

APPENDIX A

SELECTED DEFINITIONS

AASHTO - American Association of State Highway Transportation Officials.

ASTM - An abbreviation for American Society for Testing and Materials.

Abandoned - To remove from service for all functional use.

Activated Sludge Process - The process of using biologically active sewage sludge to hasten breakdown of organic matter in sewage during secondary waste treatment.

Acute Toxicity - Any poisonous effect produced within a short period of time, usually within 24-96 hours, resulting in severe biological harm and often death of test organisms.

Aeration - The process of being supplied or impregnated with air. Aeration is used in wastewater treatment to foster biological and chemical oxidation.

Aerobic - This refers to life or processes that can occur only in the presence of oxygen.

Ammonia - One of the seven forms that nitrogen can exist in nature (NH₃-N). It is used as an indicator of water quality because nitrogen is one of the fertilizing elements necessary for algal growth.

Anaerobic - Refers to life or processes that occur in the absence of oxygen.

Arch - The curved top of a structure, usually referred to as being from the springline to the top.

Assimilation - Conversion or incorporation of absorbed nutrients into protoplasm. Also refers to the ability of a body of water to purify itself of organic pollution.

Auger - A boring instrument used for subsurface exploration.

Available Chlorine - A measure of total oxidizing power.

Available Oxygen - The quantity of dissolved oxygen available for oxidation of organic matter in a body of water.

Average Daily Flow - That flow occurring in the sewers as a 24-hour dry weather average, including a nominal amount of infiltration, otherwise described as the total quantity of flow tributary to a point divided by the number of days of flow measurement.

Backfill - (a) The refilling of an excavation after a structure has been placed therein.

(b) The material placed in an excavation in process of backfilling.

Bacteria - Single-celled microorganisms that lack chlorophyll. Some bacteria are capable of causing human, animal, or plant diseases; others are essential in pollution control because they break down organic matter in the air and in the water.

Baffle - Any deflecting device used to change the direction of flow or the velocity of water.

Bar Screen - A preliminary treatment process that removes oversize solids in order to protect downstream treatment processes. Bar screens normally consist of vertical or inclined steel bars spaced at equal intervals across a channel of wastewater.

Barrel, Manhole - The vertical portion of a manhole used to gain access to a sewer or sewer structure.

Base, Manhole - The bottom or supporting structure on which the manhole barrel rests.

Bedding - The earth or other materials on which a sewer or other structure is supported.

Bell - The recessed, over enlarged, female end of a pipe into which the male or spigot end fits.

Biodegradable - The process of decomposing quickly as a result of the action of microorganisms.

Biological Oxidation - The process by which bacterial and other microorganisms feed on complex organic materials and decompose them. Self-purifications of waterways and activated sludge wastewater treatment processes depend on this process. The process is also called biochemical oxidation.

Biosolids - Settleable solids separated from the water during processing of wastewater.

Blazed - The act of removing a portion of bark from a tree for surveying purposes.

Blow Off - A waste gate or device for discharging accumulated solids or for emptying a depressed sewer.

Blueline Stream - Natural surface drainage structure shown on USGS topographic maps as a solid blueline. Also, classified by Kentucky Division of Water as a natural drainage structure having continuous flow during normal weather conditions.

Borings - Subsurface investigations performed to classify the types of soils.

Branch, Y (Wye) - A pipe joined to another pipe (usually at 60 degrees with alignment of the other) molded together and manufactured as a whole unit.

Bulkhead - A partition closing off an opening, usually constructed of timber, brick, or concrete.

Five-Day Carbonaceous Biochemical Oxygen Demand (CBOD5) - A measure of the amount of oxygen consumed in five days by the biological processes that break down organic carbonaceous matter in water. Large amounts of organic waste use up large amounts of dissolved oxygen; thus the greater the degree of pollution, the greater the BOD.

Capacity - The amount of flow in terms of cubic feet per second that a conduit can or will discharge. Capacity depends on factors such as velocity, coefficient of roughness, size, shape, and slope of conduit.

Carbon Dioxide - A colorless gas heavier than air, which is poisonous if inhaled. Its presence can be detected with proper equipment. Common in sewers that are not properly ventilated.

