

**WESTERN UPPER PENINSULA HEALTH DEPARTMENT
SUPERIOR ENVIRONMENTAL HEALTH CODE
TECHNICAL MANUAL**

Effective Date February 1, 2015

2017 Draft Revisions:

Page 12 – Pump Tank (Dosing Tank) Specifications

Appendix – Mound System Layout

Appendix – Pump Chamber (Dosing Tank) Specifications

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Introduction

The Superior Environmental Health Code was adopted to promote public health, safety and welfare of the people of the Upper Peninsula of Michigan. Within the Code are the specifications for construction of sewage systems. Due to the dynamic and complex nature of on-site sewage systems governed by the Code, an on-going technical guidance document is necessary. This Technical Guidance Manual has been prepared to provide guidelines, specifications and standard practices used to implement the code. This manual will be altered to accommodate new research and technology as frequently as necessary to provide current guidance.

Article 3.0: Licensing and Registration

Sewage System Installer Licensing Procedures

Reference: Sections 3.1 & 3.2 of the Superior Environmental Health Code

These sections state that the department shall have the authority to promulgate standards for licenses, registrations, renewals, and examinations. In developing minimum standards for licensing or registration, the department shall consider equivalency and proficiency testing and where appropriate, grant credit for past training, education, or experience in related fields.

1. The applicant shall complete a written exam proctored by an environmental health representative of the local health department.
2. The exam may be taken at any of the local health department jurisdictions.
3. Upon satisfactory completion of the exam, the results will be reviewed and incorrect answers discussed with the applicant.
4. A passing score is 70%. A retest can be scheduled at the contractor's request.
5. A separate license will be required for each local health department.
6. Licenses shall expire every three years. All licenses expire on April 30, 2017, and every three years thereafter. License fees will be prorated. If an application is made within a three year license period; full fee for three year license, 2/3 fee for 2 year period, 1/3 fee for applications received within one year of expiration date.

Article 5.0 - Sewage Systems

Permits

Reference: Section 5.3.1 of the Superior Environmental Health Code

This section of the code states that an application to construct, alter, extend or replace a sewage system shall be submitted to the department by the property owner or his authorized representative. An application will not be acted upon unless the application is complete.

1. A conventional sewage permit application must be accompanied by a completed sewage system layout sheet (mound system layout, drainfield bed layout, or trench system layout) to be considered complete. Copies of these layouts are enclosed in the appendix.
2. A sewage permit application must be accompanied by a property tax ID # for the parcel on which the sewage system is to be built.
3. For the purposes of this code, the property owner or the licensed sewage installer are considered authorized representatives.
4. A well permit will not be issued by the department unless there is an approved sewage system on-site or both permits (sewage and well) are issued at the same time.

Alternative Sewage Systems

Reference: 5.3.2 (9) of the Superior Environmental Health Code

This section of the code states that the health officer shall have the authority to issue a construction permit for an alternative sewage system if the site does not meet the minimum site requirements for a conventional system.

1. For the purposes of this code, a conventional sewage system includes: a bed system, a trench system, a gravity mound system, a pump to gravity mound system, and a mound system where pressure distribution is used solely for even distribution of effluent and no Code variances for sizing or isolation are proposed.
2. Alternative systems include but are not limited to: pressurized mound systems, aerobic treatment units, sand filters, peat filters, etc.
3. Alternative sewage systems must comply with the "Western Upper Peninsula Health Department's Alternative Technology Policy", and/or the Michigan Department of Environmental Quality, Technical Guidance for "Pressure Mound Systems. For further information on pressurized mound systems or alternative technology permitting, please reference these policies. Copies of these policies can be obtained from an Environmental Health Secretary or a Sanitarian.

Minimum Test Excavations

Reference: Section 5.6.1 of the Superior Environmental Health Code

This section of the code states that the health officer shall conduct site evaluations of parcels for completed applications submitted to the department. The depth, number and location of the test pits will be determined by the sanitarian on-site. The site evaluation will be valid for no more than twelve months.

1. The department reserves the right to send back for completion or request more information for site evaluation applications it deems incomplete.
2. A backhoe or some other mechanical means of excavating test pits is required at all site evaluations with few exceptions.
3. All site evaluations expire after twelve months. After the expiration date, a re-evaluation of the site may be requested at the departments' reduced fee under the following conditions:
 - a. The same test holes dug on-site during the original evaluation will be utilized for the sewage system.
 - b. The re-evaluation (without a backhoe) finds no major site activity has damaged the evaluated sewage system site. All isolation distances required by the code can be met.
 - c. The permit application clearly shows that the original site (where test holes were dug) is being used for the sewage system.

100 Year Flood Plain Restrictions

Reference: 5.7.1 (1) G. of the Superior Environmental Health Code

This section of the code states that sewage systems shall not be located in a floodplain of less than one hundred (100) years, or in an area subject to seasonal flooding or ponding of surface waters. .

The property owner shall demonstrate that the following criteria are met when installing sewage systems in or near one hundred (100) year floodplains:

The sewage system and the four (4) feet of soil located immediately beneath the soil-stone aggregate interface shall be located above the one hundred (100) year floodplain elevation.

Wells, which are installed within the 100 year flood plain by variance or deviation, must have elevated casings, which raise the wellhead and screened vents one foot above the 100 year flood level. Cement grout is required.

NOTE: Permits from MDEQ, Land and Water Management Division may be required prior to placing fill for a conventional sewage system in a 100 year floodplain elevation.

Sewage System Requirements - Conventional Mound Systems

Reference: Section 5.7.2 (2) of the Superior Environmental Health Code

This section of the code states that the soil depth between the limiting zone or the seasonal high water table and the aggregate/soil interface shall not be less than forty-eight inches (48").

In many cases, forty-eight (48") inches of native soil is not available on-site between a limiting layer or seasonal high water table and original grade. In order to obtain this 48" for sewage treatment, fill material must be placed on-site. When effective soil depth as defined by Section 5.7.1.C exists, a conventional mound system may be permitted and is required to meet the following standard construction practices.

Site Preparation and Construction

Ultimate success or failure of a mound relies on a clear communication and understanding of basic site preparation and construction principles. Critical issues include:

1. Proper procedures must be followed to protect the mound area including a required greenbelt during and after construction. After establishing a suitable location for the mound and replacement area including greenbelt, it should be suitably fenced or otherwise unmistakably identified to prevent further disturbance until actual construction can occur. Site planning resulting in a construction location for the mound which is isolated from other anticipated home construction activities is encouraged.
2. Soil smearing and compaction which can reduce infiltration capacity will occur if soils are worked when wet. Construction activities should be scheduled only when soils are sufficiently dry. Proper soil moisture content of the soils in the upper foot can be evaluated by rolling a sample of the soil between the hands. If the soil can be rolled into a ¼ inch or smaller "wire" it is considered to be too wet and should be allowed to dry before preparing.
3. Excess vegetation should be removed from the mound basal area. Trees should be cut flush to the ground and other vegetation over six inches in length should be mowed and cut vegetation removed.
4. Placement of fill material is to be accomplished from the end and upslope sides utilizing a tracked vehicle or equipment with adequate reach to minimize soil compaction. A minimum of six inches of fill material should be maintained below the tracks to minimize compaction. Wheeled vehicles should be prevented from travel over the mound basal area and down slope green belt area.
5. Final grading of the mound area should divert surface water drainage away from the mound. Sod the entire area or seed and mulch.

Fill Material

Clean medium sand with little or no fines is to be used to form a sand base to the elevation that is required on the permit and site evaluation. Sand fill is to be placed from the upslope side or ends to reduce site disturbance.

Five Foot Sand Extension

When constructing a conventional mound system, a five foot sand extension around the bed is required. This sand extension prevents effluent from leaching out of the toe of slope.

3:1 Slope

In addition to the five foot sand extension, a 3:1 slope to natural grade is required. It is recommended that a sand-based soil be used for this slope. This slope prevents effluent from leaching out the toe of slope while blending the system into the landscape. Note: The toe of slope must be 10 feet from the property line. Refer to the Mound System Layout in the appendix.

Isolation Distances

The toe-of-slope for Mound systems must meet all applicable isolation distances including distances to wells, property lines, foundation walls, building/storm/subsoil drains, water lines embankments, surface water, etc.

