निर्माण प्रबंधन (Construction Management) के सिद्धांत

[Nirman prabandhan (Construction Management) ke Siddhant]

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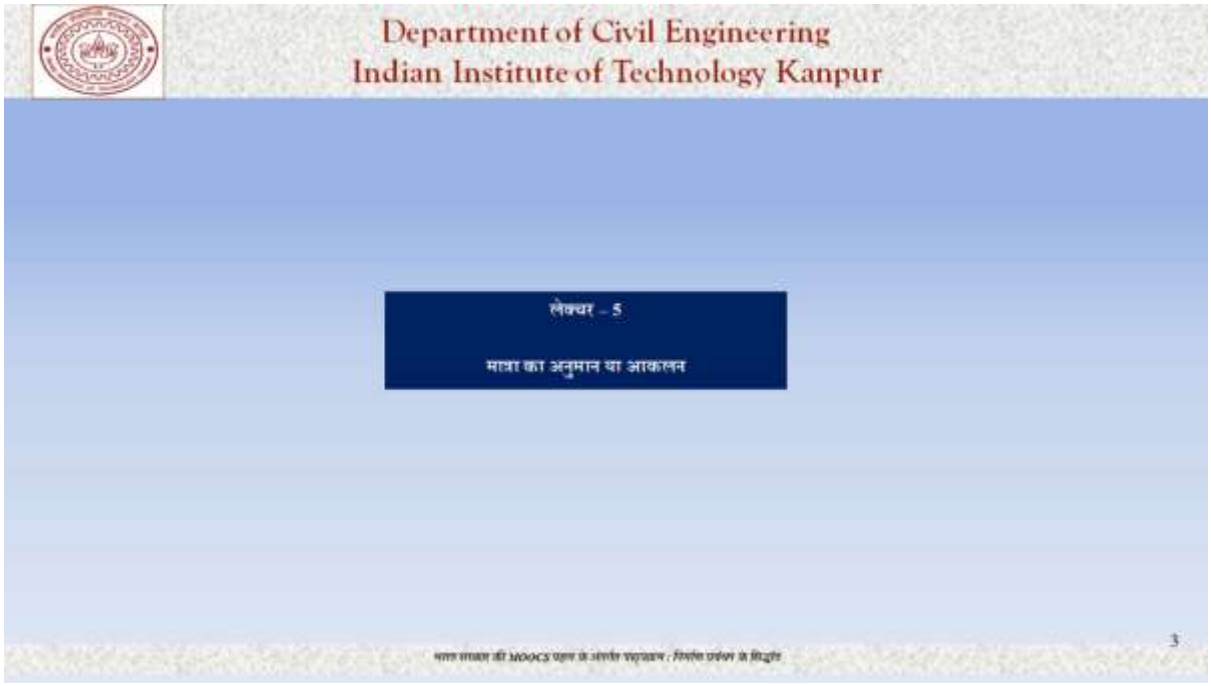
Lecture – 5

Maatra ka anumaan ya aakalan

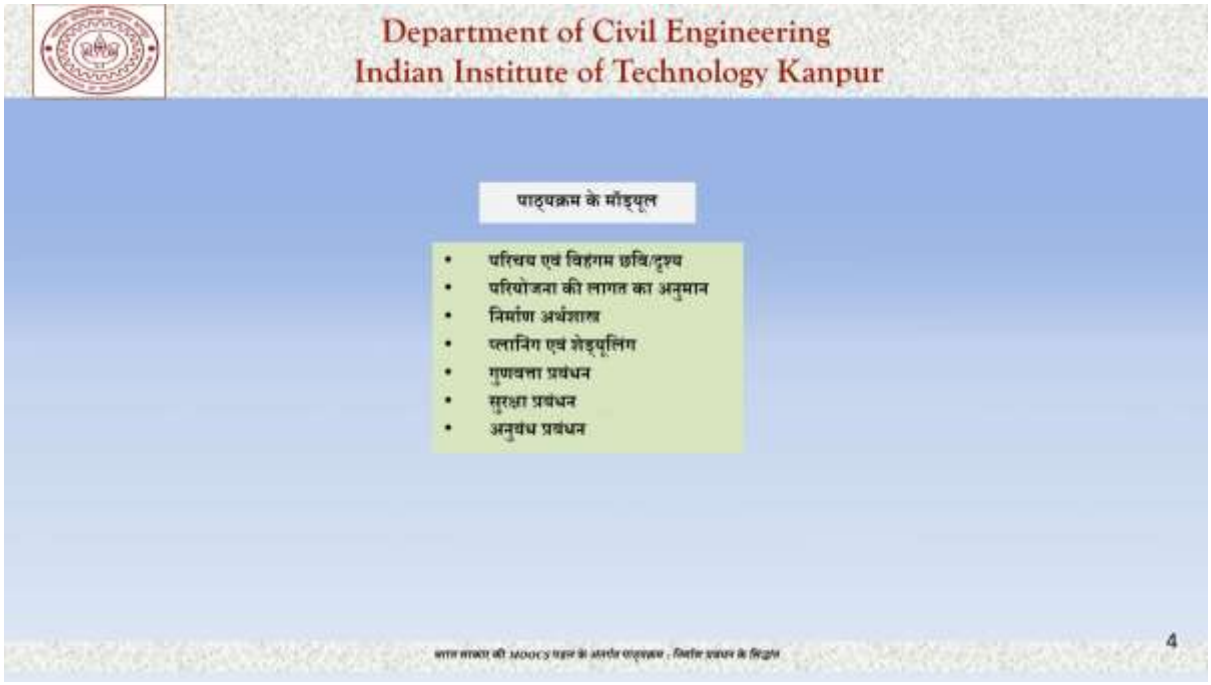
Namaskaar aapaka phir se svaagat hai Bhaarat sarakaar kee MOOCS pahal ke antargat is paathyakram Nirmaan Prabandhan ke Siddhaant mein.

(Reference Time 00:22)



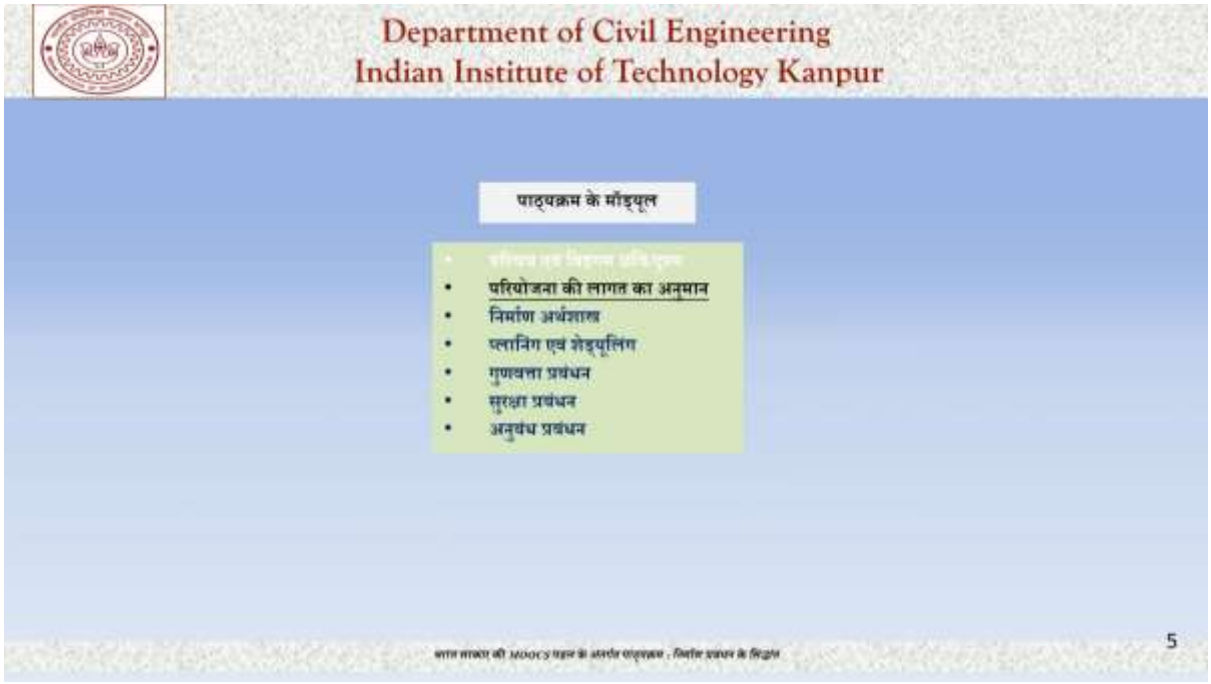
Aaj ham log lecture 5 par hain, 5ven lecture par aur hamaara focus rahega Estimation of Quantities yaanee kisee bhee gatividhi ya kaary kee maatra ka anumaan lagaana ya usaka aakalan karana.

(Reference Time 00:37)



Is paathyakram ke jo module jis par ham log charca kar rahe hain vo yahaan par dikhae gae hain.

