Technical Specification :

1.	General	
2.	Measurement of lead for materials	
3.	Indian Standard for Materials	
4.	Thickness of pipe	
5.	Quality Control for Roads	
6.	Quality Control Tests	
7.	Arrangement for Traffic (Section 112 of Most Specifications) ...	
8.	Preparation of Surface (Section 501 of Most Specifications)	
9.	Track coat	
10.	Grading requirement of Coarse aggregates	

(A) GENERAL TECHNICAL SPECIFICATIONS

1. GENERAL :

All measurements shall be made in the metric system. Different items of work shall be measured in accordance with the procedure set forth in the relevant sections read in conjunction with General conditions of contract. The same shall not, however, apply in the case of lump sum items. All measurements and computation unless otherwise indicated shall be carried to the following limits.

		(i)
	Length and breadth	10 mm.
(ii)	Height, depth or thickness of earth work, sub-bases, bases, surfacing the structural members.	05 mm.
(iii)	Areas	0.01Sq. Metre
(iv)	Cubic contents	0.01 Cubic Metre

2. MEASUREMENTS OF LEAD FOR MATERIALS :

Where lead is specified in the contract for construction materials, the same shall be measured as described hereunder.

Lead shall be measured over the shortest practicable route and not the one actually taken and the decision of the Engineer – in – charge in this regard shall be taken as final. Distances up to and including 100 meters, shall be measured in units of 50 meters exceeding 100 meters but not exceeding 1 km. in units of 500 meters. The half and greater than half of the units shall be reckoned as one and less than half of the unit ignored. In this regard, the source of the material shall be divided into suitable blocks and for each block the distance from the centre of the block to the centre of placing pertaining to that block shall be taken as the lead distance.

3. FOLLOWING MATERIALS SHALL CONFORM TO THE INDIAN STANDARDS SHOWN AGAINST THEM :

1	Cement	IS : 269
2	Sand for masonry	IS : 2116
3	Sand for concrete	IS : 383
4	Coarse aggregate	IS : 383
5	Mild steel	IS : 432
6	High yield strength deformed bars	IS : 1786

4. BARREL THICKNESS OF PIPES OF DIFFERENT CLASS SHALL BE US UNDER

Sr. No.	Internal dial of pipes in mm	Barrel NP – 1	Thickness NP – 2	(In mm) NP – 3
1	2	3	4	5
01	80	25	25	-
02	100	25	25	-
03	150	25	25	-
04	250	25	25	-
05	300	30	30	-
06	350	32	32	75
07	400	32	32	75
08	450	35	35	75
09	500	-	35	75
10	600	-	40	80
11	700	-	40	80
12	800	-	45	90
13	900	-	50	100
14	1000	-	55	100
15	1100	-	60	115
16	1200	-	65	115

5. QUALITY CONTROL FOR ROADWORKS :

GENERAL

5.1 All materials to be used, all methods and all work performed shall be strictly in accordance with the requirements of these specifications. The contractor shall set up a field laboratory at locations approved by the Engineer and equip the same with adequate equipment and personnel in order to carry out all required tests and quality control work as per specifications and / or as directed by the Engineer. The internal layout of the laboratory shall be as per clause. 121 and / or as directed by the Engineer. The list of equipment and the facilities to be provided shall be got approved from the Engineer in advance.

5.2 The contractor's laboratory should be manned by a qualified materials Engineer / Civil Engineer assisted by experienced technicians, and the set-up should be a got approved by the Engineer.

5.3 The contractor shall carry out quality control tests on the materials and work to be frequency stipulated in subsequent paragraphs, in the absence of clear indications about method and or frequency of tests for any item the instructions of the Engineer shall be followed.

5.4 For satisfying himself about the quality of the materials and work, quality control tests will also be conducted by the Engineer (by himself, by his quality control units or by any other agencies seemed fit by him), generally to the frequency set forth here in under. Additional tests may also be conduct where, in the opinion of the Engineer, need for such tests exists.

5.5 The contractor shall provide necessary co – operation and assistance in obtaining the samples for tests and carrying out the field tests as required by the Engineer form time to time. This may include provision of labour, attendants, assistance fin packing and dispatching and any other assistance considered necessary in connection with the tests.

5.6 For the work of embankment, sub grade and pavement, construction of subsequent layer of same or other material over the finished layer shall be done after obtaining permission from the Engineer, Similar permission from the Engineer shall be obtained in respect of all other items of works prior to proceeding with the next stage of construction.

5.7 The contractor shall carry out modifications in the procedure of work, if found necessary, as affected by the Engineer during inspection. Work falling short of quality shall be rectified / redone by the contractor at his own cost, and defective work shall also be removed from the site of works by the contractor at his own cost.

5.8 The cost of laboratory building including services, essential supplies like water, electricity, sanitary services and their maintains and cost of quality control according to the specification requirements shall be deemed to be incidental to the work and no extra payment shall be made fro the same. If, however, there is a separate item in the bill of quantities for setting up of a laboratory and installing testing equipment, such work shall be paid for separately.

5.9 For testing of samples of soils / soil mixes, granular materials, and mixes, bituminous materials and mixes, aggregates, cores etc. Sample in the required quantity and from shall be supplied to the Engineer by the contractor at his own cost.

5.10 For cement, bitumen, mild steel, and similar other materials where essential test are to be carried out at the manufacturer's plants or at laboratories other than the site laboratory, the cost of samples, testing and furnishing of test certificates shall be borne by the contractor. He shall also furnish the test certificates to the Engineer.

5.11 For testing of cements concrete at site during construction, arrangements for supply of samples sampling, testing and supply of test results shall be made by the contractor as per the frequency and number of tests specified in the Hand book of quality control for construction of Roads and Runways (IRC : SP : 11) and relevant is codes or relevant clauses of these specifications, the cost of which shall be borne by the contractor.

5.12 The method of sampling and testing of materials shall be as required by the "Hand Book of Quality control for construction of roads and Runways" (IRC : SP : 11), and these Most specification. Where they are contradicting, the provision in these specification shall be followed. Where they are silent, sound Engineering practices shall be adopted. The sampling and testing procedure to be used shall be as approved by the Engineer and his decision shall be final and building on the contractor.

5.13 The materials for embankment construction shall be got approved from the Engineer. The responsibility for arranging and obtaining the land for borrowing or exploitation in any other way shall rest with the contractor who shall ensure smooth and uninterrupted supply of materials in the required quantity during the construction period.

Similarly, the supply of aggregate for construction of road pavement shall be from quarries approved by the Engineer. Responsibility for arranging uninterrupted supply of material from the source shall be that of the contractor.

5.14 DEFECTIVE MATERIALS

All materials which the Engineer / his representatives has determined as not conforming to the requirements of the contract shall be rejected whether in place or not; they shall be removed immediately from the site as directed, materials, which have been subsequently corrected, shall not be used in the work unless approval is accorded in writing by the Engineer. Upon failure of the contractor to comply with any order of the Engineer / his representative, given under this clause, the Engineer / his representative shall have authority to cause the removal of rejected material and to deduct the removal cost. There of from any payments due to the contractor.

5.15 IMPORTED MATERIALS

At the time of submission of tenders, the contractor shall furnish a list of materials / finished products manufactured, produced or fabricated outside Indian which he proposed to use in the work. the contractor shall not be entitled to extension of time for acts or events occurring out side Indian and it shall be the contractor's responsibility to make timely delivery to the job site of all such materials obtained from outside India.

The materials imported from outside Indian shall conform to the relevant specifications of the contract. In case where materials / finished products are not covered by the specifications in the contract the details of specifications proposed to be followed and the testing procedure as well as laboratories / establishments where tests are to be carried out shall be specifically brought out and agreed to in the contract.

The contractor shall furnish to the Engineer a certificate of compliance of the tests carried out. In addition, certified till test reports clearly identified to the lot of materials shall be furnished at the contractor's cost.

6. CONTROL OF ALIGNMENT, LEVEL AND SURFACE REGULARITY

6.1 GENERAL

All work performed shall conform to the lines, grades, cress sections and dimensions shown on the drawings or as directed by the Engineer, subject to the permitted to lerances described herein – after.

6.2 HORIZONTAL ALIGNMENT

Horizontal alignments shall be reckoned with respect to the centre line of the carriageway as shown on the drawings. The edges of the carriageway as constricted shall be cored within a tolerance of ± 10 mm there from. The corresponding tolerance for edges of the roadway and lower layers of payment shall be ± 25 mm.

6.3 SURFACE LEVELS

The levels of the sub grade and different pavement course as constructed, shall not vary from those calculated with reference to the longitudinal and cross – profile of the road shown on the drawings or as directed by the Engineer beyond the tolerances mentioned in table 6.1

TBLE – 6.1		TOLERANCES IN SURFACE LEVELS
1.	Sub grade	+ 20 mm - 25 mm
2.	Sub – base (a) Flexible payment (b) Concrete pavement (Dry lean concrete or Rolled concrete)	+ 10 mm - 20 mm + 06 mm
3.	Base – course for flexible pavement (a) Bituminous (b) Other than bituminous (1) Machine laid (2) Manually laid	+ 06 mm - 06 mm + 10 mm - 10 mm + 15 mm - 15 mm
4.	Wearing course for flexible pavement (a) Machine laid (b) Manually laid	+ 06 mm - 06 mm + 10 mm - 10 mm
5.	Cement concrete pavement	+ 05 mm - 06 mm*

This may not exceed -08 mm at 0-30 mm from the edges.

Provided, however, that the negative tolerance for wearing course shall not be permitted in conduction with the positive tolerance for base course, if the thickness of the former is thereby reduced by more than 6 mm for flexible pavements and 5 mm for concrete pavements.

For checking compliance with the above requirement for sub grade, sub-base and base courses measurements of the surface levels shall be taken on a grid of points placed at 6.25 m. longitudinally and 3.5 in transversely. For any 10 consecutive measurements taken longitudinally or transversely, not more than one measurement shall be permitted to exceed the tolerance above, this one measurement being not in excess of 5 mm above the permitted tolerance.

For checking the compliance with the above requirement for bituminous wearing courses and concrete pavements, measurements of the surface levels shall be taken on a grid of points spaced at 6.25 m. along the length and at 0.5 m. from the edges and at the centre of the pavement. In any length of pavement compliance shall be deemed to be met for the final road surface, only if the tolerance given above is satisfied for any point on the surface.

6.4 SURFACE REGULARITY OF PAVEMENT COURSES :

The longitudinal profile shall be checked with a 3 metre long straight edge / moving straight – edge as desired by the Engineer at the middle of each traffic lane along a line parallel to the centre line of the road.

The maximum permitted number of surface irregularities shall be as per Table 6.2

Surfaces of carriageways and paved shoulders					Surfaces of laybys, service areas and all bituminous base courses			
Irregularity	4 mm		7 mm		4 mm		7 mm	
Length (m)	300	75	300	75	300	75	300	75
National Highways / Expressways*	20	09	05	01	40	18	04	02
Roads of lower category*	40	18	04	02	60	27	06	03

Category of each section of road as described in the contract.

The maximum allowable difference between the road surface and underside of a 3 m, straight edge when placed parallel with, or at right angles to the centre line of the road at points decided by the Engineer shall be,

For pavement surface (bituminous and cement concrete)	03 mm
For bituminous base courses	06 mm
For granular sub – base courses	08 mm
For sub – base under concrete	10 mm

6.5 RECTIFICATION

Where the surface regularity of sub grade and the various pavement courses fall outside the specific tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer.

(1) SUBGRADE :

Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low one deficiency shall be corrected by scarifying the lower layer and adding fresh material and recommitting to the required density. The degree of compaction and the type of materials to be used shall conform to the requirements of clauses – 305. (MOST 1995)

(2) GRANULAR SUB – BASE :

Same as at (1) above, except that the degree of compaction and the type of material to be used shall conform to the requirements of clauses – 401. (MOST 1995).

(3) LIME / CEMENT STABILIZED SOIL SUB – BASE :

For lime / cement treated materials where the surface is high, the same shall be suitably trimmed while taking care that the material below is not disturbed due to this operation. However the surface is low. The same shall be corrected as described herein below.

For cement treated material, when the time lapsed between detection of irregularity and the time of mixing of the material is less than 2 hours, the surface shall be scarified to a depth of 50 mm supplemented with freshly mixed materials as necessary and recomputed to the relevant specification. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material to specification. This shall also apply to lime treated material except that the lime criteria shall be 3 hours instead of 2 hours.

(4) WATER BOUND MACADAM / WET. MAX / MACADAM SUB – BASE / BASE :

Where the surface is high or low, the top 75 mm shall be scarified, reshaped with added material as necessary and recomputed to clause 404. (MOST 1995) This shall also apply to wet mix macadam to clause – 406. (MOST – 1995).

(5) DRY LEAN CONCRETE SUB – BASE / ROLLED CEMENT CONCRETE :

For bituminous construction other than wearing course, where the surface is low, the deficiency shall be corrected by adding fresh material over a suitable tack coat if needed and recompacting to specifications. Where the surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to specification.

For wearing course, where the surface is high or low, the full depth of the layers shall be removed and replaced with fresh material and compacted to specifications. In all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 m. in length and not less than 3.5 m. in width.

(6) DRY LEAN CONCRETE SUB – BASE / ROLLED CEMENT CONCRETE :

The defective length of the course shall be removed to full depth and replaced with material conforming to clauses 601 of 603, (MOST 1995) as applicable. The area treated shall be at least 3 m. long not less than 1 lane wide and extend to the full depth. Before relaying the course, the disturbed sub grade on layer shall be corrected by leveling, watering and compacting.

(7) CEMENT CONCRETE PAVEMENT :

The defective areas having surface irregularity exceeding 3 mm. but not greater than 6 mm may be rectified by bump cutting or scrubbling or grinding using approved equipment. When required by the Engineer, areas which have been reduced in level by the above operation (s) shall be retextured in an approved manner either by cutting grooves (5 mm deep) or roughening the surface by hacking the surface. If high areas is excess 6 mm or low areas in excess of 3 mm occur, exceeding the permitted the permitted numbers if the contractor can not rectify, the slab shall be demolished and reconstructed at the contractor's expense and in no case the area removed shall be less than full width of the lane in which the irregularity occurs and full length of the slab.

If deemed necessary by the Engineer, any section of the slab which deviates from the specifies levels and tolerances shall be demolished and reconstructed at the constructed at the contractor's expense.

(7) QUALITY CONTROL TESTS DURING CONSTRUCTION :

(7.1) GENERAL

The materials supplied and the works carried out by the contractor shall conform to the specifications prescribed in the preceding clauses.

For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control tests, as described hereinafter. The testing frequencies set forth are the desirable minimum and the Engineer shall have the full authority to carry out additional tests as frequently as he may deem necessary, to satisfy himself that the materials and works comply with the appropriate specifications. However, the number of tests recommended in Table 7.1 may be reduced at the discretion the Engineer if it is felt that consistency in the quality of materials can still be maintained with the reduced number of tests.

Test Procedures for the various quality control tests are indicated in the respective sections of these specifications or for certain tests within this section. Where no specific. Where no specific testing procedure is mentioned the tests shall be carried out at per the prevalent accepted engineering practice to the directions of the Engineer.

Table 7.1
Schedule for testing of Materials for Road Work

Sr.	Material	Details of Test	Frequency								
1.	Metal Gravel for crust	a) Gradation b) Flakiness index c) Impact Value OR Abrasion Value	1. test for 100 Cmt. 3. test for 101 to 500 Cmt. 5. test for 501 to 1500 Cmt. 7. test for 1500 to 5000 Cmt. Minimum 1 test for work.								
2.	Kapachi grit for bituminous surface	a) Gradation b) Flakiness index c) Impact Value OR Abrasion Value d) Stripping Value	1. test for 100 Cmt. 3. test for 101 to 500 Cmt. 5. test for 501 to 1500 Cmt. 7. test for 1500 to 5000 Cmt. Minimum 1 test for work.								
3.	Murum or yellow Earth as binding Material	P. I. Value	One test for 50 Cmt.								
4.	Sand	Silt content	One test for work.								
5.	Quarry spoils	Gradation	One test for work.								
6.	Asphalt	Penetration test as per specification	<table><tr><td>Tanker</td><td>Test</td></tr><tr><td>1</td><td>1</td></tr><tr><td>2 to 15</td><td>2</td></tr><tr><td>16 to 50</td><td>3</td></tr></table>	Tanker	Test	1	1	2 to 15	2	16 to 50	3
Tanker	Test										
1	1										
2 to 15	2										
16 to 50	3										
7.	Tack coat	a) Binder temperature for application. b) Rate of spread of binder.	Irregular close in intervals two tests per day.								
8.	Carpet & seal coat mix	a) Grading b) Temperature of binder in boiler, aggregate in the dryer and mix at the time laying and rolling (Binder content vide 45 IMD.2172) c) Rate of spreaded mix materials.	One test On individual constituents and mixed aggregates from the dryer for each 100 tonnes of mix subject to minimum of two tests per plant per day. One test for each 100 tonnes of mix subjects to mini. Of two test per day plant. Regular control through checks on layer thickness.								

8. ARRANGEMENT FOR TRAFFIC DURING CONSTRUCTION :

Clause 112 of most (Roads wing) Specification for road & Bridgeworks (Third revision - 1995)

8.1 GENRAL :

The contractor shall at all times carry out work on the highway in a manner creating least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing highway, the contractor shall, in accordance with the directives of the Engineer, provide and maintain during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement or along a temporary diversion constructed close to the highway. The contractor shall take prior approval of the Engineer regarding traffic arrangements during construction.

8.2 PASSAGE OF TRAFFIC ALONG A PART OF THE EXISTING CARRIAGEWAY UNDER IMPROVEMENT :

For widening / strengthening existing carriageway is proposed to be used for passage of traffic, treated shoulders shall be provided on the side on which work is not in progress, the treatment to the shoulder shall consist of providing at least 150 mm thick granular base course covered with bituminous surface dressing in a width of at least 1.5 m. and the surface shall be maintained throughout the period during which traffic uses the same to the satisfaction of the Engineer. The continuous length in which such work shall be carried out, would be limited normally to 500 m. at a place. however, where work is allowed by the Engineer in longer stretches passing places at least 20 m. long with additional paved width of 2.5 m. shall be provided at every 0.5 km. interval.

In case of widening existing two-lane to four-lane, the additional two lanes would be constructed first and the traffic diverted to it and only thereafter the required treatment to the existing carriageway would be carried out. However, in case where on the request of the contractor, work on existing two – lane carriageway is allowed by the Engineer with traffic using part of the existing carriageway, stipulations as in para above shall apply.

After obtaining permission of the Engineer, the treated shoulder shall be dismantled the debris disposed of and the area cleared as per the direction of the Engineer.

8.3 PASSAGE OF TRAFFIC ALONG A TEMPORARY DIVERSION :

In stretches where it is not possible to pass the traffic on part width of the carriageway a temporary diversion shall be constructed with 7 m. carriageway and 2.5 m. earthen shoulders on each side (total width of roadway 12 m.) with the following provision for road crust in the 7 m width :

- (i) 200 mm (compacted) granular sub base;
- (ii) 225 mm (compacted) granular base course;
- (iii) Premix carpet with seal coat / mix seal surfacing.

The alignment and longitudinal section of diversion including junctions and temporary cross drainage provision shall be as approved by the Engineer.

8.4 TRAFFIC SAFETY AND CONTROL :

The contractor shall take at necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as may be required by the Engineer for the information and protection of traffic approaching or passing through the section of the highway under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic on the highway shall be drawn up in consultation with the Engineer.

The barricades erected on either side of the carriageway / portion of the carriageway close to traffic, shall be of strong design to resist violation, and painted with alternate black and white strips. Red lanterns or warning lights of similar type shall be mounted on the barricades at night and kept lit throughout from sunset to sunrise.

At the points where traffic is to deviate from its normal path (whether on temporary diversion part width of the carriageway) the channel for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar

device to the direction of the Engineer. At night the passage shall be delineated with lanterns or other suitable light source.

One – way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two lane traffic. This shall be done with the help of temporary traffic signals flagmen kept positioned on opposite sides during all hours. For regulation of traffic the flagmen shall be equipped with red and green flags and lanterns / lights.

One both side, suitable regulatory / warning signs as approved by the Engineer shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where transition of carriageway begins and the other 120 m. away. The signs shall be of approved design and of refractory type, if so directed by the Engineer.

8.5 MAINTENANCE OF DIVERSIONS AND TRAFFIC CONTROL DEVICES :

Signs, lights barriers and other traffic control devices, as well as the riding surface of diversions shall be maintained in a satisfactory condition till such time they are required as directed by the Engineer. The temporary travelled way shall be kept free of dust by frequent applications of water, if necessary.

9. PREPARATION OF SURFACE FOR BASE AND SURFACE COURSES (BITUMINOUS)

Clause 501 of MOST (Road Wing) specifications for Road & Bridges works.

(Third Revision - 1995)

9.1 SCOPE :

This work shall consist of preparing an existing granular or black – topped, surface to specified lines, grades and cross – section in advance of laying a bituminous course. The work shall be performed on such widths and lengths as shown in applicable drawing and consist of scarifying and re-laying the granular base course and / or scarifying the existing surface, filling of potholes, sealing of cracks and / or applications of a profile corrective course (leveling course) as necessary.

9.2 MATERIALS :

9.2.1 FOR SCARIFYING AND RE-LAYING THE GRANULAR SURFACE

The materials used shall be coarse aggregates salvaged from scarification of the existing granular base course supplemented by fresh coarse aggregates and screenings so that aggregates and screening thus supplemented – correspond to clause 404 : Water bound Macadam or clause 406 : (most 1995) wet mix macadam, as the case may be.

9.2.2 FOR PATCHING POTHoles AND SEALING CRACKS :

For patching potholes, approved material having same specification as that of profile corrective course shall be used. For sealing small cracks finer than 3 mm. a fog seal conforming to section 3000 (most 1995) shall be applied while larger cracks wider than 3 mm. shall be treated with an emulsion slurry seal conforming to clause 516. (most 1995)

9.2.3 FOR PROFILE CORRECTIVE COURSE :

A profile corrective course (leveling course) is essentially a pavement base material course of correcting the existing pavement profile which has either lost its shape or has to be given a new shape to meet the requirement of specified lines, grades and cross – sections.

It shall be differentiated from the strengthening course or other type of structural pavement course needed for upgrading as a remedial measure against inherently deficient and / or distressed pavement. It is meant to remove the irregularity in the existing road profile only.

9.2.4 FOR PROFILE CORRECTIVE COURSE AND ITS APPLICATION :

The type of profile corrective course shall be as shown on the drawing. If it is to be laid as part of the overlay / strengthening course, the profile corrective course material shall be of the same specifications as that of the overlay / strengthening course. However, if provided as a separate layer, it may be of the same specification as the layer over which it is to be laid or intermediate between underlying and overlying layers, as shown on the drawing.

- (i) Wherever isolated high spots projecting over the pavement surface do exist, the same shall be cut by milling machine or any other approved method, to minimize the profile corrective course requirement. If, in the process, the bottom

layer gets disturbed, the local area shall be cut and filled with profile corrective course material.

(ii) Where the maximum profile corrective course thickness works out to be not more than 40 mm it shall be done as an internal part of the overlay course, the profile corrective course shall be provided as a separate layer adopting such construction procedures and using such equipment as may be appropriate to the specified type of material and thickness of the course to be provided.

9.3 CONSTRUCTION OPERATIONS :

9.3.1 PREPARING EXISTING GRANULAR SURFACE :

Where the existing surface is granular, all loose and disintegrated shall be removed and the surface lightly watered if the profile corrective course to be provided as a separate layer is also granular. If, however, over the existing granular surface, a profile corrective course of bituminous material is to be laid, the existing granular surface shall be primed as per clause – 502. (MOST 1995)

9.3.2 SCARIFYING EXISTING BITUMINOUS SURFACE :

Where necessary, the existing bituminous layer in the specified width shall be removed with care without causing undue disturbance to the underlying layer by suitable method approved by the Engineer. After removing it. All loosened disintegrated materials of underlying layer which might have been disturbed in the process of removal shall, before laying of overlay course, be reset properly by spreading / hand packing of aggregates and compacting with suitable roller / heavy hand rammers / approved mechanical tamper so that the level of the top surface of such scarified area shall be even and properly graded with respect to adjoining surface. Where applicable, the granular surface, after removal of the existing bituminous layer, shall be primed as per clause – 502 (MOST 1995) to receive a bituminous profile corrective course. Reusable materials shall be stacked as directed by the Engineer with all lift and lead of 1000 m.

9.3.3 PATCHING OF POTHoles AND SEALING OF CRACKS :

Before providing profile corrective course on the existing pavement, potholes, if any, shall be drained of water, cut to regular shape with sides vertical upto the affected depth and slightly beyond the limits of affected area and dried all loose and disintegrated materials from it shall be removed. The potholes shall

then be filled with material as per clause No.501.2.2 in layers not exceeding 75 mm after painting the sides and bottom with a thin layer of not straight – run bitumen / emulsion and each layer shall be compacted with approved mechanical tampers / small vibratory roller and the top layer shall be flush with the existing bituminous surface. All loose and / or surplus materials on the surface after making good the potholes shall be removed.

The cracks in the old pavement surface shall be sealed with a fog seal if cracks are small (less than 3 mm width) fog seal shall consist of a spray of a bituminous cutback or a slow – setting bitumen emulsion diluted with an equal amount of water, the rate of a spray being 0.5 to 1.0 litre / sq.m. depending upon the texture and dryness of the existing bituminous surface. The spray is allowed to set a firm condition and traffic is allowed only there after so as to ensure that the materials is not picked up by traffic. For large cracks, the sealing shall be done with emulsion slurry seal as per clause – 516 (most 1995) of these specifications.

9.3.4 LAYING THE PROFILE CORRECTIVE COURSE :

9.3.4.1 After preparing the granular surface as in clauses 501.3.1 and 501.3.2 the profile corrective course with material as per clause 501.2.3/501.2.4 shall be laid and compacted to the requirement of particular specification clause.

9.3.4.2 An existing bituminous surface shall be prepared as per clause 501.3.3 and after applying a tack coat conforming to clause 503, (MOST 1995) / the bituminous profile corrective course shall be laid and compacted to the requirement of particular specification clause.

9.3.5 In specific situation of short sags or depressions in the pavement, it may be come necessary to provide corrective course in the form of flat wedges. Normally layers in maximum thickness at any point more than 100 mm. shall not be provide. In placing multiple lifts, the lift or shortest length (at the lowest portion of the sag / depression) should be provided first, with successive lifts extending over and fully covering underneath layer, precluding development of a series of joins on the top surfaces, as illustrated in Fig. 500-1. (MOST 1995).

For camber correction or correction of super elevation of the existing carriageway method as shown in the illustrative fig. 500-2 (MOST 1995) shall be adopted depending on the profile of the existing carriageway.

10. TACK COAT : CLAUSE 503-308 MOST OF SPECIFICATION FOR ROAD & BRIDGE WORKS (THIRD REVISION - 1995)

10 TACK COAT :

10.1 PREPARATION OF BASE :

The surface on which the tack coat is to be applied shall be cleaned of dust and any extraneous material before the application of the binder, by using a mechanical broom or any other approved equipments / method as specified by the Engineer.

10.2 APPLICATION OF BINDER :

The surface shall be of grade 80/100 penetration and satisfying the requirement of IS-73 and shall be supplied by the contractor to the site of work at his own cost. It shall be the responsibility of the Contractor to carefully handle the inflammable bitumen so as to safeguard against any fire mishap. The binder shall be arrangement and spraying bar with nozzles having constant volume or pressure system capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface. After application and prior to succeeding construction of allow the tack coat to cure, without being disturbed, until the water / cutter has completely evaporated, as determined by the Engineer.

TABLE 10.2.1 RATE OF APPLICATION OF TACK COAT

Type Surface		Quantity if liquid bituminous
material in		kg. per 10 Sq. m. area
1)	On bituminous surface	5 kg. per 10 Sq. mt.
2)	On W.B.M. surface	10 kg. per 10 Sq. mt.

Note : There is no need to apply a tack coat on a freshly laid bituminous course if the subsequent bituminous course overlaid the same day without opening it to traffic.

11. GRADING REQUIREMENTS OF COARSE AGGREGATES

Grading No.	Size range	Is sieve Designation	Per cent by weight passing
1.	90 mm to 25 mm	100 mm.	100
		90 mm.	90 – 100
		50 mm.	40 – 60
		25 mm.	0 – 10
		20 mm.	0 – 5
2.	63 mm to 40 mm.	90 mm.	100
		63 mm.	90 – 100
		53 mm.	25 – 75
		45 mm.	0 – 15
		22.4 mm.	0 – 5
3.	50 mm. to 25 mm.	63 mm.	100
		53 mm.	95 – 100
		45 mm.	65 – 90
		22.4 mm.	0 – 10
		11.2 mm.	0 – 5

Executive Engineer
Panchayat R. & B. Division
DevBhumi Dwarka.

MINISTRY OF SURFACE TRANSPORT

(ROADS WING)

APPENDIX – ‘A’

To letter No. RW – 2401 / 2 / 89 – RMP

TECHNICAL REQUIREMENT OF DRUM MIX PLANTS TO BE USED ON
NATIONAL HIGHWAY WORKS

GENERAL :

The drum mix plant should be of required make and proven design, steady in structure and capable of producing desired quality of mix as per specification for laying bituminous road surface and should have following essential arrangements.

[1] **COLD AGGREGATE FEEDER :**

The cold aggregate feeder arrangement should have a minimum 3 bins of sufficient capacity capable of storing different sizes of aggregate and fines to ensure continuous uninterrupted supply of aggregate matching the capacity of the plant. Each bin should have independent belt feeder system driven by a variable speed motor and a control gate to ensure accurate aggregate feed to meet design mix formula. It is pre-requisite that only properly screened and graded materials are feed to the bins.

There should be a gathering conveyor to receive and transport material discharged from bins with separate drive arrangement.

There should be a screen or a suitable arrangement like baffle plate at the discharge end of gathering conveyor for rejection of any over – size metal above the permissible limit. The conveyor should be fitted with suitable electronic weight bridge divide for weighing quality of cold aggregate being fort to dryer drum.

The plant should have a mineral filler arrangement with suitable control device to accurately proportion the flow of filler material into dryer drum at appropriate stage.

[2] DRYER DRUM :

It should be thermo drum type with smooth rotation arrangement to give roted output and capable of reducing the moisture content of the aggregate to desirable limit of 28 to 68 and achieving hot mix temperature (up to 1600 as per requirement) with such design that no blue smoke is omitted from the exhaust. The drum may have optional arrangement for feeding reclaimed material. There should be arrangement to restrict burner flame up to certain length in the drum before bitumen is injected.

It should be fitted with positive displacement bitumen pump driven by variable speed motor automatically controlled from control cabin capable of feeding desired quantity of bitumen syndromes with aggregate feed system. Thermic fluid system or hot oil circulation system should be an in – built beadier to keep bitumen pump and pipes sufficiently hot to avoid aligning of pipes.

[3] BURNER

The burner used should be capable of burning the fuel efficiently and develop the required temperature. It should be fitted with remote control system to detect, plants failure and also electric spark vignition system or some other suitable arrangement. Burner operation should have thermo should control of flame within the specified temperature range.

[4] BITUMEN HEATER

It should consist of an insulated work of adequate capacity fitted with effective and positive control of temperature, for allowing circulation of bitumen between bitumen heater and proportioning units. Suitable arrangements should be provided for recording the temperature at the tank and in circulating system.

[5] FUEL SYSTEM

Fuel tanks should be of sufficient capacity and fitted with suitable type of fuel pump to received the fuel from storage tank and supply to line heater and burner.

[6] CYCLONE SYSTEM

Cyclone unit is required to control dust discharge within the admissible standard of pollution level.

[7] OPERATING CONTROL UNIT

The drum mix plant must have centralized control system with operation from a control cabin located adjacent to the drum mix plant. The control system should be capable of followings :

- i) Automatic control of speed of each bin feeder conveyor and gate, so as to control and regular the flow of various grades of material to ensure constant and accurate proportion of aggregates.
- ii) Pre-set and control the percentage of flow of aggregate and asphalt required as per design mix.
- iii) Automatic detection of plant operation failure, display of aggregate temperature, asphalt and mix temperature, aggregate flow etc. Fully automatic aggregate blending, bitumen, / aggregate ratio control and burner control system.
- iv) Control for pre-setting the moisture content of aggregate displayed digitally.
- v) Entire control system should be such that if desired it would be operated manually also.

[8] SURGE SILO

The plant may have optional arrangement to store hot mix material for at least equivalent to 30% of rated capacity to cater for any delay in loading the tippers. Temporary storage silo should have adequate automatically hydraulic unloading arrangement operated either from the control cabin or manually with necessary safety control.

Signature of Contractor.

Executive Engineer,
Panchayat R. & B. Division,
DevBhumi Dwarka.

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ANNEXURE – ‘B’

ADDITIONAL REQUIREMENT FOR THE DRUM MIX PLANT AND PAVER FINISHER AS PER M.O.S.T. SPECIFICATION.

(IInd REVISION – FEBRUARY – 1988)

- (a) Cold aggregate feed system for providing blended aggregate in the correct proportion (called cold binfeed arrangement).
- (b) Rotating cylindrical dryer drum fitted with suitable burner capable of heating the aggregate to the required temperature without any visible unburnt fuel or carbon residue on the aggregate and to reduce the moisture content of the aggregate to the specified minimum level.
- (c) The dryer units shall be fitted with approved type of thermometric instruments at appropriate places so as to indicate or automatically record / register the temperature of heated aggregate before adding / mixing the binder.

(d) GRADATION CONTROL

Except in case of drum mix plant, other two types of plants mentioned above shall have :

- i) a screen unit for accurate sizing of hot aggregate and feeding the same to mixing unit by weight or volume control as per the specified job mix formula.
 - ii) Paddle mixer unit shall be capable of producing a homogenous mix with uniform coating of all particles of the mineral aggregate with binder.
- (e) In case of drum mix plant, the cold feed system shall have variable speed belt conveyors / or other suitable devices for regulating the accurate into an even feed flow automatically from a central operating central cabin.

BITUMEN CONTROL UNIT

Capable of measuring / metering and spraying required quantity of bitumen at specified temperature with automatic synchronization of bitumen and aggregate feed.

FILLER SYTEM

Fines feeder system suitable to receive bagged or bulk supply of filler material and its incorporation to the mix in the correct quantity shall be a necessary auxiliary.

DUST CONTROL

A suitable built in dust control equipment for the dryer to contain the exhaust of fine dust into atmosphere for environmental control, wherever so specified by the Engineer.

