

NIGERIAN CITIES NEEDS UNDERGROUND SANITARY SEWAGE PIPE SYSTEM FED TO TREATMENT PLANT.

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ABSTRACT

What is Sewer?

Sewer is an artificial conduit or system of conduits used to remove sewage and to provide drainage. Sewage is mainly liquid waste containing some solids produced by humans which typically consists of washing water, feces, urine, laundry waste, other material from households and industry. Sanitary sewer system is an underground horizontal pipes that transports sewage waste from commercial and residential buildings through pipes that collects solid wastes from toilets, lavatory basins, kitchen sinks, including water from bathrooms. The solid wastes are transported to treatment plant by gravity where it is treated before discharge into ocean, river, lake, or canals to avoid contamination of water. The underground horizontal pipes are connected to vertical pipes to the surface mainly to have access for inspection, and they are called manhole. The manhole is usually covered with cast iron plates to avoid objects and people from falling in. This paper will focus on sanitary sewage disposal system only, not a combined sewage and storm water disposal system.

Keywords: Sanitary Sewage, Sewage Pipes, Drainage, Discharge, Liquid, Solids, Waste Materials, Vertical Pipes, Manhole, Sewage Treatment plant, Toilets, Gravity Powered.

INTRODUCTION

Sanitary sewage or sewer is an underground sanitary sewage disposal system through pipes from houses and commercial buildings to a treatment plant, before discharge. The sewage must be treated before discharge into river to control or avoid water pollution. This type of underground sanitary sewage system is the sewage disposal system commonly used in municipalities in developed countries around the world. The sanitary sewer system transports sewage materials from water

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closets, lavatory basins, sink in the kitchen, bath tubs through pipes to wastewater treatment plant before discharge.

In the ideal case, a sewer system is completely gravity – powered, like a septic system. Pipes from each house or building flow at a sewer main that runs, for example, down the middle of the street. The sewer main might be 3 to 5 feet (1 to 5m) in diameter. Periodically, a vertical pipe will run up from the main to the surface, where it is covered by a manhole cover. Manholes allow access to the main for maintenance purposes. **Marshall Brain, 2017.**

Understanding of solids deposition, erosion, and transport processes in sewer systems has improved considerably in the past decade. This has provided guidance for controlling sewer solids and associated acute pollutants to protect the environment and improve the operation of wastewater systems. The solution lies in the amount of water allotted to various process in and effluent treatment system, in impact evaluation of water quality and prediction technology, and in stressing the importance of developing a control technology. **Mouri.G, Oki. T. (2010).**

There was a time when municipalities designed a combined sewer system to collect both sanitary and storm water runoff. The combined system did not work well because sanitary waste in the process gets diluted with storm water. When sanitary waste is combined with storm water the sewage treatment system process is ineffective, it does not produce the expected result. A combined sanitary and storm water treatment would reduce cost of sewage treatment operation, but it is said to be less effective, especially during periods of rainy season when it rains heavy. For this reason, a separate sewage treatment system of sanitary waste without storm water is preferred by many municipalities.

Using multiple Antibiotic Resistance profiles of coliforms as a tool to investigate combined sewer overflow contamination our study on the Anacostia River using this approach clearly shows fecal coliforms are associated with (CSO) overflows indicating that pollution-derived coliform levels are strongly line to antimicrobial resistance. The implementation of this method as an index for water quality in the remediation of the Anacostia River has the

ability to serve as a model and monitoring tool for the rehabilitation of urban watersheds. **Gaurav Dhiman, Emma N. Burns, David W. Morris.(2016)**

In many developing countries a simplified sanitary sewer treatment system that costs less is the type they are using. The set-back with regards to the simplified sanitary treatment system is the higher cost of maintenance and running of the system.

Sanitary sewer overflow can occur due to blocked or broken sewer lines, infiltration of excessive storm water or malfunction of pumps. In these cases untreated sewage is discharged from a sanitary sewer into the environment prior to reaching sewage treatment facilities. To avoid this, maintenance is required. Sewer blockage are responsible for the majority of sewer flooding incidents. They cause the discharge of raw sewage effluent into homes and into natural water courses and are immensely expensive to the water industry. The number of sewer blockages suffered on public sewer networks is steadily increasing. This trend is likely to continue with deteriorating sewer networks and increased water efficiency both likely to contribute to an increased numbers of reported blockages. **Hillas, Trefor Tamblyn.(2014).**

Sanitary sewers like any other infrastructure gets deteriorated as they get old. Therefore, maintenance of the system is very important, especially, for a combined sanitary sewer and stormwater mainly because of infiltration and inflow since the drain pipes are sized to carry all these infiltrations. It has also been established that a combined sewer collection system through pipes at underground or tunnels can cause major water pollution due to overflow when it exceeds the treatment system especially during heavy rain fall.

