निर्माण प्रबंधन (Construction Management) के सिद्धांत

[Nirman prabandhan (Construction Management) ke Siddhant]

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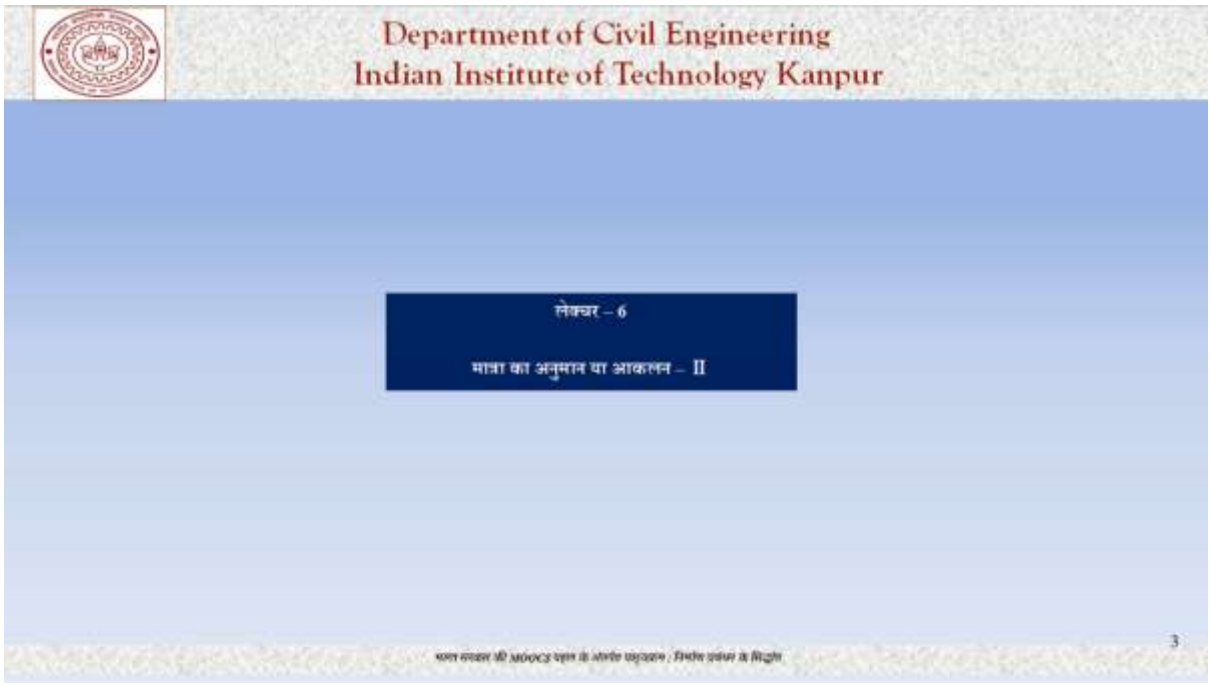
Lecture – 6

Maatra ka anumaan ya aakalan – II

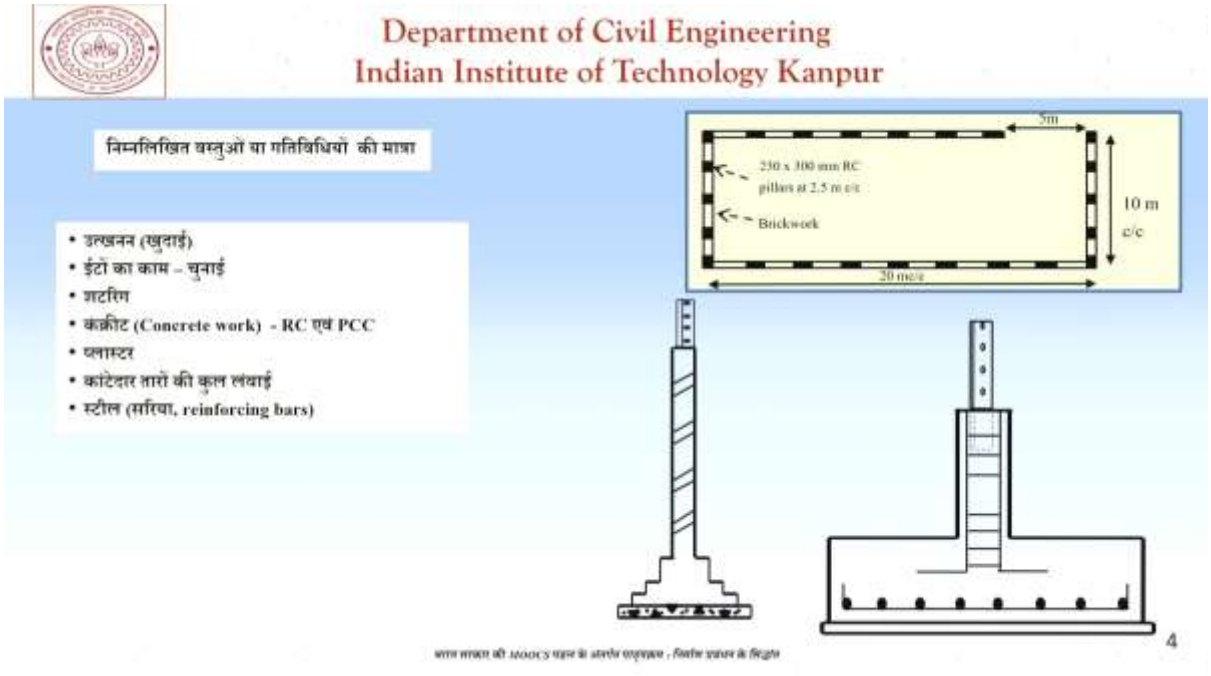
Namaskaar aap sabhee ka phir se svaagat hai Bhaarat sarakaar kee MOOCS pahal ke antargat paathyakram nirmaan prabandhan ke siddhaant ke is 6ven lecture mein.

(Reference Time 00:23)