Castings - Metallic objects (normally cast iron) formed in a mold. Examples are: manhole lids; manhole rims; catch basin grates; and frames; etc.

cfs - Cubic feet per second - A unit of measure of the volume of liquid flow past a given point in one second.

Chamber, Chlorine Contact - A structure in which water and chlorine is mixed and then detained in order to achieve disinfection.

Chamber, Diversion - A chamber which contains a device for drawing off all or part of the flow.

Chamber, Junction - A converging section of a conduit used to facilitate the flow from one or more conduits into the main conduit.

Chamber - A general term applied to a space enclosed by walls or to a compartment often prefixed by a descriptive word, such as "junction chamber", "grit chamber", etc.

Chamfer - A flat surface created by slicing off a square edge or corner.

Chemical Oxygen Demand (COD) - A measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in water. The COD test, like the biochemical oxygen demand test, is used to determine the degree of pollution in an effluent.

Chlorination - The application of chlorine to drinking water or sewage for disinfection or the oxidation of undesirable compounds or micro-organisms.

Chlorinator - A device for adding a chlorine in the form of a gas or liquid to water.

Chlorine - An element ordinarily existing as a greenish-yellow gas about 2.5 times as heavy as air. At atmospheric pressure and a temperature of -30.1 degrees Fahrenheit, the gas becomes an amber liquid about 1.5 times as heavy as water. The chemical symbol of chlorine is Cl, its atomic weight is 35.457, and its molecular weight is 70.914.

Clarification - The removal of suspended solids by means of gravity settling, which can be aided by chemically-induced coagulation.

Clarifier - A settling tank which allows solids to separate out by gravity and contains a method to mechanically remove solids from the bottom of the tank.

Coagulant Agent - Chemical(s) that cause very fine particles to clump together into larger particles.

Coagulation - The clumping of very fine particles into larger particles induced by chemicals such as lime or alum. The larger particles allow separation of the solids from the water by settling, skimming, draining or filtering.

Coefficient - A numerical quantity interposed in a formula which expresses the relationship between two or more variables, which may be derived by theoretical or experimental methods.

Coefficient, Roughness - A factor, "n", in the Kutter, Manning, Hazen-Williams, and other formulae, which represents the effect of roughness of the confining channel or conduit material upon the energy losses in the flowing water.

Collar - (a) A cylindrical ring of either brick or precast concrete, secured upon the cone or barrel of a manhole upon which the frame will rest.

(b) A cylindrical monolithic concrete encasement for securing a joint and preventing shear by movement.

Collector System - A network of lateral and branch sewers in a defined area, which collects and transports sewage to a larger sewer.

Comminutor - A device that shreds solids in the wastewater in order to make them easier to treat and transport.

Composite Sample - A combination of individual samples of water or wastewater taken at selected intervals, generally hourly for some specified period, to minimize the effect of the variability of individual samples. Periodic samples may have equal volume or may be roughly proportioned to the flow at the time each sample is taken.

Conduit - A continuous piping or passage system for transporting water or sewage underground. Also, used for containing wires and cables of other utilities.

Connection, House - See Property Service Connection.

Contract Documents - The Agreement, Addenda (which pertain to the Contract Documents), Bid Proposal (including documentation accompanying the bid and any post-bid documentation submitted prior to the Notice of Award) when attached as an exhibit the Agreement, the Bonds, the General Conditions, the Special Provisions, the Specifications and the Drawings as the same or more specifically identified in the Agreement, together with all amendments, modifications and supplements issued on or after the effective date of the Agreement.

Cradle - Type of bedding, usually of gravel or concrete, being laid upwards from the trench bottom to the springline of the pipe.

Crown - The highest inside part of a conduit; the inner top of a conduit.

Cubic Feet per Second - (Abbreviated c.f.s.) A unit of measure of the volume of liquid flow past a given point in one second.

Cul-de-sac - An alley or street having no outlet at one end, usually having an area at its dead end for turning around.

Culvert - A closed conduit typically of precast or monolithic structure of sufficient length for the passage of water.

Datum - An agreed standard point or plane of stated elevation. Any position or element in relation to which others are determined, for example, the horizontal control system used in map making.

Dead Man - A post put in solid ground for furnishing and fastening or anchoring guy wires.

Dechlorination - Removal of residual chlorine in water by a chemical or physical processes.