Replacement or Repair of an Existing System

Reference 5.9.1 (1) and 5.9.2 (1) of the Superior Environmental Health Code

Section 5.9.1 states, No person shall connect a dwelling to an existing sewage system or increase flow to an existing sewage system by greater than one bedroom or one hundred and fifty gallons per day except where allowed, in writing, by the health officer.

Section 5.9.2 states, The owner of a failing sewage system is responsible for its correction and the method of correction shall be approved by the health officer.

If during the course of an existing system inspection the sewage system has been determined to be failing or in substantial non-conformance with the requirements of the Superior Environmental Health Code, the system will not be approved for continued use. In addition, if the system is already or will be in use, the department will require repair or replacement of the sewage system.

A failing system is defined as having any of the following conditions:

1. The sewage system fails to accept effluent at the rate of application
2. Sewage effluent seeps from, or ponds on or around the sewage system
3. The health officer has determined that the sewage system has contaminated the ground water or surface waters of the state.

Examples of substantial non-conformance with the requirements of the Superior Environmental Health Code include:

1. Direct discharge of sewage to the ground surface or surface waters
2. The sewage system failing to accept effluent at the rate of application, observed as sewage backing up into the premises, or sewage backing up into the tank from the drainfield.
3. Seasonal water table over the level of the drainfield
4. Collapsed or non-water tight septic tank
5. Septic tank less than 50% of the required capacity
6. Drainfield less than 50 % of the required size
7. Cesspool instead of a septic tank and drainfield
8. Unpermitted holding tank
9. System located on, or partly on the neighboring property
10. Isolation distance less than 50% required by the Superior EH Code.
11. Other circumstances as deemed in substantial non-conformance by the health officer.

The method and time frame for correction will be furnished in writing to the property owner.

Sewage System Abandonment

Reference: Section 5.9.3 of the Superior Environmental Health Code

This section is provided to guide industry and regulators in the proper abandonment of a septic tank and/or absorption system. Regardless of the abandonment method chosen, a potential safety hazard must not be created.

Septic Tank

Abandonment shall not proceed until the septic tank is pumped and the contents properly disposed of by a licensed septage waste hauler. Alternative methods of septage and tank disposal may be approved in writing by the health officer. Proper abandonment of a septic tank shall consist of one of the following methods:

1. Collapse tank when feasible; otherwise completely fill it with material approved by the health officer. Provide compaction during the filling process to eliminate the potential to develop a sinkhole or any other safety hazard.
2. Remove and haul the tank to a licensed Type II landfill. The tank shall be pumped by a licensed septage hauler prior to removal.

Absorption System

When it is practical to do so, the absorption system should be left in place. When the area is needed for other purposes, the absorption system may be removed. The disposal method to be used shall be one of the following:

1. Remove and haul the contaminated material to a licensed Type II landfill. Containment of the contaminated material is required with particular attention paid to over-the-roadway hauling so as to avoid exposing the public to a health hazard.
2. A property owner may choose to bury the abandoned absorption system on their own premises, or the premises of another with that owner's permission. All components of the system shall be buried in a manner that does not create an environmental health hazard.

Aggregate/Filter Material

Reference: 5.10.1. of the Superior Environmental Health Code

Aggregate/filter material shall be washed stone or other material approved by the Health Officer that complies with all of the following specifications:

1. One hundred percent (100%) passing through a two and one-half inch $\frac{1}{2}$ " sieve.
2. No material shall pass a one-half inch ($\frac{1}{2}$ ") sieve except for fines. Fines are material that will pass through a number two hundred (200) sieve.
3. The total fines content passing through a number two hundred (200) sieve, as determined by a loss by wash method, shall not exceed one-half percent ($\frac{1}{2}\%$).
4. Rate 3 or more on Moh's scale of hardness. Stone aggregate may be field evaluated for hardness acceptability by determining whether it can scratch a copper penny without leaving any rock residue.
5. Twelve inches in depth (6 inches below pipe and 2 inches above pipe).
6. Extend 2 feet beyond the pipe on all sides of the absorption field.

Aggregate shall be transported, stockpiled, and/or otherwise manipulated in a manner which will not contaminate it with fines exceeding one-half percent ($\frac{1}{2}\%$) loss by wash method.

Chipped rubber, synthetics, concrete pavement, and other alternative aggregate may be approved in writing by the health officer.

Approved Piping and Distribution Products

Reference: Section 5.10.4.1. (F) of the Superior Environmental Health Code

This section of the code states that all piping and distribution products shall be approved. A list of approved piping and distribution products is in the appendix.

Aggregate Cover

Reference: Section 5.10.5 of the Superior Environmental Health Code

This section states that prior to backfilling the absorption system, the aggregate shall be covered with approved filter fabric or other approved materials.

Filter Fabric Specifications:

Strength: 25 psi
Air Permeability: 500 cfm/sq.ft.
Water Flow: 500 gpm/sp.ft. at 3 inches of head
Opening Size: 70 to 100 sieve

Soils used to cover the drainfield shall be sand based topsoil, not clay based soils in order to maximize evapo-transpiration. A minimum of 4-6 inches of cover is required.

The field area shall be seeded and mulched to provide grass growth and prevent erosion of the field. The area around the field shall be landscaped to drain surface runoff away from the field area. Trees should not be grown on or near the field area as the roots will eventually plug the laterals. Grass is the best cover for the drainfield.

The drainfield shall not have structures built upon it and vehicle traffic shall not be allowed to avoid compaction and breakage of drainfield materials.

Septic Tanks

Reference: Section 5.12(1) of the Superior Environmental Health Code

This section states: "Septic tanks shall be watertight and constructed of concrete or other materials approved by the health officer."

1. In order to provide technical guidance to meet the standard, the following specifications have been established:
 - Pre-cast concrete tanks shall have a minimum wall, compartment and bottom thickness of two and one half inches (2½") and shall be adequately reinforced. The top shall be at least four inches (4") thick and able to withstand the load for which it is intended.
 - Concrete block tanks are not permissible.
 - A cast-in-place concrete tank shall be approved by the health officer prior to construction and comply with all specifications listed in part a).

- The use of polyethylene septic tanks or tanks manufactured with materials other than concrete shall be limited to sites when use of a concrete tank is not feasible. Polyethylene tanks are not appropriate for high water table locations.
2. Manufacturers shall demonstrate, upon request of the health officer, that the septic tanks which they manufacture are watertight. Testing procedures for determining if a tank is watertight can be found on the last page of the "Advisory for Pre-cast Septic Tank Installations and Inspections" located in the appendix.
 3. Multiple compartment tanks shall comply with the following: As measured from the invert elevation of the outlet, the first compartment shall have at least (2/3) of the total required capacity
 4. Each compartment within a tank shall have an access port situated above the effluent filter and outlet baffle.
 5. The minimum liquid depth of any compartment shall be thirty-eight inches (38"). Liquid depths greater than seventy-eight inches (78") shall not be considered in determining working liquid capacity.
 6. When a high water table is present, septic tanks shall be weighted to prevent floating and shifting. The anchoring of components to counter buoyant forces due to saturated soil conditions can be determined using the following formula: Weight of the component plus the weight of the anchor = 1.5 times (volume of water the component displaces) times the (weight of water) (62.4 pounds/cubic foot at 39 degrees F).
 7. Access ports shall be provided for maintenance. They shall be a minimum of twelve inches by twelve inches (12" x 12"), twelve inches (12") in diameter, or a maximum of twenty inches by twenty inches (20"x20"), or 20" in diameter. Each access port cover should be provided with corrosion resistant strap or handle to facilitate removal.
 8. Inspection ports instead of access ports will not be accepted
 9. The access ports for cleaning and maintenance purposes shall extend to the ground surface by a secure riser. Access port covers shall be adequately secured to prevent unauthorized access. Existing tanks, which will be in continued use for a replacement system, will be required to be retrofitted with an approved riser.
 10. A tank shall be located to assure accessibility for inspection and cleaning. No other obstruction or landscaping shall impede the tank's accessibility. I
 11. A tank should be located on the same side of a building that the sewer line exits the foundation wall. The building sewer shall be at least five feet (5') in length, as short as possible, and contain not more than (2) forty-five degree (45) bends.