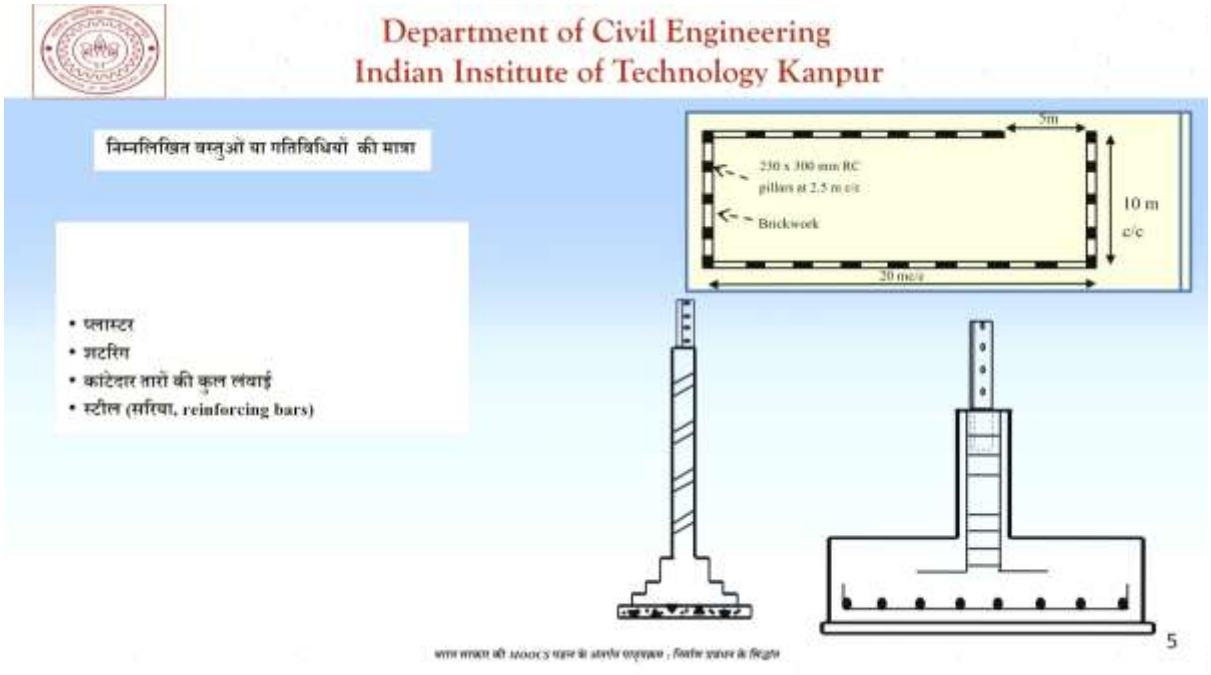
Ham kal charcha kar rahe the Estimation of Quantities (maatra ka anumaan ya aakalan). Usee charcha ko aage badhaate hue ham log aaj isee boundary wall ka udaaharan lenge.

(Reference Time 00:38)



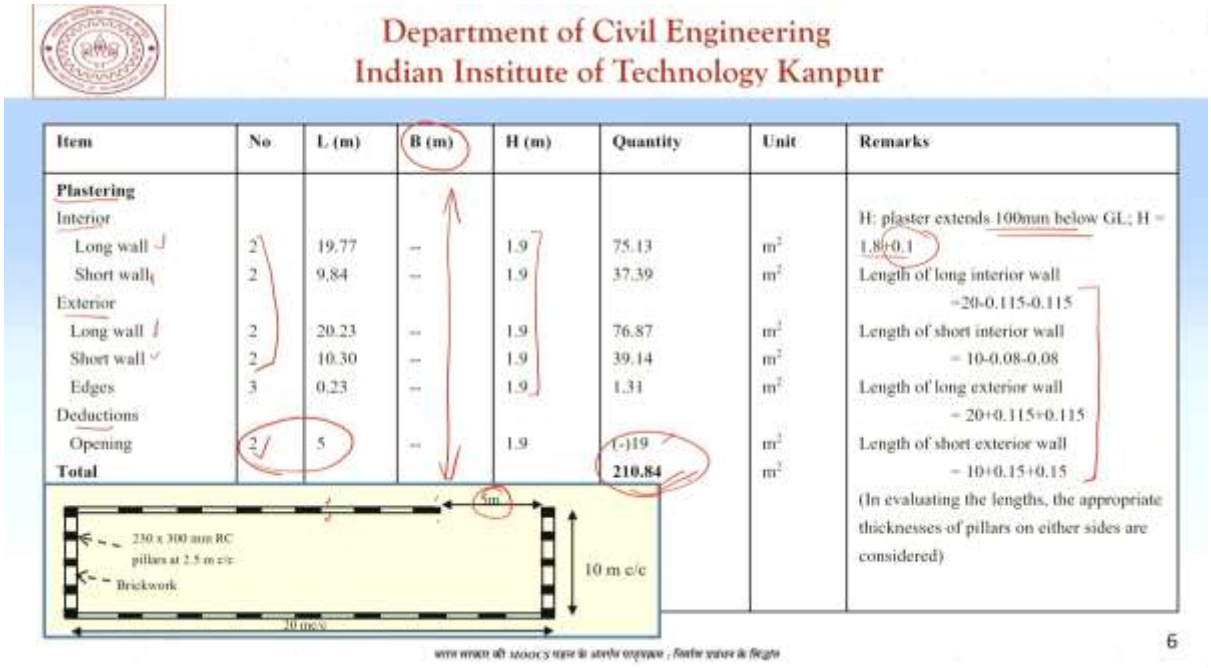
Aur kal ham logon ne jin quantities ko nikaal liya hai, jin gatividhiyon ke bare mein charcha ho chukee hai usase ham aage badhenge.

(Reference Time 00:46)



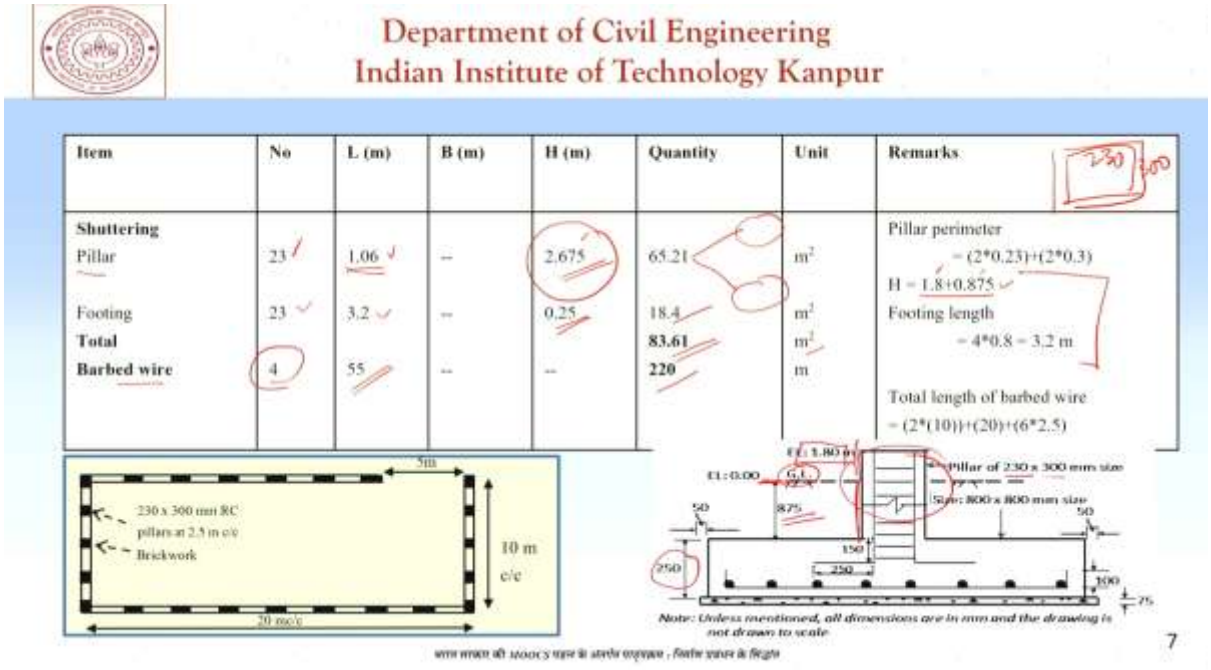
To ham aage badhenge aaj kee charcha mein plaster, shuttering, kaantedaar taaron kee kul lambaee aur steel (sariya ya reinforcing bars) inakee charcha hamako aaj karanee hai.