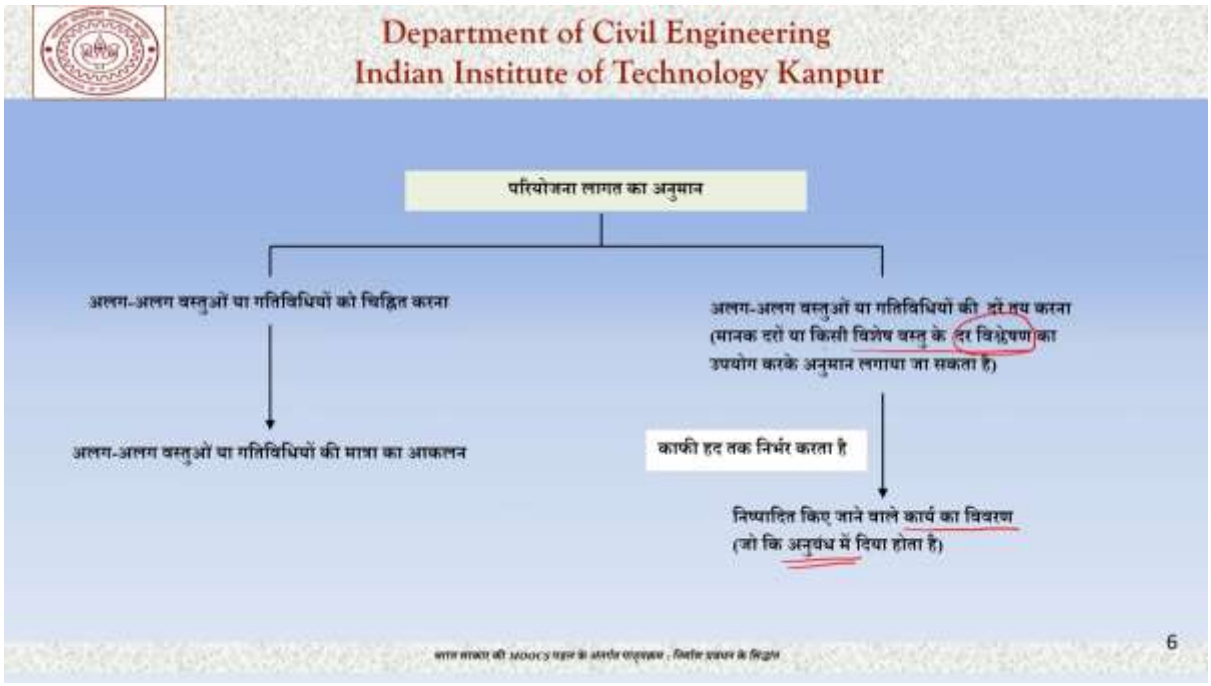
(Reference Time 00:22)



Aur isamen se jo pahala module tha parichay evan vihangam chhavi ya drshy us par hamaaree charca samaapt ho chukee hai. Aaj ham log charca shuroo kar rahe hain pariyojanaon kee laagat ka anumaan arthaat kisee bhee nirmaan kaary mein kitanee laagat

aaegee is baat kee charca karana is module ka pramukh uddeshy hai. Usake antargat ham log aaj baat karenge gatividhiyon kee maatra ke aakalan ya anumaan kee.

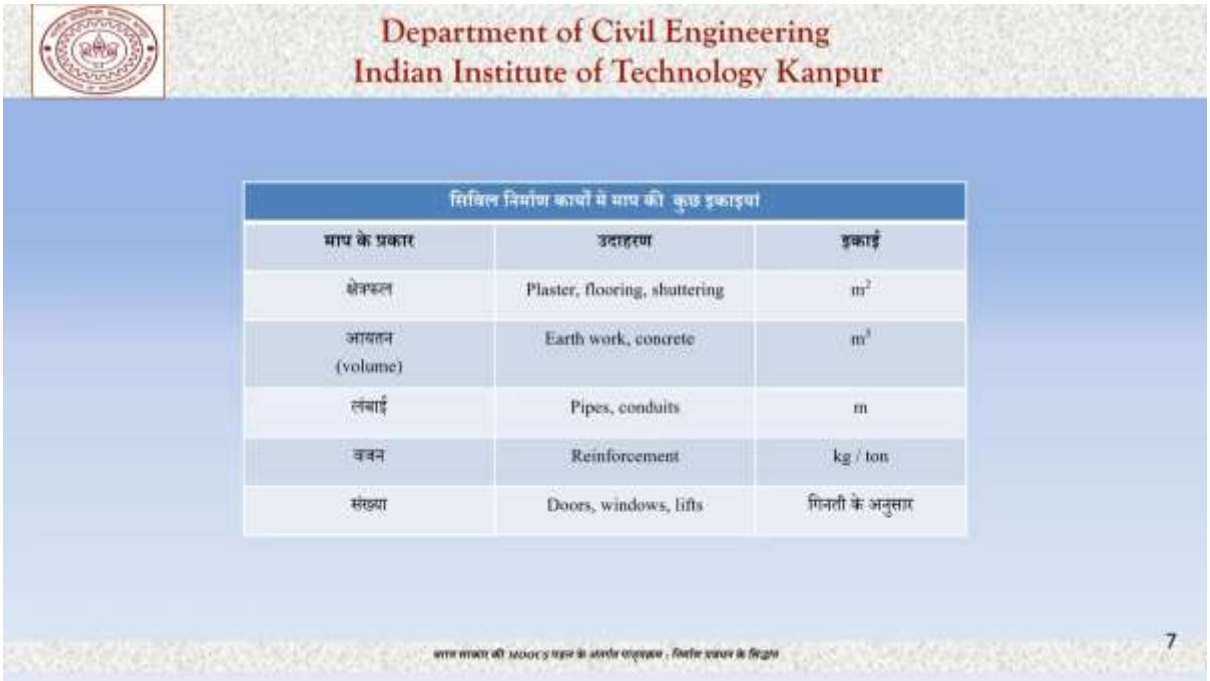
(Reference Time 01:09)



Jab ham pariyojana mein laagat ke anumaan kee baat karate hain to do baaten dhyaan mein rakhanee chaahie. Ek to hai ki us nirmaan kaary mein, us pariyojana mein alag-alag vastuen ya gatividhiyaan kaun see hain unako chinhit karana aur unakee ek soochee banaana. Gatividhiyon ke chinhit hone ke baad baat hotee hai un gatividhiyon kee maatra, kitanee maatra mein vah gatividhi hogee, earthwork hai to kitana hoga, brickwork hai kitana hoga concreting kitanee hogee, structural steel erection karana hai kitana hai kitane tonnes. To usase hamako tarah-tarah kee cheejon ka andaaja lagata hai yah hamako madda karata hai pariyojana kee laagat ka anumaan lagaane mein. Ek baar maatra ka gyaan ho jae tab hamako pata hona chaahie ki un vastuon ya gatividhiyon kee dar kya hai. Earthwork hamako pata chal gaya ki 100 cubic meter hai to ek cubic meter earthwork karane ke lie kitanee laagat aaegee. Agar ye hamen pata chal jae to ham earthwork kee laagat pata kar sakate hain usako calculate kar sakate hain. Aur ye jo dar hotee hai vah kahaan se milegee? Maanak dar arthaat kuchh published document hote hain jinamen ki amooman prayog mein aane vaalee gatividhiyon kee daren prakaashit hotee hain aur vah har 2 varshon mein sanshodhit kar dee jaatee hain jaise ki mahangaee badhatee hai ghatatee hai jo bhee hota hai usake anusaar un daron ko sanshodhit karake prakaashit kiya jaata hai, sarakar kee or se prakaashit hotee hain har company apanee dar calculate karake rakhatee hai. Usako apana pata hota hai nirmaan companiyon ko ki is activitie ko karane mein, is gatividhi ko karane mein mota-mota kitana kharca aata hai. Yadi koee vastu aisee hai jisaka ki vivaran us published literature mein nahin hai, tab hamako karana padata hai us vastu ka dar vishleshan arthaat rate analysis. Us gatividhi mein kaun-kaun see cheejen involved hain, hamen kya-kya karana padega aur un sab activities kee kya daren hain? To vahaan par ham dar vishleshan se us gatividhi kee dar ko tay karate hain aur yah dar kis baat par nirbhar karatee hai? Yah nirbhar karatee hai nishpaadit kie jaane vaale kaary ke vivaran par. Jaise ki flooring agar ham dekhen, to flooring par square meter hogee. Flooring kee dar kahaan se tay hogee? Vah tay hogee ki ham usamen muzaic flooring karenge, ki kota stone karenge, ki tiles lagaenge. To yah baat huee kaary ke

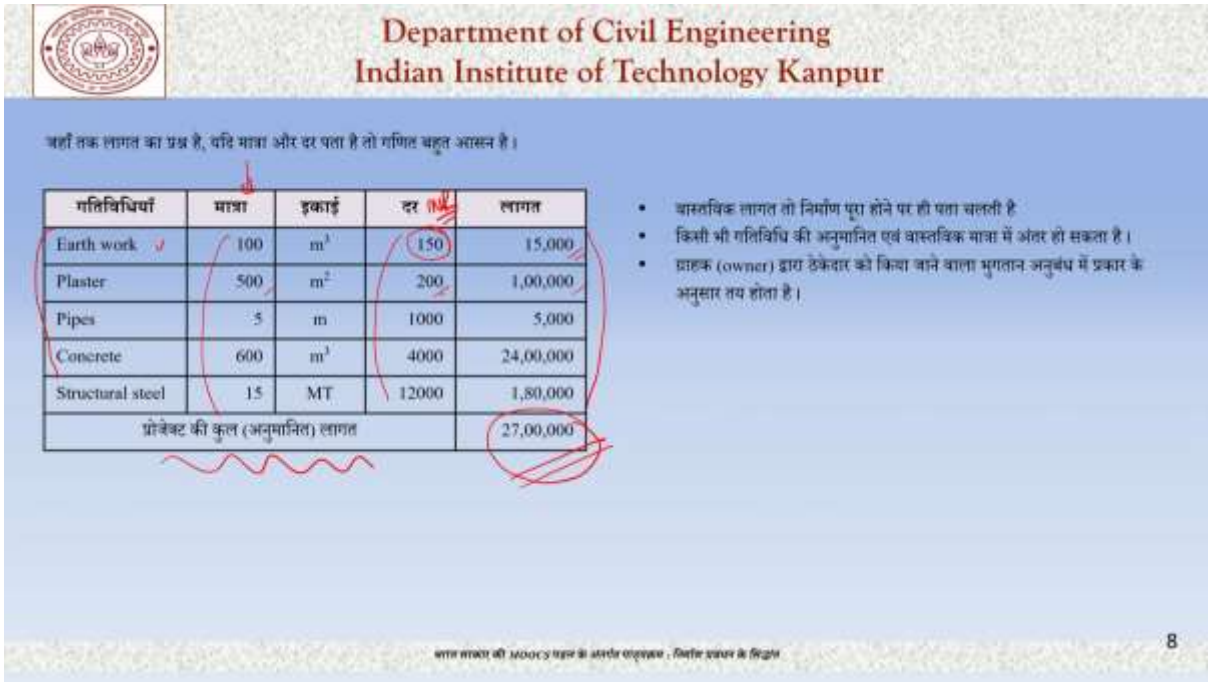
vivaran kee aur yah anubandh mein bhee aa jaata hai. To pariyojana kee laagat ka anumaan lagaane ke lie ek mota-mota siddhaant yah hai ki sabase pahale hamako gyaan hona chaahie gatividhiyon ka, unakee maatra ka aur unakee daron ka. Aaj ka hamaara vishay gatividhiyon kee maatra kaise nikaalee jaegee is baat par kendrit rahega.

