

**WASTEWATER TREATMENT SYSTEM MANUAL**  
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DEFINITIONS. Definitions as set forth in the Missouri Clean Water Law as well as 19 CSR 20-3.060, 19 CSR 20-3.070, and 19 CSR 20-3.080 shall apply to those terms where used in this rule unless the context requires otherwise or as noted in the standards. For the purposes of these standards, certain standards, terms, or words used here shall be interpreted as follows. **The word shall is mandatory.** All distances, unless otherwise specified, shall be measured horizontally.

1. **Administrative Authority** – The governing body which may include Newton County Health Department and/or the Missouri Department of Health and Senior Services which has, as authorized by statute, charter or other form of enabling authority, adopted these standards for individual on-site sewage disposal systems.
2. **Advance Systems** – An individual wastewater treatment system employing methods and devices as presented in Subsection II of these standards.
3. **Aeration Unit** – Any sewage tank which utilizes the principle of oxidation in the decomposition of wastewater by the introduction of air into the wastewater.
4. **Baffle** – A device installed in a tank for proper operation of the tank and to provide maximum retention of solids. This includes vented sanitary tees and submerged pipes in addition to those devices normally called baffles.
5. **Bedrock** – The layer of geological material which is consolidated and unweathered.
6. **Bedroom** – Any room within a dwelling that might reasonably be used as a sleeping room or as designated in the blueprints of the dwelling.
7. **Black Water** – Liquid waste carried from a dwelling or other establishment, which contains organic wastes, including excreta or other body wastes, blood, or other body fluids and garbage, excluding bathing and laundry.
8. **Building Sewer** – That part of the drainage system which extends from the end of the building drain and conveys its discharge to a wastewater treatment system.
9. **Capacity** – The liquid volume of a tank using inside dimensions below the outlet.
10. **Conventional System** – An individual wastewater treatment system employing a building sewer, tank, and the soil treatment system commonly known as seepage beds or trenches, drainfield or leachfield.
11. **Distribution Pipes/Absorption Trenches/Lateral Lines** – Pipes that are used to distribute tank effluent in a soil treatment system.
12. **Dosing Chamber (or pump pit)** – A tank or separate compartment following the sludge tank which serves as a reservoir for the dosing device.

- 13. Dosing Device** – A pump, siphon, or other device that discharges tank effluent from the dosing chamber to the soil treatment system.
- 14. Dwelling** – Any building or place used or intended to be used by human occupants.
- 15. Effluent** – Any wastewater or other substance flowing out of or discharged from a tank, other wastewater treatment device or pipe.
- 16. Environmental Public Health Specialist (EPHS)** – A person registered as an EPHS by the Missouri Board of Certification for Environmental Health Professionals or the National Environmental Health Association or employed as an EPHS by the state or local Administrative Authority.
- 17. Existing System(s)** –
  - A. For loan evaluation purposes, are wastewater treatment systems that have been in use for at least six (6) continuous months.
  - B. In conjunction with rebuilding or replacing structures, are wastewater treatment systems that had been in use at the time the home or structure was destroyed.
- 18. Flow-rate** – Flow as determined by measurement of actual water use or, if actual measurements are unavailable, as estimated by the best available data provided by **TABLE II in Subsection II. D** of these standards.
- 19. Geologist** – A person that meets the requirements defined in Chapter No. 256 of the Missouri Statutes.
- 20. Gravelless System** – An absorption system recognized and approved by the Administrative Authority as an acceptable method of subsurface disposal of wastewater without the use of gravel, such as a chamber system or gravelless pipe.
- 21. Gray water** – liquid waste, especially excluding toilet, hazardous, culinary, and oily wastes, from a dwelling or other establishment which is produced by bathing, laundry, or discharges from floor drains.
- 22. Grease Trap** – A device designed and installed to separate and retain oils and fats from normal wastes while permitting normal wastes to discharge into the drainage system by gravity.
- 23. Ground absorption sewage treatment and disposal system**—A system that utilizes the soil for the subsurface disposal of partially treated or treated sewage effluent. The following are examples:
  - A. Chamber system—A system that uses an open bottom structure which forms an underground chamber over the soil’s infiltrative surface. The wastewater is discharged into the chamber through a central weir, trough or splash plate and is allowed to flow over the infiltrative surface in any direction.

B. Conventional soil absorption system—A system that distributes effluent by gravity flow from the septic or other treatment tank and applies effluent to the soil through the use of a seepage trench or bed.

C. Dosing soil absorption system—A system that distributes effluent by a pump or automatic siphon to elevate or distribute effluent to the soil through the use of a seepage trench or bed.

D. Drip soil absorption system—An experimental system that distributes effluent through drip lines in a grid pattern (also known as trickle irrigation).

E. Pressure distribution system—A soil absorption system that distributes effluent by a pump and smaller diameter distribution piping with small diameter perforations to distribute effluent

**24. Holding Tank** – A watertight tank for storage of wastewater until it can be pumped and transported to a point of approved treatment and disposal.

**25. Imminent health hazard** - a condition which is likely to cause an immediate threat to life or a serious risk to the health, safety, and welfare of the public if immediate action is not taken

**26. Impermeable** – With regard to bedrock, a bedrock having very few cracks or crevices and having a vertical permeability less than one-inch (1”) in twenty-four (24) hours shall be considered impermeable. With regards to soils, a soil horizon or layer having a vertical permeability less than one-inch (1”) in twenty-four (24) hours shall be considered impermeable.

**27. Intermittent Sand Filters** – A bed of granular material twenty-four (24) to thirty-six (36) inches deep underlain by graded gravel and collecting tile. Wastewater is applied intermittently to the surface of the bed through distribution pipes or troughs and the bed is under drained to collect and discharge the final effluent. Uniform distribution is normally obtained by dosing to flood the entire surface of the bed. Filters may be designed to provide free access (open filters) or may be buried in the ground (buried filters or subsurface sand filters). Effluent from intermittent sand filters shall be discharged to a soil absorption system.

**28. Lateral Rock** - Clean rock, washed creek gravel, or similar insoluble, durable, and decay-resistant material free from dust, sand, silt, or clay. The size shall range from one (1) inch to three (3) inches. If limestone, dolomite, or other crushed white rock is used, it shall be washed and be a minimum of size of one and one-half (1 ½) inches.

**29. Mottling** – A zone of chemical oxidation and reduction activity appearing as splotchy patches of red, brown, orange, and gray in the soil.

**30. Mound System** – A system where the soil treatment area is built above the ground to overcome limits imposed by proximity to water table or bedrock or by rapidly or slowly permeable soils.

**31. Nuisance** - sewage, human excreta, or other human organic waste discharged or exposed on the owner's land or any other land from an on-site sewage disposal system in a manner that makes it a potential instrument or medium for the breeding of flies and mosquitoes, the production of

odors, or the transmission of disease to or between a person or persons, or which contaminates surface waters or groundwater.

- 32. On-site sewage disposal system** - any system handling or treatment facility receiving domestic sewage which discharges into a subsurface soil absorption system and discharges equal to or less than three thousand gallons per day.
- 33. Other Establishment** – Any public or private structure other than a dwelling which generates wastewater.
- 34. Plastic Limit** – A soil moisture content below which the soil may be manipulated for purposes of installing a soil treatment system and above which manipulation while cause compaction and puddling.
- 35. Professional Engineer** – An engineer holding a current license to practice from the Missouri Board for Architects, Professional Engineer and Land Surveyors, and having a background in soils, wastewater, and geology.
- 36. Rock Fragments** – The percentage of rock fragments in a soil that are greater than two millimeters (2mm) in diameter or retained on a No. 10 sieve which may include chert, sandstone, shale, limestone or dolomite. The amount of rock fragments in a soil is of a concern in areas of residual soils overlying highly permeable bedrock.
- 37. Setback** – A required separation distance measured horizontally.
- 38. Sewage or domestic sewage** – Human excreta and wastewater, including bath and toilet waste, residential laundry waste, residential kitchen waste and other similar waste from household or establishment appurtenances. Sewage and domestic sewage waste are further categorized as:
  - A. Blackwater - waste carried off by toilets, urinals, and kitchen drains.
  - B. Graywater - all domestic waste not covered in paragraph (a) of this subdivision, including bath, lavatory, laundry, and sink waste.
- 39. Sinkhole** – Any depression in the surface of the ground, with or without collapse of adjacent rock, that provides a means through which surface water can come into contact with subsurface water. Sinkhole depressions may be gradual or abrupt. They may or may not have a well-defined eye.
- 40. Site** – The area bounded by the dimensions required for the proper location of the wastewater treatment system.
- 41. Slope** – The ratio of vertical rise or fall to horizontal distance.
- 42. Soil Characteristics** – Those soil characteristics which preclude the installation of a conventional system, including, but not limited to, evidence of water table or bedrock closer than three feet

(3') to the ground surface. Also the amount of rock fragments in areas of significant potential for groundwater contamination.

- 43. Soil Scientist** – An individual who has a minimum of fifteen (15) semester credit hours of soils course work including a minimum of three (3) hours in the area of soil morphology and interpretations and has a minimum of two (2) years of field experience.
- 44. Soil Textural Classification** – Soil particle sizes or textures specified in this rule refer to the soil textural classification in the most recent U.S. Department of Agriculture Soil Survey Manual Handbook.
- 45. Soil Treatment Area** – That area of trench or bed bottom which is in direct contact with the trench rock of the soil treatment system.
- 46. Soil Treatment System** – A system where tank effluent is treated and disposed of below ground surface by filtration and percolation through the soil. It includes those systems commonly known as a seepage bed, trench, drain field, disposal field, or lateral field, and includes mound and low pressure pipe systems. See Wastewater Treatment Systems.
- 47. Subdivision** - Land divided or proposed to be divided for predominantly residential purposes into such parcels as required by local ordinances, or in the absence of local ordinances, "subdivision" means any land which is divided or proposed to be divided by a common owner or owners into three or more lots or parcels, any of which contains less than three acres, or into platted or unplatted units, any of which contains less than three acres, as a part of a uniform plan of development.
- 48. Tank** – Any watertight, covered receptacle designed and constructed to receive the discharge of wastewater from a building sewer, separate solids from liquid, digest organic matter, store liquids through a period of detention and allow the clarified liquids to discharge to a soil treatment system. Includes, but is not limited to, septic tanks and aeration units and shall be approved by the Administrative Authority.
- 49. Tank Effluent** – That liquid which flows from a tank under normal operations.
- 50. Toilet Waste** – Fecal matter, urine, toilet paper, and any water used for flushing.
- 51. Valve Box** – Any device which can stop tank effluent from flowing to a portion of the treatment area. This includes, but is not limited to, caps or plugs on distribution or drop box outlets, divider boards, butterfly valves, gate valves, or other mechanisms.
- 52. Wastewater** – Any water carried domestic waste, exclusive of footings and roof drainage. Domestic waste includes, but is not limited to, liquid waste produced by bathing, laundry, culinary operations, liquid wastes from toilets and floor drains and specifically excludes animal waste and commercial process water. Also known as sewage.



- 53. Wastewater Stabilization Pond** – A sealed earthen basin which uses the natural unaided biological processes to stabilize wastewater (also known as a lagoon).
- 54. Wastewater Treatment System (WTS)** – A system, or part of a system, serving a dwelling(s) or other establishment(s), which utilizes subsurface soil treatment and disposal.
- 55. Water Table** – The highest elevation in the soil where all voids are filled with water, as evidence by presence of water soil mottling or other information. This includes perched and zones of saturation for long periods of time.
- 56. Watertight** – Tanks constructed so that no water can get in or out below the level of the outlet.

## I. WASTEWATER TREATMENT SYSTEMS (WTS) PROCEDURES.

### A. APPLICATION FOR PERMIT

1. **PERMITS.** The wastewater treatment system permit is a two-part written authorization issued by the Administrative Authority.

A. Permit to Install.

- (1) Part One of the permit is the Permit to Install. This part gives permission to install the wastewater treatment system.
- (2) Part Two of the permit is the Permit to Use. This allows the owner to use the wastewater treatment system once all of the requirements have been satisfied, and the As-Installed Drawing is received by the Administrative Authority.

2. **PROJECTS REQUIRING PERMITS.**

A. Construction of a new system.

B. Repairing an existing system. Repairs for the replacement of small sections due to accidental damage and for the installation of tanks.

C. Rebuilding or replacing structures. In cases where home or other structure is destroyed by fire or other cause, the existing wastewater treatment system in use at the time the home or structure was destroyed, may be used to serve the replacement structure, provided the occupancy and use of the structure or home is adequate for the existing system and the existing system was functioning properly at the time the building was destroyed. If the existing wastewater treatment system was not functioning properly, or is inadequate for use, the Administrative Authority may require the system to be repaired or replaced. It is the property owner's responsibility to provide the details of the system to the Administrative Authority for this determination.

3. **PERMIT APPLICATION INFORMATION.** The applicant must provide all information requested on the application form. If additional information is necessary to properly evaluate the application, the applicant will be notified. Processing the application cannot be completed until all requested information is received, and the application fee is paid in full.

A. Permit application forms are available at the Newton County Health Department, located at 812 W. Harmony, Neosho, Missouri or at:

<https://www.newtoncountyhealth.org/environmental-health/waste-water-permits>

- (1) The front page of the application is to be completed by the owner/representative or installer.
- (2) The back page of the application is to be completed by the installer.

B. Property addresses.

- (1) The physical address of the property where the system is to be installed as assigned by the Newton County E911 addressing system.
- (2) A mailing address if different from the physical address (i.e. P.O. Box).
- (3) Legal description of the property where the system is to be installed to the nearest  $\frac{1}{4}$ . (i.e. NW  $\frac{1}{4}$ , SW  $\frac{1}{4}$ , S27, T 24, R 32).