(Reference Time 00:58)



To ham log pahala item lete hain plastering. Plaster ke bare mein yah tay ho gaya tha ki plaster boundary wall ke donon taraph hoga aur saath hee saath brickwork jo eent kee chunaee hai us par hee nahin balki concrete ke concrete pillars par bhee plaster kiya jaega. Saath hee saath yah bhee tay tha ki plaster jameen kee level se kuchh neeche jaega shaayad 200 mm kee baat huee thee. In tamaam baaton ko dhyaan mein rakhate hue agar ham plastering kee total maatra nikalana chaahen, to hamen yah taalika phir se bharanee hogee. Taalika ka roop vahee hai shivaay isake ki breadth ham logon ko likhane kee aavashyakata nahin hai. Kyonki hamane yah tay kar rakha hai ki plaster ki jo motaee hai vah ham alag se de denge. Us motaee ko de dene ke baad pooree maatra ka aakalan maatra length aur height ke anusaar kshetraphal nikaal karake kiya ja sakata hai. Aaiye ham log isako thoda detail mein dekhen ki hamane isako is tareeke se toda hai ki plastering interior wall, exterior aur phir deduction. Do lambee deevaaren hain, do chhotee deevaaren hain lambee deevaar yah 20 meter vaalee hai, 10 meter vaalee chhotee deevaar hai aur sabhee kee do do sankhyaen hain. In do sankhyaon ko lekar hamane length calculate kee yahaan par jo ki yahaan par dikhaaya gaya hai ki kaise hamane 19.77 ya 9.84, 20.23 aur 10.3 aadi ham log kaise pahunche. Saath hee saath sab jagah kee height ek hai jo ki hai 1.9 m. Us 1.9 meter ke lie bhee yah ganit dee gaee hai ki plaster 100 mm ground level ke neeche dene ka praavadhaan liya gaya hai. To agar ham yah dekhate hain to ham total karake 210 par pahunchenge lekin yah dhyaan rakhie ki hamen opening ko nikaalana hai. To yahaan par yah jo 5 m opening lee gaee hai vahaan par ham isako nikaalenge aur yah do kis lie liya gaya hai? Kyonki andar aur baahar donon taraph plastering karane kee baat thee. Jab donon taraph plastering nahin hogee to yah 2 number lekar ke 5 into 1.9 arthaat 19 square meter kam kar denge to hamen total plastering kee maatra mil jaegee.

(Reference Time 03:34)



To aage chalate hain aur shuttering kee baat karate hain. Shuttering hamako pillars mein chaahie jo ki yah hai jinaka ki size 230 by 300 mm diya gaya hai aur height hamako 2.675 hai jo ki yahaan par nikaalee gaee hai. 1.8 aur .875, yah 875 kahaan se aaya? Ground level se yah diya gaya hai ki 875 mm neeche tak yah pillar extend kar raha hai usake baad footing shuroo hotee hai isalie hamaaree shuttering kee height 1.8 plus .875 arthaat 2.675 aa jaegee aur length 1.06 hai. 1.06 kee length kya huee? 230 by 300 ka pillar hai. To agar hamaaree shuttering chaaron taraph lagaee jaanee hai, to isaka perimeter kitana hua? 300 plus 300 braabra 600 aur 460 arthaat 1060 mm 1.06 meter aur hamen 23 is tareeke ke pillar banaane hain, 23 footing banaanee hai. Footing ke lie ham perimeter nikaal sakate hain usakee height 25 centemeter 250 mm dee huee hai to ham seedhe-seedhe yah quantity nikaal sakate hain. Usakee ham seedhe se ganit karate hain to 83.61 square meter total shuttering kee aavashyakata hogee. Barbed wire ke calculation aasaan hai ki hamen chaar layer mein 55m barbed wire kheenchana hai, kaantedaar jo taar hamaara hai vah 55 meter kee lambaee chaar layer 220 m. Ab isamen kuchh cheejen aap hamesha dhyaan rakhie ki jo yah calculation kiya ja rahe hain usamen wastage ityaadi ka praavadhaan nahin hai. Usamen hamako kuchh wastage kuchh damage saath mein lena hoga to ham jab material khareedate hain arthaat jab thekedaar material khareedega to vo is baat ko dhyaan mein rakhega ki hamen agar 220 meter barbed wire agar chaahiye to kitana wastage aayega kitane tukade banenge 20m ho sakata hai beech mein kaatana pade ya jodana pade kuchh is tareeke kee baaten hongee. To in sab baaton ka dhyaan is calculation mein nahin rakha jaata hai usake baad jab calculation kee jaegee kitana material khareeda jae procure kiya jae usamen vaastavik padaarth ka uses 220 hai, to theek hai 10 percent, 2 percent, 4 percent jitana bhee hoga vah adhik khareeda jaega aur koshish hamesha yah rahatee hai ki wastage aadi kam se kam ho. Ek bindu jis par ki main aapaka dhyaan aakrsht karana chaahata hoon vah yah bhee hai ki yah poora kaaryakram jo maatra ke sateek estimation ka hai, vo kyon kiya ja raha hai? Vah isalie kiya ja raha hai ki ham jahaan tak ho sake ek sateek estimate total laagat ka laga saken. Ek any baat jo main aapako bataana chaahata hoon jo ki concrete mein thee, shuttering mein hai reinforcement work mein bhee hogee vo hai ki hamane yahaan par jab 2.65 meter height lee, to hamane oopar 1.8m yhan se lekar ground level aur ground level se neeche 875 ja karake 2.675 ko ek height maan liya. Ab yah baat sochane kee hai ki agar kya yah height bahut badh jaatee to yah calculation sahee rahata? Calculation tab bhee sahee rahega kyonki jo shuttering kee

