Holding Tank Sewage System RS&G

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Recommended Standards and Guidance (RS&G) for Holding Tank Sewage Systems

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Summary of Changes

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Preface

This Recommended Standard and Guidance (RS&G) is applicable for statewide application. Regional differences may require variations in the application of the technology. The differences may also create a need for greater or more restrictive allowances than those described here. In either case, the local health officer has full authority in the application of this technology, consistent with Chapter 246-272A Washington Administrative Code (WAC) and local code. If any provision of these recommended standards is inconsistent with local codes, regulations, ordinances, policies, procedures, or practices, the local standards take precedence.

Local application of these recommended standards may be:

1) **Adopted as part of local rules, regulations, or ordinances.** When the recommended standards, either as they are written or modified to reflect local conditions more accurately, are adopted as part of the local rules, their application is governed by local rule authority.
2) **Referred to as technical guidance in the application of the technology**. The recommended standards, either as they are written or modified to reflect local conditions more accurately, may be used locally as technical guidance.

Application of these recommended standards may combine the two approaches above. The local health officer and board of health dictate the application of these recommended standards without deviating from Chapter 246-272A WAC.

The typical rule language provided here assists local health jurisdictions wanting to adopt these recommended standards in local rules. Additional information and guidance are presented in text boxes to distinguish it from the recommended standards.

Glossary of Terms: The Washington State Department of Health (the department) website provides a glossary of common terms for all RS&Gs at http://www.doh.wa.gov/Portals/1/Documents/Pubs/337-028.pdf.

The recommended standards found here support the design of on-site sewage systems (OSS) with design flows less than 3,500 gallons per day (GPD) but may also be applied to large on-site sewage systems (LOSS). However, some provisions for LOSS are not appropriate or allowed with the 2011 adoption of the revised LOSS rule, Chapter 246-272B WAC. The LOSS requirements from the RS&G have already been included in the rule. Design engineers and others interested in LOSS should consult the rule and LOSS program staff.

Typical RS&G Organization:

Standards Section	Explanation
Performance	Describes performance expectations, including treatment levels and function.
Application	Details how to apply the technology and includes conditions required prior to proceeding with design (includes "approved" status of the technology, component listing requirements, permitting, installation, testing and inspection requirements, etc.).
Design	Outlines design and construction requirements for the technology, including minimum standards that must be met to obtain a permit.
Operation and Maintenance	Explains operation and maintenance requirements for the technology, including responsibilities of various parties, recommended maintenance tasks and frequency, assurance measures, etc.
Appendices	Provides design examples, figures and tables, specific applications, and design and installation issues.

Introduction

A Holding Tank Sewage System (HTSS) is a alternative to a conventional on-site sewage system. It is a limited-application on-site sewage system utilizing a holding tank, the services of a sewage pumper/hauler, and the off-site treatment and disposal of the sewage generated at the site served by the HTSS. It provides a means to collect and temporarily store sewage from a facility or dwelling for subsequent removal and transport to an approved disposal site. Depending upon the facility served or the circumstances surrounding the use of a HTSS, the expense of sewage pumping, hauling, and disposal at an approved facility can be costly, especially on a long-term basis. In addition, the potential for public exposure to raw sewage due to operational/management problems is significant. For this reason, use of HTSS must be closely regulated by the local health agency.

1. Performance Standards

1.1. Performance Criteria

A HTSS must provide safe, temporary storage of sewage with regularly scheduled pumping service. The sewage must be transported to an approved off-site treatment and disposal facility. Design, installation, operation, and maintenance methods must ensure HTSS do not contaminate ground or surface waters or expose the public to untreated sewage or nuisance odors.

2. Application Standards

2.1. Permitting

A permit addressing design, installation, operation, and maintenance methods must be obtained from the local health agency before installing and using a HTSS. The permit must include specific information about a contract with a certified pumper, the frequency of pumping, and location of the disposal site. The local health officer may permit a HTSS only in the following cases:

2.1.1. Emergency Use

2.1.1.1. Emergency situations, regardless of source of the sewage, either commercial or residential. Emergency situations are limited to those where an approved repair or replacement on-site system installation is delayed due to weather conditions, and/or weather-induced soil or site conditions.

