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The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. Estimation of Earth work excavation in civil engineering is the process of calculations of expected quantity required, amount of work to be done, the number of worker and equipment required and total expenditure cost to complete any project.Different types of quantities are required to be estimated accordingly to their types of work. For example, the amount of excavation, cutting and backfilling is required to be calculated in earthwork, the amount of concrete and reinforcement in RCC work and so on.The earthwork excavation is taken in cubic meters, so the detail of length, breadth and height of the work that is to be excavated is the first thing we required in estimation.Excavation shall include throwing of excavated earth material at least 1m to clear the edge of the excavation. The excavation includes setting out of work, profile, site clearance, dewatering and removal of soil.However, if the structure is to be dismantled before excavation, they are not included within it and separate estimation and rate analysis are required.The cubic rate estimate method is generally preferred for earthwork (cost estimate) in which the amount of estimate is measured in cubic meters and are directly multiplied by cubic rate to determine the cost.Different types of earthwork excavation are performed for building construction, road construction, pile and pier construction, irrigation and drainage purpose.In this method, the total centerline length is calculated in the first order. The centre to centre length is denoted by (l) and breadth by (b). Thus, the total length of the centre line is given,Total length = 2(l+b)Quantity of earthwork excavation = T. L. * w * h (h is height of trench and w is width of trench)As shown in Figure, it is clear that the inside intersected corner repeats twice when area through length and breadth is taken. And the outside corner is completely neglected. Thus, the intersected corner compensates the area od outside corner which is exactly equal giving the actual area.Special consideration is needed when more no of cross wall is included within.Total length = 2l+nb- no of junction *w/2This method is also similar to center line method, but the calculation of length is different here. The total outside perimeter is taken instead of perimeter of center line. Thus, here each corner repeats during calculations and thus they are deducted.Total length = 2(L+B) 4wAnd total quantity of earthwork excavation = T. L. * w * h (h is height of trench and w is width of trench)Special consideration for more number of cross wall is given by;Total length = 2L+ n *B- no of junction including corner *wIn this method the long wall and short wall are first of all identified. Then their respective length is calculated. And the separate quantity of both long wall and short wall is calculated and sum up at last.Long wall length (lw) = c/c length + w/2+ w/2Short wall length (sw) = c/c length w/2 w/2So,Total long wall quantity of excavation = nl * lw*w*h (nl is no. of long walls)Total short wall quantity of excavation = ns*sw *w*h (ns is no. of short walls)This method is generally use for the slab and raft foundation. The plane area of panel is calculated and then by multiplying with depth quantity is determine. And multiplying by each number of panel the total quantity is estimatedAnd, the different types of method used to calculate the earthwork excavation in road construction (in plain area), irrigation canal and drainage are:Here the area of mid cross section is taken for certain portion of length of road to be excavated (also for embankment). And then are multiplied with length to get volume of earthwork.Quantity of excavation = Area of mid section * length of the section consideredAnd,Area of mid section = area of rectangular portion + area of triangular portion (reference to figure shown)= B* d + *s*d + *s*d= Bd + sdSo, quantity of excavation = (Bd + sd) * LWhere;d is height (depth) at mid sectionB is formation widths is side slopeIn this method instead of depth of mid section, the mean area of the two ends of the certain length portion of road to be excavated are calculated to determine the estimate. So,Quantity of excavation = Mean of the area * length of section consideredArea of the both cross section (front and end face) are calculated same as above. So,Area of front face (A1) = B*d1 + s*d1Area of end face (A2) = B*d2 + s*d2Mean area (Am) =(A1+A2) /2So,Quantity of earthwork excavation = Am* LThis method is the more accurate and precise approach to calculations. Here, the Mean depth of the section is calculated to determine the area of the midsection of the considerable length of road excavation along with calculations of the area of the front end and back end of it.And, thus by Prismodial formula quantity of earth excavation is calculated.Quantity od earthwork excavation = L/6 (A1+A2+4*Am);A1 = B*d1 + s*d1A2 = B*d2 + s*d2Am = B*dm+ s*dm; dm = (d1+d2) /2The method to be used depends upon their suitability along with work type and the user.Some simple example of each for more illustration are given below.First of all, the necessary drawing with proper and detail dimensioning should be made ready for estimation.The specification also must be read properly before any estimate. If possible, trench plan drawing can be prepared separately for easy estimation. The trench plans are required especially when the formworks are to be placed beneath the ground for footing purpose.Thus, the extra width of 20-30 cm is added to the width of the actual plan structure (wall or footing foundation) for such trench.Determine the most bottom width of trench required to be constructed and according to it, the full depth is to be excavated.