An innovative generalized approach for integrated real time control of urban drainage systems is presented. The Dynamics Overflow Risk Assessment (DORA) Strategy tries to minimize the expected overflow risk by considering (i) the water volume presently stored in the drainage network (ii) The expected runoff volume (calculated by radar-based rainfall forecast models) and (iii) the estimated uncertainty of the runoff forecasts. The inclusion

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of uncertainty allows a more confident use of Real Time Control (RTC). The inclusion of forecasts and their uncertainty contributed to further improve the performance of drainage systems. **Vezzaro, L. and Grum, M.(2012).**

The main sewage pipes are fed or connected to vertical pipes mostly made of precast concrete called manholes from the main pipes underground to the surface. The manholes are used for the express purpose of having access to the underground sewage pipes to conduct inspections and maintenance in case, there is a problem in the system, and also to ventilate the gases from the sewage line. The sewer lines are usually located along at the middle of the streets and sewage discharge by gravity are connected to these pipes underground into trunk sewers at the manholes.

In Nigerian municipalities, the choice for sanitary disposal system, is the septic tank and soak away pit system. City after City in Nigeria, sewer solid materials from homes and commercial buildings are disposed through the septic tank and soakaway pit system, despite the major established disadvantages. They are as follows: That is, if the septic tank and soakaway pit is built near trees, the roots of the trees will penetrate and destroy the septic tank, especially when septic tank gets old. At flood season due to heavy rain fall, can course water from underground to rise up and fill the septic tank system, which will affect the normal drain process adversely. When the septic tank gets filled up or have cracks, it generates very toxic odor and gas emissions, therefore, it creates environmental pollution problem. Septic tank leakage can also generate underground water pollution problem which will in turn affect clean underground water. Also, if the septic tank is located around or adjacent to a river especially with fish for human consumption, the septic tank system must be properly maintained to avoid leakage that may contaminate the river. Because of the above disadvantages, the recommendation is for Nigerian municipalities to invest on proper underground sanitary sewage pipe disposal system. A system that will effectively collect and transport solids materials flushed down from toilets in houses and commercial buildings through pipes to sewer treatment plant before disposing into rivers.

The sanitary sewer is a system of underground pipes that carries sewage from bathrooms, sink, kitchens, and other plumbing components to a wastewater treatment plant where it is filtered and discharged. The sanitary sewer drainage system must involve vertical pipes, that is, precast concrete manholes from the surface connected to the underground sanitary sewage pipe line disposal system. Because, this will enable municipal authorities do proper inspection and maintenance of the system and also to vent the gases from underground pipe line through the manholes.

The designers of the underground sewage drainage system must effect a proper planning and design process of the underground pipe sanitary sewage line. They must provide a required design standards for the sanitary disposal system that is functional and consideration of inspection and maintenance that will be needed. It must be of high design standards so as to enable implement proper construction that will provide effective underground sanitary sewage disposal system. It is very important to note here that it is the culture of Nigerians to leave public infrastructures running without proper inspection and maintenance. This must not be the case, the system must receive proper, continues inspection and maintenance operation that will guarantee a long lasting and effective infrastructural system.

Sewer line and sanitary sewer system installation and maintenance are critical to public and environmental safety. With our knowledge and expertise, Fox underground takes residential, commercial, industrial, institutional and municipal sewer installation to heightened level.

Guy Fox in.(2013). Fargo, ND.

CONCLUSION

There must be city codes that will require a minimum acceptable standard for design and construction for the sanitary drainage system. There must also be a standardized plumbing model codes that will be adopted for every sanitary sewage disposal system across the board, that is, a uniform code to be used throughout the country. The other major advantage of this underground sanitary sewer drainage system is the potential employment

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generating possibilities. Many people will be employed by municipal authorities across the country. People will be employed to conduct routine inspections and maintenance of the underground sanitary sewer system. The system will need a mandatory routine inspection and maintenance to avoid blockage that will make the system ineffective. Also, many people will be hired to work at the sanitary treatment plants across the country as well.

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