Suitable auxiliary bitumen boiler of adequate capacity with self heating arrangement and temperature control device. The boiler shall be fitted with temperature indicating instruments.

REQUIREMENT FOR ESSENTIAL FEATURES FOR PAVER FINISHER

- (a) Loading hoppers and suitable distributing mechanism.
- (b) All drives having hydrostatic drive / control.
- (c) The machine shall have a hydraulically extendable screed for appropriate width requirement.
- (d) The screed shall have temping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface. It shall have adjustable amplitude and infinitely variable frequency.
- (e) The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.
- (f) The paver shall be fitted with an electronic sensing device for automatic leveling and profile control within the specified tolerances.
- (g) The screed shall have thinternal heating arrangement 20 mm thick M.S.S. can be laid by means of self propelled mechanical paver with suitable lines grades and cross section.

Signature of Contractor.

Executive Engineer,
Panchayat R.& B. Division,
DevBhumi Dwarka.

SPECIFICATIONS OF MATERIALS

M-1. Water

1.1 Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalies, salts, organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of water shall be clean. Water shall conform to the standard specified in I. S. 456 – 1978.

1.2 If required by the Engineer – in – charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I. S. 269 – 1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength, of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

1.3 Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

Hard and bitter water shall not be used for curing.

Potable water will generally found suitable for curing mortar or concrete.

M-2 Lime

2.1 Lime shall be hydraulic lime as per I. S. 712 – 1973 Necessary tests shall be carried out as per I. S. 6932 (Parts I to X) 1973.

2.2 The following field tests for limes are to be carried out :

1. A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime bears pure white colour, lime in form of porous or dirty white colour indicates quick lime, and solid lumps are the unburnt lime stone.

2. Acid tests for determining the carbonate content in time Excessive amount of impurities and rough determination of class of lime.

2.3 Storage shall comply with I. S. 712 – 1973. The slaked lime, if stored, shall be kept in a weather proof and damp – proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.

2.4 Field testing shall be done according to I. S. 1624-1974 to show the acceptability of materials.

M-3 Cement

3.1 Cement shall be ordinary Portland slag cement as per I. S. 269-1976 or Portland slag cement as per I. S. 455-1976.

M-4 White Cement

4.1 The white cement shall conform to I. S. 8042 – E – 1978.

M-5 Coloured Cement

5.1 Coloured cement shall be with white or grey Portland cement as specified in the item of the work.

The pigments used for coloured cement shall be of approved quality and shall not exceed 10% of cement used in the mix. The mixture of pigment and cement shall be properly ground to have a uniform colour and shade. The pigments shall have such properties as to provide for durability under exposure to sunlight and weather.

The pigment shall have the property such that it is neither affected by the cement nor detrimental to it.

M-6 Sand

6.1 Sand shall be natural sand, clean, well graded, hard strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soft or flaky particles, shale, alkali salts, organic matter, loam, mica or other deleterious substances and shall be got approved from the Engineer – in charge. The sand shall not contain more than 8 per cent of silt as determined by field test. If necessary the sand shall be washed to make it clean.

6.2 Coarse Sand : The fineness modulus of coarse sand shall be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse sand shall be as under :

by	I. S.	Sieve	Percentage by weight	I. S. Sieve Percentage
	Designation	passing sieve	Designation	passing sieve
	4.75mm	100	600 Micron	30 – 100
	2.36 mm	90 to 100	300 Micron	05 – 70
	1.18 mm	70 – 100	150 Micron	00 – 50

6.3 Fine Sand :
The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under :

by	I. S.	Sieve	Percentage by weight	I. S. Sieve Percentage
	Designation	passing sieve	Designation	passing sieve
	4.75mm	100	600 Micron	30 – 100
	2.36 mm	90 to 100	300 Micron	05 – 70
	1.18 mm	70 – 100	150 Micron	00 – 50

M-7 Stone Dust

7.1 This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of its as determined by field test using measuring cylinder. The method of determining silt contents by field test is given as under.

7.2 A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up to 100 mm. mark. The clean water shall be added up to 150 mm. mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.

7.3 The height of silt visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below. The stone dust containing more than 8% silt shall be washed so as to bring the content within the allowable limit.

7.4 The fineness nodules of stone dust shall not be less than 1.80.

M-8 Stone Grit

8.1 Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar. Grit shall generally be cubical in shape and as far as possible flakey elongated pieces shall be avoided. It shall generally comply with the provisions of I. S. 383-1970. Unless special stone of particular quarries is mentioned grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer – in – charge. The grit shall have no deleterious with cement.

8.2 The grit shall conform to the following gradation as per sieve analysis :

by	I. S.	Sieve	Percentage by weight	I. S. Sieve Percentage
	Designation	passing sieve	Designation	passing sieve
	12.50 mm	100 %	4.75 mm.	0 – 20 %
	10.00 mm	85 – 100 %	2.36 mm	0 – 25 %

8.3 The crushing strength of grit will be such as to allow the concrete in which it used to build-up the specified strength of concrete.

8.4 The necessary tests for grit shall be carried out as per the requirements of I. S. 2386 – (Parts – 1 or VIII) 1963, as per instructions of the Engineer – in – charge. The necessity of test will be decided by the Engineer – in – charge.

M-9 Clinder

9.1 Clinder is will burnt furnace residue which has been fused or sintered into lumps of varying sizes.

9.2 Clinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound clean and free from clay, dirt, ash or other deleterious matter.

9.3 The average grading for clinder aggregate shall be as mentioned below :

I. S. Sieve	Percentage	Sieve Designation	Percentage Passing
20 mm. 100	4.75 mm	70	
10 mm	86	2.36 mm	52

M-10 Lime Mortar

10.1 Lime : Lime shall conform to specification M-2 Water : Water shall conform to specification M-1 Sand : Sand shall conform to specification M-6.

10.2 Proportion of Mix :

10.2.1 Motor shall consist of such proportions of slaked lime and sand as may be specified in item. The slaked lime and sand shall be measured by volume.

10.3 Preparation of Mortar :

10.3.1 Lime mortar shall be prepared by wet process as per I. S. 1625-1971. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for 180 revolution with a sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

10.4 Storage :

10.4.1 Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.

10.5 Use :

10.5.1 All mortar shall be used as soon as possible after grinding. It should be used on the day on which it prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

M-11 Cement Mortar

11.1 Water shall conform to specification M-1 Cement : Cement shall conform to specifications M-3 Sand : Sand shall conform to M-6.

11.2 Proportion of Mix

11.2.1 Cement and sand shall be mixed to specified proportion, sand being measured by measuring boxes, the proportion of cement will be by volume on the basis of 50 Kg. / Bag of cement being equal to 0.0342 Cu.M. The mortar may be hand mixed or machine mixed as directed.

11.3 Proportion of Mortar :

11.3.1 In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

the mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

M-12 Stone coarse Aggregate For Nominal Mix Concrete :

12.1 Coarse aggregate shall be of machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

12.2 The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement and ordinary reinforced cement concrete shall generally be as per the table given below. However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6 mm. less than cover whichever is smaller.

TABLE

I. S. Sieve Designation	Percentage passing for single Sized aggregates of Nominal Size			I. S. Sieve Designation	Percentage passing for single Sized aggregates of Nominal Size		
	40mm	20mm	16mm		40mm	20mm	16mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10 mm	0.5	0.20	0.30
40 mm	85-100	100	-	4.75 mm	-	0.5	0.5
20 mm	0-20	85-100	100	2.35 mm	-	-	-
16 mm	85-100	-	-				

Note : This percentage may be varied some what by the Engineer – in – charge when considered necessary for obtaining better density and strength of concrete.

12.3 The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests, indicating I. S. 383-1970 and 456-1978 shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

M-13 Black Trap or Equivalent Hard Stone Coarse

13.1 Aggregate For Design Mix Concrete : Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

13.2 The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved, Aggregates shall have no deleterious with cement.

13.3 The necessary tests indicated in I. S. 383-1970 and I. S. 456-1978 shall have to be carried out to ensure the acceptability of the material.

13.4 If aggregate is covered with dust it shall be washed with water to make it clean.

M-18 Mild Steel Bars

18.1 Mild steel bars reinforcement for R.C.C. work shall conform to I. S. 432 (Part - II) 1966 and shall be of tested quality. It shall also comply with relevant part of I. S. 456-1978.

18.2 All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.

18.3 For the purpose of payment, the bar shall be measured correct up to 10 mm. length and weight payable worked out at the rate specified below.

1.	06 mm.	0.22 Kg/Rmt.	08.	20 mm.	2.47 Kg/Rmt.
2.	08 mm.	0.39 Kg/Rmt.	09.	22 mm.	2.98 Kg/Rmt.
3.	10 mm.	0.62 Kg/Rmt.	10.	25 mm.	3.85 Kg/Rmt.
4..	12 mm.	0.89 Kg/Rmt.	11..	28 mm.	4.83 Kg/Rmt.
5.	14 mm.	1.21 Kg/Rmt.	12.	32 mm.	6.31 Kg/Rmt.
6.	16 mm.	1.58 Kg/Rmt.	13.	36 mm.	7.99 Kg/Rmt.
7.	18 mm.	2.00 Kg/Rmt.	14.	40 mm.	9.86 Kg/Rmt.

M-19 High Yield Strength Steel Deformed Bars

19.1 High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I. S. 1786-1966 and I. S. 1139-1966 respectively.

19.2 Other provisions and requirements shall conform to specification No. M-18 for Mild Steel Bars.

M-20 High Tensile Steel Wires

20.1 The high tensile wires for use in prestressed concrete work shall conform to I. S. 2090-1962.

20.2 The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength the minimum strength shall be taken as per para 6-1 of the I. S. 1785-1962. Testing shall be done as per I. S. requirements.

20.3 The high tensile steel shall be free from loose mill scale, rust, oil, grease, or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through.

M-21 Mild Steel Binding Wire

21.1 The mild steel wire shall be of 1.63 mm. or 1.22 mm. (16 to 18 guage) diameter and shall conform to I. S. 280-1972.

21.2 The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust, oil, paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

M-22 Structural Steel

22.1 All structural Steel shall conform to I. S. 226-1985. The steel shall be free from the defects mentioned in I. S. 226-1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. River bars shall conform to I. S. 1148-1973.

22.2 When the steel is supplied by the Contractor test certificate of the manufacturers shall be obtained according to I. S. 226-1975 and other relevant Indian Standards.

M-27 Expansion Joints – Premoulded filler

27.1 The item provides for expansion joints in R. C. C. frame structures for internal joints, as well as exposed joints, with the use of premoulded bituminous joint filler.

27.2 Premoulded bituminous joints filler i.e. performed strip of expansion joints filler shall not get deformed or broken by twisting bending or other handling when exposed to atmospheric condition. Pieces of joints filler that have been damaged shall be rejected.

27.3 Thickness of the premoulded joints filler shall be 25 mm. unless otherwise specified.

27.4 Premoulded bituminous joints filler shall conform to I. S. 1838-1961.

M-28 Expansion joints – Copper strips & hold fasts

28.1 The item provide for expansion joints in R.C.C. frame structure for internal joints, as well as exposed joints, with the use of premoulded bituminous joints filler.

28.2 Copper sheet shall be of 1.25 mm. width and or 1.25 mm. width and the " U " shape in the middle. Copper strip shall have holdfast of 3 mm. diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm. or as shown in the drawing or as directed. The width of each flange (horizontal side) of the copper plate to be embedded in the concrete work

shall be 25 mm. depth of " U " to be provided in the expansion joint, in the copper plate shall be of 25 mm.

M-77 Selected Earth

77.1 The selected earth shall be that obtained from excavated material or shall have to be brought from outside as indicated in the items. If item does not indicate anything the selected earth shall have to be brought from outside.

77.2 The selected earth shall be good yellow soil and shall be got approved from the Engineer – in – charge. In no case black cotton soil or similar expansive and shrinkable soil shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50 mm. or less. Contractor shall make his own arrangement at his own cost for land for borrowing selected earth. The stacking of material shall be done as directed by the Engineer – in – charge in such a way not to interfere with any constructional activities and in proper stacks.

77.3 When excavated material is to be used, only selected stuff got approved from the Engineer – in – charge shall be used. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above.

Deputy Executive Engineer
Panchayat R. & B. Sub-Division
Bhanvad

Executive Engineer
Panchayat R. & B. Division
D.B.Dwarka.

Detailed

Specification

ITEM WISE SPECIFICATION

Item No.1 :- Providing and Laying granular sub-base Grade-I C.B.R. not less than 30% by providing coarse graded material,consisting of B.T. crushed stone aggregates 53 mm to 26.5 mm @ 35%,26.50 mm to 4.75 mm @ 45%,2.36 mm to below @ 20% coarse sand combination and stone dust/grit spreading in uniform layers with motor grader on prepared surface,mixing by mix in Place method with rotovator at O.M.C. to required dry density including filling the depressions which occurred during the process using vibratory roller complete as per Clause-401.

Scope :-

This work shall consist of laying and compacting well-graded B.T. material on prepared subgrade in accordance with the requirements of these Specifications. The materials shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer.

401.2 Materials :-

The material to be used for the work shall be natural sand, murrum, gravel, crushed stone or combination thereof depending upon the grading required. Materials like crushed slag crushed concrete, brick metal and kankar may be allowed only with the specific approval of the Engineer. The materials shall be free from organic or other deleterious constituents and conform to one of the three gradings given in Table 400-1.

While the gradings in Table 400-1 are in respect of close-graded granular sub-base materials, one each for maximum particle size of 75mm, 53mm and 26.5mm, the corresponding gradings for the coarse graded materials for each of the three maximum particle sizes are given at Table 400-2. The grading to be adopted for a project shall be as specified in the contract.

401.2.2 Physical requirements :-

The materials shall have a 10 percent lines value of 50 KN or more (for sample in soaked condition) when tested in compliance with BS:812(Part 111). The water absorption value of the coarse aggregate shall be determined as per IS:2386 (Part-3), if this value is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS: 383. For Grading II and III materials, the CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 percent.

TABLE 400-1. GRADING FOR CLOSE GRADED GRANULAR SUB-BASE MATERIALS

IS Sieve Designation	Per cent by weight	passing the IS Sieve	
	Grading I	Grading II	Grading III
75.0 mm	100	-	-
53.0 mm	80-100	100	-

26.5 mm	55-90	70-100	100
9.5 mm	35-65	50-80	65-95
4.75 mm	25-55	40-65	50-80
2.36 mm	20-40	30-50	40-65
0.425 mm	10-25	15-25	20-35
0.075	3-10	3-10	3-10
CBR Value (Minimum)	30	25	20

TABLE 400-2, GRADING FOR COARSE GRADED GRANULAR SUB-BASE MATERIALS

IS Sieve Designation	Per cent by weight	passing the IS Sieve	
	Grading I	Grading II	Grading III
75.0 mm	100	-	-
53.0 mm	-	100	-
26.5 mm	55-75	50-80	100
9.50 mm	-	-	-
4.75 mm	10-30	15-35	25-45
2.36 mm	-	-	-
0.425 mm	-	-	-
0.075	<10	<10	<10
CBR Value (Minimum)	30	25	20

Note :- The material passing 425 micron (0.425 mm) sieve for all the three grading when tested according to IS: 2720(Part-5) shall have liquid limit and plasticity index not more than 25 and 6 percent respectively.

401.3 Strength of sub-base :-

It shall be ensured prior to actual execution that the material to be used in the sub-base satisfied the requirements of CBR and other physical requirements when compacted and finished.

When directed by the Engineer, this shall be verified by performing CBR tests in the laboratory as required on specimens remolded at field dry density and moisture content and any other tests for the "Quality" of materials, as may be necessary.

401.4 Construction Operations :-

401.4.1 Preparation of subgrade :-

Immediately prior to laying of sub-base, the subgrade already finished to clause 301 or 305 as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water if necessary and rolled with two passes of 80-100 KN smooth wheeled roller.

Spreading and compacting :-

The sub-base material of grading specified in the Contract shall be spread on the prepared subgrade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation or other means as approved by the Engineer.

When the sub-base material consists of combination of materials mentioned in Clause 401.2.1, mixing shall be done mechanically by the mix-in-place method.

Manual mixing shall be permitted only where the width of laying is not adequate for mechanical operations as in small sized jobs. The equipment used for mix-in-place construction shall be a rotavator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer, trial runs with the equipment shall be carried out to establish its suitability for the work.

Moisture content of the loose material shall be checked in accordance with IS: 2720 (Part-2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and at controlled quantities to variable widths of surface or other means approved by the Engineer. According to need to obtain required Compaction & as per instructions of Engineer-in-charge Contractor shall use required Rollers in order to obtain required compaction and as per instructions of Engineer-in-charge, contractor shall use smooth wheeled / vibratory roller of 80 to 100 KN static weight. Rolling shall commence at edges & progress towards centre for portions having crossfall on both sides.

Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and cross fall (Camber) shall be checked and any high spots or depressions which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km. per hour.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry density for the material determined as per IS:2720(Part-8). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks, or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re-compacted.

401.5 Surface Finish and Quality Control of Work:-

The surface finish of construction shall conform to the requirements of Clause 902.

Control of the quality of materials and works shall be exercised by the Engineer in accordance with Section 900.

401.6 Arrangements of traffic:-

During the period of construction, arrangement of traffic shall be maintained in accordance with Clause 112.

401.7 Measurements for payment:-

During sub-base shall be measured as finished work in position in cubic meters.

The protection of edges of granular sub-base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

Rate:-

The contract unit rate for granular sub-base shall be payment in full for carrying out the required operations including full compensation for,

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verges, shoulders and construction of diversions;
- (ii) Furnishing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts;
- (iii) All labour, tools, equipment and incidentals to complete the work to the specifications.
- (iv) Carrying out the work in part widths of road where directed; and
- (v) Carrying out the required tests for quality control.

Item No. 2:- Supplying and stacking of crushed stone aggregates, chippings of hard of stone 40 to 63mm size free of disintegrated pieces of deleterious and organic matter (for W.B.M.) and grading as per I.R.C. code within all lead including filling the boxes with all lead and lift.

The crushed stone shall be hard, durable and free from excess flat, elongated, soft and disintegrated particles dirt and other deleterious material. The stone metal shall be obtained from quarries approved by the Executive Engineer prior to collection. The metal shall be of approved quality with all leads and lift. The size of metal shall be 40mm to 63mm and shall be machine crushed.

2. The samples of metal collected from approved quarries shall be got tested at Government recognized Laboratory. The test results shall conform to the standard requirements laid down for metal to be used for W.B.M. work .
3. The physical requirements for standard size metal shall conform to the test results indicated in the Table below

Type of const.	T E S T	Test Method	Requirement
Base	* (a) Los Angeles Abrasion value	IS 2386 Part IV	40 % (Max)
	OR * Aggregate Impact Value (b) Combined Flakiness Index	IS 2386 Part IV or IS 5640 IS 2386 Part-I	30 % (Max) 30 % (Max)

Aggregate may satisfy requirement of either of two test

Frequency of test shall as per TABLE-7.1

4. The grading requirements of the metal to be used for W.B.M. shall be as under

Sr.No.	SizeRange	Sieve Designation	Percentage by weight passing through the sieve
1	40 mm to 63 mm.	90 mm	100
		63 mm	90 – 100
		53 mm	25 – 75
		45 mm	0 - 15
		22.40 mm	0 - 5

5. Wherever any doubt exist as to whether the above requirements are satisfied, in whole or any part of the collection, metal shall be got screened by the contractor at his own cost, if so ordered by Engineer-in-charge.
6. Stacking shall be done by filling in the standard steel boxes of 2 m x 1.5 m x 0.5 m size which shall be supplied by the Department if available on rent. Other wise contractor shall make his own arrangements No deduction for voids shall be made from the gross measurements. Where any doubt exists as to whether the quantity of stacks of metal in any hectometer is not confirming with the cubical content of the standard pares (2 m x 1.5 m x 0.5 m) shall be got corrected by the contractor if so ordered by the Engineer-in-charge for which no extra payment shall be claimed by the contractor. If the quantity of metal in any stack in a particular hectometer is found to be less than the standard measurement viz. 1.5 cmt. The entire collection in the hectometers shall be paid on the basis for the quantity so found Regular stacks shall be done by the contractor on a fairly level ground. Stacking of the metal shall be done in manner as directed by the Engineer – in – charge Collection of metal shall be completed in two hectometer wise as per the final requirement and measurement shall be recorded two hectometer wise. Until the quantity of metal as per final bill requirement is not collected in any two consecutive HM and Std. boxes are not filled in completely in two hectometers, measurements shall not be recorded and payments shall nor be done.
7. For road work complete stacking of metal as per requirement shall be carried out in 3 KM. length before spreading. The metal stacks shall be measured and recorded and got cross checked by other Deputy Engineer as per rules before spreading.

The collection shall always, commence at one end of the Km. and be carried continuously towards the other end unless the Engineer – in – charge shall direct otherwise.
8. The payment shall be on cubic meter basis without deduction for voids. The contractor shall maintain all stacks in regular and proper size till the whole materials shall be not measured and finally accepted by the Department. The spreading of materials shall not be allowed till the materials are fully stacked and completed kilometer wise.

9. The rate includes cost of collection, conveyance to the site with all lead and lift and filling the boxes including all labour, tools, equipment, and other incidental expense. The rate quoted are inclusive of all such tools duties, fees royalties, taxes etc.

10. MEASUREMENT FOR PAYMENT

The payment shall be made on cubic metre basis.

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Item No. 3 :- Supplying and stacking of Machine crushed stone aggregates, chippings etc.of 6 to 10 mm size of hard stone free of disintegrated pieces, deleterious and organic matter (for WBM) and grading as per I.R.C. code. Including filling the boxes with all lead and lift.

1. The field of M.C. metal shall be of approved quarry as shown on the quarry chart as well as approved by the Executive Engineer prior to collection.
2. The M.C. metal shall be hard, tough, sound, durable, black trap field metal of close texture, free from decay and weathering. Each piece of the stone shall be angular and roughly cubical in shape and round elongated or flaky material shall be rejected. No round or oblong pebbles or angular chips larger or smaller than specified size shall be allowed.
3. All unsound, weathered or disintegrated stone obtained from the upper surface layer of the quarry or other layer of boulders shall be rejected. The physical requirement for standard size metal shall conform to the test results indicated in the Table below

Type of const.	T E S T	Test Method	Requirement
Base	* (a) Los Angeles Abrasion value	IS 2386 Part IV	50 % (Max)
	OR		
	* Aggregate Impact Value (b) Flakiness Index	IS 2386 Part IV or IS 5640 IS 2386 Part-I	40 % (Max) 15 % (Max)

Frequency of test shall be as per Ministry of Surface Transport Specification.

4. The M.C.metal shall be as nearly uniform in size as possible and shall conform to following minimum requirements of passing through the rings

* For 10 to 12mm size

Sieve size	Percentage passing through the sieve
11.20mm	100
5.60mm	90-100
180Micro	15-35

5. Wherever any doubt exist as to whether the above requirements are satisfied, in whole or part of the collection M.C. metal shall be got screened by the contractor if so ordered by Engineer-in-charge and for which no extra payments shall be claimed by the contractor.
6. Any collection which does not fully satisfy the above requirements is liable to be rejected altogether.
7. Stacking shall be done by filling in the standard steel pharas of 2 m x 1.50 m x 0.50 m size and no deduction of voids shall be made from the gross measurements.
8. Regular stacks shall be done by the contractors on a fairly level ground. All the stacks shall be marked by white wash immediate on being measured and recored by the Engineer-in-charge.
9. The rate includes blasting the rock, if any, breaking the metal, stacking, measuring in pharas etc. complete.
10. **The payment shall be on cubic meter basis** without deduction for voids. The contractor shall maintain all stacks in regular and proper size till the whole materials shall be not measured and finally accepted by the Department. The spreading of materials shall not be allowed till the materials are fully stacked and completed kilometer wise.
11. The rate includes cost of collection, conveyance to the site with all lead and lift and filling the boxes including all labour, tools, equipment, and other incidental expense. The rate quoted are inclusive of all such tools duties, fees royalties, taxes etc.

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Item No.4 :-Supplying and stacking of stone dust on road site including filling the measure boxes with all lead and lift.

1. Material shall be conform to M-7. Material for the purpose shall be approved quality. Any materials which is found inferior shall be rejected and the contractor shall remove such rejected material from the site at his own cost. The material shall be collected from quarries approved by the Executive Engineer. The materials shall be granular and
2. The materials shall be got approved by the Executive Engineer prior to collection at site. It shall be free from all rubbish, dust and any organic materials as well as clods of back cotton soils. Materials shall not be allowed to be collected from within the road boundary.
3. Stacking shall be done by filling in the std. size steel boxes of 2 m x 1.50 x 0.5 mm size which shall be supplied by the department if available on rent otherwise contractor shall make his own arrangements and not deduction for voids shall made from the gross measurements. Where any doubt exist as to whether the quality of stacks of stone dust in an hectometer is not confirming with the cubical contents of the standard pharas (2m x 1.5 m. x 0.5) shall be got corrected by the contractor if so ordered by the Engineer-in-charge for which no found to be less than the std. Measurement viz. 1.50 cmt. The entire collection in the Hectometer shall be paid on the basis of the quantity so found. Regular stacks shall be done by the contractor on a fairly level ground. Stacking of the stone dust shall be done in a manner as directed by the Engineer-in-charge.
4. For road work complete stacking of stone dust as per requirement shall be carried out in 2 KM. length before spreading. The stone dust stacks shall be got checked by the other Deputy Engineer as per rules before spreading. The collection shall always commence at one end of the KM. and be carried out continuously towards the other end unless the Engineer-in-charge shall direct otherwise.
5. **The payment shall be made on cubic meter basis** without deduction for voids. The contractor shall maintain all stacks in regular and proper size till the whole materials are collected measures and finally accepted by the Department. The spreading of material shall not be allowed till the materials are full stacks and completed kilometer wise.
6. The rate includes cost of collection, conveyance to the site with all lead and lift and filling the boxes including all labour, tools, equipment and other incidental expenses. The rate quoted are inclusive of all such levels royalties, taxes etc.

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Item No. 5:- Spreading the stone aggregate for rolling and W.B.M. including filling the interstices to required camber and gradient (excluding spreading of Blindage)(ii) 40mm to 63mm size aggregates

- 0.0 Metal shall not be spread without permission of the Engineer-in-charge. Metal should be spread under careful supervision by trained coolies. Contractor shall see the uniform spreading as per collection of metal is done. The contractor shall spread the metal fully from the stacks without keeping any balance unless directed by the Engineer-in-charge to keep some stock in balance for making good unevenness or depressions during rolling works. To ensure that the material is spread to the required thickness, the road surface shall be marked out in to length over which the contents of heaps are to be spread. The bounds of earth or Murrum (one on either side) shall be laid with a distance between them equal to the width of road to be medaled and shall be enough to prevent the loose metal from spreading during consolidation as well as to retain water used for consolidation. Payment for bunds will be made in the respective item.
- 1.0 The metal (including old metal) shall be screened and rubbish, dust, grass shall be removed and spread evenly on the prepared surface in grade and camber by using board etc. so as ensure that the surface is true to camber and grade. At least two cambers by using camber boards shall be in use at site. The surface shall be checked at every 50 ft. by means of template while the correctness of the camber in between shall be tested by string corrected as required. Between the straight lengths and the curves in camber of road to super elevation shall be made very gradually as may be directed by the Engineer-in-charge.
- 2.0 The spreading of metal shall precede only 200 mt. (max.) advance of the rolling operations. The collection and spreading of the metal shall be carried out in one and the same kilometer.
- 3.0 At the time of rolling all surface irregularities, hollows, depressions, humps etc. shall be straight. The spreading of metal the above operations with all lead and lift except consolidation.
- 4.0 The payment shall be made on Cum basis.

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ITEM NO: 6- Spreading blindage or road crust filling the gaps in metal and leveling to camber and gradient as directed.(i) STONE DUST

1. Spreading of material shall be started after the full supply in a particular KM. is collected measured and recorded in the measurements books mission of the Executive Engineer shall be obtained before spreading of murrum is allowed. After the coarse aggregate has been rolled and

dressed to the required camber and grade the binding material (murrum) is to be spread over the metaled surface then the spreading shall be uniformed and as it has to act a binding surface as far as possible. Murrum blind age shall be spread evenly with a twisting motion of the baskets. No more murrum shall be used then specified as blind age rate is for gross measurements and no deduction of voids shall be made, it shall be spread in a manner as directed by the Executive Engineer. The contractor shall make good all unevenness, depressions, projections etc. during consolidation work and rate of this item includes all these operation except consolidation.

2. Quality of binding material/murrum to be spread will be 0.10 cum per 10 m² area. After application of murrum the surface shall be copiously sprinkled with water the resulting slurry swept in which hand brooms or mechanical brooms to fill. The voids property and filled during which water shall be applied to the wheels of the roller if necessary to wash down the blinding materials sticking to them this operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.
3. The payments will be made on Cubic Meter basis.
4. The rate is for gross measurement and no deduction shall be made if the murrum is to be spread as blind age it shall be spread in manner as directed by Executive Engineer.
5. The contractor shall make good all unevenness depression during consolidation works and the rate of this item includes all these operations.

ITEM NO: - 7:- Rolling and consolidation using vibratory road roller 8 - 10 tonne capacity (C) Water bound Macadam (Layer not exceeding 100mm thickness)

1. Immediately following the spreading of the coarse aggregates rolling shall be started using rollers of vibratory roller of 80 to 100 KN. Static Weights.
2. Except on super-elevated portions where the rolling shall proceed from inner edge to outer, rolling shall begin from the edges gradually progressing towards the center. First the edge/edges shall be compacted with roller running towards backward. The roller shall then move inwards parallel to centerline of the road in successive passes uniformly lapping preceding tracks by at least one half the widths.
3. Rolling shall continue until the aggregate is thoroughly keyed and the creeping of aggregate ahead of the roller is on longer visible. During rolling slight sprinkling of water may be done if necessary. Rolling shall not be done when the sub grade is soft or yielding or when it cause a wave like motion in the sub grade or sub base course.
4. The rolled surface shall be checked transversely and longitudinally with templates and any irregularities corrected by loosening the surface adding of removing necessary amounts of aggregate and re-rolling until the entire surface conforms to desired camber and grade. In on case shall the use of screening be permitted to make and depression.
5. The blind age material! Where it is required to be used shall be applied successively in two or more than layers at a slow and uniform rate. After each application the surface shall be copiously sprinkled with water the resulting slurry, swept in with hand brooms of mechanical brooms to fill the

voids property and rolled, during which water shall be applied to the wheels of the rollers if necessary to wash down the binding materials sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.

6. After the final compaction of water bound macadam course the road shall be allowed to dry overnight. Next morning hungry spots shall be filled with screening of binding materials as directed, lightly sprinkled with water if necessary and rolled. No traffic shall be allowed on the road until the macadam has set. The Engineer-in-charge shall have the discretion to stop halt traffic from using the completed water bound macadam course if in the opinion it would cause excessive damage to the surface.

7. Payment will be made on Cubic Meter Basis of the finished work and shall include cost of watering tent of machinery, cost of fuel, wages of drivers and cleaners and murrum bunds etc.

Item No. 8 :- Earthwork for embankment including breaking clods, dressing with all lead and lift (excluding watering and consolidation).

1. The land width on which the earth work is to be done shall be cleared of all trees having a girth 30 cm. and less, loose stones; vegetation, bushes, stumps and all other objectionable materials. All the materials cleared will be the property of Government. Useful material shall be arranged in convenient stacks along the road boundary or as directed at places within 50 metres lead, and handed over to the department in convenient section. Unsuitable materials shall be burnt or otherwise disposed off by the contractor at his own cost without causing any nuisance; inconvenience or damage to the works property or people in the neighborhood. In all cases, the materials shall be disposed off in a neat manner.

2. After clearing; the site, the alignment of the road shall be properly set out true to line, curves, slopes, grades and sections as shown on the plan or directed by the Engineer-in-charge. The contractor shall provide all labours and materials such as lime, strings, pegs, nails, bamboos, stone, mortar, concrete, etc. required for setting out, establishing. Bench Marks and giving profiles: The contract rate shall be responsible for maintaining the B. Ms. profiles alignment and other marks as long as they are required for the Work on the opinion of the Engineer-in-charge. If the contractor defaults in this respect they may be restored by the department at the cost of the contractor.

3. When an existing, embankment is to be widened, continuous, horizontal benches, each at least 0.3 metre wide shall be cut into the existing slope for ensuring adequate bond with the fresh embankment materials to be added. The material obtained from the cutting of benches can be utilized in the widening of the embankment. The dumping of material from trucks for widening operations shall be avoided except in difficult circumstances when the extra width is too narrow to permit the movement of any other type of hauling equipment.

4. The soil to be used for embankment shall be free from trees stumps, roots, rubbish or any other objectionable materials. Only material considered suitable by the Engineer-in-charge shall be used for the construction and that considered unsuitable other disposed off as directed by him. The selection of the materials to be used in the construction of embankment shall be made after soil surveys and investigations carried out by the Department. The embankment shall consist of earth available from road-side borrow pits on either side with all lead and all lifts and within land width in the manner specified in Para 11 below. The

road, if any required for the purpose of haulage of earth by men, animals or vehicles will be constructed. (If not existing) and maintained by the contractor at his own cost.

5. Department will extend all necessary co-operation in helping contractor to get borrow area from nearby Government of Panchayat land; if available. However, department is not responsible if not such area is made available to the contractor and in the case contractor will have to make his own arrangement to get borrow area for borrowing earth of the quantity even by making temporary arrangement with the private land owners.

6. The embankment shall be constructed in uniform layers not exceeding 250 mm in loose thickness. The soil shall be spread uniformly over the entire width of the embankment, unless otherwise directed by the Engineer-in-charge. All clods of hard lumps of earth shall be broken to have maximum size of 15 cm: when being placed in the embankment and a maximum of size 5 cm when being placed in the top 45 cm of the embankment, the work of next layer shall be allowed only after the first layer below it has been thoroughly compacted.

7.

Where the embankment is to be placed over an existing road surface, the surface shall be scarified to minimum depth of a 5 cm. so as to provide ample bond between the old and new material. However when the embankment is to be placed over an old concrete pavement and lies within 1 metre of new sub grade level, the pavement shall be broken up in pieces not to exceed 0.1 m and may be left under the new embankment. If the existing road surface is of granular or bituminous type and lies within 1 mt of the new sub grade level, the same shall be scarified to a depth of minimum 50 mm. so as to provide ample bond between the old and the new material.