12. The inlet and outlet specifications are as follows:

- The inlet shall have a minimum diameter of four inches (4"). Plumbing from the dwelling shall gravity flow into the septic tank to allow the septic tank to properly function in settling the waste prior to effluent dispersing to the drainfield. Whole house grinder pumps/sewage ejectors/macerating pumps shall not be used to pump waste under pressure directly into the septic tank.
- The inlet and outlet shall be placed on opposite ends of the tank, unless otherwise specified by the health officer.
- The invert elevation of the inlet shall be at least two inches (2") higher than the invert elevation of the outlet.
- The outlet shall be equipped with an effluent filter and baffle extending below the tank's liquid level a distance equal to but not less than thirty-five percent (35%) or greater than fifty percent (50%) of the liquid level. The tank inlet and outlet should be installed with rubber or neoprene gaskets to provide watertight connections. The health department officer may approve in writing other watertight connections.

13. Tank ventilation shall be provided by means of a minimum of eight inches (8") of air space between the underside of the top of the tank and the top of the "tee" fitting.

14. A multiple compartment tank shall have a four inch (4") minimum diameter "tee" placed on each common wall, utilizing the same specifications as established for the effluent filter and outlet baffle in section 12.

15. Installers should assure that the septic tank is bedded properly, level, and does not have any major defects before installation. Refer to the "Advisory for Precast Septic Tank Installations and Inspections" in the appendix for this information.

Effluent Filters

Reference: Section 5.12 of the Superior Environmental Health Code

An effluent filter is required in all new and/or replacement septic system installations. The filter shall be installed and used in accordance with the manufacturer's recommendations. An effluent filter shall meet the following specifications:

- a. Be constructed of durable and corrosion-resistant materials.
- b. Be designed to prevent the escape of suspended solids during normal operation or maintenance.
- c. Retain all particles greater than one-eighth inch (1/8") in size.
- d. Be designed to accommodate the effluent discharge for the system it serves.

An effluent filter maintenance access riser shall extend from the top of the septic tank to the ground surface.

Pump Chamber/Dosing Tanks

When gravity flow from the septic tank to the drainfield portion of the sewage system is not possible, a separate pump chamber of a two compartment tank or a separate dosing tank is required to pump effluent to the drainfield.

1. The septic tank with effluent filter shall gravity flow into the pump chamber/ dosing tank.
2. The minimum size pump chamber/dosing tank is 300 gallons (2 bedroom dwelling); 500 gallons (3 bedroom dwelling); extended pumping distances and additional bedroom require additional capacity.
3. The pump chamber/dosing tank shall be adequately sized to provide enough capacity to provide all of the following combined:
 - a. Permanent liquid depth for pump submergence, minimum 18 inches
 - b. Gallon capacity of the force main (effluent line) to allow weeping back to the tank
 - c. Minimum dose volume equal to one of the following:
 - i. 150 gallons per day per bedroom divided by 4 doses per day
 - ii. 50% distribution pipe (lateral) volume (gravity flow)
 - iii. The dose rate specified in the pressure distribution design
 - iv. Three (3) minute minimum pump run time (15 gallons per minute minimum pump flow rate)
 - d. Surge storage for peak hour flow = liquid capacity of at least 10 percent the total required septic tank capacity
 - e. Emergency storage volume above the alarm float, equal or greater than four hours of flow at the daily design flow rate
4. Anti-buoyance provisions must be adequate if there is a high water table present.
5. A riser with a secure manhole cover is required to ground surface for access to the effluent pump and tank for maintenance purposes.
6. A quick disconnect coupler is required on the pump discharge line and shall be accessible from the manhole cover so that the pump can be removed from the pump chamber without entering the tank.
7. Floats must be positioned to turn the pump on and off at proper dosing volumes.
8. A separate high water float is required. The high water float shall be connected to an audio and/or visual alarm. The alarm must be installed in a conspicuous location.
9. A 1/4 inch weep hole, pointed downward, shall be provided at the elbow of the pump discharge line to allow drainage back into the dosing chamber from the force main (effluent line). Check valves are not allowed.
10. Pump shall be installed on a minimum 4 inch concrete block, unless not specified by the pump manufacturer.
11. The wiring to the pump must be approved for water contact. All wiring installed both inside and outside the dosing chamber must be in accordance with the Michigan Electrical Code.
12. The force main (effluent line) shall connect to the drainfield header in the center with a PVC "T"

or a distribution box.

Privies

Reference: Section 5.13 of the Superior Environmental Health Code

Privies/outhouses can only be permitted on parcels meeting the Michigan Department of Consumer and Industry Services' Technical Bulletin "Requirements for Plumbing Fixtures in Remote Cabin". The "Remote Cabin" determination is made by the building inspector and written proof of a plumbing permit exemption must be provided to Western Upper Peninsula Health Department.

This section of the code states that the base of an earth pit privy shall be a minimum of forty-eight (48") inches above the limiting zone or the seasonal high water table. Vault privies may be approved.

A soil test hole must be evaluated for the primary privy location. Sealed vaulted privies are required on sites that do not have at least 48 inches isolation between the base of the proposed pit and any limiting layer. Sealed vaulted privies must have a minimum tank size of three hundred (300) gallons. Vaulted privies must abide by the construction and isolation distance requirements noted on the sealed vaulted privy diagram (see appendix).

Compost Toilets

A composting toilet may be substituted for a sealed vaulted privy. It shall be used and operated according to manufacturers' instructions. Designs that incorporate a discharge to a pit or overflow are not approved.

Final Inspections

Reference: 5.15.1 of the Superior Environmental Health Code

This section of the code states that before any portion of the system has been covered and/or placed into operation, the installer shall notify the department. This notification shall occur at least one department working day prior to the completion of the system. The department shall inspect the installation within three working days to determine if it is in compliance with the code. The department shall reserve the right to extend the notification period for weekends and legal holidays.

1. For purposes of this code, the minimum components of a sewage system that must be installed for a full final inspection are as follows: septic tank, aggregate, sand fill (if required), drainfield piping network (header and footer connections), and five foot sand extensions (if required).
2. If all components of a system are present except for the septic tank, a partial inspection will be conducted by the department. An affidavit will then be mailed to the installer. The installer must complete the affidavit and return it to the health department within 10 days. A copy of the affidavit form is included in the appendix.
3. If any other components of the sewage system are missing or there are deficiencies in construction, the system will be "red tagged" as not meeting permit/code requirements. Systems not approved will require corrections to be made in accordance with Article 7

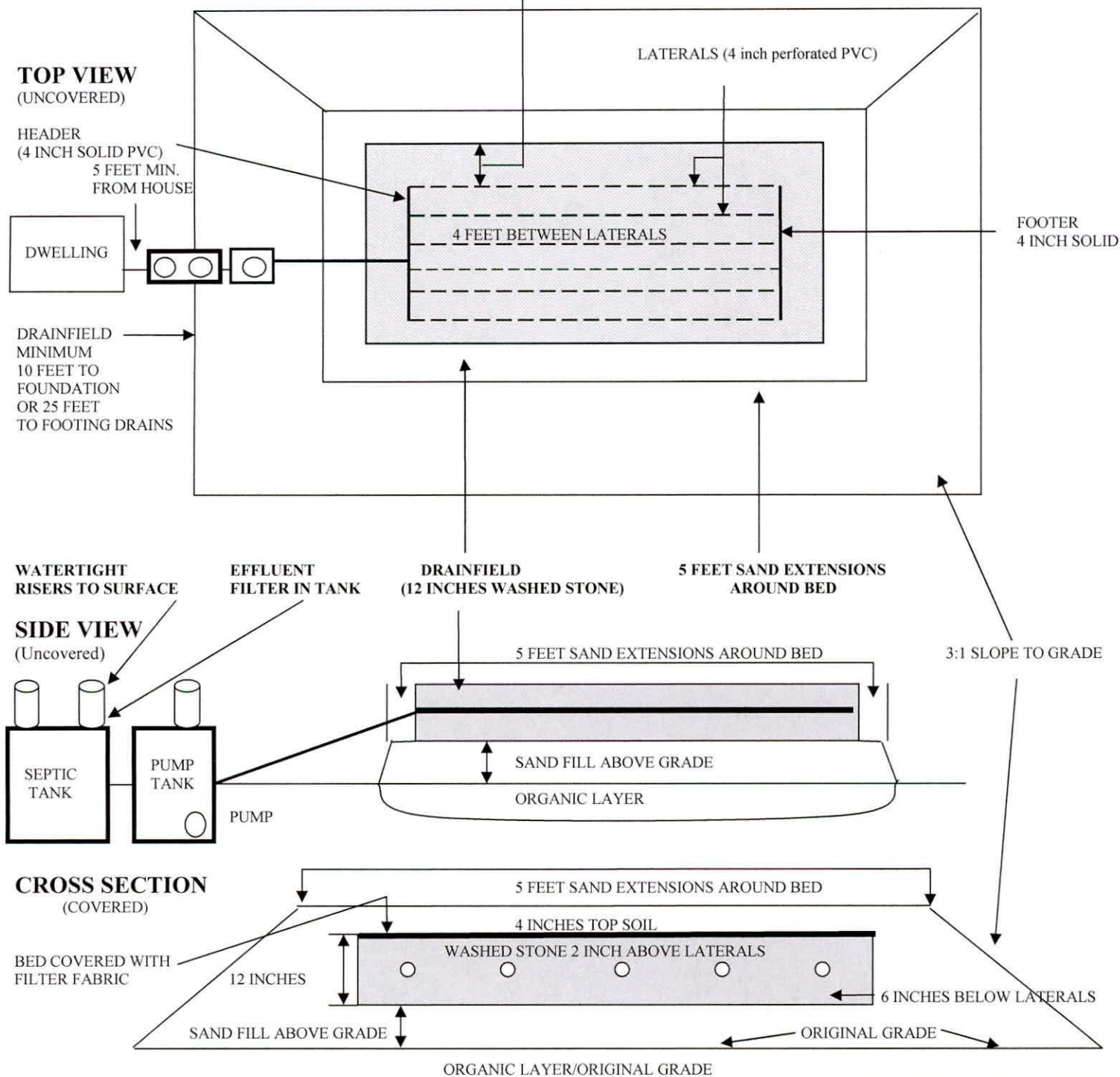
(Enforcement) of the code. Proof of correction will be required, most likely by a follow-up inspection by a sanitarian.

