DEPARTMENT OF

ENVIRONMENTAL CONSERVATION

Onsite Wastewater Systems Installation Manual

Technical Guidance and Approved Best Management Practices

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Publication Date Disclaimer

This document will be updated frequently in the first few years of publication as the Department and the Onsite Wastewater System Technical Review Committee (OWS TRC) continues to further development publicly identified best management practices for the installation, operation, and management of onsite wastewater systems. This document is intended to be updated as frequently as needed to clarify and expand on common practices used throughout the state. The publication date will be updated anytime there is a change in this manual. Please be sure you are using the most recent published version of this manual.

The Department and the OWS TRC relied on select standards published by other states in the development of this manual. The following publications may be used for standards and additional information that are not well covered in this manual (in all cases, regulatory requirements contained in 18 AAC 72 and items specifically addressed in this manual supersede different standards used by other local and state governments and the Uniform Plumbing Code.

Manual for Septic System Professionals in Minnesota
https://septic.umn.edu/manual-professional

Idaho Department of Environmental Quality Technical Guidance Manual for Individual and Subsurface Sewage Disposal Systems
https://www.deq.idaho.gov/water-quality/wastewater/septic-and-septage/

Washington State Department of Health Recommended Standards and Guidance Documents for:

- Holding Tank Sewage Systems
- Intermittent Sand Filter Systems
- Mound Systems
- Pressure Distribution Systems

https://doh.wa.gov/community-and-environment/wastewater-management/forms-publications

Any comments or suggestions on how the Department may improve this manual may be sent to Tonya Bear at tonya.bear@alaska.gov.

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1 INTRODUCTION

1.1 Purpose and Authority

This technical guidance manual was developed by the Department of Environment Conservation to provide publicly identified best management practices for the construction, installation, maintenance, and operation of onsite wastewater systems in the State of Alaska.

This manual supplements Title 18 of the Alaska Administrative Codes (AAC) Chapter 72 Wastewater Treatment and Disposal regulations (18 AAC 72) in effect as of the date of this manual. The most current regulations are available from the Department's website at dec.alaska.gov. For the purposes of this technical guidance, terms not currently defined in 18 AAC 72 may be used in the context defined in this manual. The standards presented in this guidance are focused on smaller onsite wastewater systems although these best management practices may also apply to larger onsite and community wastewater systems.

The purpose of this manual is to provide technical guidance on acceptable installations for onsite wastewater systems under a myriad of site conditions encountered throughout the state and variations of prescriptive standards that the department recognizes as approved best management practices addressing the intent and requirements of 18 AAC 72. Facilities or developments meeting the criteria to be exempt from prior plan approval must have wastewater systems that meet the requirements in 18 AAC 72 and be installed in substantial conformance to the best management practices presented in this technical guidance manual. This manual was developed under 18 AAC 72.070 as protective of public health, public and private water systems, and the environment.

1.2 Technical Review Committee

A technical review committee (TRC) was established by the Department under 18 AAC 72.007 to provide recommendations and expertise in the development of the standards and best management practices presented in this manual. The technical review committee consists of industry professionals, both certified installers and professional engineers, with many years of experience in onsite wastewater systems. The Department and the TRC will continue to develop this manual and make changes as needed.

1.3 Discharge to Waters

This manual does not cover any direct discharge to state or federal waters, including discharges that may be considered a functional equivalent covered under the Clean Water Act. All wastewater systems discharging to surface waters, including wetlands, must have prior plan approval. Permit coverage under an APDES/NPDES, or other monitoring requirements, may also apply.

1.3.1 Functional Equivalent

On April 23, 2020, the Supreme Court ruled that certain subsurface discharges could be considered a "functional equivalent" of a direct discharge to nearby surface waters. If a leach field or other point of discharge point is not located at least 100 feet from surface water, the Department will determine if the discharge is a potential functional equivalent during the waiver review process and may require

a functional equivalent analysis. For wastewater systems discharging more than 2,500 gpd, a functional equivalent analysis may be required as part of the plan review submittal. A functional equivalent discharge to Waters of the United States (WOTUS) will require authorization under an APDES permit. Private residences are excluded in the general permit from seeking coverage.

1.4 Systems or facilities not requiring explicit registration or approval

1.4.1 Pit Privy or Outhouse

Pit privies, also commonly called "outhouses", must meet the minimum construction and operation requirements at 18 AAC 72.030, or a waiver is required under 18 AAC 72.060. Some local government entities may restrict or prohibit the use of pit privies in their jurisdiction. An outhouse that utilizes a vault or holding tank, instead of an unlined excavation, must be registered under 18 AAC 72.611 as a vault privy. Additional guidance and information on pit privy construction, operation, and closure is located in Appendix B.

1.4.2 Composting or Incinerating Toilets

Composting toilets and incinerator toilets installed within a house or occupied building are not regulated by the onsite wastewater program. Human waste from composting must be disposed of at an approved solid waste facility or according to the manufacturer's directions. Ash from incinerating toilets may be disposed of according to manufacturer directions.

Compost privy, incinerator privy, moldering privies, porta-a-potties, etc. installed outside of the building footprint must meet the horizontal and vertical separation distance requirements of a pit privy.

Units must be wholly contained without a discharge of wastewater into the environment. If the unit includes overflow valves, side-streaming, dewatering of sewage, or other direct discharges of wastewater into the environment (such as separating toilets), the discharge must be to an appropriate wastewater system or otherwise approved by the Department.

1.4.3 Mobile Food Unit

For a mobile food vehicle to be exempt from registration or plan approval, the wastewater holding tank must be mounted on or within the food truck or trailer such that nothing needs to be disconnected to move the mobile food unit and the wastewater tank as a whole (much like an RV). To qualify for this exemption, the vehicle must be permitted as a "mobile food unit" by the Division of Environmental Health Food Safety and Sanitation program and meet the definition at 18 AAC 31.990(84). Any holding tanks separate from the mobile unit must be registered or approved in accordance with 18 AAC 72 and this manual as a holding tank. All septage removed from the holding tank must be disposed at a facility authorized to receive that wastewater. The wastewater cannot be disposed into an onsite wastewater system that has not been registered or approved to receive that wastewater.

1.4.4 Sewage Haul Vehicles, Vacuum Trucks

No registration or plan approval is required for vehicles manufactured to haul wastewater. All septage, sewage, sludge, and honeybucket waste must be disposed of at a facility approved or authorized to accept that type of waste. Any spills from the pumping or hauling of wastewater must be properly contained and remediated in accordance with section 1.8.

1.4.5 Some Float Homes or Other Water Vessels

Float homes and vessels moored to one area or docked in a harbor cannot discharge untreated wastewater. Float homes must have a marine sanitation device and generally falls under the EPA and Coast Guard rules for discharge of wastewater from vessels. The discharge from commercial vessels must be authorized under a discharge permit issued by DEC or EPA. Otherwise, vessels, including float homes, must discharge at least 3 miles offshore or at an approved treatment works.

1.5 Existing Systems, Non-Conforming Systems, and Change of Use

Existing onsite wastewater systems are expected to be performing and operated in a manner that is protective of public and private water systems and the environment. When an existing onsite system is modified or major components replaced, the entire system must be verified to meet current regulations. If any part of the onsite wastewater system does not meet current regulations, that portion of the system must also be modified or replaced, or a waiver of the deficiency approved.

1.5.1 Log Cribs and Cesspools

A log crib is a type of subsurface disposal system that consists of an excavation with wood (railroad ties, timbers, limbed trees, plywood, etc.) used to shore up the excavation prior to burial, creating a large void below ground. While the practice of installing log cribs has not been an acceptable standard for several decades, there are still many log cribs in use throughout the state. A disposal system utilizing wood in contact with wastewater is no longer allowed to be installed, repaired, or modified under 18 AAC 72.015. This regulation utilizes an approach to phase out the use of an outdated disposal system but does not require immediate replacement of a functioning log crib. Existing cribs that are still operating in a manner protective of public health may be left in service until such time as a failure occurs. A failure of a log crib includes a lid or sidewall collapse and back up or surfacing of effluent. A log crib must also be replaced with any other modification such as a septic tank or lift station replacement, or when additional service connections are added. A change of use may also require a log crib to be replaced.

Cesspools are disposal areas that receive untreated wastewater. Cesspools have been prohibited from use for several decades. When a cesspool is discovered, it must immediately be decommissioned and replaced with a wastewater treatment and disposal system meeting the requirements of 18 AAC 72. There are no exceptions to this requirement.

1.5.2 Abandonment and Decommissioning

Some components of a wastewater system may be abandoned in place but any component that would leave a large subsurface void must be decommissioned and not simply abandoned. Components that would leave a large void such as septic tanks, holding tanks, cribs, seepage pits, lift stations, manholes, and large diameter pipe (24 inches or larger) require decommissioning.

Proper decommissioning requires that sewage sludge in the septic tank or other component be completely removed by a septic tank pumper. Once empty, the component must be completely removed, crushed in-place, or the top cover removed and then completely filled with compacted soil, concrete, or other material, as required by the Uniform Plumbing Code.

Private sewer lines and community sewer lines within 5 feet of a property line must be cut and plugged with a permanent seal when abandoned. When a leach field is abandoned in place, the

monitor tubes must be cut off below grade and buried; any piping that allows overflow, bypass, or other diversion piping must be permanently plugged or removed.

When a wastewater system is decommissioned or abandoned, it is often during replacement or connection into a public or private utility. The location and method of decommissioning should be included with the record documents provided to the owner. If a documentation is required to be submitted to the Department for a new wastewater system, the information provided to the Department must include a statement regarding methods used and the locations of abandoned or decommissioned components of an existing system. The Department strongly encourages photos be taken for documentation of materials and methods used for abandonment or decommissioning.

1.5.3 Change of Use

A change of use of an existing system must be documented with the department. Common change of uses include conversion from a private residence to a commercial facility (such as a daycare, assisted living home, or short-term rental), beginning a home-based food service operation, or adding private sewer lines to connect additional buildings. When the change of use requires an upgrade or modification to the wastewater system, notification and documentation must be provided in the same manner as required for all new installations or replacement of existing components. When the change in use does not involve a modification to an existing system, an engineer must still evaluate the existing system and submit documentation to the Department demonstrating that the system is adequate for the new use. This documentation is usually required by other ADEC programs, such as Food Safety and Sanitation, or by other licensing agencies, such as those for assisted living homes, daycares, or other public facilities.

An increase in number of bedrooms of a private residence or other residential dwelling may also constitute a change of use unless the documentation of the installed system reflects it was sized for the number of bedrooms served. An increase in the size or number of septic tanks to meet the minimum volume required for an increase in bedrooms must be documented as a new component installation. If the soil absorption system is not also replaced for increased size, reasonable assurance must be given that the leach field is performing acceptably at the time of septic tank upgrade. Performing acceptably means the existing leach field is not showing imminent signs of failure or inadequacy of accepting an additional hydraulic load, regardless if the documented or estimated absorption area meets the minimum construction standards for the increased number of bedrooms. Once placed into service, a single leach field may not be added on to or modified to accommodate a change in use. Additional leach fields installed in parallel utilizing a distribution box or flow splitter may be acceptable. A leach field left in service must also be confirmed to meet the required separation distances or a waiver of the deficiency must be approved.

A change of use where no modifications or improvements are planned must be documented with the department by submitting an after the fact registration or approval to operate request under 18 AAC 72.290, 18 AAC 72.560, or 18 AAC 72.660.

1.5.4 Undocumented Systems or Undocumented Modifications

All wastewater systems in the state of Alaska must be registered or approved by the department except where a local government has delegated authority for wastewater systems and the system is documented with or approved by the local government authority. Onsite wastewater systems are required to have a valid registration or approval under 18 AAC 72.501 and 18 AAC 72.601. Under

18 AAC 72.080, a registration or plan approval is invalidated if the system is modified or the use of the system changes. Wastewater systems with no record of registration or written approval, must be registered or approved after the fact under 18 AAC 72.290, 18 AAC 72.560, or 18 AAC 72.660.

1.6 Remote Temporary Camps

Remote temporary camps with a population of less than 25 people and no flush toilets may be eligible for registration under an integrated authorization managed by the Division of Environmental Health Food Safety and Sanitation (FSS) program. To be eligible for the wastewater disposal portion of this authorization, the remote temporary camp must

- not be located in or near a community, or near a major road system;
- not be located within the North Slope Borough;
- have limited disposal options due to the remote nature of the camp;
- follow the best management practices and guidance contained in the integrated authorization.

Additional information and the Temporary Camp Application Worksheet may be found at https://dec.alaska.gov/eh/fss/forms/. Temporary or mobile work camps served by wastewater holding tanks are covered in section 5.7.3.

1.7 Underground Injection Control Program

Many subsurface leach fields are classified as Class V injection wells by EPA. A leach field must be registered as a Class V injection well with the EPA if it receives any amount of nondomestic wastewater, serves multiple buildings, or serves 20 or more people per day.

See https://www.epa.gov/sites/default/files/2015-08/documents/fs_septic_sys.pdf for more information or https://www.epa.gov/uic/underground-injection-control-region-10-ak-id-or-and-wa#register to register an underground injection well.

1.7.1 Motor Vehicle Waste Disposal Wells

A motor vehicle waste disposal well is a shallow disposal system that receives fluids from vehicle repair or maintenance activities. Motor vehicle waste disposal wells are regulated as Class V injection wells. Typical motor vehicle waste disposal wells consist of floor drains or sinks in service bays that connect to a septic system or dry well. In areas where vehicle maintenance may occur, floor drains are prohibited from being connected to a leach field, regardless of additional treatment such as an oil water separator. The only exception is a residential dwelling that is exempt from EPA's underground injection control program; however, garage floor drain connections are still strongly discouraged due to the potential of pollutants entering the onsite disposal system that may result in a contaminated site. ADEC does regulate contaminated sites for all facility types. Floor drains in non-residential buildings are considered a source of nondomestic wastewater and must receive explicit approval by the department.

New construction of Class V motor vehicle waste disposal wells has been banned since April 6, 2000. See https://www.epa.gov/uic/underground-injection-control-region-10-ak-id-or-and-wa#mvwdw-ak for more information. Floor drains in areas where vehicle maintenance or washing

may occur will not be approved for connection to subsurface leach field; other onsite disposal will also not be approved without monitoring. Sludge and liquid from sumps, holding tanks, or other treatment units collecting waste from motor vehicle maintenance and washing areas must be disposed of at a facility authorized to take the type of waste. Additional testing may be required by the facility prior to acceptance.

1.8 Sewage Spills and Clean Up

Spills and leaks of wastewater, sewage, septage, or similar must be collected and disposed at an approved facility and the area cleaned and disinfected. Department published guidelines are available online at https://dec.alaska.gov/water/wastewater/engineering/sewage-spill-cleanup.

2 GENERAL REQUIREMENTS FOR ONSITE SYSTEMS

2.1 Permit and Plan Approval Requirements

A person that discharges wastewater in the state of Alaska must do so in a manner that is protective of public health and the environment. The Department requires onsite wastewater systems to be installed or construction supervised by a qualified person who ensures or verifies the onsite wastewater system meets prescriptive requirements and follows standard sanitary practice. Small onsite systems that are installed in accordance with the regulations and these guidelines are seen to pose little to no threat to public health or the environment. Larger onsite wastewater systems and those with off-site disposal still require plan approval under 18 AAC 72.200 – 18 AAC 72.290, 18 AAC 72.515, and 18 AAC 72.615. In addition to plan approval, a discharge permit may also be required.

2.2 Restrictions on Approved Homeowner, Certified Installer, and Engineer

Only individuals that have received the appropriate training and licensing are allowed to install and document an onsite wastewater system that has met the requirements of 18 AAC 72 and follows this guidance. Restrictions are placed on these individuals that affect the type, size, and the facility served by an onsite wastewater system that can be installed without prior plan approval.

Only those systems that meet certain criteria can be installed without prior plan approval:

- receives domestic wastewater only, no potential sources of non-domestic wastewater allowed;
- located on the same property as the facility served, or if facility spans multiple properties, all ownership is under the same entity, including the entirety of the buildings or structures served;
- does not discharge to surface water, and is not a functional equivalent of a discharge to surface waters regardless if classified as Waters of the US or Waters of the State; and
- meets the requirements of regulations and follows the best management practices in this manual; or a waiver is obtained prior to construction or simultaneously with registration.

An onsite wastewater system that does not meet all construction standards and separation distance requirements must have a waiver approved under 18 AAC 72.540 or 18 AAC 72.640, or a plan approved under 18 AAC 72.515 or 18 AAC 72.615 prior to construction.

2.2.1 Approved Homeowner

A homeowner is allowed to install a conventional wastewater system serving their owner-occupied private residence if they complete the training provided by the Department and pay the fee to become an "Approved Homeowner". This allowance is strictly limited to only those systems that meet all the prescriptive separation distance requirements of 18 AAC 72.520 and the construction requirements at 18 AAC 72.530. In addition, the approved homeowner must have the soil classified by either obtaining a gradation analysis from a soils laboratory or a report from a professional engineer. Certain soil types and classifications require a percolation test to be conducted by a professional engineer and a report provided selecting the appropriate application rate to use from the Wastewater Applications Rates table; the professional engineer is required to seal the report and it must be included with the registration documents provided by the Approved Homeowner. A Certified Installer may only perform percolation tests and determine the appropriate application rates for systems they install under their certification.

2.2.2 Certified Installer

A Certified Installer is a licensed contractor that has received additional training by the Department and has a valid certificate under 18 AAC 72.400 – 18 AAC 72.430. A certified installer is limited to installing conventional wastewater systems that meet all the prescriptive separation distance requirements of 18 AAC 72.520 and the construction requirements at 18 AAC 72.530. Conventional onsite systems that cannot meet those requirements must obtain a waiver under 18 AAC 72.540 before construction. In addition, certified installers are restricted to conventional onsite wastewater systems that serve the following facility types:

- private residence
    - a single lot developed with no more than two residential units;
    - total calculated on lot daily flow must not exceed 1,500 gpd;
    - may include other buildings or connections as long as they are used by the residents only (ex. detached garage, RV parking);
    - does not include a commercial development open to the public or that produces a product for human consumption (ex. daycare, AirBNB or other short-term rental, in-home bakery or caterer, etc.)
- a single multi-family dwelling with no more than four residential units
    - system must serve only one building
    - total calculated on lot daily flow must not exceed 1,500 gpd
- small commercial facilities
    - a single building with calculated daily flow not exceeding 500 gpd
    - total calculated on lot daily flow must not exceed 1,500 gpd

For systems serving facilities that do not meet these criteria, the installer may only do the work as a contractor or subcontractor with the design and construction supervision by a registered engineer. In that situation, the person responsible to the Department for verifying the system meets the prescriptive standards, and submitting the notification and documentation is the registered engineer.

2.2.3 Registered Engineer

A professional engineer registered in the state of Alaska as an environmental or civil engineer may install or supervise construction of onsite wastewater systems that are designed to meet all the prescriptive separation distance requirements of 18 AAC 72.100, 18 AAC 72.520, and 18 AAC 72.620, and the construction requirements of 18 AAC 72.530 and 18 AAC 72.630 without obtaining prior plan approval.

Without prior plan approval, engineers are limited to onsite wastewater systems installed under their construction supervision to the following:

- conventional onsite wastewater systems
  - any combination of residential dwellings or commercial facilities
  - total calculated on lot or facility-wide daily flow must not exceed 2,500 gpd
- alternative onsite wastewater systems
  - any combination of residential dwelling or commercial facilities
  - total calculated on lot or facility-wide daily flow must not exceed 1,500 gpd
- temporary or mobile work camps served by wastewater holding tanks

Construction supervision and supervising construction are defined in 18 AAC 72 and specifically within the context of onsite wastewater systems that can be installed without prior approval. 18 AAC 72.990(16) provides that the terms mean

> providing oversight and direction during construction such that the supervising engineer, or a person under the supervising engineer's responsible charge (A) can validate that the system was constructed in accordance with the requirements of this chapter and conforms to department publicly identified best management practices, protective of public health, public and private water systems, and the environment; and (B) has the information necessary to prepare accurate record documents.

The Department intends "direction" in this definition to mean that the engineer is available to provide adequate instruction on relevant regulatory requirements and construction standards, and can verify the work such that the engineer can provide the Department with a great degree of confidence that the completed work conforms to regulatory requirements and the contractor has implemented and maintained the integrity of the design concept of the completed project as a functioning whole. Importantly, the Department notes that "supervision" and "direction," as those terms are used in 18 AAC 72.990(16) and elsewhere in 18 AAC 72, do not mean the engineer is responsible for the means, methods, techniques, or procedures used by the contractor or owner. The contractor, owner, and engineer are expected to have frequent communication during construction to address any concerns, changed or unexpected site conditions, and otherwise coordinate such that the engineer can validate construction and has the information necessary to prepare accurate record documents.

Additionally, the phrases "construction supervision" or "supervising construction," as defined in department regulations, are considered terms of art limited to the specific context of 18 AAC 72 and this manual. These terms do not assign or imply any liability, role, or relationship beyond what the Department requires of engineers under regulation. Further, oversight and enforcement of these regulations is limited solely to the State.

The Department does not expect an engineer to be onsite during all construction but rather expects the engineer to verify, at appropriate times, that the system is being constructed according to their design, regulatory requirements, and guidance provided in this manual. The methods the engineer uses to oversee construction and provide adequate direction are at the discretion of the engineer. Site visits conducted by the engineer, or an individual under their responsible charge, are not intended to be exhaustive or to involve detailed inspections of the work beyond the responsibilities of the engineer to the Department.

In all system installations requiring an engineer involvement, the accepted standard is that the engineer will design a system that meets regulatory requirements protective of human health and the environment. If the system is not installed according to that design, regulatory requirements, and/or is not protective, then the engineer will advise the contractor/owner of the deficiencies and options for corrections. An engineer may apply for waivers/plan approval if the deviations can be justified. Another option is to notify the Department that the system was not constructed according to the design or regulatory requirements and the contractor and/or owner have refused to make corrections or pursue other avenues such as a waiver or plan approval.

2.3 Notification and Documentation Requirements

The Department clarifies the documentation and notification requirements set out at 18 AAC 72.550 and 18 AAC 72.650 in this section. 18 AAC 72.550(a) identifies "[a] *person* who plans to install a system" (emphasis added), and 18 AAC 72.650(a) identifies "[a] *registered engineer* who plans to install a system" (emphasis added). Similarly, 18 AAC 72.550(c) identifies "[a] *person* who is responsible for construction of a system" (emphasis added) and 18 AAC 72.650(c) identifies "a *registered engineer* who is responsible for construction of a system" (emphasis added). By referring to "person" and "registered engineer" in each of these sections, the Department is referring to the applicable qualified person (such as an approved homeowner, certified installer, or registered engineer) required at 18 AAC 72.511 and 18 AAC 72.611. Use of the phrase "responsible for construction of a system" used in 18 AAC 72.550 and 18 AAC 72.650 does not imply or create any requirements for registered engineers that would conflict with the Department's interpretation of "construction supervision" or "supervising construction" at 18 AAC 72.990(16) and as provided above in this guidance.