8.

such structures, until such time as the construction of the latter is sufficiently advanced to permit the completion of approaches without the risk of interference or damage to the bridge work. Unless directed otherwise, the filling ground culverts, bridge and other structures up to a distance of twice the height of the embankment from the back of the embankment shall be carried out independent of the work on the main embankment. The fill material shall not be placed against any abutment or wing wall unless permission has been given by the Engineer-in-charge but in any case not until the concrete or masonry has been in position for 14 days, the embankment shall be brought up simultaneously in equal layers on each side of the structure to avoid displacement and unequal pressure. The sequence of work in this regard shall be got approved from the Engineer-in-charge. Where the provision of any filter medium is specified behind the abutment, the same shall be laid in layers with the laying of fill material. The material used for the filter shall conform to the requirements for filler medium and will be paid extra in the relevant item.

9.

embankment shall be formed with the super elevation and the increased width shown on the drawings or as the Engineer in-charge may direct. Finishing operations shall include the work of shaping and dressing the shoulders, road bed and the side slopes to conform the cross section.

10.

cross sections, longitudinal section etc, in token of his acceptance. The working sections both longitudinal and cross of the ground shall be taken by the Engineer-in-charge before the actual work has started. The contractor or his authorized representative shall attend day to day levelling work and sign with date the field book daily, in token of his acceptance. If there is any disagreement, the contractor shall inform of it in writing to the officer concerned with specific reference to the sections before starting further work. Once

the work is started, no cognizance of any complaint will be taken merely not signing of level book shall not be deemed as disagreement. The Executive Engineer shall also verify levelling work to the extent of 5°% before commencement of earth work and on finalization. The contractor shall maintain the embankment by filling in ruts, rain cuts depression due to shrinkage etc to proper formation and grade till this item is finally measured and accepted by the Department. The measurements shall be taken on compacted earth work. Deduction of 15% for shrinkage shall be made from gross measured quantity is measured before first monsoon and 10% if measured after one or more monsoon have been passed over the earth embankment. However the contractor shall have to bear loss of deformations etc. if any due to all settlements as well as other type of deformations etc. if any that might have taken place at the time of taking final measurement of item.

11.

- (i) The borrow pits will be so excavated as to from a road side longitudinal gutter to drain the water, interrupted by such gutter.
- (ii) The width of the drain shall be restricted to 1.5 Mts, only. The depth will be restricted to such grade so as to drain the water efficiently. All balance quantity of earth shall be brought from distant borrow areas only.
- (iii) The payment shall be made on Cum basis of finished work.
- (iii) If there is top layer of black cotton or other objectionable soils; the same shall be removed and disposed off elsewhere and usable material found at the lower level will only be used in the earthen embankment, if the contractor choose to utilize this material.
- (iv) The drain should be aligned along the boundary of the land width of the road. Not pit, other than this drain, shall be dug within 5 metres of toe to the final section of the road embankment.
- (v) No borrow pits shall be allowed in the length in which earth obtained from cutting is specified to be used in embankment.

12.0 The rate of earthwork includes, clearing jungles, dog belling, fixing profiles, erecting necessary pillars for stones for bench marks for levelling purpose, excavating earth from borrow areas, breaking clods, conveying and spreading earth in layers with all lead and lift, finishing the entire embankment and incidentals necessary to complete the work to the specifications. The cutting stuff of cutting in ordinary soil, soft Murrum, soft rock, hard Murrum and hard rock shall be utilized in embankment construction under this item within the lead specified in the particular, item. No payment shall be made under this item for the cutting stuff used in embankment but labour for cutting will be paid as per specifications in the particular item, and only balance quantity of earthwork brought from borrow areas will be paid in this item.

13.0 The Payment shall be made on Cubic meter basis of finished work.

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Item No.9 Rolling and watering of earth work in layers with vibratory roller including filling in depressions which occur during the process as directed

- 1.0 For spreading materials in layers and bringing the appropriate moisture content, the embankment materials shall be spread uniformly over the entire width of the embankment in layers not exceeding 250mm in loose thickness. Successive layers of embankment shall not

be placed until the layer under construction has been thoroughly compacted to the requirements set down hereunder.

Moisture content of the material shall be checked at the source of supply and if found less than that specified for compaction, the same, shall be made good either at the source or after spreading the soil in loose thickness for compaction. In the latter case, water shall be sprinkled directly from a hose line or from a truck mounted water tank, and flooding shall not be permitted under any circumstances.

If the materials delivered to the road bed is too wet it shall be dried, by evaporation and exposure to the sun, till the moisture content is brought down to acceptable standard for compaction. Should circumstances arise, where owing to wet weather, the moisture content cannot be reduced to the required level by the above procedure, work of compaction shall be suspended.

Moisture content of each layer of soil shall be checked in accordance with IST 2720 (Part-II) and unless otherwise mentioned shall be so adjusted, making due allowance for evaporation losses, that at the time of the compaction it is in the range of 1 percent to 2 percent below the optimum moisture content determined in accordance with ISI (Part-VII). Highly expansive clays shall however be compacted at 2 to 4 percent above the optimum moisture content.

After adding the required amount of water, the soil shall be processed by means of harrows, rotary mixers or as otherwise approved until the layer is uniformly wet.

Clods or hard lumps of earth shall be broken to have maximum size of 150mm when being placed in the lower layers of the embankment and a maximum size of 60mm when being placed in the top 0.5meter portion of the embankment below the sub grade.

Hauling equipment shall be dispersed uniformly over entire surface of the previously constructed layer to minimize cutting of uneven compaction.

Where the embankment is to be constructed on low area ground that will not support the weight of trucks or other hauling equipment, the lower part of the fill should be constructed by dumping successive loads in a uniformly distributed layers of a thickness not greater than that necessary to support the hauling equipment while placing subsequent layers.

- 2.0 Compaction : Only compacting equipment approved by Engineer-in-charge shall be employed to compact the materials. The contractor shall demonstrate the efficiency of the plants he intends to use for carrying out compaction trials.

Each layer of the materials shall be thoroughly compacted to the densities specified in

Table 1.2

Table 1.2 Compaction requirements for embankment.

Sr. No.	Type of work / Materials	Field dry density as percentage of maximum laboratory dry density as per IS : 2720 (Part-VII)
1	Top 0.5 meter portion of embankment below sub grade level and shoulders.	Not less than 100
2	Other portion of embankment	Not less than 95
3	Highly expensive class	85 to 90

Subsequent layers shall be placed only after finished layer has been tested according to M.O.S.T. specification Clause 902 and accepted by the Engineer-in-charge.

When density measurements reveal any soft areas in the embankment further compaction shall be carried out as directed by the Engineer-in-charge. If incite of that the specified compaction is not achieved, the materials in the soft areas shall be removed and replaced by approved materials and compacted to the density requirement, to the satisfaction of the Engineer-in-charge.

- 3.0 Measurements for Payment : Consolidation of earth embankment construction shall be measured by taking cross section at intervals in the original position before the work starts and after its completion and computing of the volume of earthwork in cubic meters by the method of average and areas. The measurement of fill material from borrow area a shall be the difference between the net quantities of suitable materials brought from roadway and drainage excavation. For this purpose it shall be assumed that one cubic meter of suitable materials brought to site from roadway and drainage excavation forms one cubic meter of compacted fill and bulking or shrinkage shall be ignored.

Stripping including storing and reapplication of top soil shall be measured as volume in cubic meter.

- 4.0 The contract unit rate includes cost of mechanical roller required for consolidation including all labourequipments fuel, hire charges, tools, and incidentals necessary.

Item No.10 Providing and applying primer coat with Bitumen emulsion on prepared surface of granular base incl. cleaning of road surface and spraying primer at the rate of 0.60kg/sqmt. using mechanical means.

503.1. Scope

This work shall consist of the application of a single coat of low viscosity liquid bituminous material to an existing bituminous road surface preparatory to the superimposition of a bituminous mix, when specified in the Contract or instructed by the Engineer.

503.2. Materials

503.2.1. Binder: The binder used for tack coat shall be Rapid Setting Bitumen Emulsion Grade RS-1 complying with IS:8887 or as specified in the Contract. The use of cutback bitumen (Medium Curing grade) as per IS:217 shall be restricted only for sites at sub-zero temperature or for emergency applications as directed by the Engineer.

503.3. Weather and Seasonal Limitations

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10° C. Where the tack coat consists of emulsion, the surface shall be slightly damp, but not wet. Where the tack coat is of cutback bitumen, the surface shall be dry.

503.4. Construction

503.4.1. Equipment: The tack coat distributor shall be a self-propelled or towed bitumen pressure sprayer, equipped for spraying the material uniformly at a specified rate. Hand spraying of small areas, inaccessible to the distributor, or in narrow strips, shall be permitted with a pressure hand sprayer, or as directed by the Engineer.

503.4.2. Preparation of base: The surface on which the tack coat is to be applied shall be clean and free from dust, dirt, and any extraneous material, and be otherwise prepared in accordance with the requirements of Clause 501. Immediately before the application of the tack coat, the surface shall be swept clean with a mechanical broom, or by other means as directed by the Engineer.

503.4.3. Application of binder: The binder shall be sprayed on the base at the rates specified in Table 500.2. The normal range of spraying temperature for a bituminous emulsion shall be 20° C – 60° C and for a cutback 50° C – 80° C if Medium curing grade is used. It shall be the responsibility of the Contractor to carefully handle the inflammable bituminous cutback material so as to safeguard against any fire mishap. The binder shall be applied uniformly with the aid of either self-propelled or towed bitumen pressure sprayer capable of spraying bitumen at specified rates and temperature so as to provide a uniformly unbroken spread of bitumen. Work should be planned so that no more than the necessary tack coat for the day's operation is placed on the surface.

TABLE 500.2 : RATE OF APPLICATION OF TACK COAT

Type of Surface	Quantity of Bituminous Emulsion in kg per square metre area
(i) Normal bituminous surfaces	0.20 to 0.25
(ii) Dry and hungry bituminous surfaces	0.25 to 0.30
(iii) Granular surfaces treated with primer	0.60
(iv) Cement Concrete Pavement	0.30 to 0.35

503.4.4 Curing of tack coat: The tack coat shall be left to cure until all the volatiles have evaporated before any subsequent construction is started. No plant or vehicles shall be allowed on the tack coat.

503.5. Quality Control of Work

For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 1800 shall apply.

503.6. Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 111.

503.7. Measurements for Payment

Tack coat shall be measured in terms of surface area of application in square metres.

503.8 Rate

The contract unit rate for tack coat shall be payment in full for carrying out the required operations including for all components listed in Clause 401.9 (i) to (v) and as applicable to the work specified in these Specifications.

Item No. 11 Providing & laying bituminous base course 37.5 mm thick compacted in single layer asphalt VG- 10 grade at 1.99 % by weight of mix for mixing and 2.5kg/10 smt asphalt VG-10 for tack coat & using B.T. chips of required gradation including cleaning and heating asphalt, premix material by drum mix process in proper gradation and laying with paver finisher including rolling and consolidation with 8-10 tonne vibratory roller and providing all materialequipment, tools, and plants, fire wood, oil, kerosene labour charges etc. complete using contractor's own machinaries, drum mix plant and paver finisher etc. complete.

Scope

This work shall consist of bituminous construction in single layer having 37.5 mm compacted thickness of crushed aggregates premixed with a bituminous binder on a previously prepared base to the requirements of these specification.

504.2 Materials :-

504.2.1 Bitumen :- The bitumen shall be paving bitumen of penetration grade 80/100 (VG-10) complying with Indian Standard specification for “Paving Bitumen” IS:73.

504.2.2 Coarse aggregates :-

The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable of cubical shape, free from dust and soft or friable matter, organic or other deleterious matter. Where the contractor's selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with approved anti-stripping agents as per the manufacturer's recommendations, without additional payment. Before approval of the source the aggregate shall be tested for stripping.

The aggregates shall satisfy the physical requirements set forth in Table 500-3 as under.

Table 500.3 Physical, Requirements for Coarse aggregates
for bituminous Macadam

Property	Test	Specification
Cleanliness	Grain Size analysis	Max. 5% passing 0.075 mm sieve.
Particle shape	Flakiness and Elongation Index (Combined)	Max. 30%
Strength	Los Angeles Abrasion Value	Max. 40%
	Aggregate Impact Value	Max. 30%
Durability	Soundness	
	Sodium Sulphate	Max. 12%
	Magnesium Sulphate	Max. 18%
Water Absorption	Water Absorption	Max. 2%
Stripping	Coating and stripping of Bitumen aggregate Mixtures.	Minimum retained coating 95%
Water Sensitivity	Retained Tensile Strength	Minimum 80%

Notes :-

[1] IS : 2386 Part – 1 [2] IS : 2386 Part – 1 [the elongation test to be done only on non-flaky aggregate in the sample]

[3] IS : 2386 Part – 4 [4] IS : 2386 Part – 5 [5] IS : 2386 Part – 3 [6] IS : 6241 [7] The water sensitivity test is only to be carried out if the minimum retained coating in the stripping test is less than 95 %

*** Aggregate may satisfy requirements of either of these two tests.

504.2.3 Fine aggregates :-

Fine aggregates shall consist of crushed or naturally occurring material or a combination of the two passing 2.36 mm sieve and retained on 75 micron sieve. They shall be clean hard, durable, dry and free from dust, and soft or friable matter, organic or other deleterious matter.

504.2.4 Aggregate grading and binder content :-

The combined aggregate grading for the mixture shall fall within the limits of grading requirement and content of bitumen shall be at the rate of 19.90 Kg./M.T. i.e. 1.99 % by weight of total mix.

504.2.5 Proportioning of material :-

The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirements of following Table. The binder content shall be within a tolerance of ± 0.3 % by weight of total mixture when individual specimens are taken for quality control tests in accordance with the provisions of Section 900.

Table - Composition of Bituminous course

Nominal aggregate size	25 mm	
layer thickness	37.5 mm	
IS : Sieve [MM]	Cumulative % by weight of total aggregate passing.	
53.00 mm	100	
26.50 mm	75-100	
22.4 mm	50-85	
13.20 mm	20-40	
5.60 mm	5-20	
2.80 mm	0-5	
Bitumen content % by weight of total mixture	1.99	
Bitumen Grade	80 /100 (VG-10)	

Note :- Appropriate bitumen contents for conditions in cooler areas of India may be upto 0.5% higher subject to the approval of the Engineer.

504.3 Construction Operations :-

504.3.1 Weather and seasonal limitations :-

Laying shall be suspended while free standing water is present on the surface to be covered or during rain, fog and dust storms. After rain the bituminous surface, prime or tack coat, shall be blow off with a high pressure air jet to remove excess moisture or the surface left to dry before laying shall start, laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10°C or when the wind speed at any temperature exceeds 40 K.M./H at 2 Mt. height unless specifically approved by the Engineer.

504.3.2 Preparation of the base :-

The base on which bituminous course is to be laid shall be prepared shaped and compacted to the required profile in accordance with Clauses-501.8 and 902.3 as appropriate and a prime coat, shall be applied in accordance with Clause-502 where specified or as directed by the Engineer.

501.8 Preparation of Surface :-

504.8.1 Scope :-

This work shall consist of preparing an existing granular or black topped surface bituminous course. The work shall be performed on such widths and lengths as shown on the drawings or as instructed by the Engineer. The existing surface shall be firm and clean and treated with prime or tack coat as shown on the drawings as otherwise stated in the contract.

503.3 Weather and Seasonal Limitations :-

Bituminous material shall not be applied to a wet surface or during a dust storm or when the weather is foggy, rainy or windy or when the temperature in the shade is less than 10°C .

503.4 Construction :-

503.4.1 Equipment :-

The tack coat distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at a specified rate, hand spraying of small areas, inaccessible to the distributor in narrow strips, shall be sprayed with a pressure hand sprayer or as directed by the Engineer.

503.4.2 Preparation of base :-

The surface on which the tack coat is to be applied shall be clean and free from dust, dirt and any extraneous material and otherwise prepared in accordance with the requirements of Clauses -501.8 & 513 as appropriate. Immediately before the application of the tack coat the surface shall be swept clean with a mechanical broom

and high-pressure air jet or by other means as directed by the Engineer.

504.3.4 Preparation and transportation of the mixture :-

501.3 Mixing :- Premixed bituminous materials, shall be prepared in a hot mix plant of adequate capacity and bituminous concrete, shall be prepared in a hot mix plant of adequate capacity and capable of yielding a mix of proper and uniform quality with thoroughly coating aggregates. Appropriate mixing temperatures can be found in 500.5 of these specifications, the difference in temperature between the binder and aggregate should at no time exceed 14° C. In order to ensure uniform quality of the mix and belief writing of aggregates, the hot mix plan shall be calibrated from time to time.

If a continuous mixing plant is to be used for mixing the bituminous macadam, the Contractor Must demonstrate by laboratory analysis that the cold feed combined grading is within the grading limits specified for the bituminous bound material. In the case of a designed job mix, the bitumen and filter content shall be derived using this combined grading. Further details shall be available in the Manual for Construction and Supervision of bituminous works.

501.4 Transporting :-

Bituminous materials shall be transported in clean insulated vehicles, and unless other wise agreed by the Engineer, shall be covered while in transit or awaiting tipping, Subject to the approval of an Engineer, a thin coating of diesel or lubricating oil may be applied to the interior of the vehicle to prevent sticking and to facilitate discharge of the material.

504.3.5 Spreading :-

Except in areas where a mechanical paver cannot access, bituminous materials shall be spread, leveled and tamped by an approved self propelled paving machine. As soon as possible after arrival at site, the materials shall be supplied continuously to the paver and laid without delay.

The rate of delivery of material to the paver shall be regulated to enable the paver to operate continuously. The travel rate of a paver, and its method of operations shall be adjusted to ensure an even and uniform flow of bituminous material across the screed, free from dragging, tearing and segregation of the material. In areas with restricted space where a mechanical paver cannot be used, the material shall be spread, raked and leveled with suitable hand tools by experienced staff and compacted to the satisfaction of the Engineer.

The minimum thickness of material laid in each paver pass shall be in accordance with the minimum values given in the relevant parts of these specifications. When laying binder course or wearing course approaching an expansion joint of a structure, machine laying shall stop 300 mm short of the joint. The remainder of the pavement up to the joint and the corresponding area beyond it, shall be laid by hand, and the joint or joint cavity shall be kept clear of surfacing

material.

Bituminous material with temperature greater than 145⁰ C shall not be laid or deposited on bridge deck water proofing systems, unless precautions against heat damage have been approved by the Engineer.

Hand placing of pre mixed bituminous materials shall only be permitted in the following circumstances.

- [i] For laying regulating course of irregular shape and varying thickness.
 - [ii] In confined spaces where it is impracticable for a paver to operate.
 - [iii] For foot Ways.
 - [iv] At the approaches to expansion joints at bridge viaducts or other structures.
 - [v] For laying mastic asphalt in accordance with clause 515 as below.
 - [vi] For filling of path holes.
 - [vii] Where directed by the Engineer.
- Manual spreading of pre mixed wearing course material or the addition of such material by

hand spreading to the paved area, for adjustment of level shall only be permitted in the following circumstances.

- [1] At the edge of the layers of material and at gullies and manholes.
- [2] At the approaches to expansion joints at bridges, viaducts or other structures.
- [3] As directed by the Engineer.

Table 500.5 Manufacturing and Rolling Temperatures.

Penetration	Bitumen Mixing [C]	Aggregate Mixing [C]	Mixed Material [C]	Rolling [C]	Laying [C]
35	106-170	160-175	170 Maximum	100 Maximum	130 Maximum
65	150-165	150-170	165 Maximum	90 Maximum	125 Maximum
90	140-160	140-165	155 Maximum	80 Maximum	115 Maximum

504.3.6 Rolling :-

Compaction shall be carried out in accordance with the provisions of Clauses 501.6 and 501.7 as below.

501.6 Compaction :-

Bituminous materials shall be laid and compacted in layers which enable the specified thickness, surface level, regularity requirements and compaction to be achieved.

Compaction of bituminous materials shall commence as soon as possible after laying. Compaction shall be substantially completed before the temperature falls below the minimum rolling temperatures stated in the relevant part of these specifications. Rolling of the longitudinal joints shall be done immediately behind the paving operation.

After this rolling shall commence at the edges and progress towards the center longitudinally except that on super elevated and unidirectional compared portion, it shall progress from the lower to the upper edge parallel to the center line of the pavement. Rolling shall continue until all roller marks have been removed from the surface. All deficiencies in the surface after laying shall be made good by the attendants behind the paver before initial rolling is commenced. The initial or breakdown rolling shall be done with 8-10 tonnes dead weight smooth wheeled roller. The immediate rolling shall be done with 8-10 tonnes dead weight or vibratory roller or with a pneumatic tired roller of 12 to 15 tonnes weight having nine wheels, with tire pressure of at least 5.6 K.G./Sq.Mt. The finish rolling shall be done with 6 to 8 tonnes smooth wheeled tandem rollers.

Where compaction is to be determined by density of the requirements to prove the performance of rollers shall apply in order to demonstrate that the specified density can be achieved. In such cases the contractor shall nominate the plant and the method by which he intends to achieve the specified level of compaction and finish at temperatures above the minimum specified rolling temperature. Laying trials shall then demonstrate the acceptability of the plant and method used.

Bituminous materials shall be rolled in a longitudinal direction with the driven rolls nearest the paver. The rollers shall first compact material adjacent to joints and then work from the lower to the upper side of the layer, overlapping on successive passes by at least one-third of the width of the rear roller in the case of a pneumatic-tired roller, at least the nominal width of 300 mm.

In portions with super elevated and un-directional camber, after the edge has been roller, the roller shall progress from the lower to the upper edge.

Roller should move at a speed of not more than 5 K.M./ H. The roller shall not be permitted to stand on pavement which has not been fully compacted and necessary precautions shall be taken to prevent dropping of oil, grease, petrol or other foreign matter on the pavement either when the rollers are operating or standing. The wheels of rollers shall be kept moist with water and the spray system provided with the machine shall be in good working order, to prevent the mixture from adhering to the wheels. Only sufficient moisture to prevent adhesion between the wheels of rollers and the mixture should be used. Surplus water shall not be allowed to stand on the partially compacted pavement.

501.7 Joints :-

Where longitudinal joints are made in pre-mixed bituminous materials, the materials shall be fully compacted and the joint made flush in one of the following

ways, only method [iii] shall be used for transverse joints.

[1] By beating the joints with an approved joint heater when the adjacent width is being laid but without cutting back or coating with binder. The heater shall raise the temperature of the full depth of material to within the specified range of minimum rolling temperature and maximum temperature at any stage for the material for a width not less than 75 mm. The contractor shall have equipment available for use in the event of a heater break down to form joints by method[iii].

[2] By using two or more pavers operating in echelon, where this is practicable, and in sufficient proximity for adjacent widths to be fully compacted by continuous rolling.

[3] By cutting back the exposed joint for a distance equal to the specified layer thickness, to a vertical face discarding all loosened material and coating the vertical face completely with 80/100 penetration grade hot bitumen or cold applied bitumen or polymer modified adhesive bitumen tape with a minimum thickness of 2 mm before the adjacent width is laid.

All joints shall be offset at least 300 mm from parallel joints in the layer beneath or as directed and in a layout approved by the Engineer. Joints in the wearing course shall coincide with either the lane edge or the lane marking which ever is appropriate. Longitudinal joints shall not be situated in wheel track zones.

Rolling shall be continued until the specified density is achieved or where no density is specified, until there is no further movement under the roller. The required frequency of testing is defined in Clause-903.

Surface Finish and Quality Control

The surface finish of the completed construction shall conform to the requirements of Clause 902 of MORT & H Specification. All materials and workmanship shall comply with the provisions set out in Section 900 of MORT & H Specification.

Arrangements for Traffic

During the period of construction, arrangements for traffic shall be made in accordance with the provisions of Clause 112 of MORT&H Specifications.

Measurement for Payment :-

The payment shall be made on the tonnage basis of the weight of mix aggregates and bitumen. For this purpose, the contractor shall have to install a weigh - bridge of suitable capacity for the purpose of weighing dumpers at suitable place at his cost as directed. Weight of empty dumpers and weight of loaded dumper will be recorded in bound and numbered register on plant site.

Department will be free to get some loaded dumpers test checked at other weigh bridge. Weigh bridge will be periodically got calibrated and verified from weight and measure authorities.

For the purpose of application of tack coat, if the theoretical area as per sanctioned estimate for basis of tonne differs with the actual area of work done in the field then the reduction in or addition to payment shall have to be effected to the contractor on pro-rate basis depending upon the area reduced or exceeded respectively.

Weight of mix materials will be done in presence of responsible person, not less than the rank of Supervisor of Department and the measurements shall be recorded by the Deputy Executive Engineer or Assistant Engineer or Additional Assistant Engineer, if so authorized. Record of each dumper will be mentioned separately in bond and numbered register which will be maintained by the Department representatives and signed by the contractor. Proper gate pass system shall be established for the vehicle coming to the plant site and going from the site. The location of the K.M. hectometer and meter in which individual dumpers are unloaded shall be recorded carefully.

Rate for premixed bituminous materials : - The unit rate for premixed bituminous materials shall be payment in full for carrying out the required operation including full compensation for, but not limited to:

1. Making arrangements for traffic to clause 112 except for initial treatment to verge, shoulders and construction of diversions.
2. Preparation of the surface to revive the materials.
3. Providing all materials to be incorporated in the work including arrangement for stock yards. All royalties, fees rents where necessary and all leads and lifts.
5. Mixing transporting, laying and compacting the mix as specified.
6. All labour, tools equipment, plant including installation of hot mix plant, power supply units and all machinery incidental to complete the work to these specification.
7. Carrying out the work in part widths of the road where directed.
8. Carrying out all tests for control of quality, and
9. The rate shall cover the provision of bitumen at the rate specified in the contract, with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.
10. The rate for premixed material are to include for all wastage in cutting of joints etc.
11. The rates are to include for all necessary testing mix design transporting and testing of samples, and cores. If there is not a project specific laboratory, the contractor must arrange to carry out all necessary testing at an outside laboratory approved by the Engineer, and all costs incurred are deemed to be included in the rate quoted for the material.

The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed, to be included in the contractor's rates for the materials.

Item No. 12 Providing laying and rolling of 25mm thick open graded premix bituminous carpet with B.T. aggregate as specified and using bitumen for tack coat at the rate of 2.5kg/10sqm and using VG10 bitumen for mixing with aggregate at the rate of 3.36 % i.e. 33.60 kg/M.Ton of total mix including heating and mixing in drum mix plant, transporting, spreading the same with paver finisher and consolidation with vibratory roller including necessary firewood, oil, lubricants, Labour charges etc. using contractor's own drum mix plant and equipment, tool etc completed in accordance with the requirement of specification.

Scope :-

This work shall consist of the preparation, laying and compaction of an open-graded premix surfacing material of 25 mm thickness composed of small-sized aggregate premixed with a bituminous binder on a previously prepared base, in accordance with the requirements of these Specifications, to serve as a wearing course.

Materials :-

Bitumen :-

The bitumen shall be paving bitumen of penetration grade 80/100 (VG-10) complying with Indian Standard specification for “Paving Bitumen” IS:73.

Coarse aggregates :-

The coarse aggregates shall consist of crushed rock, crushed gravel or other hard material retained on the 2.36 mm sieve. They shall be clean, hard, durable of cubical shape, free from dust and soft or friable matter, organic or other deleterious matter. Where the contractor's selected source of aggregates have poor affinity for bitumen, as a condition for the approval of that source, the bitumen shall be treated with approved anti-stripping agents as per the manufacturer's recommendations, without additional payment. Before approval of the source the aggregate shall be tested for stripping.

The aggregates shall satisfy the physical requirements set forth in Table 500-3 as under.

Table 500.3 Physical, Requirements for Coarse aggregates
for bituminous Macadam

Property	Test	Specification
Cleanliness	Grain Size analysis	Max. 5% passing 0.075 mm sieve.
Particle shape	Flakiness and Elongation Index (Combined)	Max. 30%
Strength	Los Angeles Abrasion Value	Max. 40%
	Aggregate Impact Value	Max. 30%
Durability	Soundness	
	Sodium Sulphate	Max. 12%
	Magnesium Sulphate	Max. 18%
Water Absorption	Water Absorption	Max. 2%
Stripping	Coating and stripping of Bitumen aggregate Mixtures.	Minimum retained coating 95%
Water Sensitivity	Retained Tensile Strength	Minimum 80%

Notes :-

[1] IS : 2386 Part – 1

[2] IS : 2386 Part – 1 [the elongation test to be done only on non-flaky aggregate in the sample] [3] IS : 2386 Part – 4 [4] IS : 2386 Part – 5

[5] IS : 2386 Part – 3 [6] IS : 6241

[7] The water sensitivity test is only to be carried out if the minimum retained coating in the stripping test is less than 95 %

*** Aggregate may satisfy requirements of either of these two tests.

Where crushed gravel is proposed for use as aggregate not less than 90% by weight of the crushed material retained of the 4.75 mm sieve shall have at least two fractured faces.

Proportioning of material :-

The aggregates shall be proportioned and blended to produce a uniform mixture complying with the requirement mentioned below.. The binder content shall be within a tolerance of ± 0.3 % by weight of total mixture when individual specimens are taken for quality control tests in accordance with the provisions of Section 900.

Table 500.4 Composition of Bituminous Macadam

IS : Sieve [MM]	Cumulative % by weight of total aggregate passing.
22.40 mm	100
13.20 mm	70 – 100
11.20 mm	20 – 40
3.60 mm	0
Bitumen content % by weight of total mixture	3.36
Bitumen Grade	80/100 (VG-10)

Construction Operations :-**Weather and seasonal limitations :-**

Laying shall be suspended while free standing water is present on the surface to be covered or during rain, fog and dust storms. After rain the bituminous surface, prime or tack coat, shall be blow off with a high pressure air jet to remove excess moisture or the surface left to dry before laying shall start, laying of bituminous mixtures shall not be carried out when the air temperature at the surface on which it is to be laid is below 10^0 C or when the wind speed at any temperature exceeds 40 K.M./H at 2 Mt. height unless specifically approved by the Engineer.

Preparation of the base :-

The base on which bituminous macadam is to be laid shall be prepared shaped and compacted to the required profile in accordance with Clauses-501.8 and 902.3 as appropriate and a prime coat, shall be applied in accordance with Clause-502 where specified or as directed by the Engineer.

Tack coat :-

This work shall consist of the application of a single coat of 80/100 (VG-10) bitumen on prepared surface preparatory to the superimposition of a bituminous mix, when specified in the contract or instructed by the engineer.

Equipment :-

The tack coat distributor shall be a self propelled or towed bitumen pressure sprayer equipped for spraying the material uniformly at a specified rate, hand

spraying of small areas, inaccessible to the distributor in narrow strips, shall be sprayed with a pressure hand sprayer or as directed by the Engineer.

Application of tack coat :- (as per IRC - 16 - 2008)

The application of tack coat shall be at 2.5 Kg/ 10 Sq.mt. as specified in the contract and shall be applied uniformly.

The method of application of the tack coat will depend on the type of equipment to be used, size of nozzles, pressure at the spray bar, and speed of forward movement. The contractor shall demonstrate at a spraying trial that the equipment and method to be used is capable of producing a uniform spray, within the tolerances specified.

Preparation of premix

Hot mix plant of appropriate capacity and type shall be used for the preparation of the mix material. The hot mix plant shall have separate dryer arrangement for heating aggregate.

The temperature of the binder at the time of mixing shall be in the range of 150°C to 163°C and that of the aggregate in the range of 155°C to 163°C provided that the difference in temperature between the binder and aggregate at no time exceeds 14°C. Mixing shall be thorough to ensure that a homogeneous mixture is obtained in which all particles of the aggregates are coated uniformly and the discharge temperature of mix shall be between 130°C and 160°C.

The mix shall be immediately transported from the mixer to the point of use in suitable vehicles or hand barrows. The vehicles employed for transport shall be clean and the mix being transported covered in transit if so directed by the Engineer,

Spreading and rolling :

The pre mixed material shall be spread by suitable means to the desired thickness, grades and cross-fall (camber) making due allowance for any extra quantity required to fill up depressions, if any. The cross-fall should be checked by means of camber boards and irregularities levelled out. Excessive use of blades or rakes should be avoided. As soon as sufficient length of bituminous material has been laid, rolling shall commence with 8 – 10 tonne rollers, - smooth wheel tandem type, or other approved equipment. Rolling shall begin at the edge and progress toward the center

longitudinally, except that on super elevated and uni-directional cambered portions, it shall progress from the lower to upper edge parallel to the centre line of the pavement.

When the roller has passed over the whole area once, any high spots or depressions, which become apparent, shall be corrected by removing or adding premixed materials. Rolling shall then be continued until the entire surface has been rolled and all the roller marks eliminated. In each pass of the roller the preceding track shall be overlapped uniformly by at least 1/3 width. The roller wheels shall be kept damp to prevent the premix from adhering to the wheels. In no case shall fuel/lubricating oil be used for this purpose. Excess use of water for this purpose shall also be avoided.

Rollers shall not stand on newly laid material. Rolling operations shall be completed in every respect before the temperature of the mix falls below 100° C. Joints along and transverse to the surfacing laid and compacted earlier shall be cut vertically to their full depth so as to expose fresh surface which shall be painted with a thin coat of appropriate.¹ hinder before the new mix is placed against it.

Opening to traffic :

No traffic shall be allowed on the road until the seal coat has been laid. After the seal coat is laid, the road may be opened to traffic according to Clause 513.4. of MORT&H specifications

Surface finish and quality control of work :

The surface finish of construction shall conform to the requirements of Clause 902 of MORT&H specifications. For control of the quality of materials supplied and the works carried out, the relevant provisions of Section 900 of MORT&H specifications shall apply.

Arrangements for traffic :

During the period of construction, arrangement of traffic shall be made in accordance with the provisions of Clause 112 of MORT&H specifications.

Measurement for Payment :-

The payment shall be made on the tonnage basis of the weight of mix aggregates and bitumen. For this purpose, the contractor shall have to install a weigh-bridge of suitable capacity for the purpose of weighing dumpers at suitable place at

his cost as directed. Weight of empty dumpers and weight of loaded dumper will be recorded in bound and numbered register on plant site.

Department will be free to get some loaded dumpers test checked at other weigh bridge. Weigh bridge will be periodically got calibrated and verified from weight and measure authorities.

For the purpose of application of tack coat, if the theoretical area as per sanctioned estimate for basic of tonne differs with the actual area of work done in the field then the reduction in or addition to payment shall have to be effected to the contractor on pro-rata basis depending upon the area reduced or exceeded respectively.

