

CHAPTER 13

COMMUNITY WASTEWATER SYSTEMS

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13:1 INTRODUCTION

13:1.1 Definition

Small community wastewater systems (SCWS) can be described as any sanitary wastewater system that serves more than a single dwelling. Typically, this has referred to residential use in the form of site condominiums and subdivision developments but could potentially include commercial and/or industrial properties. For the purposes of this discussion, the emphasis will be toward sanitary systems that receive less than 10,000 gallons of wastewater flow per day (10,000 gpd). In terms of the number of dwellings that can be served, this translates into approximately 39 homes or fewer. Exceeding the 10,000-gpd threshold initiates much stricter and more complex requirements under the auspices of the Department of Environmental Quality (DEQ).

13:1.2 Governing Authorities

SCWS are permitted under Part 41 of P.A. 451 of 1994. In addition, groundwater discharge requirements regulating these systems fall under Part 22 of P.A. 451 of 1994. Establishment of a SCWS requires signature of the Part 41 permit by a governmental agency. Historically, the local township or the drain commissioner's office has assumed responsibility for these systems. The specific authority given the drain commissioner by the Drain Code is discussed later in this section.

13:1.3 Common Applications

There are a number of reasons for past acceptance by drain commissioners of community wastewater systems. For instance, situations may exist in which site conditions preclude the use of individual on-site wastewater systems, or a municipal system is not available. These site conditions may include high water tables, poor soils, extreme topography, public health issues, or lack of available area on individual lots. Many properties exhibit one or more of the above conditions but may have a limited area that is completely suitable for wastewater disposal. In these instances, installation of a SCWS may be the only means of developing the property. This option can allow homes to be built at a high density while disposing of wastewater at a single collection area. Often, this type of installation eliminates the need to clear and level natural areas for each individual septic system.

The SCWS may also be a benefit to previously developed areas in need of wastewater disposal when lot size and soil conditions prevent the use of individual septic fields. In fact, the cost per user for developing a community system is often significantly less than construction of individual on-site systems. This is an important consideration in economically depressed areas.

One must also be careful in accepting community systems since they may directly conflict with local zoning and land-use ordinances. The local governmental unit should be consulted prior to committing to such a responsibility. This ensures that the proposed system will not conflict with existing zoning and other ordinances.

13:1.4 Anatomy of a Small Community Wastewater System

Community wastewater systems can typically be described by four major system components.

1. Local collection infrastructure.
2. Septic tank collection.
3. Pre-treatment area.
4. Final disposal field.

1) Local collection infrastructure

This component includes the conveyance system for collecting wastewater from individual homes. Potential systems include gravity collection, effluent pumps, and grinder pumps. When determining the most efficient collection method, the operator should consider future use and local ordinances. For instance, anticipated future hookup to a municipal wastewater system may necessitate installation of grinder pumps in order to abide by local ordinances. Potential operators of these systems should consider ease of maintenance, cost to maintain, and local ordinances when determining the type of system to be required.

a) Gravity collection

- This method typically utilizes larger pipe diameters to convey wastewater by gravity to the septic tank collection area. The solids are then separated by the large septic tanks while the effluent travels on to the pre-treatment area. Use of a gravity collection system requires proper installation of the pipe in order to ensure proper installation. Improper bedding or insufficient slope can cause serious problems for the operator in the future. Gravity line construction should always be inspected by the engineer to ensure proper installation. The disadvantage of this system is that it is typically more costly to install because of the larger diameter and bedding requirements. This tends to be a more desired system by the operator because it eliminates pumps and tanks at individual homes that must be maintained. Instead, the number of tanks and pumps are minimized with a central collection area that is isolated from resident's yards.
- Topography of the site may also dictate that a gravity collection system direct wastewater to pumping stations that subsequently convey the wastewater to the septic tank collection area. This method is typically preferred over installing pumps for individual homes.

b) Effluent pumps

Effluent pumps (Fig. 1) typically entail the use of a concrete septic tank at individual homes. The tank is outfitted with a screened chamber housing a pump. The pump is utilized to transport wastewater to the pre-treatment area while the solids are contained within the septic tank. This system is a convenient means of transporting effluent and eliminates much of the solids not compatible with local municipal systems and may present a costly retrofit problem once municipal facilities are available. Furthermore, the installation of individual tanks and pumps for each home presents an increased maintenance responsibility when compared to a gravity system. In areas not anticipated to be served by municipal sanitary systems, this may be a good system to employ.

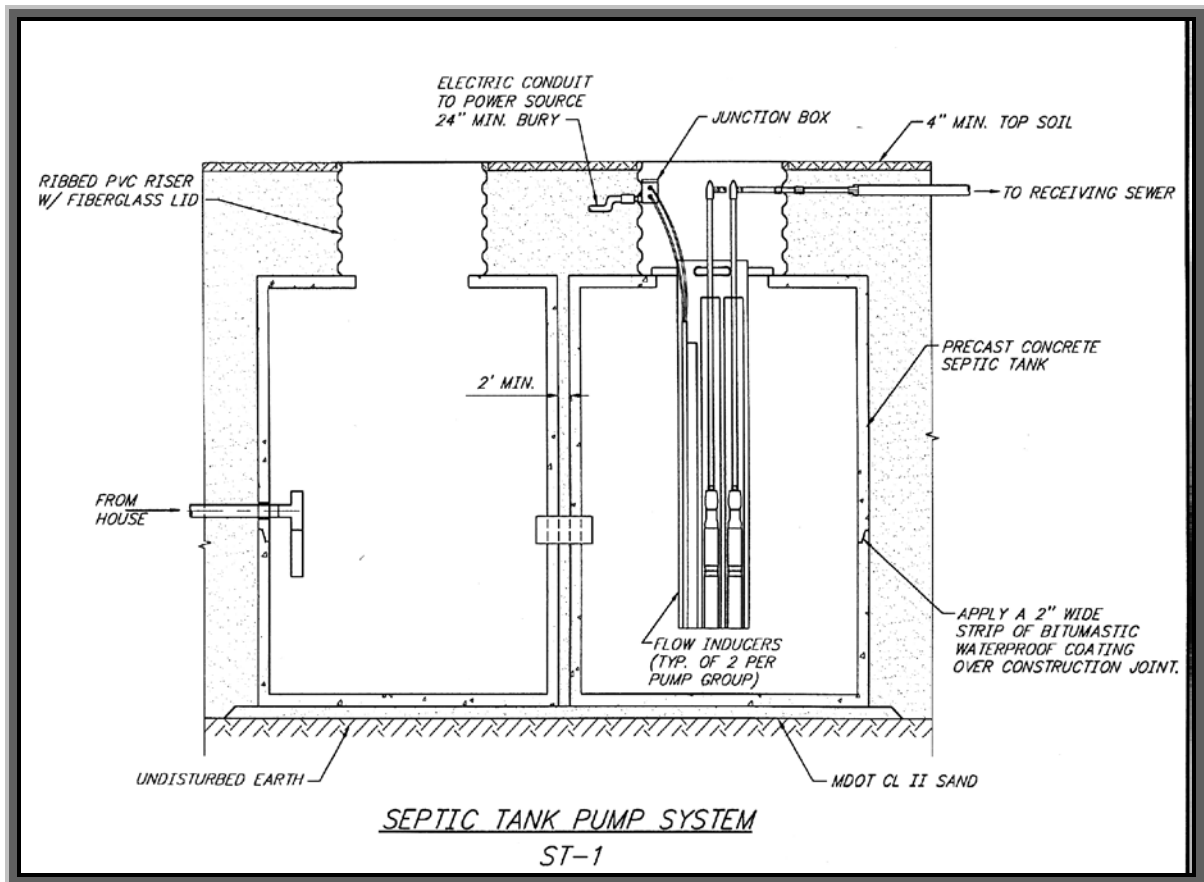


Figure 1. Septic tank outfitted with effluent pump assembly. (Drawing courtesy of Spicer Group)

