Construction methodology of laying a sewerage pipes engineering essay

Engineering

a. Briefly explain with aid of diagramme, the construction methodology of laying a sewerage pipes and describe the reasons of different bedding type for vitrified clay (rigid) pipes and ABS (flexible) pipes.

Construction methodology of laying a sewerage pipes

Laying sewerage pipe involves setting the pipe into the ground, usually in a trench dug with an excavator. The sewerage pipe can be laid right on the earth. However, the trench must be dug on a slight angle to assist in the flow of liquids through the pipe. This is done by setting a grade into the trench line to match the layout of your pipe design, and they must be very straight. This improves the flow of water through the pipe. Many methods are used to lay sewerage pipe so it is straight, but one of the best ways is to use a " laser-assisted" device. Set stakes into the ground to mark the route of your sewer line. Make sure they are straight by positioning a laser on the top of the first stake and pointing it to the last stake. Reposition the stakes that fall out of line with the laser so they line up with the laser. Dig the trench using a excavator, following the stakes used to denote the straight line. Dig the trench at a 1 percent grade toward the end of the sewer line, at a depth of 6 feet or more, or as specified by your sewer line designLay the pipe into the trench using a crane lift. Set the pipe into the trench one right after the other with enough space in between to install a coupling connector. This varies based on pipe size; consult your sewer diagram for the coupling size and length. Place a batter board over the sewer pipe section. This is a 2-by-4 board that lays across the trench with two stakes in the ends. It is secured in place with a sledgehammer. The batter board also has a " batten" that is nailed dead center to the batter board. Attach a laser to the first batten and

line up each consecutive batten on each batter board down the line. This ensures they are all perfectly straight.

Reasons of different bedding type for vitrified clay (rigid) pipes and ABS (flexible) pipes

There are different bedding type for different pipes such as rigid pipe and flexible pipe. It is shown that the bedding factors are affected by the backfill material type and compaction density, backfill height, trench width, and pipe diameter.

Vitrified clay (rigid) pipes

This vitrified clay has exceptional properties in respect to chemical resistance, mechanical strength, impermeability and hardness. It should be noted that availability of some sizes strength classifications is limited in certain geographical areas pipe is also known for brittleness. When installing clay pipe in an open trench, the bottom of the pipe needs to have continuous and uniform line-bearing support. If bedding material is used, the bottom should be over-excavated, with the proper amount of bedding material added. Proper bedding material depends on the loading factor of the pipe. Clay pipes are prone to impact damage from such things as large stones or a half brick coming into contact with the pipe during the back fill process, settlement to the sub-soil beneath the pipe can lead to stress fractures and collapse it is therefore necessary to ensure that the pipe work is bedded an appropriate granular material.

ABS (flexible) pipe

Acrylonitrile-butadiene-styrene (ABS) composite pipe consists of two concentric thermoplastic tubes integrally connected across the annulus by a truss-like bracing.. ABS composite pipe is termed a " semi-rigid" pipe because it resists deflection better than most other plastics . The pipe is light in weight and resists attack by acids, alkalies, and biological growths . ABS composite pipe is available in diameters 8-inch to 15-Inch, and in one laying length of 12 . 5 feet. Flexible pipe work relies on the granular fill around it for structural support without it the pipe work will become deformed when under load, if the deformation is greater than 5% of the pipe diameter then the system has failed and would require renewal. Increasingly called for as newer materials take the place of the traditional clay and concrete pipes that showed obvious defects such as cracking and fractures when under pressure, the powers that be now set a tolerance for deformation of new sewer systems made of modern materials and this is the tool of choice for checking the systems prior to hand over. The two images above show the selected granular bedding supporting the underneath and side of the pipe work, in practice on most domestic repairs we tend to surround the pipe with the bedding material, unless you are working in pure sand the time required to sort the excavated materials to ensure there are no sharp edges, large stones or lumps of clay coming into contact with the pipe is wasted for the sake of another barrow full of stone. There is a school of thought that by installing a granular fill around the pipe work you are in fact creating a water course around the service, which in itself could lead to soil erosion around the pipe work and that a compacted grit sand would be a preferable material

to use. In fact when working in pure sand particularly beneath the highways and roads it does go against the grain to be removing all the spoil from site and import tonnes of M. O. T and granular fill to back fill the trench. b. List down with explanation the contractor task in landscaping contract. Landscape Contracting is a profession that involves the art and technology of landscape and garden project planning, construction and landscape management, and maintenance and gardening; for garden aesthetics, human enjoyment and safety, and ecosystem-plant community sustainability. In the landscaping contract, the contractor is the person responsible for the physical work of landscaping. Their works are closely related to the construction industry and landscape designers. These contractors create the suitable ground conditions, install plants and shrubs, and recommend stones and gravel. All these items must be suitable for the location and intended use. There are various forms of contractor task in landscaping contract.