Weight of mix materials will be done in presence of responsible person, not less than the rank of Supervisor of Department and the measurements shall be recorded by the Deputy Executive Engineer or Assistant Engineer or Additional Assistant Engineer, if so authorized. Record of each dumper will be mentioned separately in bond and numbered register which will be maintained by the Department representatives and signed by the contractor. Proper gate pass system shall be established for the vehicle coming to the plant site and going from the site. The location of the K.M. hectometer and meter in which individual dumpers are unloaded shall be recorded carefully.

Rate :- The contract unit rate for Open graded premix carpet shall be payment in full for carrying out the required operations as specified. The rate shall include for all components listed below.

- (i) Making arrangements for traffic to clause 112 except for initial treatment to verge, shoulders and construction of diversions.
- (ii) Preparation of the surface to revive the materials.
- (iii) Providing all materials to be incorporated in the work including arrangement for stock yards. All royalties, fees rents where necessary and all leads and lifts.
- (iv) Mixing transporting, laying and compacting the mix as specified.
- (v) All labour, tools equipment, plant including installation of hot mix plant, power supply units and all machinery incidental to complete the work to these specification.

- (vi) Carrying out the work in part widths of the road where directed.
- (vii) Carrying out all tests for control of quality, and
- (viii) The rate shall cover the provision of bitumen at the rate specified in the contract, with the provision that the variation in actual percentage of bitumen used will be assessed and the payment adjusted accordingly.
- (ix) The rate for premixed material are to include for all wastage in cutting of joints etc.
- (x) The rates are to include for all necessary testing mix design transporting and testing of samples, and cores. If there is not a project specific : laboratory, the contractor must arrange to carry out all necessary testing at an outside laboratory approved by the Engineer, and all costs incurred are deemed to be included in the rate quoted for the material.

The cost of all plant and laying trials as specified to prove the mixing and laying methods is deemed, to be included in the contractor's rates for the materials.

Item No 13 Providing and laying seal coat with B.T. aggregate as specified using aggregate at the rate of 0.18 Cum. Per 10 Sqmt and bitumen VG10 for mixing aggregate at the rate of 4.5% i.e. 45.0 kg/M tone of total mix including heating and mixing in drum mix plant and transporting and spreading the same with paver finisher and consolidation with vibratory roller including necessary firewood oil, lubricants, labour charges using contractor's own drum mix plant, machineries and equipment tool etc. complete in accordance with the requirement of specification. .

1 DESCRIPTION

The work shall consist of construction of premix seal coat as wearing course, on a previously prepared base, to the requirement of this specification.

2. MATERIALS

2.1 Binder: The binder shall be straight run bitumen of 60/70 or 80/100 grade satisfying the requirement of IS:73. The actual grade of the binder to be used shall be decided by the Engineer-in-charge and it shall have to be brought by contractor to the site at his own cost unless otherwise specified in schedule 'A'.

2.2. COARSE AGGREGATES:

The coarse aggregates shall consist of crushed stone. These shall be clean, strong, durable of fairly cubical shape, free of disintegrated pieces, organic or other deleterious matter and adherent coatings. The aggregates shall preferably be hydrophobic and of low porosity and shall satisfy the physical requirement set forth in Table given below:

TABLE-500.1

PHYSICAL REQUIREMENT OF AGGREGATE FOR BITUMINOUS MACADAM -

Sr. No.	Test	Test Method	Requirement
1.	LOS Angles Abrasion Value*	IS : 2386 (Part - IV)	35% Maximum
2.	Aggregate Impact Value*	- d o -	30% Maximum
3.	Flakiness Index	IS : 2386 (Part - 1)	30% Maximum
4.	Stripping Value	IS : 6241	25% Maximum

5. Water Absorption IS : 2386 2% Maximum
 • (Part - III)

- 2.3 Fine aggregates:** The fine aggregates shall consist of crusher run screenings, natural sand or amixture of both. These shall be clean, hard, durable, uncoated, dry and free from injurious, soft of flaky pieces and organic or deleterious substances.
- 2.4 Filter:** The filler, where required, shall be an inert material the whole of which passes 600 micronsieve at least 90 percent passing 150 micron sieve and not less than 70 percent passing 75.micron'sieve.The filler shall be cement, stone dust, hydrated time, fly ash and other non-plastic mineral matter approved by the Engineer-in-charge.
- 2.5 Aggregate gradation:** The mineral aggregates, including mineral filler, shall be so graded orcombined as to conform to grading set forth in tables below:

Table : Aggregate gradation Pre-Mix Seal Coat

Sieve Designation	Percentage by wt passing through Sieve	
		For Type 'B'
12.5 mm		100
10mm		70-100
4.75 mm		20-40
2.35		5-20
75 micron		0-4

- 2.6 Proportioning of materials:** The binder content for premixing shall be 42.50 kg per M.T. (4.25%by weight) for mixing aggregate.
 The quantities of aggregates shall be sufficient to yield the specified thickness after compaction. The contractor shall get the job-mix formula for the mix approved by the Engineer-in-charge before starting the work.
- Variation in Proportioning of material :** The Contractor shall have the responsibility of ensuringproper proportioning of materials in accordance with the approved job mix formula ,and producing a uniform mix. A variation in binder content of ± 0.3 percent by weight of total mix shall, however, be permissible in individual specimen taken for quality control tests vide MOST Specification Section 900.

3. CONSTRUCTION OPERATIONS

- 3.1 Weather and seasonal limitation :** Premix seal coat shall not be laid during rainy weather or when the base course is damp or wet.
- 3-2 Preparation of base :** The base on which premix seal coat is to be laid shall be prepared shapedand conditioned to the specified, lines, grade and cross section in accordance with MOST Specification Clause 601 as directed by the Engineer-in-charge. The surface shall be thoroughly swept and scraped clean and free of dust and foreign matter,
- 3-3 Tack coat : Application of binder :** Binder shall be heated to the temperature appropriate to thegrade of bitumen used and approved cy the Engineer-in-charge and sprayed on the base at the rate specified hereafter. The rate of spread in terms of straight run bitumen shall be 5 kg per 10 square meter area for an existing bitumen

treated surface and 10 kg per 10 square meter area for an untreated water bound macadam surface. The binder shall be applied uniformly with the aid of sprayers. The tack coat shall be applied just ahead of the oncoming bituminous construction.

- 3.4 Preparation of the mix :** Hot mix plant of adequate capacity and capable of producing a proper and uniform quality shall be used for preparing the mix. The plant should be continuous type having a co-ordinate set of essential units such as dryer for heating the aggregates, device for feeding by weight or volume the required quantities of aggregates, a binder heating and control unit for metering out the correct quantity of heated binder together with a paddle mixer for intimately mixing of the binder and aggregates. For details regarding hot mix plant the Annexure 'A' may be referred.

The temperature of Under at the time of mixing shall be in the range of 150°C - 177°C and aggregates in the range of 150°C - 163°C provided also that at no time shall the difference in temperature of the aggregates and the binder exceed 14°C.

Mixing shall be throughout to ensure that a homogeneous mixture is obtained in which all the particles of the mineral aggregates are coated uniformly.

The mix shall be transported from the mixing plant to the point of use in suitable vehicles. The vehicles employed for transport shall be clean and be covered over in the transit if so directed by the Engineer-in-charge.

- 3.5 Spreading ;** The mix, transported from the hot mix plant to the site, shall be spread by means of self propelled mechanical pavers with suitable screens capable of spreading, tamping and finishing the mix, true to specified grade, line and cross sections. The temperature of mix at the time of laying shall be in the range of 121°C - 163°C.

Longitudinal joints and edges shall be constructed true to the delineating lines parallel to the centre line of the road, Longitudinal joints shall be offset by at least 150 mm from those in the binder course, AH joints shall be cut vertical to the full thickness of the previously laid mix and the surface painted with hot bitumen before placing fresh material.

- 3.6 Rolling :** immediately after the spreading of mix, it shall be thoroughly compacted by rolling with a set of rollers moving at a speed not exceeding 5 km per hour. The initial or break-down rolling shall be with 8-12 tonne three wheeled rollers and the surface finished by final rolling with 8-10 tonne tandem rollers, or suitable pneumatic rollers. Rolling temperature shall not be less than 100°C in any case the rolling shall be completed the temperature of mix falls about 80°C.

The roller wheels shall be kept damp to prevent the mix adhering to them but in no case shall fuel lubricating oil be used for this purpose. Rolling shall commence longitudinally from the edge and progress towards the centre except that at super elevated portions, it shall progress from the lower to upper edges parallel to the centre line of the pavement. The roller should proceed on the fresh material with rear or fixed wheel leading so as to minimize the pushing of the mix and each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. Rolling shall continue until the entire surface has been rolled to compaction and at the roller marks eliminated.

4. OPENING TO TRAFFIC

Traffic may be allowed immediately after completion of the final rolling when the mix

has cooled down to the surrounding temperature.

SURFACE FINISH AND QUALITY CONTROL OF WORK

The surface finish of construction shall conform to the requirements of most specification Clause 901 Control on the quality of material and works shall be exercised by the Engineer-in-charge in accordance with MOST Specification Clause 902.

6. ARRANGEMENT FOR TRAFFIC

The provision of MOST Specification Clause 105 shall apply as regards the flow to traffic during construction.

7. MEASUREMENT FOR PAYMENT

The payment shall be made on the tonnage basis of the weight of mix of aggregates and bitumen. For this purpose the contractor shall have to install a weigh bridge of suitable capacity for the purpose of weighing of dumpers at suitable place at his cost as directed. Weight of empty dumper and weight of loaded dumper will be recorded in bound and numbered register on plant side.

Department will be free to get some loaded dumper test checked at other weigh bridge. Weigh bridge will be periodically got calibrated and verified from weight and measure authorities.

For the purpose of application of tack coat if the theoretical area as per sanctioned estimate for basis of tonne differs with the actual area of work done in the field, then the reduction in or addition to payment shall have to be effected to the contractor on proportionate bases depending upon the area reduced or exceeded respectively. Weigh of mix materials will be done in presence of responsible person, not less than the rank of supervisor of Department, Deputy Executive Engineer or Assistant Engineer or Addl. Assistant Engineer if so authorized. Record of each dumper will be maintained separately in bound and numbered register which will be maintained by the departmental representatives and signed by the contractor. Proper gate pass system shall be established for the vehicles coming to the plant site and out going from the plant site. The location of the kilometer, hectometer in which individual dumper are unloaded will be recorded carefully.

8. RATE

The Contract unit rate for seal coat shall be for payment for carrying out the required operations including full compensation for all components listed in MOST Specification Clause 503.

Item No.14 Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and depositing on the road side slope as directed upto all lead

1. This work shall consist of excavation, removal and satisfactory disposal of all materials necessary for the construction of widening carriageway in accordance with requirements of these specifications and the lines, grades and cross sections shown in the drawings or as indicated by the Engineer.

2. After the site has been cleared the limits of excavation/ box cutting the road surface shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer.
3. Box cutting shall be carried out in conformity with the directions laid here in under and in a manner approved by the Engineer. The work shall be so done that the suitable materials available from box cutting/ excavation are satisfactorily utilized as directed.
4. The contractor shall not excavate outside the limits of box cutting. Subject to the permitted tolerances, any excess depth/ width excavated beyond the specified levels/ dimensions on the drawings shall be made good at the cost of the contractor with suitable material of characteristics similar to that removed and compacted as directed.
5. Cutting shall be done in proper grade & camber as per measurements given. Care must be taken that all slopes are evenly and truly dressed. Cutting shall be done to the exact depth required and shall be as per formation level in proper grade and the camber. If extra depth of cutting is done due to negligence of contractor the same shall be refilled with approved quality of materials duly consolidated to the satisfaction of the Engineer-in-charge (without extra cost).
6. The bottom level of box cutting i.e. sub grade shall be watered and well compacted with vibratory roller at OMC to the desired density as directed by the Engineer in charge. Rolling and compaction shall be deemed to be incidental to the work and no extra cost shall be paid for compaction of box cutting base surface.
7. The stuff received from the cutting shall be used for filling and correcting side slopes of bank and earthwork for embankment as directed by the Engineer in charge with all lead and lift.
8. The measurement of box cutting shall be taken on level basis & level shall be taken at 30 mt. interval. Volume shall be computed in cubic meters by average area method.
9. The payment shall be made on Cmt. basis.
10. The rate includes cost of all labour, machineries required, cost of carting and spreading the cutting stuff with all lead and lift and leveling the dumping ground/ embankment, rolling and consolidation of subgrade level etc. complete.

Item No.15 Providing and filling in foundation with ordinary C.C. M-100 mix and Providing necessary vertical pin headers including formwork, vibrating, ramming and curing etc. complete.

Ordinary cement concrete of specified Grade i.e. cement concrete 1:3:6 shall be carried out in accordance with the following relevant specification.

1. In case of ordinary concrete, mix is not required to be designed by preliminary tests and proportions of cement, fine aggregates and coarse aggregates are specified by volume as given in table below for different grades of concrete designated as ordinary M. 100 In the designation of a concrete mix, letter "M" refers to the mix and the number the specified 28 days works cube compressive strength of that mix on 150 mm. cubes expressed in kg/cm².
3. The ordinary concrete mix shall generally be specified by volume. For cement which normally comes in bags and is used by weight, volume shall be worked out taking 50 kg. of cement as 0.035 cubic meter in volume. While measuring aggregate by volume, shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per

its dry volume. In case it is dump, allowance for "bulking" shall be made as per IS : 2386 (Part-III).

4. Ingredients required for ordinary concrete containing one 50 Kg. bag of cement of different proportions of mix shall be as given in Table below.

TABLE

Grade of Concrete	Mix By Volume	Total Quantity of dry aggregates by volume per 50 Kg. of cement, to be taken as sum of the individual volumes of fine and coarse aggregates max	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 kg. of cement max.
1	2	3	4	5
(1 Cubic meter = 1000 liters)				
Ordinary	Liters			Liters
M.100	1:3:6	300	General 1:2 for fine aggregate to coarse aggregate by volume but subject to a upper limit of 1:1. ½ & a lower limit of 1:3	34
M.150	1:2:4	220		32
M.200	1:1.1/2:3	160		30
M.250	1:1:2	100		27

NOTE- The proportions of the aggregates shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer & the maximum size of coarse aggregate becomes larger.

Example- For an average grading of fine aggregate (that is Zone II of IS : 383-1963) the proportions shall be 1: 11/2, 1:2 and 1:3 for maximum size of aggregates 10 mm, 20 mm. and 40 mm. respectively (after carrying out sieve analysis).

Note-2 A mix leaner than M.100 (1:3:6) may be used for non- structural parts, if provided in the contract. In such case grading of aggregates shall be by volume. Other requirements for mixing, placing & curing shall be the same.

5. Following shall be the maximum nominal size of coarse aggregate for the different items of work:

Sr. No.	Item of Construction	Maximum nominal size of Coarse aggregate
(i)	R.C.C. well curb. R.C.C. well staining and R.C.C. Piles	40 mm
(ii)	R.C.C. well staining	63 mm
(iii)	Well cap or pile cap; solid type piers, abutment and wing-walls, and their pier caps	40 mm
(iv)	R.C.C. works in cross girders deck slab, wearing coats, kerb, light posts, blast walls, approach slab etc. and hollow type piers, abutments, wing-walls and their pier caps	20 mm
(v)	R.C.C. bearings.	20 mm.

(vi)	For any other item of construction not covered by items (i) to (v)	As specified on the drawing or as desired by the Engineer-In-charge in case it is not specified on drawing.
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For heavily reinforced concrete members as in the case of ribs of main beams nominal maximum size of aggregate shall usually be restricted to 5 mm. less than the minimum lateral clear distance between the main bars or 5 mm. less than the minimum cover to the reinforcement, whichever is the smaller.

6. Fine aggregate shall be clean, hard, coarse sand. It shall be free from dust and such other substances. The sand be got approved by the Engineer-in-charge.
7. All materials shall be stored as to prevent their deterioration or intrusion of their quality and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the works.
8. Cement shall be stored above the ground level in perfectly dry and water tight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregate shall be stored in such a way as to prevent admixture of foreign materials. Different size of fine or coarse aggregate shall be stored in separate stock-piles sufficiently away from the each other to prevent intermixing the materials.
9. The water for mixing shall be potable water to satisfaction of the Engineer-in-charge. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the job.
10. For all work concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate show complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.
11. When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons. It shall be done en a smooth watertight platform large enough to allow efficient turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material shall get mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 per cent above that specified.
12. Mixers which have been-out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to be the Engineer-in-

charge, the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

13. The method of transporting and placing concrete shall be approved by the Engineering-in-charge. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes places. All form work and reinforcement contained in it shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.
14. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-charge. Concreting being given, it shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly design agitators, operating continuously, when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator. Except where otherwise agreed to be the Engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.
15. Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into place from a height exceeding 2 meters. When trucking or chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept, clean, thoroughly wetted and covered with a 13 mm. thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the well surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm. in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.
16. All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of break downs.
17. Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and driving out process. It shall be covered with wet sacking, hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonary work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 14 days.

18. Form work shall include all temporary or permanent forms required for forming the concrete, together with all temporary construction required for their support. Form work shall however be divided into following two distinct categories :-
 - (1) Shuttering i.e., form work required for forming the concrete.
 - (2) Scaffolding i.e., form-work required for supporting shuttering.

Forms for shuttering shall be constructed only in metal suitably lined. Forms for scaffolding shall be constructed of metal or timber. Both shuttering and scaffolding shall be of substantial-rigid construction and shuttering shall be true to shape and dimensions shown on the drawings. All bolts and rivets shall be counter-sunk and well ground to provide a smooth, plane surface.
19. Forms shall be mortar-tight and shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports, They shall be strong enough to withstand all pressure, ramming and vibration, without deflection from the prescribed lines occurring during and after placing the concrete. Screw jacks or hard wood wedges where required shall be provided to make up any settlement in the formwork either before or during the placing of concrete. Suitable camber shall be provided in horizontal members of structure, specially in long spans to counteract the effects of any fixed as to provide for such camber. Forms shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections. Unless otherwise specified or directed, chamfers or fillets of sizes 25 mm x 25 mm shall be provided at all angles of formwork to avoid sharp corners.
20. The inside surfaces of shuttering shall, except in the case of permanent form work or where otherwise agreed to by the Engineer-in-charge, be coated with an approved material to prevent adhesion of concrete to the form work. Release agents shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come into contact with any reinforcement or pre-stressing tendons and anchorages. Different release agents shall not be used in form work for concrete which will be visible in the finished works.
21. Special measures shall be taken to ensure that the form work does not hinder the shrinkage of concrete because without these cracking could occur before the form work is removed. Where ever applicable arrangements must be made to ensure that the form work does not restrain the shortening and hogging of the beams or slabs during tensioning of the tendons. The form work should take due account of the calculated amount of positive or negative camber so as to ensure the correct final shape of the structures having regard to the deformation of a false work, scaffolding or propping and the instantaneous or deferred deformation due to various causes affecting pre-stressed structures. Where there are re-entrant angles in the concrete sections the form work should be removed, at those sections as soon as possible after the concrete has set in order to avoid cracking due to shrinkage of concrete. Form work shall be tight enough to prevent any appreciable loss of cement during vibrations, suitable tolerances should be provided in the form work. Immediately before concreting all forms shall be thoroughly cleaned. Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength alignment and general fitness, but such inspection shall not

relieve the contractor of his responsibility for safety of men, machinery, materials and for results obtained.

22. The Engineer- in-charge shall be informed in advance by the contractor of his intention to strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. Where field operations are controlled by strength tests of concrete, the removal of the load-supporting or soffit forms may commence when concrete has attained strength equal to at least twice the stress to which the concrete will be subjected at the time of striking props including the effect of any further addition of loads. When field operations are not controlled by strength tests of concrete the vertical forms of beams, columns and walls may be removed after 2 days. The props of slabs and beams may be removed after 14 and 21 days respectively. All formwork shall be removed without causing any damage to the concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to reuse the formwork, it shall be cleaned and made good to the satisfaction, of the Engineer-in-charge.
23. Immediately after the removal of forms, all exposed bars or bolts passing through the Cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honey comb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry as consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been pointed shall be kept moist for a period of twenty four hours. If rock pockets/honeycombs, in the opinion of the Engineer-in-charge are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.
24. In the case of reinforced concrete work workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency, which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump shall be adopted for different types of works.

Type of Work	Slumps	
	Where vibrators are used	Where vibrators are not used

1	Mass concrete in RCC foundations, footings and retaining walls	10 mm to 25 mm	80 mm
2	Beams, slabs and columns simply reinforced.	25mm to 40 mm	100 to 120 mm
3	Thin R.C.C. section or section with congested steel	40 mm to 50 mm 50 mm	125 mm to 150 mm 150 mm

25. Works strength tests shall be made in accordance with IS : 516. Each test shall be conducted on ten specimens, five of which shall be tested at seven days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting and cubes shall be made at the rate of one for every 5 cubic meter of concrete or a part thereof. However, if concreting done in a day is less than 15 cubic meter, the minimum number of cubes can be reduced to 6 with the specific permission of the Engineer-in-charge. Similar works tests shall be carried out whenever the quality and grading of materials is charged irrespective of the quantity of concrete provided. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveal a poor quality of concrete and in other special cases.
26. The average strength of the group of cubes cast for each day shall not be less than the specified works cube-strength. 20 per cent of the cubes cast for each day may have values less than the specified strength, provided the lowest value is not less than 85 per cent of the specified strength.
27. R.C.C. work shall have exposed concrete surface. Centering design and its erection shall be approved by the Engineer-in-charge. One carpenter with helper will invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited over reinforcement laid in position. For access to different parts, suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, kapchi or metal pieces shall not be used for this purpose. Concreting of important structural members shall always be done in the presence and under the supervision of departmental person not below the rank of Asstt. Engineer/ Addl. Asstt. Engineer, Overseer or as instructed by the Engineer-in-charge. After removal of form work checks that concrete produced is of good quality plastering shall not be allowed to the exposed faces of concrete.
28. In reinforced concrete the volume occupied by reinforcement shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.
29. All necessary labour, materials, equipment, etc., for sampling, preparing test cubes, curing etc., shall be provided by the Contractor. Testing of the materials and concrete may be arranged by the Engineer-in-charge in an approved laboratory at the cost of the contractor.
30. The payment will be made on cmt. basis of the finished work.
31. The unit rate for concrete shall include the cost of all materials, labour, tools and plant required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as

show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

Item No. 16:-Providing and casting in situ ordinary trimix cement concrete M-200 for ave. 200 mm thick road work laid as directed including providing and laying M.S. side rail of road thickness with necessary nut bolts plated fixing as per width applying plate vibrator (electric or diesel) on channel compressor with vaccume dewatering system by using all necessary equipments and materials and machinery such as running creed vibrator on prelaid M.S. channel for levelling, vaccum pump floating power trovelling etc. with filling the joints with bitumen as directed etc, complete.

[I] MATERIALS :-

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-6, Grit shall conform to M-8 and coarse aggregate shall conform to M-12, 200 Micron thick LDPE membrane shall be of approved quality. CONPLAST P-211 water reducing concrete materials shall be approved quality.

[II] WORKMANSHIP :-

Cutting for sub-base shall be done in proper grade and camber as directed by Engineer-in-Charge. Care must be taken that all slopes are evenly and truly dressed. Cutting shall be done instruction. Useful stuff shall be carefully stacked separately as directed. The stuff received from the cutting shall be utilized for filling cuts and correcting side slopes with all lead and lifts as directed.

Sub-base with H.B. Metal & murrum shall be prepared as directed by Engineer-in-Charge.

Before placing concrete, a minimum 200-Micron thick plastic over the prepared sub-base as per instruction which act as a separation layer to protect the floor against humidity and capillary water from the earth.

11.5 thicker M-200 grade concrete is being placed over the prepared sub-base. Complast P-211 (Water reducing concrete admixture) @ 100Mt. per bag of cement and Recron-35 fibbers at 125 Gms. per bag of cement shall be use in M-200 concrete mix. The relevant Specification of Item No.5.8.2 (General Specification for building) shall be followed for M-200 mix concrete and relevant specification No. 91(A) shall be followed form work required for concreting.

Leveling of the surface is done using TREMIX surface vibrator. The vibrator runs over channels, placed as per required level and slope and simultaneously level surface of the concrete.

Vacuum dewatering follows the leveling of concrete. The purpose of vacuum processing is to provide quicker setting and high early strength by removing surplus water from the concrete. The process is follows as per instruction of site Engineer-in-Charge & attached guide line.

Immediately after dewatering, the surface is floated with a skim power floater as per instruction Engineer-in-Charge. The surface shall be prepared as per requirements and instructions. For smoother surface requirement, the surface is trowelled with same machine mounted with trowelling blades. If required floor hardener "Nitoflor Hardtop" a Fasroc product shall be used at the rate of 3 to 5 Kg./Sqm. to get hard wearing surface.

Construction joints upto $\frac{1}{4}$ of the slab depth are cut after wards. They give clear and straighter theoretical cracking line in the case of unexpected stresses. Groove cutting is done within 48 hour from casting at the floor.

After surface vibrator and finishing the surface with power floater and trowel light brooming on the surface, expansion joints size 20 x 115mm shall be provided with filling the expansion joint having size 20 x 20mm by using COLPOR-200 as per manufacturers specification and directed by Engineer-in-Charge. The expansion joints filled with Nitogal 200.

Making a construction joints by cutting of joints of size 3mm x 20mm by using of concrete cutter machine construction joint are filled with "MITOSEAL-280" an elastomeric cold applied joint sealant, which ensures performance of expected functions at the joints.

Concrete should be cured in normal way (Water pending) or the surface is covered with a plastic sheet or gunny bags. In any method, the surface should be always kept wet with water. Curing must be done for atleast 7 dayse or as per directed by Engineere-in-Charge.

The machineries used for the above process shall be of standard technical specification attached separately herewith. (i.e. Surface vibrator, vacuum pump, suction mat top cover, filter pad, skim floater etc.)

The Workmanship and process for vacuumed dewatering, water cement ration, concrete placing, surface vibration, vacuum processing, floating, Trowelling and curing shall be carried out as per attached filteratures and as per instruction of Engineer-in-Charge.

[III] MODE OF MEASUREMENT :

The rate shall be include all materials, formworks, machineries and labour charges.

The rate shall be for a unit of one Cum.

Item No.17 Providing HYSD steel reinforcement for R.C.C work including bending, binding and placing in position complete upto floor two level..

1601. DESCRIPTION

This work shall consist of furnishing and placing high strength deformed reinforcement (HYSD)bars (untensioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

1602. GENERAL

Steel for reinforcement shall meet with the requirements of IS 1786:2008.

1603. PROTECTION OF REINFORCEMENT

Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on blocks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete, shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

1604. BENDING OF REINFORCEMENT

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar Bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer using a proper bar bender, operated by hand or power to obtain the correct radii of bends and shape.

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work and shall not be heated to facilitate straightening.

1605. PLACING OF REINFORCEMENT

The reinforcement cage should generally be fabricated in the yard at ground level and

then shifted and placed in position. The reinforcement shall be placed strictly in accordance with the drawings and shall be assembled in position only when the structure is otherwise ready for placing of concrete. Prolonged time gap between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

Bars shall be kept in position usually by the following methods: In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut in them accurately, or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed upto a level just below their location.

Layers of reinforcements shall be separated by spacer bars at approximately one metre intervals. The minimum diameter of spacer bars shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.

Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc, or other subsidiary reinforcement shall be provided to fix the reinforcements firmly in its correct position.

Use of pebbles broken stone, metal pipe, brick, mortar or wooden blocks etc., as devices for positioning reinforcement shall not be permitted.

Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that no point of weakness is not created in hardened concrete. The coated reinforcing bars

shall be held in place by OK of plastic or plastic coated binding wires especially manufactured for the purpose. Reference shall be made to Section 1000 for other requirements.

Placing and fixing of reinforcement shall be impeded and approved by the Engineer before concrete is deposited.

1606. BAR SPLICES

1606.1.Lapping

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or $1\frac{1}{4}$ times the maximum size of course aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

1606.2.Welding

1606.2.1. Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

1606.2.2. While welding may be permitted for mild steel reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS:1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special welding grade of S 41S grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula :

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mg + V}{5} + \frac{Ni + Cu}{15} \text{ is 0.4 or less}$$

1606.2.3. The method of welding shall conform to IS:2751 and IS:9417 and to any supplemental specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetelene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory joint performance. Precautions on over heating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.

All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V bun joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible. Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators, welding procedure are adequate to produce and maintain uniform quality at par with that attainable in shop welding to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall have to be qualified by tests prescribed in IS:2751. Inspection of welds shall conform to IS:822 and destructive or non-destructive testing may be undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in 2 or 3 stages, previous surface shall be cleaned properly. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Only competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS:814.

1606.2.4. Welded joints shall preferably be located at points where steel will not be subject to more than 75 per cent of the maximum permissible stresses and welds so staggered that at any one section, not more than 20 per cent of the bars are welded.

1606.2.5. Welded pieces of reinforcement shall be 'tested. Specimens shall be taken from the site and the number and frequency of tests shall be as directed by the Engineer.

1606.3. Mechanical Coupling of Bars

Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swagged on to bars in end to end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 per cent of the characteristic strength of the reinforcement bar.

1607. TESTING AND ACCEPTANCE

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. The fabrication, furnishing and placing of reinforcement shall be in accordance with these specifications and shall be checked and accepted, by the Engineer.

1608. MEASUREMENTS FOR PAYMENT

Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of 15:1732. Wastage, overlaps, couplings: welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in. the rates for reinforcement

1609. RATE

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, fabricating, transporting* storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work. Payment shall be made on M.T. basis

Item No. 18 Excavation for foundation up to all depth including sorting out and stacking of useful material and disposing off the excavated stuff as directed by Engineer in charge with all lead and lift in (2) Dense or hard Soil.

1. Excavation for structures shall consist of the removal of material for the construction of foundations for bridges, culverts, retaining walls, headwalls, cut off walls, pipe culverts and other similar structures, in accordance with the requirements, of these specifications and the lines and dimensions shown on the drawings or as indicated by the Engineer-in charge. The work shall include all necessary sheeting, shoring, bracing, draining and pumping and the removal of all logs, stumps, shrubs, and other deleterious matter and obstruction necessary for the foundations, trimming bottoms of excavations; back filling and clearing up the site and the disposal of all surplus material.
2. After the site has been cleared the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer-in-charge. The contractor shall provide all labour, survey instruments and materials such as strings, pegs, nails, bamboos, stones, lime, mortar, concrete etc. required in connection with the string out of works and the establishment of bench mark, centre line stones and other marks and stakes as long as in the opinion of the Engineer-in-charge, they are required for the work.
3. Excavation shall be taken to the width of the lowest step of the footing. The contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personal and works and to the satisfaction of the Engineer-in-charge.
4. The depth to which the excavation is to be carried out shall be as shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer-in-charge.
5. Where water is met with in excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing, pumping, to keep the foundation trenches dry when so required and to protect the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other details thereof shall be left to the choice of the contractor but subject to approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however, not relieve the contractor of the responsibility for the adequacy of dewatering, and production arrangements and for the quality and safety of the works.
6. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of movement of water through any fresh concrete. No. pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or other similar means.
7. The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by the Engineer-in-charge. Before footing is laid, the surface shall be slightly watered and rammed. In the event of excavation having been made deeper than that shown on the drawings or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete or masonry of the foundation grade at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level. If there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.

8. Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures.
9. Backfilling shall be done with approved materials after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part of the structure. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250 mm. loose layers, which shall be watered and compacted.
10. All the excavated materials shall be the property of the Government. Where the excavated materials are to be used in the construction of embankment, it shall be directly deposited at the required location, with all lead as directed.
11. All useful materials not intended for use in the bank, shall be stacked neatly on Government land as directed by the Engineer-in-charge with all lead. Unsuitable and surplus materials not intended for use shall be disposed off as directed by the Engineer-in-charge.
12. Excavation for structures shall be measured in cubic meters for each class of materials encountered, limited to the dimensions shown on the drawing or as directed by the Engineer-in-charge. Excavation over increased width cutting of slopes, shoring, shuttering and planking shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.
13. The contract unit rate for the items of excavation for structures shall be paid in full for carrying out the required operations including :-
 1. Setting out and fixing bench marks and centre lines stones.
 2. Construction of necessary shoring and bracing and their subsequent removal.
 3. Removal of all logs, stumps, Grubs and other deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations;
 4. Foundation sealing, dewatering including pumping;
 5. Backfilling, Clearing up the site and disposal of all surplus material within all lifts and lead;
 6. All labour, materials, tools equipment, safeguards and incidentals necessary to complete the work to the specification.
14. Excavation shall be for dense or hard soil such as vegetation or organic soil, turf, sand, silt, loam, clay, mud, black cotton soil, soft shale or soft murrum, and similar material which yields to the ordinary application of pick and shovel, or other ordinary digging equipment. Removal of gravel or any other nodular material having diameter in any one direction not exceeding 75 mm. occurring in such strata shall be deemed to be covered under this category. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

Item No 19 :-Excavation for foundation up to all depth incl. sorting out and stacking of useful materials and disposing of the excavated stuff up all lead in hard murrum.

1. Excavation for structures shall consist of the removal of material for the construction of foundation for bridges culverts, retaining walls, headwalls, cut off walls, pipe culverts and other similar structures in advance with the requirements of these specifications and the lines and dimensions shown on the drawings or as indicated by the engineer-in-charge. The work

shall be include all necessary sheeting, shoring bracing, draining and pumping and the removal of all logs stumps shrubs and other deleterious matter and obstructions necessary for the foundations, trimming bottoms of excavations; back filling and clearing up the site and the disposal of all surplus material.