Delta - Used as a symbol, this indicates the angle of deflection from the forward tangent either left or right to the centerline of the sewer.

Detention Tank - A tank used to provide adequate storage time for chemical or physical reactions to occur.

Digestion - The biochemical decomposition of organic matter. Digestion of biosolids takes place in tanks where the biosolids decompose, resulting in partial gasification, liquefaction, and mineralization of pollutants.

Discharge -

- (a) As applied to a sewer or stream; the rate of flow, or volume of water flowing therein at a given place and within a given period of time.
- (b) The act, in water or other liquid, of passing through an opening or along a conduit or channel.
- (c) The water or other liquid which emerges from an opening or passes along a conduit or channel.

Disinfection - Effective killing by chemical or physical processes of organisms capable of causing infectious disease. Chlorination is currently the most common method in wastewater treatment processes.

Diversion - An arrangement of pipes, conduits, gates and/or valves that allows flow to be passed around a hydraulic structure or appurtenance.

Double System - Usually two conduits laid in parallel -- one conduit laid in the trench being used for a drain, and the other as a sewer or sewers laid on either side of a street.

Drainage Area - A tributary area which is generally limited by a topographic area, but may be also limited by political boundary or economic factors.

Drop Inlet - A contrivance of pipe fittings which is utilized when an incoming sewer is considerably higher than the outgoing sewer.

Dynamic Head - In pumping water, a head usually expressed in pounds per square inch (p.s.i.) representing both the pressure due to the elevation to which the water is pumped and that due to friction of the water in the pipe; the head against which a pump works.

Effluent - The water or wastewater that flows from a basin, treatment process or treatment plant.

Encasement - Usually monolithic concrete that is used to enclose the periphery of a conduit.

Engineer - A consultant or in-house designer who is in responsible design and who is a registered Professional Engineer in the Commonwealth of Kentucky.

Equivalent - Being equal in measure.

Extended Aeration - Treatment process similar to conventional activated sludge with the exception that the wastewater is retained in the aeration tank longer (18-24 hours).

Fascines - A long bundle of sticks of wood bound together and used for such purposes as filling ditches and making revetments for riverbanks.

Fecal Coliform Bacteria - A group of organisms indigenous to the intestinal tracts of humans and other mammals. The presence of fecal coliform in water is an indicator of pollution and of potentially dangerous bacterial contamination.

Filtration - The process of passing water through material such as a bed of sand, coal or other granular substance to remove impurities such as suspended particles and bacteria.

Final Effluent - The effluent from the final treatment unit of a wastewater treatment plant.

Flap Gate - A gate that opens and closes by rotation around a hinge or hinges at the top of the gate, permitting the fluid to pass only in one direction.

Floc - A clump of solids formed in sewage by biological or chemical action.

Flocculation - The process of gathering fine particles to form larger particles after coagulation by the use of gentle mixing.

Flood Level - The stage of a stream at the time of a flood.

Flood Plain - The land contained within the perimeter of the probable limiting flood.

Flood Frequency - The frequency with which the maximum flood may be expected to occur at a site in any average interval of years. Frequency analysis defines the "N-year flood" as being the flood which will, over a long period of time, be equaled or exceeded on the average once every N years.

Flow, Dry-Weather (Sanitary) - The flow of wastewater in a sewer during dry weather. Such flow consists mainly of sewage and wastes with no stormwater or groundwater included.

Flow Meter - A device that measures the rate at which water is flowing through the conduit or channel.

Force Main - A pipe under internal pressure created by being on the discharge side of a pump station.

fps - Feet per second.

Gate, Sluice - A gate constructed to slide vertically, or nearly so, and fasten into or against a permanent structure.

Grade - (a) The inclination or slope of a stream channel, conduit or natural ground surface, usually expressed in terms of the ratio or percentage of vertical rise or fall per 100 feet of horizontal distance. See Slope.
(b) The elevation of the invert of the bottom of a pipe line, canal, culvert, sewer, etc.

Grade, Hydraulic - In a closed conduit under pressure, a line joining the elevations to which water would rise in pipes freely vented and under atmospheric pressure. See Gradient, Hydraulic; also, Line, Hydraulic Grade.