(Reference Time 04:15)



Gatividhiyon kee maatra nikaalane ke lie unakee ikaee ka gyaan hona aavashyak hai. Maap ke kaee prakaar hote hain kshetraphal hai, aayatan, volume hai, lambaee hai, vazan hai, sankhya hai. Udaaharan ke taur par nirmaan kaaryon mein kshetraphal par aadhaarit jo activities hain (jo gatividhiyaan hain) usamen plaster, flooring, shuttering yah sab cheejen in gatividhiyon kee ikaee square meter hai. Earthwork ya concrete isakee ikaee cubic meter hai volume mein hai. Pipes hain, conduits hain, bijalee ke taar hain inakee ikaee meter hai, kitane meter prayog mein aaega. Reinforcement arthaat sariya vajan ke hisaab se anumaanit kee jaatee hai. Lifts hain, khidakiyaan hain, daravaaje hain inakee ikaee ginatee hai ki kisee bhee building mein kitanee khidakiyaan lagengee, kis prakaar kee lagengee, kitane daravaaje lagenge kitane lift lagenge yah area ya volume mein nahin balki ginatee ke anusaar aatee jaatee hain.

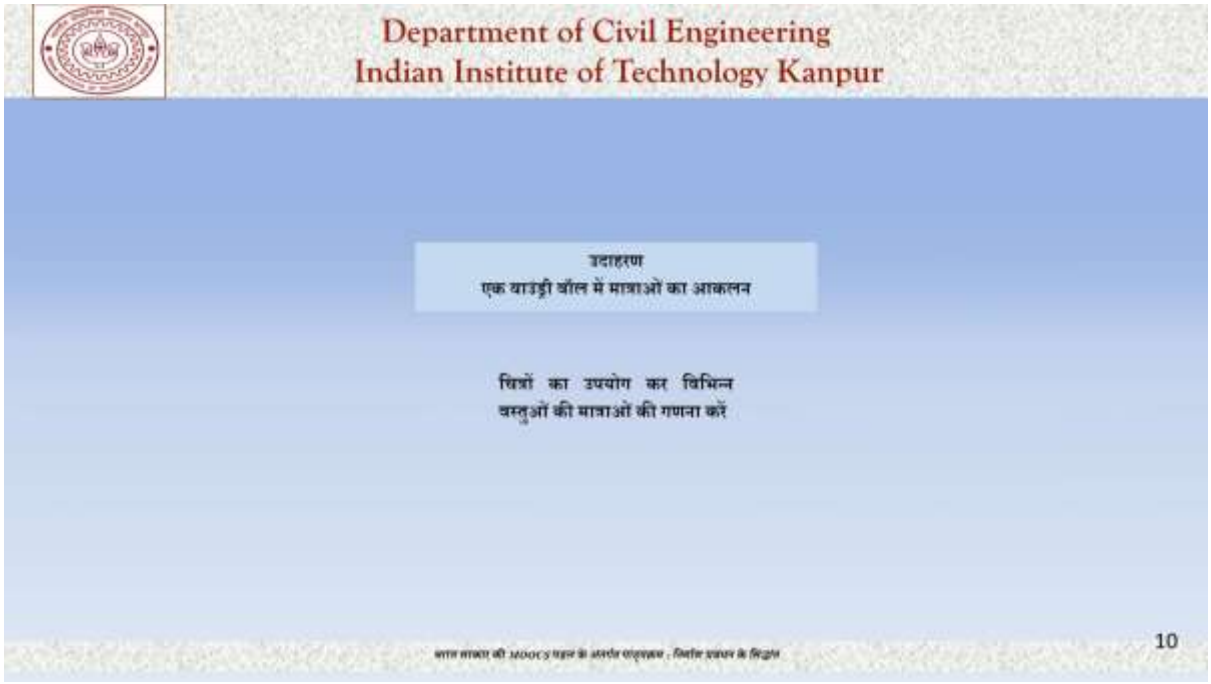
(Reference Time 05:19)



Jaisa ki mainne pahale kaha jahaan tak laagat ka prashn hai yadi maatra aur dar pata hai to ganit bahut aasaan ho jaatee hai. Udaaharan ke taur par agar ham is taalika ko dekhe is table ko dekhe, to agar hamen pata hai ki earthwork, plaster, pipes, concrete, structural steel inakee maatra 100 cubic meter, 500 square meter, 5 meter, 600 cubic meter, 15 ton hai aur in activities kee, in gatividhiyon kee dar rupe mein ye hai. 150 rupe par cubic meter agar hamaara earthwork hai to 15000 rupaye mein earthwork hoga. 200 rupaye par square meter agar hamaara plaster hai to 500 square meter plaster karane ke lie hamen 100000 rupaye lagenge ityaadi. To is prakaar se agar hamen in gatividhiyon kee soochee, unakee maatra, unakee dar agar hamako pata hai to unakee apanee-apanee laagat hamen pata chal jaegee aur bahut aasaanee se ham project kee kul laagat ka anumaan laga sakate hain. Ab prashn uthata hai ki yah maatr hamako kahaan se milegee? Yahaan se shuruaat hotee hai. Vahaan jaane se pahale maatra ka anumaan lagaane se pahale kuchh baaten main aapake saath aur saajha karana chaahata hoon vo ye hai ki dekhie vaastavik laagat to nirmaan poora hone ke baad hee pata chalatee hai, jo bhee laagat ham anumaanit karate hain vah project ke shuroo mein karate hain ki theek hai yah project hai isamen anumaan hai ki 200000 rupaye lagenge, 2 crore rupaye lagenge, 200 crore rupaye lagenge. Koee bhee nirmaan kaary ek ghadee ke tareeke se ya ek mobile phone ke tareeke se nahin hai ki hamako pata hai ki yah mobile phone 5499 rupaye mein milega. Nirmaan kaary mein us prakaar kee baat nahin kee ja sakatee hai bahut mushkil hai. Vaastavik laagat nirmaan kaary poora hone ke baad hee pata chalatee hai. Tab hamen pata chalata hai ki maatra kitanee thee ya kitanee maatra lagee. Kuchh cheejen tay hotee hain khidakee, daravaaje tay hote hain lekin earthwork kitana hua, concrete kitanee huee, shuttering kitanee lagee usaka anumaan lagaaya ja sakata hai drawings ke anusaar. Lekin vaastav mein bahut se kaaran hote hain jisamen ki vaastavik aankade anumaanit aankadon se alag ho jaate hain. 5 percent, 10 percent, 2 percent variation to hota hai aur saath hee saath daron mein bhee variation ho sakata hai kyonki nirmaan kaary hamane pahale bhee kaha tha kaee varsh chalata hai. To yah kahana ki steel kee keemat jo aaj ham lekar chalate hain 10000 rupaye ton ya 15000 rupaye ton jo bhee hai, vah 4 saal baad bhee vahee hee rahegee yah to bada mushkil hai. To yah anishchitataen hee nirmaan kaary ke prabandhan ko ek challenge banaatee hai.

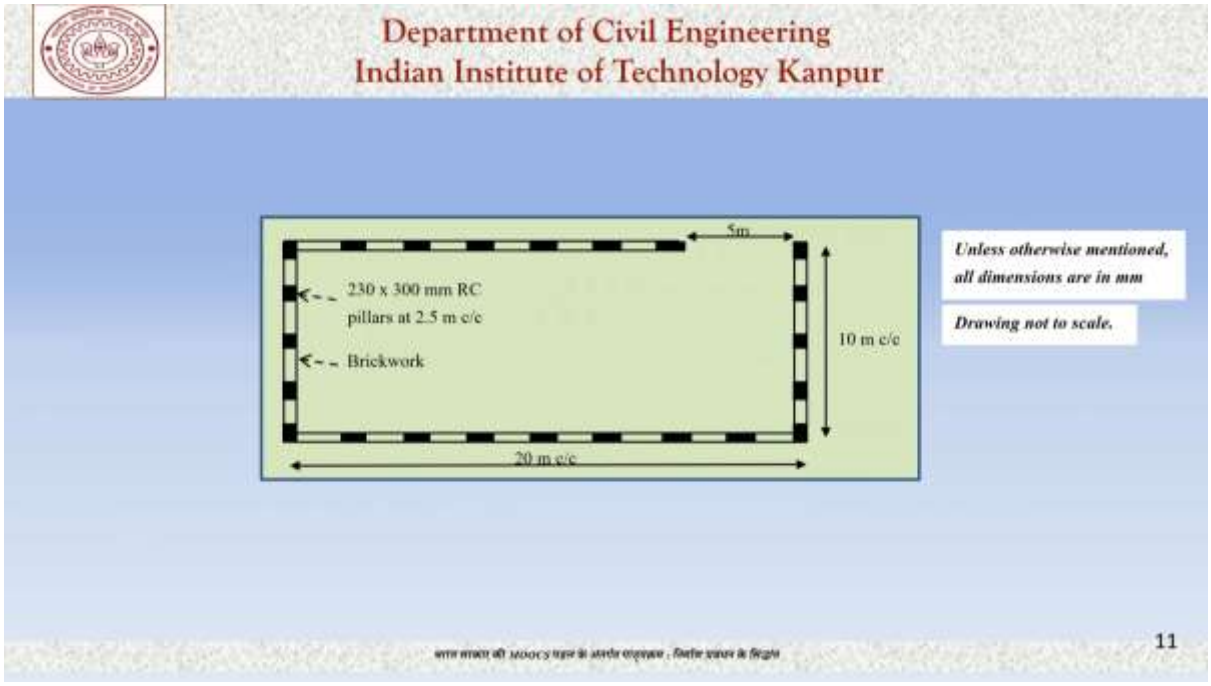
Aage chalate hain kisee bhee gatividhi kee anumaanit evan vaastavik maatra mein antar ho sakata hai is baat par hamane abhee baat kee. Graahak yaanee owner dvaara thekedaar yaani contractor ko kiya jaane vaala bhugataan anubandh ke prakaar ke anusaar tay hota hai. Is baat kee charca ham jab ham anubandhon ke prakaar kee baare mein baat karenge tab karenge ki ek nirmaan pariyojana mein kis prakaar ke anubandh hote hain aur kis prakaar se ek owner ya ek client organization thekedaar yaanee contractor ko payment karata hai is par ham charca baad mein karenge.