Landscape Design

The contractor in landscaping contract works closely with the client to design, develop, plant or maintain a given landscaped area. They will meet with clients to determine the types of plants, style of garden or requirements for the area. Besides that, they also consult with clients about options for plants, types of grass or even shrubs and trees that will flourish in the growing area. Then, they will have computer-generated models, pictures or landscape blueprints for customers to examine. Some of them work with residential clients in designing yards, gardens and beautiful natural areas on residential land whereas others work with parks, businesses or even

governments to maintain current grassed areas or to landscape and develop new or existing areas. Many contractors are qualified in design. They've either earned trade certificates incorporating design or gone through formal landscape design courses. This knowledge is inseparable from the work of the landscaping contractor, who must read design plans and deal with the issues on the plans. Landscape design, which is a major commercial interest in the industry, is a natural part of the landscaping contractor's business. Many contractors in landscaping contract operate as advisers to clients as part of their roles.

Landscape Construction

This is the work that creates landscaping designs. It may involve the following: Construction of a completely new set of landforms and featuresConstruction of gardensPlacement of retaining wallsInstallation of drainageInstallation of water featuresTree plantingTurfingInstallation of fixed watering systemsNote: Some of this work may involve subcontracting, but the contractor in landscaping contract has the primary responsibility for the work.

Landscape Remediation and Repair

A range of skills and tasks are involved in this work, and some of them include aspects of construction. It is common for contractor in landscaping contract to repair or restore landscaping that has been affected by local conditions or subsidence or that requires management due to neglect.

Landscape Maintenance

This work includes many of the same sorts of skills and tasks as remediation and repair over time. Most of them offer services ranging from designing a garden or yard right through to maintenance of the area year round. Contractor in landscaping contract also maintain expensive features for owners or local governments. They prune trees, remove noxious weeds, maintain grass and deal with any damage from disturbances such as storms. Depending on their contracts, contractor in landscaping contract also remove hazards. c. Briefly explain three (3) influencing factors for road design. Road is the channel serving as a means of communication. It is laid on ground therefore road is a landed property. There should be proper planning of land in other to achieve economic use. The purpose of road is to provide a smooth surface over which vehicles may pass under all climatic conditions. There are various of the road designs and the road designs are influence by some factors which are type of subgrade, settlement of soil and initial cost.

Type of subgrade

The performance of the road is affected by the characteristics of subgrade. Desirable properties that the subgrade should possess include strength, drainage, ease of compaction, permanency of compaction, and permanency of strength. Since subgrades vary considerably, it is necessary to make thorough study of the soils in place in order to determine the design of the road. Soil is highly variable material, the interrelationship of soil texture, density, moisture content, and strength are complex. The behavior under repeated loads is difficult to evaluate. The subgrade is the naturally

occurring ground or imported fill at formation level. Homogeneity of the subgrade strength is particularly important and avoiding hard and soft spots is priority in subgrade preparation. Any subgrade should be suitable material of such grading that it can be well compacted. Material containing variable piece sizes often proves difficult to compact, giving rise to settlement and early failure of the pavement. In the case of low strength subgrades, the foundation may include a capping layer separating the subbase from the subgrade. Capping layer material usually comprises locally available low-cost material with a California Bearing Ratio(CBR) of 15 per cent or more. It may be crushed concrete, hardcore or crushed rock of insufficient strength or stability to function as a subbase. When the California Bearing Ratio (CBR) of the subgrade is less than 5%, it is normal to require a suitable capping layer of low cost material. This capping layer is usually a granular type material designed to provide a working platform on which sub-base construction can proceed with minimum interruption from wet weather, and capping is also used to minimise the effect of a weak subgrade on pavement strength. On very good quality subgrades, such as firm sandy gravel the subbase material may be omitted.

Settlement of soil

The most important problem related to road on soft soil is the settlement which is relatively large and takes a long time to complete. Therefore a good prediction of the settlement is important in order to get a good civil engineering design. Structures built on soft soil are subject to settlement. Some settlement is often inevitable, and depending on the circumstances, some settlement is tolerable. The problem of settlement is significant when

dealing with structures such as roads on peat or organic soil. Due to the characteristics of soft soil, the structures may settle excessively both due to high compressibility and low shear strength. The settlement may take a long time depending on the ability of the soil to dissipate the excess prop induced by the construction. Road constructions in peat and organic soil areas requires a fill layer to raise the ground level and the road foundation sufficiently above ground surface and water level. Placing a fill on these compressible layers will often induce large settlement with subsequent damage to the pavement structure. Prediction of settlements is necessary to quantify in advance the amount of fill material, the duration of construction and post-construction settlements. The rate of settlement of peat and soils with high organic content are generally greater than those low organic contents. The magnitude of this should be considered particularly in designing staged construction of roads and in arranging strategy for long term road maintenance. The fluctuation of the ground water table may induce additional settlement of the soil foundation. In general, little attention has been paid to address this problem. Using polders, which has been widely used in the Netherlands, as part of the water management system in the area can be considered to control the ground water level. Attention should be paid to the settlement effect in cases where such polder construction will be located.