Gradient - The rate of change of any characteristic per unit of length, or slope. The term is usually applied to such things as elevation, velocity, pressure, etc. See Slope.

Gradient, Hydraulic - The slope of the hydraulic grade line, the rate of change of pressure head, the ratio of the loss in the sum of the pressure head, and positive head to the flow distance.

Grit - The heavy material present in wastewater, such as sand, gravel, and cinders.

Groundwater - Subsurface water occupying the zone of saturation. In a strict sense, the term applies only to water below the water table.

Head - The height of the free surface of fluid above any point in a hydraulic system; a measure of the pressure or force exerted by the fluid.

Head, Friction - The head lost by water flowing in a conduit as the result of intermolecular friction or disturbances setup by the contact between the moving water and its containing conduit.

Head, Loss of - The vertical distance or height through which a body must fall freely under the force of gravity to acquire the velocity which it possesses. It is equal to the square of the velocity divided by twice the acceleration of gravity.

Heavy Metals - Metallic elements with high molecular weights, generally toxic in low concentrations to plant and animal life. Such metals often reside in the environment and accumulate biologically. Examples include mercury, chromium, cadmium, arsenic, and lead.

Hydraulic Grade Line - A hydraulic profile of the piezometric level of water at all points along the line. The term is usually applied to water moving in a conduit, open channel, stream, etc. In an open channel it is the free water surface.

Hydrogen Sulfide (H₂S) - A malodorous gas made up of hydrogen and sulfur with the characteristic odor of rotten eggs. It can be emitted in the natural decomposition of organic matter if it becomes anaerobic. In heavy concentrations, it can cause illness or death.

I/I - Refers to infiltration and/or inflow.

Increment, Area - A precise part of an area or one of a series of areas.

Industrial Waste - That waste from the processes of manufacturing discharge in water, as distinguished from the normal sanitary waste contributed by employees.

Infiltration - Refers to groundwater that enters a sewer system through such sources as defective pipes, pipe joints, connections, or manholes.

Infiltration, Groundwater - That part of sanitary sewage flow derived from groundwater sources and passing into public sewers through defects or faulty construction.

Inflow - Refers to water discharged into service connections and sewer pipes from foundations and roof drains, paved surfaces and sump pumps.

Inorganic Matter - Chemical substances of mineral origin, or more correctly not of basic carbon structure.

Interceptor - See Sewer Interceptor.

Interceptor Sewer - A sewer which receives flow from a number of collector sewers or outlets and, frequently, additional predetermined quantities of stormwater (if from a combined system), and transports such water to a point for treatment or disposal.

Invert - The floor, bottom or lowest portion of the internal cross-section of a sewer or other conduit.

Joint, Bell-and-Spigot - A form of joint used on pipes which have an enlarged diameter or bell at one end, and a spigot at the other which fits into and is laid in the bell. The joint is then made tight by cement, lead, a rubber "O" ring, or other jointing compounds or materials.

Lamp Hole - 8" diameter cleanout on the end of a long 8" sanitary stub.

Lathes - Wooden 1" x 2" survey stakes.

Local Drainage System - A drainage system that does not receive or transport runoff from an adjoining property.

Manhole - An opening by which a man may enter or leave a sewer, conduit, or other closed structure for inspection, cleaning, and other maintenance operations, closed by a removable cover.

MGD - Millions of gallons per day.

Microbes - Minute life form or micro-organisms, especially one that causes disease.

Milligrams per liter (mg/L) - A measure of the concentration by weight of a substance per unit volume. One mg/L is equivalent to one part per million (ppm).

Monolithic - Cast-in-place, rather than precast.

MSD - Louisville and Jefferson County Metropolitan Sewer District.

Neutralization - Addition of an acid or alkali to a liquid to cause the pH of the liquid to move towards a neutral pH of 7.0.

Nutrients - Elements or compounds essential as raw materials for organism growth and development. Common nutrients are carbon, oxygen, hydrogen, nitrogen, sulfur and phosphorus.

Organism - Living organisms common to the intestinal tract of man and other mammals whose presence in wastewater is an indicator of pollution and of potentially dangerous bacterial contamination.

Outcrop, Rock - The appearance at the earth surface of a rock strata.

Outfall - The conduit leading to the discharge stream through which the effluent flows.