2. After the site has been cleared the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the engineer-in-charge. The contractor shall provide all lab our, survey instruments and materials such as strings pegs nails, bamboos, stones, lime , mortar, concrete, etc. required in connection with the setting out of works and the establishment of bench mark, centre line stones and other marks and stakes as long as in the opinion of the engineer-in-charge, they are required for the work.
3. Excavation shall be taken to he width of the lowest step of the footing. The contractor at his own expense shall due regard to the safety of personal and works and to the satisfaction of the engineer-in-charge.
4. The depth to which he excavation is to be carried out shall be is shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the engineer-in-charge.
5. Where water is met with is excavation due to stream flow, seepage, snags, rain or other reasons, the contractor shall take adequate measures such as bailing pumping, to keep the foundation trenches dry when so required and to protect the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted I this regard and other and other details there of shall be left to the choice of the contractor but subject to approval of he engineer-in-charge. Approval of the engineer-in-charge shall, however not relieve the contractor of the responsibility for the adequacy of dewatering, and production arrangements and for the quality and safety of the works.
6. Pumping fro the interior of any foundation enclosure shall be done in such aggregate manner as to preclude the possibility of movement of water through any fresh concrete. No. pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or other similar means.
7. The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by the engineer-in-charge . before footing is laid, the surface shall be slightly watered and rammed. In the event of excavation having been made deeper then that shown on the drawings or as otherwise ordered by the engineer-in-charge the extra depth shall be made to with concrete or masonry of the foundation grade at the cost of the contractor. Ordinary filing shall not be used for the purpose to bring the foundation to level. If there are any sips or blows in the excavation, these shall be removed by the contractor at his own cost.
8. Near towns, villages and all frequented places, trenches and foundation pits shall be securely fences, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures.
9. Backfilling shall be done with approved materials after concrete of masonry s fully set and carried out in such aggregate way as not to cause undue thrust on any part of the structure .all space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250m.loose layers, which shall be watered and compacted.

10. All the excavated materials shall be the property of the government . where the excavated materials is to be used in the construction of embankment, it shall be directly deposited at the required location, within 100 meters lead.
11. All useful materials not intended for use in the bank ,shall be stacked neatly on government land as directed by the engineer-in-charge within 100 meters lead. Unsuitable and surplus materials not intended for use shall be disposed off as directed by the engineer-in-charge .
12. Excavation for structures shall be measured in cubic meters for each class of material encountered, limited to the dimension shown on the drawing or as directed by the engineer-in-charge. Excavation over increased width cutting of slopes, shoring, shuttering and planking shall be deemed as convenience for the contractor In executing the work and shall not be measured and paid for separately.
13. The contact unit rate for the items of excavation for structures shall be paid in full for carrying out the required operations including :-
 1. Setting out and fixing bench marks and centre lines stones.
 2. Construction of necessary shoring and bracing and their subsequent removal.
 3. Removal of all logs, stumps, grubs and other deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations :
 4. Foundation sealing, dewatering including pumping;
 5. Backfilling clearing up the site and disposal of all surplus material within all lifts and lead upto 100 metres;
 6. All labour, materials, tools equipment, safeguards and incidentals necessary to complete the work of the specification.
14. Excavation shall be for ordinary soil such as vegetation or organic soil, turf, sand, silt, loam, clay, mud, black cotton soil, soft shale or soft murrum, a mixture of these and similar material which yields to the ordinary application of pick and shovel, or other ordinary digging equipment. Removal of gravel or any other cocular material having diameter in any one direction not exceeding 75mm. occurring in such strata shall be deemed to be covered under this category. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.
15. Excavation shall be in hard soil such as stiff heavy clay, hard shale or compact murrum requiring grating tool or pick or both and shovel. Closely applied and ravel and rubble stone having maximum cemetery in any one direction between 75 and 300 mm and soft conglomerate. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

Item No.20 Providing & Casting in situ ordinary CC M-150 mix & providing necessary pin headers including shuttering , scaffolding , laying , vibrating , curing & finishing complete with out V-grooves for all height..

Ordinary cement concrete of specified Grade i.e. cement concrete 1:3:6 shall be carried out in accordance with the following relevant specification.

1. In case of ordinary concrete, mix is not required to be designed by preliminary tests and proportions of cement, fine aggregates and coarse aggregates are specified by volume as given in table below for different grades of concrete designated as ordinary M. 100 In the designation of a concrete mix, letter "M" refers to the mix and the number the specified 28 days works cube compressive strength of that mix on 150 mm. cubes expressed in kg/cm².
3. The ordinary concrete mix shall generally be specified by volume. For cement which normally comes in bags and is used by weight, volume shall be worked out taking 50 kg. of cement as 0.035 cubic meter in volume. While measuring aggregate by volume, shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per its dry volume. In case it is dump, allowance for "bulking" shall be made as per IS : 2386 (Part-III).
4. Ingredients required for ordinary concrete containing one 50 Kg. bag of cement of different proportions of mix shall be as given in Table below.

TABLE

Grade of Concrete	Mix By Volume	Total Quantity of dry aggregates by volume per 50 Kg. of cement, to be taken as sum of the individual volumes of fine and coarse aggregates	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 kg. of cement max.
1	2	max 3	4	5
(1 Cubic meter = 1000 liters)				

Ordinary	Liters			Liters
M.100	1:3:6	300	General 1:2 for fine aggregate to coarse aggregate by volume but subject to a upper limit of 1:1. ½ & a lower limit of 1:3	34
M.150	1:2:4	220		32
M.200	1:1.1/2:3	160		30
M.250	1:1:2	100		27

NOTE- The proportions of the aggregates shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer & the maximum size of coarse aggregate becomes larger.

Example- For an average grading of fine aggregate (that is Zone II of IS : 383-1963) the proportions shall be 1: 1 1/2, 1:2 and 1:3 for maximum size of aggregates 10 mm, 20 mm. and 40 mm. respectively (after carrying out sieve analysis).

Note-2 A mix leaner than M.100 (1:3:6) may be used for non- structural parts, if provided in the contract. In such case grading of aggregates shall be by volume. Other requirements for mixing, placing & curing shall be the same.

6. Following shall be the maximum nominal size of coarse aggregate for the different items of work:

Sr. No.	Item of Construction	Maximum nominal size of Coarse aggregate
(i)	R.C.C. well curb. R.C.C. well staining and R.C.C. Piles	40 mm
(ii)	R.C.C. well staining	63 mm
(iii)	Well cap or pile cap; solid type piers, abutment and wing-walls, and their pier caps	40 mm
(iv)	R.C.C. works in cross girders deck slab, wearing coats, kerb, light posts, blast walls, approach slab etc. and hollow type piers, abutments, wing-walls and their pier caps	20 mm
(v)	R.C.C. bearings.	20 mm.
(vi)	For any other item of construction not covered by items (i) to (v)	As specified on the drawing or as desired by the Engineer-In-charge in case it is not specified on drawing.

For heavily reinforced concrete members as in the case of ribs of main beams nominal maximum size of aggregate shall usually be restricted to 5 mm. less than the minimum lateral clear distance between the main bars or 5 mm. less than the minimum cover to the reinforcement, whichever is the smaller.

6. Fine aggregate shall be clean, hard, coarse sand. It shall be free from dust and such other substances. The sand be got approved by the Engineer-in-charge.

7. All materials shall be stored as to prevent their deterioration or intrusion of their quality and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the works.

8. Cement shall be stored above the ground level in perfectly dry and water tight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregate shall be stored in such a way as to prevent admixture of foreign materials. Different size of fine or coarse aggregate shall be stored in separate stock-piles sufficiently away from the each other to prevent intermixing the materials.
9. The water for mixing shall be potable water to satisfaction of the Engineer-in-charge. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the job.
10. For all work concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate show complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.
11. When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons. It shall be done en a smooth watertight platform large enough to allow efficient turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material shall get mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 per cent above that specified.
12. Mixers which have been-out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to be the Engineer-in-charge, the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.
13. The method of transporting and placing concrete shall be approved by the Engineering-in-charge. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes places. All form work and reinforcement contained in it shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.
14. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-charge. Concreting being given, it shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly design agitators, operating continuously, when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator. Except where otherwise agreed to be the Engineer-in-charge, concrete snail be deposited in horizontal layers to a compacted depth of

- nor more than 0.45 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.
15. Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into place from a height exceeding 2 meters. When trucking or chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept, clean, thoroughly wetted and covered with a 13 mm. thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the well surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm. in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.
 16. All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of break downs.
 17. Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and driving out process. It shall be covered with wet sacking, hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonary work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 14 days.
 18. Form work shall include all temporary or permanent forms required for forming the concrete, together with all temporary construction required for their support. Form work shall however be divided into following two distinct categories :-
 - (1) Shuttering i.e., form work required for forming the concrete.
 - (2) Scaffolding i.e., form-work required for supporting shuttering.

Forms for shuttering shall be constructed only in metal suitably lined. Forms for scaffolding shall be constructed of metal or timber. Both shuttering and scaffolding shall be of substantial-rigid construction and shuttering shall be true to shape and dimensions shown on the drawings. All bolts and rivets shall be counter-sunk and well ground to provide a smooth, plane surface.
 19. Forms shall be mortar-tight and shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports, They shall be strong enough to withstand all pressure, ramming and vibration, without deflection from the prescribe lines occurring during and after placing the concrete. Screw jacks or hard wood wedges where required shall be provided to make up any settlement in the formwork either before or during the placing of concrete. Suitable camber shall be provided in horizontal members of structure, specially in long spans to counteract the effects of any fixed as to provide for such camber. Forms shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections. Unless otherwise specified or directed, chambers or fillets of sizes 25 mm x 25 mm shall be provided at all angles of formwork to avoid sharp corners.

20. The inside surfaces of shuttering shall, except in the case of permanent form work or where otherwise agreed to by the Engineer-in-charge, be coated with an approved material to prevent adhesion of concrete to the form work. Release agents shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come into contact with any reinforcement or pre-stressing tendons and anchorages. Different release agents shall not be used in form work for concrete which will be visible in the finished works.
21. Special measures shall be taken to ensure that the form work does not hinder the shrinkage of concrete because without these cracking could occur before the form work is removed. Where ever applicable arrangements must be made to ensure that the form work does not restrain the shortening and hogging of the beams or slabs during tensioning of the tendon's. The form work should take due account of the calculated amount of positive or negative camber so as to ensure the correct final shape of the structures having regard to the deformation of a false work, scaffolding or propping and the instantaneous or deferred deformation due to various causes affecting pre-stressed structures. Where there are re-entrant angles in the concrete sections the form work should be removed, at those sections as soon as possible after the concrete has set in order to avoid cracking due to shrinkage of concrete. Form work shall be tight enough to prevent any appreciable loss of cement during vibrations, suitable tolerances should be provided in the form work. Immediately before concreting all forms shall be thoroughly cleaned. Contractor shall give the Engineer-in-charge due notice before pouring any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength alignment and general fitness, but such inspection shall not relieve the contractor of his responsibility for safety of men, machinery, materials and for results obtained.
22. The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. Where field operations are controlled by strength tests of concrete, the removal of the load-supporting or soffit forms may commence when concrete has attained strength equal to at least twice the stress to which the concrete will be subjected at the time of striking props including the effect of any further addition of loads. When field operations are not controlled by strength tests of concrete the vertical forms of beams, columns and walls may be removed after 2 days. The props of slabs and beams may be removed after 14 and 21 days respectively. All formwork shall be removed without causing any damage to the concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to reuse the formwork, it shall be cleaned and made good to the satisfaction, of the Engineer-in-charge.
23. Immediately after the removal of forms, all exposed bars or bolts passing through the concrete member and used for shuttering or any other purpose shall be cut inside the concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honey comb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions

used in the grade of concrete that is being finished and of as dry as consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been pointed shall be kept moist for a period of twenty four hours. If rock pockets/honeycombs, in the opinion of the Engineer-in-charge are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

24. In the case of reinforced concrete work workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency, which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump shall be adopted for different types of works.

Type of Work	Slumps	
	Where vibrators are used	Where vibrators are not used
1 Mass concrete in RCC foundations, footings and retaining walls	10 mm to 25 mm	80 mm
2 Beams, slabs and columns simply reinforced.	25mm to 40 mm	100 to 120 mm
3 Thin R.C.C. section or section with congested steel	40 mm to 50 mm 50 mm	125 mm to 150 mm 150 mm

25. Works strength tests shall be made in accordance with IS : 516. Each test shall be conducted on ten specimens, five of which shall be tested at seven days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting and cubes shall be made at the rate of one for every 5 cubic meter of concrete or a part thereof. However, if concreting done in a day is less than 15 cubic meter, the minimum number of cubes can be reduced to 6 with the specific permission of the Engineer-in-charge. Similar works tests shall be carried out whenever the quality and grading of materials is changed irrespective of the quantity of concrete poured. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveal a poor quality of concrete and in other special cases.
26. The average strength of the group of cubes cast for each day shall not be less than the specified works cube-strength. 20 per cent of the cubes cast for each day may have values less than the specified strength, provided the lowest value is not less than 85 per cent of the specified strength.
27. R.C.C. work shall have exposed concrete surface. Centering design and its erection shall be approved by the Engineer-in-charge. One carpenter with helper will invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited over reinforcement laid in position. For access to different parts, suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, kapchi or metal pieces shall not be used for this purpose. Concreting of important structural members shall always be done in the presence and under the supervision of departmental

- person not below the rank of Asstt. Engineer/ Addl. Asstt. Engineer, Overseer or as instructed by the Engineer-in-charge. After removal of form work checks that concrete produced is of good quality plastering shall not be allowed to the exposed faces of concrete.
28. In reinforced concrete the volume occupied by reinforcement shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.
 29. All necessary labour, materials, equipment, etc., for sampling, preparing test cubes, curing etc., shall be provided by the Contractor. Testing of the materials and concrete may be arranged by the Engineer-in-charge in an approved laboratory at the cost of the contractor.
 30. The payment will be made on cmt. basis of the finished work.
 31. The unit rate for concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as-per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

Item No. 21:- Supplying and fixing reinforced concrete heavy duty non-pressure pipes with collars for culverts carrying heavy traffic as per IS 458-1991 specifications including setting the pipes in C.M. 1:2 watering and laying (to level or slopes) of class NP3 of following internal diameters.(vii) 900mm dia with all lead.

1. The work shall consist of furnishing and installing reinforced cement concrete pipe of the type dia metre and length required at the location shown on the drawings or as ordered by the Engineer-in-charge.

2. Reinforced concrete pipe shall be NP-3 type conforming to the requirements of I.S. 458 and shall be of dia as specified in the item. Each consignment of cement concrete pipes shall be inspected, if necessary and approved by the Engineer-in-charge, either at the place of manufacture or at the site before their incorporation in the works. NP3, NP2, NP1 pipes are used for R. C. C. pipes where testing of pipes. Where testing of pipes will not be feasible the contractors will have to produce a certificate from the manufacturers on company's letter head the given hereinafter form.

Production of such certificate will not however relieve the contractor from his responsibility of supplying pipes of required standard and will have to bear the loss or damage caused to the work on account of defects found subsequently during the execution. It will also be necessary to purchase these pipes from manufacturer having standard equipments for carrying out various test as per IS : 458 at his factory.

FORM OF CERTIFICATE FOR NP3, NP2, NP1 PIPES

We _____

manufacturer of R.C.C. pipes produce R.C.C. pipes as per the requirement of IS: 458 and also carry out the required test at our place. We have acquired equipments for carrying out test and are prepared to carrying out test at our factory sites.

We have experience of manufacturing of pipes of _____ years. The
 pipes _____ supplied _____ by _____ us _____ to _____ M/s.
 _____ satisfy _____ the
 requirement of I.S. 458.

Date: _____

Place: _____

Manufacturer's Sign: -

3. No pipe shall be placed in position until the foundations have been approved by the Engineer-in-charge. Where two or more pipes are to be laid adjacent to each other, they shall be separated by a distance equal to at least half the diameter of the pipe subject to minimum of 450 mm. The laying of pipes on the prepared foundation shall start from the outlet and proceed towards the inlet and be completed to the specified lines and grades. The pipes shall be fitted and matched so that when laid in work they form a culvert with a smooth uniform invert: Any pipe found defective or damaged during laying be removed at their cost of Contractor.

4. The pipes shall be jointed either by collar joint or by flush joint. In the former case, the collars shall be of R.C.C., 150 to 200 mm wide and having the same strength as the pipes to be jointed. Caulking space shall be between 13 and 20 mm according to the diameter of the pipes. Caulking material shall be slightly wet mix of cement and sand in ratio of 1:2 rammed with caulking irons: Before caulking the collar shall be so placed that its centre coincides with that of pipe and even annular space is left between the collar and the pipes. Flush joint may be shaped to form a self centering joint with a joining space 13 mm wide. The jointed space shall be filled with cement mortar 1 cement to 2 sand, mixed sufficiently dry to remain in position when forced with a trowel or rammer. Care shall be taken to fill all voids and excess mortar shall be removed. All joints shall be made with care so that their interior surface is smooth and consistent with the interior surface of the pipes. After finishing, the joints shall be kept covered and damp for at least four days.

5. RCC Pipes shall be measured along their centre between their inlet and outlet ends in linear meters.

6. The rate for the pipe shall include the cost of pipe including loading unloading, handling storing laying in position and joining complete.

The payment shall be made on Rmt. basis for completed item as per item description or as directed.

Item No. 22 Filling around the pipe with murrum including dressing tamping etc complete

1. Area around pipes shall be filled with murrum, chhara or other gritty material immediately after the pipes have been laid and the joining material has hardened. The material shall be clean, free from boulders large roots, excessive amount of sods or other vegetable matter, and lumps and shall be approved by the Engineer-in-charge. Filling up to 0.3 metre above the top of the pipe shall be carefully done and the soil thoroughly

rammed, tampered or vibrated in layers of not exceeding 150 mm. particular care being taken to thoroughly consolidate the materials under the haunches of the pipe. Filling shall be carried out simultaneously on both sides of the pipes in such a manner that unequal pressures do not occur. In case of high embankments, after filling up to the top in the above said manner a loose fill of a depth equal to external diameter of the pipe shall be placed over the pipe before further layers are added and compacted. Materials shall be filled in pharas 3m. x 1.5m. x 0.5m. size and shall be measured in cubic metres. Unit rate includes cost of materials and spreading including labour and tools needed for the above operations.

Item No. 23:- Providing & casting in situ ordinary CC M-200 mix for average 100mm thick wearing coat laid as directed incl. temping vibrating, finishing, in joints with bitumen. comp.

1. In case of Controlled concrete, mix is required to be designed by preliminary tests and proportions of cement, fine aggregates and coarse aggregates are specified by volume as given in table below for different grades of concrete designated as ordinary M. 100, M. 150, M.200 and M.250.
2. In the designation of a concrete mix, letter "M" refers to the mix and the number the specified 28 days works cube compressive strength of that mix on 150 mm cubes expressed in kg. / cm².
3. The ordinary concrete mix shall generally be specified by volume. For cement which normally comes in bags and is used by weight, volume shall be worked out taking 50 kg of cement as 0.035 cubic metres in volume. While measuring aggregate by volume, shaking, ramming or hammering shall not be done. Proportioning of sand shall be as per its dry volume. In case it is dump, allowance for "bulking" shall be made as per I.S.: 2386 (Part - III).
4. Ingredients required for ordinary concrete containing one 50 Kg bag of cement of different proportions of mix shall be as given in Table below.

TABLE

Grade of concrete	Mix by Volume	Total quantity of dry aggregate by volume per 50 Kg. / of cement to be taken as per sum of individual volume of fine and coarse aggregates, maximum	Proportion of fine aggregate to coarse aggregate.	Quantity of water per 50 Kg. of cement maximum.
1 Ordinary	2 Liters	3	4	5 Liters

M-100	1:3:6	300	Generally 1 : 2	34
M-150	1:2:4	220	for aggregate to	32
M-200	1:1 ½ : 3	160	coarse aggregate	30
M-250	1 : 1 : 2	100	by volume but	27
			subject to and	
			upper limit of 1	
			: 1 ½ and a	
			lower limit 1 : 3	

NOTE - The proportions of the aggregates shall be adjusted from upper limit to lower limit progressively as the grading of the fine aggregates becomes finer & the maximum size of coarse aggregate becomes larger.

Example - For an average grading of fine aggregate (that is Zone II of I.S.: 383-1963) the proportions shall be 1:1.1/2, 1:2 and 1:3 for maximum size of aggregates 10 mm, 20 mm. and 40 mm. respectively (after carrying out sieve analysis).

Note-2 A mix leaner than M.100 (1:3:6) may be used for non- structural parts, if provided in the contract. In such case grading of aggregates shall be by volume. Other requirements for mixing, placing & curing shall be the same.

5. Following shall be the maximum nominal size of coarse aggregate for the different items of work.

Sr. No.	Item of Construction	Maximum nominal size of coarse aggregate
(i)	R.C.C. well curb, R.C.C. well staining and R.C.C. pipes	40 mm.
(ii)	R.C.C. well staining	63 mm
(iii)	Well cap or pipe cap; solid type pipes abutment and wing-walls, and their pipe caps	40 mm
(iv)	R.C.C. works in cross girders deck slab, wearing coats, kerb, light posts, blast walls, approach slab etc. and hollow type piers, abutment, wing-walls and their pier caps.	20 mm
(v)	R.C.C. bearings	20 mm
(vi)	For any other item of construction not covered by items (i) to (v)	As specified on the drawing or as desired by the Engineer-in-charge in case it is not specified on drawing.

For heavily reinforced concrete members as in the case of ribs of main beams nominal maximum size of aggregate shall usually be restricted to 5 mm less than the minimum lateral clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement, whichever is the smaller.

6. Fine aggregate shall be clean, hard, coarse sand. It shall be free from dust and such other substances. The sand be got approved by the Engineer-in-charge.

7. All materials shall be stored as to prevent their deterioration or intrusion of their quality and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the works.

8. Cement shall be stored above the ground level in perfectly dry and water tight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregate shall be stored in such a way as to prevent admixture of foreign materials. Different size of fine or coarse aggregate shall be stored in separate stock-piles sufficiently away from the each other to prevent intermixing the materials.

9. The water for mixing shall be potable water to satisfaction of the Engineer-in-charge. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the job.

10. For all work concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate show complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

11. When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons. It shall be done on a smooth watertight platform large enough to allow efficient

turning over of the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material shall get mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 per cent above that specified.

12. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to be the Engineer-in-charge, the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

13. The method of transporting and placing concrete shall be approved by the Engineer-in-charge. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes places. All form work and reinforcement contained in it shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

14. If concreting is not started within 24 hours of the approval being given, it shall have to be obtained again from the Engineer-in-charge. Concreting being given, it shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless

carried in properly design agitators, operating continuously, when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator. Except where otherwise agreed to be the Engineer-in- charge, concrete shall be deposited in horizontal layers to neither a compacted depth of nor more than 0.45 metre when internal vibrators are used and not exceeding 0.30 metre in all other cases.

15. Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into place from a height exceeding 2 metres. When trucking or chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept, clean, thoroughly wetted and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the well surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.

16. All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of break downs.

17. Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and driving out process. It shall be covered with wet sacking, Hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonary work over the foundation concrete may be started after 48 hours of it's laying but the curing of concrete shall be continued for a minimum period of 14 days.

18. Form work shall include all temporary or permanent forms required for forming the concrete together with all temporary construction required for their support. Form work shall however be divided into following two distinct categories:

(1) Shuttering i.e., form work required for forming the concrete.

(2) Scaffolding i.e., form-work required for supporting shuttering.

Forms for shuttering shall be constructed only in metal suitably lined. Forms for scaffolding shall be constructed of metal or timber. Both shuttering and scaffolding shall be of substantial rigid construction and shuttering shall be true to shape and dimensions shown on the drawings: All bolts and rivets shall be counter-sunk and well ground to provide a smooth, plane surface.

19. Forms shall be mortar-tight and shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports. They shall be strong enough to withstand all pressure, ramming and vibration, without deflection from the prescribe lines occurring during and after placing the concrete. Screw jacks or hard wood wedges where required shall be provided to

make up any settlement in the formwork either before or during the placing of concrete. Suitable camber shall be provided in horizontal members of structure, specially in long spans to counteract the effects of any fixed as to provide for such camber. Forms shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections. Unless otherwise specified or directed, chambers or fillets of sizes 25 mm x 25 mm shall be provided at all angles of formwork to avoid sharp corners.

20. The inside surfaces of shuttering shall, except in the case of permanent form work or where otherwise agreed to by the Engineer-in-charge, be coated with an approved material to prevent adhesion of concrete to the form work. Release agents shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come into contact with any reinforcement or pre stressing tendons and anchorages. Different release agents shall not be used in form work for concrete which will be visible in the finished works:

21. Special measures shall be taken to ensure that the form work does not hinder the shrinkage of concrete because without these cracking could occur before the form work is removed. Wherever applicable arrangements must be made to ensure that the form work does not restrain the shortening and hogging of the beams or slabs during tensioning of the tendons. The form work should take due account of the calculated amount of positive or negative camber so as to ensure the correct final shape of the structures having regard to the deformation of a false work, scaffolding or propping and the instantaneous or deferred deformation due to various causes affecting pre stressed structures. Where there are re-entrant angles in the concrete sections the form work should be removed at those sections as soon as possible after the concrete has set in order to avoid cracking due to shrinkage of concrete. Form work shall be tight enough to prevent any appreciable loss of cement during vibrations, suitable tolerances should be provided in the form work, immediately before concreting all forms shall be thoroughly cleaned. Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength alignment and general fitness, but such inspection shall not relieve the contractor of his responsibility for safety of men, machinery, materials and for results obtained.

22. The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. Where field operations are controlled by strength tests of concrete, the removal of the load-supporting or soffits forms may commence when concrete has attained strength equal to at least twice the stress to which the concrete will be subjected at the time of striking props including the effect of any further addition of loads. When field operations are not controlled by strength tests of concrete the vertical forms of beams, columns and walls may be removed after 2 days. The props of slabs and beams may be removed after 14 and 21 days respectively. All formwork shall be removed without causing any damage to the concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm cover to the finished concrete surface. Where it is intended to reuse the formwork, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge.

23. Immediately after the removal of forms, all exposed bars or bolts passing through the Cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm below the surface of the concrete and the resulting holes be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry as consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been pointed shall be kept moist for a period of twenty four hours. If rock pockets/honeycombs, in the opinion of the Engineer-in-charge are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

24. In the case of reinforced concrete work workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency, which shall depend up on the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump shall be adopted for different types of works.

Sr. No.	Type of Work	Slumps	
		Where vibrators are used	Where vibrators are not used
(i)	Mass concrete in R.C.C. foundations, footings and retaining walls	10 mm to 25 mm	80 mm
(ii)	Beams, slabs and columns simply reinforced	25 mm to 40 mm	100 mm to 120 mm
(iii)	Thin R.C.C. section or section with congested steel.	40 mm to 50 mm	125 mm to 150 mm

25. Works strength tests shall be made in accordance with I.S.: 516. Each test shall be conducted on ten specimens five of which shall be tested at seven days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting and cubes shall be made at the rate of one for every 5 cubic metre of concrete or a part thereof. However, if concreting done in a day is less than 15 cubic meter, the minimum number of cubes can be reduced to 6 with the specific permission of the Engineer-in-charge. Similar works tests shall be carried out whenever the quality and grading of materials is charged irrespective of the quantity of concrete proud. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveal a poor quality of concrete and in other special cases.

26. The average strength of the group of cubes cast for each day shall not be less than the specified works cube-strength. 20 per cent of the cubes cast for each day may have values less than the specified strength, provided the lowest value is not less than 85 per cent of the specifies strength.

27. R.C.C. work shall have exposed concrete surface. Centering design and its erection shall approved by he Engineer-in-charge. One carpenter with helper will invariably be kept present

throughout the period of concreting. Movement of labour and other persons shall be totally prohibited over reinforcement laid in position. For access to different parts, suitable mobile platforms shall provide so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, Kapchi or metal pieces shall not be used for this purpose. Concreting of important structural members shall always be done in the presence and under the supervision of departmental person not below the rank of Assistant Engineer / Additional Assistant Engineer Overseer or as instructed by the Engineer-in-charge. After removal of form work checks that concrete produced is of good quality. Plastering shall not be allowed to the expressed faces of concrete.

28. In reinforced concrete the volume occupied by reinforcement shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.

29. All necessary labour, materials equipment, etc., for sampling, preparing test cubes, curing etc., shall be provided by the Contractor. Testing of the materials and concrete may be arranged by the Engineer-in-charge in an approved laboratory at the cost of the contractor.

30. The payment will be made on cmt basis of the finished work.

31. The unit rate of concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

32. Average 12 mm thick joints shall be kept in wearing coat, if required. The same shall be filled with sand and asphalt or by bituminous joint filler as directed.

The contract rate shall be for a unit of One Cmt. of completed item, including temping vibrating, finishing, curing and filling in joints with bitumen complete

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Item No. 24:- Providing and fixing ordinary Kilometer stone of precast C.C. 1:2:4 including necessary reinforcement as per I.R.C. type design in C.C. 1:4:8 including lettering and painting etc. complete.

- 1 Kilometer stone shall be of approved quality and shall be of precast 1:2:4 R.C.C. as specified in the item.
2. The size, manner of fixing, painting and lettering of K.M. stone shall conform specification as per I.R.C.-8 (Type design for VR stones). The fixing of K.M. stone shall be carried out in ordinary concrete of grade specified in the item using hand broken metal field metal or gravel.
3. The measurement for payment shall be made per No. of K.M. stone fixed in position.
4. Unit rate for Kilometer stone includes the cost of all materials, labour, tools, fixing, finishing curing, lettering and painting as directed by the Engineer-in-charge.

Item No. 25 Providing and fixing Hectometer stone as per I.R.C. type design including lettering and painting etc. complete. (I) Fixing in C.C. 1:5:10.

1. Hectometer stone shall be of approved quality and as per I.R.C. 26 (Type design for 200 meter stones) and shall be fixed in C.C. 1:5:10 which will consist of one part of cement, five part of good sand and ten parts of machine crushed metal 40 mm nominal size. Rate includes all labour and curing etc. necessary for concrete.
2. The measurement for payment shall be made per No. of Hectometer stone fixed in position.
3. Unit rate for hectometer stone includes the cost of all materials, labour, tools, fixing, finishing curing, lettering and painting as directed by the Engineer-in-charge.

Item No. 26:- Providing and fixing indicator stone of approved stone as per IRC type design including white washing etc. complete, Fixing in earth.

- 1.0** Indicator stones shall be of approved quality and of the size 20cm. x 20cm. its length shall not be less than 80cms. The top, 38cm. shall be chisel dressed on all sides. The size shape and dimension of the indicator stone shall be exact and stones shall be neatly dressed and finished before fixing. The indicator stones shall be fixed firmly in position in embankment or cutting as the case may be. The exposed part of the indicator stone shall be done by the contractor at his own cost. The measurement for payment shall be per number of indicator stone fixed in fixed in position.
- 2.0** Unit rate indicator stone includes the cost of all materials, labour, tools, fixing and white washing as directed by the Engineer-in-charge.

Item No. 27:- Providing and fixing Guard stone as per I.R.C. type design including white washing etc. complete (I) Fixing in Earth.

1. The guard stone shall be of approved quality and of 20 cm x 15 cm. size and its length shall not be less than 75 cms. The top portion shall be rounded. The top 38 cm. shall be chisel dressed on all sides. The size, shape and dimensions of the guard stones shall be exact and shall be neatly dressed and finished.
2. The guard stone shall be fixed in position as directed by the Engineer-in-charge in earth. The exposed part of the guard stones shall be given three coats of white wash. Any excavation necessary for fixing of the guard stones shall be done by the contractor at his own cost. The measurement for payment shall be per number of guard stone fixed in position.

3. Unit rate of guard stone includes the cost of all materials, labours, tools, fixing & white washing as directed by the Engineer-in-charge.
4. In case of Deep/Causeway the guard stone shall be fixed in masonry of head wall as directed by Engineer-in-charge.

(I) Fixing in Earth.

Specification same as above except that the hectometer stone shall be fixed in C.C. 1:5:10 which will consist of one part of cement, five part of good sand, and ten parts of good bricks bats. Rate includes all labour and curing etc. Necessary for concrete.

Item No. 28 Supplying and fixing Road sign Board of M.S plates and angle iron including painting, lettering etc. complete including fixing in C.C 1:4:8 with necessary excavation etc. complete as per I.R.C type Design. (II) Reflective type.

.1 GENERAL

- 801.1.1 The colour, configuration, size and location of all traffic signs for highways other than Expressways shall be in accordance with Code of Practice for Road Signs, IRC:67 or as shown on the drawings. For Expressways, the size of signs, letters and their placement shall be as specified in the Contract drawings and relevant specifications. In the absence of any details or for any missing details, the signs shall be provided as directed by the Engineer. The Aluminum sheet size to be fixed shall be as specified in the Item.
- 801.1.2 The signs shall be reflectorised type and made of encapsulated lens type reflective sheeting vide Clause 801.3, fixed over aluminium sheeting as per these Specifications.
- 801.1.3 In general, cautionary and mandatory signs shall be fabricated. through process of screen printing. In regard to informatory signs with inscriptions, either the message could be printed over the reflective sheeting, or cut letters of non-reflective black sheeting used for the purpose which must be bonded well on the base sheeting as directed by the Engineer.
- 801.2 MATERIALS :-** The various materials and fabrication of the traffic signs shall conform to the following requirements :
 - 801.2.1 Concrete :** Concrete shall be of the grade shown on the contract drawings or otherwise as directed by the Engineer.
 - 801.2.2 Reinforcing Steel :** Reinforcing steel shall conform to the requirement of IS : 1786 unless otherwise shown on the drawing.

801.2.3 Bolts, nuts, washers: High strength bolts shall conform to IS: 1367 whereas precision bolts, nuts, etc. shall conform to IS: 1364.

801.2.4 Plates and supports: Plates and support sections for the sign posts. shall conform to IS:226 and IS:2062 or any other relevant IS Specifications.

801.2.5 Aluminium: Aluminium sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminium alloy conforming to IS:736 Material designation 24345 or 1900.

801.2.6 Signs with a maximum side dimension not exceeding 600 mm shall not be less than 1.5 mm thick. All others shall be at least 2 mm thick. The thickness of the sheet shall be related to the size of the sign and its support and shall be such that it does not bend or deform under the prevailing wind and other loads.

801.2.7 In respect of sign sizes not covered by IRC:67, the structural details (thickness, etc.) shall be as per the approved drawings.

801.3 TRAFFIC SIGNS HAVING RETRO-REFLECTIVE SHEETING

801.3.1 General Requirements: The retro-reflective sheeting used on the sign shall consist of the white or coloured sheeting having a smooth outer surface which has the property of retro-reflection over its entire surface. It shall be weather-resistant and show colour fastness. It shall be new and unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure facing the sun for two years and its having passed these tests shall be obtained from a reputed laboratory, by the manufacturer of the sheeting. The reflective sheeting shall be either of Engineering, Grade material with enclosed lens or of High Intensity Grade with encapsulated lens. The type of the sheeting to be used would depend upon the type, functional hierarchy and importance of the road.