(Reference Time 08:55)



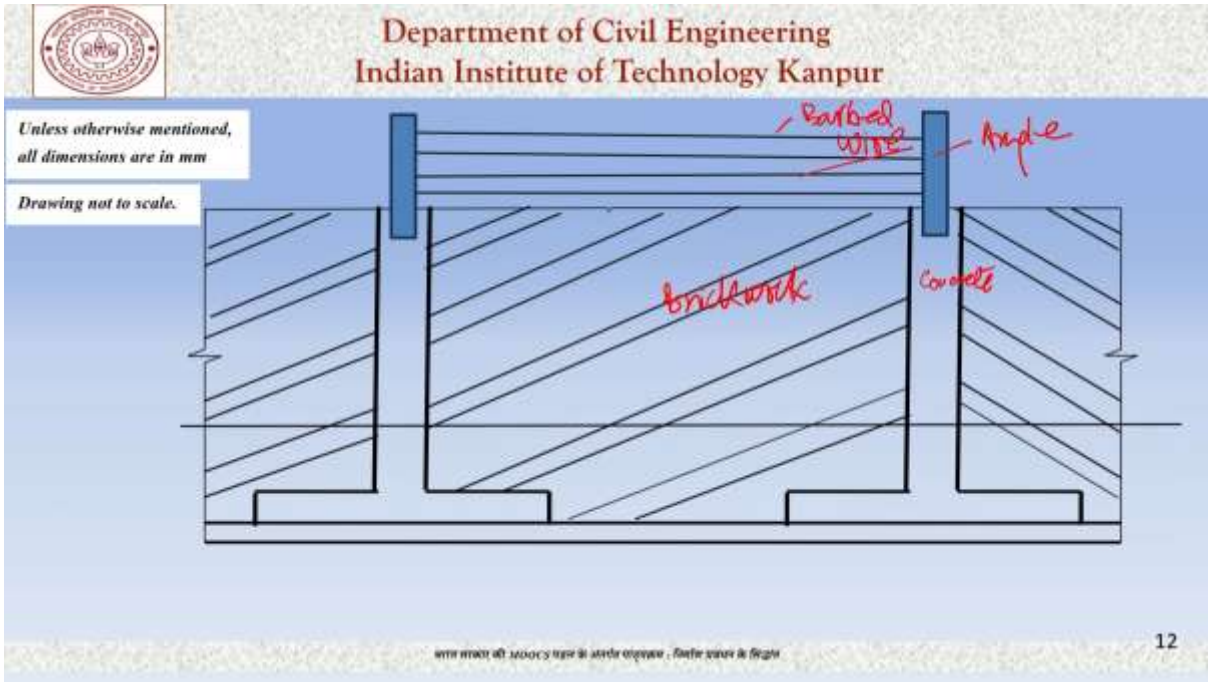
Lekin philahaal aaj ke lie ham log ek boundary wall jisakee ki charca pahale bhee kar chuke hain usaka udaaharan lekar maatraon ka aakalan ya anumaan lagaane kee prakriya par charca karenge. Ham log un drawings ka prayog karenge jo ki ham pahale bhee dekh chuke hain aur usase vibhinn gatividhiyon aur activities kee maatra nikaalenge.

(Reference Time 09:14)



Yah chitr ham pahale bhee dekh chuke hain yah boundary wall hai jisako ki ham banaenge, yah hamaara project hai yah boundary wall banaana. Jo ki 20 meter per 10 meter ke kshetr mein hai usamen 5 m ka ek get lagaane ka praavadhaan hai. Hamane tay kiya hai ki yah boundary wall 230 by 300 mm ke RC pillars jo ki 2.5 meter dooree par honge usake beech mein brick work yaanee eat kee chunaee hogee is prakaar kee boundary wall ham banaenge.

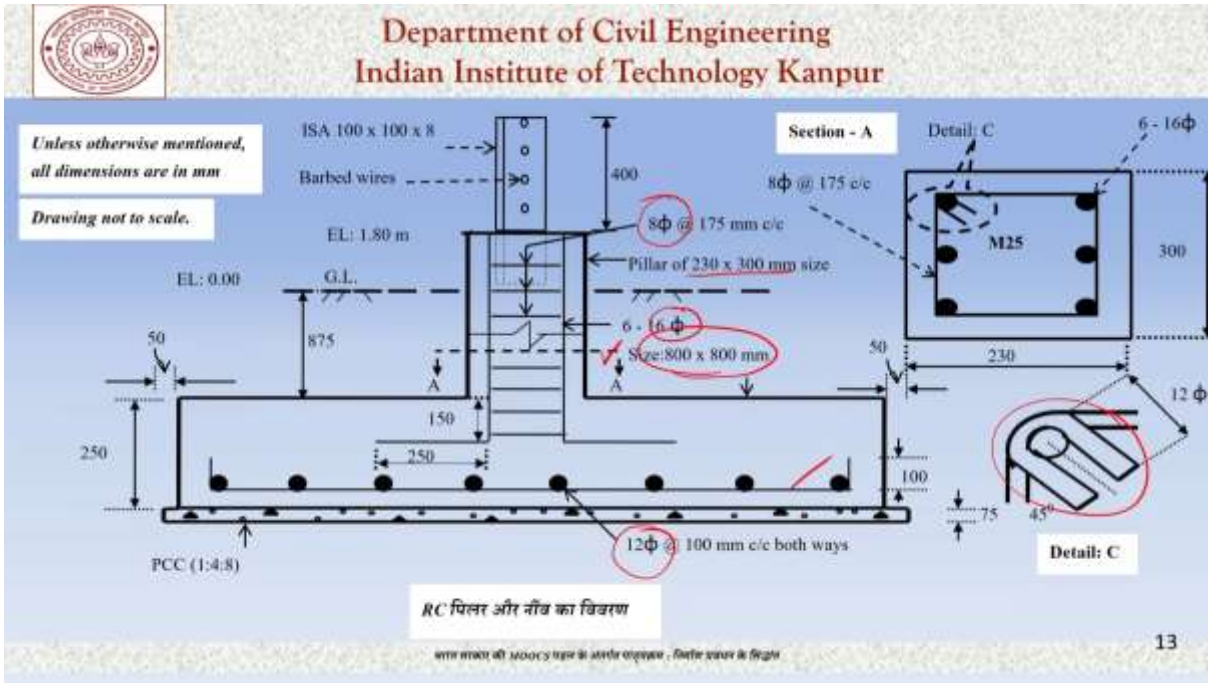
(Reference Time 09:46)



Isee boundary wall ka doosara drshy yahaan par hai jahaan par ki hamane dekha ki yah to hamaare concrete ke pillars honge, yah hamaaree eet kee chunaee hogee isako hamane likha brick work, isake saath ham yahaan par angles lagaenge, yah hamaare barbed wire honge. To

yah cheejen sab to yah baaten client ne tay kee hain ki ham is prakaar kee boundary wall banaana chaahate hain. To ab prashn yah aata hai ki is boundary wall ko banaane ke lie hamen kin gatividhiyon ko dhyaan mein rakhana chaahie.

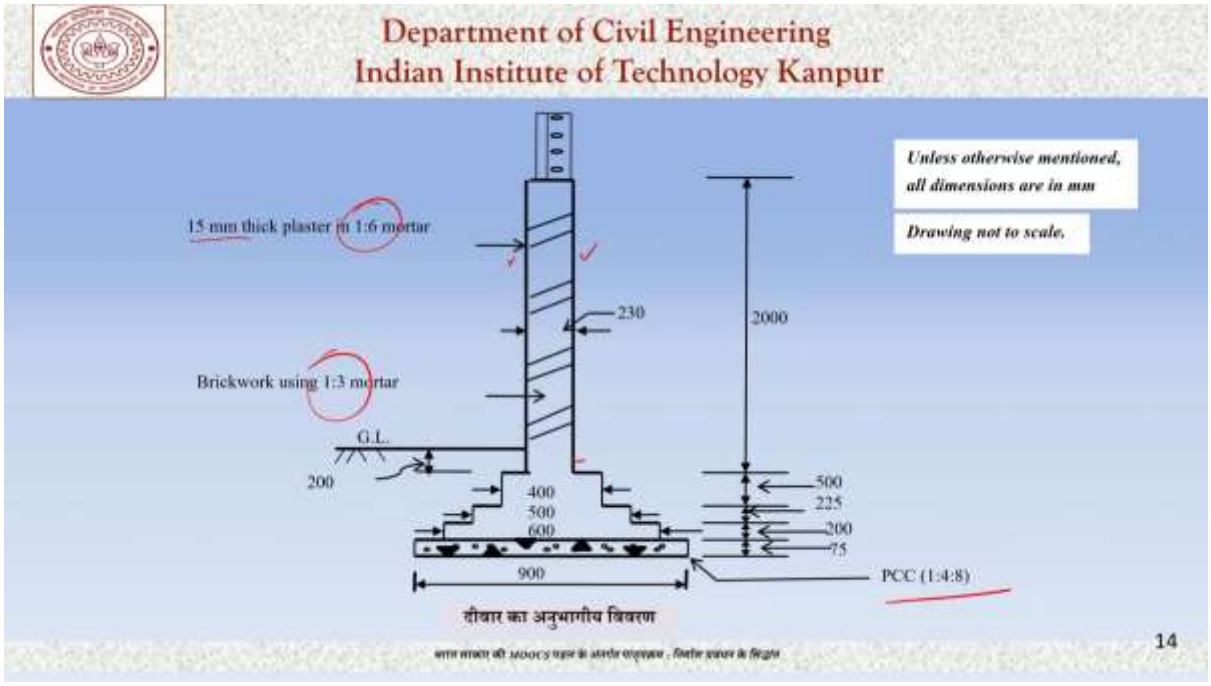
(Reference Time 10:22)



Aur bhee detail jab banaate hain to yah RC pillars aur neev ke baare mein yahaan par dikhaaya gaya hai ki jo RC pillars hoga, jo concrete ka pillars hai vah kis size ka hai. 800 by 800 mm kee usakee footing hai. 230 by 300 usaka size hai aur usamen chitr mein die gae detail ke anusaar sariya baandhee gaee hai.