- C. Certify information on the form with:
  - (1) The name and signature of the owner/representative.
  - (2) The name and signature of the installer.
- D. A complete site evaluation from a registered soil scientist.
- E. The proper fee amount.
- F. **PERMIT FEE SCHEDULE. FEES ARE AS FOLLOWS:**
  - Single family dwelling --- \$150.00
  - Non-single family dwelling --- \$225.00
  - Repairs --- \$30.00
  - Registration, General installer --- \$30.00
  - Registration, Advanced installer --- \$40.00
  - Registration, Septic tank cleaner --- \$30.00
  - Registration, Soil Scientist --- \$30.00
- G. **PERMIT APPLICATION REVIEW.** All permit applications shall be reviewed by the Administrative Authority, to determine whether or not it meets the criteria set forth in the ordinance and regulations. Upon reviewing the completed application, including any additional information requested, the Administrative Authority shall review the permit application within five (5) working days from the date of receipt of the completed application as follows:
 

Application accepted. If the Administrative Authority determines that the permit application is complete and meets system design criteria, the Administrative Authority shall issue the Permit to Install number allowing construction of the system. In the event the applicant does not receive written or verbal notification within ten (10) working days of the date of receipt of completed application, it is the applicant's responsibility to contact the Administrative Authority to verify the status of the permit prior to any construction. Once the Permit to Install number is obtained, the system can then be constructed, according to Part One of the permit.

  - A. Modification. When the Administrative Authority determines that a system as drawn requires modification, the Administrative Authority shall issue written or verbal notification to the applicant stating the determination. The written or verbal notification shall include a specific description of the modification(s) necessary to obtain approval of the application. The applicant must submit modified sketch drawings, or other information required before the Permit to Install number will be granted.
  - B. Denial. If the Administrative Authority determines that the permit application should be denied, the Administrative Authority shall issue written notification to the applicant stating that determination. If the permit is denied by the Administrative Authority, the permit amount will be refunded to the person who paid for the permit.
  - C. Variance. See **Paragraph I.C.3.**
  - D. Special Use Permit. See **Paragraph I.C.2.**

## **B. CONSTRUCTION**

**1. APPROVED PERMIT.** Upon notification of an approved Permit to Install, the applicant may construct the system as designed in the permit in accordance with the ordinance.

**2. PROPERTY OWNER.** If a property owner installs the wastewater treatment system, the property owner must comply with all of the requirements of this ordinance, and the rules and regulations for this county. If a property owner has anyone assisting with the wastewater treatment system in any fashion, the person(s) assisting shall be registered in this county. The registered installer becomes responsible for the system as specified in the ordinance. The permit shall have the installer's name and signature as specified in the permit section of the regulations.

**3. MODIFICATION.** If the installer should discover after beginning construction that the system cannot be constructed in accordance with the permit to install, the applicant may request approval for a modification of the plans set forth in the application. Such a request for modification could involve a modification of the materials and/or procedures specified in the permit application and should specify alternate materials and/or procedures which meet the criteria of the regulations. The Health Office shall process the request for modification in the same manner described in the procedures set forth in **Section I. A. 5.** of these rules.

**4. NOTIFICATION.** The installer shall notify the Administrative Authority at least twenty-four (24) hours before final evaluation is needed. Evaluations will be performed during normal business hours. No evaluation will be scheduled on weekends or holidays. After the final inspection and approval, the system may be covered. The installer shall notify the Administrative Authority to cancel scheduled evaluations if the system will not be completely done at the appointed time. All notifications must be made to the Administrative Authority during normal business hours. The telephone number is (417) 451-3743.

**5. AS-INSTALLED or AS-REPAIRED DRAWING.** An As-Installed or As-Repaired Drawing signed by the installer, shall be provided to the Administrative Authority before the Permit to Use will be issued.

- a.** Failure to provide or falsifying the drawing will result in suspension or revocation of the installer's registration.
- b.** Failure to acquire the Permit to Use could result in the property owner being referred to the Prosecuting Attorney and/or having a Notice of Non-Compliance attached to the property records.

**6. PERMIT TO USE.** The Permit to Use will be issued to the property owner if the system was installed according to the permit.

7. **NON-COMPLIANCE.** The property owner and installer will be served with a Notice of Non-Compliance if the system does not meet the permit requirements. See **Paragraph I.F.1.**

**C. PERMIT EXCEPTIONS.**

**1. PERMIT AND SITE EVALUATION EXPIRATION.** A permit and a site evaluation are valid for a limited time.

A. Permit expiration. Part One of the permit issued pursuant to this ordinance shall be valid for a period of one (1) year from the date of approval. An application may request renewal of part one of the permit for an additional one year period by filing a request for renewal in writing with the Administrative Authority before the date of expiration of the original permit. If the applicant fails to renew the permit by the expiration date, the permit shall expire, and the applicant must request a new permit prior to the beginning or continuing construction of the system.

B. Site evaluation expiration. Site evaluations are considered valid, provided the soil properties at the site are not altered by excavating, filling, tilling, compaction of soil in place by operation of heavy equipment; provided no dumping of chemicals or other compounds has occurred at the site; and provided the surface of the site has not been altered by construction or pavements.

**2. SPECIAL USE PERMIT.** Special use permits may be granted on a case-by-case basis for a specified limit of time. This type of permit is non-transferable. It is the property owner's responsibility to provide the information needed for this type of permit. If there are any changes or modifications to the wastewater treatment system with a Special Use Permit, the permit becomes null and void, thus putting the system in violation. A Special Use Permit will not be granted for:

- A. Smaller Tank Size.
- B. A system that includes laundry facilities.

**3. VARIANCE REQUEST.** Variances may be considered and granted by the Newton County Variance Committee concerning property platted prior to January 1, 1996, with site limitations.

- A. Types of eligible projects with site limitations.
  - (1) Repairs to wastewater treatment systems on property that was platted, designated, recorded, or came into existence prior to January 1, 1996.
  - (2) New to wastewater treatment system installation on property that was platted, designated, recorded, or came into existence prior to January 1, 1996.
- B. Where variances have been allowed from the standards, the Variance Committee may require a higher level of pretreatment than that of a regular tank. At the discretion of the Variance Committee, on a case-by-case basis, and with relative assurance for protection of the public health and preservation of the quality of surface and groundwaters, variances may be granted for:
  - (1) Setbacks as specified in **Table I.**
  - (2) Minimum distance between infiltrative surface and restrictive feature or bedrock.
  - (3) Minimum areas of infiltrative surface as shown in **Table V and Table VI.**

C. Variance requirements. The landowner submits a written request (Variance Request No. 1) for a variance to the Administrative Authority. Specific project information is required.

- (1) The date that the property, as legally described, was platted, designated, recorded or came into existence.
- (2) A clear description explaining why the requirements of this rule cannot be complied with.
- (3) Describe specific sections of this rule for which a variance is being requested.
- (4) The existing maximum occupancy.
- (5) The existing water usage records, if any.
- (6) Potential impact, if any, on neighboring property owners. Provide the names and mailing address of these property owners.
- (7) Sufficient actual data to indicate that the effluent will not contaminate any drinking water supply, surface water, or groundwater used for drinking water.

D. Variance conditions.

- (1) These systems shall comply with all applicable requirements of these standards except where variances have been granted.
- (2) Variances will not be granted if the result would cause non-compliance with the Missouri Clean Water Act for a system which would require a discharge permit from the Missouri Department of Natural Resources (MDNR).
- (3) Setback distances for wastewater stabilization ponds (lagoons) will be considered applicable to advanced systems. The required footage of the soil absorption system following advanced systems may be reduced by up to one-third (1/3) of that required for a conventional wastewater treatment system.
- (4) The five (5) working days review period does not apply for a variance.

E. Appeal process. When a variance request (Variance Request No. 1) has not been approved by the Variance Committee, the landowner has the right to appeal.

- (1) The landowner submits a written request (Variance Request No. 2) to the Administrative Authority to schedule a meeting with the Board of Trustees.
- (2) The owner submits a written request (Variance Request No. 3) to the Administrative Authority to schedule a meeting with the Board of Appeals. This is the final appeal.

**D. REGISTRATION, REVOCATION, OR SUSPENSION.** The Board of Trustees may revoke or suspend a person's registration upon determination that a violation of this ordinance has occurred.

**1. NOTIFICATION.** Whenever the Administrative Authority determines that a person with a valid registration has violated any provisions of this ordinance, or any of the rules adopted by the Board of Trustees, the Administrative Authority may recommend to the Board of Trustees, that said registration be suspended or revoked. If the Board of Trustees finds that the Administrative Authority's recommendation has merit, then the Board of Trustees shall schedule a hearing on the proposed suspension or revocation after giving the said person not

less than ten (10) days notice of said hearing. The Board of Trustees shall set the term of the revocation or suspension within ten (10) days of said hearing.

**2. SUSPENSION PERIOD.** No Permit to Install; Permit to Repair; or Permit to Use will be issued while a registration is suspended or revoked.

**3. APPEAL.** If the applicant wishes to appeal a suspension or revocation decision, it may be done in accordance with the provisions set forth in the ordinance.

**4. WARNINGS.** Warnings may be issued when deemed appropriate by the Administrative Authority. After the second warning the Administrative Authority will make a request to the Board of Trustees for a suspension or revocation order.

**5. REINSTATE REGISTRATON.** After a suspension or revocation of a person's registration, the person can be required to provide a performance bond payable to the Administrative Authority and retake the required training course(s) prior to reinstatement of any further registration.

## **E. RESPONSIBILITIES.**

### **1. BOARD OF TRUSTEES**

- A. Establish the rules for the ordinance.
- B. Conduct hearings when needed as stated in the ordinance.
- C. Appoint or serve as representatives on the Variance Committee.
- D. Adopt rules and procedures for Board of Appeals.
- E. Review the ordinance annually.
- F. Establish and maintain a database.

### **2. ADMINISTRATOR**

- A. Participate in planning, developing, and coordinating the ordinance.
- B. Schedule hearings as needed and as stated in the ordinance.
- C. Send letters regarding complaints received.
- D. Provide needed information to Prosecuting Attorney, or the Board of Trustees.
- E. Implement the data base.

### **3. ENVIRONMENTAL PUBLIC HEALTH SPECIALIST (EPHS)**

- A. Provide information concerning wastewater treatment systems.
- B. Provide training for persons seeking registration in this country under the ordinance.
- C. Issue permits for wastewater treatment systems which meet the required standards as set forth in the ordinance.
- D. Perform evaluations to verify the installer has installed the system according to the permit(s) issued.
- E. Maintain records of permits issued and loan evaluations performed by this office for future reference.
- F. Investigate wastewater complaints received by this office, when needed.

#### **4. INSTALLER**

- A. Attend classes as required for registration.
- B. Register in Newton County.
- C. Guarantee workmanship and materials on all installations for one (1) year.
- D. Comply with all rules, regulations, orders, and decisions of the Administrative Authority.
- E. Obtain all required permits.
- F. Provide all information requested by the Administrative Authority.
- G. Maintain complete and accurate records of each installation.
- H. Report to the Administrative Authority any violation of the ordinance.
- I. Design a system and apply for a permit using a properly approved site evaluation.
- J. Complete an As-Installed or As-Repaired drawing once the wastewater treatment system is installed or repaired to obtain the Permit to Use.

#### **5. PROPERTY OWNER**

- A. Comply with all rules, regulations, orders, and decisions of the Administrative Authority.
- B. Obtain a proper site evaluation.
- C. Obtain all proper permits.
- D. Report to the Administrative Authority any violation of the ordinance.
- E. Hire a registered installer for installing one's own system if property owner does not demonstrate proper knowledge for installing own system.

#### **6. CONTRACTOR**

- A. Comply with all rules, regulations, orders, and decisions of the Administrative Authority.
- B. Obtain a proper site evaluation.
- C. Hire a registered installer for installing system.
- D. Obtain all proper permits.
- E. Report to the Administrative Authority any violation of the ordinance or rules and regulations.

#### **7. TANK CLEANER**

- A. Attend classes as required for registration.
- B. Register in Newton County.
- C. Schedule appointments with the Administrative Authority for inspection of trucks, equipment, and sites.
- D. Provide all information requested by the Administrative Authority.
- E. Maintain records for at least one (1) year.
- F. File with the Administrative Authority all agreements and approvals for disposal of septage.
- G. Comply with all rules, regulations, orders, and decisions of the Administrative Authority.



## 8. SOIL SCIENTIST

- A. Attend classes as required for registration.
- B. Meet state requirements for Missouri Department of Health (prior to step c.)
- C. Register in Newton County.
- D. Provide all information requested by the Administrative Authority.
- E. Maintain records for each site evaluation performed for at least two (2) years.
- F. Comply with all rules, regulations, orders, and decision of the Administrative Authority.
- G. Report to the Administrative Authority any violation of the ordinance.

## F. ADMINISTRATION OF ORDINANCE.

1. **Notice of Non-Compliance.** A Notice of Non-Compliance will be submitted to the installer and property owner if a wastewater treatment system has not been installed or repaired according to the permit.
  - A. This notice will apply to all wastewater treatment systems installed or repaired after September 1, 1995, and will state why the wastewater treatment system is not in compliance and that the Administrative Authority must be contacted in an effort to resolve the situation.
  - B. The Notice of Non-Compliance will be attached to the property records. Failure to make necessary corrections or the wastewater treatment system could jeopardize future legal transactions of this property (i.e. bank loans).
  - C. The removal, destruction, alteration, or defacement of the Notice of Non-Compliance is in violation of the ordinance.
2. **Complaints.** A complaint must be received by the Administrative Authority before any action can be taken. Complaints can be submitted in writing; verbally; or anonymously.
  - A. The following information is needed to investigate a complaint.
    - (1) The date the complaint is made.
    - (2) Name, address, and telephone number of the person causing the complaint.
    - (3) Location of the complaint.
    - (4) Detailed description of the complaint.
  - B. Once a complaint is received, the Administrative Authority will proceed as follows:
    - (1) Investigate the complaint to determine if a violation of the ordinance does exist.
    - (2) If a violation does exist, the owner will be notified by letter or notice or contact the Administrative Authority in writing (by mail or in person). The contact must be within seven (7) days from receipt of the letter or notice and state how and when the problem is to be corrected.
    - (3) The proper permit shall be obtained prior to any work being performed. No more than thirty (30) days will be allowed without the Administrative Authority's approval.
    - (4) If the owner fails to contact the Administrative Authority within seven (7) days or the proper permit is not obtained, the matter may be referred to the Prosecuting Attorney

and/or a Notice of Non-Compliance will be attached to the property records.