2.3.1 Notification

The qualified person described at 18 AAC 72.511 or 18 AAC 72.611 (approved homeowner, certified installer, or registered engineer as required) planning to install or modify an onsite wastewater system without prior plan approval must notify the department at least 24 hours before beginning construction. The notification must be submitted through the Environmental Data Management System (EDMS) on the form provided by the department. The notification form must include the following information:

1. the legal description and physical address of the property including directions to the site;
2. name and email address of the person responsible for installation and documentation;
3. the scheduled date of installation or modification; and
4. other information requested on the 24-hr notification form.

2.3.2 Registration

Within 90 days of installation or modification of an onsite wastewater system, the qualified person described at 18 AAC 72.511 or 18 AAC 72.611 must submit for the department's assessment a completed registration package that includes

1. a completed Documentation of Construction on the form provided by the Department through EDMS
2. calculations for maximum daily flow, pump selections, pressurized distribution systems, etc. as applicable
3. drawings on the forms provided by the Department, or record drawings provided by the engineer, that includes
    a. a scaled site plan showing new, existing, and decommissioned or abandoned wastewater system components, nearby drinking water sources and surface waters, and all existing or proposed buildings or connections planned for the wastewater system;
    b. cross-sections and profile view of the installed system;
    c. testhole log(s) and location of testhole(s);
    d. percolation test data sheet and results if required for the soils encountered;
    e. calculations and other details as necessary to facilitate the departments review
4. photographs that document the various states of installation or modification to include at a minimum
    a. foundation cleanout(s) and all sewer line(s)
    b. all treatment components, disposal system, and mechanical devices including pumps, alarms, and control panels as applicable
    c. final grading and landscaping around the system
5. for advanced treatment systems or package plants, a signed statement from the owner or operator of the system on a form provided by the department certifying they will operate and maintain the system in accordance with an operations and maintenance manual developed for the system
6. the registration fee of $115.

An Approved Homeowner must also submit the laboratory soils report or soils report sealed by an engineer with their documentation.

The site plan, cross-section, testhole/soil absorption system, and photo log portion of the form must be uploaded as attachments. The Department provides a pdf document that may be used for the required drawings and an easy-to-use photo log on its website at septic.alaska.gov. The Department will accept drawings not using the Department provided diagrams as long as the required information is included.

2.4 Wastewater Quantity and Quality

2.4.1 Residential Dwellings

All year-round residential dwellings including private residences and multi-family units must use a daily flow of 150 gallons per day per bedroom. Residential dwellings utilizing a hauled water system may use 100 gallons per day per bedroom. Wastewater systems serving dwellings or structures that

do not have flush toilets may be eligible for further reductions in daily flow under the Graywater Systems section.

2.4.2 Commercial Facilities

Commercial facilities include any building or services open to the public. Examples of commercial facilities include RV parks, restaurants, office buildings, nightly lodging, residential care facilities, and daycares. The daily flow for commercial facilities must be calculated by using published typical flows from the EPA wastewater system manual, the UPC, or this guidance. Typical flows published by other states may also be used when the use is more specific than the sources provided in the Wastewater Minimum Daily Flows table.

Wastewater Minimum Daily Flows		
Commercial Sources		
Source	**Unit**	**Flow in gpd/unit**
Airport	Passenger	3
Assisted Living Homes	Resident	100
	Employee	15
Automobile Service Station	Vehicle Served	12
	Employee	15
Bar	Employee	15
	Guest	3
Day Care Facilities	Each Child and Employee	15
w/ food service		20
Department Store	Employee	10
	Toilet Room	500
Hotel	Employee	15
	Guest	50
Laundry – Self Serve	Machine	550
	Wash	50
Office	Employee	15
Restaurant	Meal	3
	Customer	9
	Employee	15
Rooming House	Tenant	75
Shopping Center	Employee	15
	Parking Space	2
Recreational Sources		
Bathhouse for cabins/rooms	Person	25
Cabin, Resort	Person	50
Cabin, Basic	Person	25
Cafeteria	Customer	2
	Employee	10
Campground, Developed	Person	30

Coffee Shop	Customer	6
	Employee	10
Coffee Cart (no food preparation, pre-packaged items only)	Unit	150
Day Camp	Person	15
Dining Hall	Meals Served	7
Dormitory/Bunkhouse	Person	40
Hotel, Resort	Person	50
RV Park with Sewer/Water Hookups	Vehicle Space	100
RV Park dump station	Vehicle space	50
Store, convenience	Customer	3
	Employee	10
Theater	Seat	3
Visitor Center	Visitor	5
Institutional Sources		
Assembly Hall	Seat	3
Hospital	Bed	165
	Employee	10
Prison	Inmate	120
	Employee	10
School, with cafeteria, gym, showers	Each student, staff, faculty	25
School, without cafeteria, gym, showers	Each student, staff, faculty	15

2.4.3 Seasonal Use

No reductions in the minimum calculated daily flow may be taken for seasonal use facilities.

2.4.4 Non-Domestic Wastewater

Wastewater systems receiving non-domestic wastewater or having a potential source of non-domestic wastewater must obtain prior plan approval from the Department. Private residences are excluded (must meet the definition at 18 AAC 72.990(67)).

There are a wide variety of potential non-domestic wastewater sources but not all are treated equally. Non-domestic wastewater sources include drinking water treatment waste, fish or meat processing facilities, breweries and distilleries, and the grease trap contents from a commercial kitchen. A potential source of non-domestic wastewater also includes floor drains. Floor drains in vehicle maintenance areas are prohibited from being connected to a subsurface leach field. Refer to section 1.7.1 in the Underground Injection Control section.

2.5 Minimum Treatment

The minimum treatment requirements of 18 AAC 72.050 must be met prior to onsite disposal. The disposal system must also meet the minimum construction standards in regulation and this manual. Minimum treatment and construction standards are contained in sections specific to a system type. The construction requirements in regulation and the standards presented in this manual are intended to help ensure Water Quality Standards in 18 AAC 70 are met. If minimum construction standards

or separation distance requirements are not attained, a valid waiver of the provision must be approved by the Department in accordance with 18 AAC 72.060, 72.540, and 72.640.

For systems consisting of collection and storage only, the final disposal location must be at a facility approved to receive septage or sludge. The location of septage or sludge disposal must be included with the registration documents.

2.6 Evaluating Site Conditions

Each site is unique and must be assessed on a case-by-case basis. Surface and subsurface conditions must be taken into account while assessing what type of system may be installed.

Preliminary assessment

A preliminary assessment should be performed that consists of collecting all available information concerning the site and the surrounding area including the location of any public or private drinking water sources. Sources of information may be the local ADEC Office, soil surveys through the U.S. Department of Agriculture Natural Resources Conservation Service, aerial photos, local government offices, neighboring property owners, and local well driller's logs (available at ADNR's WELTS database online). When replacing an existing system, the records available through ADEC should be checked for information on the existing system as well as any plat approval restrictions.

During the preliminary evaluation phase, the person responsible should be able to determine the type of system that is appropriate for the site and whether prior plan approval is required. The person responsible should always look for the best possible site conditions when locating an onsite system.

GENERAL SITE CHARACTERICS & RATING			
Site Criteria	**Good**	**Moderate**	**Poor**
Flooding	None (protected)	Rare	Common
*Depth to Bedrock	>11 ft	7-11 ft	<7 ft
*Depth to Cemented Soil (Clay-Silt)	>11 ft	7-11 ft	<7ft
*Depth to Seasonal High Water Table	>9 ft	7-9 ft	<7 ft
Permeability (Percolation Rate)	3-10 min/in	1-3 or 10-24 min/in	<1 min/in or >45 min/in
Slope	0-10%	10-20%	>20%
Soil Classification	**GW, **GP, SW, SP	GM & SM	ML & CL
* Depth from original ground level ** These soils require a sand liner unless waived by the Department			

A preliminary field evaluation should then be performed that consists of a site inspection to locate areas on the lot best suited for a soil absorption system. Features such as gullies, surface water, steep slopes, onsite and neighboring wells, and roads must be noted in relation to proposed soil absorption system location. Once the most suitable site for the system is determined, a test pit or

boring is dug within 25 feet of the perimeter of the proposed soil absorption system, to confirm subsurface conditions.

The test pit or boring needs to extend to at least 6 feet below the bottom of the proposed soil absorption system, to verify that no impermeable soil layers are within 6 vertical feet of the proposed bottom of the distribution rock. Data to be collected from the explorations include an estimate of soil texture or classification, soil structure, soil density, groundwater depth, location of any impermeable layers, and soil moisture conditions.

2.7 Surface Features

In many cases topographic features limit where an onsite wastewater treatment and disposal system may be located. When evaluating a site, one of the first things that should be done is to locate all surface features that will limit the location of an on-site system as follows:

- Drinking water wells: All drinking water systems in the vicinity of the system must be located to the distance practical, generally within 2 times the regulatory separation distance requirement. This includes wells on the property itself and on adjacent properties. If the onsite wastewater system is within 200 feet of any well, the classification the water system must be known before proceeding. More information is in section 2.
- Other components of onsite wastewater systems such as private sewer lines, community sewer lines, cleanouts, and lift stations must be separated from drinking water systems by the distances shown in Minimum Separation Distance Requirements table.
- Surface water: A lift station, holding tank, septic tank, soil absorption system, or other wastewater treatment or disposal system shall be evaluated for the minimum separation distance requirement to surface water as shown in the Minimum Separation Distance Requirements table.
- Slope and cut banks: A conventional soil absorption system shall be evaluated for the minimum separation distance requirement to a slope exceeding 25% that has more than 10 feet of elevation change.
- Lot Lines: The wastewater disposal should be 10 feet or more from the lot lines, and must be entirely within the boundaries of the property associated with the facility served.
- Other wastewater systems: Adjacent onsite system absorption fields must be horizontally separated from one another by the distances described in the Minimum Separation Distance Requirements table.
- Obstacles: Objects such as trees, boulders, gardens, or man-made structures may be located inside the area selected for the onsite sewer system. If the property owner does not want these items removed, the system may be able to be laid out to go around them. Typically, a shallow or deep trench type leach field would be used in these cases. Including minimal curves should have negligible effects on the leach field performance.
- Flooding sites: Systems should be installed outside of known flooding areas. If not possible, the responsible party must coordinate with the local floodplain management on any additional restrictions. For areas outside of a local floodplain management, the following restrictions apply: Tanks must be anchored to counter buoyant forces during conditions of the flood. All sewer vents and cleanouts must be not less than 2 feet above the base flood

elevation or fitted with watertight or locking caps that prevent the inflow of floodwater into the system. A conventional leach field cannot be installed in 20-year flood zones.

Changing site conditions

Site conditions are subject to change over time. Previous documentation on record with the Department may not accurately reflect current site conditions. Every site must be re-evaluated for surface and subsurface conditions each time an onsite wastewater system is installed or modified. Things to consider are:

- Adjacent property development and drainage patterns: Streets, highways, up-gradient properties, nearby large development, and other potential nearby development may change local drainage patterns that may directly or indirectly effect an onsite wastewater system. Changes can include surface drainage of waters into the wastewater system but can also steer drainage patterns away from the system.
- Eroding site conditions: Lots nearby rivers or bluffs may experience erosion over time. If the rate of erosion can be calculated, placement of the system should account for the rate of erosion and the lifespan of the system.
- Climate changing factors: Warming arctic conditions can melt permafrost which destabilizes the existing soils, introduces additional groundwater into the soils, etc. Seasonal rain patterns can occur resulting in more or less precipitation in the area. Resilient system selections should be chosen.
    - Droughts: Systems installed during droughts should account for historical known seasonal high water table or surface water conditions. Pay attention to nearby vegetation or visual cues for areas previously inundated by water

2.8 Evaluating Subsurface Conditions

This section will be improved in the future with much more detail on determining soil classification. Until that time, the guidance provided in the Idaho or Minnesota technical manual publications referenced at the beginning of this manual are excellent resources.

2.8.1 Soil Texture and USCS Group Determinations

Soil types defined by the Unified Soil Classification System (USCS) are identified with a two letter symbol. The USDA defines soils according to a textural system that is determined by the percentage present of each particle size. Soils considered suitable for conventional soil absorption systems include:

- Clean Gravels (GW or GP)
- Clean Sands (SW or SP)
- Silty Gravel (GM)
- Silty Sand (SM)
- Silt (ML)

Soils classified as clays (CL or CH), organic silts and clays (OL), and peats (PT), are not considered suitable for a subsurface soil absorption system unless designed by a registered engineer. Systems

installed on sites with these soils conditions must be done in accordance with the standard practices presented in this manual or have engineering plan approval from ADEC prior to construction.

To identify subsurface soil conditions, a test hole or pit must be dug, preferably using a backhoe because a larger excavation provides the best opportunity to examine soils. The test hole(s) must be dug around the perimeter of the actual system site, rather than within, and be within 25 feet of the anticipated leach field site. Equipment must be kept off the proposed system site to prevent compaction of the soil. The soil strata where the leach field distribution media will be installed and below are the determining factors in how the soil absorption system should be constructed. An alternate method of determining subsurface conditions is by boring, either by machine or by hand. This method should only be attempted by more experienced soil testers. A well log is not a substitute for a test hole or boring.

2.8.2 Percolation Tests

Percolation tests are required in all soil types except for in clean sands classified as SP or SW. In clean gravels (GP or GW), a percolation test is required to confirm if the gravels percolation faster than 1 min/inch which will require the installation of a sand liner. The percolation test in clean gravels can be skipped as long as a sand liner is installed.

This section will be further developed with percolation test procedures. Until that time, the EPA falling head percolation test procedure, guidance provided in the Manual for Septic System Professionals in Minnesota, or the Municipality of Anchorage percolation test procedure contained in their wastewater system ordinance at 15.65 must be used.

Regional exceptions for percolation tests

Greater Fairbanks Area:

- Fairbanks Silt Loam, a dry windblown loess located in the hills, can be designated a silty sand (SM) and sized at 275 sf/bed or 0.55 gpd/sf
- Fairbanks Schist, a highly fractured schist, can be designated a silty gravel (GM) and sized at 225 sf/bed or 0.67 gpd/sf
- North Pole, much of this area has sandy sediments on the bordering the classification between sand or gravel by USCS, these systems may be installed using 150 sf/bed or 1.0 gpd/sf application rate; some areas of North Pole do not fall under this categorical exception such as Lakloey Hill, sites with permafrost, or where the sediments are primarily gravel without a high percentage of sands (greater than 45% passing the #4 sieve)

Tok:

See the section 2.11 for information on the regional waiver for the sand liner requirement. A percolation test is not required for GP/GW soils in areas where the conditions of the sand liner waiver are met.

Soldotna Area:

- Nikiski Sands, a sandy gravel that may have slightly more than 50% gravel resulting in a GP or GW classification; this area does not require percolation test and can be sized at 150 sf/bed or 1.0 gpd/sf

2.8.3 Limiting Conditions

A limiting condition is a subsurface feature that limits the vertical location and type of leach field system that may be installed. Limiting conditions include groundwater, bedrock, permafrost and poor soil conditions. All limiting conditions within 6 feet of the bottom of a leach field must be identified.

Seasonal high water tables vary by region and time. In most locations, the seasonal high is between June 1 and September 30. If installing a system in a timeframe not known for a seasonal high water table or in a period of drought, a seasonal high water table adjustment factor needs to be included, usually at least 1 to 2 feet.

2.9 Separation Distance Requirements

Minimum separation distance requirements contained in 18 AAC 72.100, 18 AAC 72.520, and 18 AAC 72.620 must be met for all existing and new components, or a waiver approved for the lessor separation distance prior to beginning construction or modification of a wastewater system. When a system is modified or replaced, in almost all cases a previously issued waiver is void.

2.9.1 Public Water Systems

Regulations at 18 AAC 80 set the minimum separation distance requirements between wells and surface water intakes serving a public water system. For help classifying a public water system, contact the Drinking Water Program at your local ADEC office or submit the drinking water classification form available on website at https://dec.alaska.gov/eh/dw/forms/. Public drinking water systems may also be shown on GIS maps available at https://dec.alaska.gov/eh/dw/dwp/protection-areas-map/ or by turning on the PWS layer within EDMS Map Explorer.

2.9.2 Private Water Systems

Regulations at 18 AAC 72.100 set the separation distance requirements for private water systems.

At locations where a private water line must cross a private or community sewer line, the following requirements must be met or a waiver approved by the department:

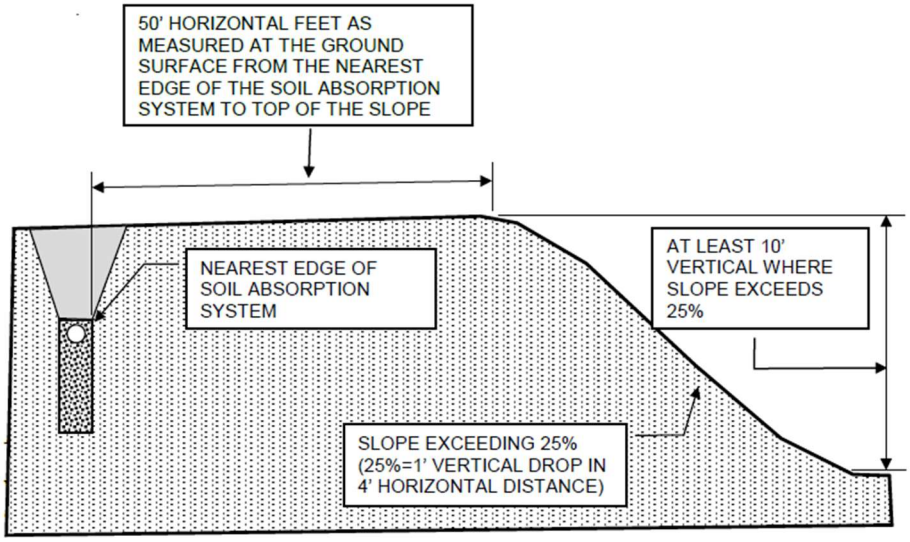
- The sewer line must be located at least 12 inches below the water line
- The sewer line joints must be located 9 feet from the private water line joints

2.9.3 Surface Water

Regulations prohibit installing a lift station, holding tank, septic tank, soil absorption system, seepage pit, pit privy or other wastewater treatment or disposal system within 100 feet, measured horizontally, of the mean annual high water level of a lake, river, stream, spring or slough or the mean higher high water level of coastal waters. Note that this includes a slough which is further defined as a swamp, bog, or marsh.

2.9.4 Slopes & Cut Banks

Regulations require a 50-foot set back, measured at the ground surface, from the nearest edge of any type of a conventional soil absorption area and a slope exceeding 25% that has more than 10 feet of elevation change.



2.9.5 Other Obstacles

Objects such as trees, boulders, gardens, or man-made structures may be located inside the area selected for the onsite sewer system. If the property owner does not want these items removed, the system can be redesigned or laid out to go around them. Because of the deep nature of most excavations, it is recommended that the system is installed 10 feet away from these obstacles.

MINIMUM HORIZONTAL SEPARATION DISTANCES TO DRINKING WATER SYSTEMS

all horizontal separation distances must be measured from nearest edge to nearest edge

	Private Sewer Line[a] and Cleanouts, Basement Sump	Sewer Line[b] and Cleanouts, Manholes, Lift Station	Septic Tank, Wastewater Holding Tank, Lift Station, Manholes	Pit Privy, Soil Absorption System	Fuel Tank[c] and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination[d]
Public Water System	100 feet	200 feet	200 feet	200 feet	100 feet	100 feet	200 feet
Private Water System	25 feet	100 feet	100 feet	100 feet	25 feet	25 feet	100 feet
Water line	10 feet	10 feet	10 feet	10 feet	10 feet	10 feet	Contact DWP
Private Water Line	1 foot	5 feet	5 feet	5 feet	10 feet	5 feet	--

Additional separation distance requirements may apply for public water systems; 18 AAC 80 must be referenced for all public water system requirements.
a. A drain pipe buried in the ground below a building is required to meet the same separation distance as a private sewer line to a public water system.
b. Sewer line includes sewer main, community sewer line, and stormwater sewer lines.
c. The separation distance to fuel tanks applies to below-ground fuel tanks and fuel lines, and to above-ground tanks greater than 500 gallons.
d. Other sources of contamination include, but are not limited to, animal byproducts, manure, and agricultural waste. The separation distance to landfills is covered under 18 AAC 60. DWP = Drinking Water Program.

MINIMUM VERTICAL SEPARATION DISTANCES TO DRINKING WATER COMPONENTS

	Private Sewer Line, Building Sewer	Community Sewer Line or Cleanout, Sewer Main	Septic Tank, Wastewater Holding Tank	Soil Absorption System	Fuel Tank** and Lines	Drinking Water Treatment Waste disposal system	Other Sources of Contamination*
Water line	18 inches recommended	18 inches	cannot cross	cannot cross	no crossing recommended	10 feet	Contact DWP
Private Water Line	12-inches	12-inches	cannot cross	cannot cross	no crossing recommended	5 feet	--

Well Classification and Select Abbreviated Definitions (See 18 AAC 80.1990 or 18 AAC 72.990 for complete definitions)

Public Water System: a potable water system serving 25 or more people at least 60 days per year or a system that has at least 15 service connections.

Water Line: is a pipe or conduit used to carry water as part of a public water system but does not include a water service line or private water line.

Private Water System: a potable water system that is not a public water system

Private Water Line: is a line, pipe, or conduit used to carry water as part of a private water system. The department interprets regulations to not include a water service line that is connected to a public water system in the definition of private water line.

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

MINIMUM HORIZONTAL SEPARATION DISTANCES FROM SEWER COMPONENTS					
	River, Lake, Stream, Spring, Slough[c]	**Slopes >25%**	**Soil Absorption System**	**Lot Line[a]**	**Foundation[a]**
Septic Tank, Holding Tank, Lift Station	100 feet	need to be stable	5 feet	10 feet	10 feet
Soil Absorption System	100 feet	50 feet[d]	see b. below	10 feet	10 feet
Pit Privy	100 feet	50 feet recommended	see b. below	10 feet	10 feet
a. Recommended minimum horizontal separation distance. All parts, including ground cover for freeze protection must be wholly located on the property with the facility being served. Locating a septic tank or soil absorption system too close to a building foundation may have negative impacts. The septic tank cleanouts or manhole riser must be accessible for maintenance purposes. b. 6 feet or 2 times the distribution media depth, whichever is greater. c. Setbacks is from the mean annual high water level of surface water or the mean higher high water level of tidally influenced water. d. Separation distance applies to the downhill slope; does not apply to mound type soil absorption systems					

MINIMUM VERTICAL SEPARATION DISTANCES FROM SEWER COMPONENTS		
	Seasonal High Water Table	**Impermeable Soil, Permafrost, Bedrock**
Septic Tank, Wastewater Holding Tank	need buoyancy protection	--
Subsurface Soil Absorption System	4 feet	6 feet
Pit Privy	4 feet	--

Disclaimer: This separation distance table was developed for convenience but may not contain all separation distances required to be met.

2.10 Freeze Protection

All geotechnical insulation products shall meet the current ASTM C578 Type IV standard specifications for "Rigid Cellular Polystyrene Thermal Insulation," and have a minimum compressive strength of 25 psi. Examples of products that meet this standard are DuPont Styrofoam Brand Scoreboard, Owens Corning Foamular 250, and Insulfoam Type IX. Spray foam insulation must not be used over a leach field. Filter fabric is still required with insulation. Extra care must be taken backfilling the excavation when insulation is used.