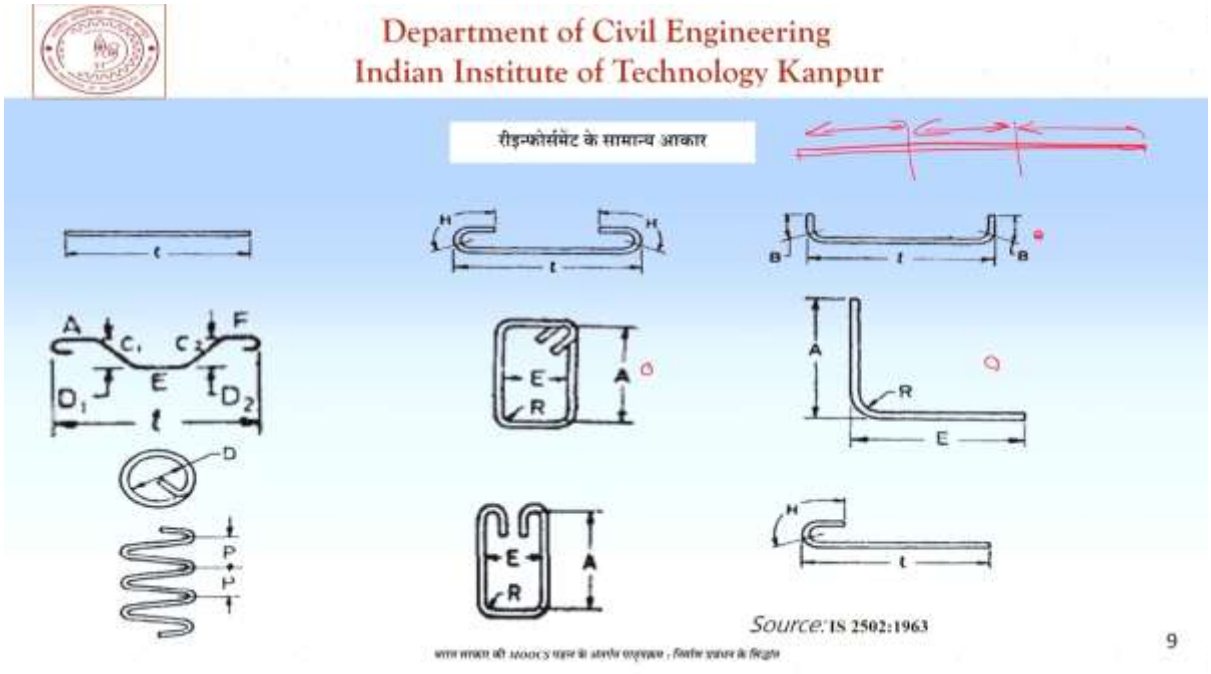
requirement hai vah to vahee hai 65.21 hai to 65.21 hai. Lekin ground ke neeche yahaan par shuttering lagaane mein aur ground ke oopar shuttering lagaane mein jo level of difficulty hai jis tareeke kee chunautiyaan kaamagaaron ko saamane aaenge vah alag hotee hai. To ho sakata hai ki unakee dar alag-alag ho. To yah 65 ko ham divide karana chaahen to divide kar sakate hain. Ground ke neeche kitanee shuttering aa rahee hai, ground ke oopar kitanee shuttering aa rahee hai usako nikaalane ke lie hamen yah 2.675 ko vibhaajit karana padega ki ground ke oopar kee jo height hai vah ground ke oopar kee dar se payment hoga ground ke neeche jo hai vah ground ke neeche kee dar se payment hoga, yah baaten anubandh mein description of items jo kaary ka vivaran hai usamen dee gaee hotee hai. Us par jab ham charcha karenge to hamen lagata hai ki yah baat aapako aur spasht roop se samajh mein aa jaegee.

(Reference Time 08:09)

To aaiye aage chalate hain ham log baat karate hain reinforcement kee. Yah thoda sa mushkil ho sakata hai samajhane ke lie lekin ham usako jahaan tak ho sakega saral bhaasha mein samajhaane kee koshish karenge. Aap logon ne agar koee nirmaan kaary dekha hoga, to dekha hoga ki is prakaar se reinforcement yaanee sariya steel ka jaal banaakar ke rakha jaata hai aur usake baad yahaan par shuttering laga karake isake andar concrete kee jaatee hai. To yahaan par ye pillar bhee hai to ham yahaan par pillar kee bhee shuttering lagaenge peechhe ek ye plank aaega aise karake pillar kee shuttering lagegee aur phir yah pooree concrete bhar dee jaegee. Jahaan tak sariya ka savaal hai usaka aakaar alag-alag ho sakata hai. Ye vaalee sariya agar aap dekhenge to seedhee sariya hai jabaki yahaan par ye vaalee jo sariya hai vah ek L shape mein hai. Yah vaalee yah sariya yahaan baandhee gaee hai vo ek box ke tareeke se hai. Na sirph aakaar balki inaka vyaas arthaat diameter bhee alag-alag ho sakata hai. To sariya ke requirement ko calculate karane mein yah dhyaan mein rakhana chaahie ki hamako kis diameter kee kitanee length chaahie (kitanee lambaee) chaahie. To vajan to theek hai chaahe vah 1 ton hai ya 2 ton hai, 4 ton hai jo bhee hai utanee sariya to chaahie, lekin sariya vibhinn diameter kee milatee hai. To hamen kis diameter kee kitanee sariya chaahie yah dhyaan mein rakhana chaahie. Yah ek udaaharan tha jahaan par ki sariya kee shape complicated nahin thee. Agar ham is udaaharan ko dekhate hain to ek bada tank hai jisamen

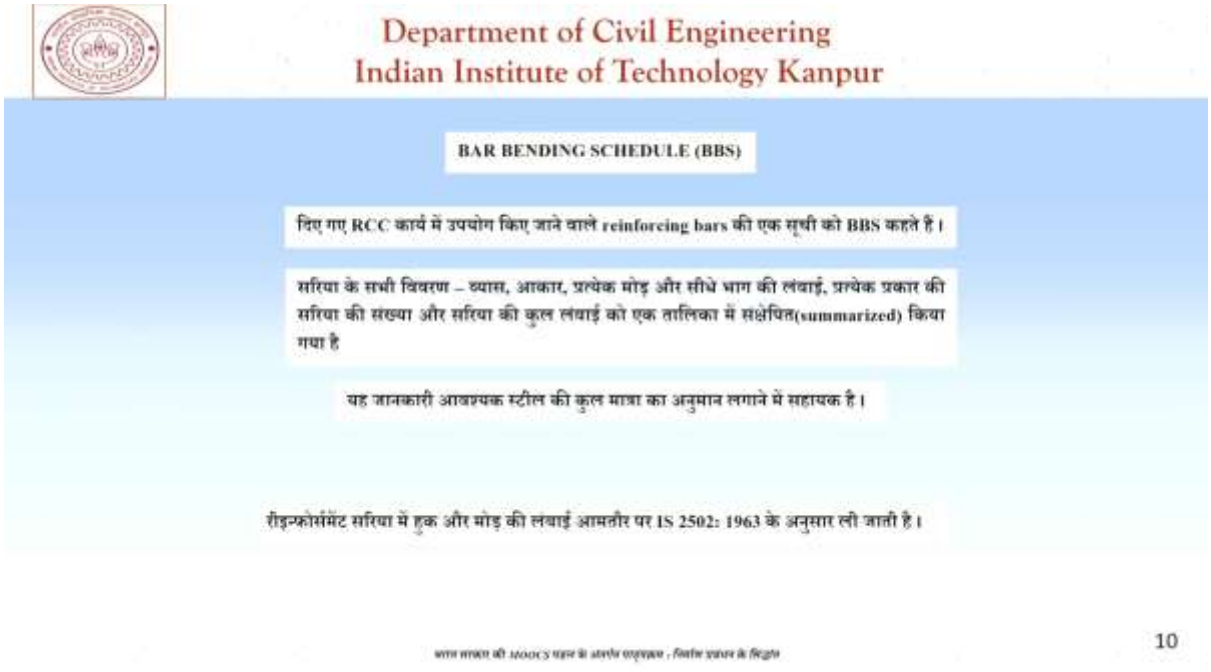
ki aap dekh sakate hain ki yah radial hai arthaat golaakaar hai isamen rectangular sariya nahin hai isamen yah vaalee shape to L hai lekin yah vaalee jo sariya lagee hai vah ek tareeke se ghumaavadaar hai. In sab baaton ko sariya ke aakalan mein sariya ke estimation mein dhyaan mein rakhana hota hai.