801.3.3 Engineering grade sheeting : This sheeting shall be of enclosed lens type consisting of microscopic lens elements embedded beneath the surface of a smooth, flexible, transparent, water-proof plastic, resulting in a non-exposed lens optical reflecting system. The retro reflective surface after cleaning with soap and water and in dry condition shall have the minimum coefficient of retro-reflection (determined In accordance with ASTM Standard :E-81 0) as indicated in Table 800-2.

Table 800 – 2

ACCEPTABLE MINIMUM COEFFICIENT OF RETRO-REFLECTION FOR ENGINEERING GRADE
SHEETING

(CANDELAS PERLUXPER SQUARE METRE)

Observation angle (in degrees)	Entrance Angle (in degrees)	White	Yellow	Orange	Green	Red	Blue
0.2	-4	70	50	25	9.0	14.5	4.0
0.2	+30	30	22	7.0	3.5	6.0	1.7
0.5	-4	30	25	13.5	4.5	7.5	2.0
0.5	+30	15	13	4.0	2.2	3.0	0.8

When totally wet, the, sheeting shall not show less than 90 per cent of the values, of retro-reflection indicated in Table 800-2. At the end of 5 years, the sheeting shall retain at least 50 per cent of its original retro reflectance.

801.3.4 Messages/Borders: The messages (legends, letters, numerals etc) and borders shall either be screen-printed or of cut-outs. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. Cut-outs shall be of materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.

801.3.5 For screen-printed transparent coloured areas on white sheeting, the co-efficient of retro-reflection shall not be less than 50 per cent of the values of corresponding colour in Tables 800-1 and 800-2, as applicable.

801.3.6 Cut-out messages and borders, wherever used, shall be made out of retro-reflective sheeting (as per Clause 801.3.2 or 801.3.3 as applicable), except those in black which shall be of non-reflective sheeting.

801.3.7 Colour : Unless otherwise specified, the general colour scheme shall be as stipulated in IS:5 "Colour for Ready Mixed Paints", viz

Blue - IS Colour No.166: French Blue

Red	-	IS	Colour No.537 : Signal Red
Green	-	IS	Colour No.284 : India Green
Orange	-	IS	Colour No.591 : Deep Orange

The colours shall be durable and uniform in acceptable hue' when viewed in day light or under normal headlights at night

801.3.8 Adhesives: The sheeting shall either have a pressure sensitive adhesive of the aggressive-tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface, or a tack free adhesive activated by heat, applied in ct, heat-vacuum applicator, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate ,such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. In case of pressure-sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer's specifications. Sheetting with adhesives requiring use of solvents or other preparation for adhesive shall be applied strictly In accordance with the manufacturer's instructions.

801.3.9 Refurbishment: Where existing signs are specified for refurbishment, the sheeting shall have a semi-rigid aluminium backing pre- coated with aggressive-tack type pressure sensitive adhesive. The adhesive shall be suitable for the type of material used for the sign and should thoroughly bond with that material.

801.3.10 FABRICATION :

801.3.10.1 Surface to be reflectorised shall be effectively prepared to receive the retro reflective sheeting. The aluminium sheeting shall be degreased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the application of retro-reflective sheeting.

801.3.10.2 Complete sheets of the material shall be used on the signs except where it is unavoidable; at splices, sheeting with pressure sensitive 1 adhesives shall be overlapped not less than 5 mm. Sheeting with heat activated adhesives may be spliced with an overlap not less than 5 mm or butted with a gap not exceeding 0.75 mm. Where screen printing with transparent colours is proposed, only butt jointing shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

801.3.11 Warranty and durability: The contractor shall obtain from the manufacturer a seven year warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of high intensity grade and a five year warranty for the adhesive sheeting of engineering grade and submit the same to the Engineer. In addition, a seven year and a five year warranty for satisfactory in field performance of the finished sign with retro-reflective sheeting of high intensity grade and engineering grade respectively, inclusive of the screen printed or cut out letters/legends and their bonding to the retro-reflective sheeting shall be obtained from the Contractor/supplier and passed on to the Engineer. The Contractor/supplier shall also furnish a certification to that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty.

Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning, shall show no appreciable discolouration, cracking, blistering or dimensional change and shall not have less than 50 per cent of the specified minimum reflective intensity values (Tables 800-1 and 800-2) when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer (AASHTO Designation M 268).

801.4 INSTALLATION

801.4.1 Sign posts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally, signs with an area upto 0.9 sq.m. shall be mounted on a single post, and for greater area two or more supports shall be provided. Sign supports may be of mild steel, reinforced concrete or galvanized iron (G.I.) Post end(s) shall be firmly fixed to the

ground by means of properly designed foundation. The work of foundation shall conform to relevant specifications as specified.

801.4.2 All components of signs and supports, other than the reflective portion and G.I. posts shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. Any part of mild steel(M.S.) post , below ground shall be painted with three coats of red lead paint.

801.4.3 The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size in the case of reinforced concrete or G.I. posts. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

801.5 MEASUREMENTS FOR PAYMENT

The measurement of information signs shall be in numbers sign board supplied and fixed.

801.6 RATE The Contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site and incidentals to complete the work in accordance with the specifications.

Item No.29:- Providing and fixing Junction board of M.S. Plate and angles as per standard I.R.C. design incl. fixing in cement concrete 1: 4: 8 with necessary excavation, painting, figuring and lettering on board etc. complete.

1. The size of the board shall be 110 c. in length the iron post shall be 2.1 metres. The posts shall be fixed to the board by welding. The shall be true & strong and neat in appearance .

The board shall be fixed in C.C. 1:4:8 concrete. The concrete block for each post shall be 30cm x 30 cm in size the depth of the concrete block shall be 85 cm of which 60 cm will be below ground & 25 cm above ground level. The exposed concrete block i.e. its portion above ground level shall be neatly finished & its shape should be truly square

The post shall be painted with two coats of paint, alternatively in black& white strips 23 cms. in height after applying one coat of Anticorrosive paint. The paint shall of approved quality. The board shall be painted with colour as directed by Engineer – in –Charge. The information as per instruction of Engineer-in Charge shall be written on board with letter and signs in accordance with I.R.C. the information maybe one or more of the three scripts viz. Hindi English and Gujarati.

The board shall be fixed truly vertical and workmanship of the board shall be neat, clean and good in appearance.

The measurement for payment shall be for number of board fixed in position and complete in all respects.

The unit rate includes cost of materials labour tools welding concreting, painting ,letteringetc complete

Item No. 30 Providing and fixing Village name board as per Standard I.R.C. type design of steel plate including painting lettering etc. complete with fixing in C.C. 1:4:8 block with necessary excavation.

1. The work shall be carried out as per the item of sign boards except that there shall not be top plate of 38 cm x 38 cm triangular shape and lower plate of 38 cm x 61 cm rectangular plate of 6mm thickness shall be fixed at top fencing towards the direction of the village.
2. The boards plate shall be painted in black color, letter & figures shall be painted in white color with an arrow direction towards the village. Painting & lettering shall be done on both side. The size of the letters and figures as well as thickness of arrow will be as directed by the Engineer – in - Charge.
3. The measurement for payment as well as operations included in the unit rate shall be as per item of sign boards.

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Item No. 31 Citizen' s information Board- Providing and fixing of typical MMGSY information board as per instruction. Two MS plates of 1.6 mm thick, of 900 mm x 750mm size fixed at top & bottom duly welded with MS angles of 25 x 25 x 5 mm thick M.S plate shall be welded by two vertical M.S flats & four horizontal M.S flats 5 mm thick to 75 mm x 75 mm of 12 SWG square tubes posts duly embedded in cement concrete M-15 grade blocks of 600mm x 600mm x 75mm, below ground level. Painting New letters & figure of any shade with ready mixed synthetic enamel paint of superior quality in required shade and colour, All sections of framed posts and steel tube will be painted with primer and two coats of epoxy paints as per drawing

The work of providing and citizen board shall be executed as per relevant specifications of **Item No. 28** of this contract. The measurement shall be in numbers of citizen board supplied and fixed in position.

Item No.32 Hazard Marker Sign:- Providing and fixing sign board made out of 2mm aluminium sheet size 90x30 cm ,rectangle as per the design /drawing attached (IRC) pretreated with phosphating process acid etching ,coated with one coat of epoxy primer and two coats of best quality epoxy paints ,reflectorised with retro reflective sheeting as per latest M.O.S.T.specification ,3.1m long stand post and frame fabricated from suitable size iron angle of 35 x35x3mm &50 x50 x5mm painted with best quality epoxy coating the fixing at site shall be in 1:2:4 cc block of size 45 x45x 60 cm for each leg.including excavation curing etc. complete under the supervision of Engineer in charge (A Engineers grade)

1 TRAFFIC SIGNS

1.1 Scope

The work shall consist of the fabrication, supply and installation of ground mounted traffic signs on roads. The details of the signs shall be as shown in the drawings and in conformity with the Code of Practice for Road Signs, IRC:67-2010.

1.2 Materials

The various materials and fabrication of the traffic signs shall conform to the following requirements:

1.2.1 Concrete

Concrete for foundation shall be of M-15 Grade as per Section 1700 or the grade shown on the drawings or otherwise as directed by the Engineer.

1.2.2 Reinforcing Steel

Reinforcing steel shall conform to the requirement of IS:1786 unless otherwise shown on the drawing

1.2.3 Bolts, Nuts, Washers

High strength bolts shall conform to IS:1367 whereas precision bolts, nuts, etc., shall conform to IS:1364.

1.2.4 Plates and Supports

Plates and support sections for the sign posts shall conform to IS:226 and IS:2002 are any other relevant IS Specifications.

1.2.5 Substrate

Sign panels shall be fabricated on aluminum sheet, aluminates composite panel, fiber glass sheeting or sheet molding compound. Aluminum sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminum alloy conforming at IS: 736-Material Designation 24345 or 1900. Aluminium Composite Material (ACM) sheets shall be sandwiched construction with a thermoplastic core of Low Density Polyethylene (LOPE) between two thick skins/sheets of aluminum with overall thickness and 3 mm or 4 mm (as specified in the Contract), and aluminum skin of thickness 0.5mm and 0.3mm respectively on both sides. The mechanical proportion of ACM and that of aluminum skin shall conform to the requirements given in Table 01. When tested in accordance with the test methods mentioned against each of them.

Table 1 Specification for Aluminum Composite Material (ACM)			
Sr. No	Description	Specification	
		Standard Test	Acceptable value
A	Mechanical Properties of ACM		
1	Peel of strength with retro reflective shwwting (Drum)	ASTM 0903	Min. 4 N/mm ²
2	Tensile Strength	ASTM E8	Min. 40 N/mm ²
3	0.2% Proof stress	ASTM E8	Min. 34 N/mm ²
4	Elongation	ASTM E8	Min. 6%
5	Flexural Strength	ASTM 393	Min. 130 N/mm ²
6	Flexural Modulus	ASTM 393	Min. 44.0 N/mm ²
7	Shear strength with punch shear test	ASTM 732	Min. 30 N/mm ²
B	Properties of aluminum skin		
1	Tensile strength (Rm)	ASTM E8	Min. 65 N/mm ²
2	Modulus of elasticity	ASTM E8	Min. 70,000
3	Elongation	ASTM E8	A50 Min 2%

4	0.2% Proof Stress	ASTM E8	Min. 10 N/mm ²
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1.2.6 Plate Thickness

Shoulder mounted ground signs with a maximum side dimension not exceeding 600 mm shall not be less than 1.5 mm thick with Aluminum and 3 mm thick with Aluminum Composite Material. All other signs be at least 2 mm thick with Aluminum and 4 mm thick with Aluminum Composite Material. The thickness of the sheet shall be related to the size of the sign and its support and shall be such that it does not bend or deform under prevailing wind and other loads. In respect of sign sizes not covered by IRC:67, the structural details (thickness, etc.) shall be as per the approved drawings or as directed by the Engineer.

1.3 Traffic Signs having Retro-Reflective Sheeting

1.3.1 General Requirements

The retro-reflective sheeting used on the sign shall consist of the white or colored sheeting having a smooth outer surface which has the property of retro-reflection over its entire surface. It shall be weather-resistant and show color fastness. It shall be new and unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for co-efficient of retro-reflection, day/night time color luminous, shrinkage, flexibility, linear removal, adhesion, impact resistance, specular gloss and fungus resistance and its having- passed these tests shall be obtained from a Government Laboratory/Institute, by the manufacturer of the sheeting. The retro-reflective sheeting shall be either of Engineering Grade material with enclosed lens, High Intensity Grade with encapsulated lens or Micro-prismatic Grade retro-reflective element material as given in Clauses 801.3.2 to 801.3.7. Guidance on the recommended application of each class of sheeting may be taken from IRC:67.

1.3.2 High Intensity Grade Sheeting

1.3.2.1 High Intensity Grade (Type III)

This high intensity retro reflective sheeting shall be of encapsulated lens type consisting of spherical glass lens, elements adhered to a synthetic resin and encapsulated by a flexible, transparent waterproof plastic having a smooth surface or as an unmetallised micro prismatic reflective material element. The retro reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM 0:4956-09) as indicated in Table 02

Table 2 – Acceptable Minimum Co-efficient of Retro-Reflection for High Intensity Grade Sheeting (Type 3) (Encapsulated Lens Type) (Candelas Per Lux Per Square Meter)								
Observation Angle in degrees	Entrance Angle in degrees	White	Yellow	Orange	Green	Red	Blue	Brown

0.108	-40	300	200	120	54	54	24	14
0.108	+30	180	120	72	32	32	14	10
0.2	-40	250	170	100	45	45	20	12
0.2	+30	150	100	60	25	25	11	8.5
0.5	-40	95	62	30	15	15	7.5	5
0.5	+30	65	45	25	10	10	5	3.5

A minimum of Coefficient of Retro-reflection (RA) $\text{cd/fcft}^2 (\text{cd-lx-1 m}^2)$.

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 7 years, the sheeting shall retain at least 80% of its original retro-reflectance.

1.3.3 High Intensity Micro-Prismatic Grade Sheeting (HIP) (Type IV)

This sheeting shall be of high intensity retro-reflective sheeting made of micro-prismatic retro- reflective element material coated with pressure sensitive adhesive. The retro-reflective surface after cleaning with soap and water and in dry condition shall have the minimum co- efficient of retro- reflection (determined in accordance with ASTM 0:4956-09) as indicated in Table 03.

Table 3 – Acceptable Minimum Co-efficient of Retro-Reflection for High Intensity Micro-Prismatic Grade Sheeting (Type 4)
(Candelas Per Lux Per Square Meter)

Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown
0.106	-40	500	380	200	70	90	42	25
0.106	+30	240	175	94	32	42	20	12
0.2	-40	360	270	145	50	65	30	18
0.2	+30	170	135	68	25	30	14	8.5
0.5	-40	150	110	60	21	27	13	7.5
0.5	+30	72	54	28	10	13	6	3.5

A minimum of Coefficient of Retro-reflection (RA) $\text{cd/fcft}^2 (\text{cd-lx-1 m}^2)$.

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 7 years, the sheeting shall retain at least 80% of its original retro-reflectance.

1.3.4.1 Prismatic Grade Sheeting (Type VII)

The reflective sheeting shall be retro reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after cleaning with soap and water and in dry

condition shall have the minimum co-efficient of retro reflection (determined in accordance with ASTM E 810) as indicated in Table 04.

1.3.4.2 Prismatic Grade Sheeting (Type IX)

The reflective sheeting shall be retro-reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after cleaning with soap and water and in dry condition shall have minimum co-efficient of retro reflection (determined in accordance with ASTM E 810) as indicated in Table 05.

Table 4 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 8) (Candelas Per Lux Per Square Meter)											
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.1°B	-4°	10	75	375	10	1	4	30	800	600	300
0.1°B	+30°	46	34	175	46	6	2	14	370	280	135
0.2°	-4°	70	52	265	70	1	3	21	560	420	210
0.2°	+30°	32	24	120	33	4	1	10	260	200	95
0.5°	-4°	25	19	94	25	3	1	7.5	200	150	75
0.5°	+30°	11	86	43	12	1	5	3.5	92	69	35
A minimum of Coefficient of Retro-reflection (RA) $\text{cd/fcft}^2 (\text{cd-lx-1 m}^2)$.											
B values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.											

Table 5 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 9) (Candelas Per Lux Per Square Meter)										
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.1°B	-4°	600	500	250	66	13	13	530	400	200
0.1°B	+30°	370	280	140	37	74	17	300	220	110
0.2°	-4°	380	285	145	38	76	17	300	230	115
0.2°	+30°	215	162	82	22	43	10	170	130	65
0.5°	-4°	240	180	90	24	48	11	190	145	72
0.5°	+30°	135	100	50	14	27	6	110	81	41

1.0"	-4"	80	60	30	8	16	3	64	48	24
1.0"	+30"	45	34	17	4.5	9	2	36	27	14

A minimum of Coefficient of Retro-reflection (RA) $\text{cd/fcft}^2 (\text{cd-lx-l m}^2)$.

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.

1.3.4.3 Prismatic grade Sheeting (Type 11)

Retro reflective sheeting typically manufactured as a cube corner. The reflective sheeting shall be retro reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after cleaning with soap and water in dry condition shall have the minimum coefficient of retro reflective (determined in accordance with ASTM E810) as indicated in Table 06.

Table 6 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 11) (Candelas Per Lux Per Square Meter)											
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.1"B	-4"	83	620	290	83	1	37	25	660	500	250
0.1"B	+30"	32	245	115	33	5	15	10	260	200	100
0.2"	-4"	58	435	200	58	8	26	17	460	350	175
0.2"	+30"	22	165	77	22	3	10	7	180	130	66
0.5"	-4"	42	315	150	42	6	19	13	340	250	125
0.5"	+30"	15	110	53	15	2	7	5	120	90	45
1.0"	-4"	12	90	42	12	1	5	4	96	72	36
1.0"	+30"	45	34	16	5.0	7	2	1	36	27	14

A minimum of Coefficient of Retro-reflection (RA) $\text{cd/fcft}^2 (\text{cd-lx-l m}^2)$.

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.

1.3.5 Adhesives

The sheeting shall have a pressure-sensitive adhesive of the aggressive-tack type requiring no heat, solvent other preparation for adhesion to a smooth clean surface, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting

from the sign base in one piece by use of sharp instrument. The sheeting shall be applied in accordance with the manufacturer's specifications.

1.3.6 Fabrication

Surface to be refectories shall be effectively prepared to receive the retm-reflective sheeting. The aluminum sheeting shall be de-greased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the application of retro-reflective sheeting. Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure-sensitive adhesives shall be overlapped not less than 5 mm. Where screen printing with transparent colours is proposed, only butt joint shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

1.3.7 Messages/Borders

The messages (legends, letters, numerals etc.) and borders shall either be screen-printed or of cut out from durable transparent overlay or cut out from the same type of reflective sheeting for the cautionary/mandatory sign boards, Screen printing shall be processed and finished with materials and in a manner specified by the sheeting maufacturer. For the informatory and other sign boards, the messages (legends, letters, numerals etc.) and borders shall be cut out from durable transparent overlay film or cut-out from the same reflective sheeting only. Cut-outs shall be from durable transparent overlay materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer. For screen-printed transparent colored areas on white sheeting, the co- efficient of retro-reflection shall not be less than 50 percent of the values of corresponding color in Tables 800-2 to 800-8 as applicable. Cut-out messages and borders, wherever used, shall be either made out of retro-reflective sheeting or made out of durable transparent overlay except those in black which shall be of non reflective sheeting or opaque in case of durable transparent overlay.

1.3.8 Colour for Signs

1.3.8.1

Signs shall be provided with retro-reflective sheeting and/or overlay film/ screening ink. The reverse side of all signs shall be painted grey.

1.3.8.2

Except in the case of railway level crossing signs the sign posts shall be painted in 250 mm side bands, alternately black and white. The lowest band next to be ground shall be in black.

1.3.8.3

The colour of the material shall be located within the area defined by the chromaticity coordinates in Table 800-7 and comply with the luminance factor when measured as per ASTM D-4956.

Table 7 – Color Specified Limits (Daytime)

Color	1		2		3		4		Daytime Laminate factor (Y %)	
	x	y	x	y	x	y	x	y	Min.	Max.
White	0.303	0.3	0.368	0.366	0.34	0.393	0.274	0.329	15	--
Yellow	0.498	0.412	0.557	0.442	0.479	0.52	0.438	0.472	24	45
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	.0771	2.5	11
Red	0.648	0.351	0.735	0.235	0.629	0.281	0.565	0.346	2.5	11
Blue	0.14	0.035	0.244	0.21	0.19	0.255	0.065	0.216	1	10
Orange	0.558	0.352	0.636	0.364	0.57	0.429	0.506	0.404	12	30
Brown	0.43	0.34	0.61	0.39	0.55	0.45	0.43	0.39	1	6
Fluorescent Yellow- Green	0.387	0.61	0.369	0.546	0.428	0.496	0.46	0.54	60	--
Fluorescent Yellow	0.479	0.52	0.446	0.483	0.512	0.421	1.557	0.442	45	--
Fluorescent Orange	0.583	0.416	0.535	0.4	0.595	0.351	0.645	0.355	25	--

1.3.8.4

The Regulatory/Prohibitory and warning signs shall be provided with white background and red border. The legend/ symbol for these signs shall be in black color. The Mandatory sign shall be provided with Blue background and white Symbol/letter.

1.3.8.5

The colors chosen for informatory or guide signs shall be distinct for different classes of roads. For National Highways and State Highways, these signs shall be of green background and for Expressways these signs shall be of blue background with white border, legends and word messages.

1.3.9 Refurbishment

Where existing signs are specified for refurbishment, the sheeting shall have a semi-rigid aluminium backing or materials as per Clause 1.2.5, pre-coated with aggressive-tack type pressure sensitive adhesive. The adhesive shall be suitable for the type of material used for the sign and should thoroughly bond with that material.

1.3.10 Sizes of Letters

1.3.10.1

Letter size should be chosen with due regard to the speed, classification and location of the road, so that the sign is of adequate size for legibility but without being too large or obtrusive. The size of the letter, in terms of x-height, to be chosen as per the design speed is given in Table 08.

Table 8 Acceptable Limits for Sizes of Letters			
Design Speed (Km/hr.)	Minimum 'x' Height of Letters (mm)	Minimum Sight Distance / Clear Visibility Distance (m)	Minimum Distance from Centre Line (m)
40	100	45	12
50	125	50	14
65	150	60	16
80	250	80	21
100	300	90	24
120	400	115	32

The thickness of the letters and their relation to the x-height, the width, the heights are indicated in Table IV (a) of the Annexure-4 of IRC:67 to facilitate the design of the informatory signs and definition plates.

1.3.10.2

For advance direction signs on non-urban roads, the letter size ('x' height) should be minimum of 150 mm for Expressway, National and State Highways and 100 mm for other roads. In case of overhead signs, the size (X' height) of letters may be minimum 300 mm. Thickness of the letter could be varied from 1/6 to 1/5 of the letter 'x' size. The size of the initial uppercase letter shall be 1-1/3 times x-height. In urban areas, letter size shall be 100 mm on all directional signs. For easy and better comprehension, the word messages shall be written in upper case letters only.

1.3.10.3

Letter size on definition plates attached with normal sized signs should be 100 mm or 150 mm. In the case of small signs, it should be 100 mm. Where the message is long, as for instance in "NO PARKING" and "NO STOPPING" signs, the message may be broken into two lines and size of letters may be varied in the lines so that the definition plate is not too large. The lettering on definition plates will be all in upper case letters.

1.3.11 Warranty and Durability

The Contractor shall obtain from the manufacturer a ten year warranty for satisfactory field performance including stipulated retro-reflectance of the retro reflective sheeting of micro-prismatic sheeting and a seven-year warranty for high intensity grade and submit the same to the Engineer. The warranty shall be inclusive of the screen printed or cut out letters/legends and their bonding to the retro-reflective sheeting. The Contractor/supplier shall also furnish the LOT numbers and certification that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty and that the contractor/supplier is the authorized converter of the particular sheeting.

All signs shall be dated during fabrication with indelible markings to indicate the start of warranty. The warranty shall also cover the replacement obligation by the sheeting manufacturer as well as contractor for replacement/ Repair/ restoration of the retro-reflective efficiency.

A certificate in original shall be given by the sheeting manufacturer that its offered retro-reflective sheeting has been tested for various parameters such as co efficient of retro- reflection, day/night time color and luminance, shrinkage, flexibility, linear removal, adhesion, impact resistance, specular gloss and fungus resistance; the tests shall be carried out by a Government Laboratory in accordance with various ASTM procedures and the results must show that the sheeting has passed the requirements for all the above mentioned parameters, A copy of the test reports shall be attached with the certificate.

1.4 Installation

1.4.1

The traffic signs shall be mounted on support posts, which may be of GI pipes conforming to IS:1239, Rectangular Hollow Section conforming to IS:4923 or Square Hollow Section conforming to IS:3589. Sign posts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally, signs with an area up to 0.9 sq.m shall be mounted on a single post, and for greater area two or more supports shall be provided. Post-end(s) shall be firmly fixed to the ground by means of properly designed foundation. The work of foundation shall conform to relevant Specifications as specified.

1.4.2

All components of (including its back side) and supports, other than the reflective portion and G.I. posts shall be thoroughly de-scaled, cleaned, primed and painted with two coats of epoxy/ fibre glass/ powder coated paint. Any part of support post below ground shall be painted with protective paint.

1.4.3

The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

1.5 Measurement for Payment

The measurement of standard cautionary, mandatory and information signs shall be in numbers of different types of signs supplied and fixed, while for direction and place identification signs, these shall be measured by area in square metres.

1.6 Rate

The Contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site furnishing of necessary test certificates, warranty and incidentals to complete the work in accordance with these Specifications. .

Item No.33 supplying and fixing Cat Eye (Stimsonite) made out from Acrilo beaultile sterine Injuction high compressed molding with reflector made of MMC (prismatic type of size 12cm x 6cm x 2.5cm) provided with bituminous adhesive 100g. with each unit for fixing. (High Intensity grade)

1.1 General

Reflective pavement marker (R P M) or road stud is device which is banded to or anchored within the road surface for lane marking and delineation for night- time visibility, If reflects incident light in directions close to the direction from which it came.

1.2. Definitions

1.2.1 Description of Terms Specific to this standard

1.2.1.1

Coefficient of luminous intensity (CIL) or specific intensity = the ratio of luminous intensity of the retro-reflector in the direction of observation to luminance at the retro - reflector on a plane perpendicular to the direction of the incident light expressed in terms of Milaca deal as per incident lux (med / Ix).

1.2.1.2

Horizontal entrance angle - the angle in the horizontal plane between the direction of incident light and the normal to the leading edge of the marker.

1.2.1.3

Observation angle - the angle in the reflector between the illumination axis and the observation axis.

1.2.1.4

Retro - reflection - reflection in which the radiation is returned in direction close to the uirection from which it came, this property being maintained over wide variations of the direction of incident radiation.

1.2.1.5

Head - that part of a road stud which is above the road surface when the road stud is fixed in position in the road.

1.2.1.6

Upper surface - that part of the external surface of road stud which is visible when the road stud is fixed in position in the road. stud is fixed position in the road.

1.2.1.7

Anchorage - that part of a road stud which is below the road surface when the road surface when the road stud is fixed position in the road.

1.3 Material

1.3.1

Plastic body of RPM road stud shall be molded from ASA(Acrylic Sterner Acryl nitrite) or HIPS (Impacts polystyrene) or ABS or any other suitable material approved by the Engineer-in-charge. The marker shall support a load of 13635 kg tested in accordance with ASTM D4280.

1.3.2

Reflective panels shall consist if number or lenses containing single or dual prismaic cubes capable of providing total intenal reflection of the light entering the lens face. Lenses shall be molded of methyl methecrylate conforming to ASTMD 788 or equivalent.

1.4. Design

1. 4.1

The slope or retro-reflecting surface shall preferably be 35 +/- 5 degree to base.

1.4.2

The area of each retro-reflecting surface shall not be less than 13.0 sq. cm.

1.5. Optical Performance

1.5. 1

Unidirectional and bi-directional studs Fach reflector or combination of reflectors on each face of the stud shall have 1.5. 1. 1 C.I.L. not less than that given in Table 1 or 2 as appropriate.

Table 1 Minimum C.I.L Values for Category 'A' studs				
Entrance angle	Observation Angle	C.I.L. in med 1x		
		White	Amber	Red
0" U 5" L&R	0.3"	220	110	44
0" U 10" L&R	0.5"	120	60	24

Table 1 Minimum C.I.L Values for Category 'B' studs				
Entrance angle	Observation Angle	C.I.L. in med 1x		
		White	Amber	Red
0" U 6" L&R	0.3"	20	10	4
0" U 10" L&R	0.5"	15	7.5	3

Note:- The entrance angle of 0° corresponds to the normal aspect of the reflectors when the reflecting road stud is installed in horizontal road surface.

1.5.1.2

A stud that incorporates one or more corner cube reflectors shall be considered to be included in category 'A'. A stud that incorporates one or more biconvex reflectors shall be considered to be included in category 'B'.

1.5.2 Omni - directional studs

Each Omni-directional stud shall have a minimum C.I.L. of not less than 2 med/ 1x.

1.5.3

1.5.3.1

Coefficient of luminance intensity can be measured by produced described in ASTM E 809 "Practice for Measuring Photometric Characteristics" or as recommended in BS: 873 - Part 4:1973.

1.5.3.2

Under test conditions, a stud shall not be considered to fail the photometric requirements if the measured C.I.L. at any one position of measurement is less than the values specified in Table 1 or 2 provided that.

- (1) The value is not less than 80% of the specified minimum, and
- (2) The average of the left and right measurements for the specific angle is greater than the specified minimum.

1.6. Fixing of Reflective Markers

1.6.1. Requirements

1.6.1.1

The enveloping profile of the head of the stud shall be smooth and the studs shall not present any sharp edges to traffic.

1.6.1.2 The reflecting portions of the studs shall be free from crevice or ledges where dirt might accumulate

1.6.1.3

All road studs shall be legibly marked with the name, trade mark or other means of identification of the manufacturer.

1.6.1.4

Marker height shall not exceed 20mm.

1.6.1.5

Marker width shall not exceed 130 mm.

1.6.1.6

The base of the marker shall be flat within 1.3 mm. If the bottom of the marker is configured. The outermost faces of the configurations shall not deviate more than 13 mm from flat surface.

1.6.2 Placement

1.6.2.1

The reflective marker shall be fixed to the road surface using the adhesives and the produced recommended by the manufacturer. No nails shall be used to affix the marker as nails are hazardous for the roads.

1.6.2.2

Regardless of the type of adhesive used. The markers shall not be fixed if the pavement is not surface dry and on new asphalt concrete surfacing unit the surfacing has been opened to traffic for a period of not less than 14 hours

1.6.2.3

The portions of the highway surface, to which the marker is to be bonded by the adhesive, shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint and any other material which would adversely affect the bond of the adhesive.

1.6.2.4

Use a wire brush, if necessary to loosen and remove dirt. Then brush or blow clean.

1.6.2.5

The adhesive shall be places uniformly on the cleaned pavement surface or on the bottom of the marker in a quantity sufficient to result in complete coverage of the area of contact of the marker with no voids present and with a slight excess after the marker has been lightly pressed in place.

1.6.2.6

For epoxy installations, excess adhesive around the edge of the marker, excess adhesive on the pavement and adhesive on exposed surfaces of markers shall be immediately removed. Soft rags moistened with the mineral spirits or kerosene may be used if necessary to remove adhesive from exposed faces of pavement markers.

1.7. Warranty and durability.

The contractor shall obtain from the manufacturer a two year warranty for satisfactory field performance including stipulated retro-reflectance of the reflecting panel and submit the same to the Engineer. In addition, a two year warranty for satisfactory infield performance of the finished road marker shall also be given by the contractor who carried out the work of fixing of reflective road markers. In case the markers are displaced, damaged, get worn out or lose their reflectivity compared to stipulated standards, the contractor would be required replace all such markers within 15 days of the intimation from the Engineer at his own cost and with no extra remuneration to be paid for such works.

1.8 Measurement for Payment

The measurement of reflective road markers shall be in numbers of different types of markers supplied and fixed.

1.9 Rate

The contract unit rate for reflective road markers shall be payment in full compensation for furnishing all labor, material, tools, equipment including incidental costs necessary for carrying out the work at site conforming to the specifications complete as per approved drawings or as directed by the Engineer.

Item No. 34 MMGSY "LOGO" Board : Providing and fixing of MMGSY LOGO informatory sign board with Logo as per section 1700 of MORTH specifications and drawing. The board will be a composite unit consisting of Two Plates of ACM (Aluminum Composite Material), material specifications as per clause 17001.3. The top most plate will be of 3mm ACP in diamond shape of 600x600mm size, riveted with MS angle iron frame of 25mmx25mmx5mm size on back on edges. The Lower plate will be of 4mm ACP of 1100x300mm size riveted with MS angle iron frame of 25mmx25mmx5mm size on back on edges. Riveting of all the sheets over angle and flat iron frame will be done neatly to have plain surface on one side. The angle iron frame of Both the plates will be welded to a 75mm x75mmx6mm Mild steel post at Centre and this post will be embedded in cement concrete M15 grade block of 450x450x600mm below ground level. The height of the bottom of the lower plate will be 1200mm from normal ground level. The spacing between the diamond shaped plate and Lower Plate is kept 150mm. MMGSY logo, letters and numerals on the ACM should be made up of Retro Reflective sheeting of Type-1 AEGP Class-A grade as per the latest MORD section 1700 and IRC 67-2012 specifications. All the section of the frame and posts shall be painted with primer and two coats of epoxy paint. The design, painting and lettering shall be done as per the MMGSY Logo sign Design and as directed by Engineer in-charge. A warranty for 5 years for the Retro reflective sheeting for Type-1 Class-A from original manufacturer shall be submitted by contractor.

The work of providing and fixing Logo board shall be executed as per relevant specifications of **Item No. 32** of this contract. The measurement shall be in numbers of Logo board supplied and fixed in position.

Item No.35 Chevron sign:-Providing and fixing sign boards made out of 1.5mm aluminum sheet / 3mm ACP (Aluminum composite Panel); size 60x50cm rectangular as per design of IRC-67-2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint; reflectors with High Intensity Prismatic Grade retro reflective sheeting of Type-4 as per ASTM D-4956 and latest M.O.S.T. Specifications; 3.3 mtr long stand post of Iron Angle 75 x 75 x 6mm/ 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35x35x3mm; painted with best quality epoxy coatings in black and white bends. the details of symbol or inscription / numerals for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 Cms. for each leg including excavation, curing etc. complete under the supervision of engineer in charge. A warranty for 7 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-B Type-4 Retro Reflective sheeting

1 TRAFFIC SIGNS

1.1 Scope

The work shall consist of the fabrication, supply and installation of ground mounted traffic signs on roads. The details of the signs shall be as shown in the drawings and in conformity with the Code of Practice for Road Signs, IRC:67-2010.