One inch of manufactured insulation may be substituted for one foot of soil cover, up to a maximum of 2 feet of soil cover with at least two inches of insulation. The minimum soil cover shall not be reduced to less than two feet insulation.

These freeze protection standards also apply to advanced treatment units unless the manufacturer has provided specific recommendations or designed the package plant or advanced treatment system to operate in arctic conditions with lessor ground cover or insulation equivalency.

INSULATION REQUIREMENTS	
Geographical Area	**Depth of Soil Cover or Insulation Equivalent***
Southwest Alaska (Kodiak Island Borough and all areas southwest of Chignik, including Chignik)	two feet of soil cover
Southeast Alaska (east of 141° West longitude), the coastal area south and east of Valdez (to 141° West longitude), and the Valdez corporate boundary	three feet of soil cover
All remaining areas of the state	four feet of soil cover
*Up to two feet of the required soil cover may be substituted with insulation material publicly identified by the department as equivalent. Soil cover may not be reduced to less than two feet.	

2.11 Sand Liners

Sand Liners are intended to provide additional treatment in fast draining soil conditions. Soils with percolation rates faster than 1 minute per inch require a sand liner. Sand liner material shall conform to either specification Standard 1 or Standard 2 in the table below.

A two-foot-thick sand liner meeting ADEC specifications, must be placed beneath all leach fields when the receiving soil is classified as gravel (GW or GP), unless a percolation test verifies the rate of water infiltration is slower than 1 minute per inch, or the sand liner requirement is waived by the Department. Also refer to section 2.8.2 for areas where a percolation test is not required for GW/GP soils and a sand liner is waived or implied.

The person responsible must ensure the sand liner material meets the specifications. The department recommends gradation analysis be obtained from the source that is representative of the material used. Multiple gradations may be needed to ensure quality.

Additional Notes on Sand Liners:

- Sand liners may be used only with a bed or shallow trench type system

- A minimum infiltrative area of 150 square feet per bedroom is required
- It is recommended that the infiltration area is increased by 50%
- Compaction of the sand liner must be avoided

Standard 1 - Specific Sieve Criteria	
Sieve Size	**Percent Passing by Weight**
No. 10	85 to 100
No. 20	60 to 90
No. 40	25 to 50
No. 60	≤ 15
No. 200	≤ 5
* The sand may not have more than 45% (of the total) passing any one sieve and retained on the next consecutive sieve of those shown above.	
Standard 2 – Cc and Cu Criteria	
Property	**Criteria**
Coefficient of Uniformity (Cu)	< 4
Coefficient of Curvature (Cc)	≤ 1
Amount Passing No. 10 Sieve	≥ 85%
Amount Passing No. 200 Sieve	≤ 5%
* The sand must not have more than 45 % of the total passing any one sieve and retained on the next consecutive sieve, of those listed in Standard 1	

2.11.1 Regional Sand Liner Waivers

Tok:

A regional sand liner waiver was issued by the Department on January 16, 2002 for select areas in and around Tok where subsurface soil conditions consists of gravelly sand or sandy gravel. The following site conditions and location must be met for the waiver to apply:

- Applicable for a private residence only;
- Groundwater cannot be encountered in any test holes (dug to at least 6 feet below the bottom of the leach field);
- Waiver does not apply to systems located within 200 feet of any surface water body;
- Waiver applies only to the following areas:
    - T18N R11E, Sections 1, 2, and 11 – 14;
    - T18N R12E, Sections 7 – 34;
    - T18N R13E, Sections 18 – 20 and undesignated area to the Tok River, excluding the 200 ft buffer zone around the surface water;
    - T17N R12E, Sections 1, 2, and 11 – 14 and undesignated area to the Eagle Trail

2.12 Classified Fill

For a conventional bed or shallow trench system using a cut and fill technique, the material used to fill the excavation must meet the sand liner requirements or the following criteria:

CLASSIFIED FILL CRITERIA	
Sieve Size	Percent Passing by Weight
3”	100
1-1/2”	85 - 100
3/4”	55-100
No. 4	45 - 100
No. 10	12 - 60
No. 40	4 – 30
#200	<10%

2.13 Distribution Medium

Distribution medium means sewer rock, polystyrene beads, chambers, or gravelless pipe or another material used to provide void space in a soil absorption system. The distribution media provides void space through which effluent flows, storage space, and encourages lateral distribution of effluent through the leach field prior to reaching native soils.

2.13.1 Sewer Rock

There are two specifications for sewer rock, coarse and fine. The fine graded sewer rock must be used in bed, shallow trench, or mound type systems. Coarse graded sewer rock may be used for all other types of conventional leach fields. Sewer rock should be rounded and not compactable to allow for adequate void space. It is critical that the amount of fines (soil passing the #200 sieve) is less than 1%. Fines can easily clog up the infiltrative surface in the soil absorption system and will lead to early failure of the leach field. The use of tailings is not allowed, angular rock must be avoided.

SEWER ROCK CRITERIA	
Coarse Grade Sewer Rock Criteria	
Sieve Size	Percent Passing by Weight
3”	100
2”	0 to 100
1 ½”	0 to 71
1”	0 to 30
¾”	0 to 10
½”	0 to 5
#200	0 to 1
Fine Graded Sewer Rock Criteria	
Sieve Size	Percent Passing by Weight
2”	100
1 ½”	90 to 100

1”	0 to 100
¾”	0 to 10
½”	0 to 5
#200	0 to 1

2.13.2 Chambers

Chambers are for use in bed or shallow trench type systems only and must installed in accordance with the standard details and drawings for bed or shallow trench systems in this manual. Chambers are given credit for bottom area only, require filter fabric over the chambers to prevent fines from migrating into the chamber louvers, and are to be installed per manufacturer specifications.

2.13.3 Gravelless Pipe

There are several types of gravelless media. For the purposes of this manual, the department considers manufactured polystyrene beads such as EZFlow as an approved media. Gravelless pipe that doesn't provide the equivalent media depth for the type of field are not allowed unless approved by the department through the plan review process.

2.13.4 Other Media

Distribution medium not described above must be presented to and approved by the Department.

2.14 Filter Fabric

All geotechnical fabric products shall be Typar 3401 or equivalent. Geotechnical fabric products shall conform to AASHTO M288 Class 3 and have the following characteristics:

- Minimum Permittivity (ASTM D4491) - 0.5/sec
- Maximum Apparent Opening Size (ASTM D4751) – 0.20 to 0.21 mm (US Sieve #70)

A barrier of geotechnical filter fabric is always required on top of the sewer rock and chambers to prevent soil backfill from migrating into the void spaces. Other distribution medium may also require filter fabric or have an equivalent method of preventing fines from migrating into the void space. VISQUEEN or other impermeable material may not be used. Foam board insulation is not a substitute for filter fabric.

3 PIPING, COLLECTION AND PUMPING SYSTEMS

3.1 General Requirements

Building sewer lines, disposal sewer lines, leach field lines, cleanouts, and standpipes shall use solvent welded couplings and fittings of the same designation as the pipe being joined. Please refer to the table for the current approved list of pipe types or ASTM designations.

SEWER LINES APPROVED PIPE MATERIALS					
Pipe Type	**ASTM Designation**	**Building Sewer**	**Disposal Sewer**	**Leachfield Pipe**	**Cleanout and Monitor**
Schedule 40 ABS	F628	Yes	Yes	No	Yes

Schedule 40 PVC	D1785	No	Yes	Yes	Yes
Schedule 40 PVC	D2665	No	Yes	Yes	Yes
SDR 35	D3034	No	Yes	Yes	Yes

Pipe Joints and Mechanical Watertight Couplings

Solid pipe with no joints shall span 5 feet from the inlet and outlet of septic tanks onto undisturbed earth, or the soil may be backfilled and compacted in six-inch lifts before laying the pipe. All pipe joints in monitoring tubes, cleanouts, solid lines, manifolds, and distribution piping must be cleaned prior to gluing, and glued with proper cement for that pipe type.

Manufacturers and types of banded rubber couplings include, but are not limited to Fernco brand, Mission brand, or equal. Mechanical watertight couplings are required on the inlet, outlet, and cleanout or vent pipes on septic tanks. The use of banded rubber couplings are only allowed for connecting the Building Sewer, the Disposal Sewer and the cleanout pipes to the septic tank. Do not use banded rubber couplings for any other purpose.

Pipe Bedding & Installation

Sewer lines shall be laid on undisturbed or compacted soil and must be properly bedded and compacted to the spring line to prevent deflections and low points in the line where water and solids can accumulate and may freeze or otherwise block the pipe. Soil in the pipe zone must also be properly compacted to prevent excessive deflection or pipe collapse because of soil pressure from backfill. Areas that are over-excavated, such as at the septic tank ends, should be carefully compacted to adequately support the piping yet protect the septic tank from deflection. In a multiple trench or bed type leach field, the wastewater must be distributed to each lateral by a solid pipe manifold. All leach field piping must be level, including manifold pipe and perforated pipes.

3.2 Sewer Line Slopes

The slope of the Building Sewer pipe in the 10 feet immediately preceding the septic tank must be between 1/8" to 1/4" per foot (not to exceed 2% slope). The slope or grade of the sewer pipes should be as uniform as possible.

MINIMUM AND MAXIMUM SEWER LINE SLOPES		
Nominal Sewer Line Size*	**Minimum Slope**	**Maximum Slope****
four-inch	two percent	20 percent
six-inch	one percent	13 percent
eight-inch	0.4 percent	eight percent
*For pipes larger than eight-inch nominal diameter, minimum and maximum slopes must be calculated using the Manning formula to maintain a minimum velocity of two feet per second and a maximum velocity of 10 feet per second when flowing full. **Maximum slope may be exceeded for drop connections or for sewer lines located after pretreatment.		

Drop Connections

Drop connections shall have a maximum drop of 10 vertical feet. A drop connection shall be constructed using a combo fitting with the sweep pointing downward and a cleanout pipe to the surface. The bottom of the vertical drop shall be constructed with a 90 degree sweep.

3.3 Building Sewer and Private Sewer Lines

All building sewer or private sewer lines must be a minimum 4-inch diameter for gravity flow. A foundation cleanout shall be installed within five (5) feet of the outside wall of the foundation. The use of double cleanouts is strongly encouraged. Additional building sewer or private sewer line cleanouts shall be installed at intervals not to exceed one-hundred feet in straight runs and for each aggregate horizontal change in direction of 45 degrees or more prior to the septic tank or pre-treatment tank.

3.4 Community Sewer Lines

By definition, there are no community sewer lines associated with a private residence. Community sewer lines shall be laid straight and at a uniform slope. Manholes must be installed at locations where there are changes in pipe slope, size, alignment, and at intersections. Where a community sewer line is entirely located on a single property or serving a single facility, and the sewer line is 6-inches in diameter or less, a cleanout may be installed instead of a manhole as described in the private sewer line section.

3.5 STEP Tanks

STEP is an acronym and stands for "Septic Tank Effluent Pumping". For the purposes of this manual, a "STEP tank" refers specifically to a septic tank that has a pump installed in the second compartment of the tank or has a third compartment manufactured for use with a pump. A "STEP Tank" that is separate from the septic tank is referred to as a pump station or lift station in this manual. When a septic tank is used as a STEP tank, the minimum operating volume listed in the Minimum Septic Tank Size table must be increased by at least 250. For example, a three (3) bedroom home must have a minimum operating volume of 1,250 gallons if used as a STEP tank. A STEP tank will require a manhole riser that extends to the ground surface to provide access to the pump and floats for maintenance. The manhole riser must be pre-manufactured and compatible with the manhole access and connect to the tank with a bonded or mechanical connection that is watertight. The top two feet of the manhole riser must be insulated. The manhole riser must have a lid that is secured. The use of a frost plug in the riser is recommended.

3.6 Pump Stations and Lift Stations

A pumping station, or also commonly called a lift station, is a separate vault chamber specifically used to house a pump. The pump station may be used to elevate wastewater to gain vertical distance to a limiting condition or for use as a dosing chamber for a leach field. Vaults that are not pre-manufactured for use as a lift station must first be submitted to the Department for approval through the normal plan-review process prior to construction. Small vaults (generally less than 100 gallons in volume) that are more suitable for, or manufactured for the purpose of, a basement sump are not allowed to be used as a lift station.

3.7 Basement Sumps

Basement sumps is a term that refers to a pump station that is located within the footprint of a building that collects sewage. Basement sump is not intended to apply to sumps that handle groundwater dewatering only. The construction and installation of basement sumps falls under the state plumbing code, however, basement sumps are required to be located at least 25 feet from a private drinking water well.

4 CONVENTIONAL ONSITE WASTEWATER SYSTEMS

4.1 Restrictions

Prior Department approval is required before constructing, installing, or modifying any part of a conventional wastewater system for systems that have daily flows or a cumulative on-lot or facility-wide flow greater than 2,500 gallons per day, the system serves more than one lot or structure not under the same ownership, the system receives non-domestic wastewater, or the system is installed in an area where other conventional onsite wastewater systems have been known to perform poorly. Conventional leach fields may only be installed in areas where the soil conditions are suitable for a subsurface discharge.

4.2 Septic Tank

Septic tanks separate solid material from liquid by providing time for heavier materials to settle to the tank bottom forming a sludge layer, and for lighter materials to float to the top forming a scum layer. These layers may later be reduced in volume by anaerobic digestion, which is the decomposition of organic and inorganic matter in the absence of oxygen. Septic tanks do not completely purify wastewater, eliminate odors, or digest all solid material, but they are effective in trapping most solids and scum so that reasonably clarified wastewater (effluent) is passed on to the leach field. Improperly sized or damaged tanks, or steep slopes of sewer lines prior to the septic tank can cause turbulence in the septic tank, will prevent the adequate separation of solids and scum in the tank.

A typical septic tank has two compartments. A two-compartment configuration has been shown in some studies to exhibit a slightly better removal of suspended solids than single compartment tanks. Regulations require that two compartment tanks be used. Baffles are located at the inlet, compartment divider, and outlet of a septic tank. The inlet baffle is designed to slow down the incoming wastewater and direct it downward. The interior baffle keeps most of the solid material in the first compartment and the outlet baffle is the last defense to retain solids and scum in the tank.. Materials that degrade slowly, such as coffee grounds, oil and grease, paper towels, disposable diapers, feminine hygiene products, and similar materials should not be disposed of in septic tanks. Water treatment wastes add a significant hydraulic load to the system and may contribute to the corrosion of steel septic tanks, which must be considered when evaluating the appropriate size and tank material. Household cleaning chemicals and detergents, in quantities normally used, are generally not harmful to the system. Performance additives, such as yeast, bacteria and enzymes, have not been found to be beneficial to the septic tank performance, particularly in cold climates, and should not be used.

Septic tanks should be pumped when the sludge layer or floating scum layer exceeds 6 inches. A two-year pumping cycle is recommended. If septic tanks are not pumped periodically, accumulated sludge will overflow with the wastewater into the soil absorption system, resulting in premature failure of the field. The single most important maintenance item a homeowner can do is to pump a septic tank every two years at a minimum.

Septic tanks are manufactured where the outlet pipe is two to three inches lower than the inlet pipe. During installation, if the inlet and outlet ends of the septic tank are reversed, water will back up into the building sewer, stranding solids that could block the line.

Mechanical watertight couplings, such as Fernco couplings, or equivalent are required on the inlet and outlet of these septic tanks. The use of banded rubber couplings are only for connecting the Building Sewer, the Disposal Sewer, and cleanouts to the septic tank. Do not use banded rubber couplings for any other purpose.

Tanks should be located so that a pump truck can readily access the tank and in areas away from driveways or parking lots where snow is typically removed during winter months. Tanks shall not be in a driveway unless rated by the manufacturer for vehicular traffic and is insulated with at least 2 inches of foam board or spray foam. If a tank is paved over, the tank must still be accessible either through vehicle rated risers or cleanouts. Cleanout pipes must be at least four inches in diameter to accommodate a pumping hose, and should extend above grade and the tops capped. Cleanout locations should be "tied" to permanent landmarks by measuring and recording the distance between the cleanout pipes and permanent features such as house corners, so that the pipes may be found if covered with snow or soil.

Septic tanks shall conform to the standards listed in this section. In all cases, installation recommendations or requirements of the manufacturer must be followed.

- Conform to Appendix H of the Uniform Plumbing Code;
- Bear proof of certification by the applicable quality control/assurance certifying organization;
- Have two (2) compartments; and
- Follow the manufacturer's recommendations for maximum burial depth

4.2.1 Minimum Size

Minimum Septic Tank Size			
Residential Dwellings		**Commercial Facilities**	
Number of Bedrooms	Minimum Tank Size*	Daily Design Flow	Minimum Tank Size*
0 - 3	1,000 gallons	Up to 500 gpd	1,000 gallons
4 - 8	1,000 plus 250 gallons for each bedroom over three	501 to 750 gpd	1,250 gallons
9 - 13	2,500 gallons	751 to 1,000 gpd	1,500 gallons
14 - 18	3,000 gallons	1,001 to 1,250 gpd	2,000 gallons
Greater than 18	1,125 + (0.75 * design flow)	Greater than 1,250 gpd	1,125 + (0.75 * design flow)

*Tanks may be used in series or in parallel to achieve the minimum septic tank volume. The installation and design of more than one tank must be by a method publicly identified by the department as acceptable guidance under 18 AAC 72.070 and protective of public health, public and private water systems, and the environment.

- If a kitchen sink garbage disposal is used, an additional 250 gallon capacity is recommended above the minimum bedroom size, to contain the extra sludge generated.
- If a lift station is located prior to the septic tank, the minimum septic tank size must be increased by 250 gallons for residential dwellings with more than 18 bedrooms or commercial facilities with an estimated daily flow greater than 1250 gallons.
- When an integral lift station is contained in the tank, an additional 250 gallons is required to compensate for the loss in volume due to the pumping chamber.
- An insulated, watertight, flanged manhole riser, and cover are required in place of cleanout or vent pipes on septic tanks with tank volumes greater than 2,000 gallons.

A larger tank may always be installed and is encouraged for multiple family dwellings and commercial facilities such as restaurants.

4.2.2 Tanks in Series

Tanks in series means that two tanks are used inline. The first tank receives raw waste and drains to a second, downstream tank. Single compartment tanks may be placed in series to achieve minimum volume requirements. The first tank must be sized to accept two-thirds of the total volume required. For instance, if the total volume of tankage required is 1,500 gallons, the upstream tank must be at least 1,000 gallons, and the downstream tank must be at least 500 gallons. The downstream tank must be placed 5 feet from the upstream tank. The upstream tank may be dual-compartment if the first compartment is sized to meet two-thirds of the total volume required. The downstream tank may be single-compartment or two-compartment. If a single-compartment tank is used, an effluent filter should be installed on the outlet of the second tank.

4.2.3 Tanks in Parallel

Tanks in parallel means two tanks that are installed to operate simultaneously. A device must be used to evenly split the flow between the two tanks. Two compartment tanks that meet the two-thirds/one-third rule may be placed in parallel to achieve minimum volume requirements. The total volume of the two tanks must meet the overall volume requirement. For instance, if 2,000 gallons of total volume is required, two 1,000 gallon tank may be installed in parallel.

4.2.4 Tanks in Series and Parallel

In some cases, such as remote projects where transporting large tanks is infeasible, single compartment tanks may be placed in parallel and series. The first two tanks must have a total of two-thirds of the design volume and be placed in parallel. A device must be used to split the flow evenly between the two tanks. The third tank must be placed at least 5 feet downstream and receive wastewater from both upstream tanks. The third tank must be sized to hold one-third of the total required volume. For instance, if the total tank volume required is 3000 gallons, two 1,000 gallon tanks may be placed in parallel upstream and one 1,000 gallon tank may be placed downstream in series.

4.3 Conventional Soil Absorption Systems

The leach field or soil absorption area is used as the final treatment and disposal point for the clarified effluent from the septic tank. Physical, chemical, and biological processes occurring within the soil will reduce the organic and microbial constituents of the wastewater. At least four feet of unsaturated soil below the leach field is required to effectively reduce the bacteria to an acceptable level. Regulation requires at least 4 feet of vertical separation between the bottom most portion of the distribution media and the groundwater table measured during the time of year when it is expected to be the highest. The local ADEC office may have records available that would be of use in determining the elevation of the seasonal high groundwater table.

Excavation

All excavation shall be accomplished according to OSHA safety regulations. The bottom of the leach field excavation and the bottom of the septic tank excavation shall be level before the placement of the tank or leach field media. Excavations shall not be left open.

Construction machinery should not be driven over the infiltrative area. Beds and trenches should be excavated using a backhoe or similar apparatus, not using a dozer. If during the excavation process, the infiltrative surface becomes smeared, the surface should be raked or otherwise roughened, to remove the smeared soils. To overcome the smearing that naturally occurs when a backhoe bucket is drawn through soil, some contractors have installed rakes on the side of their buckets.

Final Grading, Topsoil, and Seeding

Final grading over a wastewater disposal system should be slightly mounded to allow for settling and graded to help precipitation to drain water away from both the septic tank and the absorption area. If backfill has settled, or was not properly completed at the time of construction, the area should be regraded to provide adequate drainage. The final graded area must be covered with topsoil and seeded with grass.

4.3.1 Minimum Application Rates

The most conservative wastewater application rate from the table below, based on either percolation rate or soil texture (USCS), must be used.

If more than one soil horizon or soil type is to be used in the absorption area, more than one percolation test may be needed to size the system. When using soil horizons with differing percolation or application rates, the system must be sized based on the soil with the most conservative application rate.

WASTEWATER APPLICATION RATES				
Percolation Rate[a] (minutes/inch)	**Soil Texture (Unified Soil Classification)**	**Application Rate in sf/bedroom**	**Application Rate in gpd/sf for design flows ≤ 2,500 gpd**	**Application Rate in gpd/sf for design flows >2,500 gpd**
Faster than 1	Gravel (GW/GP)	Not Suitable[b]	Not Suitable[b]	Not Suitable[b]
1 – 5	Gravel (GW/GP)	125	1.2	0.79 – 0.98

1 – 15	Medium to coarse sand (SW/SP)	150	1.0	0.67 – 0.89
6 – 15	Fine sand or loamy sand (SP-SM)	190	0.8	0.61 – 0.74
16 - 30	Sandy loam, silty gravel (GM), silty sand (SM)	250	0.6	0.52 – 0.61
31 – 60[c]	Loam, silt loam, silt (ML)	335	0.45	0.25 – 0.52
61 – 120[d]	Silty clay loam, clay loam[e]	Not Suitable[d]	Not Suitable[d]	Not Suitable[d]

a. Soils classified as silty sand (SM), silty gravel (GM), or silt (ML) must have a percolation test conducted; percolation tests must be performed in accordance with either a method publicly identified by EPA or the department as acceptable, or by an alternate method that has been presented by a registered engineer and approved by the department; a certified installer may perform the percolation test for systems installed under the certified installer's certification; Soils classified as clay (CL or CH), organic silt or clay (OL), or peat (PT) require an engineer design and prior department approval.
b. Soils classified as gravel (GW or GP) for which a percolation test has not been conducted or a percolation test result is faster than one minute per inch may still be used if a shallow trench or bed system is installed with a two-foot sand liner below the distribution media and if application rates used are at least 1.0 gpd/sf or 150 sf/bedroom; sand must meet the specifications publicly identified by the department under 18 AAC 72.070; the department may waive the sand liner requirement in a manner set out in 18 AAC 72.540.
c. Soils with percolation rates slower than 30 minutes per inch are unsuitable for seepage pits.
d. Soils with percolation rates slower than 60 minutes per inch require an engineer design and prior department approval; soils with percolation rates slower than 120 minutes per inch are considered impermeable.
e. Soils without expandable clays or soil types not listed in this table require an engineer design and prior department approval.