**3. Violations.** Any person violating any of the provisions of the ordinance could be referred to the Prosecuting Attorney.

A. Types of violations are:

- (1) Creating a nuisance or imminent health hazard.
- (2) Persistent violation or creating a nuisance or imminent health hazard.
- (3) Construction or repair of a wastewater treatment system without a permit.
- (4) Construction or repair without a permit and previously found guilty of the same.
- (5) Misrepresenting oneself as being registered in the county.

B. Any person found guilty of installing or repairing without a permit can be required to provide a performance bond before beginning another installation or repair. This requirement expires after two consecutive years of being found guilty.

C. Any person found guilty of violating any portion of the ordinance may have their registration suspended or revoked and the person's name shall be listed on the suspended or revoked personnel list which will be made available to the public.

## II. DESIGN AND CONSTRUCTION

### A. General

**1. Intent.** The intent of these standards is to provide minimum requirements for site evaluations, design, and construction of wastewater treatment systems in the country.

**2. Applicability.** For these standards, wastewater treatment system means all equipment and devices necessary for proper collection, storage, treatment, and disposal of wastewater from a dwelling or other facility producing wastewater flows of three thousand (3,000) gallons per day, or less. Included within the scope of this definition are building sewers, tanks, subsurface absorption systems, mound systems, intermittent sand filters, gravelless systems, and wastewater stabilization ponds.

**3. Responsibilities.**

A. The design, construction, operation, and maintenance of wastewater treatment systems shall be the responsibility of the designer, owner, developer, installer, or user of the system.

B. Actions of the representatives of the Administrative Authority engaged in the evaluation and determination of the measures required to comply with the provisions of the ordinance, and the rules and regulations shall in no way be taken as a warranty that wastewater treatment systems permitted will function in a satisfactory manner for any given period of time.

## **B. Site Evaluation**

**1. Evaluation.** All proposed sites for wastewater treatment systems shall be evaluated for the following:

- A. Soil conditions, properties, and permeability.
- B. Slope.
- C. The existence of lowlands, local surface depressions, rock outcrops and sinkholes.
- D. All required setback distances as required in TABLE I of this rule.
- E. Flooding probability of surface water and depth to water table.
- F. Location of easements and underground utilities.
- G. Amount of available area for the installation of the system and an area for a replacement system.
- H. Location of dwellings.
- I. Runoff water potential, roads, streets, etc.
- J. Any potential for significant groundwater contamination.

**2. Preliminary Soils Information.** The Soil Survey of Newton County, Missouri book is NOT site specific and shall NOT be used in lieu of the actual site evaluation.

### **3. Procedures for site evaluations.**

- A. Soil Morphology (Soil Profile). This evaluation shall be conducted by a Missouri Department of Health and Senior Services registered soil scientist or engineer. This professional must also be registered with the Newton County Health Department.
- B. Soil Pit.
  - (1.) A minimum of one soil pit shall be dug for each represented soil in the lateral field area. The hole for the tank shall NOT be used for the soil pit.
  - (2.) Soil pits shall be dug to a depth of minimum forty-eight inches (48") unless bedrock is encountered before forty-eight inches (48") of depth, or as required to determine the soil characteristics.
  - (3.) The soil pit shall be a minimum of sufficient size that meets the depth requirement and allows for entry and evaluation by the soil scientist and/or administrative authority.
- C. All procedures shall be followed based on the procedures stated in the ordinance.
- D. Any other site evaluation methods shall be preapproved by Newton County Health Department administrative authority, and to include but not limited to, a scheduled appointment for a representative to observe the method in-person during the evaluation.

**C. Minimum Set-back Distances.** All wastewater treatment and disposal systems shall be located in accordance with the distances shown in TABLE I.

**D. Flow Rates.** Design of wastewater treatment systems for establishments or housing not identified in this part shall be determined using available flow data, water using fixtures, occupancy or operation patterns and measured data.

- 1. Volume determination.** In determining the volume of wastewater from single family dwellings, the minimum flow rate shall be one hundred twenty (120) gallons per day per bedroom. The minimum volume of wastewater from each single-family dwelling shall be two hundred forty (240) gallons per day. When the occupancy of a single family dwelling exceeds two (2) persons per bedroom, the volume of wastewater shall be determined by the maximum occupancy at a rate of sixty (60) gallons per person per day. Note: This calculation can be used only when the number of persons in the single-family dwelling is known.
- 2. Selected types of establishments.** TABLE II AND III shall be used to determine the minimum design daily flow of wastewater required in calculating the design volume of wastewater treatment systems to serve selected types of establishments. The minimum design volume of wastewater from any establishment shall not be less than one hundred (100) gallons per day flow.
- 3. Other establishments.** For housing developments other than a single-family residence and other establishments, TABLE II shall be used to estimate the flow rate. Actual metered flow rate may be used. If metered flow rates are used, documentation from the public water supply serving an existing facility in similar locations shall be provided to the health department.
- 4. Population to be served.** The figures in Table III shall be used in determining the population for which to design the wastewater treatment system. Lower-per-unit occupancies allowed when justified.
- 5. Reduction in flow.** Reductions in design flow rates may be allowed on a case-by-case basis depending upon water conservation plans. Separate systems may be used for gray water and black water systems. Flow rate may be reduced up to forty percent (40%) for gray water systems when the blackwater is discharged to a holding tank and disposed off site or when waterless toilets are utilized. Minimum size gray water tank shall be one thousand (1,000) gallons.

The Newton County Wastewater Treatment Systems Ordinance #95-6 originally went into effect September 1995 and was revised May 1, 1997.

Recently the Ordinance has undergone additional revisions in May 2022 for fees adjustments and July 2022 for SECTION 7. REGISTRY OF PERSONS AND BUSINESSES ENGAGED IN WASTEWATER TREATMENT SYSTEMS PROJECTS.

**7.03** A homeowner may install the wastewater treatment system serving their primary residence once the homeowner demonstrates proper knowledge of installing a wastewater treatment system by passing an examination given by the Newton County Health Department.

Under this ordinance there is **no land/acreage requirements**, however certain procedures and rules shall be followed.

A complete site evaluation (soil morphology) determines the amount of lateral lines needed and trench depth. Using this information with the setback distances from **Table 1** (below) the amount of land needed can be determined.

**TABLE 1 SETBACK DISTANCES**

<b>Minimum Distance in Feet From:</b>	<b>Tanks (1)</b>	<b>Disposal Area (2)</b>	<b>Lagoon (single family)</b>
Private water supply well	50	100	100
Public water supply well (new construction)	300	300	300
Non-community type well (new construction)	300	300	300
Existing public wells (existing systems)	100	100	100
Classified stream, lake or impoundment*	50	50	50
Stream or open ditch (3)	25	25	25
Property lines	10	10	75
Building foundation	5	15	15
Basement**	15	25	25
Basement – walk-out side**	5	15	15
Water line under pressure	10	10	10
Suction water line	50	100	100
Upslope interceptor drains	---	10	10
Top of slope of embankments or cuts of 2 feet or more vertical height	---	20	20
Other soil absorption system except repair area	---	20	20
Underground swimming pools***	15	15	15
Caves, springs, or sinkhole rims	50	100	500
Known mineshafts and abandoned wells (4)	150	150	150

Number of Bedrooms

Minimum Liquid Capacity Gallons

1 to 3	1000
4	1250
5	1500

Note: These figures provide for use of garbage grinders, automatic clothes washers and other household appliances.

For six (6) or more bedrooms the tank shall be sized on the basis similar to an establishment.

- (1) Includes tanks, intermittent sand filters, and dosing chambers
- (2) Includes subsurface absorption systems. Does not include wastewater stabilization ponds (lagoons).
- (3) Tanks & subsurface absorption systems shall never be located in the drainage area of a sinkhole.
- (4) Unplugged, abandoned wells or well with less than 80' of casing depth. All abandoned wells must be sealed in accordance with the Division of Geology & Land Survey (DGLS) instructions.

\*A classified stream is any stream that maintains permanent flow or permanent pools during drought periods and support aquatic life.

**TABLE 2A—Quantities of Domestic Sewage Flows**

<b>Type of Establishment</b>	<b>Flow</b>
<b>Residential Units</b> (gallons per day per unit unless otherwise indicated)	
Single Family Dwelling	120/bedroom
Multiple Family Dwelling (with laundry capabilities)	120/bedroom
Multiple Family Dwelling (without laundry capabilities cottages)	95/bedroom 50/person (in excess of 2 persons/bedroom)
Mobile Home Parks	300/home*
 <b>Commercial Facilities</b>	
Transportation terminals (airports, bus stops, railroad stations and the like)	5/passengers
Laundromats	580/machine
Beauty Shops (Style Shops)	125/chair
Bowling Lanes	50/lane
Business (other than those listed elsewhere in this table)	25/employee
Factories (exclusive of industrial waste)	25/person/shift
add for showers	10/person/shift
Marinas	10/boat slip
with bathhouse	30/boat slip
Motels/Hotels	120/room
with cooking facilities	175/person
Offices (per shift)	25/person
Service Stations	250/water closet or urinal
24-hour Service Stations	325/water closet
Theaters: Movies	5/seat
Drive-in	15/vehicle space
Warehouses	30/employee
Public parks (toilets only)	5/user
Public parks with bath house	15–25/user
<b>Camps</b>	
Construction or Work Camps	60/person 40/person with chemical toilets
Summer Camps	60/person
Campgrounds—with Comfort Station (without water and sewer hookups)	100/campsites
Travel Trailer/Recreational Vehicle Park (with water and sewer hookups)	120/space
<b>Assembly &amp; Mercantile</b>	
Retail Stores	120/ 1000 sq. ft. of retail sales area
Stadium, Auditorium, Theater, Drive-in	5/seat or space
Swimming Pools, Spas, and Bathhouses	10/person

Churches (Not including a Kitchen, Food Service Facility, Day Care or Camp)	3/seat
Churches (With a Kitchen but not including a Food Service Facility, Day Care or Camp)	5/seat
Country Club	20/member
<b>Food or Drink Establishment**</b>	
Bar (not serving food)	20/seat
Restaurants	40/seat or 40/15 sq. ft. of dining area, whichever is greater
24-hour Restaurant	75/seat
Food Stands	
1) per 100 square feet of food stand floor space	50 gal.
2) add per food employee	25 gal.
Other food service facilities	5/meal
Meat Markets	
1) per 100 square feet of market floor space	50 gal.
2) add per market employee	25 gal.
<b>Institutional**</b>	
Hospitals	300/bed
Day Care Facilities	15/person
Residential Care Facilities	60/person
Rest Homes and Nursing Homes	
with laundry	120/bed
without laundry	60/bed
Day Schools	
with cafeteria, gym, and showers	15/student
with cafeteria only	12/student
with neither cafeteria nor showers	10/student
Boarding Schools	60/person

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1 Establishments with flows greater than three thousand gallons per day (3,000 gpd) shall be regulated under Chapter 644, RSMo, administered by the Department of Natural Resources.

\* Must consider flow into the soil absorption system from mobile homes where taps are allowed to run to prevent freezing.

\*\* Establishments processing food may be required to provide grease interceptors in an accessible location prior to the sewage treatment system.

Note: Gallons per person per unit includes normal infiltration for residential systems.

**Table 2B–Sewage Works Population/Design Table**

<b>UNIT</b>	<b>PERSONS/UNIT</b>
Apartments or Condominiums	
1 bedroom	2.0
2 bedroom	3.0
3 bedroom	3.7
Camper trailers with sewer hookup	3.0
Camper trailers without sewer hookup	2.5
Mobile Homes	3.0-3.7
Motels	3.0
Residences	3.7



**E. Sinkholes.** Sinkholes, losing streams, and caves that commonly occur in karst topography provide avenues of contamination for groundwater. Any type of wastewater treatment system that is to be located in a karst area must be carefully designed to prevent contaminants from affecting the underlying groundwater supplies. The following requirements are intended to provide specific criteria for site evaluations, design and construction for any site upon which sinkholes or other karst features are located.

**1. Sinkhole Evaluation.** An evaluation including the following information shall be made for all sites upon which sinkholes or other karst features are fully or partially located. All evaluations shall be conducted by registered soil scientists, geologists, or engineers. However, the Administrative Authority may require that a registered geologist evaluate the sinkhole and the Administrative Authority may seek an evaluation from Missouri Department of Natural Resources - Division of Geology and Land Survey. The site evaluation for the proposed individual wastewater treatment system must show the following items with respect to location of proposed construction, proposed or existing property lines, and existing structures:

- A. Location and limits of the area of the sinkhole depression as determined by field surveys. Location of sinkholes based solely upon USGS 7-1/2 Minute Series Quadrangle Maps will not be considered sufficient unless field verified.
- B. Location and elevation of the sinkhole eye.
- C. Location and elevation of any solutional opening.
- D. Topographic contours at maximum intervals of two feet (2') and spot elevations sufficient to determine the low point on the sinkhole rim and the high point of the sinkhole floor.

**2. Sinkhole Requirements.** Construction of a new wastewater treatment systems in sinkholes shall not be approved. The setback from a sinkhole rim to any part of the system can be found in Table I. Exceptions will be made only in situations where it can be conclusively demonstrated that there are no practical alternatives to such construction. These situations will be considered on a case-by-case basis.

**F. Building Sewers.** Building sewers used to conduct wastewater from a building to a wastewater treatment system shall be constructed of material meeting the minimum requirements of American Society for Testing Materials (ASTM) Standards, F789-85, Schedule 40 PVC or cast iron, all with approved type joints.