(Reference Time 10:15)



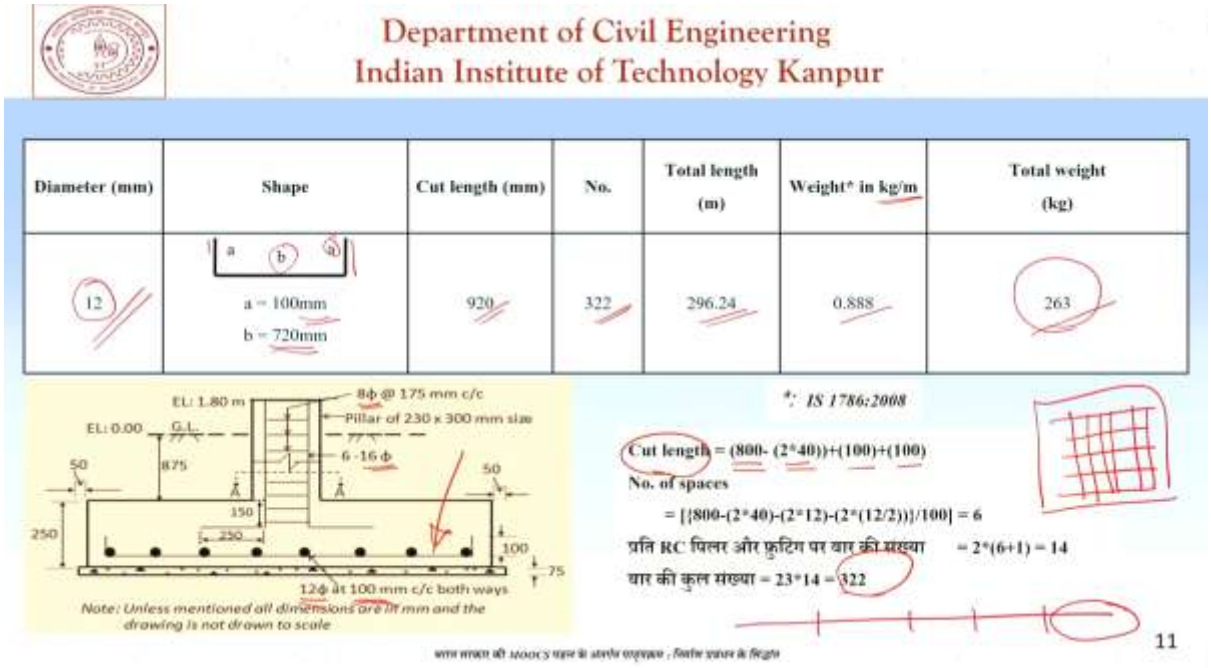
To is slide mein saamaany roop mein jitane aakaar kee sariya ham log building nirmaan mein, normal nirmaan mein use karate hain vah dikhaaya gaya hai. Ab aap yah dekhie ki jab sariya seedhee aatee hai to hamako yah pata hona chaahie ki hamako kis maap ke tukade kie jaen taaki chaahe vah is tareeke kee sariya ban sake ya is tareeke kee sariya ban sake ya L shape mein sariya ban sake. To is prakaar sariya ko ek anushaasan mein rahate hue kitanee sariya hamako kis tareeke kee chaahie isako banaane ka jo tareeka hota hai usako ham kahate hain bar bending schedule.

(Reference Time 11:03)



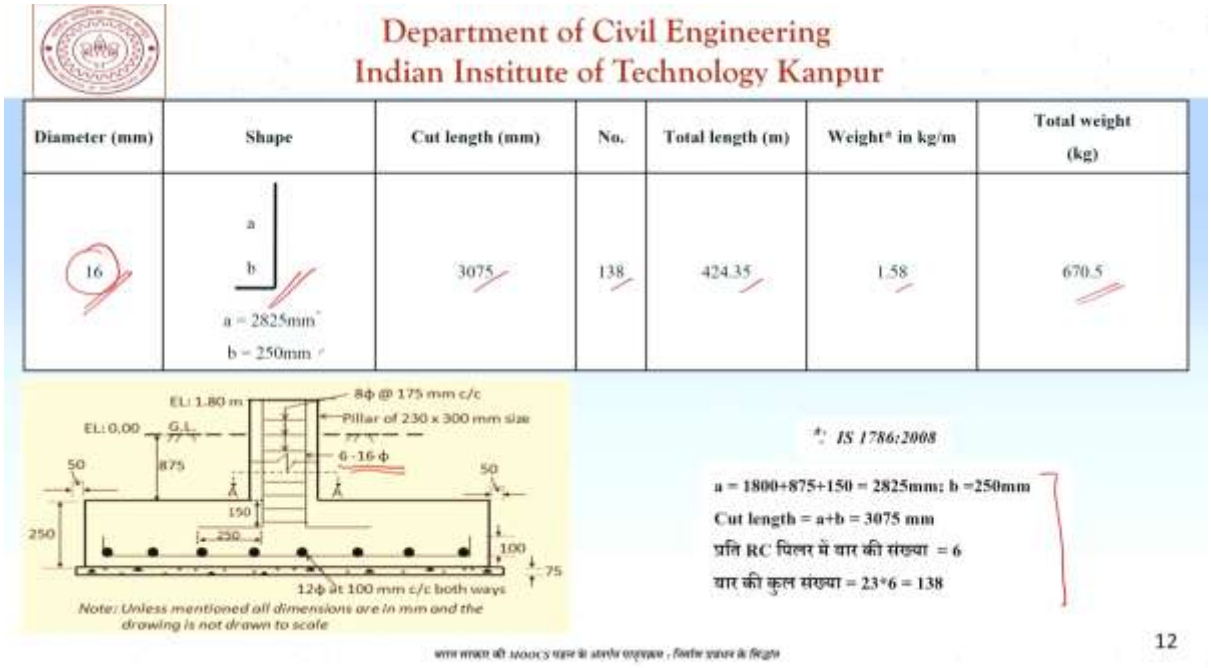
Yah bar bending schedule kya hota hai? Die gae RCC kaary arthaat reinforcement concrete ke kaary mein upayog kiya jaane vaala reinforcing bars kee ek suchi hotee hai usako ham kahate hain bar bending schedule. Us bar bending schedule mein kya dikhaaya jaata hai? Sabhee vivaran arthaat vyaas, aakaar, pratyek mod aur seedhe bhaag kee lambaee, pratyek prakaar kee sariya kee sankhya aur sariya kee kul lambaee isako ham ek taalika mein sankshipat roop mein dikhaate hain, vo kahate hain bar bending schedule. To bar bending schedule banaane ke lie yah aavashyak hai ki ham drawing se har prakaar kee sariya kee shape aur unake nambar sahee tareeke se nikaal sake. Yah jaanakaaree aavashyak steel kee kul maatra ka anumaan lagaane mein bahut sahaayak hotee hai balki isake bina ham isaka anumaan laga hee nahin sakate hain. Reinforcement ya sariya ke hook aur mod kee lambaee aamataur par IS 2502 ke anusaar lee jaatee hai.