c) Grinder pumps

Grinder pumps are often utilized by larger municipal wastewater systems but may work well with a SCWS. These pumps grind all solids within the wastewater stream and convey the slurry to the septic tank collection area. The advantage to this system is that it is usually compatible with municipal wastewater systems and is generally very reliable. Like the effluent pumps, the grinders typically require individual units for each home. The result is increased maintenance for the operator in comparison to a gravity system. In addition, the grinding action imparted by these pumps increases the amount of suspended solids that must be reconstituted in a septic tank prior to being sent to the pre-treatment or final disposal area.

2) Septic tank collection

Septic tanks are typically employed in the SCWS to separate solids from the liquids within the wastewater stream. This is either accomplished with individual tanks located at each residence or with larger tanks designed to handle wastewater flows for the entire development (Fig. 3).

The use of septic tanks at each residence is typically utilized in conjunction with effluent pumps that periodically convey the liquids to the pre-treatment area. The majority of solids remains in the septic tank and must be removed occasionally in order to assure proper operation of the system. In addition, each home is typically outfitted with its own alarm system to alert the homeowner to any problem or malfunction.

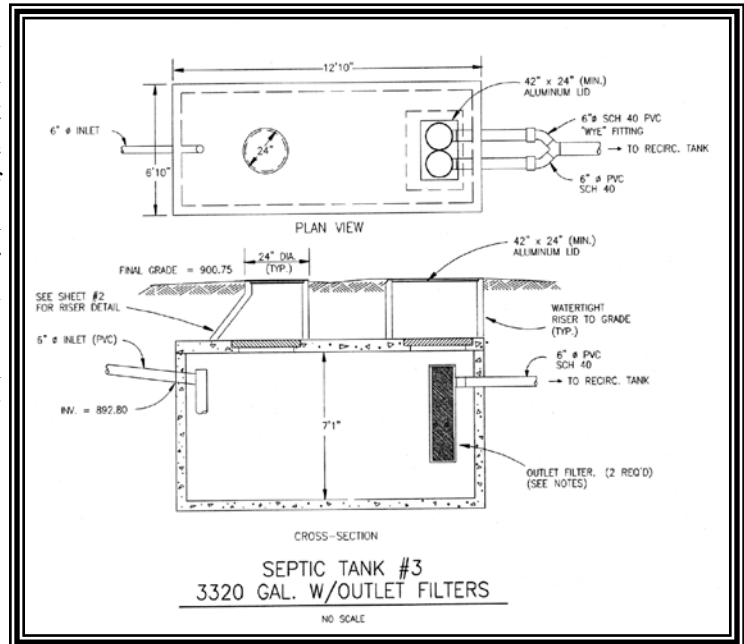


Figure 2. Large septic tank schematic. (Courtesy of Boss Engineering Co.)

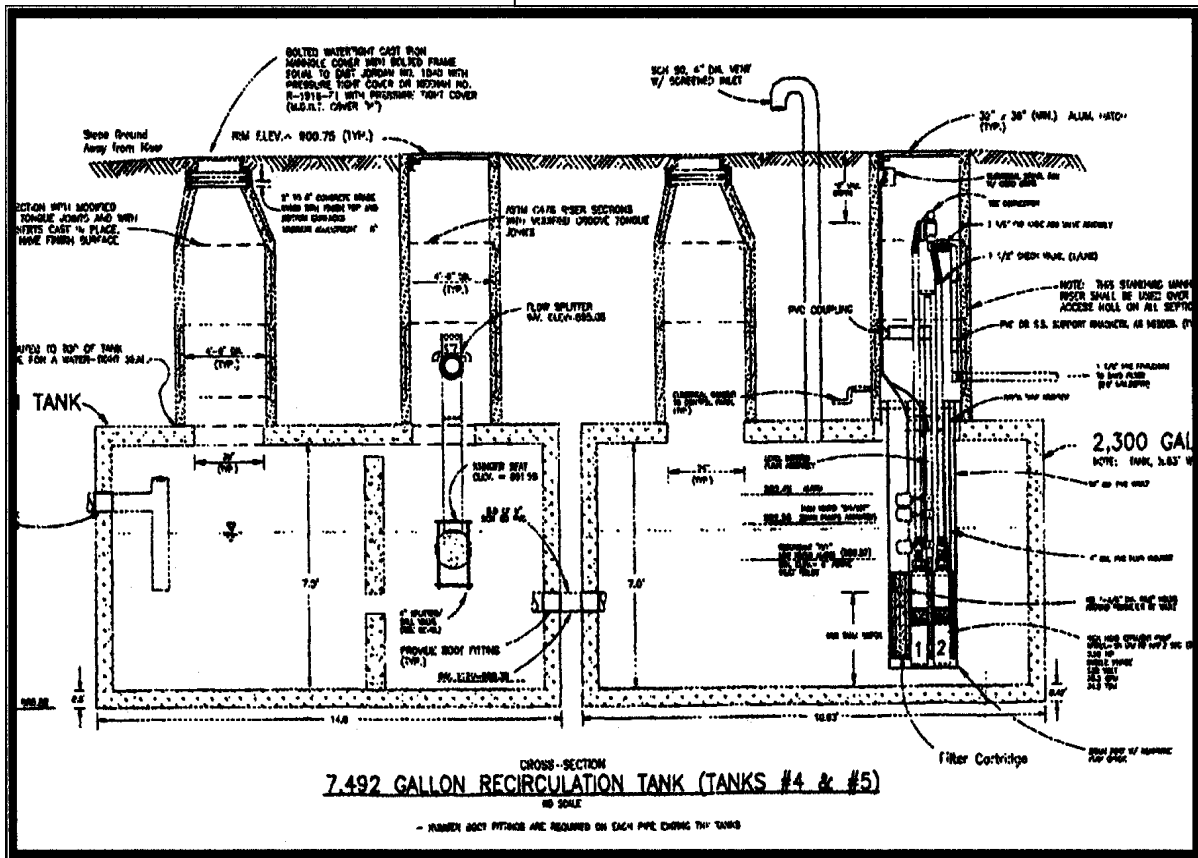


Figure 3. Recirculation tank system. (Courtesy of Boss Engineering Co.)

include wetlands and lagoons. Use of wetlands and lagoons is often prohibitive in small community systems due to their associated cost.