1. **Size.** Building sewers shall not be less than four inches (4") in diameter.
2. **Slope.** Building sewers shall be laid to the following minimum slope:
  - A. 4 inch sewer --- 12 inches per 100 feet.
  - B. 6 inch sewer --- 8 inches per 100 feet.
3. **Cleanouts.** An accessible cleanout shall be provided before the tank. An accessible cleanout shall be provided at least every one hundred feet (100') and at every change in direction or slope if the change exceeds forty-five degrees (45°). This includes before the tank and between the tank and the lateral field.
4. **Connection to the tank.** The pipe going into and out of the tank shall be:
  - A. Schedule 40 PVC, cast iron, or equivalent.
  - B. Extend a minimum of two feet (2 ft.) beyond the tank excavation hole.
  - C. A minimum of two feet (2 ft.) of earth dam between tank excavation hole and absorption trench.

**G. Tanks.** All liquid waste and washwater shall discharge into a wastewater treatment system. Roof, garage, footing, surface water, drainage, cooling water discharges and hazardous wastes shall be excluded from the wastewater tank. Backwash from water softeners and swimming pool filtration systems may be excluded from the wastewater tank. In such event of excluding swimming pool filter backwash, the MDNR shall be contacted for applicability of a discharge permit. All wastewater tank effluent shall be discharged to a soil absorption system that is designed to retain the effluent upon the property from which it originated.

1. **General.** All tanks must be constructed of concrete or other corrosive resistant material approved by the Administrative Authority. All tanks regardless of material or method of construction shall be:
  - A. Watertight and designed and constructed to withstand all lateral earth pressures under saturated soil conditions with the tank empty.
  - B. Designed and constructed to withstand a minimum of two feet (2') of saturated earth cover above the tank top.
  - C. Resistant to corrosion or decay.
2. **Water Treatment Systems Tanks.** Wastewater treatment tanks, regardless of material or method of construction, shall conform to the following criteria:

- A. The liquid depth of any tank or its compartment(s) shall not be less than thirty-six inches (36"). A liquid depth greater than six and one-half feet (6 ½') shall not be considered in determining tank capacity.
- B. No tank or compartment shall have an inside, horizontal dimension less than twenty-four inches (24").
- C. Inlet and outlet connections of the tank shall be protected by baffles or sanitary tees.
- D. The space in the tank between the liquid surface and the top of the inlet and outlet baffles shall not be less than twenty percent (20%) of the total required capacity, except that in horizontal cylindrical tanks this space shall not be less than fifteen percent (15%) of the total required liquid capacity.
- E. Inlet and outlet baffles shall be constructed of acid-resistant concrete, acid-resistant fiberglass, or plastic.
- F. Sanitary tees shall be affixed to the inlet or outlet pipes with a permanent waterproof adhesive or affixed with stainless steel connectors top and bottom.
- G. The inlet baffle shall extend at least six inches (6") but no more than twenty percent (20%) of the total liquid depth below the liquid surface and at least one inch (1") above the crown of the inlet sewer.
- H. The outlet baffle and the baffles between compartments shall extend below the liquid surface a distance equal to forty percent (40%) of the liquid depth except that the penetration of the indicated baffles or sanitary tees for horizontal cylindrical tanks shall be thirty-five (35%) of the total liquid depth. They also shall extend above the liquid surface as required in Paragraph II.G.2d of this rule. In no case shall they extend less than six inches (6") above the liquid surface.
- I. There shall be at least one inch (1") between the underside of the top of the tank and the highest point of the inlet and outlet devices.
- J. The inlet shall not be less than three inches (3") above the outlet.
- K. The inlet and outlet shall be located opposite each other along the axis of maximum dimension. The horizontal distance between the nearest points of the inlet and outlet devices shall be at least four feet (4').
- L. Sanitary tees shall be at least four inches (4") in diameter. Inlet baffles shall be no less than six inches (6") or no more than twelve inches (12") measured from the end of the inlet pipe to the nearest point of the baffle. Outlet baffles shall be six inches (6") measured from beginning of the outlet pipe to the nearest point on the baffle.
- M. Access to the tank shall be as follows:
  - (1) Manholes. There shall be one (1) or more manholes. The manhole depth below finished grade shall extend to a point within eighteen inches (18") but no closer than eight (8") below finished grade. Manhole risers are not required when the tank is within eighteen inches (18") of final grade. All manhole openings must be provided with a substantial, fitted, water-tight cover of concrete, cast iron, or other approved material. All manhole covers should be covered with at least six inches (6") of earth. Manhole covers which terminate above grade shall have an effective approved locking device if constructed of material other than concrete.

- (2) A six-inch (6") inspection port shall be provided over the inlet and outlet baffles of each tank and terminate at or above grade. An inspection port shall not be used as a pump out access. A manhole cover at or above grade may also serve in place of inspection ports.
- N. Compartmentation of single tanks shall be in accordance with the following:
  - (1) Tanks larger than fifteen hundred (1,500) gallons and fabricated as a single unit shall be divided into two (2) or more compartments.
  - (2) When a tank is divided into three (3) or more compartments, one-half (1/2) of the total volume shall be in the first compartment and the other half equally divided in the other compartments.
  - (3) Connections between compartments shall be baffled so as to obtain effective retention of scum and sludge. The submergence of the inlet and outlet baffles of each compartment shall be as specified in Paragraphs II.G.2.g and h of this rule.
  - (4) Adequate venting shall be provided between compartments by baffles or by opening at least fifty (50) square inches near the top of the compartment wall.
  - (5) Adequate access to each compartment shall be provided by one (1) or more manholes at least twenty inches (20") square or in diameter and located within six feet (6') of all walls of the tank.
- O. The use of multiple tanks shall conform with the following:
  - (1) Where more than one (1) tank is used to obtain required liquid volume, the tanks shall be connected in series.
  - (2) Each tank shall comply with all other provisions of this section.
  - (3) No more than three (3) tanks in series can be used to obtain the required liquid volume.
  - (4) The first tank shall be no smaller than any subsequent tanks in a series.
- P. The liquid capacity of a tank serving a dwelling shall be based upon the number of bedrooms contemplated in the dwelling and shall be at least as large as the capacities given in TABLE IV: For six (6) or more bedrooms the tank shall be sized on the basis similar to an establishment. See Paragraph II.G.2.q of this section.

**TABLE IV**  
**Dwelling Tank Capacity**

Number of Bedrooms	Minimum Liquid Capacity Gallons
1 to 3	1,000
4	1,250
5	1,500

Note: These figures provide for use of garbage grinders, automatic clothes washers, and other household appliances. Garbage grinders are not recommended due to the introduction of fats.

- q. For individual residences with more than five (5) bedrooms, multiple-family residences or any place of business or public assembly, the liquid capacity of the tank shall be designed in accordance with the following:

Equation:  $V = 1.5Q + 500$   
V = is the liquid capacity of the tank  
Q = the design daily flow

The minimum liquid capacity of a septic tank serving two (2) or more residences shall be fifteen hundred gallons (1,500 gals.).

**3. Location.** Location of the tank shall include the following:

- A. The tank shall be placed so that it is accessible for the removal of liquids and accumulated solids.
- B. The tank shall be placed on firm and settled soil capable of bearing the weight of the tank and its contents.
- C. The tanks shall be set back as specified in TABLE I of this rule.

**4. Solids Removal.**

- A. The owner of any tank or his/her agent shall regularly inspect and arrange for the removal and sanitary disposal of septage from the tank whenever the top of the sludge layer is less than twelve inches (12") below the bottom of the outlet baffle or whenever the bottom of the scum layer is less than three inches (3") above the bottom of the outlet baffle. Yearly inspections of tanks are recommended.
- B. When a repair is made to any part of a wastewater treatment system, the tank shall be pumped and the baffles inspected.

**5. Pump Chambers.** Tanks for pumping effluent to a higher elevation (not for dosing) shall be a minimum volume equivalent to two (2) days flow.

**6. Aeration Units.** An aeration unit wastewater treatment plant utilizes the principle of oxidation in the decomposition of wastewater by the introduction of air into the wastewater. An aeration unit may be used as the primary treatment except where special local conditions may limit their use. All aeration unit type treatment systems shall comply with the general requirements set forth in in Subsection II.G.1 and with:

- A. Limitations. Special conditions where aeration units should not be used may include, but not be limited to:
  - (1) Where intermittent use(interruptions allowing more than five (5) days without continuous flow) will adversely affect the functioning of the plant.
  - (2) Where local ordinances restrict their use.
- B. General. The aeration unit shall be located where it is readily accessible for accordance with TABLE I of these standards.
- C. Design. All aeration units shall comply with National Sanitation Foundation Standard No. 40 or as required by the Administrative Authority. The aeration unit shall be discharged into a soil absorption system or other final treatment system in accordance with Sections H and I of these standards. No reductions in the area of soil absorption systems or other final treatment systems shall be permitted because of the use of an aeration unit. Direct surface discharge from an aeration unit treatment plant shall not be permitted. The aeration unit shall have a minimum

treatment capacity of one hundred twenty gallons per bedroom per day (120 gals./pbd) or five hundred gallons (500 gals.), whichever is greater.

- D. Effluent disposal. Effluent from an aeration unit shall be discharged into a soil absorption system or other final treatment system in accordance with Sections H and I of these standards. No reductions in the area of soil absorption systems other final treatment systems shall be permitted because of the use of an aeration unit. Direct surface discharge from an aeration unit treatment plant shall not be permitted.
- E. Operation and maintenance. Where aeration units are used in institutional or administrative arrangements to control their use, operation, and maintenance are recommended. Aeration units shall be pumped at least once a year to remove excess solids from the plant.

7. **Grease Traps.** Grease traps shall be required at food service facilities, meat markets, and other places of business where the accumulation of grease or oils can cause premature failure of a soil absorption system. The following design criteria shall be met:

- A. The grease trap shall be located as close to the fixtures being served as possible and shall be plumbed to receive all wastes associated with food handling but no toilet wastes.
- B. The grease trap liquid capacity shall be sufficient to provide at least five gallons (5 gals.) of storage per meal served per day or at least two-thirds (2/3) of the required tank liquid capacity.
- C. Two (2) or more chambers must be provided, with total length-to-width ratio at least two to one (2:1). Chamber opening and outlet sanitary tee must extend down at least fifty percent (50%) of the liquid depth.
- D. Access manholes with a minimum diameter of twenty-four (24"), shall be provided over each chamber and sanitary tee. The access manholes shall extend at least to finished grade and be designed and maintained to prevent surface water infiltration. The manholes shall also have readily removable covers to facilitate inspection and grease removal.

**H. Absorption Systems.** The common design of absorption systems is one using absorption trenches, each separate from the other containing a distribution pipe. This type of system should be used whenever practical. Other types of absorption systems may be used as alternatives where the site conditions meet the specific design requirements of the advanced systems. Installation shall not be made while the soil is wet or moist. This is to prevent smearing and destroying the structure of the soil.

The amount of lateral lines needed can be figured by using the following calculation:

Equation:

The number of bedrooms x 120 gallons per day (gpd) = flow rate

Flow rate divided by loading rate = square feet

Square feet divided by trench width = lineal feet

Example:

3 bedroom house

0.5 loading rate (found on site evaluation form)

3 foot trench width

3 bed x 120 gpd = 360 gallons flow rate

360 / 0.5 = 720 square feet

720 sf / 3 ft = 240 lineal feet

### **1. Absorption Trenches.**

An absorption trench gives additional treatment to the wastewater from the treatment tank. Regardless of its appearance of clarity or transparency, the outflow or effluent from a tank is a dangerous source of contamination. The satisfactory operation of the disposal system is largely dependent upon the site selection, design and construction of the absorption trench.

- A. Absorption trenches shall not be constructed in soils with loading rates slower than 0.2 gpd/sq. ft. The maximum loading rate shall be 0.5 gpd/sq.ft. unless it is difficult to achieve this loading rate without modifications to the conventional trench.
- B. The absorption trench shall be located on the property to maximize the vertical separation distance from the bottom of the absorption trench to the seasonal high ground water level, as determined by the presence of mottling, bedrock or other limiting layer. The vertical separation between the bottom of the absorption trench and limiting layer or seasonal high water table should be two feet (2') and in no case shall the separation distance be less than one foot (1') for standard systems.
- C. Absorption trenches shall not be constructed in unstabilized fill or ground which has become severely compacted due to construction equipment.
- D. Absorption trenches shall not be constructed in soils which are dry.
- E. Absorption trenches shall not be constructed in excavated soils, unless the soil scientist documents that the excavation will not interfere with treatment of the effluent.
- F. Absorption trenches shall be constructed in undisturbed soils.
- G. Curtain drains or approved vertical drains may be required where there is less than eighteen inches of separation between the trench bottom and the uppermost elevation of the seasonally high water table. Curtain drains shall be dug at least six inches (6") into the limiting layer and filled with and filled with gravel to the same depth as the perched water table. Curtain drains must be daylighted on at least one end, preferably on both ends. Screens shall cover the daylighted end of the pipe. Coiled tubing is not approved for use in the curtain drains. Perforated pipe of the same strength as laterals shall be placed in the bottom of the trench with the perforated hole pointed up towards the perched water table and away from the lateral field. Vertical drains shall not be used in areas where contamination may penetrate through the limiting layer. Vertical drains shall penetrate through the limiting layer. Both curtain drains and vertical drains may vary in width.
- H. Each absorption trench system shall have a minimum of two (2) trenches with no one (1) trench longer than one hundred feet (100'), unless approved by the Administrative Authority. The absorption trenches shall be located not less than three (3) times the trench width on centers with a minimum of five feet (5') on centers.
- I. Absorption trenches shall be at least eighteen inches (18") and not more than thirty inches (30") below the finished grade unless specifically approved by the Administrative Authority.
- J. The pipe used between the tank and the absorption system shall be a minimum of two feet (2') beyond the excavation for the tank and four inches (4") inside diameter and equivalent to the pipe

used for the building sewer as set forth in these standards. The pipe shall have a minimum fall of not less than one-eighth inch (1/8") per foot.