(Reference Time 12:07)



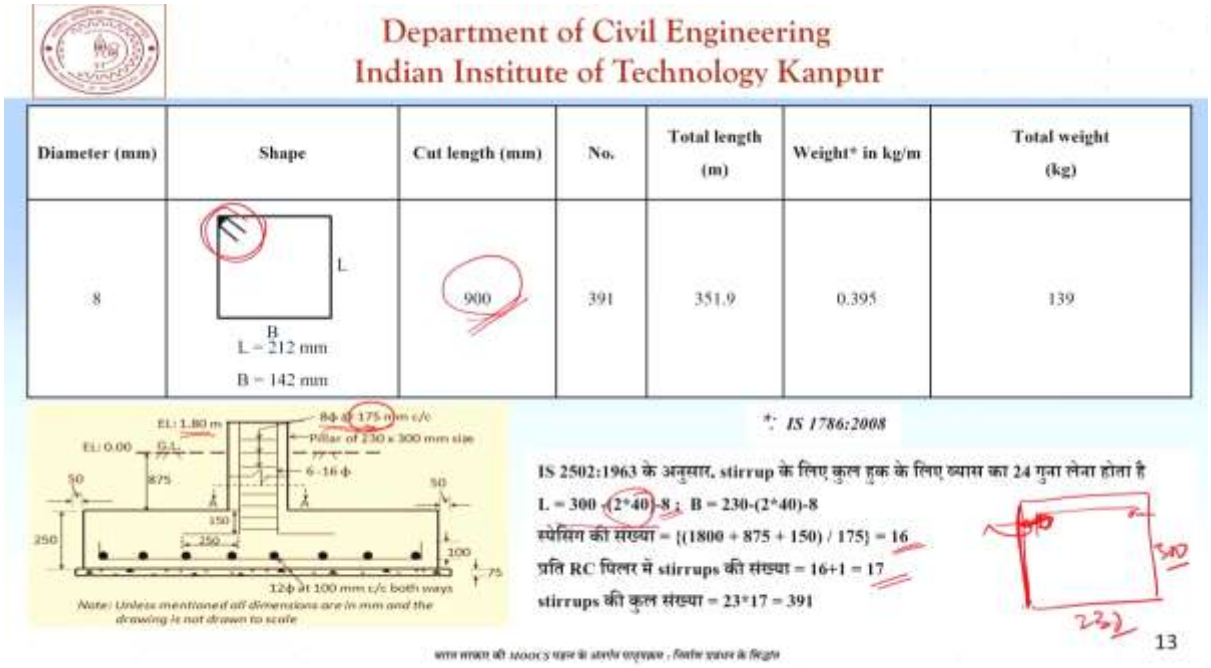
Aaiye ab ham is baat kee charcha karate hain ki hamaaree yah boundary wall hai. Usamen kis prakaar kee sariya ka prayog hona hai? To agar aap dekhenge ki yahaan par 12 mm kee hai, yahaan par 16 hai aur yahaan par 8 hai, to isamen ek simple udaaharan liya gaya hai jisamen ki hamane sirph 3 diameter kee sariya lee hai. To yah jo taalika dee gaee hai yah 12 mm diameter kee sariya kitanee chaahie aur kis size kee chaahie, usako dikha raha hai. 12 mm kee sariya hamako chaahie yaanee footing ke neeche aane ke lie usakee shape is prakaar kee hogee, yoo shape hogee . Jisamen kee ek b hai aur ek a hai, b kya hua? 720 . Ab yah 720 kahaan se aaya? 800 hamaaree footing kee total lambaee aur chaudaee hai. Us 800 mein se hamane 40-40 mm ka cover nikaal diya aur ye 100 hamane jode is A ke. To hamaaree cut length ho gaee 920. Is prakaar kee sariya hamen chaahie kitanee? 322. Yah 322 kahaan se aaya? Ham 800 by 800 kee spacing mein is prakaar se sariya rakhenge, yah isamen dikhaaya gaya hai aur inakee spacing 100 mm hai. To agar us spacing ko dhyaan mein rakhate hue total calculation karenge to ham paenge ki yah 322 is prakaar kee U shaped sariya hamako chaahie. Agar ham 322 sariya lete hain jisakee ki cut length 920 hai, to hamen total length 296.24 mm 12 mm vyaas kee sariya chaahie. Isaka par meter vajan .888 hai aur isalie total weight jo ki hamen 12 mm kee sariya ka chaahie is boundary wall. Mein vo hai 263 kilo. Ab is 263 kilo mein phir vahee baat aatee hai ki kya jab ham 920 mm kee pieces kaatenge, to ham ek badee sariya mein se 920-920 kaatate chalenge to kya hamen yahaan par ek wastage nahin hoga? In sab baaton ko dhyaan mein rakhana hoga. Ham kitanee sariya kis length kee lekar aae kis prakaar se kaate usako manage karana ek chhotee see kala hai.

(Reference Time 14:45)



Aage badhate hain aur ham dekhate hain 16 mm kee sariya ko. 16 mm kee sariya hamaaree use ho rahee hai yahaan par pillar mein aur yah hai L shape mein to yahaan par A aur B calculation karane kee vidhi dee huee hai total cut length dee huee hai aur usake number aa jaenge total length aa jaegee. Weight diya hua hai aur hamaara total weight aa jaega. To is prakaar ham yah dekhenge ki hamen 16 mm kee diameter kee sariya mein 670.5 kilo steel chaahie.