Small community wastewater systems utilizing no pre-treatment is strongly discouraged both from the standpoint of groundwater considerations and replacement cost. Pre-treatment of wastewater prior to release into the ground guarantees a dramatic reduction in overall wastewater strength and lessening of the risks for groundwater contamination. In addition, system failure will likely result within the upper sand layer of the sand filter. The resulting cost to replace the upper layer of sand is typically far less than replacing a final disposal field.

4) Final disposal field

The final disposal or septic field is the dispersal mechanism for the uniform application of wastewater to the ground. This process allows the natural filtration capabilities of soil to act upon the wastewater and render it harmless prior to reaching the groundwater table. Typically, local sanitary ordinances require minimum isolation distances between the groundwater table and the septic field in order to guarantee adequate dry soil for filtration.

The final disposal field is typified by either a series of trenches or a large excavated bed. The excavated bed or trenches are usually filled with approximately one foot of “6A” stone in which small PVC piping is placed. The stone helps ensure that perforations within the pipe are not blocked and aid in an even dispersal of wastewater.

The final disposal field may be dosed by gravity or pressurized with the use of pumps. Most larger systems are pressurized in accordance with the State wastewater design guidelines. This is usually the recommended method since it helps to more evenly distribute the wastewater and reduces soil saturation, thus helping to avoid clogging of the soil and anaerobic conditions

13:2 AUTHORITY FOR ACCEPTANCE BY THE DRAIN COMMISSIONER

Several methods exist that allow the Drain Commissioner to accept or construct a community wastewater system.

1. Petition under Chapter 3 of the Drain Code: It is possible for landowners to petition the drain commissioner to construct a sanitary drain. This is the same procedure for constructing a stormwater drain. This process may ultimately be more expensive and time consuming than other methods, however, it is a potential method for establishing a SCWS.
2. Petition under Chapter 20 of the Drain Code: A public corporation such as a township, city, or village may petition for the establishment of a SCWS under this chapter. This process may also be lengthy like the chapter 3 alternative.
3. Acceptance under section 433 of the Drain Code: This method allows for the construction of the system by a single landowner and the subsequent conveyance of all rights, easements, responsibilities, etc. to the Drain Commissioner. This method is identical to that commonly used by Drain Commissioners to establish public stormwater drainage systems.

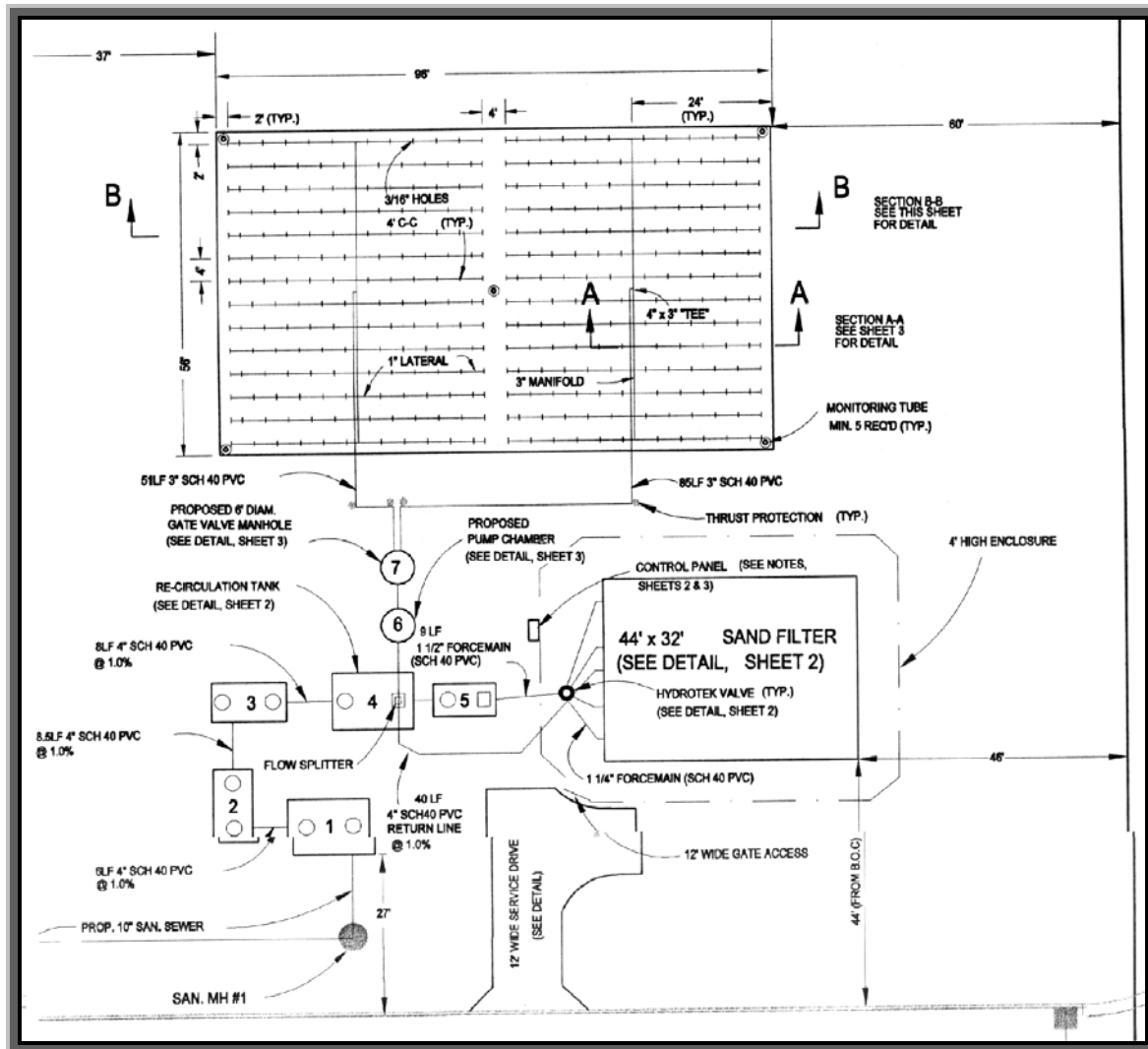


Figure 5. Plan view of a community wastewater system. (Courtesy of Boss Engineering Co.)

13:3 WHAT'S INVOLVED IN ACCEPTANCE OF A SCWS

Acceptance of any community wastewater system invokes a series of State Acts governing the design, construction, discharge and potential impacts to the environment. As an operator of these systems, one must understand the liability assumed by their acceptance.

In most circumstances, discharge rates of under 10,000 gallons per day (gpd) require permits under Parts 31 and 41 of P.A. 451 and adherence to the administrative rules governing groundwater quality under Part 22 of P.A. 451. While we are primarily focused on systems generating less than 10,000 gpd, it may be helpful to note that capacities of 10,000-20,000 gpd typically require alternate methods of treatment such as constructed wetlands. In addition, groundwater investigations, sampling requirements, and reporting requirements are significantly more stringent.