- K. Gravity-fed absorption field distribution lines shall be at least four inches (4") in diameter. Perforated distribution lines shall be at least one-half inch (1/2") and no more than three-fourths inch (3/4") in diameter.
- (1) All perforated pipe used in the absorption system shall meet ASTM Standard. ASTM Standard D-2729 has a minimum requirement for plastic pipe of 2,500 lb. crushproof.
  - (2) Coiled tubing shall not be used.
- L. The absorption trenches shall be constructed as level as possible but in no case shall the fall in a single trench bottom exceed one-fourth inch (1/4") in ten feet (10'). The ends of the distribution lines shall be capped or plugged, or when they are at equal elevations, they should be connected. All caps shall be exposed for evaluation.
- M. Rock used in soil absorption systems shall be clean, washed gravel or crushed stone and graded or sized between one to three inches (1" – 3") with no more than ten percent (10%) material to pass through a one-half inch (1/2") screen. Limestone, dolomite, or other crushed rock shall be avoided when possible. If limestone dolomite or other crushed rock is used, it shall be washed and be a minimum size of one and one-half inches (1 1/2"). The rock shall be placed a minimum of one foot (1') deep with at least six inches (6") below the pipe and two inches (2") over the pipe and distributed uniformly across the trench bottom and over the pipe. Before placing soil backfill over the trenches, the gravel shall be covered with one of the following:
- (1) Unbacked, rolled, three and one-half inch (3 1/2") thick fiberglass insulation.
  - (2) Untreated building paper.
  - (3) Synthetic drainage fabric.
  - (4) A minimum of eight inches (8") of straw for a compacted thickness of two inches (2").
  - (5) Other material approved by the Administrative Authority laid as to separate the gravel from the backfill.
- N. Complex slope patterns and slopes dissected by gullies shall not be considered for installation of absorption trenches. Uniform slopes under fifteen percent (15%) shall be considered suitable for installation of absorption trenches. When slopes are less than two percent (2%), provisions shall be made to ensure adequate surface drainage. When slopes are greater than four percent (4%), the absorption trenches shall follow the contour of the ground. Slopes greater than fifteen percent (15%) may require installation of interceptor/curtain drains upslope from the soil absorption system to remove all excess water that might be moving laterally through the soil during wet periods. Usable areas larger than minimum are ordinarily required in this slope range. Slopes greater than thirty percent (30%) shall be considered unsuitable for installation of absorption trenches.
- O. Effluent distribution devices, including distribution boxes, flow dividers, and flow diversion devices, shall be of sound construction, watertight, not subject to excessive corrosion and of adequate design as approved by the Administrative Authority. Effluent distribution devices shall be separated from the tank and absorption trenches by a minimum of two feet (2') of gravel, undisturbed or compacted soil and shall be placed level on a solid foundation of soil or concrete to prevent differential settlement of the device. Distribution boxes provided with flow equalizers are recommended and encouraged.



- (1) Each distribution line shall connect individually to the distribution boxes and shall be water tight.
  - (2) The pipe connecting the distribution box to the distribution line shall be of tight joint construction laid on undisturbed earth or properly bedded throughout its length.
- P. Stepdowns or drop boxes shall be used where topography prohibits the placement of absorption trenches on level grade. Whenever the design flow rate requires more than seven hundred fifty feet (750') of distribution line in a stepdown or drop box type system, the absorption field shall be divided into two (2) or more equal portions. Stepdowns shall be constructed a minimum of two feet (2') of undisturbed soil and constructed to a height level with the top of the upper distribution line. The inlet to a trench relief line should be placed either in the center or as far as practical from the outlet (overflow) from the same trench. The top of the trench outlet laterals, which allow effluent to move to the distribution lines, shall be two inches (2") below the invert of the outlet supply line.
- Q. Dosing is required for all systems when the design flow requires more than five hundred (500) lineal feet of distribution line. When the design flow requires more than one thousand (1,000) lineal feet of distribution line, the absorption field shall be divided into two (2) equal portions and each half dosed alternatively, not more than four (4) times per day. Dosing shall be accomplished by the use of a pump. Each side of the system shall be dosed not more than four (4) times per day. The volume of each dose shall be greater than the daily volume divided by the daily dosing frequency or an amount to approximately three-fourths (3/4) of the internal volume of the distribution lines being dosed (approximately one-half (1/2) gallon per lineal foot of four-inch (4") pipe).
- R. The Administrative Authority may permit the use of a bed system on sites where the minimum soil loading rate is 0.4 gpd/sq. ft. and essentially meeting the other requirements of this section, and only on lots which are limited by topography, space or other site planning considerations. In such cases the number of square feet of bottom area needed shall be increased by fifty percent (50%) over what would be required for a trench system. Distribution lines shall be at least eighteen inches (18") from the side of the bed and shall have lines on three-foot (3') centers. When the design volume of wastewater exceeds six hundred (600) gallons per day, adequate space shall be provided to accommodate a trench system for the absorption field. In any area where a bed system is proposed:
- (1) Elevation measurements of all four corners of the proposed bed must be included in the bed drawing.
  - (2) The bed will be limited to sites with two percent (2%) or less slope of the original grade.
  - (3) There will be no more than a two inch (2") change in total bed depth (floor grade) between the edges of the bed – (2 inches = 0.17 ft.).
  - (4) The lowest edge of the bed shall not be flush with the original grade.
  - (5) Sketch drawings for bed systems must include the following calculations:
    - Equation #4
    - $(100 \text{ Ft} / S) \times V = W$
    - Where S = Slope is expressed in feet (elevation in 100 linear feet)
    - V = Maximum variation in bed depth (in feet)
    - W = Maximum width of bed

- S. Gravelless subsurface absorption systems may be used as an alternative. These systems include approved gravelless pipe and chamber systems that are installed under these conditions.
- (1) When replacing a conventional four inch (4") pipe placed in gravel filled trenches.
  - (2) When the minimum soil-loading rate is 0.3 gpd/sq. ft.
  - (3) With a minimum of twelve inches (12") cover.
  - (4) With approval from the Administrative Authority.
  - (5) Following all manufacturers specifications and installation procedures.
  - (6) Cannot be used in areas where conventional systems would not be allowed due to poor permeability, high ground water, insufficient depth to bedrock, or a large amount of grease such as a restaurant.
- T. Modifications to standard absorption trenches may be utilized to overcome selected soil and site limitations and must be approved by the Administrative Authority include the following:
- (1) Shallow placement of absorption trenches shall be utilized where insufficient depth to seasonally high water table or limiting layer. Shallow trenches shall be designed and constructed to provide a minimum of twenty four inches (24") of natural soil separation between the trench bottom and the seasonally high water table or limiting layer. Shallow trenches shall be covered with loamy soil to a depth of eight to twelve inches (8-12") at center. The cover over the absorption field shall extend at least five feet (5') beyond the edge of any trench. Curtain or vertical drains are required when necessary to provide proper drainage.
  - (2) Alternating dual field absorption systems may be utilized where soils are limited by high clogging potentials, a loading rate equal to or below 0.2 gpd/sq.ft or high shrink/swell potential soils and where the potential for malfunction and need for immediate repair is required. Alternating dual field absorption systems shall be designed with two (2) complete-absorption fields, each sized a minimum of seventy-five percent (75%) of the total area required for a single field and shall be separated by an effluent flow diversion valve. The diversion valve shall be constructed to resist five hundred pounds (500 lbs.) crushing strength, structurally sound and shall be resistant to corrosion. Valves placed below the ground level shall be installed so that it may be operated from the ground surfaces.
  - (3) Sand-lined trenches may be used in areas where the soil has greater than fifty percent (50%) rock fragments and there is an abnormally high potential for ground water contamination. The material must be natural or manufactured sand and have no more than fifteen percent (15%) clay content, clean river sand that is screened to one-fourth (1/4") and smaller may be used. Manufactured sand shall be chat sand produced from flint chat or fines manufactured from igneous rocks or chert gravel. Crushed limestone is acceptable.
    - (a) In standard four-inch (4") pipe and gravel trenches the depth of liner material must be twelve inches (12") below the gravel and at least six inches (6") on the sides of the gravel up to the top of the gravel. To place sand on the sides of the trenches, the trench walls must be excavated on a slope instead of vertically. The side slopes should be two to one (2:1) and in no case steeper than one to one (1:1). When it is impossible to excavate the trenches on a slope the sand may be placed on the sides of trenches by diffing the trench twelve inches (12") deeper than the recommended trench depth. The sand is placed eighteen inches (18") deep in the bottom of the trench and a V shaped form is dragged through the sand to push the sand at least six inches (6") up on the side the gravel.

- (b) The effluent to sand-lined systems should be equally distributed as much as practically possible. Dosing is recommended in order to more positively assure even distribution.
- (c) The sand-lined trenches may be used with the approval of the Administrative Authority where the percentage of rock fragments is not greater than seventy percent (70%) for at least four feet (4') below the trench bottom. For sand-lined trenches to function properly, the permeability of the natural material should be similar to the permeability of the liner material. Sand-lined trenches must not be used over fragipans or other restrictive layers which have perched water tables and could cause saturation of the liner material.
- (d) In gravelless pipe and chamber systems the minimum thickness of liner material is six inches (6") around the pipe.

U. Wastewater Stabilization Ponds. A wastewater stabilization pond can provide satisfactory wastewater treatment in rural areas where soils are not suited for absorption systems. Single residence wastewater stabilization ponds are not general suitable in subdivisions with lots less than (3) acres in size. No more than one (1) single family residence will be allowed on one (1) stabilization pond.

(1) The minimum separation distances may be modified as necessary to accommodate the following site requirements:

- (a) The pond shall be located a minimum of seventy-five feet (75') from property lines as measured from the adjoining pond shoreline. However, this distance must be increased where necessary to be sure that all effluent is disposed upon the property from which it originated.
- (b) The pond shall be located a minimum of two hundred feet (200') from the nearest existing residence and a minimum of one hundred feet (100') from the residence that it serves.
- (c) The pond shall be located at least one hundred feet (100') from a potable water supply or pump suction line.
- (d) The pond shall be located at least fifty feet (50') from a stream, water course, lake, or impoundment.

(2) Ponds may be utilized when there are no significant limitations related to groundwater from their use and the soils have been demonstrated to be impermeable. There shall be a minimum separation distance between the pond bottom and creviced bedrock of three feet (3') or installation of a clay liner with a minimum thickness of one foot (1') or a synthetic liner. Percolation losses from the pond shall not exceed one-eighth inch (1/8") per day to prevent groundwater contamination or nuisance conditions. Site modifications may be accomplished to provide these soil requirements. In areas of highly permeable bedrock, restrictive layers such as fragipans shall be minimum of twelve inches (12") thick and shall not be breached during construction.

(3) Steeply sloping areas should be avoided.

(4) Selection of the pond site should consider a clear sweep of the surrounding areas by prevailing winds. Heavy timber should be removed for a distance of fifty feet (50') from the water's edge to enhance wind action and prevent shading.

(5) The Administrative Authority requires that a properly sized and constructed tank precede the pond. The use of a tank should not be used as a basis for reduction of the setback distances as set forth in paragraphs II H.1. u (1) – (4) of these standards.

- (6) The pond shall be designed on the basis of four hundred forty (440) square feet of water surface area per bedroom at the three foot (3') operating level. Whenever the pond is preceded by a properly sized tank, the water surface area may be reduced up to twenty percent (20%); however, the minimum water surface area at the three foot (3') level shall be nine hundred (900) square feet.
- (7) A single cell is generally acceptable for a single residence pond systems. If multiple cells are used for further polishing or storage of the effluent, the secondary cell should be one-half (1/2) the size of the primary cell.
- (8) The minimum embankment top width shall be four feet (4'). The embankment slopes shall not be steeper than three to one (3:1) on the inner and outer slopes. Outer embankment slopes shall be sufficient to prevent the entrance of surface water into the pond. Freeboard shall be at least eighteen inches (18") and preferably twenty-four inches (24"). Additional freeboard may be provided.
- (9) Embankments shall be seeded with a locally hardy grass from the outside toe to one foot (1') above the water line to minimize erosion and facilitate weed control. Alfalfa or similar long rooted crops which might interfere with the water-holding capacity of the embankment shall not be used. Riprap may be necessary under unusual conditions to provide protection of embankments from erosion.
- (10) The influent line shall be of a sound, durable material of water-tight construction. The line shall have a minimum diameter of four inches (4") and be laid on a firm foundation at minimum grade of one-eighth inch (1/8") per foot. The influent line shall discharge as far as practical from the possible outlet side of the pond. A cleanout or manhole should be provided in the influent line near the pond embankment. From this point the line should be laid to the inner toe of the embankment and then on the bottom of the pond to the terminus point. A concrete splash pad three feet (3') square should be placed under the terminus of the pipe. The elevation of the cleanout or manhole bottom should be a minimum of six inches (6") above the high water level in the pond.
- (11) The shape of the pond should be such that there are no narrow or elongated portions. Round, square, or rectangular cells are considered most desirable. Rectangular cells shall have a length not exceeding three (3) times the width. No islands, peninsulas, or coves shall be permitted. Embankments should be rounded at corners to minimize accumulation of floating materials.
- (12) The floor of the pond shall be stripped of vegetation and leveled to the proper elevation. Organic material removed from the pond area shall not be used in embankment construction. The wetted area for the pond must be sealed to prevent excessive exfiltration. Seals consisting of soils must be adequately compacted by the construction equipment or a sheeps-foot type roller may be used.
- (13) Embankments shall be constructed of impervious materials and compacted sufficiently to form a stable structure with very little sediment.
- (14) Any effluent should be withdrawn from six inches (6") below the water surface. This can be accomplished by placing the outlet pipe eight to ten inches (8-10") lower on the inlet end than the outlet end of the pipe.
- (15) The pond area shall be enclosed with a four foot (4') high woven or chain-link fence to preclude livestock and discourage trespassing. The fence shall be so located to permit mowing

of the embankment top and slopes. A gate of sufficient width to accommodate mowing equipment shall be provided. The construction of this fence is the responsibility of the owner. (16) Effluent from a pond must be disposed of on the property from which it originated. This may be accomplished by locating the outlet as far as practical from the property line and out of any natural drainage ditches or swales. The minimum distance from the outlet to a property line shall be one hundred feet (100'). Another method is to construct a terraced swale with a minimum length of one hundred fifty feet (150'). If these methods are unsuccessful, or whenever there is less than twelve inches (12") of permeable soil over a restrictive layer, controlled surface irrigation must be used. To utilize controlled surface irrigation, the pond must be capable of operating up to five feet (5') deep with one foot (1') of freeboard or have a second cell for storage. The Administrative Authority shall approve the method of effluent disposal.