2.1.2. Permanent Use

2.1.2.1. Controlled, part-time, commercial usage situations, such as recreational vehicle parks, trailer dump stations, campgrounds, marinas, etc.

2.1.2.2. Repair of failing on-site sewage systems, but only where no other option is feasible. The local health officer must first determine the following options are not feasible:

- Conventional on-site sewage system;
- Conventional on-site sewage system with off-site drainfield;
- Alternative on-site sewage system with enhanced treatment prior to disposal to the receiving soils;
- Connection to a public or private larger on-site sewage system;

- Connection to a public sewer; or,
- Connection of an effluent pump to a public sewer.

2.2. Siting

2.2.1. The holding tank portion of the HTSS must be located in such a way as to facilitate pumping while limiting public exposure to, or nuisance caused by, accidental sewage spillage during pumping.

2.2.2. The HTSS must meet the same horizontal setbacks required for sewage tanks by Chapter 246-272A-0210 WAC, (Location).

Table 1 Minimum Horizontal Separations

Items Requiring Setback	From sewage tank and distribution box
Well or suction line	50 ft.
Public drinking water well	100 ft.
Public drinking water spring measured from the ordinary high-water mark	200 ft.
Spring or surface water used as drinking water source measured from the ordinary high water mark[1]	50 ft.
Pressurized water supply line	10 ft.
Decommissioned well (decommissioned in accordance with Chapter 173-160 WAC)	N/A
Surface water measured from the ordinary high-water mark	50 ft.
Building foundation/in-ground swimming pool	5 ft.
Property or easement line	5 ft.
Interceptor/curtain drains/foundation drains/drainage ditches: Downgradient[2] Up gradient[2]	 5 ft. N/A
Other site features that may allow effluent to surface: Downgradient[2] Up gradient[2]	 5 ft. N/A
Downgradient cuts or banks with at least 5 ft. of original, undisturbed soil above a restrictive layer due to a structural or textural change.	N/A
Downgradient cuts or banks with less than 5 ft. of original, undisturbed, soil above a restrictive layer due to a structural or textural change.	N/A

Other adjacent soil dispersal components/subsurface stormwater infiltration systems	N/A

[1]If surface water is used as a public drinking water supply, the designer must locate the OSS outside of the required source water protection area.

[2]The item is downgradient when liquid will flow toward it upon encountering a water table or a restrictive layer. The item is up gradient when liquid will flow away from it upon encountering a water table or a restrictive layer.

2.3. Installation

Holding tank systems must be installed according to the design approved by the local health officer and in accordance with the local health department permit requirements.

2.4. Inspection

The holding tank system installation must be inspected by the local health officer before use. The local health officer may inspect various items, including, but not limited to, the following:

2.4.1. Watertightness of the tank, tested after installation by filling with water;

2.4.2. Non-buoyancy in high groundwater areas or conditions;

2.4.3. Leak-proof nature of the service access(es), access ports, risers, lids, and covers;

2.4.4. Methods to secure lids and covers from inappropriate or unapproved access;

2.4.5. Methods of venting provided by the design and the installation. Venting should exhaust above the roof line of the building;

2.4.6. Impervious surfaces around the access ports, equipment and methods for cleaning sewage spills; and

2.4.7. Alarm functions.

3. Design Standards

3.1. Tank Design/Material Requirements

3.1.1. Holding tanks must be on the department's "List of Registered Sewage Tanks."

3.1.2. Holding tanks must be:

3.1.2.1. Designed, constructed, and installed to maintain watertightness; and

3.1.2.2. Designed, constructed, and installed to withstand anticipated stresses associated of use. This includes resistance to effects of raw sewage and the ability to withstand internal and external loading.