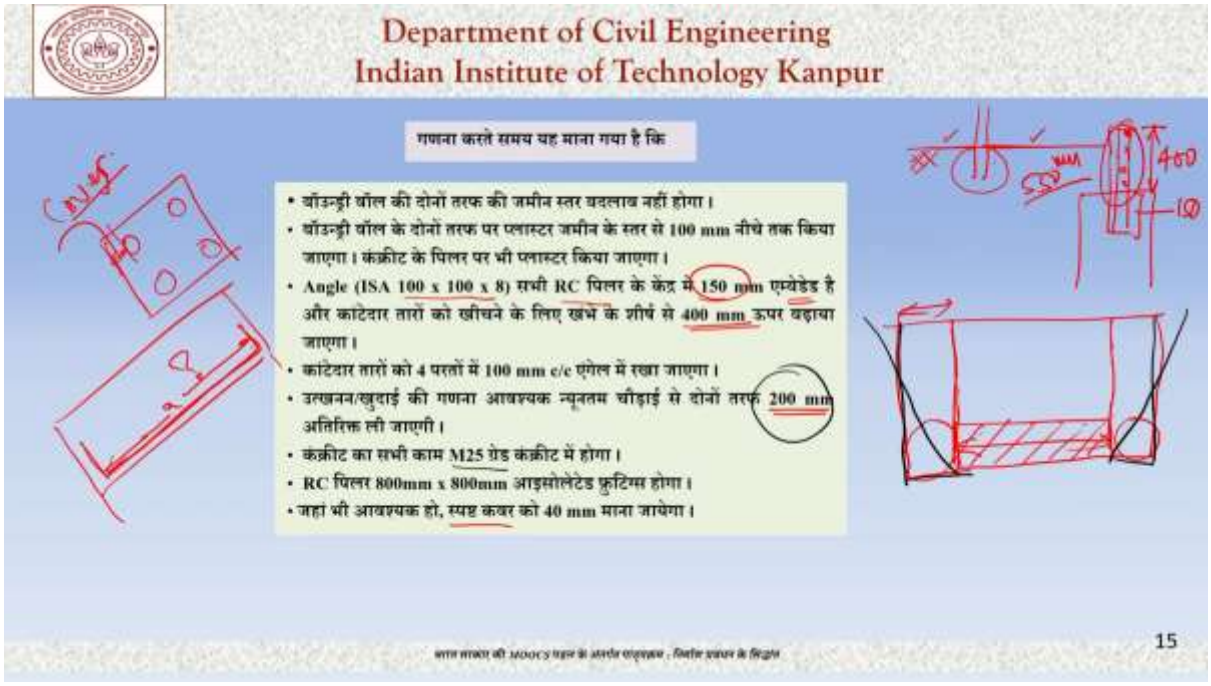
Aur sariya ka detail is picture mein aur clearly diya hua hai jahaan par ki ham yahaan par ham ek section lekar dekh rahe hain ki yah jo pillars hai usamen kis prakaar kee sariya lagee huee hai. Isaka bhee jo aur detail agar dekhen to details C hai jahaan par ki ham dekh rahe hain ki kis prakaar se in stirrups ko moda gaya hai. Yah sab jaanakaaree ham kyon kar rahe hain? Is par ham charca isalie kar rahe hain ki steel kee maatra jab nikaalenge to hamako pata hona chaahie ki steel kis diameter kee hai aur kis diameter kee steel hamen kitanee maatra mein chaahie. To agar ham is chitr ko dekhate hain, to yahaan par 16 mm diameter kee baat ho rahee hai, yahaan par 12 mm diameter kee baat ho rahee hai aur yahaan par 8 mm diameter kee baat ho rahee hai. To yahaan se hamako yah pata chalega baad mein ham isaka calculation karenge ki hamako to 8 mm, 12 mm ya 16 mm kee sariya hamako kis length mein chaahie. Aur usako ham jab weight mein convert karenge to hamen total requirement of steel yaanee steel hamen kitane kilo ya kitane ton chaahie, usamen kitanee steel 8 mm kee hogee ya 12 mm kee hogee, 16 mm kee hogee yah baat vahaan se nikaal kar aaegee.

(Reference Time 12:16)



Aage badhate hain aur ham dekhate hain brickwork kee or. Brickwork mein hamane ye dekha ki client ne tay kiya hai ki isamen 15 mm thick plaster donon taraph deevaar ke is taraph aur deevaar ke is taraph donon taraph hoga aur yah plaster neeche kahaan tak jaega, yah sab baaten hamako pata honee chaahie. Brickwork mein 1 ration 3 ka masaala lagega, plaster 1, 4 ka hoga kyonki ye detail (ye vivaran) agar hamaare paas nahin hai to ham kisee bhee prakaar ka sahee aakalan nahin kar sakate hain. Yahaan par ek aur gatividhi dikh rahee hai ek aur activity dikh rahee hai ek aur vastu dikh rahee hai vah hai PCC. Jab ham concrete kee baat karate hain to concrete reinforced concrete jisako ki prabalit concrete kahate hain. Reinforced concrete vo hotee hai jisamen ki tension mein usaka bal ya usakee carrying capacity badhaane ke lie sariya ka prayog hota hai. Plain concrete vo hotee hai jisamen kee sariya ka prayog nahin hota hai. To Plain cement concrete 1, 4, 8 ke anupaat se neeche lagaane ka praavadhaan hai. Agar aap dhyaan se dekhenge to jo footing thee usake neeche bhee PCC lagae jaane ka praavadhaan liya gaya hai.

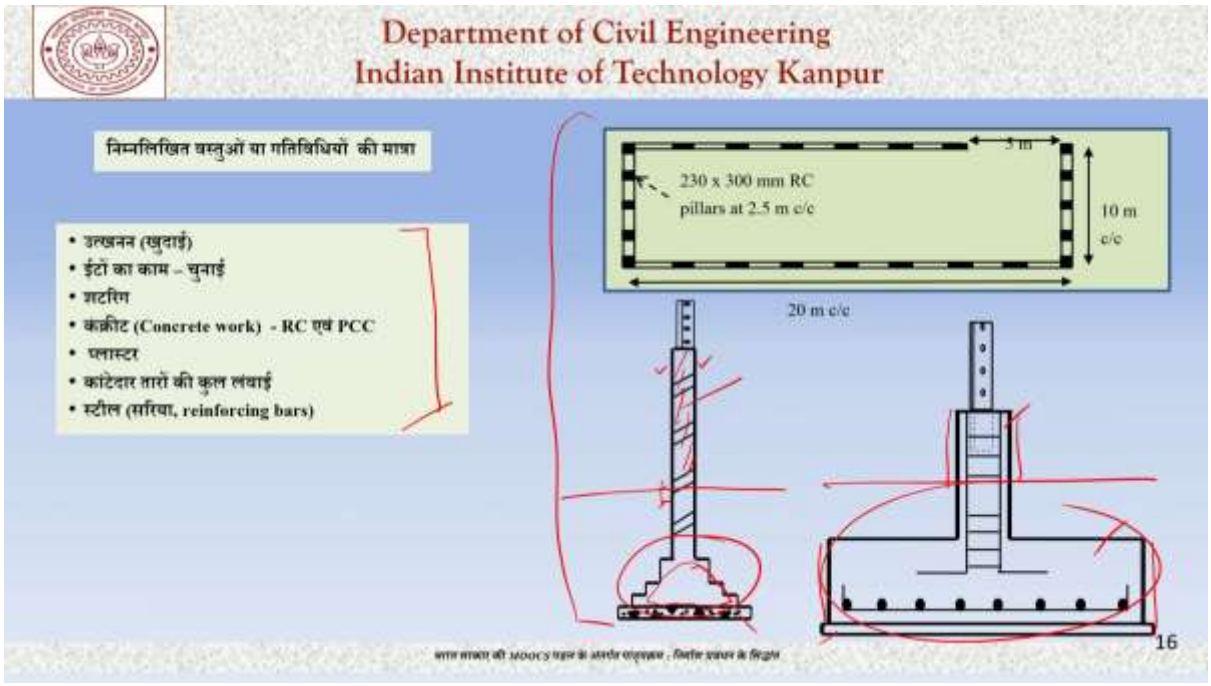
(Reference Time 13:55)