The primary involvement from the Drain Commissioner is in the execution of the Part 41 agreement as the responsible authority for the system. As the signer, the State considers you to be responsible for the system. In the event of failure, a contamination issue, new regulations, etc., the State will dictate policy to the signer of the Part 41.

The liability issue is an important one to consider when deciding who will maintain the system. Developers will often request that the local association have the responsibility for contracting with an operator. This may sound convenient; however, failure of the party to adequately monitor and maintain the system could result in the Drain Commissioner being responsible for neglect. Should the Drain Commissioner decide to operate the system with County personnel, he/she must make the commitment to provide service seven days a week and adequately support maintenance staff with adequate equipment. This arrangement allows for excellent oversight of operations however it is time, equipment, and labor intensive. More will be discussed on this issue later in the chapter.

13:4 DEVELOPING ACCEPTANCE GUIDELINES

Drain Commissioner's accepting community systems should first develop a set of written standards outlining the conditions under which they will accept a system. While the decision to take responsibility for a SCWS is clearly at the discretion of the Drain Commissioner, acceptance of one system and refusal of another without written standards is both unfair and a potential liability. The price of land and the strength of property rights laws virtually guarantee a lawsuit when anyone is denied the development of property without clear standards.

In addition to the establishment of conditions that the site and developer must meet, a strong acceptance agreement should be developed as a condition for acceptance. This is typically a component of the 433 Agreement described earlier and establishes safeguards with respect to system maintenance, replacement, warranty, and other liability issues.

13:4.1 Legal agreement (433 Agreement)

The legal agreement is perhaps the most important component in the acceptance of a SCWS (Appendix I). It outlines all of the responsibilities for involved parties, stipulates all required fees, warranty's, bonds, etc. In addition, it usually assures those necessary easements and master deed language is recorded according to the operator's standards prior to final acceptance. Some suggestions for incorporation in the agreement include:

- a) Provisions for drain office to review master deed language prior to recording.
- b) Requirements for rate study by design engineer.
- c) Construction requirements such as rules for notification in case of problems, pre-construction meetings, inspection of construction, defective parts, inspection log submittal by engineer, asbuilt drawings, stop work orders by drain office, etc.
- d) Warranty/bond requirements.
- e) Easement language

13:4.2 Maintenance fund

A maintenance agreement should outline all pertinent responsibilities relating to maintenance including the party performing the maintenance, fees, etc. This can be included as part of the 433 or as a separate document. The following is a basic set of maintenance suggestions for inclusion into the agreement.

- a) Initial deposit for maintenance. The Drain Commissioner should require an initial maintenance deposit to help defray costs. System startups are typically expensive until all of the bugs have been worked out of the system. These costs should probably not be borne by the property owners but rather by the developer. Sec. 196(12) of the Drain Code allows for maintenance limitations to be exceeded to cover costs associated with pumping station service, and sewage treatment facilities.
- b) It may also be prudent to require the design engineer to perform a yearly maintenance estimate based upon all anticipated costs. These would include spare parts, utility charges, lawn care, personnel costs, mileage, and replacement cost. This allows the Drain Commissioner to assess a uniform fee for true costs without having to assess for deficiencies in the future. This avoids yearly surprise assessments that tend to anger landowners.

13:4.3 System warranty

The requirement of some basic warranty is recommended in order to help defray costs associated with poor design and installation. This is a good idea since assessing these costs to the property owners resulting from oversights by the developer's agents is neither equitable nor politically popular. This deposit is distinguished from the maintenance fee in that it's intent is to cover specific component failures, sometimes long after system installation.

- a) The Drain Commissioner may require as part of the agreement a warranty in the form of a bond, cash deposit, or letter of credit to cover minor failures. As an example, this could include pipe fractures resulting from improper bedding or compaction or replacement of non-pressure fittings with pressure rated replacements.
- b) A warranty for replacement of the pre-treatment component such as a sand filter or constructed wetland is also a good idea. A sand filter system will likely fail at the sand filter rather than the septic field and having funds available for quick replacement is important. Requiring enough money for even a portion of the replacement cost is still of great help when these components fail. The alternative is to incur these costs out of Drain Office funds and assess the people within the development for the full cost of the replacement.

13:5 ESTABLISHING DESIGN GUIDELINES

Once the decision has been made to accept a system, it is advisable to establish some baseline criteria for design and construction of SCWS especially with regard to some of the critical factors affecting longevity of the system. Some of the factors that should be considered before accepting the system include local soil types, septic tank capacity, and type of collection sewer, construction materials, sand filter media, and local planning issues.

13:5.1 Soil Types

Adequacy of soils is an important factor in the functionality of a SCWS. Soils should be well drained and permeable in order to facilitate dispersal of the wastewater. Loamy to coarse sand is ideal for this application because of its porosity. Well-drained sandy loams may also be acceptable. One should be careful of installing these systems in loam or clay loam soils since the presence of silt and clay will often impede proper drainage of these systems. It is recommended that a soil scientist with some knowledge of wastewater system design be consulted regarding the suitability of the on-site soils.

13:5.2 System Sizing

Several factors come into play with regard to adequate sizing of SCWS component sizing. This is especially true with septic tank capacity, the sand filter, and the final disposal field.

- **Calculating Daily Flows**

Anticipated flows play a key role in determining sizing requirements for these components. It is reasonable to expect that each home will generate 200-250 gallons per day (gpd) as a baseline for determining expected flows. Utilizing a figure of 250 – 300 gpd provides a safety margin for computing anticipated flows. Based upon these figures, the 10,000 gal capacity threshold would allow for a maximum of 30-39 homes on one system.

(1) Septic Tank Sizing

- (a) Sizing of the septic tanks is an important consideration in designing a system that will adequately treat the type of wastewater being generated. For example, use of grinder pumps will tend to increase the amount of suspended solids, potentially creating a problem for the pre-treatment filter. Septic tanks should be sized according to the type of waste flow in order to maximize the entrainment of particulates in order to avoid clogging of the filter and final disposal field. Studies performed on effluent pump systems have recommended the following formula to determine septic tank capacity:

$$V = 2.2Q_a$$

Where “V” is the septic tank capacity and “Q_a” is the average daily flow. Therefore, a design capacity of 10,000 gpd for the system would require a minimum septic tank capacity of 22,000 gal.

- (b) The use of grinder pumps will often necessitate an increase in septic tank capacity because of the additional time required to reconstitute the particulates. A 20% increase in the above formula is typically sufficient. Please note that current State regulations require only 24 hours septic tank capacity without regard for the type of wastewater being accepted.

(2) Sand filter sizing

Design loading rates for the sand filter should not exceed 5 gal/ft²/day. This is to ensure that the sand does not become saturated and reduce the capability of the organisms to break down the wastewater and associated organics.

(3) Final field sizing

Dosing rates for the final disposal field are established by the State and should not exceed 1.5 gal/ft²/day for the same reasons outlined for the sand filter.