Oxygen Demand - The quantity of oxygen utilized in the biochemical oxidation of organic matter.

Package Wastewater Treatment Plant - A prefabricated wastewater treatment plant that is hauled to the plant site and installed as the only facility.

Peak - A maximum quantity which occurs over a relatively short period of time, such as an hour or day.

Peak Demand - The maximum, momentary load placed on a wastewater plant or pumping station.

Peak, Instantaneous - The maximum rate which ever occurs, possibly for only a moment.

pH - A measure of the acidity or alkalinity of a material, liquid, or solid. pH is represented on a scale of 0 to 14, with 7 representing a neutral state, 0 representing the most acid, and 14 representing the most alkaline.

Pipe, Vitrified Clay - A pipe made of clay burned in a kiln with surfaces glazed for water tightness. It is used for carrying sewage and sometimes for carrying water. It is seldom used under pressure.

Pollutant - Any gas, liquid, or solid that makes a resource unfit for a specific purpose.

Population, Equivalent - A hypothetical number of persons representing flow. The equivalent population of an existing industry or a school, for example, is determined from the normal flow of sewage divided by the average contribution of wastewater per person.

Population, Saturation - The actual or equivalent population of a given area that exists or would occur when the area is completely developed according to its present use for developed areas, and its present zoning for undeveloped areas.

Population, Total Equivalent - The sum of the residential population in a given area, and its equivalent population.

Potable Water - Water suitable for drinking or cooking purposes from health and aesthetic considerations.

ppm - Part per million. A measure of the concentration by weight of a substance per unit volume. One ppm is equal to one mg/L.

Precast - That which is formed in a mold or form and distributed by the manufacturer as a complete unit.

Precipitate –

(a) Noun: An insoluble, finely-divided substance which is a product of a chemical reaction within a liquid.

(b) Verb: Separation from solution of an insoluble substance.

Pretreatment - Any process used to reduce pollution before the wastewater is introduced into a sewer system for further treatment.

Primary Treatment - An early stage process in wastewater treatment in which floating and settleable solids are mechanically separated from the water being treated.

Private Drainage System - See Local Drainage System

Property Service Connection - That portion of a sewer system located within an easement or right-of-way which transports sewage from private property to the main sewer.

Proposed - That which is to have immediate consideration for construction.

Pump Station - A station at which sewage is pumped to a higher elevation.

Receiving Waters - A stream, river, lake, ocean, or other surface or groundwaters into which treated or untreated wastewater is discharged.

Sanitary Sewers - Sewers intended to carry wastewater from residences, businesses and industries. Stormwater runoff is carried in a separate system.

Screen - A device with openings used to retain or remove suspended or floating solids in flowing water or sewage.

Secondary Treatment - Wastewater treatment process used to convert dissolved or suspended materials into a form more easily separated from the water being treated. The most common form of secondary treatment is a biological treatment process that is followed by secondary clarifiers.

Sedimentation Tanks - Tanks where the solids are allowed to settle or to float. Settled solids are pumped to thickeners or digesters. Scum that floats in a sedimentation tank is either skimmed off or recycled through the wastewater treatment plant.

Sedimentation - The separation of solids by means of gravity.

Service Area - A geographic area serviced by a public utility or served by a sewage collection system.

Settleable Solids - Bits of debris and fine matter heavy enough to settle out of wastewater.

Sewage - Largely, the water supply of a community after it has been fouled by various uses. From the standpoint of source, it may be a combination of the liquid or water carried wastes from residences, businesses and institutions, together with those from industrial establishments, and with such groundwater, surface water, and stormwater as may be present.

Sewage, Combined - Sewage containing both sanitary sewage and surface or stormwater.

Sewage, Domestic - Sewage derived principally from dwellings, businesses, institutions, and the like. It may or may not contain groundwater, surface water, or stormwater.

Sewage, Industrial - Sewage in which industrial wastes pre-dominates.

- Sewage, Sanitary -
- (a) Domestic sewage with storm and surface water excluded.
 - (b) Sewage discharging from the sanitary conveniences of dwellings (including apartment complexes and hotels), office buildings, factories, or institutions.
 - (c) The water supply of a community after it has been used and discharged into a sewer.

Sewer - A pipe or conduit that carries waste, storm or surface water.