(Note: But when the height of excavation is too deep the trench are constructed in step wise such that width increase upwards or in slope (increasing width upward) to maintain stability.determine the depth of excavation needed. Different structures are located at different depth so it must have noted carefully. For example, the depth of footing is higher than the depth of the foundation beam.Determine the volume of excavation needed using any od techniques of estimate the quantity.Footing: excavation for footing is determined. If the footings are of the same dimensions overall building, then at the first volume required doe one footing is calculated and then multiplied by its numbers.Foundation beam: Any one of the techniques above explain can be used. For footing, the long wall and short wall method are comparatively easier so it is select here for calculating.Given data:Formation width (B) = 12mSide slope for cutting (s:1) = 1.5: 1Formation road gradient is(downward) 1 in 200. (So, change of level per chainage should be 30/200=0.15)Solution:Find out R.L of formation level. This is done by deducting 0.15 from top R.L of 0 chainages (108.6) per each chainage.Find out depth of cutting or banking required.Depth of earthwork = R.L of F.L R.L. of G.LIf the depth value is in -ve sign then cutting(excavation) is indicated and if it is +ve then filling (banking) is indicated. (Note, here we only deal with excavation)Determine the chainage at which the process of excavation and filling gets change by linear interpolation techniques.(X-20)/(0-0.5) = (150-120)/(-0.6-0.5)On calculation value of x is 133.63 which can be taken as approx. 134 for easier calculation.Calculate the quantity of earthwork to be excavated using any one of the methods as explained above (Here, we use the midsectional method)Calculation is as shown in table: (note only excavation is shown so -ve sign is neglected)I hope this article on Estimation of Earth work excavation remains helpful for you.Happy Learning Civil ConceptContributed by,Civil Engineer Rajan ShresthaRead Also,How to Calculate rate analysis for plaster work Step by Step?Rate analysis for plastering Step by Step Procedure for CalculationRate analysis for Concrete- Step by Step calculation with tableAAC blocks specifications (Autoclaved aerated concrete), Composition8 Points to improve the Durability of Concrete structure Experience full-fledge invoicing module with estimates, POs, receipts Get offline support to work seamlessly Multiple payment gateways + custom payment method Live customer support Manage projects and customers efficiently Automate workflow, get analytics, & more For my business, one of the headaches was managing both stocks and expenses. 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Enter Estimate DetailsFill in the key details to keep things organized: Estimate Number: A unique ID for easy tracking. Issue Date: The date you create the estimate. Due Date: How long the estimate is valid before prices or availability might change. 4. Add Customer Details Include your customers name and contact info so theres no confusion about who the estimate is for. 5. List Your Services & Costs Now for the important part breaking down the project costs. Make it clear and easy to understand: Describe whats included services, materials, labor, and any other costs. List work hours, equipment, and any extra fees like permits or licensing. For each item, add the quantity, description, unit price, and tax (if needed). 6. Set a Project Timeline If the job takes more than a day, give your customer a timeline. Include the start date, estimated duration, and any major project milestones. 7. 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A signature makes it clear that everyone agrees on the details. PDF, Email or Print Convert to an Invoice See when your estimate has been opened Get notified when your estimate is accepted Estimation of Earth work excavation in civil engineering is the process of calculations of expected quantity required, amount of work to be done, the number of worker and equipment required and total expenditure cost to complete any project.Different types of quantities are required to be estimated accordingly to their types of work. For example, the amount of excavation, cutting and backfilling is required to be calculated in earthwork, the amount of concrete and reinforcement in RCC work and so on.The earthwork excavation is taken in cubic meters, so the detail of length, breadth and height of the work that is to be excavated is the first thing we required in estimation.Excavation shall include throwing of excavated earth material at least 1m to clear the edge of the excavation. 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Things are getting normal, but still, we have to follow the guidelines to prevent ourselves and others from contacting the Covid-19 virus. As you know, during this pandemic are encouraged to socially distance themselves and remain quarantined in homes. Travel Does it feel like a nuts idea to ride a bike across the USA? Yes, it is, but this crazy idea is going to give you the best bike tour experience, you had ever felt in your life. Coast to coast, thousands of miles, you are really taking a bold decision, but you are not alone. Blog, Travel Are you inspired of seeing the world on two wheels? Well, if yes, then, believe me, this is going to be a life-changing experience. Dont think too much, it is the battle fought in your mind, if you win once from there, the toughest circumstances such as sleeping in a tent, on the open road, and cruising through the route covering thousands of miles, would not be able to shake your nerves. 