13:5.3 Construction materials

Use of quality materials in the construction of the SCWS is a critical component in guaranteeing longevity of the system. These materials not only include the piping, valves, and pumps, but also the filter media present in the sand filter.

a) Filter media

Specific sand gradation standards are offered by the State for sand filter construction. A sieve analysis should always be performed by the design engineer on the proposed filter media prior to its installation. In addition, the stone utilized in the filter should meet engineer design requirements for size and should be clean. Silt covered stone can significantly impact the performance and life span of a sand filter system.

b) System components

Quality of system components is an important issue that should be outlined by the design engineer or the office of the Drain Commissioner. These include pressure rated pipe, intrinsically safe electrical components, pipe thickness requirements, pump specifications, and many other system specifications.

13:5.4 Considerations for the future

Foresight is an invaluable aid during the planning process for these systems. Conceptualization of potential issues that will arise in the future can save a tremendous amount of time and money. Foremost among these topics are the issues of future connection to municipal systems and system abandonment.

- *Future connection to municipal wastewater systems.*

Chances are that most SCWS' will be connected to a municipal facility at some point in the future. It is important therefore that landowners are aware that their SCWS will be connected to a larger wastewater facility as soon as it becomes available. Also associated with this subject are the political realities of relinquishing a system. Finally, system design can be modified to facilitate this transition. The following are important issues.

- (1) *Notification of potential homebuyers.*

- a) The 433 Agreement should require language within the master deed notifying home buyers that the facility will be incorporated into the larger system when available and that they may be subject to hookup and maintenance fees for the new system.
- b) It is recommended that the operator completes a review of the master deed language and approves it prior to final acceptance of the system. This helps to avoid "inadvertent" omissions by the developer and language that may conflict with the operator's ability to maintain the system.

- (2) *Statutory requirements for relinquishment of the system.*

- a) A drain may not be relinquished if it crosses the political boundaries of a public corporation. This is an important consideration if the operator hopes to relinquish the system in the future. The drain should be encompassed wholly within the confines of a single public corporation.
- b) Relinquishment of a drain requires majority concurrence by the governing board of the local governmental unit and reciprocal concurrence by the County Board of Commissioners. Therefore, the operator should carefully consider the state of relations between their office and the local unit. This could present a major issue when it comes time to relinquish jurisdiction.

- *Closure and abandonment*

Once a system has been absorbed by a larger municipal operation additional expense to abandon the system may be necessary. Local health departments or State health agencies may require certain actions such as crushing and filling of the tank, electrical shutoff,

removal of sand filter contents, etc. In addition, the question of what to do with the property containing the system is raised. This should be spelled out in the initial contract to avoid conflicts. As an example, the developer might wish to reclaim it as another lot while the homeowner's association may feel that it should be a park.

13:6 SYSTEM MAINTENANCE

As discussed previously, the decision of who will maintain the SCWS is an important one. However, should the Drain Commissioner decide that the maintenance responsibilities would be handled in-house, issues related to preparedness must be addressed.

Proper system maintenance cannot be stressed enough. The operator cannot hope to control cost and liability without a vigorous maintenance program. This program has many components and the design engineer will usually aid the operator in getting started. The design engineer should also be required to provide an operation and maintenance manual to guide the operator. Critical components to a successful maintenance program include:

13:6.1 Personnel

Personnel represent the single most important component in a successful maintenance program. Personnel must be knowledgeable of the system and must be available 7 days a week 24 hours per day to respond to emergency situations. Typically, SCWS' are equipped with emergency dialers that recognize system failures and are programmed to dial an emergency number to alert the operating personnel.

13:6.2 Equipment

- a) The operator must be able to offer proper equipment, both in terms of safety and effective maintenance. Staff must have service vehicles capable of handling many spare parts, good communications capability in order to respond to emergencies, and a proper service facility. Invariably, personnel must make repairs and will require some type of facility in which to affect repairs to pumps, valves, and other system components.
- b) Maintenance related costs could always be assessed back to the users, however, the operator should be cautious in starting a maintenance program with a limited amount of users. The cost associated with gearing up for this endeavor could prove overly burdensome to the district(s).

13:6.3 Miss-Dig membership

Utility staking is one responsibility often neglected when considering the pro's and con's of whether to subcontract maintenance responsibilities. It is, however, an important duty for any utility operator. Monitoring this notification network requires operator time, a membership to the Miss-Dig network, and a dedicated computer, modem, and printer. The operator essentially monitors all staking requests and responds to those requests relating to activities within the development served by the SCWS. The operator must then stake all sanitary lines and system components that might be affected by the proposed excavation. Typically, this is not an issue if the maintenance duties are contracted through a firm that specializes in these operations. That firm will likely have its own access license to the Miss-Dig network.

13:6.4 Emergency response

Most utility operations work requires that special attention be paid to the issue of safety. This is especially true with sanitary systems. Operators must be fully versed in safety requirements and practices. These include but are not limited to:

a) *Confined space entry*

Operators frequently enter confined spaces such as septic tanks and pump chambers where gases can accumulate and present extremely dangerous conditions. Ability to correctly operate personnel winches, gas detectors, ventilation systems, breathing devices and a whole host of other safety devices is a must. Operators need to be certified in this area and should seek regular refresher courses.

b) *First aid*

Operators should be trained in CPR and basic first aid as a precaution for on-the-job injuries.

c) *Electrical experience*

Due to the constant exposure of the operator to electrical components associated with pumps, alarms, generators and other devices, maintenance personnel should have a good working knowledge of this field in order to safely operate and affect repairs to these instruments.

13:7 CONCLUSIONS

This information provided in this chapter is intended to provide Drain Commissioners with a knowledge foundation to better assist in the decision making related to the acceptance of small community wastewater systems. Since every situation and County is different, it is important that the Drain Commissioner weigh all of the liabilities and benefits prior to making a decision to accept one of these systems. Review of all related site information encumbrances and other related information is also a must.

There is no doubt that small community wastewater systems have their place and are situation dependent. Their acceptance is completely under the purview of the Drain Commissioner and a choice that many will be asked to make as competition for land grows and the marginal sites are targeted for development. It is hoped that the information presented herein provides a helpful guide for understanding the basics of these systems and aiding in decisions relating to them.

APPENDIX
Document List

1. Agreement for the Establishment of a County Drain and County Sanitary Drainage District
2. Source of Guideline Manual

**AGREEMENT FOR THE ESTABLISHMENT OF A COUNTY
DRAIN AND COUNTY SANITARY DRAINAGE DISTRICT FOR THE
[INSERT DEVELOPMENT NAME AND TYPE]
PURSUANT TO SECTION 433 OF ACT NO. 40 OF
THE PUBLIC ACTS OF 1956, AS AMENDED THE PUBLIC ACTS OF 1956, AS AMENDED**

THIS AGREEMENT, made and entered into this _____ day of _____ 2____, by and between **(INSERT COMMISSIONER NAME AND COUNTY)**, hereinafter referred to as "Drain Commissioner" on behalf of the proposed **[INSERT DEVELOPMENT NAME]** Sanitary Drain Drainage District; and **[INSERT CORPORATION NAME]**, a Michigan **[INSERT CORPORATION TYPE]**, as owner(s) of land described in Exhibit A attached hereto, hereinafter referred to as "Landowner".