Appendix

1. Mound System Layout
2. Pump Chamber (Dosing Tank) Specifications
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3. Trench System Layout
4. Sealed Vault Privy Diagram
5. Michigan DEQ Approved Perforated Plastic Drainfield Pipe and Tubing
6. Technical Advisory Council for On-site Wastewater Treatment: Advisories:
 - Advisory for Precast Concrete Septic Tank Installation and Inspections
 - Advisory for Tank Riser and Lid Assemblies
 - Advisory for Geo-Fabric Soil-Stone Separator in Drainfields
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7. WUPHD Alternative Technology Policy (Separate document available upon request)
8. Michigan DEQ Technical Guidance for Pressure Mound Systems (Separate document available upon request)

MOUND SYSTEM LAYOUT- Not to Scale

OUTER LATERALS TO EDGE OF BED = 2 FEET



SEPTIC SYSTEM SPECIFICATIONS

BED AREA: _____ sq. ft. per bedroom X _____ Bedrooms = _____ sq. ft. Bed Area

STONE BED DIMENSIONS x

SEPTIC TANK CAPACITY _____ gallons

SAND FILL DIMENSIONS x

(with garbage disposal septic tank additional 250 gallons)

SAND FILL ABOVE GRADE: _____ inches

PUMP TANK CAPACITY _____ gallons

NUMBER OF LATERALS _____ (double header if 7 or more laterals)

Client Name: _____ Permit # _____

Client Name: _____

Force Main (Effluent Line) Diameter: _____ Inches

Force Main (Effluent Line) Length: _____ Feet

Proposed Pump Tank: _____

Manufacturer and Size

(Information to be provided by the Septic Contractor)

Permit # _____

Minimum Septic Tank Capacity: _____ Gallons

Minimum Pump Tank Capacity: _____ Gallons





Minimum Dose Volume: ★ _____ Gallons

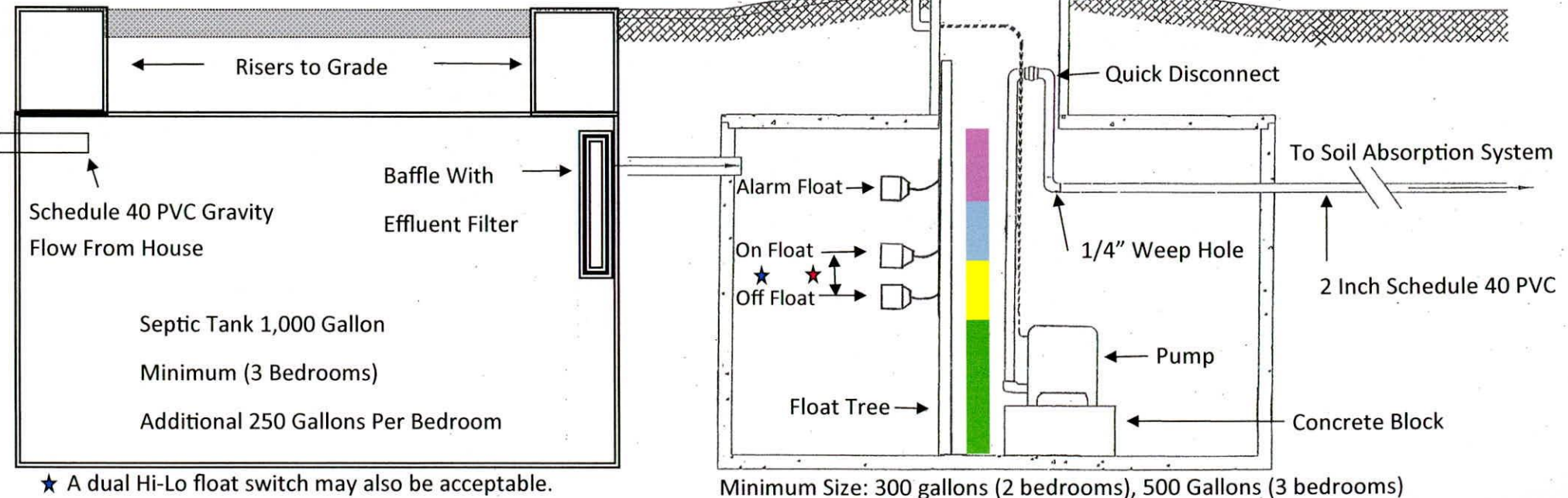
Set On/Off Float(s): _____ Inches Apart

(Information to be provided by WUPHD Sanitarian)

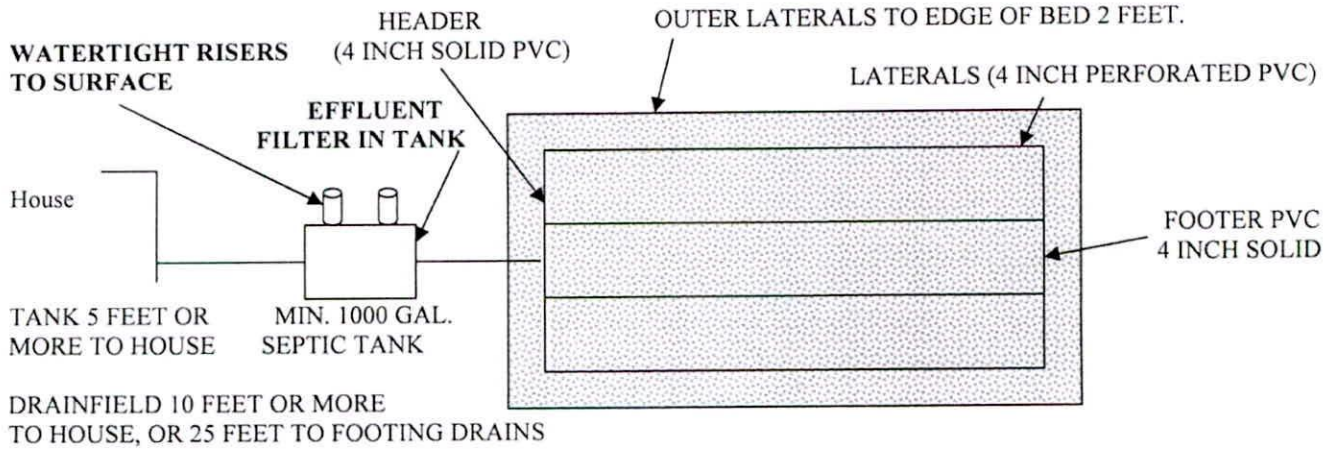
Installation of a Pump Chamber (Dosing Tank)

1. The septic tank shall gravity flow into the pump chamber (dosing tank).
2. Anti-buoyance provisions must be adequate if there is a high water table present.
3. A riser with a secure manhole cover is required to ground surface for access to the effluent pump and tank for maintenance purposes.
4. A quick disconnect coupler on the pump discharge line and shall be accessible from the manhole cover so that the pump can be removed from the pump chamber without entering the tank.
5. Floats or dual float must be positioned to turn the pump on and off at proper dosing volume.
6. A separate high water float is required. The high water float shall be connected to an audio/visual alarm. The alarm must be installed in a conspicuous location.
7. A 1/4 inch weep hole, pointed downward, shall be provided at the elbow of the pump discharge line to allow drainage back into the dosing chamber from the force main (effluent line). Check valves are not allowed.
8. Pump shall be installed on a minimum 4 inch concrete block, unless not specified by the pump manufacturer.
9. The wiring to the pump must be approved for water contact. All wiring installed both inside and outside the dosing chamber must be in accordance with the Michigan Electrical Code.
10. The force main (effluent line) shall connect to the drainfield header in the center with a PVC "T" or a distribution box.