(17) It may be necessary to introduce water into the pond to facilitate start-up of the biological processes, however, there shall be no permanent connection of any roof drain, footing drain or any source of rainwater to the wastewater stabilization pond.

(18) Odor problems caused by spring turnover of water, temporary overloading, ice cover, atmospheric conditions or anaerobic conditions may be controlled by broadcasting sodium or ammonium nitrate and should not exceed two pounds (2 lbs.) per day until the odor dissipates.

V. Holding tanks. The use of holding tanks is generally discouraged and their interim use shall be limited to situations where construction of satisfactory wastewater treatment and disposal systems will occur within one (1) year. Use of a holding tank must be specifically approved by the Administrative Authority. A Special Use Permit is required.

(1) A holding tank shall be constructed of the materials and by the same procedures as those specified for watertight tanks.

(2) A cleanout pipe of at least six inches (6") diameter shall extend to the ground surface and be provided with a sealed and properly secured/locked lid. A manhole of at least twenty inches (20") dimension shall extend through the cover to a point within twelve inches (12") but no closer than six inches (6") below finished grade. The manhole cover shall be covered with at least six inches (6") of earth.

(3) The tank shall be protected against flotation under high water table conditions. This shall be achieved by weight of the tank, earth anchors, or shallow bury depths.

(4) For a residence, the size shall be one thousand gallons (1,000 gal.) or four hundred gallons times the number of bedrooms, whichever is greater. For permanent structures other than residences, the capacity shall be based on measured flow rates or estimated flow rates. The tank capacity shall be at least five (5) times the daily flow rate.

(5) Holding tanks shall be located as follows:

(a) In an area readily accessible to the pump truck under all weather conditions.

(b) Set back distances as specified for tanks in TABLE I of these standards.

(c) Where accidental spillage during pumping will not create a nuisance.

(6) A contract for disposal and treatment of the wastewater shall be maintained by the owner with a pumper, municipality, agency, or firm which possesses a current and valid registration with the Administrative Authority and a current and valid permit issued by the Missouri Department of Natural Resources for such activity. The owner shall keep records of who pumped the tank, when the tank was pumped, and where it was disposed. A copy of the contract shall accompany the application for permit.

(7) Holding tanks shall be monitored to minimize the chance of accidental sewage overflows. A high water alarm device shall be installed on all holding tanks so that it activates no higher than one foot (1') below the inlet pipe. This device shall have an audible and an illuminated alarm. If the latter is used, it shall be conspicuously mounted.

(8) Holding tanks used in conjunction with permanent black water/gray water systems must conform to the requirements of this section except that the minimum size tank is one thousand gallons (1,000 gal). In these situations, the holding tank is to receive toilet waste only.

**III. Advanced Systems.** The Administrative Authority requires that all advanced systems be designed and constructed by an installer registered specifically for advanced systems.

1. General. The intent of this section is to provide minimum standards for the design, location, installation, use and maintenance of advanced wastewater treatment systems in areas of limiting soil characteristics or where a standard system cannot be installed or is not the most suitable treatment.

2. Low Pressure Pipe. The low pressure pipe system (LPP) is an advanced system that can be constructed in many areas where standard absorption trenches cannot. The LPP overcomes many problems with the site by utilizing uniform distribution of effluent, dosing, and resting cycles and shallow placement of trenches. See LPP Manual for requirements.

3. Wetlands. The constructed wetland is an advanced system that provides secondary levels of treatment. This type of system requires some form of pretreatment such as a tank or lagoon.

4. Elevated Sand Mounds. The elevated sand mound is an advanced treatment system that utilizes above ground soil absorption at the secondary level of treatment.

5. Sand Filter. The sand filter, whether buried or recirculating, is an advanced system that provides secondary levels of treatment in tight soils.

6. Other systems. Where unusual conditions exist, special systems of treatment and disposal, or other than those specifically mentioned in these standards, may be employed provided:

A. Reasonable assurance of performance of the system is presented to the Administrative Authority. Specific technical data, no personal opinions or sales literature, is to be submitted to this department. An opinion from an engineer, soil scientist, geologist regarding the system without specific technical data will not be considered for approval.

B. The engineering design of the system is first approved by the Administrative Authority. The report will specifically detail how no other system mentioned in the standards can successfully be employed on this site.

C. There is no discharge to the ground surface or surface waters.

D. Adequate substantiating data to indicate that the effluent will not contaminate any drinking water supply, groundwater used for drinking water, or any surface water.

E. Treatment and disposal of the wastes protects public health and general welfare.

F. These systems comply with all applicable requirements of these standards and with all applicable requirements of the Missouri statutes.

G. Specific construction criteria for these systems are not provided in the standards, therefore there will be a statement on the construction permit that this is an experimental system.

#### IV. SOIL EVALUATION

A. General. The intent of this section is to provide minimum standards for site evaluations based upon the evaluation of soil characteristics, namely texture, color, structure, drainage, and depth. Criteria are also given for sizing standard systems and some advanced systems. This type of evaluation shall be conducted by a professional soil scientist, engineer, environmental public health specialist or registered geologist with special training in determining soil morphological characteristics in the field. The person performing the site evaluation shall be registered in Newton County.

B. Site Evaluation. An investigation of proposed soil absorption site shall consider the following factors:

- (1) Topography and landscape position.
- (2) Soil characteristics (morphology) which includes texture, structure, porosity, consistency, color and other physical, mineral, and biological properties of various horizons in the soil profile.
- (3) Soil drainage, which includes both external (surface) and internal (soil).
- (4) Soil depth.
- (5) Restrictive horizons.
- (6) Available space.

C. Site Evaluation Classification. Site evaluations shall be made in accordance with these standards. Based on this evaluation, each of the factors listed shall be classified as Suitable (S), Provisionally Suitable (PS), or Unsuitable (U).

D. Topography and Landscape Position. Uniform slopes under fifteen percent (15%) shall be considered suitable with respect to topography. When slopes are less than two percent (2%), provisions shall be made to ensure adequate surface drainage. When slopes are greater than four percent (4%), the absorption lines shall follow the contour of the ground.

1. Uniform slopes of fifteen percent (15%) through thirty percent (30%) shall be considered provisionally suitable with respect to topography, (except for highly permeable soils). Slopes within this range may require installation of interceptor drains upslope from the soil absorption system to remove all excess water that might be moving laterally through the soil during wet periods. Usable areas larger than minimum are required in the slope range.
2. Slopes greater than thirty percent (30%) shall be considered unsuitable.
3. Complex slope patterns and slopes dissected by gullies and ravines shall be considered unsuitable topography.
4. Areas subject to frequent flooding shall be considered unsuitable to landscape positions.
5. Depressions shall be considered unsuitable with respect to landscape positions except when the site complies essentially with the requirements of this section and is specifically approved by the Administrative Authority.
6. The surface area on or around a ground absorption treatment and disposal system shall be landscaped to provide adequate drainage. The interception of perched or lateral groundwater movement shall be provided where necessary to prevent soil saturation on or around the ground absorption treatment and disposal system.



## E. Soil Characteristics (Morphology)

1. Texture. The relative amounts of different sizes of mineral particles in a soil are referred to as soil texture. All mineral soils are composed of sand, two to five hundredths millimeter (2-.05 mm) in size; silt, which includes intermediate sized particles cannot be seen with the naked eye but feel like flour when pressed between the fingers, five hundredths to two thousandths millimeter (0.05-0.002 mm) in size, that gives cohesion to a soil less than two thousandths millimeter (0.002mm) in size or a combination of these. The texture of the different horizons of soils may be classified into five (5) general groups and shall be used for determining the application rates.

A. Soil Group I. Sandy texture soils contain more than seventy percent (70%) sand-sized particles in the soil mass. These soils do not have enough clay to be cohesive. Sandy soils have favorable wastewater application rates but may have a low filtering capacity leading to malfunction due to contamination of groundwater. The sandy group includes the sandy and loamy sand soil textural classes and shall generally be considered suitable in texture.

- (1) Sand. Sand has a gritty feel, does not stain fingers and does not form a ribbon or ball when wet or moist.
- (2) Loamy sand. Loamy sand has a gritty feel, stands the fingers (silt and clay), forms a weak ball and cannot be handled without breaking.

B. Soil Group II. Coarse loamy texture soils more than thirty percent (30%) sand-sized particles and less than twenty percent (20%) clay-sized particles in the soil mass. They exhibit slight or no stickiness. The coarse loamy group includes sandy loam and loam soil textural classes and shall generally be considered suitable in texture.

- (1) Sandy loam. Sandy loam feels gritty and forms a ball that can be picked up with the fingers and handled with care without breaking.
- (2) Loam. Loam may feel slightly gritty but does not show a fingerprint and forms only short ribbons ranging from twenty-five hundredths to fifty hundredths inch (.25-50") in length. Loam will form a ball that can be handled without breaking.

C. Soil Group III. These fine loamy texture soils contain less than forty percent (40%) clay-sized particles and not more than thirty percent (30%) sand-sized particles in the soil mass. They exhibit slight to moderate stickiness. The fine loamy group includes sandy clay loam, silt loam, clay loam, silty clay loam textural classes and shall generally be considered provisionally suitable in texture.

- (1) Silt loam. Silt loam feels floury when moist and will show a fingerprint but will not ribbon and forms only a weak ball.
- (2). Silt. Silt has a floury feel when moist and sticky when wet, but will not ribbon and forms a ball that will tolerate some handling.
- (3) Sandy clay loam. Sandy clay loam feels gritty but contains enough clay to form a firm ball and may ribbon to form seventy-five hundredths to one inch (.75-1") pieces.
- (4) Silty clay loam. Silty clay loam is sticky when moist and will ribbon from one to two inches (1-2"). Rubbing silty clay loam with the thumbnail produces a moderate sheen. Silty clay loam produces a distinct fingerprint.

(5) Clay loam. Clay loam is sticky when moist. Clay loam forms a thin ribbon of one to two inches (1-2") in length and produces a slight sheen when rubbed with the thumbnail. Clay loam produces a nondistinctive fingerprint

D. Soil Group IV. These clayey texture soils contain forty percent (40%) or more clay-sized particles and include sandy clay, silty clay, and clay. This group may also include clay loam and silty clay loam when the clay fraction is thirty-five percent (35%). For evaluation purposes, clayey soil will indicate thirty-five percent (35%) or greater clay content. There are two (2) major types of clays, non-expandable and expandable. The nonexpandable clays, when wet, are slightly sticky to sticky; when moist, are friable to firm, and when dry, they are slightly hard to hard. The non-expandable clays (Group IVa) shall generally be considered provisionally suitable. The expandable clays, when wet, are very sticky and very plastic and when moist these clays are very firm to extremely firm and when dry are very hard to extremely hard. The expandable clays (Group IVb) shall be considered unsuitable in texture.

- (1) Sandy clay. Sandy clay is plastic, gritty, and sticky when moist and forms a firm ball and produces a thin ribbon to over two (2) inches in length.
- (2) Silty clay. Silty clay is both plastic and sticky when moist and lacks any gritty feeling. Silty clay forms a firm ball and readily ribbons to over two inches (2") in length.
- (3) Clay. Clay is both sticky and plastic when moist, produces a thin ribbon over two inches (2") in length, produces a high sheen when rubbed with the thumbnail and forms a strong ball resistant to breaking.

E. Soil Group V. This soil group may be of any texture, however, the most predominant are cherty and very cherty soils, slit loams, and silty clay loams. The amount of rock fragments in these soils is of concern in areas of residual soils overlying highly permeable bedrock where ground water could become contaminated. Soils with fifty percent (50%) or less rock fragments will be considered suitable. Soils of fifty percent (50%) through seventy percent (70%) rock fragments will be considered provisionally suitable. Soils with greater than seven percent (70%) rock fragments will be considered unsuitable.

F. The soil texture shall be estimated by field testing.

2. Soil consistency. Soil consistency comprises the attributes of soil material, typically clay, that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation or rupture.

A. Soil consistency when wet shall be considered as follows:

- (1) Stickiness. Stickiness is the quality of adhesion to other objects. For field evaluation of stickiness, wet soil material is pressed between thumb and finger and its adherence noted. Degrees of stickiness are described as follows:
  - (a) Slightly sticky. After pressure, soil material adheres to both thumb and finger but comes off one or the other cleanly. It is not appreciably stretched when the digits are separated.
  - (b) Sticky. After pressure, soil material adheres to both thumb and finger tends to stretch somewhat and pull apart rather than pulling free from either digit.
  - (c) Very sticky. After pressure, soil material adheres to both thumb and finger and decidedly stretched when they are separated.

(2) Plasticity. Plasticity is the ability to change shape continuously under the influence of an applied stress and to retain the impressed shape on removal of the stress. For field determination of plasticity, roll the soil material between the thumb and finger and observe whether a wire or thin rod of soil can be formed. Degree of resistance to deformation at or slightly above field capacity is as follows:

- (a) Slightly plastic. Wire formable but soil mass easily deformable.
- (b) Plastic. Wire formable and moderate pressure required for deformation of the soil mass.
- (c) Very plastic. Wire formable and much pressure required for deformation of the soil mass.

B. Soil consistency when moist. Consistency when moist is determined at a moisture content approximately midway between air dry and field capacity. At this moisture content, most soil materials exhibit a form of consistency characterized by: tendency to break into smaller masses rather than into powder, some deformation prior to rupture, absence of brittleness, and ability of the material after disturbance to cohere again when pressed together. To evaluate this consistency, select and attempt to crush in the hand a mass that appears slightly moist.