WITNESSETH:

WHEREAS, Section 433 of Act No. 40 of the Public Acts of 1956, as amended, authorizes the Drain Commissioner to enter into an Agreement with the Landowner and developer, if any, to establish a drain which was constructed by the Landowner or developer to service an area of its own land as a County Drain; and,

WHEREAS, Landowner, pursuant to Section 433 of Act No. 40 of 1956, as amended, wishes to provide a sanitary sewer drain to its own lands and has requested same to be established and dedicated as a County Drain under the jurisdiction of the Drain Commissioner; and,

WHEREAS, Landowner has been advised and understands and agrees to assume the total cost of the construction of the drain to include Engineering, inspection, easement acquisition, legal and administrative expenses and costs attendant to this Agreement; and,

WHEREAS, Landowner further understands that the Drain constructed, or to be constructed, pursuant to this Agreement, when finally accepted by the Drain Commissioner, will be known as the **[INSERT DEVELOPMENT NAME]** Sanitary Drain and that the land to be drained will be known and constituted as the **[INSERT DEVELOPMENT NAME]** Sanitary Drain Drainage District and will be subject to assessments, for costs of future operation, inspection, maintenance and improvement; and,

WHEREAS, Landowner has agreed to assume and pay all costs as set forth herein, and,

WHEREAS, Landowner has obtained, at its own expense, a certificate from a registered professional Engineer satisfactory to the Drain Commissioner to the effect that the community septic system has sufficient capacity to provide adequate sewer service without detriment to or diminution of the drainage service which the outlet presently provides. A copy of said certificate being attached hereto as Exhibit B.

WHEREAS, Landowner has contracted with a Registered Professional Engineer in the State of Michigan to construct said sanitary drain. Said Landowner's Engineer has reviewed this Agreement and provided a statement that it has been retained by Landowner to perform or cause to be performed all the Engineering services required under this Agreement. A copy of this statement is attached hereto as Exhibit C.

WHEREAS, upon completion of the design process and final approval of the design by the Drain Commissioner, Landowner has prepared, or caused to be prepared, an estimate of the construction cost for the sanitary drain.

NOW, THEREFORE, in consideration of the premises and covenants of each, the parties hereto agree as follows:

1. Landowner agrees to construct, at its expense, the Drain in accordance with plans and specifications approved by the Drain Commissioner.
2. The Landowner agrees to pay the costs of construction of said Drain and drainage facilities, including the acquisition of the necessary rights of way or easements, Engineering, surveying, inspection, as defined within this Agreement, legal and administration costs. In addition, the Landowner has deposited with the Drain Commissioner an amount of money equivalent to five (5%) percent of the costs of construction of the Drain, not to exceed Two Thousand Five Hundred and No/100 (\$5,000.00) Dollars, which monies are to be deposited in a special drain fund to be used for future maintenance of the Drain, hereinafter referred to as "[INSERT DEVELOPMENT NAME] Sanitary Drain Maintenance Fund." Landowner shall also deposit in the Maintenance Fund the sum of Fifteen Thousand and No/100 Dollars (\$15,000.00) to ensure proper replacement of the sand filter system.
3. That the Landowner shall secure, at its own expense, all easements or rights of way necessary for the construction of the Drain over and across the properties owned by Landowner and across such other lands as necessary for the construction of the Drain from the point of beginning at the outlet to the point of ending. Said easements or rights of way shall be secured in writing, in a form acceptable to the Drain Commissioner, and shall be secured on behalf of the [INSERT DEVELOPMENT NAME] Sanitary Drain Drainage District. The Landowner shall be responsible for all costs for the recording of said easements, as directed by the Drain Commissioner.
4. Landowner shall secure all necessary permits or authorizations as may be required by local, state or federal law and provide copies to the Drain Commissioner. The Drain Commissioner shall be provided copies of all correspondence and reports involving any governmental agency with respect to the Drain.
5. Landowner shall provide one set of final plans which shows the location of all structures and utilities constructed on the property. Landowner shall also provide an operation and maintenance manual which will include recommendations for operating the system in accordance with all applicable local, State and Federal Regulations, specification sheets for the equipment used in the system, calculations forming the basis for the design, a rate study, and recommended maintenance for optimal system operation.

All shop drawings and testing results provided to or prepared by Landowner's Engineer will be included in the operation and maintenance manual. The rate study shall include provision of the following budgetary line items and any other items recommended by Landowner's Engineer. The

Engineer shall use an estimated inflation rate, provision of a sinking fund for capital costs for replacement of primary system components, and Engineering economic analysis in generation of a per lot rate per annum for sewer service.

- a. Recommended spare part list costs
- b. Monthly inspection costs given a labor rate of \$70/hour for a two-man crew and mileage costs of \$.35/mile assuming a 20 mile round trip for inspections
- c. Periodic pumping costs
- d. Periodic pump replacement costs
- e. Miss Dig costs at \$35/hr for a one-man crew
- f. Sand Filter Media Replacement Costs
- g. General Maintenance (Lawn Care) at \$24/hr for a one-man crew plus mileage costs at \$.35/mile assuming a 20 mile round trip if not provided by the Developer or the Association
- h. Utility costs for system operation, including phone and electrical service.
- i. Contingency for emergency repairs.

Landowner shall contract the Landowner's Engineer to complete changes to the operation and maintenance manual after a review by the Drain Commissioner.

At a minimum, a one-sheet drawing detailing the electrical components of the system shall be included with the plans.

6. Landowner's Engineer shall conduct an on-site, pre-construction meeting with the Drain Commissioner or his agents, the contractor and Landowner prior to construction of the drain. The Drain Commissioner shall then review the adequacy of soil erosion control measures and assess their compliance with the approved plans and conditions of the grading permit. Landowner agrees to establish all soil erosion control procedures prior to construction of the Drain, and maintain such throughout construction.

7. Landowner's Engineer or his authorized designee shall be on-site to perform inspection duties at all times during the construction and installation of the Drain and shall complete a daily written inspection report during construction. The Engineer shall verify that all aspects of the pre-installation, construction and installation of the community septic system are performed according to the requirements of the plans and specification manual. The inspection reports shall be submitted to the Drain Commissioner.

8. If Landowner's Engineer observes a defective installation or construction activity, the Engineer shall promptly inform the Landowner and contractor of any installation or construction not performed in accordance with the plans and specifications, notify the Landowner and contractor, in writing, of his obligation to repair or replace the defective installation or construction such that it is in accordance with the plans and specifications, and direct the contractor, in writing, to perform this obligation. The Landowner and Engineer shall take actions to prevent the contractor from performing any additional work until the defective installation or construction is repaired or replaced to meet the approved plans and specifications. Copies of all correspondence between the Landowner, Engineer and contractor shall be provided to the Drain Commissioner. All operations shall be subject to the approval of the Drain Commissioner.