Aage badhate hain aur dekhate hain ki ganana karane mein hamen kya assumptions dene honge. Is udaaharan mein ganana karate samay yah maana gaya hai ki boundary wall ke donon taraph jameen ke star mein badalaav nahin hoga. Isaka matalab kya hai? Agar hamaaree jameen yahaan par hai yah hamaaree jameen ka level hai to ham boundary wall banaenge yahaan par thoda sa gaddha karana padega phir ham usako backfil karenge yah charca ham log kar chuke hain. Lekin is side aur is side mein ground kee level ek hee rahegee. To jo ham gaddha karenge usakee backfil jab karenge, to isee level par karenge. Boundary wall ke donon taraph ka plaster jameen ke star ke 100 mm neeche tak kiya jaega. Concrete ke pillar par bhee plaster kiya jaega. Yah sab cheejen kisee bhee tareeke se decide ho sakatee hain. Ham kah sakate hain ki plaster jameen ke star se 200 mm hoga ya jameen ke star ke 500 mm oopar tak hoga, kuchh bhee kah sakate hain lekin jis tareeke ka detail agar ham pahale se tay karate hain aur usako nishpaadit karate hain. Hamaaree maatraon mein vaastavik maatra aur anumaanit maatra isamen antar kam ho jaega. Jahaan tak angle ka savaal hai usamen yah kaha gaya hai ki ek 100 by 100 by 8 mm ka jo angle hai vah RC pillar ke 150 mm embed kiya jaega. Arthaat jo hamaara RC pillar aise aaega usamen vah angle neeche embed kiya jaega aur yah embedment length yah 150 mm lee jae. Isake oopar taar kheenchane ke lie yah 400 mm oopar jaega. To yah 400 mm hoga arthaat ek angle ka tukada jo ki ham RC pillar mein lagaenge usakee total length 550 mm honee chaahie. Is prakaar kee jaanakaaree hamako drawings se ya diye gaye conditions se milatee hai. Kaantedaar taaron kee 4 paraten 100 mm center too center angle mein rakhee jaayengee arthaat is angle mein yahaan par ye 4 layers kaantedaar taaron kee boundary wall ke chaaro taraph lagaee jaayengee. Khudaee kee ganana aavashyak nyoonatam chaudaee se donon taraph 200 mm atirikt lee jaegee. Isaka kya matalab hai? Ki agar hamako yahaan neeche footing banaanee hai ya neeche ek neev banaane ke lie yah dimension chaahie. To ek to tareeka yah hai ki ham yah hamaaree ground level agar hai to yah neev banaane ke lie hamako kam se kam itanee khudaee to karanee hee hai. Yahaan par kaha gaya hai ki is nyoonatam chaudaee se 200 mm adhik dono taraph len arthaat yahaan se 200 mm adhik ham khudaee karen. Yah 200 mm kyon lee jaatee hai ya 200 mm hee kyon lee jaegee? 400 bhee ho sakatee hai, 500 kyon nahin ho sakatee, is par tarah-tarah kee baaten ho sakatee hain. Mota siddhaant yah hai ki yahaan par hamen kuchh working space chaahie taaki ham yahaan par is footing ko bana sake pahalee cheej to yah hai. Doosaree cheej ye hai ki jab ham gaddha khodate hain ya mittee

hata denge to yah kahana ki ham itana gahara gaddha seedhe-seedhe khod paenge yah bhee theek nahin hai. Jameen kee jo sthiti hai jo soil kee properties hai vahaan par usamen is prakaar ka vertical gaddha khod paana kabhee-kabhee sambhav nahin hota hai, tab hamen kya karana padata hai ki hamako gaddhe ko is shape mein lena hota hai. Vo tarah-tarah kee baaten alag hain vo nirmaan kaary ke samay dekhee jaengee lekin abhee aakalan ke lie yahaan par yah condition dee gaee hai ki ham 200 mm badhaakar ke yah khudaee kee maatra nikaale. Concrete ka sabhee kaam m25 grade concrete mein hoga yah m25 grade kee jab baat ho rahee hai to ham pillars kee baat kar rahe hain, footing kee baat kar rahe hain. PCC m25 nahin hai PCC ke lie 1, 4, 8 concrete alag se likhee huee hai. RC pillar 800 into 800 isolated footings hai yah ham logon ne pichhalee drawing mein abhee dekha. Jahaan bhee aavashyak ho spasht cover ko 40 mm maana jaega. Spasht cover kya hota hai? Reinforce concrete ka kaam karate samay agar hamaaree column ya beam is cross section kee hai aur sariya yahaan par lagaee gaee hai, to surface se yah jo dooree hotee hai reinforcing bar kee isako cover kahate hain. Is cover kee jaanakaaree hamako kyon aavashyak hai maatra nikaalane mein? Isalie aavashyak hai ki agar hamaaree footing is prakaar kee hai jisamen ki yah sariya laganee hai, to is sariya kee jo shape hai usamen yah dimension ya yah lambaee kitanee hogee? Yah is footing ke dimension se kam hai, kitana kam hai vo hamen cover ko dekhakar tay karana hota hai. To isalie jitanee chhotee-chhotee yah baaten ham maatra ka anumaan lagaate samay incorporate kar sake, dhyaan rakh sake utana hee hamaara maatra ka aakalan sateek ho jaata hai.

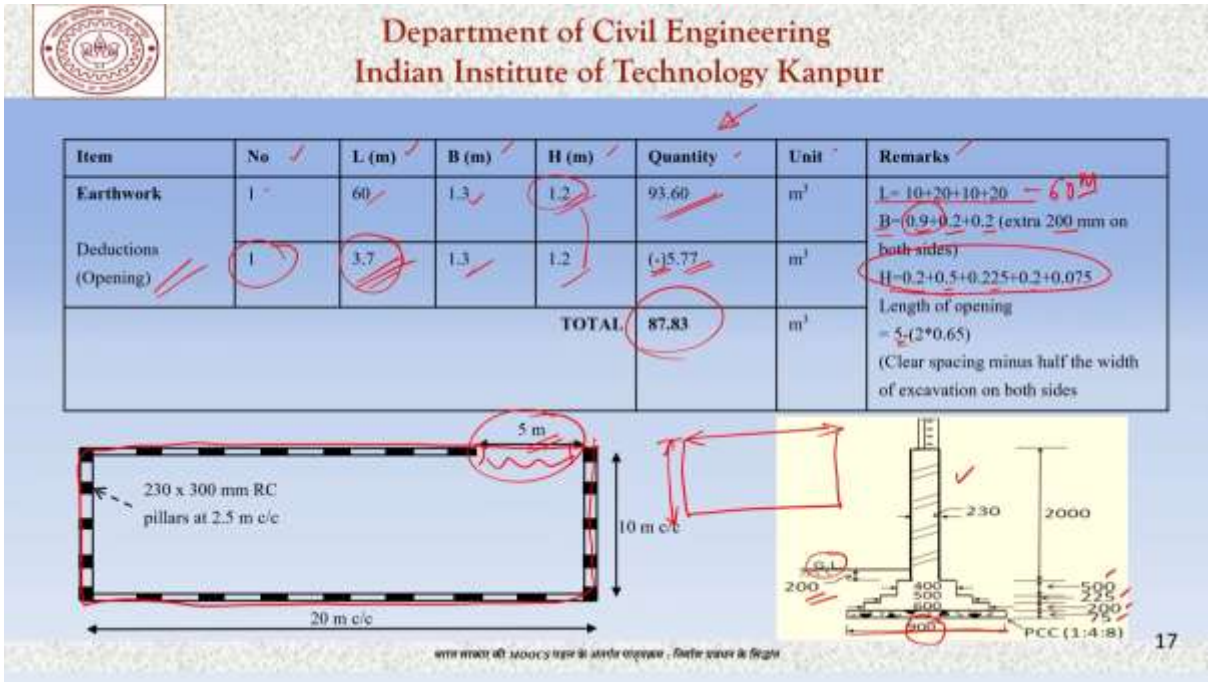
(Reference Time 19:21)



Chalie aage badhate hain aur is boundary wall mein vibhinn gatividhiyon kee maatra nikaalane ka prayaas karate hain. Pahalee gatividhi ham kahate hain khudaee kee hai. Jo ki hamako ground level ke neeche chaahe vo brick work kee neev ho ya hamaaree RC pillar kee neev ho usake lie hamako jo bhee khudaee karanee padegee usakee maatra nikaalana. Phir baat aatee hai eet ka kaam yaanee chunaee kee. To yah hamaaree brickwork hai jisamen ki graund ke oopar ye vo ye section hai aur ground ke neeche usako majabootee dene ke liye usakee chaudaee badha dee gaee hai. Shuttering ka kaam hamako concrete mein aavashyak hota hai kyonki hamen concrete ko shape denee hotee hai. To concrete mein column hai aur

ye footing hai yahaan par hamako shuttering lagaanee hogee kitanee shuttering lagaanee hai isaka hamen anumaan lagaana hoga. Concrete work yaanee ki RC ya PCC. To RC yaanee prabalit concrete ya reinforced concrete vo hamaare pillar mein aur footing mein hogee. PCC yahaan neeche donon taraph leveling course ke roop mein hogee. Plaster karana, ye pahale charcha ho chukee hai ki yah tay hai ki boundary wall ke donon taraph evan pillars par bhee plastering kee jaegee aur yah plastering jameen kee satah se 100 mm neeche tak lee jaegee. Kaantedaar taaron kee kul lambaee hamako pata honee chaahie aur saath hee saath hamen steel sariya ya reinforcing bars kee maatra pata honee chaahie. Ab ek prashn main aapake lie chhodana chaahata hoon. Kya is boundary wall ko banaane ke lie inheen quantities kee aavashyakata hai? Ek quantity mainne isamen chhod dee hai. Main chaahata hoon ki aap us par sochen aur usako identify karane kee chinhit karane kee koshish karen ki in chitron mein dee gaee boundary wall ko banaane ke lie kis baat ko dhyaan mein nahin rakha gaya hai. Kisee bhee anubandh mein yah ho jaata hai. Laakh koshish kee jae ki ham sabhee gatividhiyon ko account for karen lekin chuk ho jaatee hai. To yah to hua homework aapake lie. Ham log aage badhate hain aur in quantities ke actual estimation yaanee vaastavik ganana shuroo karate hain.