Initial cost

The economic analysis of different road should be based on life-cycle costs rather than just initial capital cost. This means that the life expectancy of the structure and the cost of inspection, maintenance, repair and rehabilitation

should be considered, along with less tangible aspects such as user safety, travel delays, environmental impacts and acceptable risk. For example, a poor road geometrics might entail a low initial cost but high maintenance costs, a high accident record and repeated closure due to overtopping of the approach road. A life cycle cost analysis would probably demonstrate that, despite the higher initial cost, the second solution would be cheaper in the long run. The adoption of higher design standards normally leads to higher initial costs, but may result in lower costs to the road in terms of future costs of maintenance and renewal. These may consists of vehicle operating costs, time and delay costs. Costs that must be taken into account when considering roads over their life cycle fall into two main groups which are those affecting the road agency and road users.

Road agency

Costs incurred by them include the ongoing disbursements for maintenance in all its forms to pavements, footways and footpaths, cycletracks, drainage features, structures and signaling. For all new roads, costs of construction need to be considered. These costs include those for planning, design, procurement, the construction itself, and its supervision and management.

Road user costs

Costs to the road user are normally considered to include vehicle operating costs (including both running and standing costs), time costs (including those for delays due to congestion and roadworks) and road accident costs. A life cycle cost approach may be used to investigate trade-offs between road construction and maintenance costs, the approach can also take road user

costs into account to assist in determining optimum standards of design and policies of road maintenance. d. Briefly explain four (4) requirements of joints for cladding system. Cladding system in nature is either a single or double-skin (panel) building element, designed to carry its own dead weight as well as exterior loads such as snow and wind loads, while providing the desired enclosure for the structure. Joint is one of the components in order to construct a cladding system. Joints should function for many years under severe climatic conditions (heat, water, humidity) and under stress developed by various forces acting upon structures (compression, tension, shear) of such polymers is being used. There are some specific requirements of joints for cladding system which are joint that can exclude wind and rain, allow for structural, thermal and moisture movement, good durability and easily maintained.

Exclude wind and rain

The requirement of the joint for the cladding system is the joint need to exclude wind and rain in order to keep the element inside the building in a good condition. Rain may penetrate from outside the building. Thus, the joint need to be weathertight in order to prevent rain entering the building and to require minimum maintenance. Wind forces even at low pressures can be higher than those inside the building assisting rain to enter through penetrations, gaps and joints. All joints left open, as in a rain screen system. The effect of wind and rain penetration uponthe cladding and the substrate must be fully assessed. Localised pressure at corners and exposed edges are of particular concern. Condensation is likely to occur at the external cladding as the temperature gradient drop across the width of the cladding. Warm

moist air from inside the building will condense as it cools forming moisture droplets in the insulation, framework surface, internal face of the cladding and elsewhere. Moisture that has penetrated or collected on the inside face of the external cladding cannot escape the building fabric either by natural drainage or by ventilation of a cavity. Water may accumulate around the joint of the cladding with potential to cause deterioration of the building elements. Therefore, the joint that can exclude wind and rain is needed.

Allow for structural, thermal and moisture movement

Joint design should consider the structural, thermal, moisture and all other factors that affect the performance and movement of a joint. All cladding materials including joints are subjected to seasonal change in temperature and tend to change in dimension accordingly. The joint seal should of course be adequately designed to withstand the movement of the joint. Joints open in winter and close in summer. Thus, movement at the joint is dependent on the temperature range the cladding panels experience such as the coefficient of thermal expansion of the material making up the panel and the effective length of the panels. Most problems of jointing for cladding panels occur at the external panel-to–panel joint, particularly at the crossover situation. These external joints and their jointing materials must be able to accommodate the thermal movements and deflection movements of the moulding under maximum dead and live load conditions. Some jointing also have a better inherent resistance to oxidation attack and subsequent ageing. For thermal movement, the jointing which has a lower coefficient of thermal expansion will be more benefit. In calculating thermal movements the designer needs to assume a realistic figure for the temperature gradient set

up within the cross-section of the panel. The joint should accommodate the fabrication and erection tolerances of the panels. It should also accommodate the differential movements due to shrinkage and thermal movement.

Good durability

A good durability joint is essential for a cladding system to ensure that the cladding system can perform well. Evaluation of future joint durability is performed in several ways. Often requirements are specified (air entrainment, maximum absorption, minimum compressive strength, etc.) to enhance the durability of the joints. Joints also must be durable to accommodate the tolerances of fabrication, construction and erection.

Easily maintained

The joint that can easily maintained is one of the requirements. This is because the material of the joint such as iron is easily to oxidize and rust. If the joint is rust, it means that the joint is easily break up and cladding system for the building is not stable. When properly constructed the joints for the cladding systems require some maintenance. The most important maintenance item for the joints is the sealant in joints. If a sealer or concrete coating has been used for aesthetics or to minimize moisture penetration into the panel, the sealer or coating will require reapplication. Joints are the focal point for wear and deterioration. The aspects of maintenance and repair should be considered at the design stage. The choice of a suitable sealant is important as is the appropriate sealant cross-section. Although today’s sealants are long-lasting, they eventually will need replacement or

repair. The process and ease of this should be part-and-parcel of joint design. There should be provision for inspection and maintenance of face sealants and joints. For example, we can put a downpipes in front of a face-sealed joint, whilst protecting the sealant from UV light, impedes both inspection and repair..