- (1) Friable. Soil material crushes easily under gentle to moderate pressure between thumb and finger and coheres when pressed together.
- (2) Firm. Soil material crushes under moderate pressure between thumb and finger but resistance is distinctly noticeable.
- (3) Very firm. Soil material crushes under strong pressure; barely crushable between thumb and finger.
- (4) Extremely firm. Soil material crushes only under very strong pressure; cannot be crushed between thumb and finger and must be broken apart bit by bit.

C. Soil consistency when dry. The consistency of soil material when dry is characterized by rigidity, brittleness, maximum resistance to pressure, more or less tendency to crush to a powder or to fragments with rather sharp edges, and inability of crushed material to cohere again when pressed together. For evaluation, the air-dry mass shall be selected and broken in the hand.

- (1) Slightly hard. Weakly resistant to pressure; easily broken between thumb and finger.
- (2) Hard. Moderately resistant to pressure; can be broken in the hands without difficulty but is barely breakable between thumb and finger.
- (3) Very hard. Very resistant to pressure; can be broken in the hands only with difficulty; not breakable between thumb and finger.
- (4) Extremely hard. Extremely resistant to pressure; cannot be broken in the hands.

4. Soil Structure. In many soils, the sand, silt, and clay particles tend to cling or stick to one another to form a ped or a clump of soil. This is known as soil structure. Soil structure may have a significant effect on the movement of effluent through a soil. Structure is usually not important in soil groups I and II, and these types of soils shall generally be considered suitable as to structure. The three (3) kinds of soil structure that are most significant in movement of effluent through groups III and IV soils are block-like, platy and the absence of soil structure or massive conditions. These kinds of soil structure are described as follows:

A. Block-like soil structure. In groups III and IV soils, if the soil exhibits many peds of angular and sub-angular peds, then the soils have block-like structure. The effluent may move between the cracks of these types of peds. Block-like structure in groups III and IV soils is frequently destroyed by mechanical excavating equipment manipulating the soil when it is too wet. Trenches for absorption lines being placed in group III and IV soils with block-like structure should only be dug when the soils are moist and dry. Block-like soil structure in groups III and IV soils shall be considered provisionally suitable.

B. Platy soil structure. If group III and IV soils fall out into plate-like sheets, then the soil would have a platy structure. Water or effluent movement through these soils would be extremely slow, and the structure shall be considered unsuitable.

C. Absence of soil structure. Some groups II, III, and IV soils are massive and exhibit no structural aggregates. In these kinds of soils, water or effluent movement would be negligible. This structure shall be considered unsuitable.

F. Soil Drainage. Soils with seasonally high water tables are of major concern in evaluating sites for wastewater disposal. These are soil areas that give good absorption rates during dry seasons of the year but force effluent to the surface during wetter seasons.

1. The depth of the seasonal high water table can commonly be recognized by those examining soil profiles. The criteria for recognition of high water tables is that of soil color. Subsurface horizons that are in colors of reds, yellows, and browns generally indicate good soil aeration and drainage throughout the year. Subsurface horizons that are in colors of gray, olive, or bluish colors, of chroma two (2) or less (Munsell Color Chart) indicate poor aeration and poor soil drainage. These dull or grayish colors may occur as a solid mass of soil or may be in mottles of localized spots. The volume of grayish color is indicative of the length of time that free water stands in that soil profile. There are soils that have light-colored mottles which are relic from the light-colored rock from which the soils have weathered. These soils would not have high water tables, so one must distinguish between a true soil composed of sand, silts, and clays, or the rock material that may still exist in the soil profile.

2. Any soil horizon that has the grayish colors of chroma 2 or less (Munsell Color Chart) indicative of high water tables or is either subject to periodic high water, within twenty-four inches (24") of the surface, or is less than twelve inches (12") between the proposed trench bottom and the high water table, shall be considered unsuitable as to drainage. Soils where the seasonally high water table is less than forty-eight inches (48") and more than twenty-four inches (24") below the naturally occurring surface shall be considered provisionally suitable for soil drainage, provided there remains at least twelve inches (12") of soil between the proposed trench bottom and the seasonally high water table. Soils where the seasonally high water table is greater than forty-eight inches (48") below the naturally occurring surface shall be considered suitable for soil drainage. Drainage systems installed for groundwater lowering shall be maintained so that a minimum separation of one foot (1') occurs between the absorption trench bottom and the seasonally high water table. For extensive drainage systems, such as groundwater lowering in subdivisions, easements shall be recorded and shall have adequate width for reasonable egress and ingress for maintenance.

G. Soil Thickness. Soil thickness is the thickness of soils to rock. Soil depth suitability classifications shall be as follows:

1. Soil depths of forty-eight inches (48") or greater shall be considered suitable.
2. Soil depths less than forty-eight inches (48") but that are thirty-six inches (36") or greater shall be considered provisionally suitable.
3. There shall be a minimum of two feet (2') separation distance between the bottom of the absorption trench and bedrock.

H. Restrictive Horizons. Restrictive Horizons severely restrict the movement of water and air and shall be considered unsuitable. These restrictive horizons shall not be breached. Restrictive horizons in soils are recognized by their apparent resistance in excavation or in using a soil auger. Restrictive horizons may occur as fragipans or claypans. The fragipan is a layer that owes its hardness mainly to extreme density or compactness as opposed to high clay content or cementation. The layer is typically dense and brittle. Although fragments are friable when removed, when in place the material is so dense water moves through it very slowly. Unlike fragipans, the claypan is a compact, slowly permeable layer in the subsoil having a much higher clay content than the overlying material. A sharply defined boundary exists between the claypan and the overlying material. Claypans are typically hard when dry and plastic and sticky when wet.

I. Other Applicable Factors. The site evaluation should include consideration of any other applicable factors involving environmental principles including:

1. The proximity of a large capacity/newly constructed and/or new construction of a public or non-community water supply well, the cone of influence of which would dictate a larger separation distance than the minimum specified in these standards.
2. The potential environmental hazard of possible failures of soil absorption systems involving large quantities of wastewater, which would dictate larger separation distances than the minimum specified in these standards.
3. The potential environmental and health hazard of possible massive failures of soil absorption systems proposed to serve large numbers of residences, as in residential subdivisions or mobile home parks.

J. Determination of Overall Site Suitability Classification. This is the classification reported on the site evaluation form representing a specific factor to determine the overall site suitability for subsurface soil absorption systems. The representative suitability classification for a soil factor is determined by the soil factor in relation to the entire soil and the minimum criteria for a conventional or alternative wastewater system. The lowest representative suitability classification of the individual site factors will determine the overall site suitability classification.

1. Suitable Classification. Site factors that meet the minimum criteria, without any required provisions, for a standard absorption system at the maximum allowable trench depth shall be classified suitable.
2. Provisionally Suitable Classification. Site factors that with required provisions meet the minimum criteria for a system specified in the standards shall be classified provisionally suitable.
3. Unsuitable Classification. Where it is anticipated that the severe limitations cannot be mitigated, then the site shall be considered unsuitable. The site evaluator shall state on the soil evaluation form that the site is unsuitable if he or she believes the limitations will clearly create an unacceptably high potential for system failure.

K. Design Criteria. Tables V and VI may be used when determining the application rate for the appropriate system.

# APPENDIX A – FORMS

**NEWTON COUNTY HEALTH DEPARTMENT**  
**ENVIRONMENTAL FEE SCHEDULE**  
**(REVISED 2021)**

**SERVICES**

**FEE SCHEDULE**

Single Family Dwelling Septic Permit	\$150.00
Non-Single Family Dwelling Septic Permit	\$225.00
Repair Permit	\$30.00
Official Bacteria Water Sample (collected by Health Department Representative)	\$30.00
Official Nitrate Water Sample (collected by Health Department Representative)	\$15.00
Unofficial Bacteria Water Sample (collected by an individual)	\$25.00
Unofficial Nitrate Water Sample (collected by an individual)	\$10.00
Metals Water Sample (Collected by Health Department Representative)	\$30.00
Tattoo Permit (Annual Fee)	\$100.00
High Risk Food Establishment (Annual Fee)	\$250.00
Medium Risk Food Establishment (Annual Fee)	\$175.00
Low Risk Food Establishment (Annual Fee)	\$100.00
Mobile Food Unit (Annual Fee)	\$100.00
Temporary Event Food Stand	\$20.00/event
Septic System General Installer Registration (Annual Fee)	\$30.00
Septic System Advanced Installer Registration (Annual Fee)	\$40.00
Septic Tank Cleaning/Pumping Registration (Annual Fee)	\$30.00
Soil Scientist Registration (Annual Fee)	\$30.00

Date Rec'd \_\_\_\_\_  
Date Issued \_\_\_\_\_

**PART ONE**

**PERMIT TO INSTALL NO.** \_\_\_\_\_

LOAN \_\_\_\_\_ GRANT \_\_\_\_\_ COMPLAINT \_\_\_\_\_

**PERMIT APPLICATION for a Wastewater Treatment System**

Return completed form, copy of site evaluation and appropriate fee to:  
Newton County Health Department  
P.O. Box 447, Neosho, MO 64850

Applicant Complete This Section

Owner's Name: \_\_\_\_\_ Daytime Phone No.: \_\_\_\_\_

E911 Address of Property: \_\_\_\_\_

City State Zip

Mailing Address: \_\_\_\_\_

City State Zip

Legal Description of Property: \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4, S \_\_\_\_\_ T \_\_\_\_\_ R \_\_\_\_\_

PROPERTY - Directions to site (include street names): \_\_\_\_\_

**TYPE OF OCCUPANCY**

Residence: Number of bedrooms \_\_\_\_\_ Number of persons in home \_\_\_\_\_

Commercial: Type \_\_\_\_\_ Number of persons or employees served \_\_\_\_\_

Is the property located in a subdivision regulated by Missouri Department of Natural Resources:

YES \_\_\_\_\_ NO \_\_\_\_\_ Lot Number \_\_\_\_\_ A copy of MODNR's approval for the subdivision will be needed  
Subdivision name: \_\_\_\_\_

I certify that to the best of my knowledge the information contained on this form is correct and the proposed work will be completed in accordance with the permit issued.

Owner/Representative  
Name and Signature: \_\_\_\_\_ Date \_\_\_\_\_

Installer Name and signature: \_\_\_\_\_ Date \_\_\_\_\_

Installer Daytime Phone No.: \_\_\_\_\_

An equal opportunity affirmative action employer. Services provided on a nondiscriminatory basis.



TO BE COMPLETED BY THE INSTALLER ONLY.

### PROPOSED INSTALLATION PLAN

DRAWN BY: \_\_\_\_\_ FOR: \_\_\_\_\_  
INSTALLER'S NAME HOMEOWNER'S NAME

MUST INDICATE THE DIRECTION NORTH

LOT DIMENSIONS: \_\_\_\_\_ LENGTH \_\_\_\_\_ WIDTH OR NUMBER OF ACRES \_\_\_\_\_

#### DESIGN DETAILS (FILL IN THE BLANKS)

INDICATE IF AN ADVANCED SYSTEM IS BEING INSTALLED:

\_\_\_\_\_ FT OF 4" SCD 40 BETWEEN HOUSE AND TANK

\_\_\_\_\_ FT OF 4" SCD 40 PAST EXCAVATION HOLE

\_\_\_\_\_ GALLON CONCRETE TANK

\_\_\_\_\_ MANUFACTURER OF TANK

\_\_\_\_\_ % OF SLOPE OF GROUND IN THE LATERAL FIELD AREA

\_\_\_\_\_ FT. SETBACK TO PROPERTY LINE

\_\_\_\_\_ FT. SETBACK TO ALL WELLS IN AREA

\_\_\_\_\_ SERVICE CONNECTIONS TO WELL  
(NUMBER OF BUILDINGS USING WELL)

\_\_\_\_\_ " DEPTH OF TRENCH

\_\_\_\_\_ " WIDTH OF TRENCH

\_\_\_\_\_ TYPE OF BARRIER MATERIAL

\_\_\_\_\_ " LATERAL ROCK ON TOP OF PIPE

\_\_\_\_\_ " OF CLEAN ROCK AROUND PIPE

\_\_\_\_\_ " OF LATERAL ROCK UNDER PIPE

PI 5-

PART ONE

PERMIT TO REPAIR NO. \_\_\_\_\_

LOAN \_\_\_\_\_ GRANT \_\_\_\_\_ COMPLAINT \_\_\_\_\_ FOR REPLACEMENT PARTS ONLY.

**REPAIR PERMIT for a Wastewater Treatment System**

Return completed form, copy of site evaluation and appropriate fee to:

Newton County Health Department

P.O. Box 447, Neosho, MO 64850

Applicant Complete This Section

Owner's Name: \_\_\_\_\_ Daytime Phone No.: \_\_\_\_\_

E911 Address of Property: \_\_\_\_\_

Mailing Address: \_\_\_\_\_

Legal Description of Property: \_\_\_\_\_ 1/4 \_\_\_\_\_ 1/4, S \_\_\_\_\_ T \_\_\_\_\_ R \_\_\_\_\_

PROPERTY - Directions to site (include street names): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

TYPE OF OCCUPANCY:

Residence: Number of bedrooms \_\_\_\_\_ Number of persons in home \_\_\_\_\_

Commercial: Type \_\_\_\_\_ Number of persons or employees served \_\_\_\_\_

Is the property located in a subdivision regulated by Missouri Department of Natural Resources:

YES \_\_\_\_\_ NO \_\_\_\_\_ Lot Number \_\_\_\_\_ A copy of MODNR's approval for the subdivision will be needed.

Describe the REPAIR \_\_\_\_\_

\_\_\_\_\_

I certify that to the best of my knowledge the information contained on this form is correct and the proposed work will be completed in accordance with the permit issued.