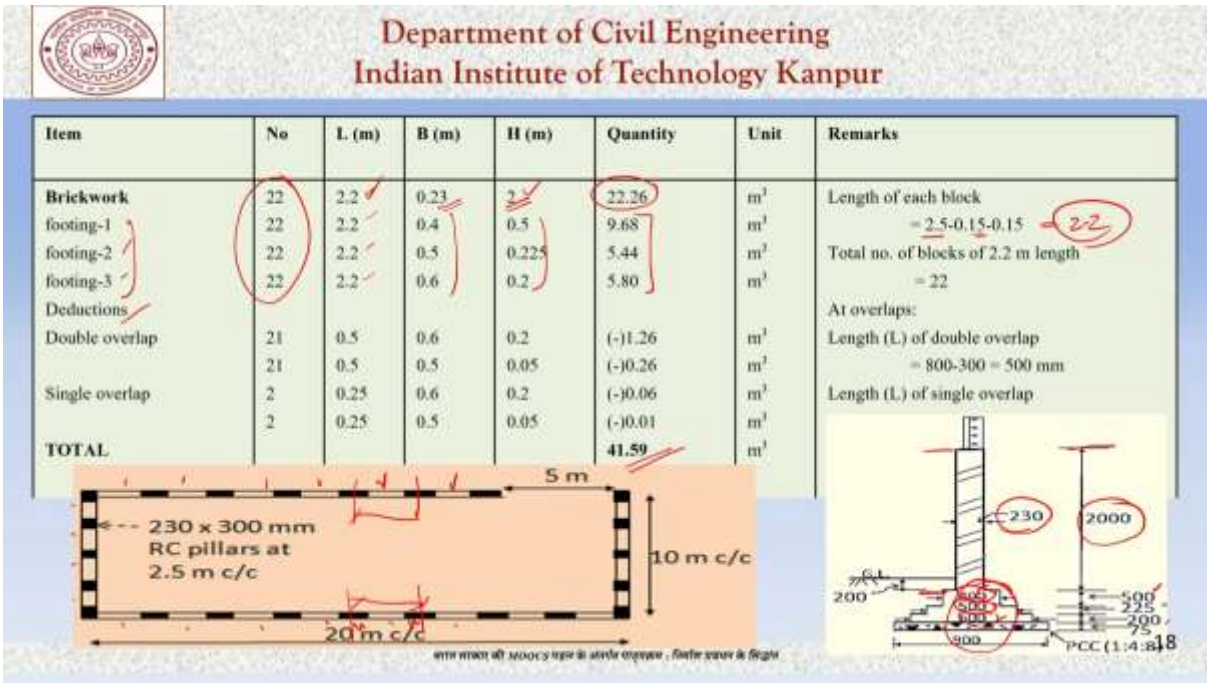
(Reference Time 21:48)



Pahale ham log charcha karate hain earthwork kee. Yah jo table hai yah quantity estimation kee ek template hai jisamen ki ham number length, breadth, height aur quantity unit inako likhate hain aur phir jis bhee gatividhi kee baat ham kar rahe hain usake baare mein vo numbers likhana shuroo karate hain. Aap isako dekhenge ham log kaise plaster kee, concrete kee, earthwork kee quantities kee maatraen ham is table mein kis prakaar likhate hain aur yah remark column hota hai jisamen ki isamen dee gaee sankhyaon ya inako dee gaee values hamane kaise vahaan pahunche usako explaine kiya jaata hai usake baare mein vivaran diya jaata hai taaki agar koee check karana chaahe usako to vo check kar sake. To ham log earthwork kee jab charcha karate hain to usako ek maanate hain ki hamaara ek hee number hai. Ham yah kahate hain ki 60 meter kee total lambaee involved hai. Vo 60 meter kahaan se aaya? Vo yahaan par likha hua hai 10 plus 20 plus 10 plus 20 arthaat hamane yah maana ki chaaron taraph ham is prakaar se earthwork karenge. Breadth arthaat usakee chaudaee to

earthwork kaise karana hai hamako yah drawing dekhakar samajh mein aa gaya ki hamako is prakaar se ek earthwork karana hai. Jiskee ki lambaee hamane nikaalee 60 meter, isakee chaudaee kitanee honee chaahie is channel kee? Chaudaee hai .9 plus 2 plus .2 arthaat yah 200 mm to ham logon ne exstra liya aur 900 mm jo hai vo hamaaree PCC kee chaudaee hai. Is PCC ko chaudaee mein ham 200 aur 200 jod denge to yah aa gaya 1.3. Height kitanee hai arthaat depth kitanee hai is kes mein? Depth .2, .5, .225, .2, .075 . Yah kahaan se aaya? Ground level dee huee hai usase yah diya hua hai 200 phir hamen laga yahaan par 500, 225, 200 aur 75 mm arthaat yah total hamaaree excavation kee height ho gaee 1.2. Isakee calculation aap khud check kar sakate hain aur kyonki ab ham mein karana chaahate hain isalie hamane usako guna kar diya aur 93.6 cubic meter hamaara earthwork aa gaya. Ab is earthawork ko lene ke lie hamane simple raasta apanaaya tha ki hamane chaaron taraph earthawork le liya tha. Yahaan par yah 5 meter kee opening hai isako hamen nahin lena chaahie. Isake lie hamane kaha deduction ek number ham lenge jisamen ki 3.7 mm ka earthwork ham nahin karenge. Yah 3.7 kyon hua? 5 meter kee hamaaree opening hai usamen se kuchh to hamen earthwork yahaan par aur isake sang karana hee padega. To yah jo beech vaala portion bacha usako hamane liya ki itana 3.7 meter mein 1.3 meter aur 1.2 yah to comman rahega. Ye 3.7 meter kee khudaee hamako nahin karanee hai. To yah minus sign laga karake 5.77 likh diya gaya aur isako jodakar ke sab 87.83 cubic meter hamaara earthwork aa gaya. To yah hamaara earthwork ka estimation tha anumaanit maatra 87.83 cubic meter banee.

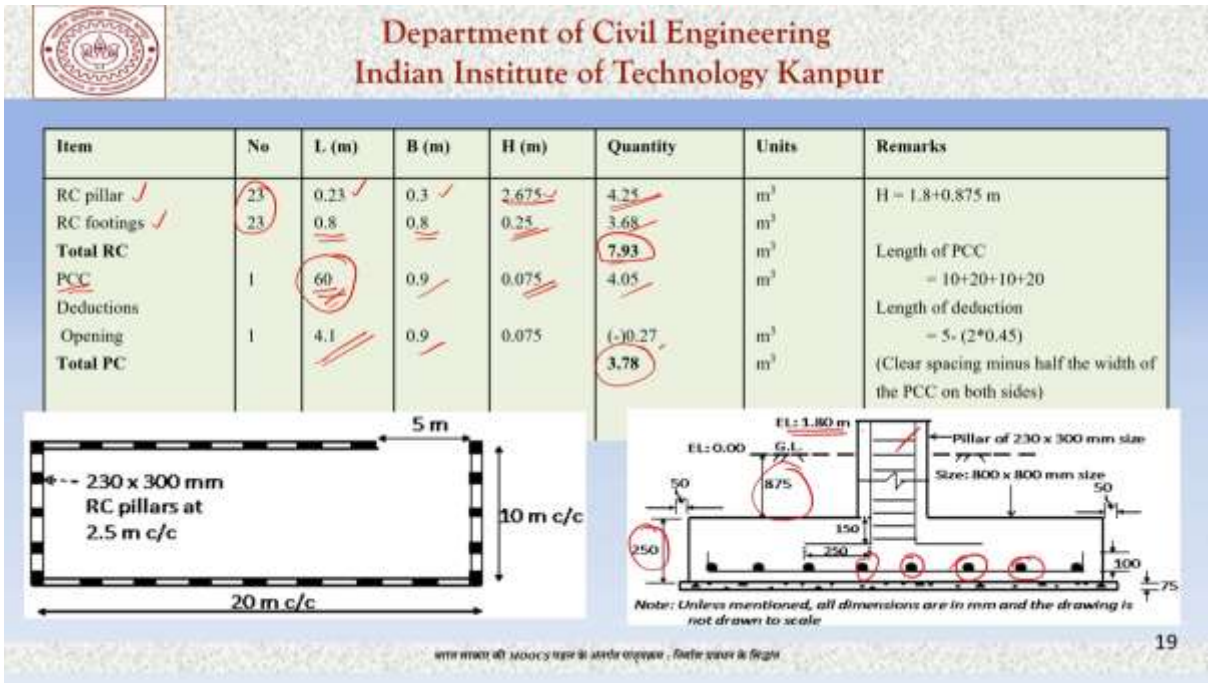
(Reference Time 25:25)



Isee prakaar ham aage chalate hain aur brickwork ke baare mein charcha karate hain. To brickwork ke lie ham kya karenge brickwork kee quantity kaise nikaalee jae? Isake kaee tareeke ho sakate hain aap apane tareeke se nikaal sakate hain. Jo is udaaharan mein liya gaya hai vo hai footing 1, footing 2, footing 3. Hamane 3 footing leen. In 3 footings mein kya kiya? Hamane kaha ki inakee length har ek kee 2.2 meter hai. Yah 2.2 kahaan se aaya? 2.5 m center too center yah hamen distance diya hua tha. Yahaan se ye concrete aa jaega 230 ka aadha, 15 idhar 15 idhar to isako ham agar ghata denge to 2.2 ho jaega. To 2.2 hamaaree lambaee ho gaee jo ki do RC pillars ke beech mein brickwork aaega. Usake saath mein yah

22 number hai, yah 22 number kyon hai? Kyonki hamane in sab parts ko in sub-section ko alag-alag maana hai agar aap isaka total nikaalenge 50, 55 meter kee jo boundary wall hai. Us 55 meter mein agar ham concrete ke pillars 2.5 meter center too center pe laga denge, tab aapako samajh mein aaega ki hamako 22 section brickwork ke chaahie. Us 22 section ko hamane is prakaar se broken down kar diya. Isakee width kitanee hai? Surface ke oopar 2 meter hai. Yahaan se agar ham shuroo karate hain to yah 230 thik boundary wall yahaan se lekar ke yahaan top tak 2m dee huee hai . 2M boundary wall ka total volume itana aa gaya. Total 22 section mein isake neeche footing 1, footing 2, footing 3 hai. Yah footing 2, footing 3 mein isakee height vo yahaan par dee huee hai, usakee width vo yahaan par dee huee hai unako lekar ke agar ham dekhenge to har stage kee quantity nikal aaegee. Usamen se hamen kuchh deductions karane padenge kyonki jahaan-jahaan par RC ka pillar aa jaega, footing aa jaegee vahaan par utana brickwork nahin hoga. Usaka deductions yahaan par dikhaaya gaya hai aur total brickwork kee quantity 41.49 cubic meter hai. Yahaan par aap yah dhyaan rakhie ki brickwork kee quantity ko cubic meter mein liya gaya hai. Kabhee-kabhee brickwork kee quantity ko square meter mein bhee liya jaata hai. Lekin us samay hamako brickwork kee chaudaee nirdhaarit karanee hotee hai. Hamako kahana hota hai ki 230 thick brickwork itane square meter, 115 mm thick brickwork itane square mm. Bhaarat mein especially uttar bhaarat mein pooree eet aur aadhee eet kee deevaaren banaee jaatee hai. To pooree eet kee jab ham deevaar banaate hain to usako ham 230 mm aur aadhee eet kee deevaar mein 115 mm lekar ke chalate hain. To agar hamane ek baar usakee chaudaee specify kar dee, tab hamako square meter mein brickwork dene mein koee aapatti nahin hai. Kyonki antat: uddeshy hai ki hamako total brickwork mein kitanee eenten lagegee, kitana masaala lagega usaka andaaja mil jaana chaahie. Is udaaharan mein hamane brickwork kee quantity kyonki yahaan par chaudaee alag-alag thee aur ek mota anumaan lagaana tha to hamane usako total cubic meter mein le liya hai.