3.1.3. If buried, the tank:

3.1.3.1. Must be inherently non-buoyant so as to prevent floating when empty during high groundwater periods if such events are anticipated. A tank is non-buoyant if installed above the groundwater elevation, the weight of the empty tank exceeds buoyant forces, or "side wings" anchor the tank into surrounding soil;

3.1.3.2. Must be able to withstand traffic loading if the area is subject to vehicular traffic loads; and,

3.1.3.3. May be re-cast or cast-in-place concrete, fiberglass, or polyethylene.

3.1.4. If installed above ground, the tank:

3.1.4.1. Must be designed and constructed to function as needed, and must retain shape, integrity, and watertightness;

3.1.4.2. Must provide adequate support for all associated piping; and

3.1.4.3. May be concrete, fiberglass, or polyethylene.

3.2. Sizing

Establishing the holding tank capacity requires consideration of both design and operational aspects. The required storage capacity depends on two items: daily sewage flow and pumping service frequency.

3.3. Design Considerations

3.3.1. Daily sewage flow – Minimizing the daily sewage flow is prudent. If the facility is to be permanently served by the holding tank sewage system, water-saving fixtures and processes must be incorporated where possible. Use the same daily design flow estimates as for a conventional on-site sewage system (see Chapter 246-272A-0230 WAC).

3.3.2. Pumping service frequency – Establishing the required pumping service frequency depends upon various conditions:

3.3.2.1. Where facility use or wastewater generation is low and service response is good, and "on-call" operation may be acceptable.

3.3.2.2. Where facility use or wastewater generation is high, regularly scheduled pumping service is required. The scheduled pumping

frequency will depend on the holding tank's storage capacity, the hauling volume capacity of the service vehicle, the proximity of a suitable disposal site, travel time, and service costs.

In general, holding tanks requiring regular service should be pumped once or twice each week. Some commercial facilities may require more frequent service, while some low-use domestic facilities may function quite satisfactorily with "on-call" service. For sizing purposes, however, pumping should occur at least weekly. Less frequent pumping, as with "on-call" operations, may lead to more odor-related nuisance problems.

3.3.3. Holding tank sizing criteria – Tank sizing consists of two portions called "normal operating volume" (NOV) and "reserve storage volume" (RSV):

3.3.3.1. The NOV is the liquid storage below the "time-to-pump" alarm level. The required normal operating volume is calculated by multiplying the estimated daily sewage flow (DSF) by the number of days between pumping service visits (PSV). PSV is the number of days between pumping (not to exceed 7 even if service is "on-call"). The formula for calculating normal operating volume is:

NOV = (DSF) (PSF)

3.3.3.2. The RSV is the liquid storage capacity above the "time-to-pump" alarm level and below the invert of the inlet pipe. The reserve storage volume (RSV) must be at least 3 times greater than the anticipated daily design flow for the facility. There may be special cases where three-day reserve storage is insufficient, in which case additional reserve storage should be addressed by the design. The formula for calculating reserve storage is:

RSV = (DSF) (3)

3.3.3.3. The "total liquid volume capacity" (TLVC) must consist of the NOV plus RSV. The formula for calculating total liquid volume capacity is:

TLVC = NOV + RSV

3.3.3.4. The TLVC can be met with multiple holding tanks.

A Sample Calculation

A holding tank sewage system is being designed for a small marina with a daily sewage flow (i.e., normal operating volume) of 500 gallons, which will be serviced once each week. How much total liquid volume capacity will be needed to serve the needs of this facility?

(Step 1) NOV is 7 times the daily design flow because a week

is 7 days, therefore;

NOV = (500 GPD) (7)

NOV = 3,500 gallons

(Step 2) Since RSV must be three times greater than the daily

design flow, it is multiplied by 3:

RSV= (500 GPD) (3)

RSV= 1,500 gallons

(Step 3) The TLVC of the holding tank(s) must include both the NOV) and the RSV, so these two values are added together:

TLVC = NOV + RSV

TLVC = 3,500 gallons + 1,500 gallons

TLVC = 5,000 gallons

3.4. Alarms

3.4.1. Both audible and visual alarms are required.

3.4.2. The alarms must be set to signal at the "time-to-pump" and "exceeding reserve storage volume" levels.

3.4.3. The audible and visual alarm indicators must be located outside the facility with battery power where electrical power is not available.