Sewer, Branch - A sewer which receives sewage from lateral sewers and discharges into a larger sewer.

Sewer, Collector - A sewer which receives flow directly from property service connections. Collector sewers are tributaries to interceptor sewers.

Sewer, Combined - A sewer intended to receive both wastewater and storm or surface water.

Sewer, Interceptor - A sewer which receives flow from a number of collector sewers or outlets and, frequently, additional predetermined quantities of stormwater (if from a combined system), and transports such water to a point for treatment or disposal.

Sewer, Inverted Siphon - A section of sewer constructed lower than adjacent sections to pass beneath a watercourse or other obstruction. It runs full or at greater than atmospheric pressure because its crown is depressed below the hydraulic grade line.

Sewer, Lateral - A sewer which receives sewage from a relatively small area which discharges into a branch or other sewer and has few other sewers tributary to it.

Sewer, Main - The principal sewer to which branch sewers and submains are tributary, also called trunk sewer.

Sewer, Outfall - A sewer that receives wastewater and/or stormwater and carries it to a point of final discharge.

Sewer, Relief - A sewer built to carry the flows in excess of the capacity of an existing sewer.

Sewer, Sanitary - A sewer which primarily carries sewage, and to which storm surface, and ground waters are not intentionally admitted.

Sewer, Submain - An arbitrary term used for relatively large branch sewers.

Slope - The inclination of the invert of a conduit expressed as a decimal or as feet per stated length measured horizontally in feet.

Soundings - Method used to ascertain the depth of rock strata.

Springline - The inner edge of the inclined or horizontal base where the arch begins.

Stabilization - The process of converting active organic matter into inert, harmless material.

Stacks - A vertical connection to a collector sewer. Used when more economical than a typical property service connection.

Storm Sewer - A separate sewer that carries runoff from storms, surface drainage and street, and does not include domestic or industrial wastes.

Subgrade - The bottom of a trench or other excavation that is somewhat below the predetermined elevation of the bottom of the final excavation or structure, the intervening space being backfilled with some special material such as sand, gravel, broken stone, or tamped earth, or impervious lining. The term is also applied to the elevation of such bottom.

Submain - See Sewer, Submain.

Sump - A depression that serves as a receptacle for liquids to be pumped.

Surcharge - A condition where a sewer is inadequate to discharge the total amount of flow when it is just filled or flowing at the planned depth or head. The amount of surcharge is measured by the volume or rate of excess flow or by the excess height of the hydraulic grade line.

Surface Water - Water on the earth's surface open to the atmosphere, such as rivers, streams, and oceans.

Swale - A shallow ditch which does not exceed 6" in depth from the top of bank.

"Ten-States Standards" - "Recommended Standards for Wastewater Facilities of the Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers." 1990 Edition.

Through Drainage System - A drainage system that collects or transports runoff from more than one property.

Topography - The configuration of a surface area including its relief, or relative elevations, and the location of its natural and constructed features.

Total Dissolved Solids (TDS) - The total amount of dissolved materials, organic and inorganic, contained in water and wastes. Excessive dissolved solids make water unpalatable for drinking water and unsuitable for some industrial uses.

Transition - A short section of a conduit used as a conversion section to unite two conduits having different hydraulic elements.

Trunk - See Trunk Sewer.

Trunk Sewer - A sewer which receives many tributary branches and which serves a large area.

USGS - Abbreviation for United States Geological Survey.

Velocity, Self-Cleaning - The minimum velocity in sewers necessary to keep solids in suspension and prevent their deposition and the subsequent nuisances from stoppages and odors on decomposition.

Wastewater - See Sewage.

Water Quality Criteria - The maximum levels of pollutants that can be reached prior to impacting the suitability of water for a given water use classification. Generally, water use classification includes: public water supply; recreation; propagation of fish and other aquatic life; agricultural use and industrial use.

Water Quality Standard - A plan for water quality management containing four major elements: the use (recreation, drinking water, fish and wildlife propagation, industrial or agricultural) to be made of the water; criteria to protect those uses; implementation plans (for needed industrial municipal waste treatment improvements) and enforcement plans; and an anti-degradation station to protect existing high quality waters.

Watershed - The area drained by a given stream or segment of a stream.