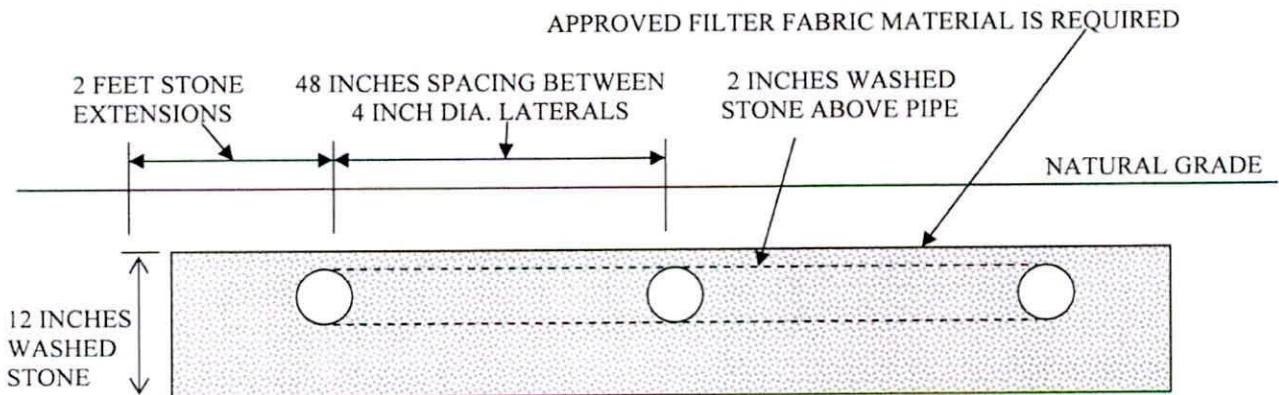
-  Emergency Volume
-  Surge Volume
-  Dose Volume ★
-  Pump Submergence Volume



DRAINFIELD BED LAYOUT



CROSS SECTION OF CONVENTIONAL DRAINFIELD BED



BOTTOM OF BED MUST BE 48 INCHES MINIMUM ABOVE LIMITING LAYER

Sewage System Specifications

Bed Area: _____ sq. ft. per Bedroom X _____ Bedrooms = _____ sq. ft. Bed Area

Bed to be installed no deeper than _____ inches below natural grade

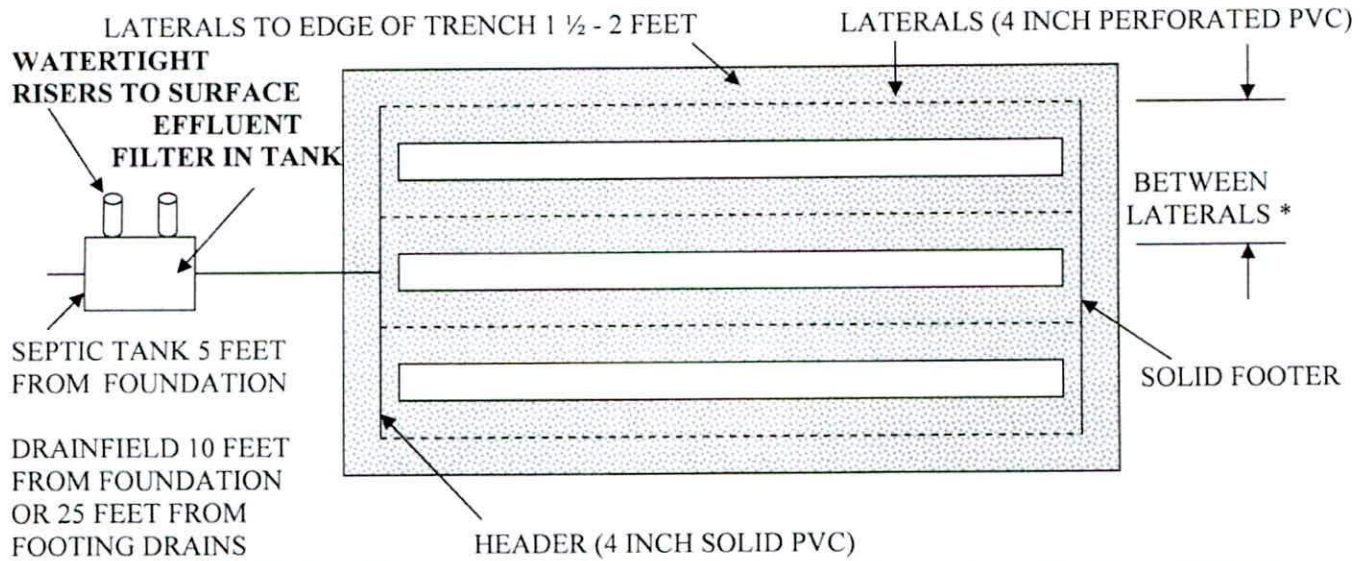
Bed dimensions: _____ X _____ Septic tank capacity _____ gallons

Lateral dimensions: _____ X _____ Spacing between laterals _____ inches

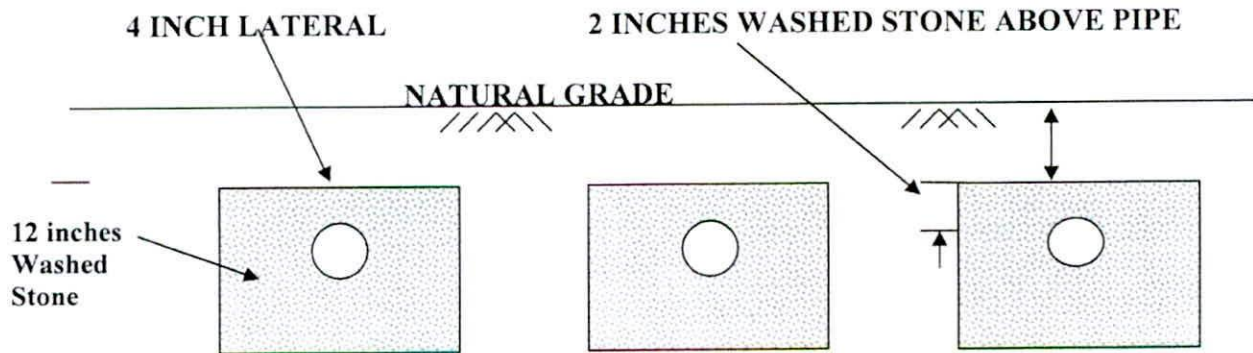
Number of Laterals: _____ Note: A double header is required if seven (7) or more laterals are installed

Client Name: _____

TRENCH SYSTEM LAYOUT



CROSS SECTION OF TRENCHES



BOTTOM OF TRENCH MUST BE 48" MINIMUM ABOVE LIMITING LAYER

Size and Spacing of Trenches

* Width of Trench (inches)	18	24	30	36
Spacing between Trenches(feet)	4	5	6	7

Sewage System Specifications

Trench Width: ___ Ft. x Trench Length: ___ Ft. x ___ # Trenches = ___ Sq. Ft. of Drainfield Area

Trench bottom to be no deeper than: _____ inches below natural grade.