1.2 Materials

The various materials and fabrication of the traffic signs shall conform to the following requirements:

1.2.1 Concrete

Concrete for foundation shall be of M-15 Grade as per Section 1700 or the grade shown on the drawings or otherwise as directed by the Engineer.

1.2.2 Reinforcing Steel

Reinforcing steel shall conform to the requirement of IS:1786 unless otherwise shown on the drawing

1.2.3 Bolts, Nuts, Washers

High strength bolts shall conform to IS:1367 whereas precision bolts, nuts, etc., shall conform to IS:1364.

1.2.4 Plates and Supports

Plates and support sections for the sign posts shall conform to IS:226 and IS:2002 are any other relevant IS Specifications.

1.2.5 Substrate

Sign panels shall be fabricated on aluminum sheet, aluminates composite panel, fiber glass sheeting or sheet molding compound. Aluminum sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminum alloy conforming at IS: 736-Material Designation 24345 or 1900. Aluminium Composite Material (ACM) sheets shall be sandwiched construction with a thermoplastic core of Low Density Polyethylene (LOPE) between two thick skins/sheets of aluminum with overall thickness and 3 mm or 4 mm (as specified in the Contract), and aluminum skin of thickness 0.5mm and 0.3mm respectively on both sides. The mechanical proportion of ACM and that of aluminum skin shall conform to the requirements given in Table 01. When tested in accordance with the test methods mentioned against each of them.

Table 1 Specification for Aluminum Composite Material (ACM)			
Sr. No	Description	Specification	
		Standard Test	Acceptable value
A	Mechanical Properties of ACM		
1	Peel of strength with retro reflective shwwting (Drum)	ASTM 0903	Min. 4 N/mm ²
2	Tensile Strength	ASTM E8	Min. 40 N/mm ²
3	0.2% Proof stress	ASTM E8	Min. 34 N/mm ²
4	Elongation	ASTM E8	Min. 6%
5	Flexural Strength	ASTM 393	Min. 130 N/mm ²
6	Flexural Modulus	ASTM 393	Min. 44.0 N/mm ²
7	Shear strength with punch shear test	ASTM 732	Min. 30 N/mm ²
B	Properties of aluminum skin		
1	Tensile strength (Rm)	ASTM E8	Min. 65 N/mm ²
2	Modulus of elasticity	ASTM E8	Min. 70,000
3	Elongation	ASTM E8	A50 Min 2%
4	0.2% Proof Stress	ASTM E8	Min. 10 N/mm ²

1.2.6 Plate Thickness

Shoulder mounted ground signs with a maximum side dimension not exceeding 600 mm shall not be less than 1.5 mm thick with Aluminum and 3 mm thick with Aluminum Composite Material. All other signs be at least 2 mm thick with Aluminum and 4 mm thick with Aluminum Composite Material. The thickness of the sheet shall be related to the size of the sign and its support and shall be such that it does not bend or deform under prevailing wind and other loads. In respect of sign sizes not covered by IRC:67, the structural details (thickness, etc.) shall be as per the approved drawings or as directed by the Engineer.

1.3 Traffic Signs having Retro-Reflective Sheeting

1.3.1 General Requirements

The retro-reflective sheeting used on the sign shall consist of the white or colored sheeting having a smooth outer surface which has the property of retro-reflection over its entire surface. It shall be weather-resistant and show color fastness. It shall be new and unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for co-efficient of retro-reflection, day/night time color luminous, shrinkage, flexibility, linear removal, adhesion, impact resistance, specular gloss and fungus resistance and its having- passed these tests shall be obtained from a Government Laboratory/Institute, by the manufacturer of the sheeting. The retro-reflective sheeting shall be either of Engineering Grade material with enclosed lens, High Intensity Grade with encapsulated lens or Micro-prismatic Grade retro-reflective element material as given in Clauses 801.3.2 to 801.3.7. Guidance on the recommended application of each class of sheeting may be taken from IRC:67.

1.3.2 High Intensity Grade Sheeting

1.3.2.1 High Intensity Grade (Type III)

This high intensity retro reflective sheeting shall be of encapsulated lens type consisting of spherical glass lens, elements adhered to a synthetic resin and encapsulated by a flexible, transparent waterproof plastic having a smooth surface or as an unmetallised micro prismatic reflective material element. The retro reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM D4956-09) as indicated in Table 02

Table 2 – Acceptable Minimum Co-efficient of Retro-Reflection for High Intensity Grade Sheeting (Type 3) (Encapsulated Lens Type) (Candelas Per Lux Per Square Meter)								
Observation Angle in degrees	Entrance Angle in degrees	White	Yellow	Orange	Green	Red	Blue	Brown
0.108	-40	300	200	120	54	54	24	14
0.108	+30	180	120	72	32	32	14	10
0.2	-40	250	170	100	45	45	20	12
0.2	+30	150	100	60	25	25	11	8.5
0.5	-40	95	62	30	15	15	7.5	5
0.5	+30	65	45	25	10	10	5	3.5
A minimum of Coefficient of Retro-reflection (RA) cd/fcft^2 (cd-lx-1 m^2).								
B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 7 years, the sheeting shall retain at least 80% of its original retro-reflectance.								

1.3.3 High Intensity Micro-Prismatic Grade Sheeting (HIP) (Type IV)

This sheeting shall be of high intensity retro-reflective sheeting made of micro-prismatic retro-reflective element material coated with pressure sensitive adhesive. The retro-reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM 0:4956-09) as indicated in Table 03.

Table 3 – Acceptable Minimum Co-efficient of Retro-Reflection for High Intensity Micro-Prismatic Grade Sheeting (Type 4) (Candelas Per Lux Per Square Meter)								
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown
0.106	-40	500	380	200	70	90	42	25
0.106	+30	240	175	94	32	42	20	12
0.2	-40	360	270	145	50	65	30	18
0.2	+30	170	135	68	25	30	14	8.5
0.5	-40	150	110	60	21	27	13	7.5
0.5	+30	72	54	28	10	13	6	3.5
<p>A minimum of Coefficient of Retro-reflection (RA) cd/fcft^2 (cd-lx-1 m^2).</p> <p>B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 7 years, the sheeting shall retain at least 80% of its original retro-reflectance.</p>								

1.3.4.1 Prismatic Grade Sheeting (Type VII)

The reflective sheeting shall be retro reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro reflection (determined in accordance with ASTM E 810) as indicated in Table 04.

1.3.4.2 Prismatic Grade Sheeting (Type IX)

The reflective sheeting shall be retro-reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after cleaning with soap and water and in dry condition shall have minimum co-efficient of retro reflection (determined in accordance with ASTM E 810) as indicated in Table 05.

Table 4 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 8) (Candelas Per Lux Per Square Meter)											
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange

0.1"B	-4"	10	75	375	10	1	4	30	800	600	300
0.1"B	+30"	46	34	175	46	6	2	14	370	280	135
0.2"	-4"	70	52	265	70	1	3	21	560	420	210
0.2"	+30"	32	24	120	33	4	1	10	260	200	95
0.5"	-4"	25	19	94	25	3	1	7.5	200	150	75
0.5"	+30"	11	86	43	12	1	5	3.5	92	69	35

A minimum of Coefficient of Retro-reflection (RA) cd/fclft^2 (cd-lx-1 m^2).

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.

Table 5 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 9) (Candelas Per Lux Per Square Meter)										
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.1"B	-4"	600	500	250	66	13	13	530	400	200
0.1"B	+30"	370	280	140	37	74	17	300	220	110
0.2"	-4"	380	285	145	38	76	17	300	230	115
0.2"	+30"	215	162	82	22	43	10	170	130	65
0.5"	-4"	240	180	90	24	48	11	190	145	72
0.5"	+30"	135	100	50	14	27	6	110	81	41
1.0"	-4"	80	60	30	8	16	3	64	48	24
1.0"	+30"	45	34	17	4.5	9	2	36	27	14

A minimum of Coefficient of Retro-reflection (RA) cd/fclft^2 (cd-lx-1 m^2).

B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.

1.3.4.3 Prismatic grade Sheeting (Type 11)

Retro reflective sheeting typically manufactured as a cube corner. The reflective sheeting shall be retro reflective sheeting made of micro prismatic retro reflective material. The retro reflective surface, after

cleaning with soap and water in dry condition shall have the minimum co-efficient of retro reflective (determined in accordance with ASTM E810) as indicated in Table 06.

Table 6 – Acceptable Minimum Co-efficient of Retro-Reflection for Prismatic Grade Sheeting (Type 11) (Candelas Per Lux Per Square Meter)											
Observation	Entrance	White	Yellow	Orange	Green	Red	Blue	Brown	Fluorescent Yellow/Green	Fluorescent Yellow	Fluorescent Orange
0.1"B	-4"	83	620	290	83	1	37	25	660	500	250
0.1"B	+30"	32	245	115	33	5	15	10	260	200	100
0.2"	-4"	58	435	200	58	8	26	17	460	350	175
0.2"	+30"	22	165	77	22	3	10	7	180	130	66
0.5"	-4"	42	315	150	42	6	19	13	340	250	125
0.5"	+30"	15	110	53	15	2	7	5	120	90	45
1.0"	-4"	12	90	42	12	1	5	4	96	72	36
1.0"	+30"	45	34	16	5.0	7	2	1	36	27	14
A minimum of Coefficient of Retro-reflection (RA) cd/fcft^2 (cd-lx-1 m^2).											
B values for 0.1" observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order. When totally wet, the sheeting shall show not less than 90 percent, of the values of retro-reflection indicated in above Table. At the end of 10 years, the sheeting shall retain at least 80% of its original retro-reflectance.											

1.3.5 Adhesives

The sheeting shall have a pressure-sensitive adhesive of the aggressive-tack type requiring no heat, solvent other preparation for adhesion to a smooth clean surface, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. The sheeting shall be applied in accordance with the manufacturer's specifications.

1.3.6 Fabrication

Surface to be refectories shall be effectively prepared to receive the retm-reflective sheeting. The aluminum sheeting shall be de-greased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other

contaminants prior to the application of retro-reflective sheeting. Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure-sensitive adhesives shall be overlapped not less than 5 mm. Where screen printing with transparent colours is proposed, only butt joint shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

1.3.7 Messages/Borders

The messages (legends, letters, numerals etc.) and borders shall either be screen-printed or cut out from durable transparent overlay or cut out from the same type of reflective sheeting for the cautionary/mandatory sign boards. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. For the informatory and other sign boards, the messages (legends, letters, numerals etc.) and borders shall be cut out from durable transparent overlay film or cut-out from the same reflective sheeting only. Cut-outs shall be from durable transparent overlay materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer. For screen-printed transparent colored areas on white sheeting, the co-efficient of retro-reflection shall not be less than 50 percent of the values of corresponding color in Tables 800-2 to 800-8 as applicable. Cut-out messages and borders, wherever used, shall be either made out of retro-reflective sheeting or made out of durable transparent overlay except those in black which shall be of non reflective sheeting or opaque in case of durable transparent overlay.

1.3.8 Colour for Signs

1.3.8.1

Signs shall be provided with retro-reflective sheeting and/or overlay film/ screening ink. The reverse side of all signs shall be painted grey.

1.3.8.2

Except in the case of railway level crossing signs the sign posts shall be painted in 250 mm side bands, alternately black and white. The lowest band next to be ground shall be in black.

1.3.8.3

The colour of the material shall be located within the area defined by the chromaticity coordinates in Table 800-7 and comply with the luminance factor when measured as per ASTM D- 4956.

Table 7 – Color Specified Limits (Daytime)										
Color	1		2		3		4		Daytime Laminate factor (Y %)	
	x	y	x	y	x	y	x	y	Min.	Max.
White	0.303	0.3	0.368	0.366	0.34	0.393	0.274	0.329	15	--
Yellow	0.498	0.412	0.557	0.442	0.479	0.52	0.438	0.472	24	45
Green	0.026	0.399	0.166	0.364	0.286	0.446	0.207	0.771	2.5	11
Red	0.648	0.351	0.735	0.235	0.629	0.281	0.565	0.346	2.5	11
Blue	0.14	0.035	0.244	0.21	0.19	0.255	0.065	0.216	1	10
Orange	0.558	0.352	0.636	0.364	0.57	0.429	0.506	0.404	12	30

Brown	0.43	0.34	0.61	0.39	0.55	0.45	0.43	0.39	1	6
Fluorescent Yellow-Green	0.387	0.61	0.369	0.546	0.428	0.496	0.46	0.54	60	--
Fluorescent Yellow	0.479	0.52	0.446	0.483	0.512	0.421	1.557	0.442	45	--
Fluorescent Orange	0.583	0.416	0.535	0.4	0.595	0.351	0.645	0.355	25	--

1.3.8.4

The Regulatory/Prohibitory and warning signs shall be provided with white background and red border. The legend/ symbol for these signs shall be in black color. The Mandatory sign shall be provided with Blue background and white Symbol/letter.

1.3.8.5

The colors chosen for informatory or guide signs shall be distinct for different classes of roads. For National Highways and State Highways, these signs shall be of green background and for Expressways these signs shall be of blue background with white border, legends and word messages.

1.3.9 Refurbishment

Where existing signs are specified for refurbishment, the sheeting shall have a semi-rigid aluminium backing or materials as per Clause 1.2.5, pre-coated with aggressive-tack type pressure sensitive adhesive. The adhesive shall be suitable for the type of material used for the sign and should thoroughly bond with that material.

1.3.10 Sizes of Letters

1.3.10.1

Letter size should be chosen with due regard to the speed, classification and location of the road, so that the sign is of adequate size for legibility but without being too large or obtrusive. The size of the letter, in terms of x-height, to be chosen as per the design speed is given in Table 08.

Table 8 Acceptable Limits for Sizes of Letters			
Design Speed (Km/hr.)	Minimum 'x' Height of Letters (mm)	Minimum Sight Distance / Clear Visibility Distance (m)	Minimum Distance from Centre Line (m)
40	100	45	12
50	125	50	14
65	150	60	16
80	250	80	21

100	300	90	24
120	400	115	32

The thickness of the letters and their relation to the x-height, the width, the heights are indicated in Table IV (a) of the Annexure-4 of IRC:67 to facilitate the design of the informatory signs and definition plates.

1.3.10.2

For advance direction signs on non-urban roads, the letter size ('x' height) should be minimum of 150 mm for Expressway, National and State Highways and 100 mm for other roads. In case of overhead signs, the size ('X' height) of letters may be minimum 300 mm. Thickness of the letter could be varied from 1/6 to 1/5 of the letter 'x' size. The size of the initial uppercase letter shall be 1-1/3 times x-height. In urban areas, letter size shall be 100 mm on all directional signs. For easy and better comprehension, the word messages shall be written in upper case letters only.

1.3.10.3

Letter size on definition plates attached with normal sized signs should be 100 mm or 150 mm. In the case of small signs, it should be 100 mm. Where the message is long, as for instance in "NO PARKING" and "NO STOPPING" signs, the message may be broken into two lines and size of letters may be varied in the lines so that the definition plate is not too large. The lettering on definition plates will be all in upper case letters.

1.3.11 Warranty and Durability

The Contractor shall obtain from the manufacturer a ten year warranty for satisfactory field performance including stipulated retro-reflectance of the retro reflective sheeting of micro-prismatic sheeting and a seven-year warranty for high intensity grade and submit the same to the Engineer. The warranty shall be inclusive of the screen printed or cut out letters/legends and their bonding to the retro-reflective sheeting. The Contractor/supplier shall also furnish the LOT numbers and certification that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty and that the contractor/supplier is the authorized converter of the particular sheeting.

All signs shall be dated during fabrication with indelible markings to indicate the start of warranty. The warranty shall also cover the replacement obligation by the sheeting manufacturer as well as contractor for replacement/ Repair/ restoration of the retro-reflective efficiency.

A certificate in original shall be given by the sheeting manufacturer that its offered retro- reflective sheeting has been tested for various parameters such as co efficient of retro- reflection, day/night time color and luminance, shrinkage, flexibility, linear removal, adhesion, impact resistance, specular gloss and fungus resistance; the tests shall be carried out by a Government Laboratory in accordance with various ASTM procedures and the results must show that the sheeting has passed the requirements for all the above mentioned parameters, A copy of the test reports shall be attached with the certificate.

1.4 Installation

1.4.1

The traffic signs shall be mounted on support posts, which may be of GI pipes conforming to IS:1239, Rectangular Hollow Section conforming to IS:4923 or Square Hollow Section conforming to IS:3589. Sign posts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally, signs with an area up to 0.9 sq.m shall be mounted on a single post, and for greater area two or more supports

shall be provided. Post-end(s) shall be firmly fixed to the ground by means of properly designed foundation. The work of foundation shall conform to relevant Specifications as specified.

1.4.2

All components of (including its back side) and supports, other than the reflective portion and G.I. posts shall be thoroughly de-scaled, cleaned, primed and painted with two coats of epoxy/ fibre glass/ powder coated paint. Any part of support post below ground shall be painted with protective paint.

1.4.3

The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

1.5 Measurement for Payment

The measurement of standard cautionary, mandatory and information signs shall be in numbers of different types of signs supplied and fixed, while for direction and place identification signs, these shall be measured by area in square metres.

1.6 Rate

The Contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site furnishing of necessary test certificates, warranty and incidentals to complete the work in accordance with these Specifications. .

Item No. 36:- Informatory signs: providing & Fixing sign board made out of 2mm aluminum sheet size 80 X cms. Rectangle as per the design of IRC – 67 – 1977 Pre treated with phosphating process & acid etching : coated with one coat of epoxy primer and two coats of best quality epoxy pinte reflectorized with retro reflective sheeting as per lates MOST specification: 3.1 M long stand post and frame fabricated from suitable size iron angle of 35 X 35 X 3mm . 75 X 75 X 6mm. as required : painted with best quality epoxy coating in black and white bends the details of symbole for each board shall be as per the instruction of Engineer-in-charge, the fixing at site shale be in 1:2:4 CC block of size 45 X 45 x 60 cms. For each leg. Including excavation curing etc. comp. under the supervision of engineer in charge. (B) High intensity grade.

The work of providing and fixing Informatory sign board shall be executed as per relevant specifications of **Item No. 34** of this contract. The measurement shall be in numbers of Informatory sign board supplied and fixed in position.

Item No.37 Cautionary warning Board : Providing and fixing sign boards made out of 2mm alluminium sheet; size 90x90x90 cmseuilateralal triangle as per design of IRC 67 1977. Pre treated with phospheting process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paints; reflectorised with retro reflectivesheeting as per latest MOST specifications; 3.10m long stand postand frame fabricated from suitable sizeiron angle of 35x35x3mm,75x75x6mm as required; painted with bestquality epoxy coating in black andwhite bends the details of symbol foreach board shall be as per theinstruction of engineer in charge the fixing at site shall be in 1:2:4 CC block of size 45x45x60cms for each leg incl. excavation curing ertc. comp. under the supervision of engineer in charge Engineer grade etc comp.

1. The board shall consist of a 90 cm x 90 cm triangular plate of 6 mm thickness at the top and a 90 cm x 61 cm rectangular plate of 6 mm thickness below if fixed at suitable distance. This shall be fixed to the angles iron post. of 75 mm x 75 mm x 6 mm size by means of welding or riveting as directed by the Engineer-in-charge. The angle iron post shall be split at the bottom end to 10 cm (minimum) in length and shall be fixed at right angle to the central line of the road in ordinary concrete of grade as specified in the item, using hand broken metal, field metal or gravel., Two steel bars 12 mm dia, shall also be embedded in concrete for fixing as directed by the Engineer-in-charge. The top of the post shall be at a height of 25 cm. as above the ground level. Concrete platform shall be of the size 45cm x 45 cm and shall project 2.5 cm above ground level and shall be at least 60 cm below ground level. Total height of post shall be 3 Mt. (minimum). The exposed platform shall be neatly finished and its shape shall be as directed by the Engineer-in-charge.
2. The post will be painted with two coats alternatively in black and white strips 23 cm in height after applying one coat of anticorrosive paint. The paint shall be of approved quality. The board shall be painted with approved colour and lettering shall be in accordance with I.R.C. 30 (Standard Letters and Numerals of Different Heights for use on Highway designs) and as per notified signs of Motor Vehicle Act. respectively.
3. The Measurement for payment shall be per number of sign board fixed in position.
4. The unit rate includes the cost of materials, labour tools, drilling of holes, riveting of welding, fixing, curing , lettering painting as directed by the Engineer-in-charge.

Item No. 38 :- Excavation for foundation in hard murrum and boulders and very stiff or sticky, clays and other similar strata including shoring and strutting and dewatering as necessary and disposing of the excavated stuff as directed.

1. Excavation for structures shall consist of the removal of material for the construction of foundations for bridges, culverts, retaining walls, headwalls, cut off walls, pipe culverts and other similar structures, in accordance with the requirements, of these specifications and the lines and dimensions shown on the drawings or as indicated by the Engineer-in-charge. The work shall be include all necessary sheeting, shoring, bracing, draining and pumping and the

removal of all logs, stumps, shrubs, and other deleterious matter and obstruction necessary for the foundations, trimming bottoms of excavations; back filling and clearing up the site and the disposal of all surplus material.

2. After the site has been cleared the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer – in – charge. The contractor shall provide all labor, survey instruments and materials such as strings, pegs nails bamboos, stones, lime mortar, concrete, etc. required in connection with the stting out of works and the establishment of bench mark, centre line stones and other marks and stakes as long as in the opinion of the Engineer – in – charge, they are required for the work.
3. Excavation shall be taken to the with of lowest step of the footing. The contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personal and works and to the satisfaction of the Engineer – in – charge.
4. The depth to which the excavation is to be carried out shall be is shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer – in – charge.
5. Where water is met with in excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing pumping, to keep the foundation trenches dry when so required and to project the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other details

thereof shall be left to the choice of the contractor but subject to approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however not relieve the contractor of the responsibility for the adequacy of dewatering and production arrangements and for the quality and safety of the works.

6. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of movement of water through any fresh concrete. no pumping shall be permitted during the placing of concrete of for any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or other similar means.
7. The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by the Engineer-in-charge. Before footing is laid, the surface shall be slightly watered and rammed. In the event of excavation having been made deeper than that shown on the drawings or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete or masonry of the foundation grade at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level. If there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.
8. Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures.
9. Backfilling shall be done with approved materials after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part

of the structure. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250mm. loose layers, which shall be watered and compacted.

10. All the excavated materials shall be the property of the Government. Where the excavated materials is to be used in the construction of embankment, it shall be directly deposited at the required location, within 100 metres lead.
11. All useful materials not intended for use in the bank, shall be stacked neatly on Government land as directed by the Engineer-in-charge within 100 metres lead. Unsuitable and surplus materials not intended for use shall be disposed off as directed by the Engineer-in-charge.
12. Excavation for structures shall be measured in cubic metres for the Engineer – in – charge encountered limited to the dimensions shown on the drawing or as directed by the Engineer – in – charge. Excavation over increased width cutting of slopes, shoring shuttering and planking shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.
13. The contract unit rate for the items of excavation for structures shall be paid in full for carrying out the required operations including:-
 1. Setting out and fixing bench marks and centre lines stones.
 2. Construction of necessary shoring and bracing and their subsequent removal.
 3. Removal of all logs, stumps, Grubs and other

deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations;

4. Foundation sealing, dewatering including pumping;
5. Backfilling, Clearing up the site and disposal of all surplus material within all lifts and lead upto 100 metres;
6. All labour, materials, tools equipments, safeguards and incidentals necessary to complete the work to the specification.

14. Excavation shall be in hard soil such as stiff heavy clay, hard shale or compacted murrum requiring grafting tool or pick or both and shovel, closely applied and gravel and rubble stone having maximum diameter in any one direction between 75 and 300mm and soft conglomerate. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

15. The payment shall be made on cubic meter basis.

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Item No. 39 :- Excavation in large boulders and soft rock by welding including shoring, strutting and dewatering as necessary and disposing of the excavated stuff as directed.

1. Excavation for structures shall consist of the removal of material for the construction of foundations for bridges, culverts, retaining walls, headwalls, cut off walls, pipe culverts and other similar structures, in accordance with the requirements, of these specifications and the lines and dimensions shown on

the drawings or as indicated by the Engineer-in-charge. The work shall be include all necessary sheeting, shoring, bracing, draining and pumping and the removal of all logs, stumps, shrubs, and other deleterious matter and obstruction necessary for the foundations, trimming bottoms of excavations; back filling and clearing up the site and the disposal of all surplus material.

2. After the site has been cleared the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer – in – charge. The contractor shall provide all labor, survey instruments and materials such as strings, pegs nails bamboos, stones, lime mortar, concrete, etc. required in connection with the stting out of works and the establishment of bench mark, centre line stones and other marks and stakes as long as in the opinion of the Engineer – in – charge, they are required for the work.
3. Excavation shall be taken to the with of lowest step of the footing. The contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personal and works and to the satisfaction of the Engineer – in – charge.
4. The depth to which the excavation is to be carried out shall be is shown on the drawings, unless the type of material encountered is such as to require changes, in which case the depth shall be as ordered by the Engineer – in – charge.
5. Where water is met with in excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing pumping, to keep the foundation trenches dry when so required and to project the green concrete/masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other details thereof shall be left to the choice of the contractor but subject to approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however not

relieve the contractor of the responsibility for the adequacy of dewatering and production arrangements and for the quality and safety of the works.

6. Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of movement of water through any fresh concrete. no pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or other similar means.
7. The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by the Engineer-in-charge. Before footing is laid, the surface shall be slightly watered and rammed. In the event of excavation having been made deeper than that shown on the drawings or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete or masonry of the foundation grade at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level. If there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.
8. Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures.
9. Backfilling shall be done with approved materials after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part of the structure. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250mm. loose layers, which shall be watered and compacted.

10. All the excavated materials shall be the property of the Government. Where the excavated materials is to be used in the construction of embankment, it shall be directly deposited at the required location, within 100 metres lead.
11. All useful materials not intended for use in the bank, shall be stacked neatly on Government land as directed by the Engineer-in-charge within 100 metres lead. Unsuitable and surplus materials not intended for use shall be disposed off as directed by the Engineer-in-charge.
12. Excavation for structures shall be measured in cubic metres for the Engineer – in – charge encountered limited to the dimensions shown on the drawing or as directed by the Engineer – in – charge. Excavation over increased width cutting of slopes, shoring shuttering and planking shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.
13. The contract unit rate for the items of excavation for structures shall be paid in full for carrying out the required operations including:-
 1. Setting out and fixing bench marks and centre lines stones.
 2. Construction of necessary shoring and bracing and their subsequent removal.
 3. Removal of all logs, stumps, Grubs and other deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations;
 4. Foundation sealing, dewatering including pumping;
 5. Backfilling, Clearing up the site and disposal of all surplus material within all lifts and lead upto 100 metres;

6. All labour, materials, tools equipments, safeguards and incidentals necessary to complete the work to the specification.

14. Excavation shall be in soft rock or such as lime stone, sand stone, laterite, hard conglomerate or other soft or disintegrated rock which may be quarried or spilt with crow bars, boulders which do not require blasting having diameter in any direction of more than 300 mm. and any rock which in dry state may be hard, requiring blasting but which when wet become soft and manageable by means other than blasting. The classification of excavation shall be decided by the Engineer – in – charge and his decision shall be final and binding on the contractor.

15. The payment shall be made on cubic meter basis.

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Item No. 40 :- Excavation in hard rock by dry wet blasting and chiselling including dewatering preparing foundation base by proper banching and stepping and disposing of excavated stuff as directed (A) Requiring blasting.

1 to 13. Para of the item of excavation for foundation in sorts of soil shall apply.

14. Excavation shall be in any rock or boulders having diameter in any one direction of more than 300 mm. for which the use of mechanical plant blasting is required. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor. Merely the use of explosive in excavation will not be considered as a reason for higher classification unless blasting is clearly necessary in the opinion of the Engineer-in-charge.

15. Where blasting is prohibited for any reason, excavation shall be carried out by chiseling, wedging or any other approved method.

16. Blasting shall be carried out only with the written permission of the Engineer-in-charge. All the statutory laws, regulations, rules etc. pertaining to the acquisition, transport, storage, handling any use of explosives shall be strictly followed.

17. The Contractor may adopt any method or methods of blasting consistent with the safety and job requirements, after approval from the Engineer-in-charge.

18. The magazine for the storage of explosives shall be build to the design and specifications of the explosives department concerned and located at the approved site. No unauthorized person shall be admitted into the magazine which when not use shall be kept securely locked. No matches or inflammable material shall be allowed in the magazine. The magazine shall have any effective lightening conductor. The following shall be hung in the lobby of magazine.

- (a) A copy of the relevant rules regarding safe storage both in English and in the language with which the workers concerned are familiar.
- (b) A statement of upto date stock in the magazine.
- (c) A certificate showing the last date of testing of the lightening conductor.
- (d) A notice that smoking is strictly prohibited.

The Payment shall be made on Cum basis for complete item.

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Item No. 41 :- Providing and fixing mild steel dowel bars of 32mm dia. For anchoring by drilling holes in foundation strata including necessary bending, hooking of dowel bars and grouting the holes complete as per detailed drawing and as directed.

1. This item provides for necessary Thermo Mechanically Treated (TMT) bars of 32 mm dia anchoring in foundations strata as per detailed drawings and as directed by Engineer – in – charge. For this purpose 100 mm holes shall be kept in staining itself at regular interval as shown in drawings or as directed by Engineer – in – charge. Thermo Mechanically Treated (TMT) bars of approved quality shall be supplied by the contractor at the work place. The item includes transporting the bars to the site of work, handling, cutting, bending, hooking and placing in position as required as per drawing. The grout holes shall be not less than 100 mm dia. The anchorage length of bars shall not be less than 60 times dia. of bar grouting of grout holes shall be of 1:2 proportions (1-part of cement, 2- parts of sand) and shall be done under pressure as directed. These dowel bars shall be inserted through holes kept in the well staining to the bottom of the grout holes. Grout holes shall not be less than 1 Mt. in depth. In case no dowel bars are ultimately decided to be provided in the holes of the staining kept for the purpose, the same shall be filled with the concrete of the same proportion as of well staining at the cost of the contractor.

2. Mode of measurement will be One Running Meter. Of dowel bar considered as one number from bottom of grout hole to the top of staining.

3. Unit rate includes cost of material, labour, tools and plant and grouting holes to complete the work.

Item No. 42 :- Providing & casting in situ ordinary cement concrete M-200 mix and providing necessary pin headers incl. shuttering, scaffolding, laying, vibrating, curing and finishing complete. Without V- Grooves.

The work shall be carried out as per this Tender Item No. 20 except that concreting shall be done in M-200 grade .The contract rate shall be for a unit of One Cmt. of completed item, including temping vibrating, finishing, curing and filling in joints with bitumen complete.

The payment will be made on cmt basis of the finished work.

The unit rate of concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

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Item No. 43 :- Providing & casting in situ ordinary cement concrete M-150 mix and providing necessary pin headers incl. shuttering, scaffolding, laying, vibrating, curing and finishing complete. Without V- Groves.

The work shall be carried out as per this Tender Item No. 20 except that concreting shall be done in M-150 grade .

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The payment will be made on cmt basis of the finished work.

The unit rate of concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

ITEM NO: - 44 Providing and casting in situ controlled cement concrete M-200 Mix for RCC Work in pear cap/ abutment cap and dirt wall incl. controlled c.c.m-250 bed block or pedestals of required size bellow bearing as per detail drawing including centering, Shutturing ,scaffolding , wherever necessary laying vibrating ,curing and finishing complete

1. For controlled concrete, design of the mix shall be approved after preliminary test and all necessary precautions shall be taken in its production to ensure that the required works cube strength is attained and maintained. The controlled concrete shall be in eight grades designated as M. 100, M. 150, M. 200, M. 250, M. 300, M. 350, M. 400 and M. 450 with the suffix 'Controlled' added to it.

2. In the designation of a concrete mix, letter 'M' refers to the mix and the number to the specified 28 days works cube compressive strength of that mix on 150 mm. cubes, expressed in/cm² where ordinary Portland cement conforming to IS: 269 or Portland blast furnace cement conforming to IS: 455 is used, the compressive strength requirements for various grades of concrete shall be as given below:

Grade of Concrete	Compressive work test strength in kg/cm ² on 150 mm. cubes conducted in accordance with IS :516	
	Min. at 7 days	Min. at 28 days
M 100	70	100
M150	100	150
M200	135	200
M250	170	250
M300	200	300
M350	235	350
M400	270	400
M450	300	450

Note - In all cases, the 28 days compressive strength specified in the above Table shall alone be the criterion for acceptance or rejection of the concrete.

Where the strength of a concrete mix, as indicated by tests, lies in between the strength for any two grades specified in the above Table such concrete shall be classified for all purposes as a concrete belonging to the lower or the two grades between which its strength lies.

3. Concrete mix shall be designed on the basis of preliminary tests so as to attain strength at least 33 percent higher than that required on work test. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work in question and can be properly compacted with the means available. Except where it can be shown to the satisfaction of the Engineer-in-charge that supply of properly graded aggregate of uniform quality

can be maintained till the completion of work, grading of aggregate should be controlled by obtaining the coarse aggregates in different sizes and blending them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stock piles, required quantity of material shall be stock piled several hours, preferably a day, before use. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequency for a given job determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.

4. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be weighed separately to check the net weight. Where cement is weighed from bulk stocks at site and not by bags, it shall be weighed separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighted. All measuring equipment shall be maintained in a clean and serviceable condition. Their accuracy shall be periodically checked.

5. It is most important to keep the satisfied water cement ratio constant and at its correct value. To this end, moisture content in both fine & coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions The amount of mixing water shall than be adjusted to compensate for variation in the moisture content. For the determination of moisture content in the aggregates. IS: 2386 (Part-III) shall be referred to Suitable adjustments shall also-be made in the weights of aggregate to allow for the variation in weight of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 210 Kg. per cubic meter in plain concrete and not less than 300 kg/per cubic meter in reinforced concrete structural members. The minimum quantity of cement for prestressed concrete work shall not be less than 300 kg/per cubic meter of concrete not shall it be more than 540 kg/per cubic meter of concrete.