4.3.2 Bed System

Bed type leach fields are typically shallow excavations that utilize a solid header and perforated laterals to distribute effluent evenly across the leach field area. A bed type leach field is usually installed in areas with a limiting condition (seasonal high water table, bedrock, or an impermeable soil) is present within 4 to 8 feet of the ground surface and is often used in conjunction with a lift station to obtain the required vertical separation. The bottom of the distribution media must be below original grade and meet vertical separation distances to be considered a conventional bed.

Site Considerations:

- Suitable for sites with less than 10% slope
- Suitable for sites that require a sand liner (GW or GP soils percolating faster than 1 min/in)
- Typically used in areas where a limiting condition (such as the water table) is close to the ground surface
- Performs best in sands and gravels with minimal fines; bed systems are not recommended to be installed in soils with high percentage of silt
- For larger bed systems, pressure distribution or multiple zones allows for a more even distribution of effluent

Construction Standards:

- Beds should be rectangular in shape with the header width shorter than the lateral length.
- More than 5 feet wide; recommended no more than 24 feet wide
- Maximum length is 100 feet measured from the manifold or solid header
- Minimum depth of distribution medium measured from the spring line of the distribution pipe is 12 inches
- Distribution pipe and chambers must be laid level in the leach field area; pressure distribution should be utilized when a lift station is located prior to the field
- Longest dimension must be parallel to the slope contour
- Minimum of two monitoring tubes required, placed in opposite corners. Four monitoring tubes are recommended, one in each corner
- May use chambers or other gravelless media in lieu of sewer rock
- If the infiltrative surface (bottom) has smearing (glazing) evident, an alternate strata should be used (example, placing at least 6-inches of sand liner or classified fill below the distribution media)

Sizing:

Bed type leach fields receive credit for the bottom area only. Absorption area is calculated by multiplying length times width.

Total Absorption Area = Length x Width

Length of Bed = Total Absorption Area / Width

Width of Bed = Total Absorption Area / Length

Drawings:

New drawings will be coming with future revisions. The drawings in the 2016 OWSIM publication are still mostly valid for conventional leach field areas and are included in Appendix C.

4.3.3 Shallow Trench System

Shallow trench systems are shallow excavations that are no more than 5 feet wide and 100 feet in length. Shallow trenches may be installed using multiple separate trenches with effluent distributed between trenches utilizing a solid header, drop connections, or distribution boxes. Of all system types, shallow trenches use the most surface area to obtain required absorption area but also have flexibility to avoid surface obstacles. The bottom of the distribution media must be below original grade and meet vertical separation distances to be considered a conventional shallow trench.

Site Considerations:

- Suitable for sites with less than 25% slope
- Often used for sites where a bed system won't fit
- Suitable for sites that require a sand liner
- Typically used in areas where a limiting condition is close to the ground surface
- Trench systems allow for some flexibility to fit site conditions.

Construction Standards:

- Minimum depth of distribution medium is 12 inches, measured from the spring line of pipe
- Maximum 5 feet wide
- Maximum trench length is 100 feet
- May use chambers in lieu of sewer rock
- Distribution pipe or chambers must be laid level
- For sloping sites, length of the trench must be along the contour of the slope
- Multiple trench systems can be installed to operate in parallel.
- Monitoring tube required at the end of each trench, or at each end when installed perpendicular to the disposal sewer pipe
- Avoid compaction and sealing of the soil's infiltrative surface
- If the infiltrative surface (bottom) has smearing (glazing) evident, an alternate strata should be used or place 6-inches of sand liner or classified fill on top of native silty soils.

Sizing:

Shallow trench soil absorption systems receive credit for bottom area only. Absorption area is calculated by multiplying length times width.

Total Absorption Area = Length x Width

Drawings:

New drawings will be coming with future revisions. The drawings in the 2016 OWSIM publication are still valid for conventional leach field areas and are included in Appendix C.

4.3.4 5-Wide Trench

5-wide trench systems are hybrid leach field system that uses both sidewalls and bottom as its infiltrative surface. The name is given because they are always 5 feet wide with a variable amount of distribution media. Utilizes the entire bottom area and a portion of its sidewalls as the infiltrative surface.

Site Considerations:

- Cannot be used in areas where a sand liner is required
- Often used in areas with limiting conditions, such as sloughing soils or a high water table, that prevents the installation of a deep trench
- Suitable for sites with less than 25% slope
- Trench systems allow for some flexibility to fit around obstacles

Construction Requirements:

- Always 5 feet wide
- Minimum depth of distribution medium measured from the spring line of the pipe is 18 inches and maximum depth is 48 inches
- Maximum trench length is 100 feet
- Leach field piping must be laid level
- For sloping sites, length of the trench must be along the contour of the slope

- Multiple trench systems can be installed to operate in parallel when connected with a solid header or distribution box
- Monitoring tube required at the end of each trench, or at each end when installed perpendicular to the disposal sewer pipe
- If the infiltrative surface (bottom and sidewalls) have smearing (glazing) evident, the areas must be raked; an alternate soil strata should be used if possible

Sizing:

5-wide trench soil absorption systems receive full credit for the bottom and a partial credit for sidewalls. Absorption area is calculated by multiplying length times 5 and dividing by the sizing factor in the below table.

Trench Length Required = (Total Absorption Area Required / 5) x Sizing Factor

Total Absorption Area = (Length x 5) / (Sizing Factor)

5-Wide Leachfield Length Sizing Factor	
Depth of Sewer Rock Beneath Perforated Pipe	System Sizing Factor
18 inches (1 ½ feet)	0.78
24 inches (2 feet)	0.70
30 inches (2 ½ feet)	0.64
36 inches (3 feet)	0.58
42 inches (3 ½ feet)	0.54
48 inches (4 feet)	0.50

Drawings:

New drawings will be coming with future revisions. The drawings in the 2016 OWSIM publication are still valid for conventional leach field areas and are included in Appendix C.

4.3.5 Deep Trench Leach Field

Deep trench soil absorption systems are deep excavations that have four feet or greater of distribution media depth.

Site Considerations:

- Suitable for sites with less than 25% slope
- Often the most preferred system when limiting conditions are not encountered.
- Cannot be used in areas where a sand liner is required
- Best in soils that are fine grained and somewhat cohesive such as silt and sandy silt soils
- If the infiltrative surface (sidewalls) has smearing (glazing) evident, an alternate strata should be used if possible. Otherwise, a soil test can be performed to determine the soils absorption ability.
- Trench systems allow for some flexibility to fit around obstacles

Construction Requirements:

- Width varies, typically bucket-width or 12 inches to 24 inches. 12-inch wide buckets may limit depth of excavation.
- Minimum depth of distribution medium measured from the spring line of the pipe is 4 feet and maximum is 12 feet
- Maximum trench length is 100 feet
- Leach field piping must be laid level
- For sloping sites, length of the trench must be along the contour of the slope
- Multiple trench systems can be installed to operate in parallel when connected with a solid header or distribution box
- Monitoring tube required at the end of each trench, or at each end when installed perpendicular to the disposal sewer pipe
- If the infiltrative surface areas have smearing (glazing) evident, the areas must be raked before the distribution medium is installed to prevent sealing the soil's infiltrative surface.

Sizing:

Deep trench soil absorption systems receive credit for the sidewall area along the length only. Absorption area is calculated by multiplying the length of the trench by the depth and multiplying by 2 for each sidewall.

Total Absorption Area = Length x Depth x 2 Sidewalls

Drawings:

New drawings will be coming with future revisions. The drawings in the 2016 OWSIM publication are still valid for conventional leach field areas and are included in Appendix C.

4.3.6 Seepage Pit

Seepage pits are large pit systems that have a perforated tank located in the middle. These are the most expensive, but seem to be the longest lasting, system.

Site Considerations:

- Suitable for sites with less than 10% slope
- Suitable for sites with percolation rates less than 30 minutes per inch.
- May be used in silt and weathered bedrock applications.
- Cannot be used in areas where a sand liner is required

Construction Requirements:

- The entire excavation must be filled with leach rock around the distribution tank
- Depth may not exceed more than 2 feet below bottom of leach tank; total depth may not exceed 8 feet
- If rectangular, longest dimension should be parallel to the slope contour
- Monitoring tube required as a solid pipe only attached to the top of the distribution tank
- When installing a system in a soil with sidewall smearing, the sidewalls must be scarified before the sewer rock is installed to prevent sealing the soil's infiltrative surface.

Sizing:

Seepage pit soil absorption systems receive credit for the sidewall area only. Absorption area is calculated by the total perimeter length and multiplying it by the depth.

Total Absorption Area = Perimeter x Depth

Perimeter of Seepage Pit

Rectangular shape: Perimeter = 2 x Width + 2 x Length

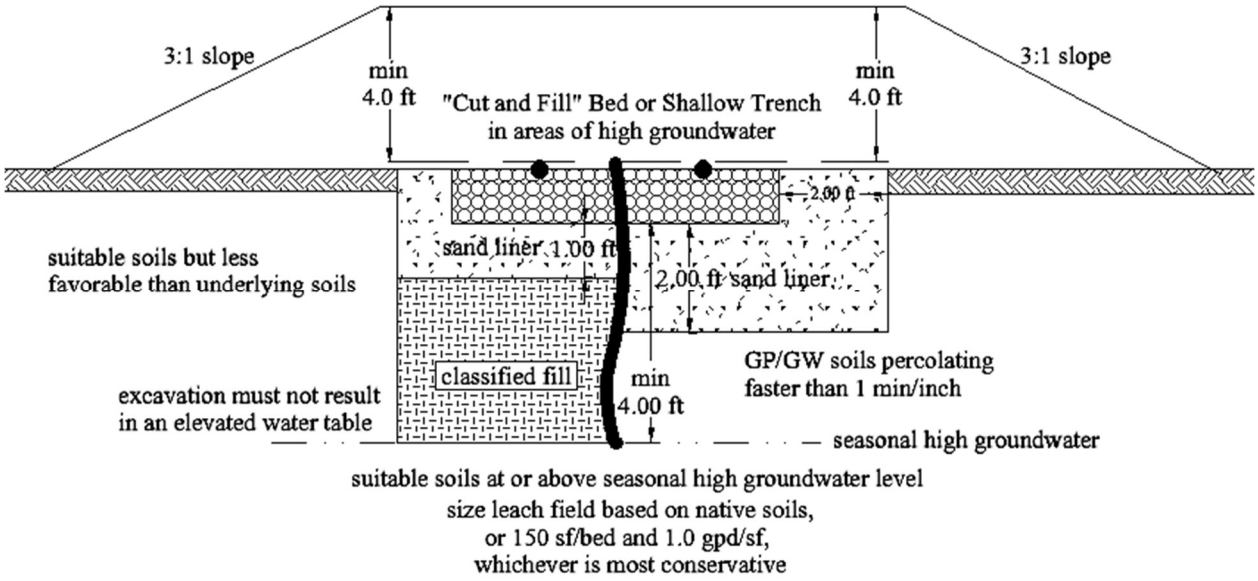
Square shape: Perimeter = Length x 4 side walls

Drawings:

New drawings will be coming with future revisions. The drawings in the 2016 OWSIM publication are still valid for conventional leach field areas and are included in Appendix C.

4.4 Cut and Fill Systems

Cut and fill systems are used on sites with shallow slowly permeable soils overlying more permeable soils such as gravels, sands, and sandy loams and where construction of a conventional leach field system below the tight soil horizons are not possible due to a limiting condition. Only a bed or shallow trench type leach field may be utilized for a cut and fill system. Sites that do not have a more permeable suitable native soil (example, the soil horizon to depth is all silts) are not suitable for a cut and fill system. The following figures show site conditions where a cut and fill system may be used. A system that requires a sand liner in GP or GW soils are a type of cut and fill system.



4.4.1 Replacement Leach Field in Same Location as Existing Leach Field

Replacement in same place systems are used on sites where the only suitable replacement location is in the same location as the operating system. Only a bed or shallow trench leach field are eligible for to be replaced in the same area. To install a new system in the same area as an existing system, the old distribution media and a minimum of two feet of soils below the bottom of the distribution

media must be removed and properly disposed. The excavation must be filled with a sand liner or classified fill to maintain vertical separation distances. A technique similar to the cut and fill system is typically used. No part of the failed leach field may be left in service. Systems replaced in the same area often do not last as long as the original system; an alternative engineered system solution including waivers or an advanced treatment unit may be a better solution.

5 ALTERNATIVE ONSITE WASTEWATER SYSTEMS

5.1 Permit and Operational Requirements

Alternative onsite wastewater systems installed without prior plan approval must be designed by a professional engineer to meet standard sanitary engineering practice and the publicly identified best management practices identified in this manual. In addition, the installation must be inspected by the design engineer, or a person under their responsible charge, at appropriate phases of construction to ensure the system is installed according to the design and to develop record documents required to be submitted to the Department. All existing components of a wastewater system must be verified to confirm they meet the standards in this manual and are still functional.

Wastewater systems that will not meet separation distance requirements in 18 AAC 72.100 and 18 AAC 72.620 must obtain a waiver approval prior to beginning construction. An alternative onsite wastewater system that discharges to surface waters (including wetlands and relatively permanent waters) must continue to obtain prior plan approval and an approval to operate in accordance with 18 AAC 72.615 and 18 AAC 72.200 – 290.

5.2 Restrictions

Alternative onsite wastewater systems that receive domestic wastewater, and include onsite disposal or storage only may be constructed, installed, or modified without prior plan review for systems serving

1. a private residence, multi-family dwelling, commercial facility, employee housing or other supporting infrastructure, or a combination of thereof where the total on lot design flow and total facility-wide design flow is 1500 gallons per day or less
2. temporary or mobile camps associated with mining or oil and gas exploration and development that do not discharge to WOTUS or otherwise require a permit issued by DEC (does not exempt from other agency permits that may be required)

Alternative onsite wastewater systems may consist of a wide variety of system designs from package plants to holding tanks. This manual is generally organized by type of wastewater system, disposal system, or component specific requirements. This manual is not intended to be a full substitute for engineering judgement and sanitary practices but rather provides some minimum acceptable standards and best management practices for alternative onsite wastewater systems.

5.3 Advanced Treatment Systems

A package plant or advanced treatment unit must have current certification from an accredited third-party testing organization such as NSF 40 or equivalent third-party accreditation; or shall

demonstrate the ability to meet secondary treatment requirements through a one-year monitoring and sampling plan showing the system can successfully treat wastewater under similar installations.

Wastewater must meet minimum treatment requirements of 18 AAC 72.050 prior to disposal. This manual covers disposal system options for advanced onsite wastewater systems only which, by definition, does not include disposal to surface waters. All systems that discharge to surface waters, including wetlands, are required to have plan approval under 18 AAC 72.615.

5.3.1 Disinfection

Disinfect is defined at 18 AAC 72.990(25). In general, it means fecal coliform is reduced to less than 200 cfu/100 mL.

Disinfection by UV light, chlorination, ozonation, or other process is required for all land surface discharges unless the Department approves the discharge without disinfection through plan review under 18 AAC 72.615.

Disinfection by UV light, ozonation, or other process is required for some increased application rates for soil absorption systems in the table presented in section 5.5.3. Soil absorption systems utilizing a two-foot sand liner or other suitable soils of a minimum four foot depth are presumed to provide the disinfection necessary prior to reaching the groundwater.

Disinfection as required for land surface discharges is also required for all leach field type systems that include collection and conveyance piping installed in or under the leach field area daylighting to the ground surface. In addition, fencing and signage is also required the same as other land surface discharges.

5.3.2 Nitrogen Removal

Additional content will be added in future revisions. Nitrogen removal may be required in areas where the nitrate level in the groundwater exceeds 10 mg/L or the wastewater disposal system is expected to increase nitrate levels in groundwater above 10 mg/L at the property boundary, at nearby surface water, or in any private or public water system. Nitrogen removal technology is also required to utilize the highest wastewater application rates presented in column three of the table for secondary treated wastewater.

5.4 Land Surface Disposal

Wastewater discharged to the ground surface must meet the secondary treatment standard defined at 18 AAC 72.990. For systems installed without plan approval, effluent discharged to the land surface must meet the disinfection standard and the land surface discharge area must be fenced, and a warning sign posted. The fencing and warning signs are not required for land surface discharges serving a private residence but are recommended.

Land surface discharges must meet horizontal separation distance requirements to surface water, and private and public water system sources. Consideration of lot size and proximity to neighboring properties must also be considered. All wastewater discharged to the land surface must remain within the property boundary.

While a land surface discharge is an option, visible wastewater is a quick way to raise alarm of uninformed neighbors and usually receives complaints more frequently or sooner than discharges to a soil absorption system. Wastewater observed creating a nuisance on adjacent properties is considered a failure of the system under 18 AAC 72.090.

5.5 Alternative Soil Absorption Systems

An alternative soil absorption system (SAS) is a type of soil disposal system that does not meet the requirements of a conventional soil absorption system. This includes systems that utilize additional treatment in order to use a higher application rate than a SAS that receives septic tank effluent.

5.5.1 Mound Systems

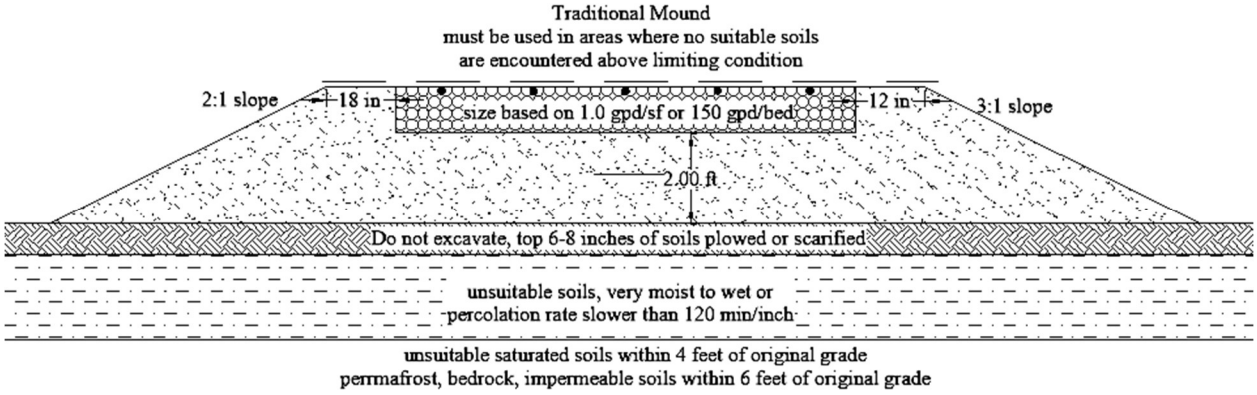
The content of this section will be improved in the future. The mound system guidance provided in either the Minnesota or Idaho technical guidance publications referenced at the beginning of this manual are excellent resources and are acceptable for topics not well covered in this section.

Mound type systems are a type of soil absorption system where the bottom of the distribution media must be located above original grade due to shallow limiting conditions or unsuitable soils. The distribution media depth in a mound must include 12-inches of fine leach rock, measured from the springline of the effluent distribution piping, or utilize manufactured media of equivalent depth.

All mound systems must include pressurized distribution of effluent to the distribution media. An engineer who utilizes elevation change to demonstrate pressure distribution, must still incorporate timed dose into the design with a minimum of 5 doses a day and maximum dose in any one hour period not exceeding 15% of the daily flow. The minimum calculated residual head at the furthest point of distribution should be at least 4 psi regardless if a pump or elevation change is used.

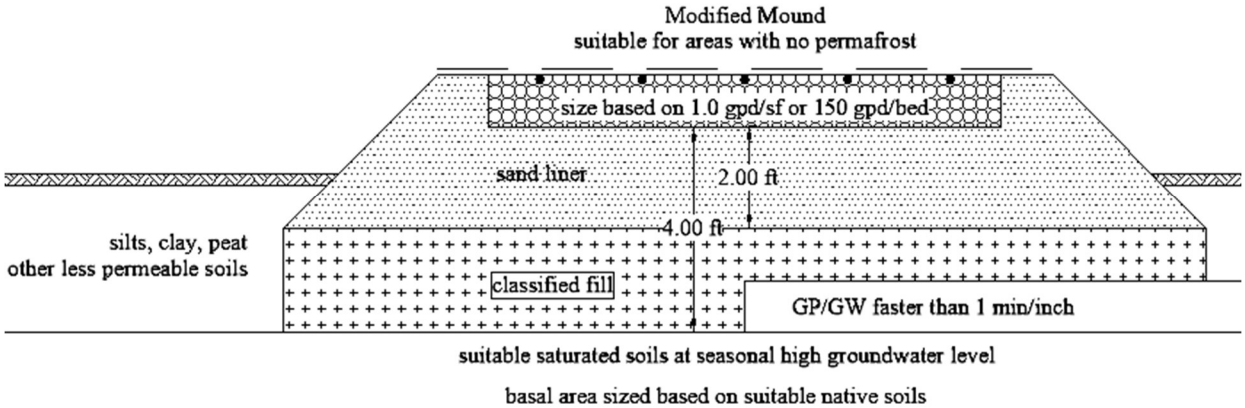
Traditional Mound

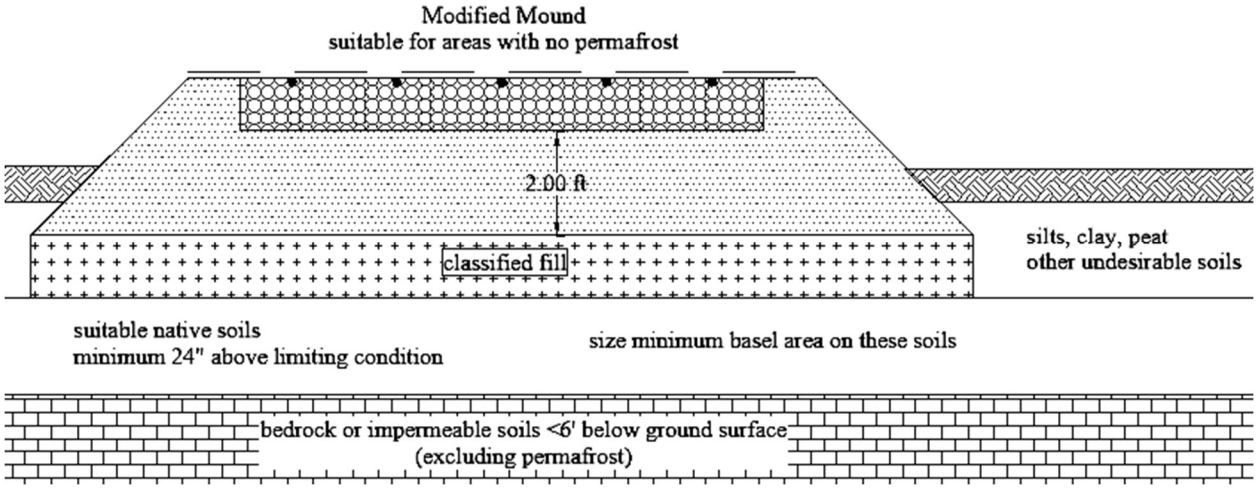
A traditional mound is the only type of alternative soil absorption system that is suitable for areas of shallow permafrost, wet slowly percolating soils, or otherwise where a modified mound is not suitable. The principal behind the traditional mound design does not rely on native soils for treatment; rather the sand liner is expected to provide sufficient treatment prior to reaching the original ground surface. Organic soils are left in place promote horizontal movement of the effluent away from the mound where effluent may not be otherwise be dispersed in the subsurface soils.