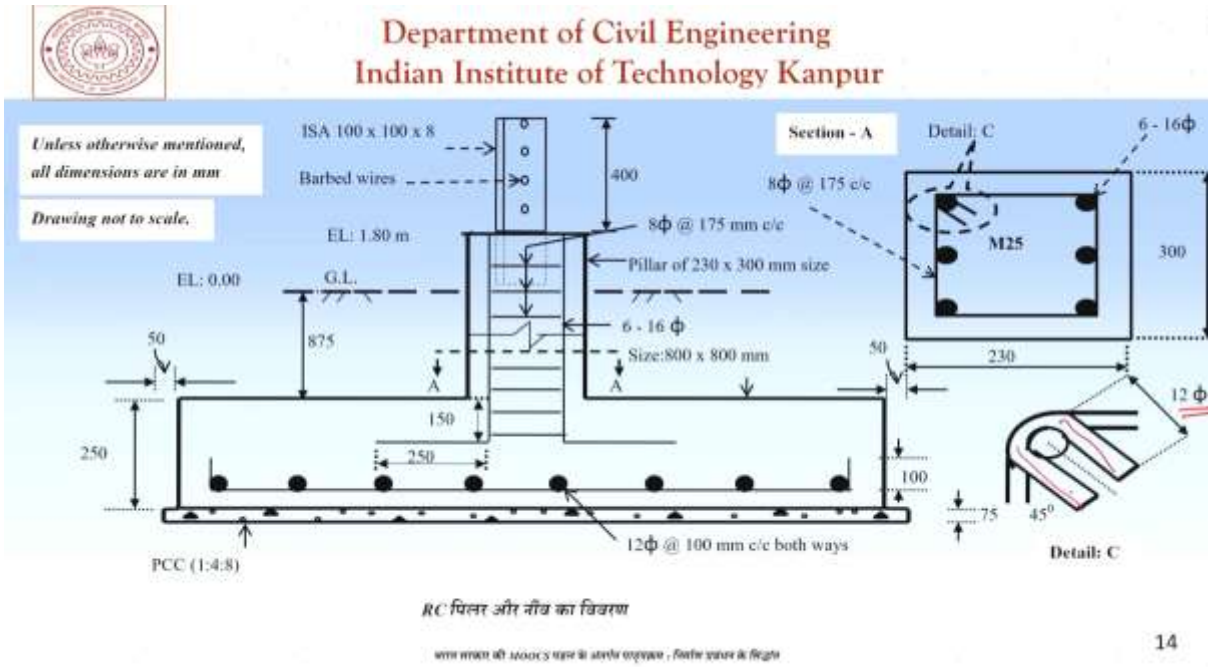
(Reference Time 00:22)



Isake aage ham log chalate hain is shape kee sariya mein jo ki hamaare pillars mein 175 center too center total ek 1.8 se lekar ke -.875 tak lagegee. To is prakaar se hamen 16 spaces

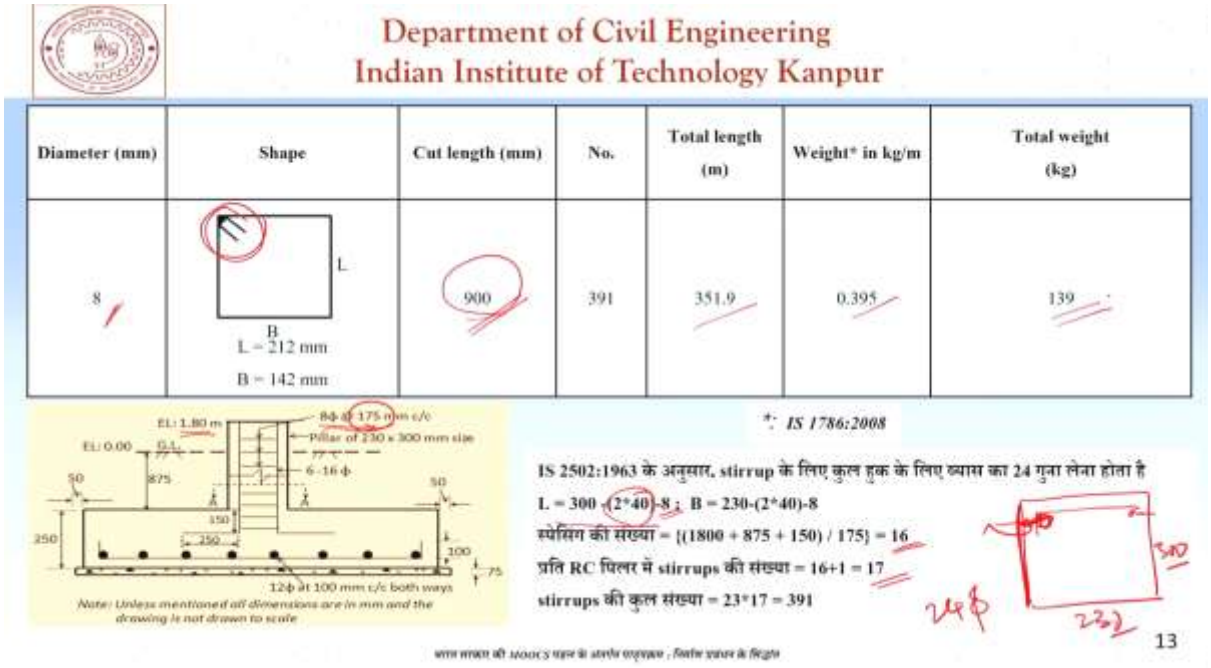
ho gaeen, 17 stirrups hamaare lagenge. Har stirrups ke lie hamen cut length 900 lenee hogee. Ab 900 kyon lenee hogee? Usaka calculation yahaan par diya hua hai ki 300 minus 2 into 40 minus 8. Ye 2 into 40 kya hai? Ye diya hua tha cover, aapako dhyaan hoga ki hamane kaha ki agar concrete yahaan par hai aur hamaaree sariya yahaan par hai to is distance ko yah jo clear spacing hotee hai is satah se lekar sariya tak is satah ko cover kahate hain aur is drawing mein 40 mm lene ka praavadhaan kiya gaya hai. To 230 by 300 agar pillar hai, to dono taraph se 40, 40 mm yah kam ho jaayega. Ab yah 8 mm aur kyon kam kiya gaya hai yah mai aapake liye chhod deta hoon sochane ke liye. Soch ke dekhiyega ki ye 8 mm aakhir kyon kam kiya gaya hai aur saath hee saath tab bhee ye 900 nahee aayega. Ye 900 nahee aayega kyonki ye hook is length mein is lambaee mein abhee accounted nahee hai.

(Reference Time 16:56)



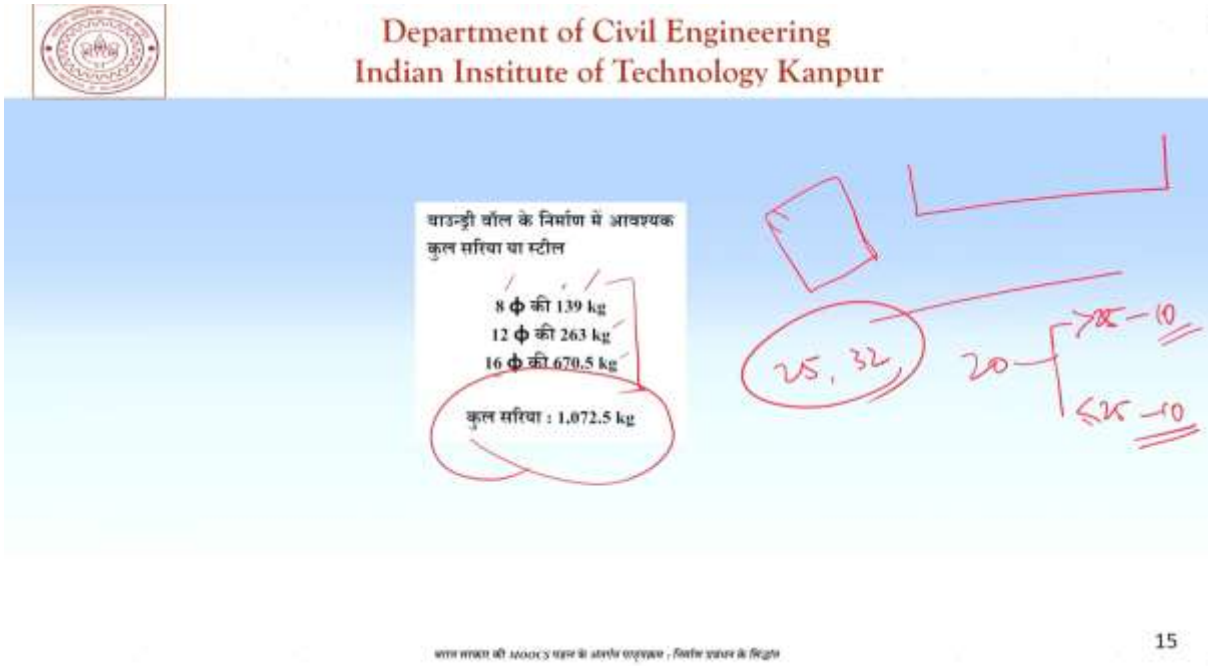
Is hook kee lambaee aapako yaad hoga yahaan par dee huee thee jo ki diya hua hai 12 phaee. To ek hook idhar ek hook udhar.