9. The Drain Commissioner may perform or cause to be performed inspections of the construction activities, in addition to those performed by the Landowner's Engineer. The contractor shall address all deficiencies in installation, construction or testing promptly when informed by the

Drain Commissioner or the Landowner's Engineer. The contractor shall be stopped from performing any additional construction or installation activity until the deficiencies have been addressed to the satisfaction of both the Drain Commissioner and Landowner's Engineer.

10. Landowner's Engineer shall provide an inventory list for the Drain Commissioner and all inspectors to include a product description of each item installed. The Engineer shall keep a log documenting review and approval of all shop drawings and material specifications prior to delivery by the contractor. Copies of the shop drawings and material specifications and the review and approval log shall be forwarded to the Drain Commissioner for review. Any deviations from specified methods, equipment and materials as provided in the plans and specifications shall be submitted to the Drain Commissioner for review and approval prior to construction following review by the Landowner's Engineer.

11. Landowner shall prepare, or cause to be prepared and conveyed to the Drain Commissioner, a map and description of the proposed Drainage District and provide two sets of reproducible mylar record drawings of the system as built and installed, which shall include and any other data needed by the Drain Commissioner for proper drain operation, maintenance, inspection and assessment. The drawings shall also include the actual location of all piping, tanks, manholes, electrical lines, and the 3M locator disk. Dimensions will be provided on the drawings to locate any part of this system within 1.5 feet.

12. Landowner shall submit any proposed field changes in the approved plans and specifications to the Drain Commissioner. No proposed change in the plans and specifications shall be constructed without the written approval of the Drain Commissioner. The Drain Commissioner reserves the right to reject any and all requests for field design changes.

13. Landowner shall provide to the Drain Commissioner three sets of lead sheets providing a field measured distance from lot corners to the end of each lead and give the distance from the downstream manhole to the wye for each lead. As built elevations shall be provided for the gravity main at each manhole intersection, and provide a minimum of one elevation for the force main and additional elevations for any changes in depth greater than .5 feet. Landowner's Engineer shall submit a single set of prints for review by the Drain Commissioner. Landowner's Engineer will address all Drain Commissioner comments on the print submittal to the satisfaction of the Drain Commissioner before final submission of the duplicate as-built drawings.

14. Landowner agrees to construct the Drain in accordance with the applicable provisions, including Chapters 10, 20, 30, 40 and 50, of the 1997 edition of the Recommended Standards for Wastewater Facilities. If a conflict exists between this standards and the plans or specifications, the more restrictive standard shall apply.

15. Landowner shall construct the drain such that the leakage exfiltration or infiltration in the sanitary waste collection system shall not exceed 50 gallons per inch of pipe diameter per mile per day.

16. The electrical installation of the system shall be tested during the final inspection using a generator provided by the Drain Commissioner. Landowner shall retain an electrician and the panel supplier to be present at the final inspection to make any changes required by the Drain Commissioner.

17. Landowner shall give the Drain Commissioner a minimum of three working days notice of the date of the completion of the construction of the proposed Drain, including the proper installation and operation of all components and final cover fully established, at which time the Drain Commissioner shall perform, or caused to be performed, an inspection, advising of the defects and corrections to be made by Landowner. A representative of Landowner, Landowner's Engineer and contractor shall be present for the inspection.

18. Following completion of corrections, and completion of the final inspection, Landowner shall post with the Drain Commissioner an irrevocable letter of credit, for a time period of not less than 2 years, hereinafter referred to as "Letter of Credit", payable to the Drain Commissioner in an amount equal to the construction cost estimate prepared by Landowner's Engineer. This security shall be used for the completion of necessary corrections. Should corrective maintenance be required, the Drain Commissioner shall give a maximum of eighteen (18) hours notice thereof to the Landowner. If corrective action has not been taken at the end of the eighteen (18) hour period, the Drain Commissioner may hire Engineers and contractors and take such other action to correct conditions as may be reasonably required and to charge the cost thereof to the letter of credit and/or the **[INSERT DEVELOPMENT NAME]** Sanitary Drain Maintenance Fund. Landowner shall be responsible for the payment of the costs in excess of the Letter of Credit and shall reimburse the Drain Commissioner before expiration of the two-year period. After the two-year period has expired, and all proper reimbursements are made to the Drain Commissioner, the Letter of Credit shall be terminated. Maintenance, to be performed by the Drain Commissioner at Landowners' expense, is not limited to but shall include replacement of all materials (including pipes, pumps, vaults, tanks, connections, associated appurtenances, compacted backfill and proper vegetative cover) used in the collection and treatment system in all common-element areas or public right-of-ways, ingress and egress easements, and the labor costs associated with the installation of the materials in accordance with sound Engineering principles.

19. At such time as the Landowner meets all of the requirements of this Agreement, as specified by the Drain Commissioner, the Drain Commissioner shall issue a letter of final acceptance of the Drain as a County Drain and, by operation of this Agreement, same shall be so dedicated and will be established as a County Drain pursuant to the provisions of Act 40 of the Public Acts of 1956, as amended. In the event that Landowner fails to make the necessary corrections of the specified defects, the Drain Commissioner shall either deny final acceptance of the project as a County Drain, or have the necessary corrections made, drawing on the Letter of Credit. Prior to final acceptance of the project by the Drain Commissioner, Landowner shall file in the office of the Drain Commissioner that all claims or amounts due for labor, materials, and equipment furnished for the project have been paid in full.

20. The **[INSERT DEVELOPMENT NAME]** Sanitary Drain Maintenance Fund is agreed and understood as being for the sole benefit of the **[INSERT DEVELOPMENT NAME]** Sanitary Drain and use thereof may be made by the **[INSERT DEVELOPMENT NAME]** Sanitary Drain Drainage District at large, or part thereof, and that such payment shall not relieve the subject property from any future assessments levied pursuant to the Drain Code of 1956, as amended. Landowner shall make deposits to the Maintenance Fund outlined in this Agreement simultaneously with the posting of the Letter of Credit to the Drain Commissioner.

21. Landowner agrees to indemnify and hold harmless the Drain Commissioner for any and all claims, damages, lawsuits, costs and expenses, arising out of or incurred as a result of the Drain Commissioner assuming responsibility for the community septic system under federal, state and/or local environmental laws and regulations, including all future amendments to such laws or

regulations and the administrative and judicial interpretation thereof, except for liability arising out of the gross negligence or intentional wrongful conduct of the Drain Commissioner or its agents.

22. Modification, amendments or waivers of any provisions of the Agreement may be made only by the written mutual consent of the parties.

This Agreement shall become effective upon its execution by the Landowner and the Drain Commissioner and shall be binding upon the successors and assigns of each party.

22. Modification, amendments or waivers of any provisions of the Agreement may be made only by the written mutual consent of the parties.

This Agreement shall become effective upon its execution by the Landowner and the Drain Commissioner and shall be binding upon the successors and assigns of each party.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by the duly authorized officers as of the day and year first above written.