3.4.4. Only the audible alarm may be turned off by the user.

3.5. Piping

All plumbing connections must be watertight so that if the holding tank is full, further use of the system will cause sewage to back up into fixtures within the facility served. Use of the holding tank sewage system beyond the rated tank capacity must not allow discharge of sewage to the ground surface through the service access, pumping access ports, or vent openings.

3.5.1. Gravity flow to tank – conventional plumbing requirements apply.

3.5.2. Pressure flow to tank – pump activation and deactivation must be double-controlled by float switches within the pump chamber and holding tank, not solely in the pump chamber. This prevents excess sewage from being pumped into the holding tank.

3.5.3. Multiple tank installations – piping and all connections must be watertight and securely bedded and back-filled to prevent groundwater infiltration and sewage exfiltration.

3.5.4. In areas where freezing is a concern, all piping must be adequately protected by design and installation.

3.5.5. Aboveground tank installations present particular concerns for physical damage to piping and tanks. Whenever piping is aboveground or exposed to potential physical damage or breakage, it must be adequately supported and protected. Where multiple, interconnected tanks will be installed, care should taken to prevent breakage of connections by differential settling through use of a common slab, flexible connections, or bedding.

3.6. Venting and Odor Control

3.6.1. Gravity flow to the holding tank – Separate venting directly from the holding tank is not required since the holding tank will vent through the building sewer line. However, special care will be necessary to assure that pumping and service access port lids are leak-proof so all sewage gases will vent through the facility waste vent pipes.

3.6.2. Pressure flow to the holding tank – Direct venting of the holding tank is required since gases will not adequately vent through the pressurized line from a sewage pump. Vent pipes should end at a point that is high enough and far enough from area of human activity to avoid vent stack odors and related nuisances. To assure that the sewage gases vent through the vent stack, pumping and service access port lids must be leak proof.

3.7. Overflow Provisions

The holding tank system must be designed and installed such that no overflow is allowed, other than within the structure at the elevation of the lowest fixture served.

3.8. Surface Water

Landscaping adjacent to the holding tank system should direct surface water flow away from the tank and access points.

3.9. Materials

Construction materials used throughout the holding tank system must be able to function as designed while exposed to sewage, sewage gases, and physical forces caused by repeated tank filling and pumping which is inherent to system operation.

4. Operation and Maintenance

4.1. Pumping and Service

A holding tank system requires regular pumping and servicing. To assure that this work can be performed efficiently, the system must be designed, installed, and maintained in a way which promotes ease of access for pumping and cleanup.

4.1.1. Service access must be provided by:

4.1.1.1. At least one for each compartment or separate tank;

4.1.1.2. Being brought to or above ground surface; and

4.1.1.3. With a minimum inside diameter or square dimension of 20 inches.

4.1.2. Pumping access ports:

4.1.2.1. May be used in lieu of additional service access where additional access points are needed to efficiently pump the tank(s) and used in addition to service access.

4.1.2.2. Must have a minimum inside diameter or square dimension of 10 inches.

4.1.3. Large tanks (greater than 2,000 gallons) must have multiple access points (service access or pumping access ports) to allow for efficient pumping of all contents.

4.1.4. Methods of securing covers must be used for all access points located at or above the ground surface to secure service accesses or access ports from inappropriate or unapproved access.

4.1.5. All covers must be leak-proof to prevent infiltration or exfiltration of liquid or the escape of nuisance odors or hazardous gases.

4.2. Pumping Service Contracts

Before a permit is issued for installation of a holding tank sewage system, the owner of the system must submit complete documentation that addresses the following items to the satisfaction of the local health officer:

4.2.1. Service contract with a certified and licensed sewage system pumping firm;

4.2.2. Frequency of pumping, by schedule or call-for-service;

4.2.3. Financial guarantee for operation, such as a bond or an assignment of funds, in the amount specified by the health officer or operation by a public agency. It is suggested that financial guarantee be in an amount at least equal to the cost of one year's service, and/or the estimated cost of cleanup and abatement of a sewage spill.