Modified Mound

Similar to a cut a fill system, a modified mound may only be used in areas where more suitable soils are located above or at a limiting condition. Below are two scenarios where a modified mound may be used. In the case of a modified mound in areas with high water tables, the bottom of the distribution media must be located at least 4 feet above the seasonal high water table. A modified mound is not allowed in shallow permafrost areas or very moist to wet soil conditions.





5.5.2 Pressure Distribution

All mounds require a pressure distribution using a pump. Timed dose is recommended.

Additional content will be added in future revisions. In the meantime, the pressure distribution guidance published by Washington State Department of Health should be uitilized.

5.5.3 Increased Application Rates for Soil Absorption Systems

A soil absorption receiving secondary treated wastewater may utilize the application rates in the below table; additional components and treatment is necessary to apply the higher application rates.

Overflow conveyance piping to the land surface that have the potential to bypass or short circuit soil treatment are not allowed without disinfection (ex. UV).

Secondary treatment is defined at 18 AAC 72.990(79). In general, it means advanced treatment that produces effluent with less than 30 mg/L of BOD and TSS.

Disinfect is defined at 18 AAC 72.990(25). In general, it means fecal coliform is reduced to less than 200 cfu/100 mL. Soil absorption systems utilizing sand liners and/or suitable soils above a limiting condition are presumed to provide physical disinfection necessary to meet the 18 AAC 70 Water Quality standard of 1 cfu/mL for groundwater.

Wastewater Application Rates for soil absorption systems receiving effluent meeting secondary treatment standards

Percolation Rate[a] (minutes/inch)	**Soil Texture (Unified Soil Classification)**	**with gravity distribution**	**with timed dose or pressurized distribution**	**with timed dose or pressurized distribution and nitrogen removal**
Faster than 1	Gravel (GW/GP)	Not Suitable	Not Suitable[b]	Not Suitable[b]
1 – 5	Gravel (GW/GP)	1.8	2.0	3.0
1 – 15	Medium to coarse sand (SW/SP)	1.5	1.8	2.8
6 – 15	Fine sand or loamy sand (SP-SM)	1.2	1.5	2.5
16 – 30	Sandy loam, silty gravel (GM), silty sand (SM)	0.9	1.2	2.0
31 – 60	Loam, silt loam, silt (ML)	0.5	0.8	1.0
61 – 90	Silty clay loam, clay loam[c]	0.3	0.4	0.5
91 – 120[d]	Any soil texture[c]	Not Suitable[d]	0.15	0.25

a. Percolation tests must be performed in accordance with either a method publicly identified by EPA or the department as acceptable. The application rate must be based on either the percolation test or soil texture/classification, whichever is the most conservative.
b. Soils classified as gravel (GW or GP) for which a percolation test has not been conducted or a percolation test result is faster than one minute per inch may still be used if a shallow trench or bed system is installed with a two-foot sand liner below the distribution media and the application rates listed for SW/SP is used; sand must meet the specifications publicly identified by the department; the department may waive the sand liner requirement in a manner set out in 18 AAC 72.540 or disinfection must be included as part of the treatment prior to discharge to the leach field; for treatment that includes disinfection (ex. UV) the application rates listed for gravel (GW/GP) may be used.
c. Soils with expandable clays or soil types not listed in this table require an engineer design and prior department approval.
d. Soils with percolation rates slower than 90 min/inch require prior department approval; soils with percolation rates slower than 120 minutes per inch are considered impermeable.

5.6 Graywater Systems

The OWS TRC is preparing content to greatly improve on this section and expects that it will be available by the next publication date anticipated in May, 2024. Wastewater that does not contain waste from a toilet is known as graywater. Graywater from sinks, showers, laundry, kitchen, bath, or other domestic source must still receive treatment before being discharged to the environment.

Additional information on best practices for the use and installation of graywater only systems will be included in future revisions of this manual. In the meantime, graywater system guidance provided in either the Minnesota or Idaho technical guidance publications referenced at the beginning of this manual are excellent resources and are acceptable.

5.7 Holding Tanks

A holding tank is a watertight tank used for the temporary storage of wastewater. Holding tanks that receive only non-waterborne human urine or excrement is defined as a vault privy. All holding tanks must be pumped regularly and the contents disposed at a facility approved to receive septage. Except for holding tanks serving facilities listed in Section 5.2, holding tanks shall conform to the requirements listed in 18 AAC 72.615(d) and receive plan approval prior to construction.

Holding tanks receiving waterborne waste should generally be avoided for year-round residential dwellings and are discouraged unless there are no other practicable alternatives. The exception to this might be a community operated pump and haul system. The registration of a holding tank installed without plan approval must include the location of septage disposal and information justifying a holding tank as the most practicable and feasible wastewater system for the facility operations and site conditions.

This section does not apply to marine sanitation devices or tanks contained in a mobile food unit permitted under 18 AAC 31. This section also does not apply to holding tanks contained wholly within an occupied building where any spills or leaks would be contained within the building. For holding tanks receiving non-waterborne human waste only, refer to the vault privy section for minimum standards.

5.7.1 Minimum Storage Capacity

Calculations for holding tanks and daily flow for the facility must be submitted, providing a base minimum of two days' storage capacity, or greater if the department identifies it as necessary. Holding tanks serving residential dwellings must be sized the same as required for a septic tank.

If water is supplied by a water holding tank, the wastewater holding tank should be sized at 110% of the water holding tank volume. If water is supplied from a private well or public water system, a year-round residential dwelling unit may not use a wastewater holding tank unless the tank is maintained by a community operated pump and haul program.

5.7.2 Overflow Prevention

All holding tanks receiving waterborne waste must be equipped with an audible and visual high-water alarm. It is strongly recommended a double alarm system be used to provide an early alert to the occupants of the need to schedule pumping and to minimize water use.

For a single alarm system, the float must be set to alarm at no more than 80% to 85% of the storage capacity or at a volume equaling at least 2 days of storage capacity at an assumed reduced water usage rate of 25% of the design flow. For a double alarm system, the first alarm should be set at 80% to 85% and the second alarm set at 90% to 95% of the storage capacity. Depending on the location of the property and availability of pumpers, the high-water alarm(s) may need to give occupants more advanced warning prior to the tank nearing maximum capacity.

5.7.3 Mobile or Temporary Work Camps

Mobile or temporary work camps that are served by holding tanks located within a mobile module may be registered and do not require prior plan approval.

Additional content will be added in future revisions. In the meantime, standard designs that have regularly been approved by the Department for mobile holding tank modules serving camps associated with Oil and Gas are acceptable for registration.

5.8 Vault Privy

A vault privy is a watertight vessel that receives only human waste with no addition of water. Vault privies will typically be used at public facilities with a high amount of traffic and the use of an onsite wastewater disposal system is not practical due to the lack of a pressurized water system or electricity. The vault should be easily accessible for pumping and maintenance. Private residences should use a pit privy if site conditions allow minimum separation distances to be met.

Vault privies must be designed by a registered engineer. The vault must be protected from the introduction of atmospheric water by a shelter located over the vault opening. A commercially available design should be used. A vault privy must meet the same separation distances as a holding tank but is not required to have a high-water alarm. If the bottom of the vault is set in the seasonal groundwater table, buoyancy protection and calculations must be provided.

A responsible party must be identified that will ensure pumping the vault will occur and contents are disposed at an approved wastewater treatment system.

Appendices

Appendix A – Formula's and Examples

All of the formulas and examples in this Appendix are based on minimum requirements. In scenarios where numbers must be rounded, they are to be rounded up to be conservative (e.g., above the minimum requirements).

Wastewater Flows and Application Rate Formula's

Residential:

Total Absorption Area Required may be calculated from the number of bedrooms or from the total wastewater flow
Total Wastewater Flow = Number of bedrooms x 150 gpd/bedroom
Total Absorption Area Required = Number of bedrooms x Application rate in sf/bedroom

Commercial:

Peak Wastewater Flow = Number of Units x Flow in gpd/unit

Total Absorption Area Required = Peak Wastewater Flow /Application rate in gpd/sf

Leach Field Formula's

Bed: *credit for bottom area only*

Total Absorption Area Required / Bed Width = Total Bed Length Required

Common bed widths are, 12', 18', and 24'

E.g., 18ft width x 25ft length = 450 sqft

Shallow Trench: *credit for bottom area only*

Total Absorption Area Required / Trench Width = Total Trench Length Required

E.g., 5ft width x 60ft length = 300 sqft

5-Wide: *credit for percentage of side walls and bottom area*

(Total Absorption Area Required / 5) x Sizing Factor of Depth of Sewer Rock = Total Trench Length Required

E.g., (450 sqft required / 5ft width) x 0.70 (RF for sewer rock depth of 2ft) = 63ft length

Deep Trench: *credit for side wall area only*

Total Absorption Area Required / (2 Sidewalls x Depth of Sewer Rock) = Total Trench Length Required

E.g., (6ft depth x 2 sidewalls) x 62.5ft length = 750 sqft

Seepage Pit: *credit for side wall area only*

Total Absorption Area Required / Depth of Sewer Rock = Total Perimeter Required
Total Perimeter / 4 = Length of each
This calculation assumes a pit with four equal sides or a square. For rectangular seepage pits, the length of each section must add up to be the total perimeter.
E.g., 6ft depth x 25ft length x 4 sidewalls = 600sqft

Example scenarios for conventional soil absorption systems:

Scenario 1

Site Evaluation:

A client has a 4-bedroom single-family home at a location which is suspected to have a high seasonal high groundwater table which fluctuates throughout the year.

In August, a 13-foot-deep test hole is dug within 25 feet of the proposed system reveals silty sand (SM) soils with a groundwater table at 11 feet below the ground surface. A percolation test was performed at 4 ½ feet which resulted in a percolation rate of 10 minutes per inch.

The application rate determined from section 4.3.1 of this manual is determined to be 250 sf/bedroom as it is the most conservative rate based on the observed soil texture (SM) and percolation rate.

Since the testhole was dug in August on a relatively normal precipitation year, it is decided to research surrounding onsite systems and discuss the location with Department staff. It is then concluded that August is not the time of year that represents the seasonal high ground water table.

Adjusting 2 feet to the encountered groundwater table places the seasonal high groundwater table at 9 feet below the ground surface. The bottom of the sewer rock then must be placed at 5 feet or higher to maintain the required 4 foot vertical separation distance to the seasonal high groundwater table.

With the above information, you determine that a shallow trench or bed leach fields are the most appropriate systems to be installed on this property.

Leach Field Calculations:

Total Absorption Area Required

4 bedrooms x 250 sf/bedroom = 1000 sf required

Potential leach field sizes:

Bed:
1000 sf / 18 ft-wide = 55.55 ft length required, round up to 56 ft or an 18 ft-wide by 56 ft-length bed
1000 sf / 24 ft-wide = 41.67 ft length required, round up to 42 ft, or a 24 ft-wide by 56 ft-length bed

Shallow Trench:
1000 sf / 5 ft-wide = 200 ft length required, use 2 parallel 100 ft-length by 5 ft-wide shallow trenches or 3 parallel 67 ft-length by 5 ft-wide

Scenario 2

Site Evaluation:

A property owner has a 2-bedroom single-family home and a 1-bedroom cabin on a moderately sloped lot. A discussion with the owner determines that the site meets the definition of a private residence. In the area of the proposed soil absorption area, the slope is estimated at 15% and there is no slope exceeding 25% within 50 feet of the leach field.

A 16-foot-deep test hole, the maximum reach of the excavator, is dug within 25 feet of the proposed system reveals a predominantly coarse sand with a minimal amount of gravel is encountered. No groundwater or impermeable soils were encountered. The gravel is estimated by weight to be 20% of the total soil encountered. The USCS classification is then determined to be poorly graded sand with gravel or SP.

The application rate determined from section 4.3.1 of this manual is determined to be 150 sf/bedroom.

Since the excavator could only dig to 16 feet and to ensure the vertical separation distances to groundwater and impermeable soils, the bottom of the sewer rock then must be placed at 10 feet below ground surface to maintain the required 6-foot vertical separation distance to impermeable soils.

With the above information, you determine that a deep trench or 5-wide are the most appropriate systems to be installed on this property. A shallow trench may also be used.

Leach Field Calculations:

Total Absorption Area Required
3 bedrooms x 150 sf/bedroom = 450 sf required

Potential leach field sizes:

Deep Trench:
450 sf /(6 ft-deep x 2 sidewalls) = 37.5 ft length required, round up to 38 ft or a 38 ft-length by 6 ft-deep deep trench
450 sf /(5 ft-deep x 2 sidewalls) = 45 ft length required, or a 45 ft-length by 5 ft-deep deep trench
450 sf /(4 ft-deep x 2 sidewalls) = 56.25 ft length required, round up to 57 or a 57 ft-length by 4 ft-deep deep trench

5-wide:
450 sf / 5 ft-wide = 90 ft length required prior to multiplying the system sizing factor
90 ft-length x 0.50 (sizing factor for 4 ft depth of sewer rock) = 45 ft length required, or a 45 ft-length by 5 ft-wide by 4 ft deep 5-wide
90 ft-length x 0.58 (sizing factor for 3 ft depth of sewer rock) = 52.2 ft length required, round up to 53 feet or a 53 ft-length by 5 ft-wide by 3 ft deep 5-wide
90 ft-length x 0.78 (sizing factor for 18 inches depth of sewer rock) = 70.2 ft length required, round up to 71 feet or a 71 ft-length by 5 ft-wide by 18 inches deep 5-wide

Scenario 3

Site Evaluation:

A coffee cart business desires to upgrade from holding tanks to an onsite wastewater disposal system and a well. The property is 5 acres with a large driveway with multiple entrances to accommodate vehicle access. The lot is relatively level with no surface conditions that could affect the system location on the initial investigation. The business owner would prefer the leach field to be a seepage pit if possible.

Multiple potential test hole locations are identified in the initial planning stage. Locations are identified to keep the septic tank and leach field out of the driveway, the sewer line 100 feet away from the proposed well, and the septic tank / leach field 200 feet away from the proposed well. The business owner is referred to the Department's Drinking Water program for a water system classification.

A 16-foot-deep test hole is dug within 25 feet of the proposed system reveals 3 feet of organic silt (OL), 4 feet of fine sand (SP-SM), and 9 feet of silty gravel (GM). No groundwater or impermeable soils were encountered. Percolation tests were performed at 5 feet below ground surface in the fine sand layer resulting in a percolation rate of 6 minutes per inch and at 8 feet below ground surface in the silty gravel resulting in a percolation rate of 22.5 minutes per inch.

The application rate determined from section 4.3.1 of this manual is determined to be 0.80 gpd/sf in the SP-SM layer and 0.60 gpd/sf in the GM layer. Because the system selected utilizes multiple soil horizons with varying application rates, the most conservative application rate of the varying soil horizons is 0.60 gpd/sf.

Since the test hole depth is 16 feet deep and to ensure the vertical separation distances to groundwater and impermeable soils, the bottom of the sewer rock then must be placed no deeper than 10 feet below ground surface to maintain the required 6 foot vertical separation distance to impermeable soils.

With the above information, you determine that a seepage pit may be installed on this property as requested by the owner. All other system types may also be used.

Leach Field Calculations:

Total Absorption Area Required
1 Coffee Cart x 150 gpd/unit = 150 gpd
150 gpd / 0.60 gpd/sf = 250 sf required

Potential leach field sizes:

Seepage Pit:
250 sf / 6 ft-deep = 41.67 ft perimeter required, use 42 ft
42 ft / 4 sides = 10.5 ft per side, use 11 ft, or a 6 ft-deep 11x11ft seepage pit

Appendix B - Guidelines for pit privy design, operation and closure

Decide where to locate the pit

- Find a site where the groundwater table is deep enough to ensure the four foot minimum vertical separation between the bottom of the pit and the groundwater.
- Locate the pit privy in area where the water will drain away from pit
- A pit privy shall not be installed in an area that is subject to flooding.
- Pit privies meeting the below requirements are not required to be approved by or registered with the Department. Check with local government for additional restrictions or requirements.
- The pit privy must meet the following minimum separation distances (setbacks).

Pit Privy Minimum Required Separation Distances Measured Horizontally or Vertically	
Distance in Feet	**Separation Distance to**
100 feet	Surface water, wetlands, sloughs, swamps and from any potable water system that is not a public water system
200 feet	Any water source used to supply a public water system serving at least 25 people for more than 60 days
6 feet	From the edge of the pit privy to any other soil absorption field
4 feet	The distance between the bottom of the pit privy and seasonal high groundwater table

If you cannot meet these setback requirements, contact the local DEC office. You may be required to provide site-specific information that documents your properties particular circumstance, or you may not be eligible to install a pit privy at your property.

Dig the pit

- Dig a pit deep enough to provide capacity for the amount of waste anticipated. When sizing the pit, include the estimated amount of ash from burnable solid waste if you intend to dispose of the ash in the pit privy.
- As noted above, dig the pit so that the bottom of the pit is at least four feet above the groundwater table to prevent flooding of the pit and provide adequate treatment of the waste.
- Construct the pit to prevent cave-ins. If necessary, cribbing can be used to shore up the sides of the pit. Cribbing should fit firmly against the earthen walls on all sides. Cribbing should descend the full depth of the pit and rise flush with the ground level. Use only untreated lumber for the cribbing.
- Construct the pit so water drains away from the opening and not into the pit. Use the excavated soil to berm up around the pit.

Construct the privy

- There need not be a "house" associated with a pit privy as long as the opening of the pit is protected from rain and snow. This prevents the pit from filling with extra liquids.

- There must be a covering over the pit that prevents insects and vermin (voles, shrews, etc.) from entering the pit. A bench must be constructed over the pit that has a closing lid. If you use a commercial toilet seat, remove the knobs from the underside of the seat and seal the toilet seat to the bench.
- Use durable and cleanable materials. Painted or stained wood surfaces are acceptable.
- If you construct a structure that includes ventilation, screening with openings no greater than 1/16 inch should be used to cover the vent opening.
- Ensure that all possible accesses into the pit are sealed to prevent small insects from entering the pit.

Operate the pit properly

- Use lime to control odors. Apply as frequently as needed.
- Use extreme caution when working with strong disinfectants such as lime. Be careful to not spill the lime or allow it to remain on the seat of the privy. Lime will cause chemical burns to the skin.
- Do not dump graywater, garbage, oil, hazardous substances, toxic waste, or un-burned solid waste into a pit privy.
- Ash from burnable solid waste can be dumped into a pit privy.
- If the privy is used yearly, but closed seasonally, apply lime to the pit prior to the seasonal closure. Additionally, secure the pit against rain, snow and vermin. For example, if a toilet seat is used it should be removed and the hole covered with a board secured to the bench with nails or screws. A tarp may be needed over the bench to further guard against snow and rain filling the pit.
- A pit privy must be closed when it fills to within two feet of the ground surface. See Step five for instructions on abandoning a pit privy.

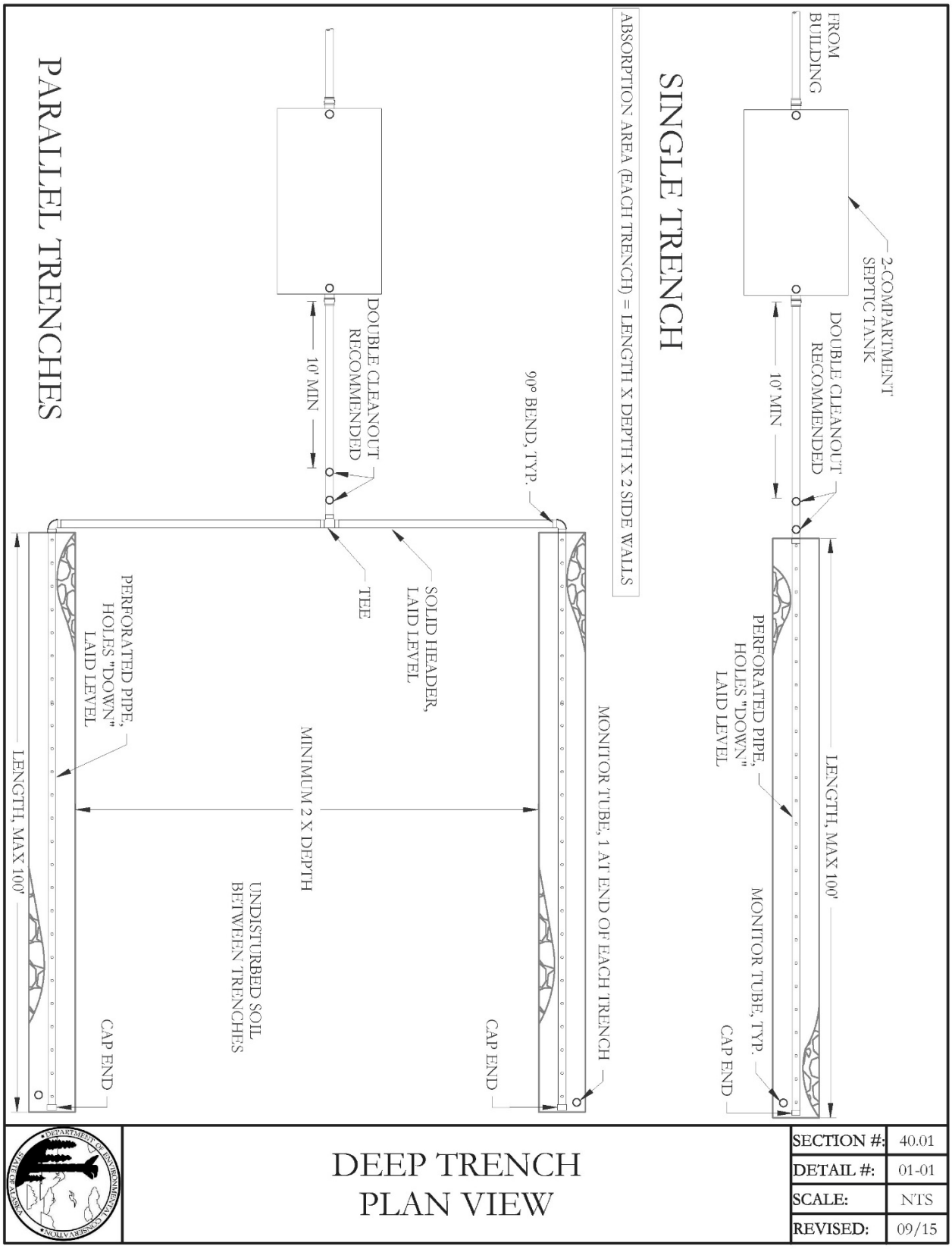
Abandon the pit privy properly when solids are within two feet of the ground level or when use of the pit privy is permanently discontinued