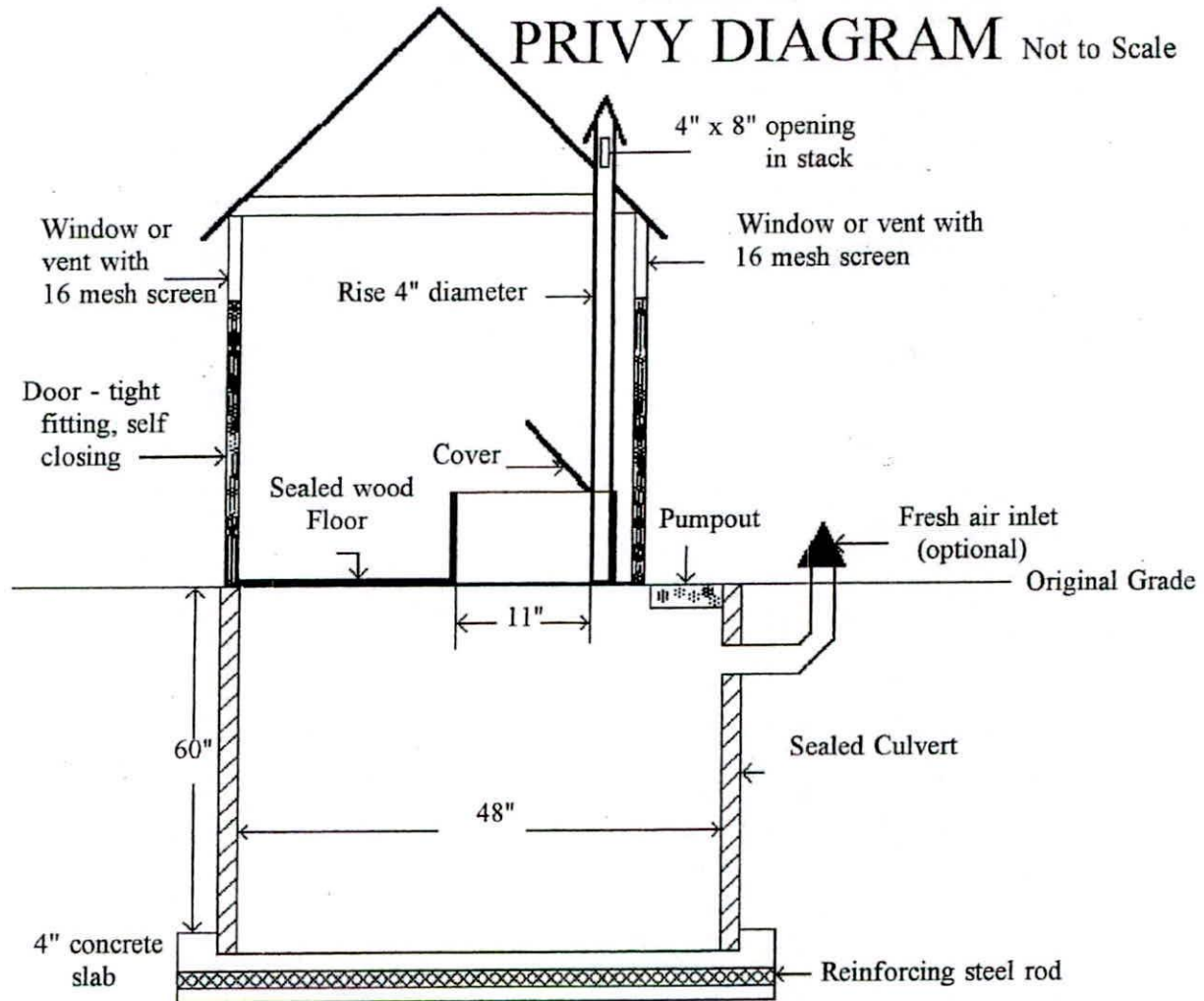
Septic Tank Capacity: _____ Gallons

Spacing Between Laterals: _____ Ft.

Note: A Double Header is required if seven (7) or more trenches are installed

Client Name: _____

SEALED VAULTED PRIVY DIAGRAM Not to Scale



ADDENDUM - VAULT TYPE PRIVY PERMIT

To be constructed in accordance with Act 273, of P.A. 1939

1. Privy vault shall be constructed of an impervious material and be water tight. The tank shall be sealed so as to prevent drainage or leakage of effluent or sewage.
2. The tank shall be provided with an outside opening, not less than 12" in diameter, fitted with a tight cover, to permit inspection and cleaning.
3. A ventilation pipe connected to the vault and extending above all parts of the building shall be installed.
4. The privy building shall be vented and of fly tight construction. Floor surfaces should be non-absorbent and easily cleanable.
5. A sealed vault shall not be installed within 75' of a water well or surface water.
6. Regular pumping and hauling, as needed, shall be done by a licensed septic tank contractor. Said materials shall be legally disposed of.
7. NO pressurized water. Water must be obtained from a hand pump.

**2003 PERFORATED PLASTIC DRAINFIELD PIPE AND TUBING
APPROVED BY THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY**

MANUFACTURER	DIAMETER/TYPE	PERFORATIONS/SPACING	MARKINGS
Advanced Drainage Systems	4" Corrugated PE	2 rows - 5/8" @ 4" centers	ASTM F405 MDPH-MS-PE ADS 4" ID HEAVY DUTY
Advanced Drainage Systems	4" Smooth PE	2 rows - 5/8" @ 4" centers	ADS 3000 TRIPLE WALL HDPE 4" I.D. (100 mm) ASTM F 810 MS
Baughman Tile Company	4" Smooth PE	2 rows - 5/8" @ 4 1/2" centers	BAUGHMAN TILE CO. POLY 3-WALL HDPE 3500 4" I.D. (100MM) ASTM F810-405 MS
Baughman Tile Company	4" Corrugated PE	2 rows - 5/8" @ 4 1/2" centers	POLY-DRAIN MTS AASHTO M252 HEAVY DUTY MS PAULDING, OHIO POLY CAP
Bristolpipe	4" PVC	2 rows - 5/8" @ 6" centers	4" BRISTOLPIPE PVC PERFORATED PIPE ASTM D-2729 3000 LBS. CRUSH MS
Cresline	4" PVC	2 rows - 5/8" @ 5" centers	4" CRESLINE PVC DS -3000 POUND CRUSH PVC SEWER PIPE MS ASTM D 2729
Genova	4" PVC	2 rows - 5/8" @ 5" centers	4" GENOVA MS PVC PERFORATED SEWER PIPE ASTM D-2729
Hancor	4" Smooth PE	2 rows - 1/2" @ 3" centers	HANCOR 4-IN HDPE SDR-38 MIN RECYCLE CONTENT 80 PCT LBT 3000 LB F810 MS
Hancor	4" Corrugated PE	2 rows - 1/2" @ 4" centers	HANCOR HEAVY DUTY ASTM F-405 Heavy Duty BOCA 73 38 MS-PE
Hancor	3" Smooth PE	2 rows - 1/2" @ 3" centers	HANCOR 3" HDPE SDR-38 MIN RECYCLE CONTENT 80 PCT LBT 3000-LB F810 MS

MANUFACTURER	DIAMETER/TYPE	PERFORATIONS/SPACING	MARKINGS
Hancor	6" Smooth PE	2 rows - 1/2" @ 3" centers	HANCOR HDPE 6" SDR-43 MIN RECYCLE CONTENT 80 PCT LBT 3000-LB F810 MS
Haviland Drainage	3" Smooth PE	2 rows - 5/8" @ 5" centers	HAVILAND DPI 3500 TRI WALL HDPE 3" I.D. ASTM F810 MS
Haviland Drainage	4" Smooth PE	2 rows - 1/2" @ 3" centers	HAVILAND D.P.I. 3500 TRI-WALL HDPE 4" I.D. (100MM) ASTM F810 MS
Haviland Drainage	6" Smooth PE	2 rows - 1/2" @ 3" centers	HAVILAND-DPI 6" SDR43 HDPE SAND BEARING 3000 LB. MIN CRUSH ASTM F810 MS
Haviland Drainage	4" Corrugated PE	2 rows - 1/2" @ 4.5" centers	DPI 4" 100 MM MS HEAVY DUTY ASTM F-405 AASHTO M-252
Heritage Plastics	4" PVC	2 rows - 5/8" @ 5" centers	HERITAGE PLASTICS, INC. 4" PVC SEWER PIPE ASTM D2729 3000 # CRUSH MS
TBA	4" Smooth PE	2 rows - 5/8" @ 6" centers	TBA INC PE 4" ASTM F810 3000# CRUSH MS SDR 38 PERFORMANCE TESTED
Tolloti	4" Smooth PE	2 rows - 5/8" @ 5.5" centers	TOLLOTI 3000LBS PE 4" ASTM F-810 MS
Tolloti	4" PVC	2 rows - 5/8" @ 5" centers	GRP 4" PVC S&D ASTM D-2729 MS 3000