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Blog, Miscellaneous, Riding and Health, Travel If you are inspired of riding a bike and now find the right time because limited social interaction has allowed you to think about yourself, I think this is really the right time. Especially for those who live in overcrowded cities like New York, where their workplace is not that far from their residence. TheyRead More Bike Riding Safety 7 Tips Blog, Riding and Health, Travel If you are inspired to use your bike for work, there is bad news for you. Only 2 out of 5 people who start bike commuting go to the end of week 1. No, I am not saying you are not fit for that, your fitness level does not depend here, the more depends here is how do you manage your expectations. Blog, Travel Hitachi Digging Machine near a quarrySource: Equipment Radar Digging, also known as excavation, is the act of using machines or tools to remove material (usually dirt, sand, gravel, etc). Digging typically involves the combination of two actions - the breaking of the surface and the moving of the material to a different location. Diggering machines (also known as diggers) are commonly found at most construction jobs because surfaces must be prepared for new structures and foundations. Common jobs that require diggers include: Excavating trenches and foundations Digging holes Mining Landscaping Road construction Dredging (rivers and harbors) Grading Tunneling By far, the most common applications for diggers include residential, commercial and infrastructure construction. Buildings and infrastructure typically require a smooth, stable surface to build upon. Most natural land is uneven by nature, which means that construction workers need to use digging machines to rework the land into a surface that is optimal for a new structure or road. What Are Digging Machines? Various types of construction machinery can be used in digging. Diggers are broad category that encompasses equipment capable of digging - excavators, mini-excavators, mining shovels, draglines, augers, trenchers, scrapers, backhoe loaders, bulldozers, skid-steer loaders, motor graders and crawler loaders all can be called diggers. The most common types of diggers are typically excavators and mini-excavators. Excavators Excavators are common and versatile large digging equipment found on most job sites. Excavators are driven by by tracks or wheels, but tracks are more common because excavators tend to work mostly on uneven surfaces where tracks outperform wheels. Typically an excavator has a bucket arm controlled by hydraulics attached to a pivoting cab that can rotate back and forth. The operator sits in a cab and controls the arm, bucket and drive. The default attachment for excavators is a bucket, which is used for digging. The excavator arm typically extends, breaks the ground surface, scoops up material, then lifts the material and places it in another location or a truck bed. Excavators are very flexible and can use a variety of attachments. Source: Caterillar.com Mini-Excavators Mini-excavators are similar to large excavators, except they are much smaller and easier to transport. Mini-excavators typically go up to about 70 horsepower, and have a max operating weight of about 2,000 pounds. Mini-excavators are best suited for urban areas, since they can navigate in tight spaces. Mini-excavators have a max digging depth of about 5-16 feet. Source: Caterpillar.com Mining Shovels Mining shovels are designed for digging large amounts of overburden and ore. Mining shovels are very expensive, and they are used almost exclusively at above ground mining operations. Caterpillar's largest mining shovels have a dipper payload of 120 tons, dipper capacity of over 80 cubic yards, and a working weight of over three million pounds. Source: Caterpillar.com Dragline Excavators Dragline excavators (also known as simply "draglines") are some of the largest machines in the world. Draglines are very expensive (tens of millions of dollars), and they are typically found at large mining operations. Draglines have useful lives of many decades. A dragline bucket system includes a large bucket suspended from a boom with wire ropes. The bucket is moved using a number of ropes and chains. Draglines are the biggest digging machines in the world. Caterpillar's largest dragline (Caterpillar 8750 Dragline) is capable of moving over 150 cubic yards of material, and the boom extends over 400 ft. The 8750 weighs about 16 million pounds. Source: Caterpillar.com Dozers Dozers (also called "bulldozers") are heavy equipment commonly used with large earthmoving jobs. Dozers are very powerful and capable of moving large volumes of material. Dozers typically feature a wide, flat blade in front that is moved using hydraulics. Dozers are commonly used in road construction and projects that require large volumes of dirt to be moved. The vast majority of dozes use tracks. Source: Caterpillar.com Trenchers Trencher are used to dig trenches (if you did not already guess by the name). Trenchers dig narrow and long holes, usually used for underground cables, pipes and utilities. Trenchers operate and look similar to a chain saw blade, but they cut the earth rather than a tree. Trenchers are available in many different types and sizes, from small walk-behind models to full-size trenching machines that cut into asphalt pavement and other hard surfaces. Trenchers feature a conveyor system to move material from the excavated area to the surface next to the digging machine. Trenchers' digging depth is often limited to