[INSERT DEVELOPMENT NAME] SANITARY DRAIN DRAINAGE DISTRICT

In The Presence Of:

Printed Name _____

(Insert Drain Commissioner's name)
(Insert County Name)
Commissioner

Printed Name: _____

[INSERT CORPORATION NAME]

In The Presence Of:

Printed Name: _____

By: _____

Its: _____

Printed Name: _____

[IF A CONDOMINIUM ASSOCIATION HAS BEEN FORMED, PROVIDE THIRD SIGNATORY, 2 WITNESSES &, ADDITIONAL NOTARY LOCATION FOR AN AUTHORIZED REPRESENTATIVE OF A CONDOMINIUM ASSOCIATION TO SIGN]

STATE OF MICHIGAN)
) ss.
COUNTY OF (Insert Name))

On this _____ day of _____, 2____, before me, a Notary Public in and for said County, personally appeared **(INSERT DRAIN COMMISSIONER NAME & COUNTY)**, to me known to be the person described in and who executed the foregoing instrument and acknowledged the same to be his free act and deed.

Notary Public
(County Name), Michigan
My Commission Expires: _____

EXHIBIT B

I, **[INSERT ENGINEER NAME]**, a Registered Professional Engineer in the State of Michigan, do hereby certify to the following for the **[INSERT DRAIN NAME, USE DEVELOPMENT NAME]**, Sanitary Drain Drainage District in Section **[INSERT SECTION NUMBER]** of **[INSERT TOWNSHIP NAME]**:

1. The above-mentioned lands to be developed naturally drain into the area served by the existing drains and that the existing drains are the only reasonable available outlet for the drainage from the lands to be developed.
2. To my knowledge, there is existing capacity in the existing drains to serve the lands to be developed without detriment or diminution of the sanitary sewer service provided or to be provided in the foreseeable future in the existing district. This statement is made with reliance upon consultation with the office of the **(Insert Name)** County Drain Commissioner and upon review and approval of the construction plans by that office.

[TYPE ENGINEER NAME]

Date: _____

EXHIBIT C

AFFIDAVIT OF ENGINEER

STATE OF MICHIGAN)
) SS
COUNTY OF **(Insert Name)**

[INSERT NAME OF ENGINEER], being first duly sworn, deposes and says that he/she is a registered professional engineer with **[INSERT NAME OF ENGINEERING COMPANY]**, hereinafter referred to as the “**Company**”, and has the authority to make this Affidavit on their behalf.

That Landowner has retained the services of the Company to design and supervise the construction of the **[INSERT DRAIN NAME, USE DEVELOPMENT NAME]** Sanitary Drain.

That Landowner has contracted with the Company to perform or cause to be performed all of the engineering services required under that Agreement for the Establishment of a County Drain and County Drainage District pursuant to Section 433 of Act No. 40 of the Public Acts of 1956, as amended.

That said Agreement has been personally reviewed by me and the Company agrees to perform any and all “engineering services” necessary to the construction of the Drain.

Further deponent sayeth not.

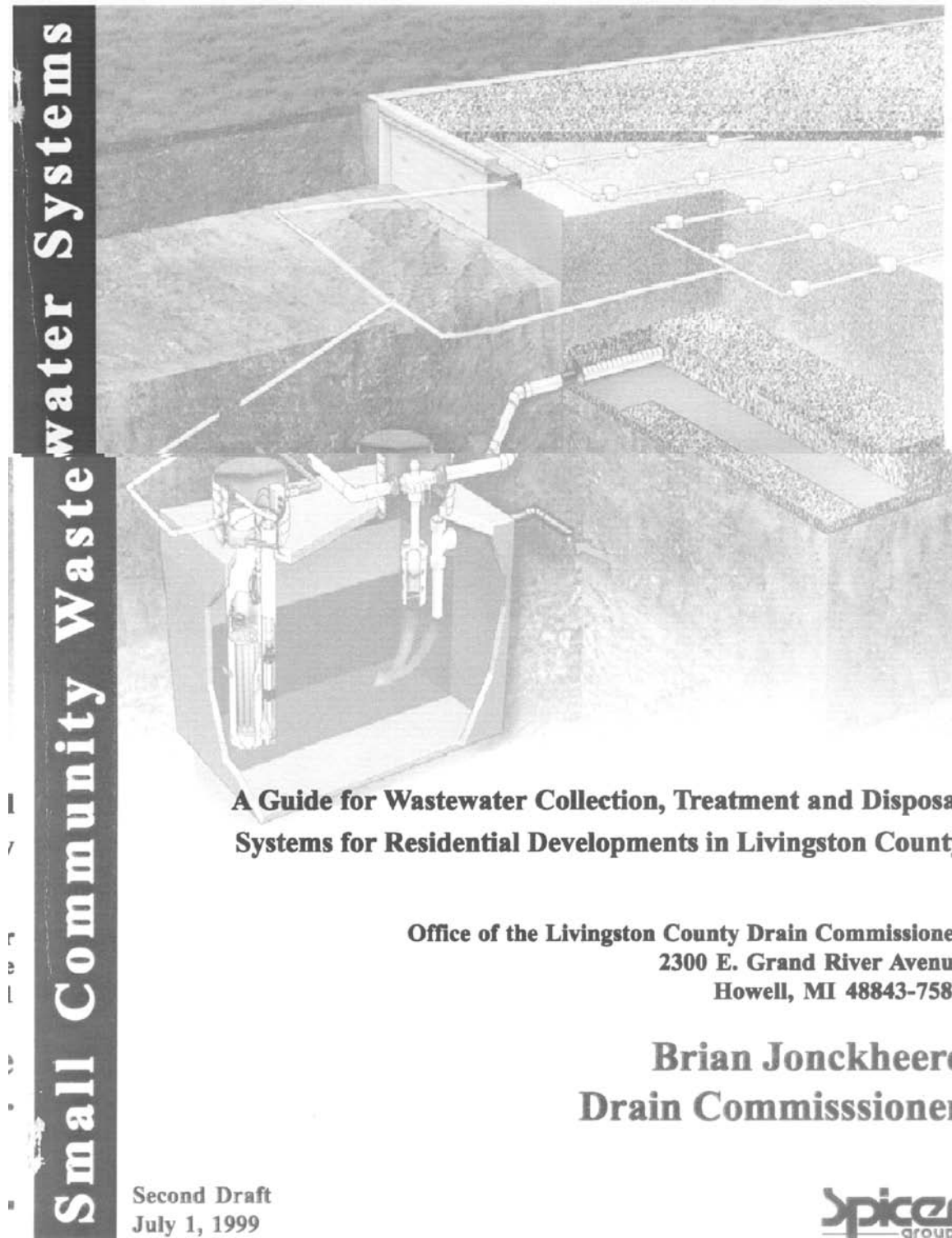
TYPE THE NAME OF THE ENGINEER

Subscribed and sworn to before me this _____ day
of _____, 2____.

_____, Notary Public
County, Michigan

My commission expires:

Appendix II



**A Guide for Wastewater Collection, Treatment and Disposal
Systems for Residential Developments in Livingston County**

**Office of the Livingston County Drain Commissioner
2300 E. Grand River Avenue
Howell, MI 48843-758**

**Brian Jonckheere
Drain Commissioner**

Second Draft
July 1, 1999



Design guideline manual is available through the office of the Livingston County Drain Commissioner.