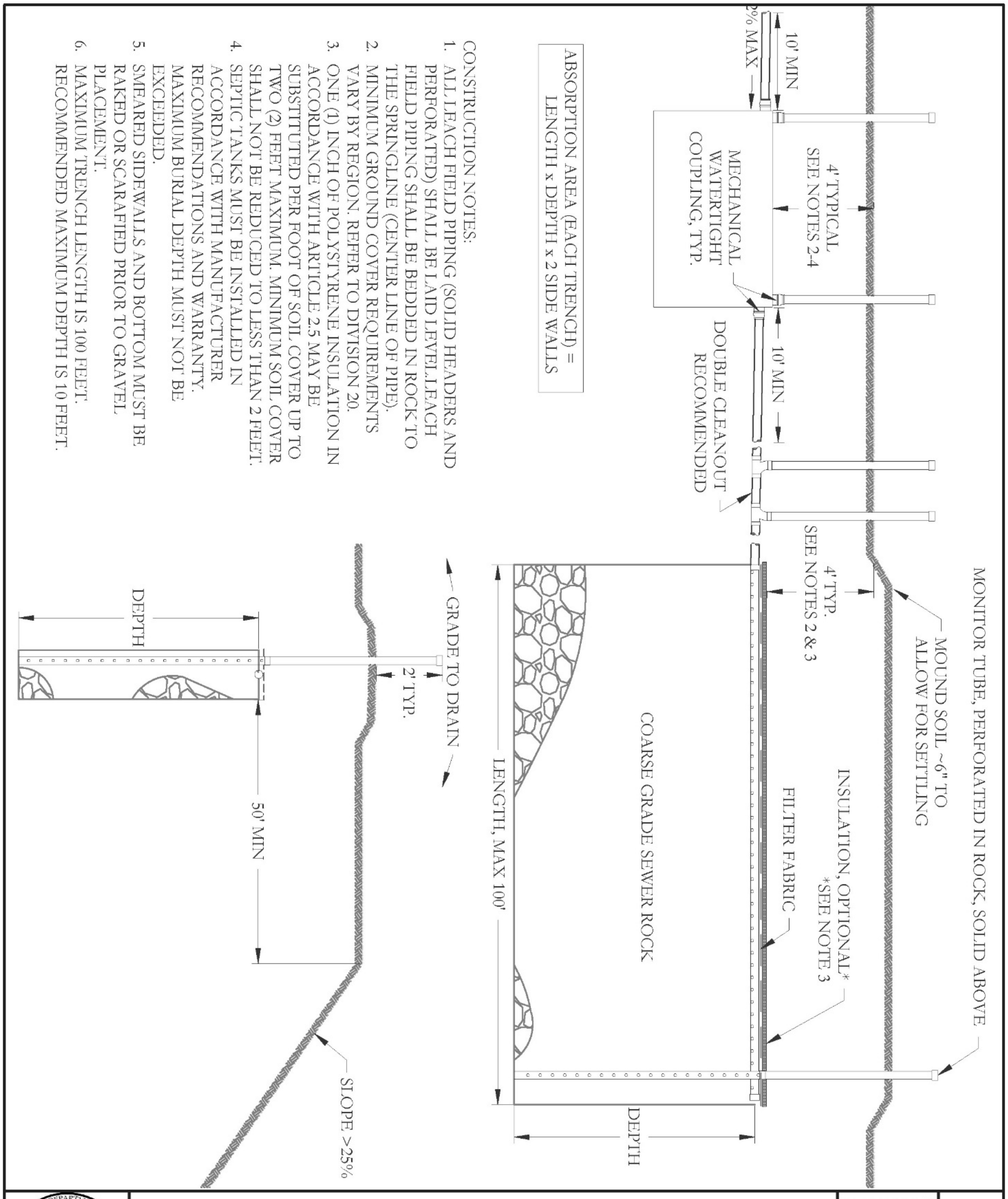
- Remove any structure erected over the pit.
- Apply lime to the pit.
- Cover with a minimum of two feet of compacted soil. More cover may be needed to adequately cover the pit.
- Contour the soil so there is a mound that will ensure drainage away from the pit and to allow settling of the soil.
- Mark the pit location so that future owners avoid digging a new pit into a previously abandoned pit.

Appendix C – Conventional Onsite System Drawings

These drawings are from the 2016 Onsite Wastewater System Installation Manual. These drawing for conventional leach fields are still mostly valid and are to be used for reference until new drawings are incorporated in this manual.

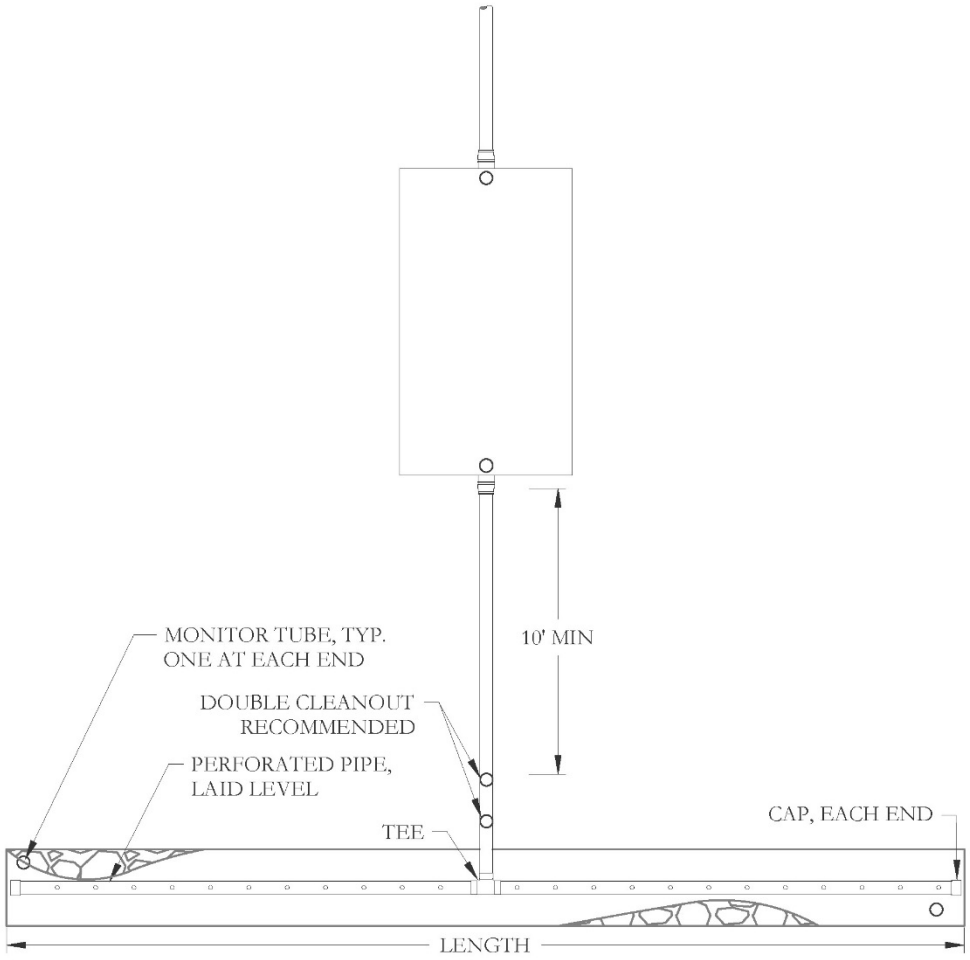
Article 1.2 Standard Drawings for Deep Trench Systems





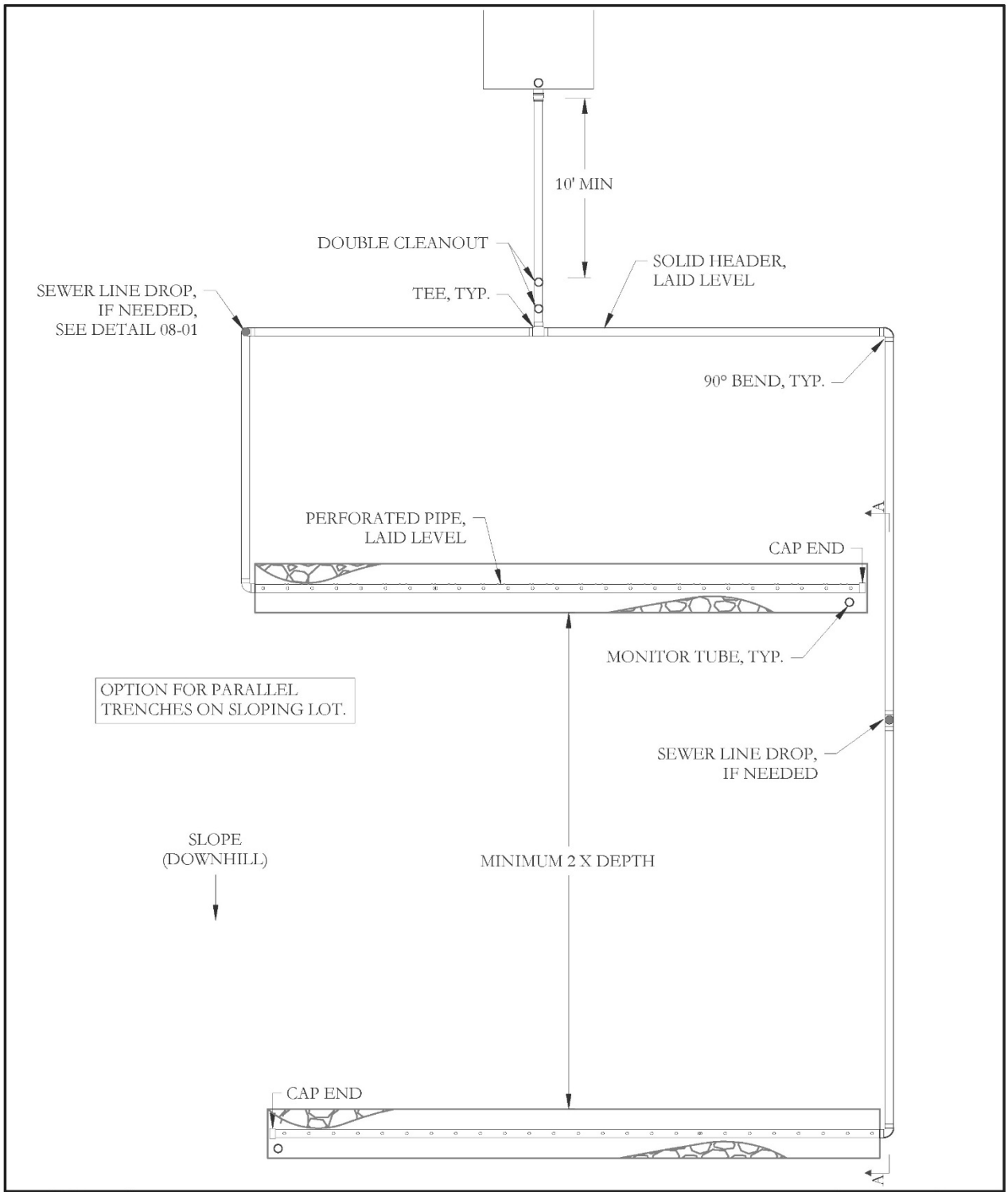
DEEP TRENCH PROFILE VIEW

SECTION #:	40.01
DETAIL #:	01-02
SCALE:	NTS
REVISED:	09/15



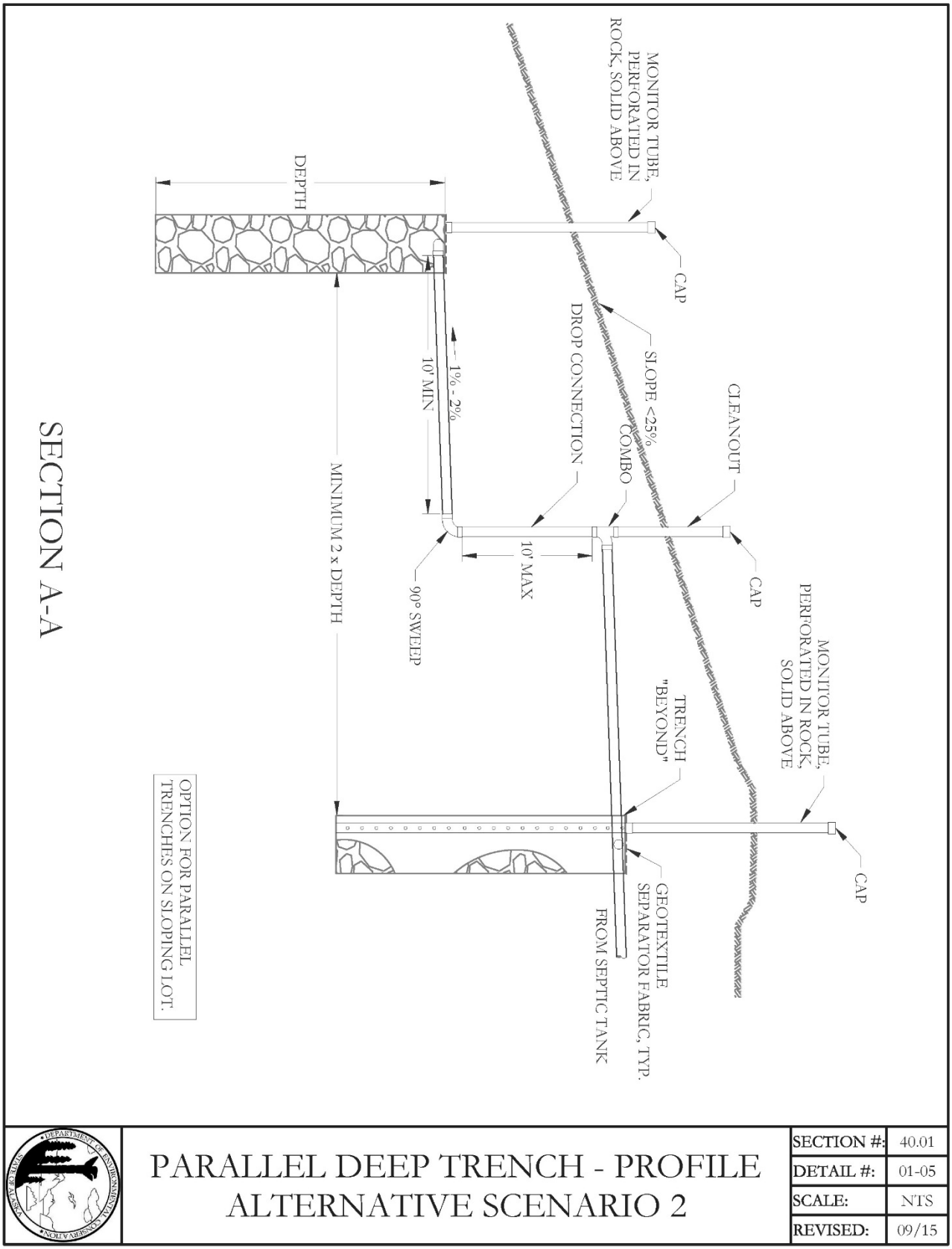
DEEP TRENCH
ALTERNATIVE SCENERIO 1

SECTION #:	40.01
DETAIL #:	01-03
SCALE:	NTS
REVISED:	09/15

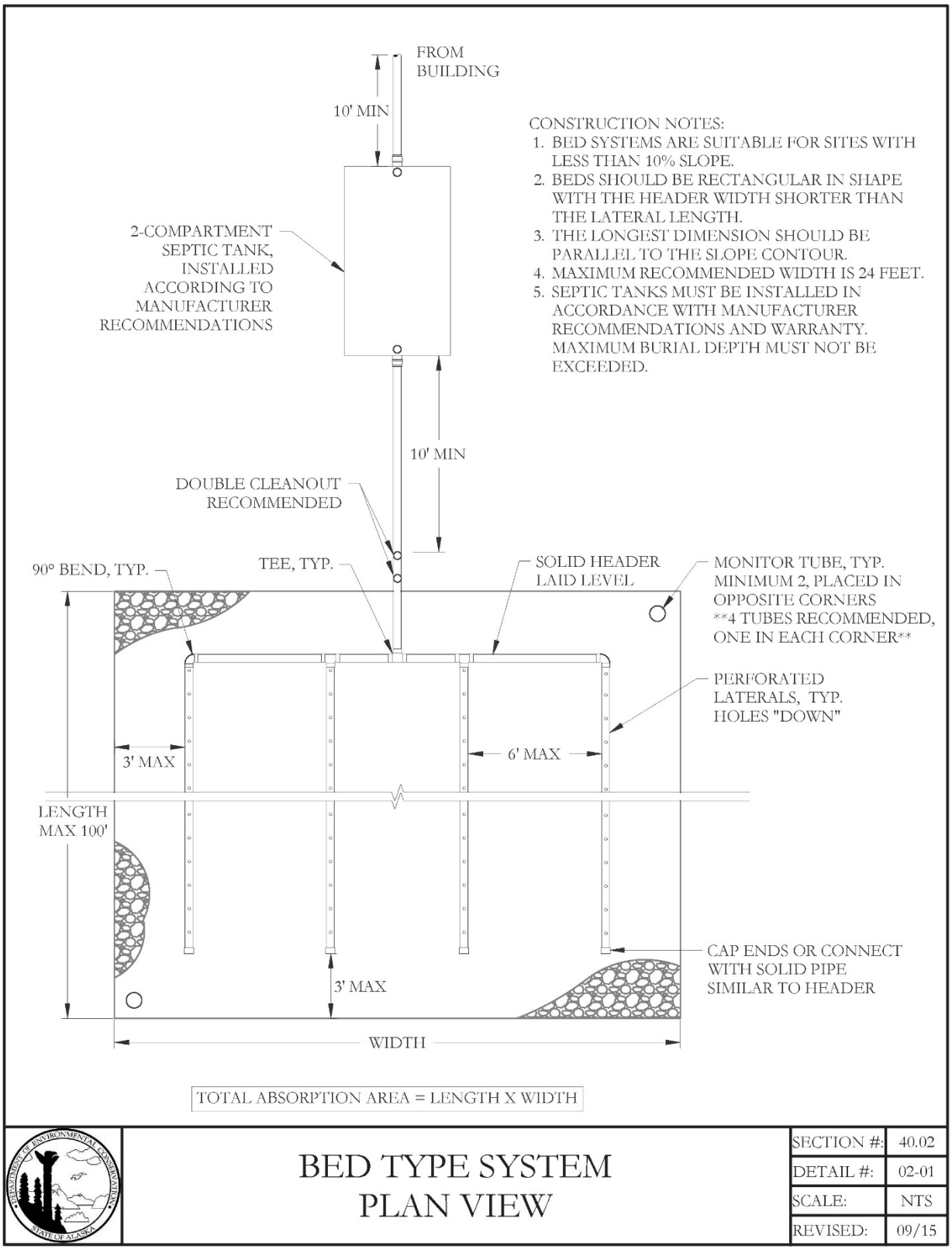


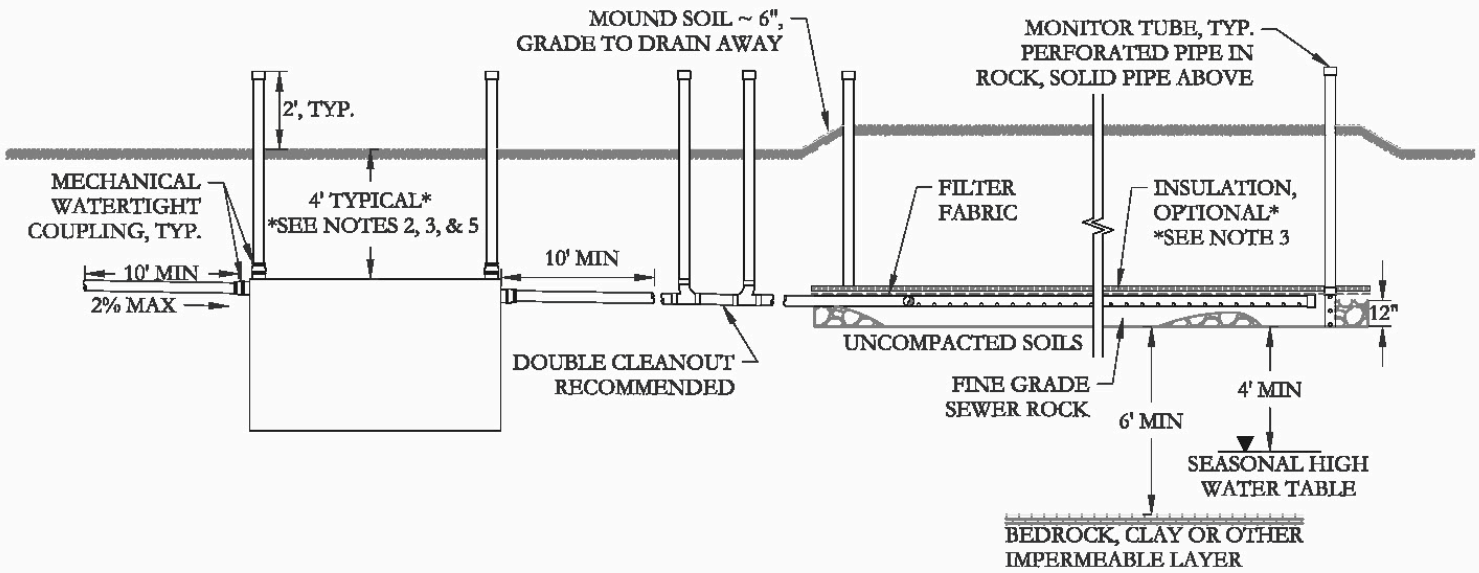
PARALLEL DEEP TRENCH - PLAN
ALTERNATIVE SCENERIO 2

SECTION #:	40.01
DETAIL #:	01-04
SCALE:	NTS
REVISED:	09/15


SECTION A-A
MONITOR TUBE, PERFORATED IN ROCK, SOLID ABOVE
CAP
DEPTH
SLOPE <25%
DROP CONNECTION
COMBO
CLEANOUT
CAP
1% - 2%
10' MIN
MINIMUM 2 x DEPTH
10' MAX
90° SWEEP
MONITOR TUBE, PERFORATED IN ROCK, SOLID ABOVE
CAP
TRENCH "BEYOND"
GEOTEXTILE SEPARATOR FABRIC, TYP.
FROM SEPTIC TANK
OPTION FOR PARALLEL TRENCHES ON SLOPING LOT.
PARALLEL DEEP TRENCH - PROFILE
ALTERNATIVE SCENARIO 2
SECTION #: 40.01
DETAIL #: 01-05
SCALE: NTS
REVISED: 09/15