Expires 12/31/2005



Technical Advisory Council
for
Onsite Wastewater Treatment

Advisory
for
Precast Concrete Septic Tank
Installations and Inspections

Approved by the
Technical Advisory Council
December 6, 2006



Fig. A



Fig. B



Fig. C



Fig. D

Precast Concrete Septic Tank Installations and Inspections

1. Excavation:

- a. Tank should have a minimum 18" clearance around all sides for proper placement and back filling (Fig. A & C). Proper use of bedding material is critical so as to provide a uniform bearing surface to ensure the tank will not be subjected to adverse settlement. Use a minimum of 4" of granular (sand or "pea stone") bedding overlying a firm and uniform base unless otherwise specified. Tanks should not bear on large boulders or rock edges. Set the tank level to provide the proper elevation drop from inlet to outlet (Fig. B). Proper use of bedding over undisturbed soils ensures the tank is set level and stays that way.

2. Burial Depth and Loadings:

- a. Most standard concrete septic tanks are not designed for burial depth in excess of 3 feet of cover over the tank (Fig. C). Tanks used for deep burial or traffic loadings should be specially designed for the intended use.

3. Concrete Tank Inspection:

- a. Verify that the tank is of correct capacity and configuration as required.
- b. Joint sealing materials should be of high quality, preformed and flexible to achieve a watertight seal. Sealants conforming to ASTM C990 meet the criteria and should be of proper size for the joint of the concrete tank. Apply sealants to form a continuous length of seal. Properly splice the sealant by one of the following methods. Overlap splice: place one piece on top of the other and carefully mold together. Side by side splice: place ends in a parallel position and carefully mold together.
- c. The connection between the pipe and tank must be accomplished with a watertight, resilient and flexible connector. These connectors are generally referred to as boots (Fig. D). Connectors conforming to ASTM C-923 fulfill this requirement.



Fig. E



Fig. F



Fig. G

- d. Inspect the tank visually for any defect that may impair the use or life of the product. These may include cracks (Fig. E), honeycombed areas (Fig F), cold joints, etc. Repairs should be made using only materials that are specifically developed for concrete repair; and make repairs according to the manufacturer's specifications.
 - e. A cold joint (Fig. G) is a joint or discontinuity formed when a concrete surface hardens before that next batch is placed against it. Cold joints require special care and, as a minimum, should include a high quality water-stop, bonding agent, and continuation of reinforcing between pours. **ON TYPICAL RESIDENTIAL CONCRETE SEPTIC TANKS, A COLD JOINT SHOULD RARELY, IF EVER, BE OBSERVED.**
 - f. Verify the outlet device (pre-cast tee, plastic tee, effluent filter, etc.) is provided and of proper size and length.
 - g. All access risers and covers must be structurally sound and watertight. Riser covers shall be secured to prevent unauthorized entry.
- 4. Backfilling:**
- a. Care should be taken when backfilling, to prevent damage or misalignment to the entry and exit piping, the tank and fittings, and any joints. Back fill should be placed in uniform, mechanically compacted layers less than 24" thick. Compact one or two sides before backfilling the other sides. Excavated material may be reused for this purpose but should be free of any large stones, debris, or material great than 3" in diameter. Heavy concrete tanks are least likely to float in a flooded excavation. Concrete tanks will float, however, if the water level in the excavation is allowed to rise to a high level, causing potential damage to pipe connections and tank placement. To prevent this from happening, keep water pumped out of the excavation until after backfilling is completed, or fill the tank with water, or place soil on top of the tank.



Fig. H

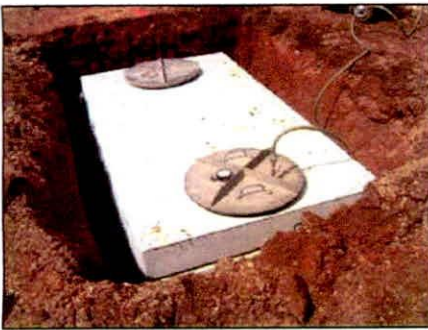


Fig. I



Fig. J

5. Tank Testing:

- a. Each manufacturer and supplier of concrete tanks should develop a quality control program that includes testing. The use of one of two primary test methods is recommended.

- b. Vacuum Testing: The recommended procedure is to introduce a minimum vacuum of 4" of mercury and hold the vacuum for five minutes with no loss (Fig H, I & J).

Depending on the tank configuration, it may take some time to stabilize the vacuum level due to various factors (compression of sealant, temperature variations, etc.) It is permissible to apply vacuum until the vacuum level stabilizes at 4 inches. Once vacuum is stabilized, remove the vacuum source and hold the vacuum for 5 minutes. If the tank fails the test, it may be repaired and retested. The suggested range of the gauge is 0-10 inches of mercury (maximum).

Warning: Testing with negative pressure involves potentially hazardous conditions. It is recommended that the negative air pressure testing of concrete tanks not exceed 7 inches of mercury, which is the recognized maximum requirement for structural strength proof testing. Take precautions to minimize potential risks by incorporating safety devices that will prevent excessive vacuum levels (safety release valves, etc).

- c. Water Testing: Fill the tank with clear water to the ceiling of the tank, or 2" above the top of the tank inside the riser if so equipped, and allow it to stand for 24 hours. If there is visible leakage (water flowing or dripping in a steady stream) repair the tank, refill it and allow it to stand for one hour. No measurable drop in water level is allowed. Do not reject the tank for damp spots on the exterior. Condensation on the exterior of the tank due to temperature variation is not considered a failure.

Warning: Do not allow the water inside the riser to exceed 2" above the top of the tank as additional head pressure may cause joint seal failure.

- d. Frequency of testing as recommended by the National Precast Concrete Association is one tank per form per year at a minimum or every 250 tanks per form, whichever is greater. Forms producing tanks that fail this test must undergo additional testing commencing with the next production of tanks from the form and continuing until 10 consecutive tanks pass the test.
- e. Some manufacturers conduct regular periodic testing of the tank they produce; many do not. Ask the supplier and encourage them to conduct testing on the product they manufacture.
- f. For further information on construction and installation of precast concrete septic tanks please contact the National Precast Concrete Association at 800-366-7731 or www.precast.org



ADVISORY
TECHNICAL ADVISORY COUNCIL FOR ONSITE WASTEWATER TREATMENT

TANK RISER AND LID ASSEMBLIES
December 2008

Onsite-systems should be designed and constructed with serviceability in mind. Tank access risers installed to grade simplify inspection, maintenance and repairs. When the tank location is easily identified and accessible; service providers and inspectors can conduct services quicker, easier, safer, and with less disruption and cost to the system owner. Furthermore, risers installed to grade promote regular maintenance as they provide a visual reminder to the owner that they have a septic system. The purpose of this advisory is to promote awareness of the basic design and installation of riser and lid assemblies with an emphasis on safety.

✓ **Riser location:**

- Risers should be installed on any tank opening that may require access. On large non-residential tanks, additional access risers may be required to facilitate proper removal of accumulated solids.

✓ **Type of riser material:**

- Risers must be made of corrosion resistant material and must maintain structural integrity
- The preferred commercially available risers are made of concrete, PVC, fiberglass, HDPE, and other plastics.

✓ **Size of risers:**

- Typical diameters range from 24" to 30". The diameter used must be compatible with the type of maintenance and service that is expected through the access opening. If final grade to the top of the tank is 24" or less, a 24" diameter riser is generally sufficient for access. For deeper tanks, or duplex pump installations, a larger diameter riser may be warranted to facilitate tank and equipment maintenance.