4.3. Operational Permit

The local health officer must require an annal operational agreement and may collect fees to oversee operations of the holding tank system. The operation agreement must include, as a minimum:

4.3.1. Pumping, hauling, and disposal must be by a sewage pumping contractor certified, licensed, and approved by a local health officer.

4.3.2. Disposal of sewage from a holding tank system must be at a site or sites approved by the local health officer in the jurisdiction where the sewage is disposed;

4.3.3. Operational records must be maintained by the owner and pumper. Records must include information about pumping frequency, sewage volume, disposal site(s), proof of acceptance by the disposal site operator, alarms, and system servicing and repairs;

4.3.4. Copies of operation records must be submitted to the local health officer according to permit requirements;

4.3.5. An emergency response plan addressing alternate plans in the event of a pumper failing to provide service, a hydraulic overload for the holding tank system, and a sewage spill at the site; and,

4.3.6. Establish the right of the permitter to inspect the facility.

4.4. Disposal of Contents

Contents of the holding tank must be pumped, hauled, and disposed of in a manner approved by the local health officer.

4.4.1. No sewage from the holding tank system must be applied onto the ground or into ground water or surface waters.

4.4.2. Sewage from a holding tank system may be applied into:

4.4.2.1. The ground using an approved on-site sewage system and with the knowledge and consent of the local health officer;

4.4.2.2. A wastewater treatment facility approved by the department of Ecology; or,

4.4.2.3. Other treatment and disposal sites approved by the local health officer.

5. Large On-Site Sewage Systems

Sewage systems serving facilities with daily design flows between 3,500 and 14,500 gallons per day are permitted under the jurisdiction of the department, except in counties where this program is operated by the local health jurisdiction under contract with the department. In all cases, the department requirements must be met.

5.1. Requirements for Large On-Site Sewage Systems

Application, engineering, design, construction, inspection, and operation and maintenance requirements for large on-site systems are contained in the Washington State Regulations for Large Onsite Sewage Systems (Design Flows of Greater Than 3,500 Gallons per Day), Chapter 246-272B WAC.

5.2. Requirements for Large On-Site Holding Tank Sewage Systems

Requirement for use of a holding tank sewage system for LOSS with flows between 3,500 and 14,500 gallons per day include:

5.2.1. The facility served, the proposed interim use holding tank sewage system, and long-term sewage treatment and disposal system serving the facility must be owned by a public entity, although not necessarily the same public entity.

5.2.2. Continual operation and management of the holding tank sewage system must be conducted by an appropriate and approved publicly owned entity, such as a public utility district.

5.2.3. The holding tank sewage system must be for short-term interim use only where a long-term sewage treatment and disposal facility:

5.2.3.1. Currently exists with plans and committed construction funds to extend service to the proposed facility; or

5.2.3.2. Is proposed with approved plans and committed construction funds which will provide sewage treatment and disposal service to the proposed facility within a reasonable, approved, time-period.

5.2.4. The entire sewage treatment and disposal project, including the short-term use holding tank sewage system and proposed long-term system, must meet all appropriate review and approval procedures required for LOSS.

5.2.5. A complete engineering report must be submitted to the department, or, if in a county with jurisdiction-by-contract, the local health jurisdiction. The engineering report must as a minimum, in addition to other design aspects document in detail:

5.2.5.1. The existing sewage treatment plant capacity and commitment by the responsible management entity that the required portion of plant capacity will be reserved and allocated to the facility to be served for the anticipated use period of the HTSS.

5.2.5.2. The results from an economic analysis and acceptance/adoption by the legal board or owner of the facility to be served by the holding tank sewage system; and

5.2.5.3. The future sewage treatment plant capacity and commitment by the responsible management entity that the required plant capacity portion will be reserved and allocated to the facility to be served into the future beyond the anticipated use period for the holding tank sewage system.


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