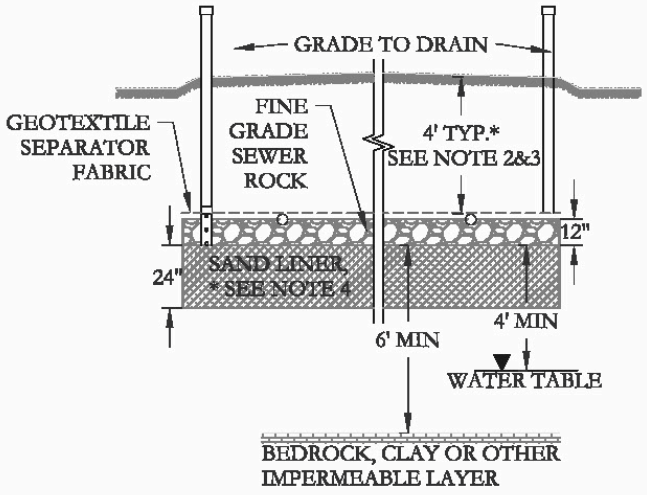
Article 2.2 Standard Drawings for Bed Type Systems





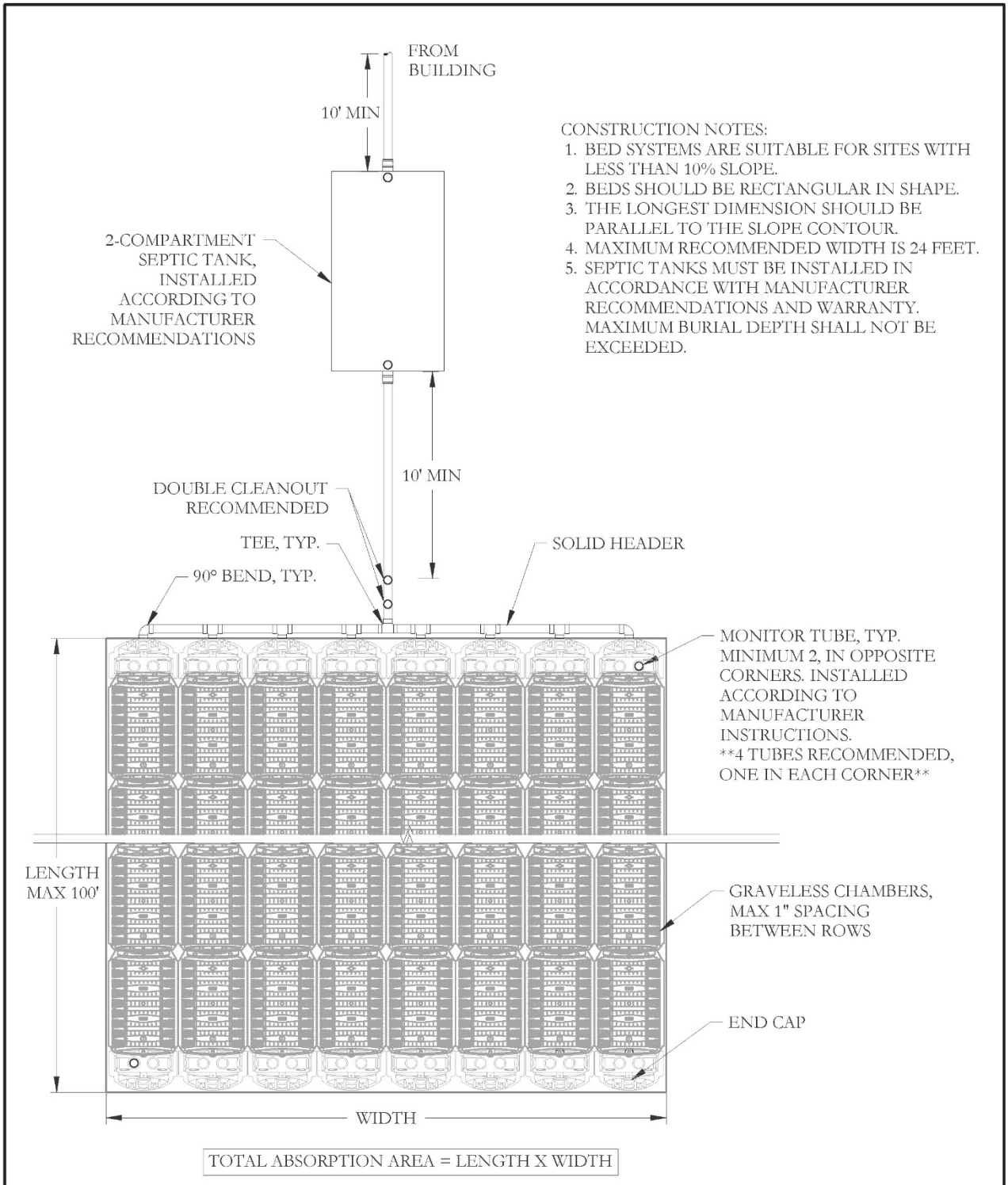
CONSTRUCTION NOTES:

1. ALL LEACH FIELD PIPING (SOLID AND PERFORATED) SHALL BE LAID LEVEL AND BEDDED IN ROCK TO THE SPRINGLINE (CENTER LINE OF PIPE). MINIMUM 12 INCHES OF ROCK MUST BE PLACED BELOW SPRINGLINE.
2. MINIMUM GROUND COVER REQUIREMENTS VARY BY REGIONS. REFER TO DIVISION 20.
3. ONE (1) INCH OF POLYSTYRENE INSULATION MAY BE SUBSTITUTED PER FOOT OF SOIL COVER UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN TWO (2) FEET.
4. SAND LINER, MEETING THE GRADATION SPECIFICATION IN ARTICLE 3.18, REQUIRED IF GRAVEL SOILS PERCOLATE FASTER THAN 1 MIN/INCH.
5. SEPTIC TANKS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS AND WARRANTY. MAXIMUM BURIAL DEPTH MUST NOT BE EXCEEDED.



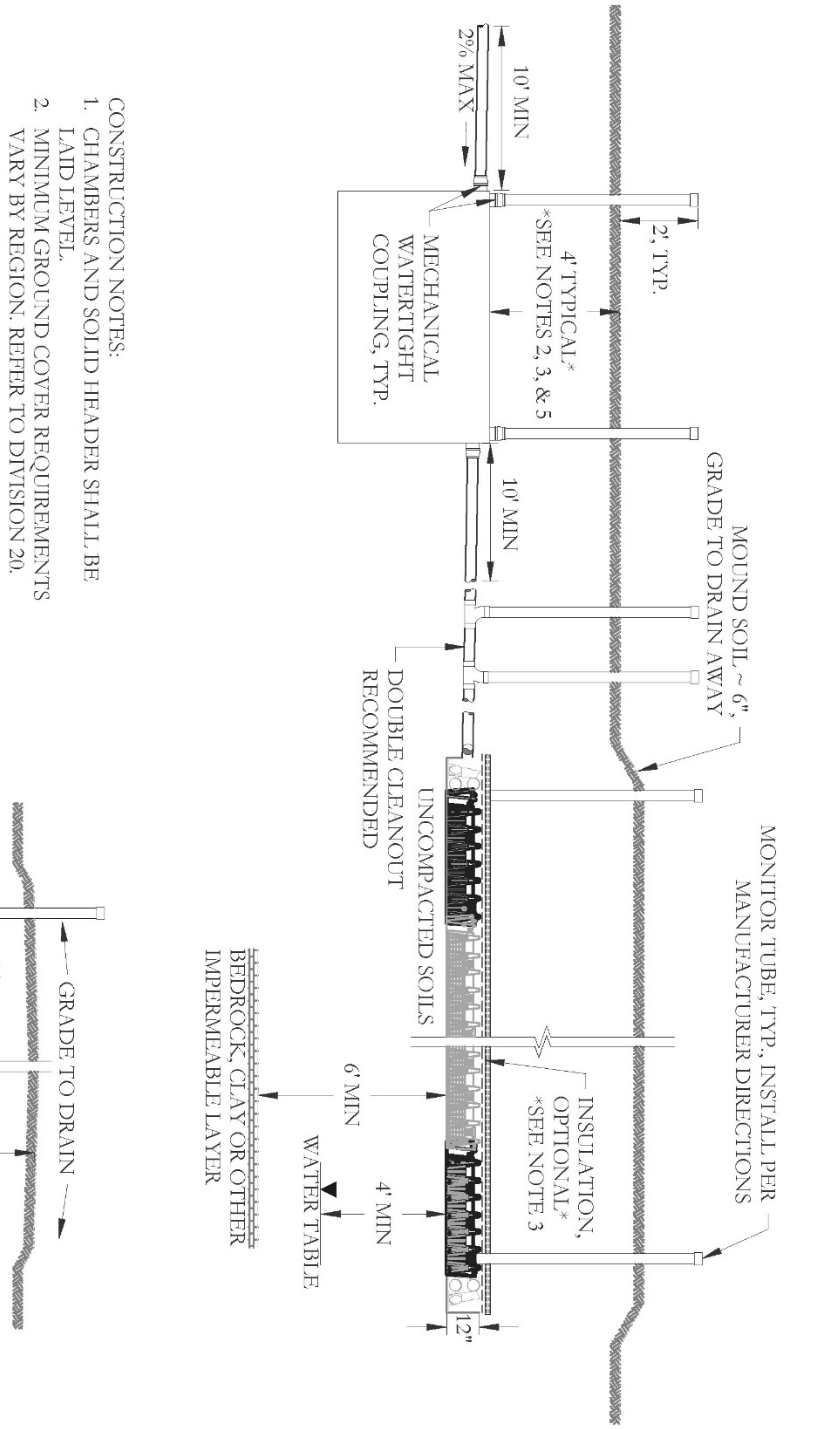
SECTION #:	40.02
DETAIL #:	02-02
SCALE:	NTS
REVISED:	09/15

BED TYPE SYSTEM PROFILE VIEW



BED WITH GRAVELESS CHAMBERS PLAN VIEW

SECTION #:	40.02
DETAIL #:	02-03
SCALE:	NTS
REVISED:	09/15



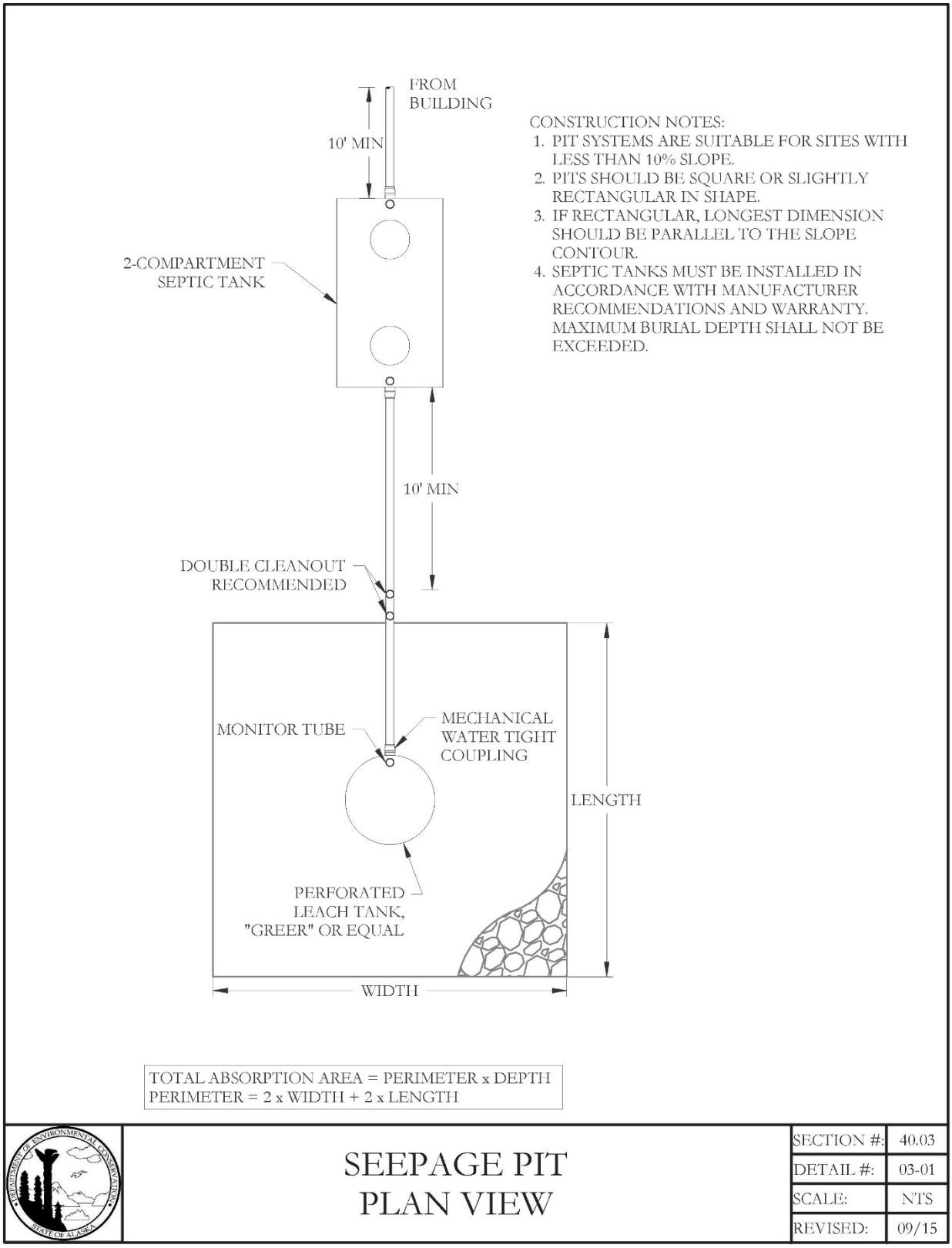
CONSTRUCTION NOTES:

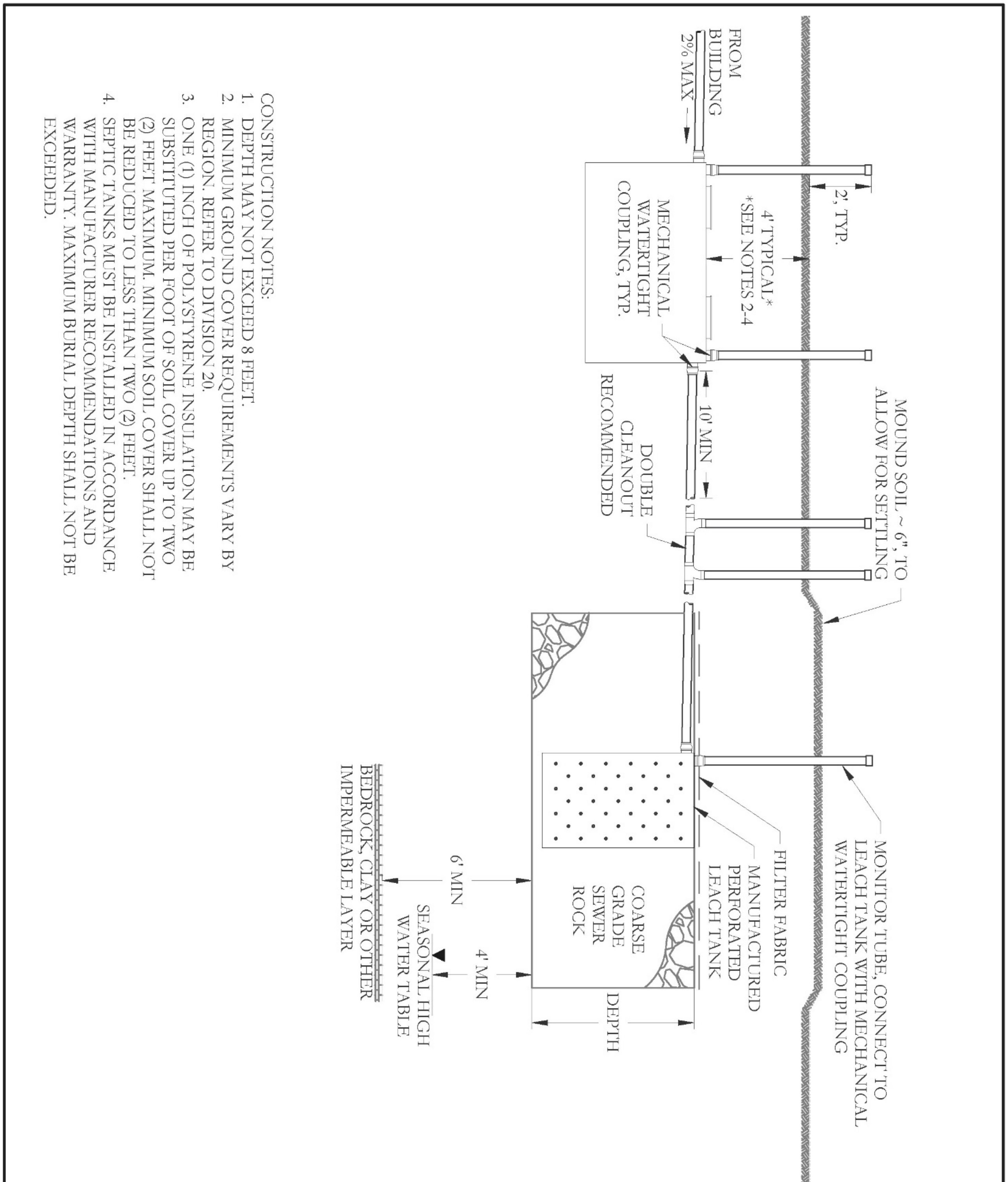
1. CHAMBERS AND SOLID HEADER SHALL BE LAID LEVEL.
2. MINIMUM GROUND COVER REQUIREMENTS VARY BY REGION. REFER TO DIVISION 20.
3. ONE (1) INCH OF POLYSTYRENE INSULATION IN ACCORDANCE WITH ARTICLE 2.5 MAY BE SUBSTITUTED PER FOOT OF SOIL COVER UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN 2 FEET.
4. 2 FOOT THICK SAND LINER, MEETING THE GRADATION SPECIFICATION IN ARTICLE 3.18, REQUIRED IF GRAVEL SOILS PERCOLATE FASTER THAN 1 MIN/INCH.
5. SEPTIC TANKS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS AND WARRANTY. MAXIMUM BURIAL DEPTH MUST NOT BE EXCEEDED.

BED WITH GRAVELESS CHAMBERS PROFILE VIEW

SECTION #:	40.02
DETAIL #:	02-04
SCALE:	NTS
REVISED:	09/15

Article 3.2 Standard Drawings for a Seepage Pit Type System

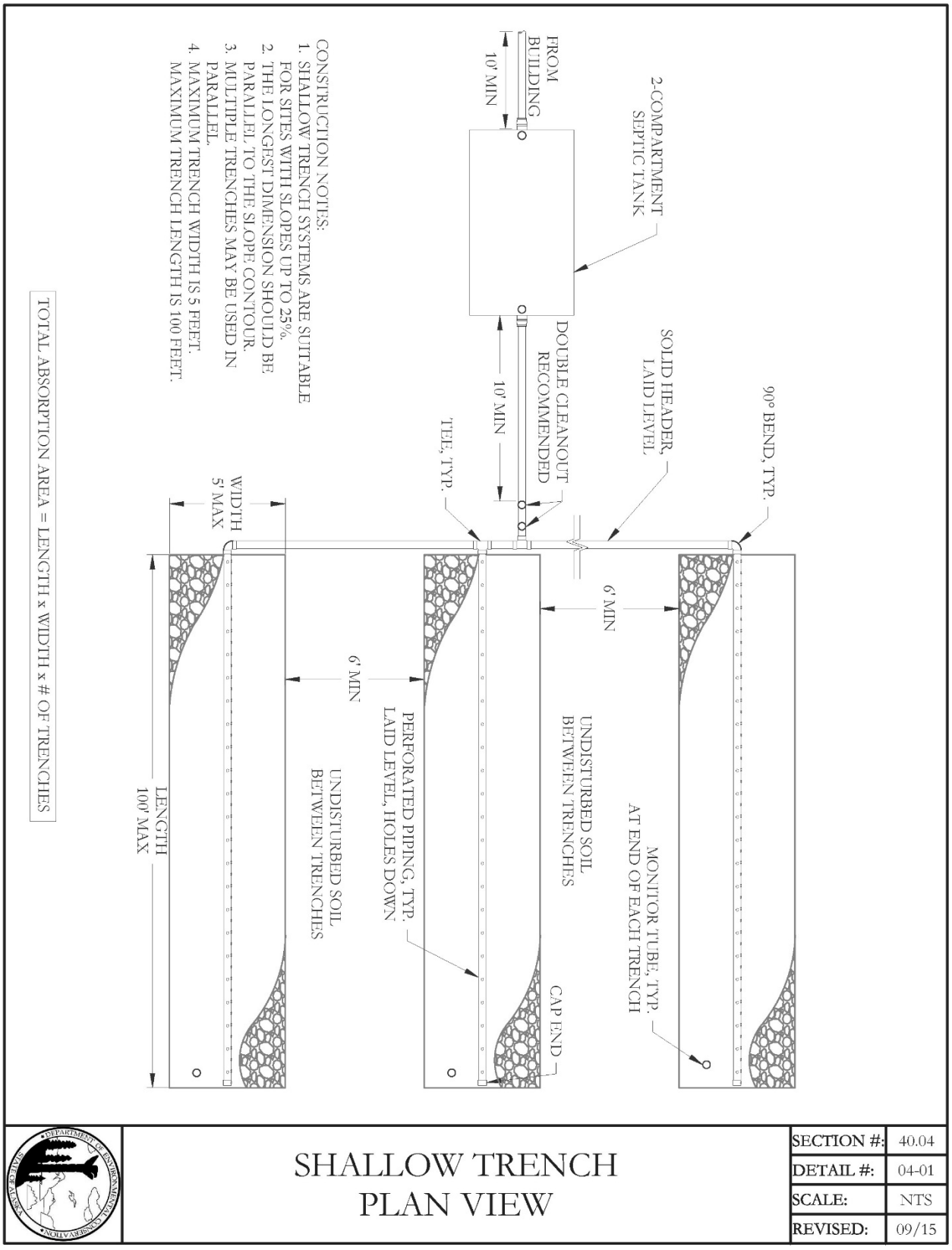


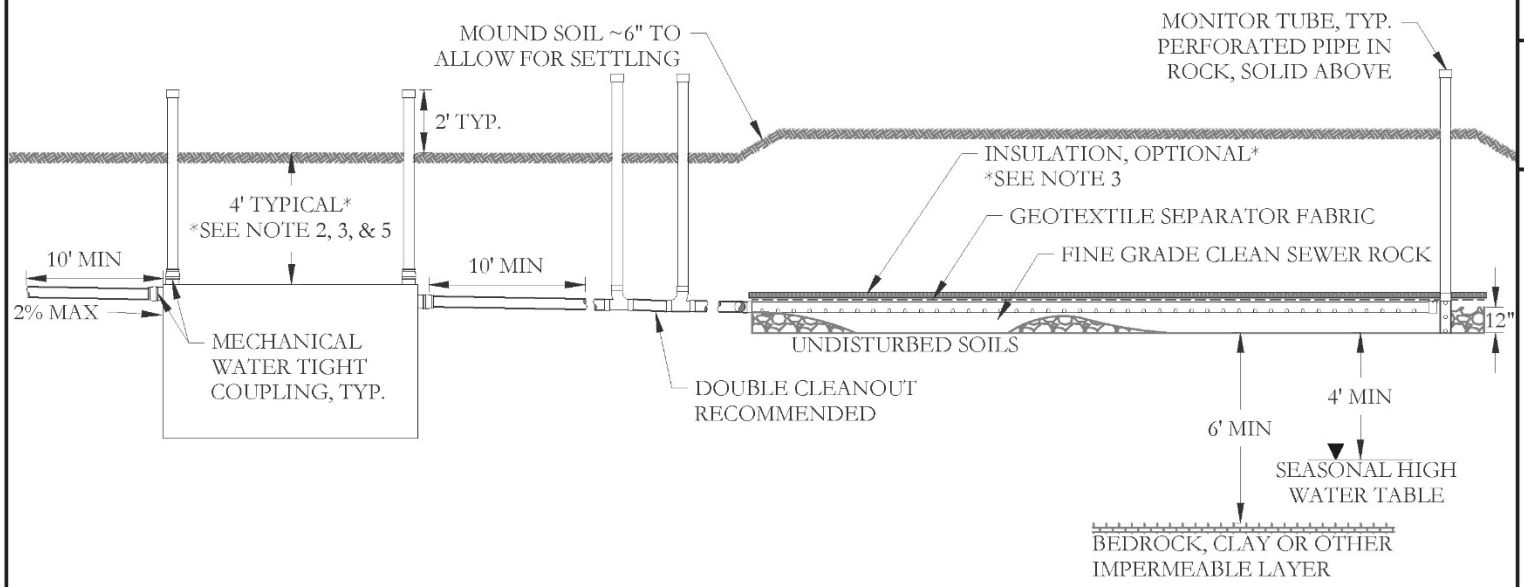


SEEPAGE PIT PROFILE VIEW

SECTION #:	40.03
DETAIL #:	03-02
SCALE:	NTS
REVISED:	09/15

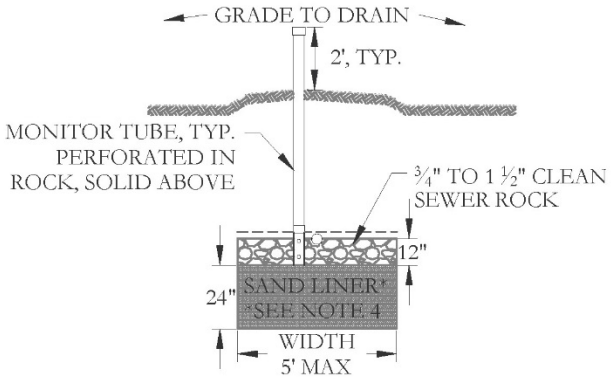
Article 4.2 Standard Drawings for a Shallow Trench Type System