the length of the trencher blade. Source: DitchWitch.com Skid-Steer LoadersSkid-steer loaders are among the most versatile machines used in construction because they are compact, inexpensive and efficient. Skid-steer loaders are able to maneveur in tight areas, which makes them perfect for work in urban areas. Skid-steer loaders come in both tracked and wheeled models. Skid-steer loaders are compatible with a wide variety of attachments, which enables them to serve many different applications such as digging, compacting, drilling, grappling, snow plowing, jack hammering, material handling and other tasks. Source: Caterpillar.com Motor Graders Motor graders are heavy equipment used for grading and moving small volumes of dirt. Motor graders feature a long blade under the machine's belly that is moved to create a flat and smooth surface. Some motor graders use a second blade ahead of the front axle. Motor graders are commonly used for road construction and ground preparation (such as a new housing community development). In addition to flat surfaces, motor graders can also create sloped surfaces and drainage ditches with shallow V-shaped cross-sections. Source: Caterpillar.com Backhoe Loaders Backhoe loaders (or just "backhoes") feature an adjustable shovel in front and a bucket in the back. The bucket functions similar to an excavator arm and bucket, and it is used for digging. Backhoe loaders can be both medium-sized and compact, so they are well suited to work in smaller spaces. Backhoe loaders are used to dig holes and trenches and move materials. Most backhoes use wheels, so they are better suited for urban areas and flat surfaces. Source: Caterpillar.com Digging Technology Believe it or not, rework is a major driver of construction project profitability. Rework often requires additional manhours, more materials, and project delays. Digging mistakes can add up, because an offset ground foundation could mean that the project has to be delayed while it is corrected. Precision digging can be challenging because many digging machines today are controlled by humans eyeballing the activity. The difference between a 0 degree grade and 2 degree grade might be hard for a digger operator to distinguish sitting in the cab. The challenge is even greater when working at large depths where line of sight and space are limited. Trimble, a leader in precision agriculture and construction equipment, has developed various technology solutions to automate digging and grade control for excavators, dozers, soil compactors, motor graders and more. Trimble's technology uses computer-aided design (CAD), sensors and GPS to plan, control and monitor digging activities at construction sites. Trimble's grade control features: Reduce over and under cutting Improve efficiency and accuracy of less experienced operators Achieve finished grade accuracy with fewer passes and no manual staking or bluetops Monitor project progress with machines to further reduce dependency on contract surveyors and grade checkers Detect over- or under-compacted areas or subsurface soft spots Improve compaction efficiency by achieving target pass count more accurately Trimble's Grade Control On Digging Machine Source: Trimble.com Common Methods To Dig Holes Digging Safety Digging work presents serious safety risks to all workers involved. The largest risk in digging is cave-ins becasue they are more likely to result in fatalities. to result in worker fatalities. One cubic yard of soil can weigh as much as a car - this can result in the worker become buried, crushed or suffocated. Extra care should be taken when digging deep. If the digging machine is close to the edge of a deep hole, the ground could loosen and cave in under the weight of the digging machine. Always take note of your surroundings, the level of soil compaction, and relative depths. Soil Conditions Digging standards require a the worker person to classify soil and rock deposits as: Stable rock: Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed. Type A soil: Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 kPa) or greater. Examples include clay, silty clay, and clay loam. Type B soil: Includes cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa) and granular cohesionless soils. Examples include angular gravel, crushed rock, silt, silt loam, sandy loam, and in some cases, silty clay loam and sandy clay loam. Type C soil: Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less, granular soils. Examples include granular soils (including gravel, sand, and loamy sand), submerged soil or soil from which water is freely seeping, submerged rock that is not stable, or material in a sloped, layered system. Pre-Digging Inspection You should always check for buried obstacles before digging. Call811 is a free hotline that will help you identify underground utilities. Underground items to identify can include: Power lines Gas lines Water lines Fiberoptics lines Underground tunnels or roads Archaeological sites (protected) Also, you should know the approximate depth of your local water table. Ground conditions can change quickly once you hit the water table. Protecting From Cave-Ins OSHA generally requires that employers protect workers from cave-ins by: Sloping and benching the sides of the excavation; Supporting the sides of the excavation; or Placing a shield between the side of the excavation and the work area. ResourcesDigger Safety: OSHA Trench & Excavation SafetyMonster Trench Digging Machine Find Similar Articles By Topic #construction #excavators #Caterpillar #mining Payment Method Select Payment Method Paypal PayMate Authorize.Net eWAY

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