6. Following shall be the maximum, nominal size of coarse aggregate for the deferent Items of work.

Sr. No.	Item of Construction	Maximum nominal size of coarse aggregate
(i)	RCC Well curb, RCC well staining and RCC Piles.	40 mm
(ii)	RCC well staining	63 mm
(iii)	Well cap or pile cap; solid type piers, abutments and wing-walls, and their pier caps	40 mm
(iv)	R.C.C. works in cross gilders deck slab, wearing coarse, kerb, light posts, ballast walls, approach slab etc. arid hollow type piers, abutments wing-walls and their pier caps.	20 mm
(v)	R.C.C. bearings	20 mm

(vi)	For any other item of construction not covered by item (i) to (v)	As specified on the drawing or as desired by the Engineer-in-charge in case it is not specified on drawing.
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For heavily reinforced concrete members as in the case of ribs of main beams, nominal maximum size of aggregates shall usually be restricted to 5 mm. less than the minimum lateral clear distance between the main bars or 5 mm. less than the minimum cover to the reinforcement, whichever is the smaller.

7. Fine aggregate shall be clean, hard, coarse sand. It shall be free from dust and such other substances. The sand shall be got approved by the Engineer-in-charge.

8. All materials shall be stored as to prevent the deterioration of their quantity and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the works.

9. Cement shall be stored above the ground level in perfectly dry and watertight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregates shall be stored in such a way as to prevent admixture of foreign materials. Different sizes of fine or coarse aggregate shall be stored in separate stock piles sufficiently away from such other to prevent intermixing of the materials.

10. The water for mixing shall be potable water to the satisfaction of the Engineer-in-charge. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the job.

11. For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the aggregate shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

12. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-charges, the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another

13. The method of transporting and placing concrete shall be approved by the Engineer-incharge, Concrete shall be so transported and placed that no contamination, segregation or loss of Its constituent material takes place. All form work and reinforcement contained In it shall be cleaned and made free from standing water, dust, snow or Ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

14. If concreting is not started within 24 hours of the approval being given, It shall have to be obtained again from the Engineer-in-charge. Concreting then shall proceed continuously over the

area between constructions joints, Fresh concrete shall not be placed against concrete which has been in position for more than 50 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly design agitators, operating continuously when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator, Except where otherwise agreed to by the Engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used not exceeding 0.30 meter in all other cases.

15. Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into place from a height exceeding 2 meters. When trunking or chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened; swept clean, thoroughly wetted and covered with a 13 mm. thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 33 mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the Wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layers of concrete to be placed on this surface shall not exceed 150 mm. in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.

16. All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns.

17. Immediately after compaction on, concrete shall be protected against harmful effects of either including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and drying out process, It shall be covered with wet sacking, hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 14 days.

18. Form work shall include all temporary or permanent forms required for forming the concrete, together with all temporary construction required for their support. Formwork shall however be divided into following two distinct categories:

- (1) Shuttering i. e. form work required for forming the concrete.
- (2) Scaffolding i. e. formwork required for supporting.

Forms for shuttering shall be constructed only, in metal suitably lined. Forms for scaffolding shall be constructed of metal or timber. Both shuttering shall be of substantial rigid construction and

shuttering shall be true to shape and dimensions shown on the drawings. All bolts and rivets shall be counter-sunk and well ground to provide a smooth, plane surface.

19. Forms shall be mortar-tight and shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports, they shall be strong enough to with stand all pressure, ramming and vibration, without deflection from the prescribed lines occurring during and after placing the concrete. Screw jacks or hardwood wedges where required shall be provided to make up any settlement in the formwork either before or during the placing of concrete. Suitable camber shall provide in horizontal members of structure especially in long spans to counteract the effects of any deflection. The formwork shall be so fixed as to provide for such camber. Forms shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections. Unless otherwise specified or directed chamfers or fillets of sizes 25 mm. x 25 mm. shall be provided at all angles of form to avoid sharp corners.

20. The inside surfaces of shuttering shall, except in the case of permanent form work or where otherwise agreed to by the Engineer-in-charge, be quoted with an approved material to prevent adhesion of concrete to the form work. Release agent shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come into contact with any reinforcement or prestressing tendons and anchorages. Different release agent shall not be used in form work for concrete which will be visible works.

21. Special measures shall be taken to ensure that the form work does not hinder the shrinkage of concrete because without these cracking could occur before the form work is removed. Wherever applicable arrangements must be made to ensure that the form work does not restrain the shortening and hogging of the beams or slabs during tensioning of the tendons. The form work should take due account of the calculated amount of positive or negative camber so as to ensure the correct final shape of the structure having regard for the deformation of false work, scaffolding or propping and the instantaneous or deferred deformation due to various causes affecting prestressed structures. Where there are reentrant angles in the concrete sections the form work could be removed at these sections as soon as possible after the concrete has set in order to avoid cracking due to shrinkage of concrete. Form work shall be tight enough to prevent any appreciable loss of cement during vibration. Suitable tolerance should be provided in the form work. Immediately before concrete all forms shall be thoroughly cleaned. Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness, but such inspection shall not relieve the contractor of his responsibility for safety of men, machinery, materials and for results obtained,

22. The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions that influence the setting of concrete and or the materials used in the mix. Where field operations are controlled by strength tests of concrete the removal of the load supporting or soffit forms may commence when concrete has attained strength equal to at least twice

the stress to which the concrete will be subjected at the time of striking props including the effect or any further additional of loads, when field operations are not controlled by strength tests of concrete the vertical forms of beams, columns and walls may be removed after 2 days. The props of slabs and beams may be removed after 14 and 21 days respectively. All formwork shall be removed without causing any damage to the concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removal parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar, No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge.

23. Immediately after the removal of forms, all exposed bars, all exposed bars of bolts passing through the Cement Concrete member and used for shuttering or any other purpose shall be cut inside the Cement Concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar. All final caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb, spot broken edges or corners and other defects, shall be thoroughly cleaned saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry a consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been pointed shall be kept moist for a period of twenty four hours. If rock pockets/honey-combs, in the opinion of the Engineer-in-charge are of such an extent or character as to effect the strength of the structure materially or to endanger the, life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

24. In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump tests shall be adopted for different types of work:

Type of work		Slump	
		Where vibrators are used	where vibrators are not used
(i)	Mass concrete in R.C.C. foundations, footings and retaining walls.	10 mm to 25 mm	80 mm
(ii)	Beams, slabs and columns simply reinforced	25 mm to 40 mm	100 mm to 120 mm
(iii)	Thin R.C.C. section or section with congested steel	40 mm to 50 mm	125 mm to 150 mm

25. For controlled concrete preliminary tests shall consist of three sets of separate tests and each set, test shall be conducted in on six specimens. Not more than one set of six specimens shall be made on any particular dia. Of the six specimens in each set, three shall be tested at seven days and the remaining three at 28 days. The preliminary tests at 7 days are intended only to indicate the strength likely to be attained at 28 days. Works strength tests shall be made in accordance with IS: 516. Each test shall be conducted on ten specimens five of which shall be tested at seven days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting and cubes shall be made at the rate of one for every 5 cubic meter or concrete of part thereof. However, if concreting done in a day is than 15 cubic meters, the minimum number of cubes can be reduced to 6 with specific permission of the Engineer-in-charge. Similar works tests shall be carried out whenever the quality and grading of materials is changed irrespective of the quantity of concrete poured. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals s poor quality of concrete and in other special cases.

26. The average strength of the group of cubes cast for each day shall not be less than the specified work cube strength 20 percent of the cubes cast each day may have values less than the specified strength, provided the lowest value is not less than 85 percent of the specified strength.

27. R.C.C. work shall have exposed concrete surface. Centering design and its erection shall be approved by the Engineer-in-charge. One carpenter with helper with invariably be kept through out the period of concreting. Movement of labour and other person shall be totally prohibited over reinforcement laid in position. For access to different parts, suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement Timber, kapachi or metal pieces shall not be used for this purpose. Concreting of important structural members shall always be done- in the presence and under the supervision or departmental person not below the rank of Astt. Engineer/Addl. Astt. Engineer/Overseer or as instructed by the Engineer-in-charge. After removal of from work and shuttering, the Executive good quality. Plastering shall not be allowed to the exposed faces of concrete.

28. In reinforced concrete the volume occupied by reinforcement shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.

29. All necessary labour, materials, equipment etc. for sampling, preparing test cubes, curing etc., shall be provided by the contractor. Testing of the materials and concrete may be arranged up the Engineer-in-charge in an approved laboratory at the cost of the contractor.

30. The payment will be made on Cubic Meter basis of the finished work.

31. The unit rate for concrete shall include the cost of all materials, labour, tools and plant required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for

producing concrete of specified strength to complete the structure or its components as shown on the drawings and according to these specifications. The rate shall also include the cost of making, fixing and removing of all centres and forms required for the work.

Item No. 45 :- Providing and laying weep hole in abutments and returns by using AC pipes of 100mm dia. incl. laying in proper grade and joining etc. complete as per detailed specifications.

1. Providing weep holes in abutments and returns using 100 mm dia. A.C. or PVC pipe in G.1 grating incl. cutting, fixing the pipe in required slope & position as directed by Engineer-in-Charge.
 2. Weep holes of 100mm Internal dia. may be provided at 1.00 Mt. C/ C in horizontal and vertical direction. 100mm dia. A.C. pipe or PVC pipe shall be provided for full width of abutment and return. The pipe shall be provided with slope of 1-vertical to 20 horizontal towards draining face (1:20) Grating shall be provided on AC / PVC pipe on inner face of abut & return.
 3. The bottom row of weep holes may be provided just 15 cms. above the ground level or low water level whichever is higher.
 4. Measurement for payment shall be per number of weep holes provided
 5. Unit rate includes the cost of materials, labour, tools, cutting, fixing to complete work.
 6. The rate shall be inclusive of royalties & all taxes and toll tax.
3. Unit rates includes cost of all materials labour and tools to complete the work.

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ITEM NO: -46 Providing and casting in situ Controlled cement concrete M-250 mix for R.C.C. solid slab including centering, scaffolding, curing and finishing complete.

1. For controlled concrete, design of the mix shall be approved after preliminary test and all necessary precautions shall be taken in its production to ensure that the required works cube strength is attained and maintained. The controlled concrete shall be in eight grades designated as M. 100, M. 150, M. 200, M. 250, M. 300, M. 350, M. 400 and M. 450 with the suffix 'Controlled' added to it.

2. In the designation of a concrete mix, letter 'M' refers to the mix and the number to the specified 28 days works cube compressive strength of that mix on 150 mm. cubes, expressed in kg/cm^2 where ordinary Portland cement conforming to IS: 269 or Portland blast furnace cement conforming to IS: 455 is used, the compressive strength requirements for various grades of concrete shall be as given below:

Grade of Concrete	Compressive work test strength in kg/cm^2 on 150 mm. cubes conducted in accordance with IS :516	
	Min. at 7 days	Min. at 28 days
M 100	70	100
M150	100	150
M200	135	200
M250	170	250
M300	200	300
M350	235	350
M400	270	400
M450	300	450

Note - In all cases, the 28 days compressive strength specified in the above Table shall alone be the criterion for acceptance or rejection of the concrete.

Where the strength of a concrete mix, as indicated by tests, lies in between the strength for any two grades specified in the above Table such concrete shall be classified for all purposes as a concrete belonging to the lower or the two grades between which its strength lies.

3. Concrete mix shall be designed on the basis of preliminary tests so as to attain strength at least 33 percent higher than that required on work test. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work in question and can be properly compacted with the means available. Except where it can be shown to the satisfaction of the Engineer-in-charge that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate should be controlled by obtaining the coarse aggregates in different sizes and blending them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stock piles, required quantity of material shall be stock piled several hours, preferably a day, before use. Grading of

coarse and fine aggregate shall be checked as frequently as possible, frequency for a given job determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.

4. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be weighed separately to check the net weight. Where cement is weighed from bulk stocks at site and not by bags, it shall be weighed separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighted. All measuring equipment shall be maintained in a clean and serviceable condition. Their accuracy shall be periodically checked.

5. It is most important to keep the satisfied water cement ratio constant and at its correct value. To this end, moisture content in both fine & coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variation in the moisture content. For the determination of moisture content in the aggregates, IS: 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregate to allow for the variation in weight of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 210 Kg. per cubic meter in plain concrete and not less than 300 kg/per cubic meter in reinforced concrete structural members. The minimum quantity of cement for prestressed concrete work shall not be less than 300 kg/per cubic meter of concrete not shall it be more than 540 kg/per cubic meter of concrete.

6. Following shall be the maximum, nominal size of coarse aggregate for the deferent Items of work.

Sr. No.	Item of Construction	Maximum nominal size of coarse aggregate
(i)	RCC Well curb, RCC well staining and RCC Piles.	40 mm
(ii)	RCC well staining	63 mm
(iii)	Well cap or pile cap; solid type piers, abutments and wing-walls, and their pier caps	40 mm
(iv)	R.C.C. works in cross girders deck slab, wearing coarse, kerb, light posts, ballast walls, approach slab etc. arid hollow type piers, abutments wing-walls and their pier caps.	20 mm
(v)	R.C.C. bearings	20 mm
(vi)	For any other item of construction not covered by item (i) to (v)	As specified on the drawing or as desired by the Engineer-in-charge in case it is not

		specified on drawing.
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For heavily reinforced concrete members as in the case of ribs of main beams, nominal maximum size of aggregates shall usually be restricted to 5 mm. less than the minimum lateral clear distance between the main bars or 5 mm. less than the minimum cover to the reinforcement, whichever is the smaller.

7. Fine aggregate shall be clean, hard, coarse sand. It shall be free from dust and such other substances. The sand shall be got approved by the Engineer-in-charge.

8. All materials shall be stored as to prevent the deterioration of their quantity and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the works.

9. Cement shall be stored above the ground level in perfectly dry and watertight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregates shall be stored in such a way as to prevent admixture of foreign materials. Different sizes of fine or coarse aggregate shall be stored in separate stock piles sufficiently away from such other to prevent intermixing of the materials.

10. The water for mixing shall be potable water to the satisfaction of the Engineer-in-charge. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the job.

11. For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the aggregate shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

12. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-charges, the first batch of concrete from the mixer shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another

13. The method of transporting and placing concrete shall be approved by the Engineer-incharge, Concrete shall be so transported and placed that no contamination, segregation or loss of Its constituent material takes place. All form work and reinforcement contained In it shall be cleaned and made free from standing water, dust, snow or Ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

14. If concreting is not started within 24 hours of the approval being given, It shall have to be obtained again from the Engineer-in-charge. Concreting then shall proceed continuously over

the area between constructions joints, Fresh concrete shall not be placed against concrete which has been in position for more than 50 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly design agitators, operating continuously when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator, Except where otherwise agreed to by the Engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used not exceeding 0.30 meter in all other cases.

15. Unless otherwise agreed to by the Engineer-in-charge concrete shall not be dropped into place from a height exceeding 2 meters. When trunking or chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened; swept clean, thoroughly wetted and covered with a 13 mm. thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 33 mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the Wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed and then coated with neat cement grout. The first layers of concrete to be placed on this surface shall not exceed 150 mm. in thickness, and shall be well rammed against old work particular attention being given to corners and close spots.

16. All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators can not be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns.

17. Immediately after compaction on, concrete shall be protected against harmful effects of either including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and drying out process, It shall be covered with wet sacking, hessian or other similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over the foundation concrete may be started after 48 hours of its laying but the curing of concrete shall be continued for a minimum period of 14 days.

18. Form work shall include all temporary or permanent forms required for forming the concrete, together with all temporary construction required for their support. Formwork shall however be divided into following two distinct categories:

- (1) Shuttering i. e. form work required for forming the concrete.
- (2) Scaffolding i. e. formwork required for supporting.

Forms for shuttering shall be constructed only, in metal suitably lined. Forms for scaffolding shall be constructed of metal or timber. Both shuttering shall be of substantial rigid construction

and shuttering shall be true to shape and dimensions shown on the drawings. All bolts and rivets shall be counter-sunk and well ground to provide a smooth, plane surface.

19. Forms shall be mortar-tight and shall be made sufficiently rigid by the use of ties and bracings to prevent any displacement or sagging between supports, they shall be strong enough to with stand all pressure, ramming and vibration, without deflection from the prescribed lines occurring during and after placing the concrete. Screw jacks or hardwood wedges where required shall be provided to make up any settlement in the formwork either before or during the placing of concrete. Suitable camber shall provide in horizontal members of structure especially in long spans to counteract the effects of any deflection. The formwork shall be so fixed as to provide for such camber. Forms shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections. Unless otherwise specified or directed chamfers or fillets of sizes 25 mm. x 25 mm. shall be provided at all angles of form to avoid sharp corners.

20. The inside surfaces of shuttering shall, except in the case of permanent form work or where otherwise agreed to by the Engineer-in-charge, be coated with an approved material to prevent adhesion of concrete to the form work. Release agent shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come into contact with any reinforcement or prestressing tendons and anchorages. Different release agent shall not be used in form work for concrete which will be visible works.

21. Special measures shall be taken to ensure that the form work does not hinder the shrinkage of concrete because without these cracking could occur before the form work is removed. Wherever applicable arrangements must be made to ensure that the form work does not restrain the shortening and hogging of the beams or slabs during tensioning of the tendons. The form work should take due account of the calculated amount of positive or negative camber so as to ensure the correct final shape of the structure having regard for the deformation of false work, scaffolding or propping and the instantaneous or deferred deformation due to various causes affecting prestressed structures. Where there are reentrant angles in the concrete sections the form work could be removed at these sections as soon as possible after the concrete has set in order to avoid cracking due to shrinkage of concrete. Form work shall be tight enough to prevent any appreciable loss of cement during vibration. Suitable tolerance should be provided in the form work. Immediately before concrete all forms shall be thoroughly cleaned. Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness, but such inspection shall not relieve the contractor of his responsibility for safety of men, machinery, materials and for results obtained,

22. The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions that influence the setting of concrete and or the materials used in the mix. Where field operations are controlled by strength tests of concrete the removal of the load

supporting or soffit forms may commence when concrete has attained strength equal to at least twice the stress to which the concrete will be subjected at the time of striking props including the effect or any further additional of loads, when field operations are not controlled by strength tests of concrete the vertical forms of beams, columns and walls may be removed after 2 days. The props of slabs and beams may be removed after 14 and 21 days respectively. All formwork shall be removed without causing any damage to the concrete. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removal parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar, No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge.

23. Immediately after the removal of forms, all exposed bars, all exposed bars of bolts passing through the Cement Concrete member and used for shuttering or any other purpose shall be cut inside the Cement Concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar. All final caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb, spot broken edges or corners and other defects, shall be thoroughly cleaned saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and of as dry a consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which have been pointed shall be kept moist for a period of twenty four hours. If rock pockets/honey-combs, in the opinion of the Engineer-in-charge are of such an extent or character as to effect the strength of the structure materially or to endanger the, life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of the structure affected.

24. In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips all reinforcement. The degree of consistency which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slump tests shall be adopted for different types of work:

Type of work		Slump	
		Where vibrators are used	where vibrators are not used
(i)	Mass concrete in R.C.C. foundations, footings and retaining walls.	10 mm to 25 mm	80 mm
(ii)	Beams, slabs and columns simply reinforced	25 mm to 40 mm	100 mm to 120 mm

(iii)	Thin R.C.C. section or section with congested steel	40 mm to 50 mm	125 mm to 150 mm
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25. For controlled concrete preliminary tests shall consist of three sets of separate tests and each set, test shall be conducted in on six specimens. Not more than one set of six specimens shall be made on any particular dia. Of the six specimens in each set, three shall be tested at seven days and the remaining three at 28 days. The preliminary tests at 7 days are intended only to indicate the strength likely to be attained at 28 days. Works strength tests shall be made in accordance with IS: 516. Each test shall be conducted on ten specimens five of which shall be tested at seven days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting and cubes shall be made at the rate of one for every 5 cubic meter or concrete of part thereof. However, if concreting done in a day is than 15 cubic meters, the minimum number of cubes can be reduced to 6 with specific permission of the Engineer-in-charge. Similar works tests shall be carried out whenever the quality and grading of materials is changed irrespective of the quantity of concrete poured. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals s poor quality of concrete and in other special cases.

26. The average strength of the group of cubes cast for each day shall not be less than the specified work cube strength 20 percent of the cubes cast each day may have values less than the specified strength, provided the lowest value is not less than 85 percent of the specified strength.

27. R.C.C. work shall have exposed concrete surface. Centering design and its erection shall be approved by the Engineer-in-charge. One carpenter with helper with invariably be kept through out the period of concreting. Movement of labour and other person shall be totally prohibited over reinforcement laid in position. For access to different parts, suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement Timber, kapachi or metal pieces shall not be used for this purpose. Concreting of important structural members shall always be done-in the presence and under the supervision or departmental person not below the rank of Astt. Engineer/Addl. Astt. Engineer/Overseer or as instructed by the Engineer-in-charge. After removal of from work and shuttering, the Executive good quality. Plastering shall not be allowed to the exposed faces of concrete.

28. In reinforced concrete the volume occupied by reinforcement shall not be deducted. The slab shall be measured as running continuously through and the beam as the portion below the slab.

29. All necessary labour, materials, equipment etc. for sampling, preparing test cubes, curing etc., shall be provided by the contractor. Testing of the materials and concrete may be arranged up the Engineer-in-charge in an approved laboratory at the cost of the contractor.

30. The payment will be made on Cubic Meter basis of the finished work.

The unit rate for concrete shall include the cost of all materials, labour, tools and plant required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as shown on the drawings and according to these specifications. The rate shall also include the cost of making, fixing and removing of all centres and forms required for the work.

Item No. :- 47 Providing 12mm thick pre-moulded asphalt filler joints as per drawings.

1. Open joints shall be constructed at the location as directed by the Engineer-in-charge using a wood strip, metal plate, other suitable material which is subsequently removed. When removing the material care shall be exercised to avoid chipping or breaking the corners of the concrete. The edge of the concrete at the joints shall be edge finished. Reinforcement shall not extend across as open joint.
2. When performed filler is to be provided the filler shall be placed in correct position before concrete is placed against the filler. The filler material shall form part of the joining and while concreting the slab, care shall be taken to prevent the former from being displaced. After the work is completed, the exposed face of the joint shall be cleaned of all loose material sticking to it.
3. The material used for filling expansion joint shall be bitumen impregnated felt which shall conform to the requirements of IS:1838 and shall be got approved from the Engineer-in-charge. The joint shall consist of large pieces and assembly of small pieces to make up the required size shall be avoided.
4. The expansion joint shall be measured in Sqm metres. Thickness of the expansion joint will be 12mm. Width of the expansion joint shall be equal to full depth of the slab.
5. The rate shall include the cost of all materials, labour, equipments and other incidental charges for fixing the joints complete in all respect as per these specification.
6. The payment shall be made on Sqm meter basis.

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Item No. 48 :- Providing and casting in situ Controlled cement concrete M – 250 for average 75 mm thick wearing coat laid as directed including temping,vibrating, finishing, curing and filling in joints with bitumen complete.

The work shall be carried out as per this Tender Item No. 20 concreting shall be done in M-250 grade for average 75 mm thick wearing coat laid as directed. Average 12 mm thick joints shall be kept in wearing coat, if required. The same shall be filled with bituminous joint filler as directed.

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The unit rate of concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifications. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

The payment shall be made on cubic meter basis.

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Item No. 49 :- Providing and casting in situ Controlled cement concrete M-250 for approach slab including formwork, curing and finishing complete

The work shall be carried out as per this Tender Item No. 20 except that concreting shall be done in M-250 grade .The contract rate shall be for a unit of One Cmt. of completed item, including temping vibrating, finishing, curing and filling in joints with bitumen complete.

The payment will be made on cmt basis of the finished work.

The unit rate of concrete shall include the cost of all materials, labour, tools and plan required for mixing, placing in position, vibrating and compacting finishing as per directions of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength to complete the structure or its components as show on the drawings and according to these specifica-

tions. The rate shall also include the cost of making/fixing and removing of all centers and forms required for the work.

Item No.50 Providing thermo mechanically treated bars (T.M.T.) Fe415 for R.C.C. work including bending, binding and placing in position etc. complete. As per detailed drawing

1601. DESCRIPTION

This work shall consist of furnishing and placing high strength deformed reinforcement (TMT)bars (untensioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

1602. GENERAL

Steel for reinforcement shall meet with the requirements of IS 1786:2008.

1603. PROTECTION OF REINFORCEMENT

Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on blocks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete, shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency of thick paint This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

1604. BENDING OF REINFORCEMENT

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar Bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer using a proper bar bender, operated by hand or power to obtain the correct radii of bends and shape.

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work and shall not be heated to facilitate straightening.

1605. PLACING OF REINFORCEMENT

The reinforcement cage should generally be fabricated in the yard at ground level and then shifted and placed in position. The reinforcement shall be placed strictly in accordance with the drawings and shall be assembled in position only when the structure is otherwise ready for placing of concrete. Prolonged time gap between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

Bars shall be kept in position usually by the following methods:

In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and

formwork subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut in them accurately, or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed upto a level just below their location.

Layers of reinforcements shall be separated by spacer bar at approximately one metre intervals. The minimum diameter of spacer bar shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.

Necessary stays, blocks, metal chain, spacers, metal hangers, supporting wires etc, or other subsidiary reinforcement shall be provided to fix the reinforcements firmly in its correct position.

Use of pebbles broken stone, metal pipe, brick, mortar or wooden blocks etc., as devices for positioning reinforcement shall not be permitted.

Bar coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in manner such that point of weakness is not created in hardened concrete. The coated reinforcing Reel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose. Reference shall be made to Section 1000 for other requirements.

Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.

1606. BAR SPLICES

1606.1.Lapping

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or $1 \frac{1}{4}$ times the maximum size of course aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

1606.2.Welding

1606.2.1. Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

1606.2.2. While welding may be permitted for mild steel reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS:1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special welding grade of S 41S grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula :

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mg + V}{5} + \frac{Ni + Cu}{15} \text{ is 0.4 or less}$$

1606.2.3. The method of welding shall conform to IS:2751 and IS:9417 and to any supplemental specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetelene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory

joint performance. Precautions on over heating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.

All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible. Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators, welding procedure are adequate to produce and maintain uniform quality at par with that attainable in shop welding to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall have to be qualified by tests prescribed in IS:2751. Inspection of welds shall conform to IS:822 and destructive or non-destructive testing may be undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in 2 or 3 stages, previous surface shall be cleaned properly. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Only competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS:814.

1606.2.4. Welded joints shall preferably be located at points where steel will not be subject to more than 75 per cent of the maximum permissible stresses and welds so staggered that at any one section, not more than 20 per cent of the bars are welded.

1606.2.5. Welded pieces of reinforcement shall be 'tested. Specimens shall be taken from the site and the number and frequency of tests shall be as directed by the Engineer.

1606.3. Mechanical Coupling of Bars

Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swagged on to bars in end to end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 per cent of the characteristic strength of the reinforcement bar.

1607. TESTING AND ACCEPTANCE

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. The fabrication, furnishing and placing of reinforcement shall be in accordance with these specifications and shall be checked and accepted, by the Engineer.

1608. MEASUREMENTS FOR PAYMENT

Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of 15:1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in. the rates for reinforcement

1609. RATE

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, fabricating, transporting* storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work. Payment shall be made

Item No. 51 :- Providing & laying filter Media 600 mm thick directed at the back of abutments, returns and wing walls as per detailed specifications.

1. Well graded pebbled or metal of 40mm to 63 mm size shall be used. The grading and tolerance of metal of pebbles shall be as under:

Sr. No.	No. of size Range	Sieve Designation	percentage by wt. passing through the sieve.
1	63 mm to 40 mm	90 mm	100-00
2		63 mm	90-100
3		53 mm	25-75
4		45 mm	00-15
5		22.4 mm	00-05

The size shall be 40mm to 63 mm where in tolerance limit for over size shall be upto 15% and that for lower size should be upto 15% and below 20mm. It shall be allowable upto 50%. The filter material shall be tightly placed to a thickness of not less than 600mm. and provided over the entire surface behind abutment, wings or return walls to the full height.

2. Material shall be first stacked in boxed 2m x 1.1 / s.m. x 0.5m size on fairly level ground and measured.
3. The measurement for payment shall be made on Sqm basis .
4. The unit rate includes the cost of materials, scaffolding, labour and tools to complete the work.

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Item No.52 Demolition of Brick work and stone masonry including stacking of seviceable materials and disposal of unserviceable materails with all lead and lift (ii) in cement mortar

1.0 Workmanship:

- 1.1 The demolition shall consist of demolition of one or more parts of the building as specified or shown in the drawings. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant item as specified or shown in the drawings.
- 1.2 The demolition shall always be planned before hand and shall be done in reverse order or the one in which the structure was constructed. This scheme shall be got approved from the Engineer - in - Charge before starting the work This however will not absolve the contractor from the responsibility of proper and same demolition.
- 1.3 Necessary dropping, shoring and under planning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismentaling and demolishing is taken up and the work shall be carried out in such a way that no damages is caused to the adjoining property.
- 1.4 Wherever required temporary enclosures of partitions shall also be provided. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.
- 1.5 Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof masonry etc shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed.

- 1.6 All materials obtained from demolition shall be the property of Government unless otherwise specified and shall be kept in safe custody until handed over to the Engineer - in - Charge.
- 1.7 Any serviceable materials obtained during dismantling or demolition shall be separated out and stacked properly as directed with all lead and lift. All unserviceable materials rubbish etc shall be stacked as directed by Engineer - in - Charge
- 1.8 On completion of work the site shall be cleared of all debris rubbish and cleaned as directed.
- 2.0 Mode of measurement and payment
- 2.1 Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed. The demolition of unreinforced cement concrete shall be measured under this item specification deduction for voids openings etc shall be on same basis as that employed for construction of work.
- 2.2 The rate shall be for a unit of one cubic meter.

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Item No.53 Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift (i) RCC work

1.0 Workmanship:

- 1.1 The demolition shall consist of demolition of one or more parts of the building as specified or shown in the drawings. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant item as specified or shown in the drawings.
- 1.2 The demolition shall always be planned before hand and shall be done in reverse order or the one in which the structure was constructed. This scheme shall be got approved from the Engineer - in - Charge before starting the work This however will not absolve the contractor from the responsibility of proper and safe demolition.
- 1.3 Necessary darning, shoring and underpinning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damages are caused to the adjoining property.
- 1.4 Wherever required temporary enclosures or partitions shall also be provided. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.

- 1.5 Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof masonry etc shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed.
- 1.6 All materials obtained from demolition shall be the property of Government unless otherwise specified and shall be kept in safe custody until handed over to the Engineer - in - Charge.
- 1.7 Any serviceable materials obtained during dismantling or demolition shall be separated out and stacked properly as directed with all lead and lift. All unserviceable materials rubbish etc shall be stacked be directed by Engineer - in - Charge
- 1.8 On completion of work the site shall be cleared of all debris rubbish and cleaned as directed.
- 2.0 Mode of measurement and payment
- 2.1 Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed. The demolition of unforcement cement concrete shall be measured under this item specification deduction for voids openings etc shall be on same basis as that employed for construction of work.
- 2.2 The rate shall be for a unit of one cubic meter.

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Item No.54 Providing Mild steel reinforcement for R.C.C work including bending, binding and placing in position complete upto floor two level..

1601. DESCRIPTION

This work shall consist of furnishing and placing high strength deformed reinforcement (Mild steel) bars (untensioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

1602. GENERAL

Steel for reinforcement shall meet with the requirements of IS 1786:2008.

1603. PROTECTION OF REINFORCEMENT

Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the

factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on blocks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

Portions of uncoated reinforcing steel and dowels projecting from concrete, shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

1604. BENDING OF REINFORCEMENT

Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar Bending Schedules.

Bars shall be bent cold to the specified shape and dimensions or as directed by the Engineer using a proper bar bender, operated by hand or power to obtain the correct radii of bends and shape.

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work and shall not be heated to facilitate straightening.

1605. PLACING OF REINFORCEMENT

The reinforcement cage should generally be fabricated in the yard at ground level and then shifted and placed in position. The reinforcement shall be placed strictly in accordance with the drawings and shall be assembled in position only when

the structure is otherwise ready for placing of concrete. Prolonged time gap between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

Bars shall be kept in position usually by the following methods: In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut in them accurately, or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed up to a level just below their location.

Layers of reinforcements shall be separated by spacer bars at approximately one metre intervals. The minimum diameter of spacer bars shall be 12 mm or equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be allowed to sag between supports.

Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc, or other subsidiary reinforcement shall be provided to fix the reinforcements firmly in its correct position.

Use of pebbles broken stone, metal pipe, brick, mortar or wooden blocks etc.,

as devices for positioning reinforcement shall not be permitted.

Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that no point of weakness is not created in hardened concrete. The coated reinforcing bars shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose. Reference shall be made to Section 1000 for other requirements.

Placing and fixing of reinforcement shall be impeded and approved by the Engineer before concrete is deposited.

1606. BAR SPLICES

1606.1. Lapping

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or $1\frac{1}{4}$ times the maximum size of coarse aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

1606.2. Welding

1606.2.1. Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

1606.2.2. While welding may be permitted for mild steel reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS:1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade

including special welding grade of S 41S grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula :

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mg + V}{5} + \frac{Ni + Cu}{15} \text{ is 0.4 or less}$$

1606.2.3. The method of welding shall conform to IS:2751 and 15:9417 and to any supplemental specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetelene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory joint performance. Precautions on over heating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.

All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V bun joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible. Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators, welding procedure are adequate to produce and maintain uniform quality at par with that attainable in shop welding to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall have to be qualified by tests prescribed in IS:2751. Inspection of welds shall conform to IS:822 and destructive or non-destructive testing may be undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in 2 or 3 stages, previous surface shall be cleaned properly. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Oily competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS:814.

1606.2.4. Welded joints shall preferably be located at points where steel will not be subject to more than 75 per cent of the maximum permissible stresses and welds so staggered that at any one section, not more than 20 per cent of the bars are welded.

1606.2.5. Welded pieces of reinforcement shall be 'tested. Specimens shall be taken from the site and the number and frequency of tests shall be as directed by the Engineer.

1606.3. Mechanical Coupling of Bars

Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swagged on to bars in end to end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 per cent of the characteristic strength of the reinforcement bar.

1607. TESTING AND ACCEPTANCE

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. The fabrication, furnishing and placing of reinforcement shall be in accordance with these specifications and shall be checked and accepted, by the Engineer.

1608. MEASUREMENTS FOR PAYMENT

Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of

15:1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in. the rates for reinforcement

1609. RATE

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, fabricating, transporting* storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work. Payment shall be made on M.T. basis