Owner/Representative

Name and Signature: \_\_\_\_\_ Date \_\_\_\_\_

Installer Name and Signature: \_\_\_\_\_ Date \_\_\_\_\_

Installer Daytime Phone No.: \_\_\_\_\_

**TO BE COMPLETED BY THE INSTALLER ONLY.**

**PROPOSED REPAIR PLAN**

**DRAWN BY:** \_\_\_\_\_ **FOR:** \_\_\_\_\_

INSTALLER'S NAME

HOMEOWNER'S NAME

**MUST INDICATE THE DIRECTION NORTH**

**LOT DIMENSIONS:** \_\_\_\_\_ **LENGTH** \_\_\_\_\_ **WIDTH OR NUMBER OF ACRES** \_\_\_\_\_

**DESIGN DETAILS (FILL IN THE BLANKS)**

**INDICATE IF AN ADVANCED SYSTEM IS BEING REPAIRED:**

\_\_\_\_\_ FT OF 4" SCD 40 BETWEEN HOUSE AND TANK

\_\_\_\_\_ FT OF 4" SCD 40 PAST EXCAVATION HOLE

\_\_\_\_\_ GALLON CONCRETE TANK

\_\_\_\_\_ MANUFACTURER OF TANK

\_\_\_\_\_ % OF SLOPE OF GROUND IN THE LATERAL FIELD AREA

\_\_\_\_\_ FT. SETBACK TO PROPERTY LINE

\_\_\_\_\_ FT. SETBACK TO ALL WELLS IN AREA

\_\_\_\_\_ SERVICE CONNECTIONS TO WELL (NUMBER OF BUILDINGS USING WELL)

\_\_\_\_\_ " DEPTH OF TRENCH

\_\_\_\_\_ " WIDTH OF TRENCH

\_\_\_\_\_ TYPE OF BARRIER MATERIAL

\_\_\_\_\_ " LATERAL ROCK ON TOP OF PIPE

\_\_\_\_\_ 4" OF CLEAN ROCK AROUND PIPE

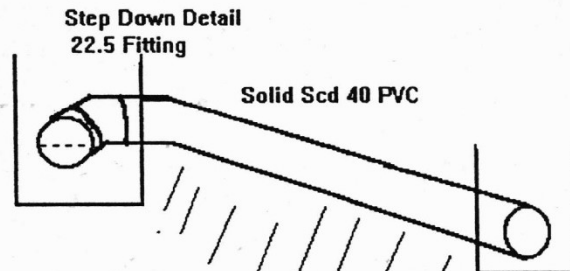
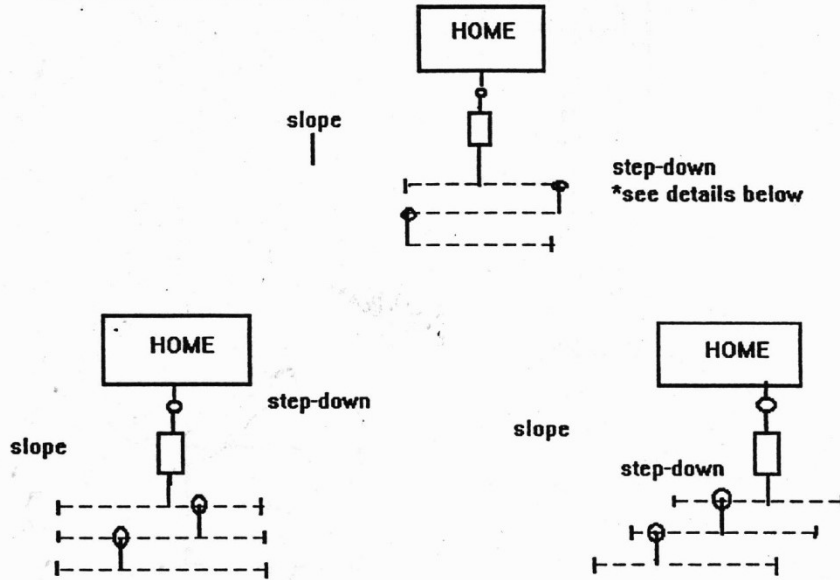
\_\_\_\_\_ " OF LATERAL ROCK UNDER PIPE

DD 5-07

# APPENDIX B – DRAWINGS

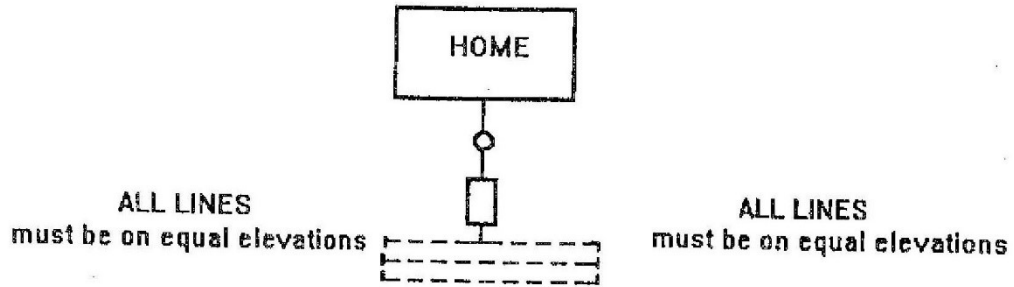
### EXAMPLES: STEP-DOWN SYSTEMS

Laterals must follow contours



Earth dam - pipe and fitting must be installed so that 4" lateral pipe is 1/2 full before overflow in stepdown occurs.

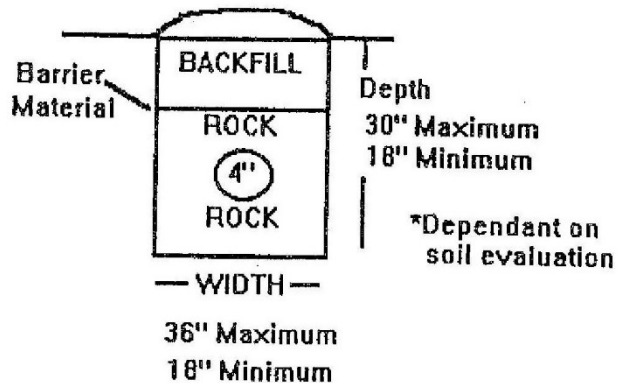
### EXAMPLE: LEVEL SYSTEM



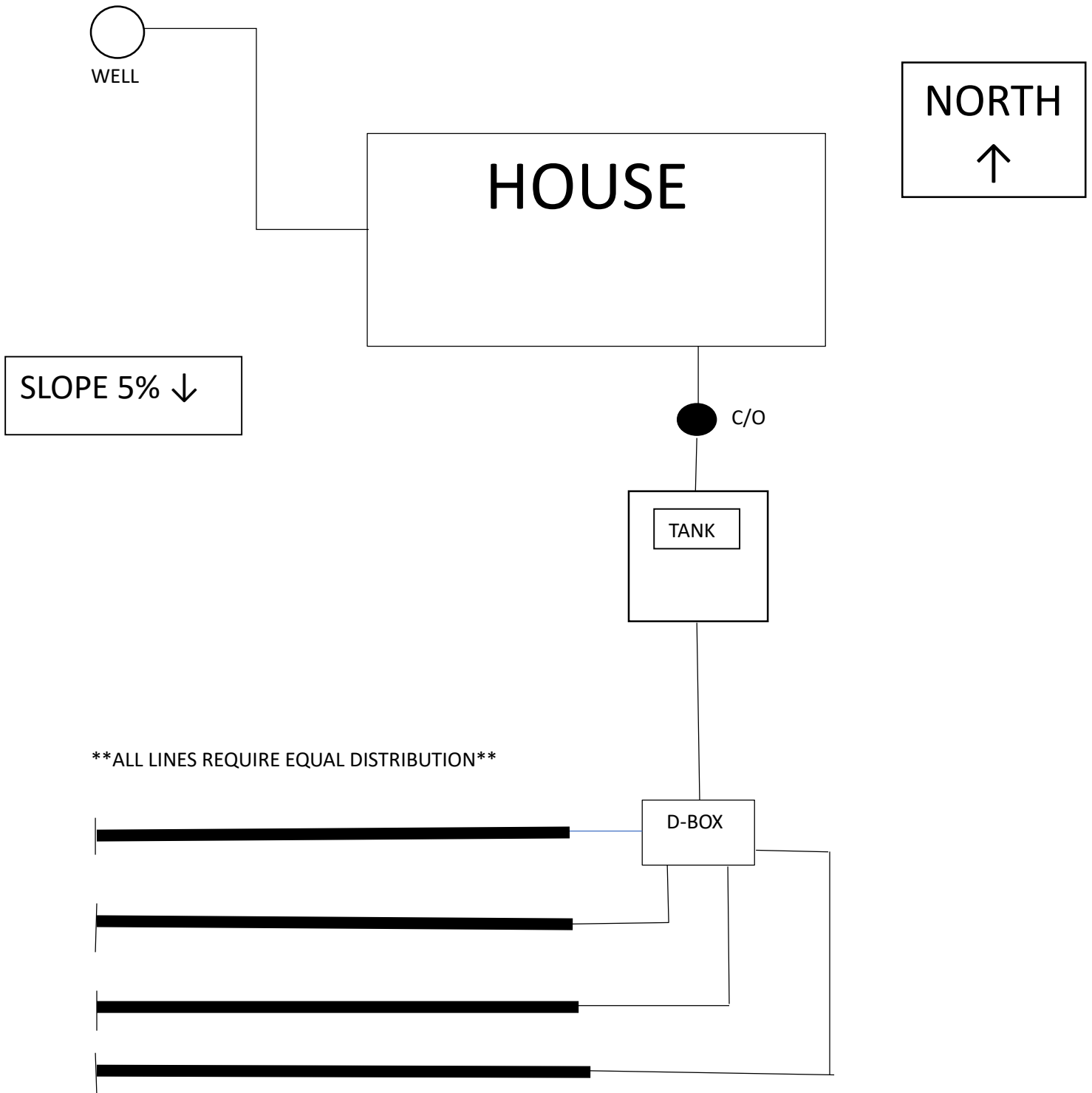
"Level" topography systems are to be used **ONLY** when the distribution lines are at equal elevations. When "level systems are used, the ends of the distribution lines are to be connected with perforated 4" PVC of the appropriate strength.

### TRENCHES

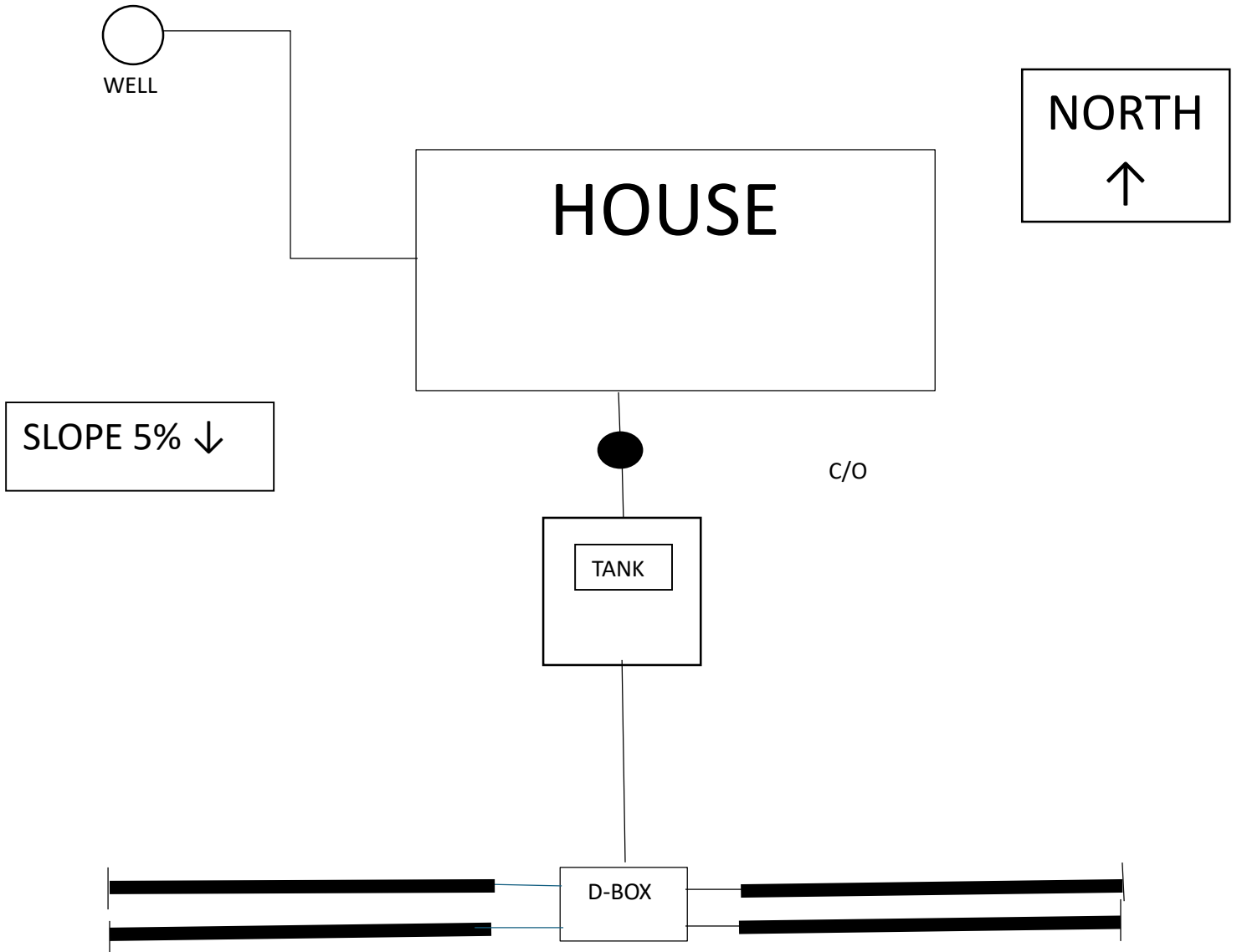
#### EXAMPLE: CONVENTIONAL TRENCH



**DISTRIBUTION BOX EXAMPLE**



**DISTRIBUTION BOX EXAMPLE**



**\*\*ALL LINES REQUIRE EQUAL DISTRIBUTION\*\***