CONSTRUCTION NOTES:

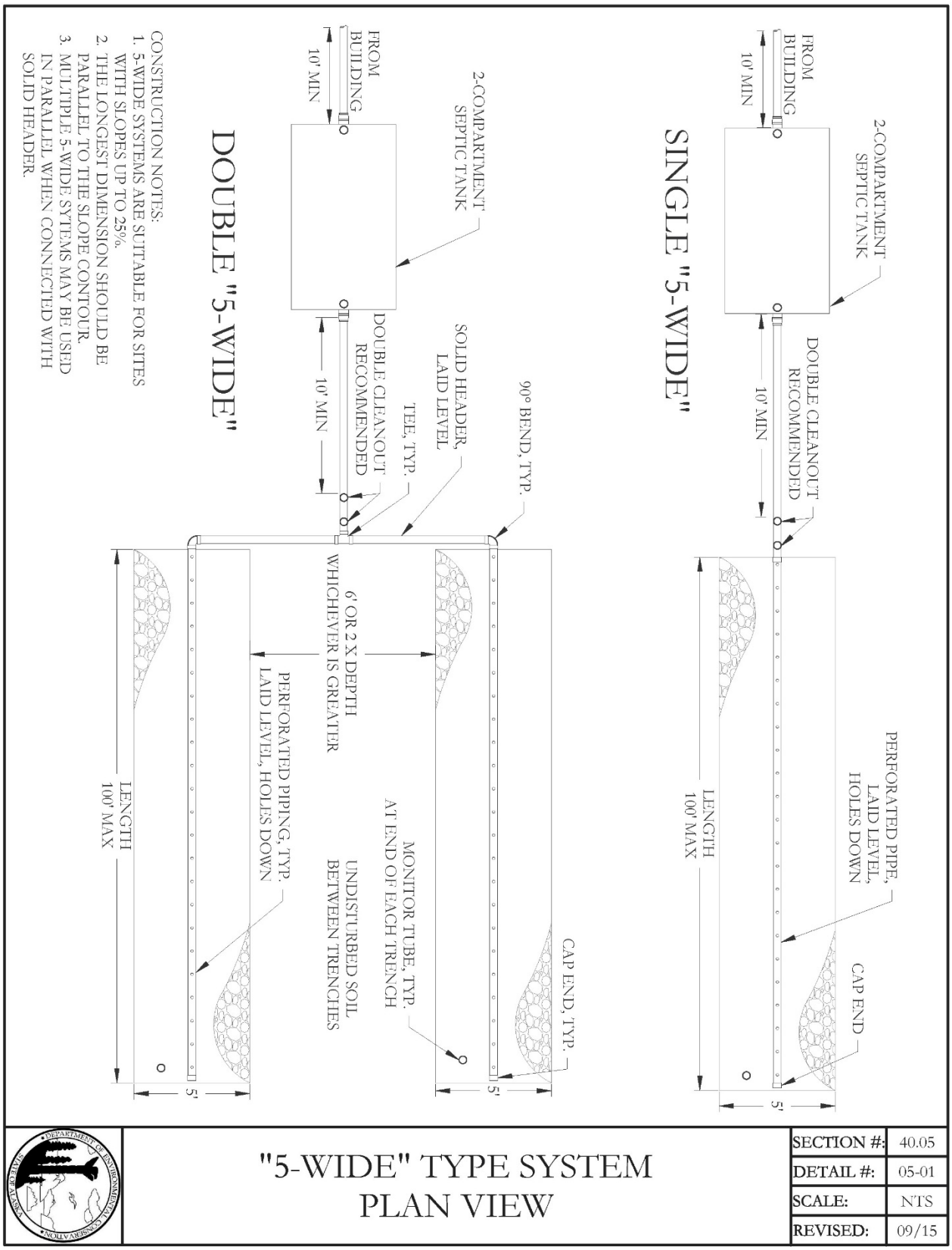
1. ALL LEACH FIELD PIPING (SOLID AND PERFORATED) SHALL BE LAID LEVEL. LEACH FIELD PIPING SHALL BE BEDDED IN ROCK TO SPRINGLINE (CENTERLINE OF PIPE). ROCK MUST EXTEND MINIMUM OF 12 INCHES BELOW SPRINGLINE.
2. MINIMUM GROUND COVER REQUIREMENTS VARY BY REGION. REFER TO DIVISION 20.
3. ONE (1) INCH OF POLYSTYRENE INSULATION MAY BE SUBSTITUTED PER FOOT OF SOIL COVER UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN TWO (2) FEET.
4. SAND LINER REQUIRED IF GRAVEL SOILS PERCOLATE FASTER THAN 1 MIN/INCH.
5. SEPTIC TANKS MUST BE INSTALLED IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS AND WARRANTY. MAXIMUM BURIAL DEPTH MUST NOT BE EXCEEDED.

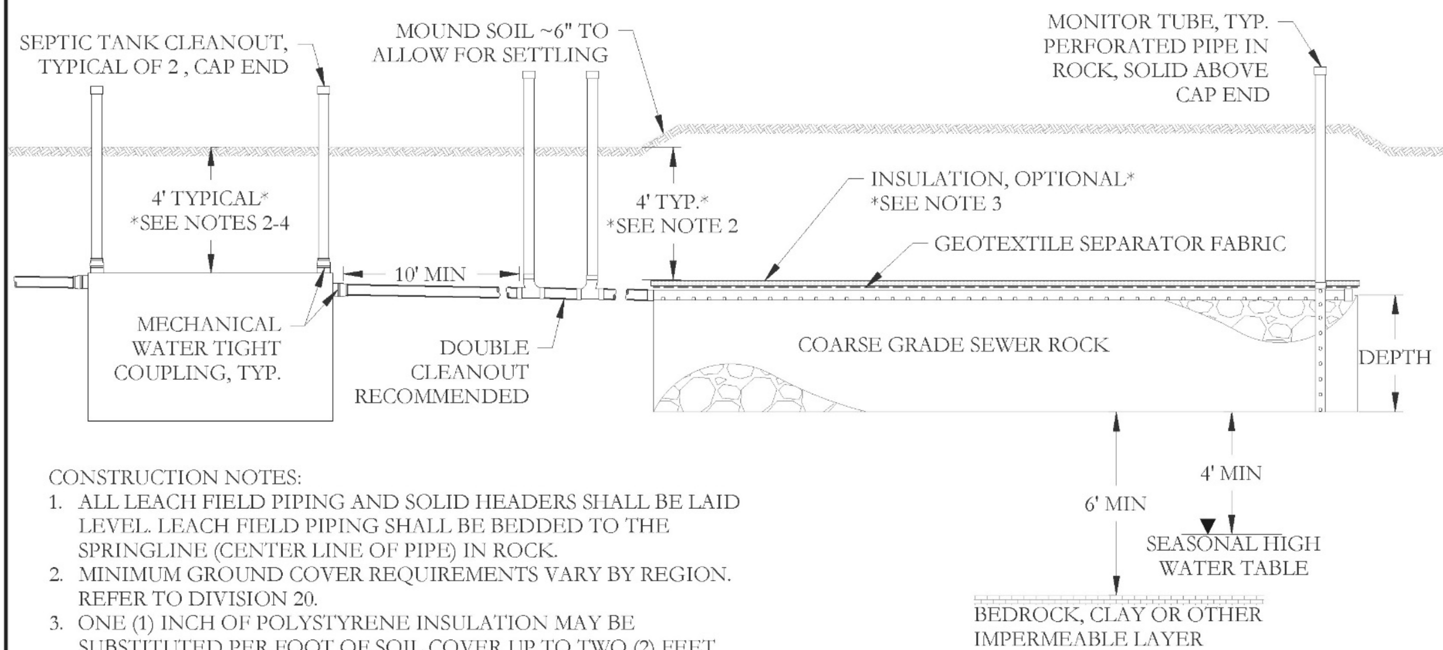


SHALLOW TRENCH PROFILE VIEW

SECTION #:	40.04
DETAIL #:	04-01
SCALE:	NTS
REVISED:	09/15

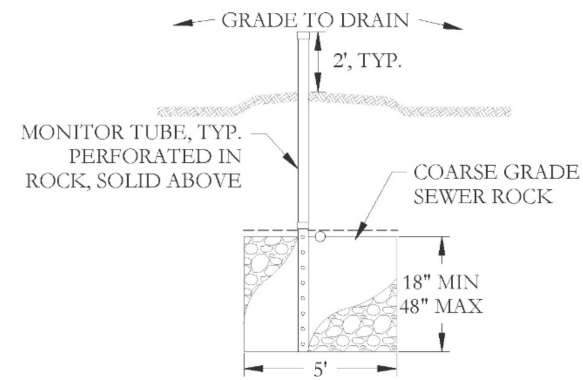
Article 5.2 Standard Drawings for a Five Wide Type System





CONSTRUCTION NOTES:

1. ALL LEACH FIELD PIPING AND SOLID HEADERS SHALL BE LAID LEVEL. LEACH FIELD PIPING SHALL BE BEDDED TO THE SPRINGLINE (CENTER LINE OF PIPE) IN ROCK.
2. MINIMUM GROUND COVER REQUIREMENTS VARY BY REGION. REFER TO DIVISION 20.
3. ONE (1) INCH OF POLYSTYRENE INSULATION MAY BE SUBSTITUTED PER FOOT OF SOIL COVER UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN TWO (2) FEET.
4. SMEARED SIDEWALLS AND BOTTOM MUST BE RAKED OR SCARAFIED PRIOR TO GRAVEL PLACEMENT.



5-WIDE DRAINFIELD LENGTH REDUCTION FACTOR (RF)

DEPTH OF GRAVEL BELOW PIPE (INCHES)	LENGTH REDUCTION FACTOR
18	0.78
24	0.70
30	0.64
36	0.58
42	0.54
48	0.50

LENGTH = AREA REQUIRED/5' (WIDTH) x RF (TABLE ABOVE)

EXAMPLE: FOR 450 SQ FT ABSORPTION AREA USING 36" OF ROCK:
LENGTH = 450 FT^2 ÷ 5' x 0.58 = 53' (ALWAYS ROUND UP TO NEAREST FOOT)

"5-WIDE" TYPE SYSTEM PROFILE VIEW

SECTION #:	40.05
DETAIL #:	05-02
SCALE:	NTS
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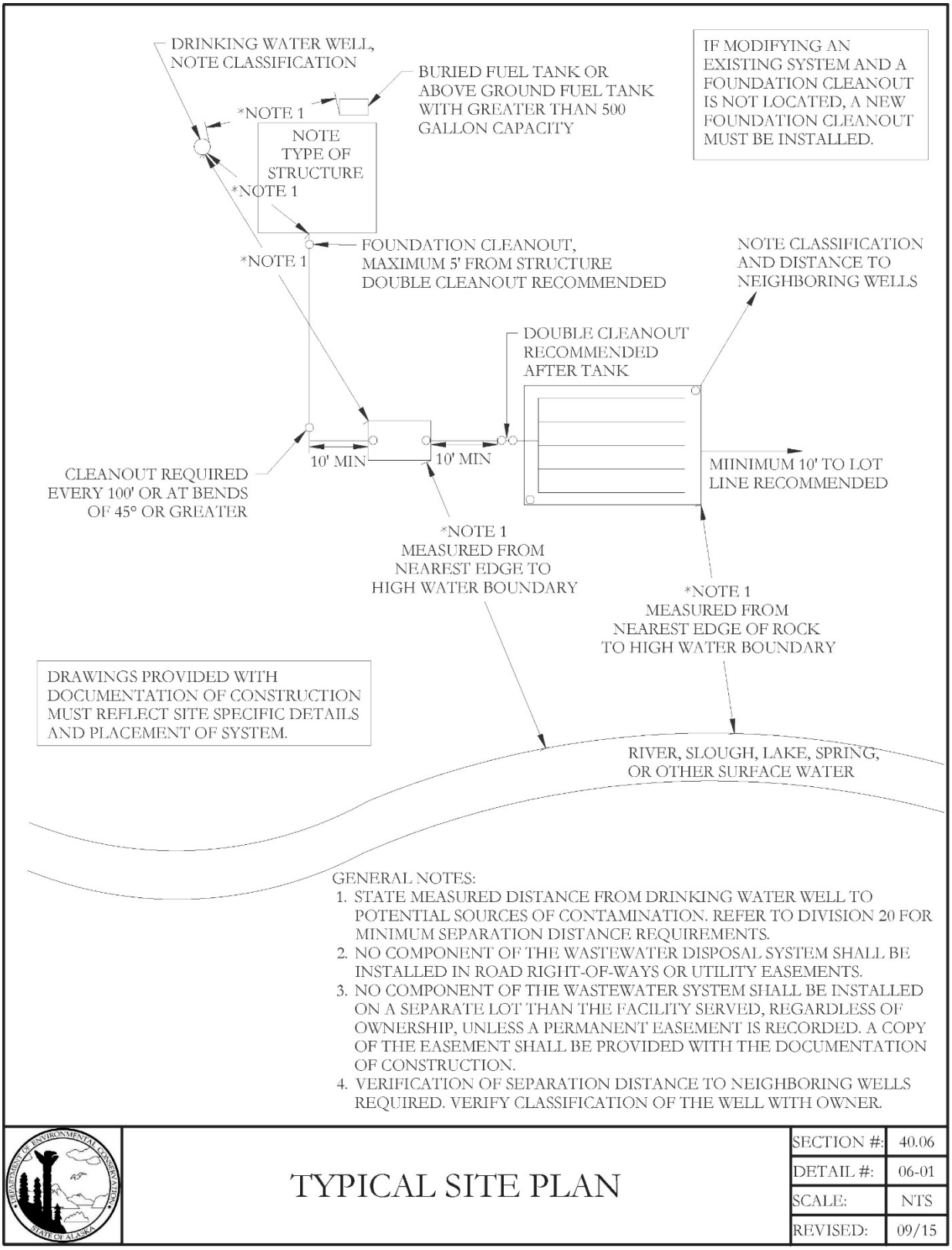
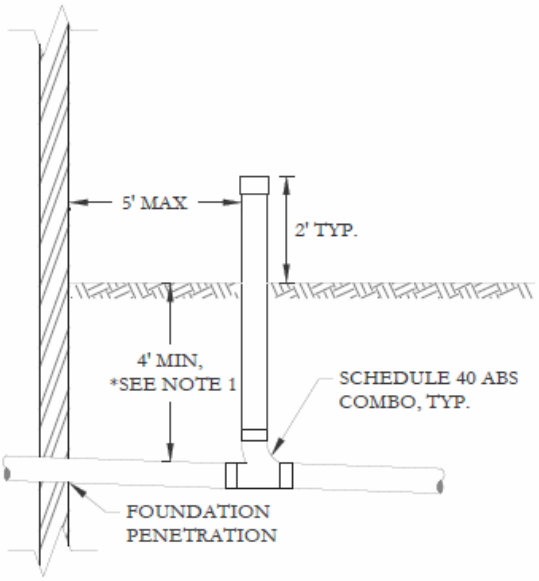
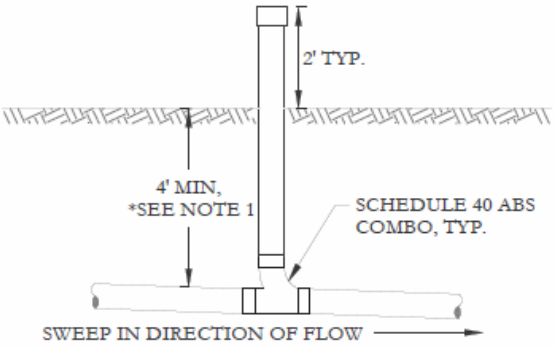
SECTION 40.06 TYPICAL SITE PLAN



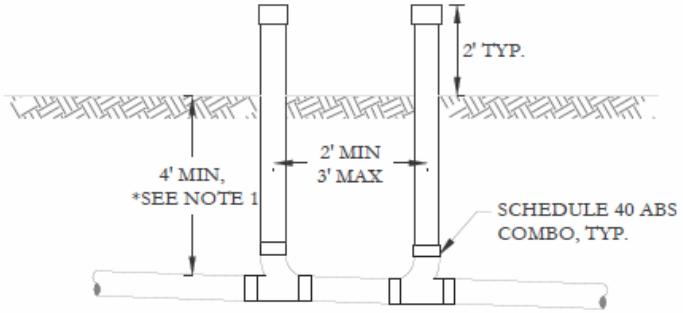
SECTION 40.07 TYPICAL CLEAN OUT



FOUNDATION CLEANOUT



SINGLE CLEANOUT



DOUBLE CLEANOUT

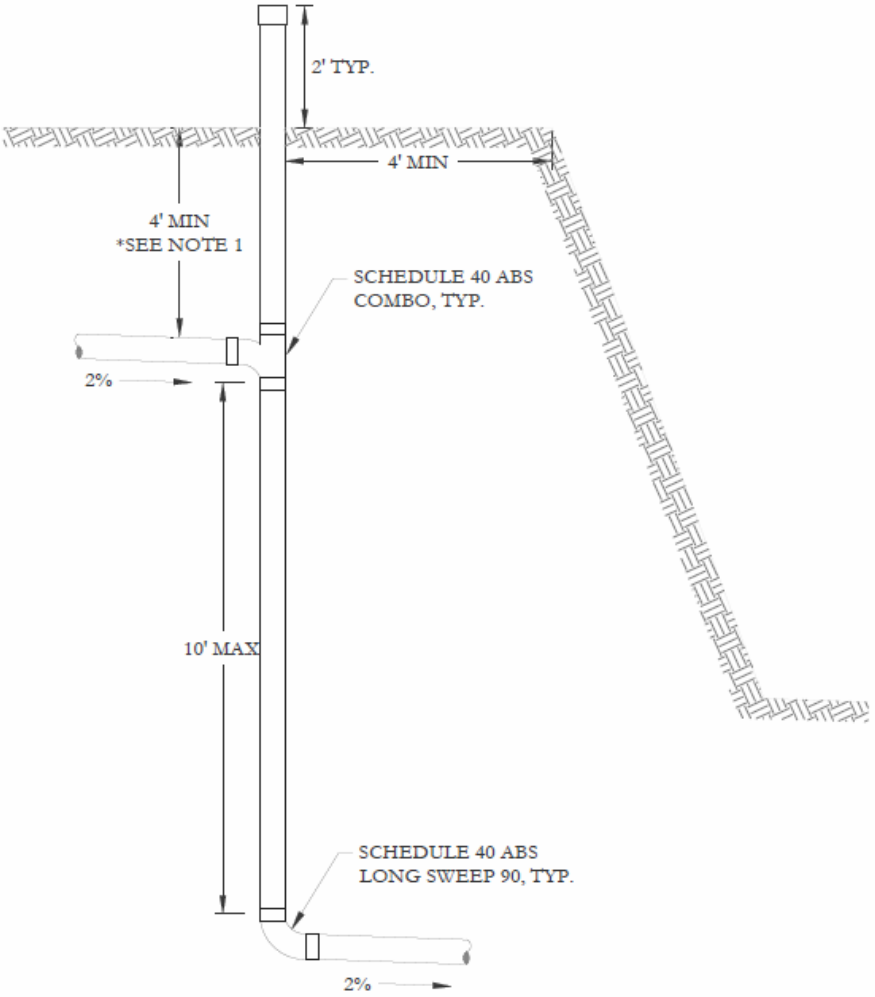
CONSTRUCTION NOTES:

1. ONE (1) INCH OF INSULATION MAY BE SUBSTITUTED PER FOOT OF SOIL COVER UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN 2 FEET.
2. SWEEP TYPICALLY IS IN DIRECTION OF FLOW.
3. CLEANOUTS REQUIRED EVERY 100 FEET AT A MINIMUM AND AT CHANGE IN DIRECTION OF 45° OR GREATER.
4. EASILY ACCESSIBLE FOUNDATION CLEANOUT IS REQUIRED.
5. DO NOT CUT OFF PIPING OR BURY BELOW GRADE. RECOMMEND MARKING LOCATION SO CLEANOUTS IN ORDER TO LOCATED WHEN NEEDED.

CLEANOUT DETAILS

SECTION #:	40.07
DETAIL #:	07-01
SCALE:	NTS
REVISED:	04/14

SECTION 40.08 TYPICAL DROP CONNECTION



GENERAL NOTES:

1. ONE (1) INCH INSULATION MAY BE SUBSTITUTED PER FOOT OF SOIL UP TO TWO (2) FEET MAXIMUM. MINIMUM SOIL COVER SHALL NOT BE REDUCED TO LESS THAN TWO (2) FEET.

DROP CLEANOUT

SECTION #:	40.08
DETAIL #:	08-01
SCALE:	NTS
REVISED:	04/14