✓ **Riser attachment:**

- Riser attachment to the tank must be watertight.
- Many riser manufacturers offer tank to riser adapters that provide a watertight method of installation. The adapters are either cast-in or are attached to the tank top with stainless steel fasteners. Bolt down adapters utilize butyl rubber or other pliable sealant between the tank and adapter to ensure the watertight seal.
- The tank installer must communicate with both the tank and riser manufacturer to ensure product compatibility and proper installation procedures.
- For concrete risers, butyl rubber or other waterproof, corrosion-resistant pliable sealant can be placed between a clean tank surface and bottom of the riser to produce the watertight seal.
- HDPE risers will not provide a watertight bond with concrete. Therefore, when using HDPE risers, butyl rubber, or other waterproof, corrosion-resistant pliable sealant must be used to create the watertight seal.

✓ **Riser lids:**

- Access lids must be waterproof, resistant to ultraviolet light, resistant to corrosion from septic tank gases and moisture, and have a non-slip surface.
- Lids should also have a minimum wheel load rating of 2,250 pounds for covers terminating at grade as per International Building Code.
- Lids should contain a durable gasket material that fits tight to the riser to prevent odors, insects, water infiltration, and soil intrusion.

✓ **Lid security:**

- Lids must be secured to prevent unauthorized entry into the tank.
- If screws are used, they must be stainless steel.
- Typical Phillip or slotted head screws are not recommended. Use screws with hex heads or other designs that require a special tool to remove.
- Concrete or cast iron covers should be heavy enough to prevent access to children. ASTM 1227 07-C specifies that a concrete lid shall be 59 pounds minimum.
- To minimize the potential of a concrete lid from flipping when stepped upon, or easily slid to the side, the cover and top of riser should have a "step" shaped design verses a "wedge" or butt joint design.
- Some manufacturers have different methods for cover security such as stainless steel locking rings, lockable latches, or an under lid locking latch that may require a special tool for entry. If locks are used, they should be resistant to corrosion, weatherproof and protected from soil.
- Use lids with appropriate signage and raised lettering indicating hazardous conditions within the tank.

✓ **Secondary form of security:**

- A secondary form of security should be used. Secondary devices can prevent an accidental fall into the tank if the primary lid is removed or damaged. Examples include grates, nets and other devices that can be installed into the riser.
- Grates require a flange inside the riser to mount and support it.
- Nets are typically affixed in the riser with stainless steel eyebolts. Bolt penetrations must be watertight.
- Concrete lids can be manufactured to fit over the tank opening within the riser. The lid must have a durable handle and a "step" shaped design to facilitate removal. To prevent lifting injuries, an internal concrete lid should only be installed on tanks less than 18" in depth.
- Personnel should consider utilizing some form of barricade over open tank accesses when conducting an inspection or any type of service on the tank. This is especially important when multiple lids are open, or at times when the tank may be out of view of service personnel.

✓ **Additional considerations:**

- The riser and lid information provided above is for non-traffic areas only. Should the tank be located in a traffic area special design procedures must be followed for tanks, risers and lids to ensure structural, long term, integrity.
- Consider accessibility when designing and installing equipment in risers. For example, effluent screen handles, floats, and pump discharge pipes should extend far enough to be easily reached from grade, after the lid has been removed.
- If upon arrival to a site unsecured covers are noticed, try to secure them and then educate the owner of the associated hazards, such as toxic gases, lack of oxygen and possible drowning.
- Assure that all covers are properly secured prior to leaving the site.

To facilitate inspection and maintenance requirements, the use of tank access risers is becoming more prevalent around the country; therefore, lid manufacturers, NSF, and regulatory agencies are currently collaborating on the topic of secured riser assemblies. The Technical Advisory Council will continue to monitor the ongoing discussions between the groups and will revise this document should any information of significance emerge.

Note that this and other TAC Advisories are available at www.mowra.org (under TAC information).



Advisory
Technical Advisory Council for Onsite Wastewater Treatment

Use Of Geo-Fabric As A Soil-Stone Separator In Drainfields

Geosynthetic fabrics are commonly used as the separation material on top of drainfield stone to provide separation between the soil cover and the stone. The purpose of the fabric is to minimize soil particle (i.e. sediment) movement through the stone to the infiltrative surface. If sediment moves to the infiltrative surface, it will reduce the infiltrative capacity of the surface beyond the reduction that is caused by the development of a biomat.

It is important for the soil absorption system to "breathe" or pass oxygen rich air into the stone and liberate gases that develop. Therefore any cover material must not become clogged with sediment to the point that air cannot pass freely through. Lighter weight fabric will be superior to heavier in this regard due to its relative inability to trap and hold sediment.

The Technical Advisory Council (TAC) has surveyed the available materials and specifications that are in use by other states for cover separation fabric. A well-documented specification for this purpose was not found. There are numerous parameters used to describe geofabric products and there is currently no industry standard method of specifying cover fabric. Based on information received from manufacturers and the experience of fabric users in Michigan and other states, the following specifications are recommended for cover fabric until more is learned (bold specifications are considered most important):

Use Non-woven fabric

Weight – Not to exceed 2.0 oz. per square yard

Trapezoidal tear strength -- 10 lbs minimum. (ASTM D 4533-91)

Puncture Strength -- 8 lbs minimum (ASTM D 4833-88)

For additional information, the state of Wisconsin Administrative code Chapter 84, Section 40, page 203 (<http://www.legis.state.wi.us/rsb/code/comm/comm084.pdf>) contains information on fabric for this use also.

A current list of suppliers of filter fabric material meeting this specification is maintained on the MOWRA web site under the TAC Information section. Users are encouraged to err on the light side if fabric of the above specifications cannot be located. Also, users are encouraged to comment on this specification and provide additional information on sources of materials available for this application. As more information becomes available, this specification will be revised. To provide information on other products, contact the chair of the TAC. For contact information, see www.mowra.org/ and click TAC Information.

This Advisory was approved by the Technical Advisory Council August 31, 2005.



TECHNICAL ADVISORY COUNCIL
FOR
ONSITE WASTEWATER TREATMENT

**Subject: RESIDENTIAL SEPTIC TANK EFFLUENT PUMPING SYSTEMS
CLASSIFICATION FOR WIRING ELECTRICAL EQUIPMENT**

The 1995 publication of Standard 820 of the National Fire Protection Association (NFPA) indicates classification changes for residential septic tank effluent pumping systems. NFPA 820, Fire Protection in Wastewater Treatment and Collection Facilities, determines the hazard classification of various types of wastewater treatment and collection systems. Prior to the 1995 edition, residential wet and dry well pumping systems were classified as Class 1, Division 2 environments, due to the possible presence of explosive gases, namely methane. This classification indicates potentially flammable and explosive hazards and would require the use of explosion proof equipment.

Research has demonstrated that residential sewage systems, vented through the home plumbing, adequately vent methane. Therefore, the classification of Residential Septic Tank Effluent Pumping Systems has been changed to **unclassified**. This is indicated in Table 2 of NFPA 820. This classification does have a restriction in which no more than five dwellings can be served by the sewage pumping system. In other words, systems that serve more than five dwellings are not automatically covered by this unclassified designation.

The Bureau of Construction Codes (BCC) within the Michigan Department of Consumer and Industry Services has since acknowledged the new classification. As unclassified, the electrical wiring requirements are greatly simplified. However, chapters one through four of the National Electrical Code must be adhered to. The BCC also emphasizes the following three points:

1. Flexible cord use must provide for physical protection of the cords.
2. A disconnect must be within sight of the pump motors. Unless the pump control box is located outside of the home within sight of the pump, an additional disconnect will be required at the pump.
3. Wet wells contain hydrogen sulfide, which is corrosive. All electrical components located in the tank or riser over the tank should be of non-corrosive materials—plastic or stainless steel. The conduit between the tank and the pump control box should contain a sealing conduit to keep gases from the control box.

For safety reasons, the TAC adds an additional recommendation to this list. Every pump control box should be kept locked with a padlock or other secure locking device to prevent unauthorized entry.

The Technical Advisory Council presents this advisory to clarify questions regarding the classification of residential septic tank effluent pumping systems only. Since NFPA 820 leaves room for individual interpretation, please contact your local electrical authority prior to design and construction of wastewater treatment and collection systems. If your local authority still questions the issue regarding unclassified residential systems, have them contact the Electrical Division of the BCC at (517) 241-9320.

This informational bulletin was approved for distribution by the Technical Advisory Council for Onsite Wastewater Treatment at their regular meeting on February 13,

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