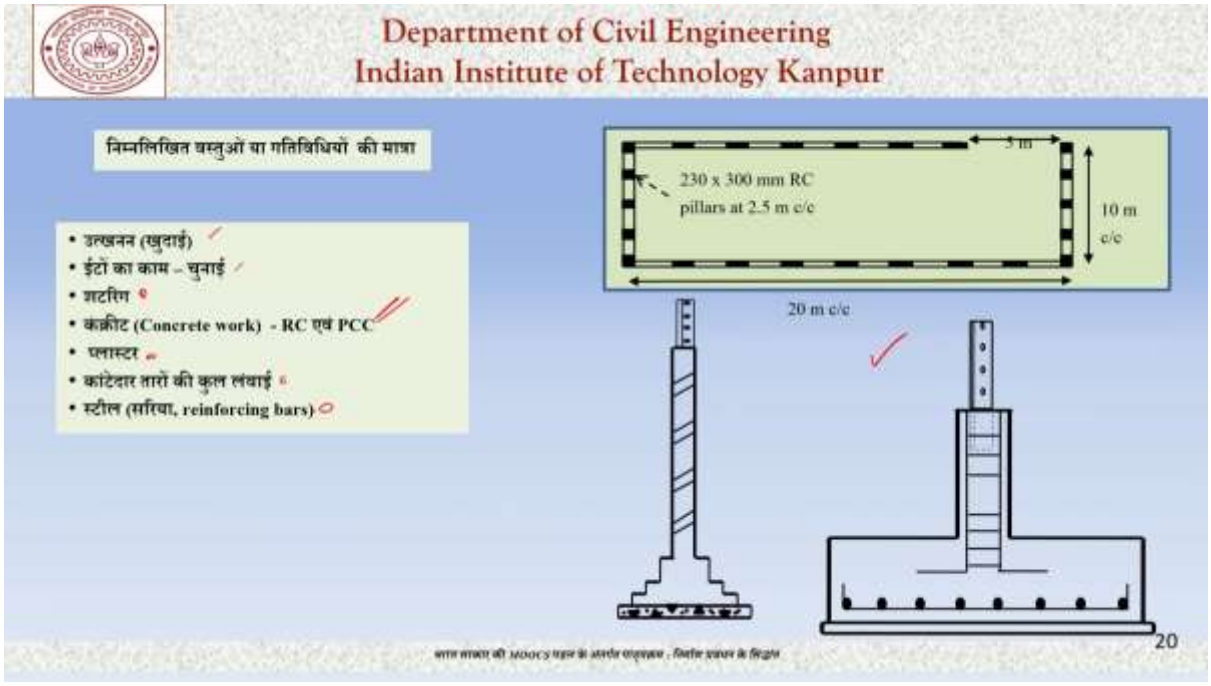
(Reference Time 29:06)



Ab ham log aate hain concrete work par. Reinforced concrete pahale calculate karate hain usaka estimation karate hain. To hamako 23 pillar banaane hain aur 23 footing banaanee hai to ye number ho gaya 23. Isakee length .23 aur width .3 kyonki hamane 230 by 300 kaha tha

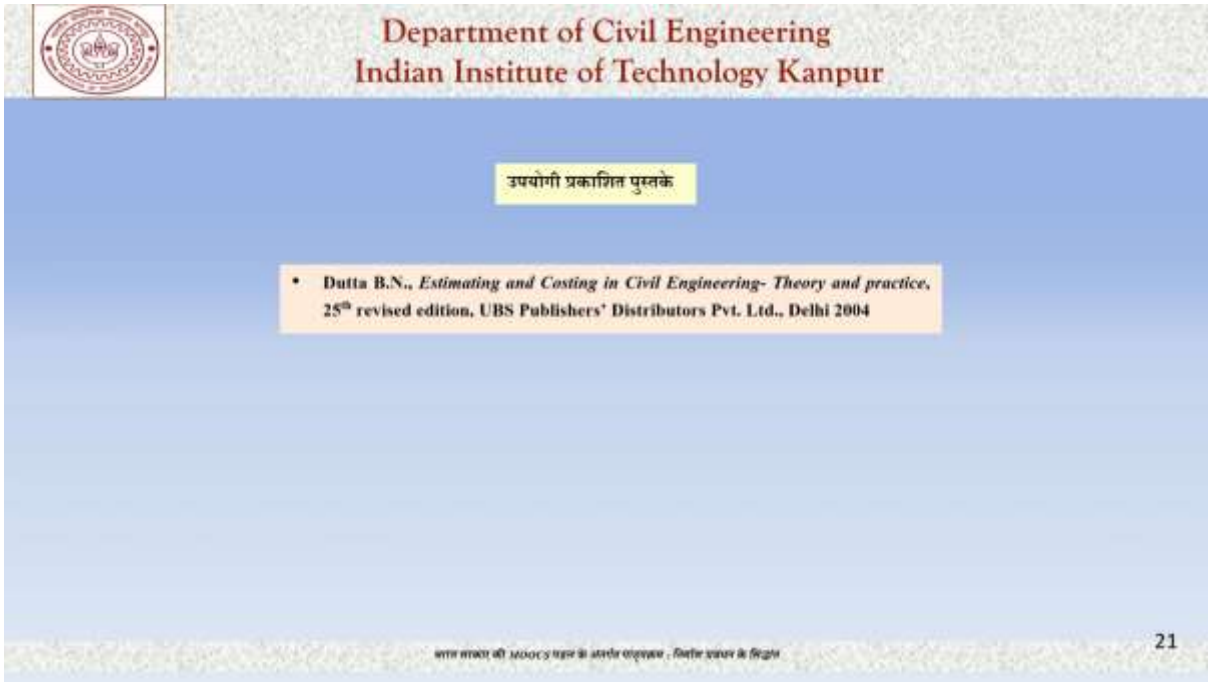
aur isakee height 2.675 jo ki hamako yahaan drawing se nikal ke aaegee. To oopar to thee boundary wall jahaan par ki 1.8 elevation hai, usake baad 1.8 jo ki top of boundary wall hai aur us boundary wall kee 875 mm yahaan par to isako agar ham jod denge to 2.675. To is prakaar se is pillar kee height 2.675 ho gaee jisaka ki prayog karake ham pillar mein aane vaalee total reinforce concrete kee quantity ya maatra nikaalate hain 4.25. Usee prakaar se 23 footing banegee jo ki .8 into .8 hogee. Unakee thickness ya height 0.25 hai vo is diagram mein ya is chitr mein diya hua hai. To ham footing kee maatra 3.68 nikaalate hain aur total hamaara reinforce concrete work aaya 7.93 cubic meter. Is prakaar agar ham PCC kee baat karen, plain cement concrete kee to hamako 60 m hamane PCC le liya jis prakaar se hamane earth work ka calculation kiya tha usee prakaar hamane yahaan bhee 60 m liya, 0.9 yah isakee chaudaee hai yahaan par ek drawing mein pichhalee baar dikhaee gaee thee is drawing mein nahin hai. 0.075 usakee 75 mm height maanee gaee aur 4.05 cubic meter PCC ho gaya lekin is PCC ko karane mein kyonki hamane yahaan par 60 m liya tha isalie hamako 4.1m deduct karana hoga aur yah deduction lene se hamaara calculation .27 cubic meter ka hua aur total net PCC 3.78 ka hoga. To is prakaar hamane is slide mein reinforce concrete aur plain concrete kee maatra nikaal lee. Yah dhyaan mein rakhiega ki hamane reinforce concrete kee maatra nikaalate samay reinforcement bar jitanee steel isamen use hogee chaahe vah neeche footing mein ho ya column mein ho usake volume ko ghataaya nahin hai yah ek convention hai agar aap usako khud calculate bhee karana chaahenge to aap dekhenge ki vah maatra bahut hee kam hotee hai isalie vo ghataane ka koee praavadhaan nahin liya jaata anumaan mein.

(Reference Time 31:47)



To isake saath hee aaj ka lecture ham yahaan par samaapt karana chaahenge. Hamane aaj is boundary wallke udaaharan ko lekar ke khudaee, chunaee aur concrete ke kaam kee maatra nikaalee hai. Agale lecture mein ham shuttering, plaster, kaantedaar taaron kee kul lambaee aur steel bars par charcha karenge.

(Reference Time 32:12)



Upayogee prakaashit pustakon mein aaj ka material jo hai jo aaj ham logon ne charcha kee usako aur vistaar se samajhane ke lie main sujhaav doonga ki aap B.N. Dutta's jee kee kitaab ‘Estimating and Costing in Civil Engineering Theory and Practice’ ko padhen. Dhanyavaad. Jay hind.