(Reference Time 17:06)



Arthaat total 24 times phaee yah bhee hamako jodana hoga cut length nikaalane ke liye. In sab baaton ko dhyaan mein rakhakar ham total length nikaalate hain 351.9 agar ye ham dhyaan mein rakhen aur isaka weight hai .395 to hamen 8 mm kee sariya 139 kilo chaahiye.

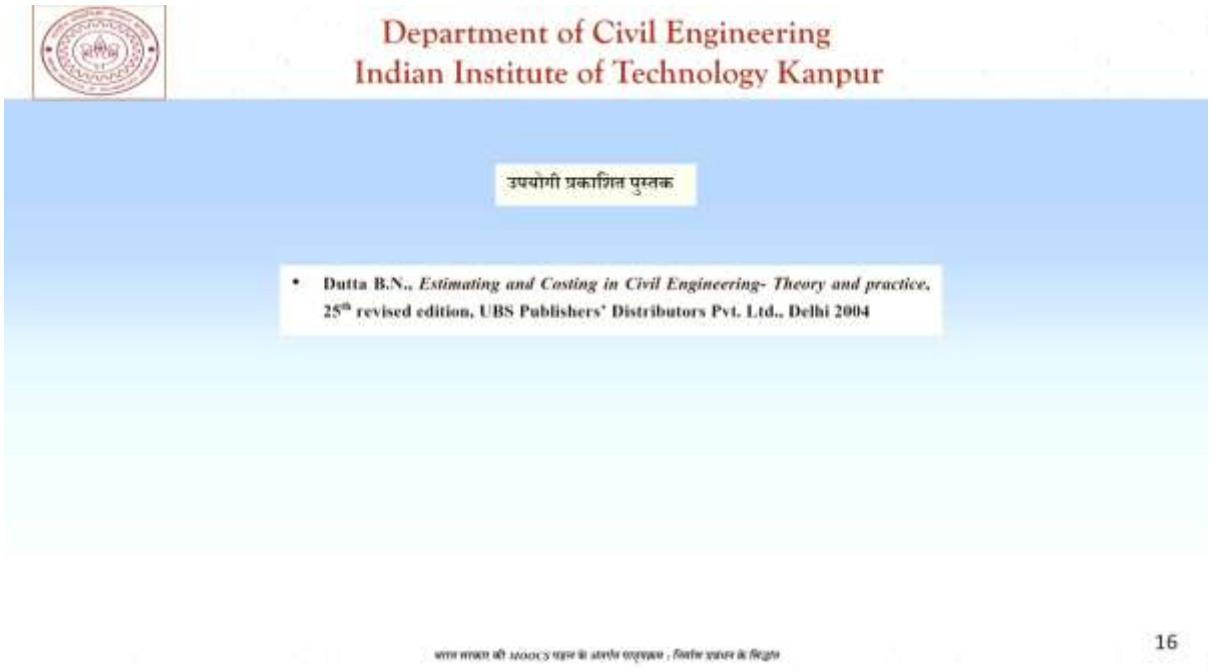
(Reference Time 17:33)



Agar ab ham isakee summary banaate hain. To hamako dikhaee padata hai ki 8 mm kee 139 kilo, 12 mm kee 263 kilo aur 16 mm kee 670.5 kilo arthaat kul sariya ka requirement ya aavashyakata hamako is project mein 1,072.5 kilo ka hai. Ab yah baat sochane kee hai ki kya jitana shram karana padega, 8 mm kee sariya ko ek shape dene ke liye is udaaharan mein shape dee gayee hai ye box kee is prakaar se. Is shram ke mukaabale is prakaar se U shape

mein usako modana ya seedhee sariya rakh dena, kya sabhee mein ek sa shram lagega? Obviously hai uttar bilkul spasht hai ki nahee shram alag-alag lagega. 8 mm kee sariya patalee hotee hai usako moda toda aasaanee se kiya ja sakata hai. 25 mm, 32 mm agar sariya hone lagatee hai tab modana kathin ho jaata hai, unako kaatana kathin ho jaata hai. To aksar yah dhyaan mein rakhana hota hai projects mein ki agar sariya ka diameter bahut badh gaya hai to usaka rate alag se liya jaega. Bahut kam ho gaya hai to usaka rate alag se liya jaega. To jis prakaar se hamane charcha kee thee starting ya concrete kee jahaan par ki vibhaajan kiya ja sakata hai oonchaee ke aadhaar par, jameen se kitana oopar hai kitana neeche hai usamen chunautiyaan alag-alag hongee isalie ham usako quantity ko divide karen alag-alag dekhen. Sariya ke kaam mein aksar yah vibhaajan diameter ke aadhaar par hota hai. To theek hai kal 20 ton sariya hogee lekin 25m se jyaada 10 ton hai aur 25 mm se kam ya 25 mm aur usase kam bhee 10 ton hai. To is 10 ton ka rate aur is 10 ton ka rate alag-alag ho sakata hai. In sab baaton ko dhyaan mein rakhate hue ham ab taiyaar hain is boundary wall ke estimation ke lie. Lekin phir se main aapako yaad dila doon ek maatra hamane isamen nahin dee hai pichhale lecture mein bhee vah baat huee thee ki vo kaun see maatra hai jo ki chhoot gaee hai. Usako aap apane aap sochie aur yah dekhie ki kya ham vaastav mein is boundary wall ke ek estimate banaane ke lie taiyaar hain. Isake saath aaj ka lecture ham samaapt karate hain.

(Reference Time 20:10)



Aur upayogee pustak ke lie mera sujhaav hai vahee B.N. Dutta 'Estimating and Costing in Civil Engineering' yah aapako bahut upayogee ho sakatee hai. Dhanyavaad. Jay hind.