State of Vermont

Agency of Natural Resources

ENVIRONMENTAL PROTECTION RULES -- CHAPTER 1

SMALL SCALE WASTEWATER TREATMENT AND DISPOSAL RULES

EFFECTIVE -- August 8, 1996

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WASTEWATER MANAGEMENT DIVISION
Sewing Building, 103 South Main Street
Waterbury, Vermont 05671-0405

ENVIRONMENTAL PROTECTION RULES

Chapter 1

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
AGENCY OF NATURAL RESOURCES

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UBCHAPTER 1. PURPOSE - DEFINITIONS

§ 1-101. Purpose of Rules

A. Policy, practice and standards for the mobile home parks, public buildings, campground and subdivision programs are contained in these rules.

These rules do not limit the powers of State or local health authorities to control existing or potential health problems.

B. The purpose of these rules is to prevent health hazards, unsanitary conditions, and groundwater or surface water pollution caused by improper subdivision of land, construction and operation of campgrounds, mobile home parks and public buildings; or from water supplies or treatment and disposal of sewage from sources within the jurisdiction of these rules. These rules are intended to:

1) prevent the creation of health hazards;

2) prevent surfacing sewage or the pollution or contamination of drinking water supplies, groundwater and surface water;

3) insure the availability of an adequate supply of potable water;

4) insure the provision of adequate drainage as related to the proper functioning of sewage disposal or water supply systems; and

5) insure that facilities are designed and constructed in a manner which will promote sanitary and healthful conditions during operation and maintenance;

Granting of a permit or certification of compliance under these rules does not relieve the project owner of the responsibility for satisfactory functioning of the systems approved.

C. In accomplishing the purposes of (B), it is the express intent of the Department to encourage innovation, allow maximum flexibility in design, and minimize delay in the processing of applications.

§ 1-102. Definitions

Unless otherwise stated:

A. "Agency" means the Agency of Natural Resources.

B. "Board" means the Vermont Water Resources Board.

C. "Commissioner" means the Commissioner of the Department or her/his designated representative.

D. "Department" means the Department of Environmental Conservation.

E. "Director" means the Director of the Division or her/his designated representative.

F. "Discharge" means the disposal of wastes in a manner that does not comply with the provisions of Section 1-703 of these regulations.

G. "Division" means the Wastewater Management Division of the Department.

H. "Elevation" means height above mean sea level, using the U.S. Geological Survey datums.

I. "Flood plain" means any area which is flooded with an average frequency of once or more in each 100 years as determined by the Secretary.

J. "Floodway" means the channel of a river or other water course and the adjacent land areas that must be reserved in order to discharge 100 year frequency flood without cumulatively increasing the water surface elevation more than one foot.

K. "Hydrogeologist" or "qualified hydrogeologist" means a person with training or experience in bedrock geology, glacial geology and groundwater hydrology sufficient to prepare adequately the hydrogeologic studies and analyses required by these rules.

L. "Individual sewage system" means an on-site sewage treatment and disposal system serving a single family residence.

M. "Innovative system" means a sewage system not permitted on the effective date of these rules but which is designed to achieve the purposes of these rules.

N. "Minor projects" means single lot subdivisions, and projects with a design water and wastewater flow of less than 600 gallons per day where site conditions are favorable for on-site sewage disposal so that no site modifications are required. Projects involving industrial waste (see §1-713) shall not be considered minor projects.

O. "Municipality" means a town, city, incorporated village or incorporated fire district.

P. "Person" means any individual, partnership, public or private corporation, unincorporated organization, trust, State or Federal agency, municipality, or other entity which holds an interest in land.

Q. "Potable Water Supply" means the source, treatment and conveyance equipment used to provide water used or intended to be used for human consumption, washing, bathing, the preparation of food or laundering.

R. "Professional engineer" means a person registered to practice engineering in the State of Vermont acting within the authority of his or her license.

S. "Qualified consultant" or "consultant" means a professional engineer or a site technician acting within the authority of his or her certification.

T. "Qualified wastewater treatment plant operator" means a person licensed by the Department to operate a wastewater treatment plant.

U. "Secretary" means the Secretary of the Agency or her/his designated representative.

V. "Sewage" means sanitary waste or used water from any building, including but not limited to carriage water, shower and wash water, and process wastewater. For purposes of these rules, storm water shall not be considered sewage.

W. "Site technician" means a person who is certified under the provisions of Title 3 V.S.A. §2827.

X. "Wastewater system" means any piping, pumping, treatment or disposal system used for the conveyance and treatment of domestic, commercial or industrial waterborne wastes.

APPENDIX 1-1A - Legal Authorities

A. These rules are adopted under the authority of the Secretary pursuant to Title 3 V.S.A., §808, 831 et seq, 2822 (f), (g), (h), (i) and (j), 2827, and 2873 (a) and (c); 10 V.S.A., §1265a, §1271, 1951-1955 and 6231; and 18 V.S.A., §1218; and 24 V.S.A., §3631 and 3632.

B. These rules succeed and supersede the existing Environmental Protection Regulations, which were effective on 9/10/82, and the Vermont Health Regulations, Chapter 5, Sanitary Engineering, Subchapter 10, Part II (Wastewater Treatment and Disposal - Individual On-Site Systems) which are repealed upon adoption of these rules.

These rules are not intended to affect other existing health regulations, including but not limited to Vermont Health Regulations, Chapter 5, Subchapter 2 (Food Service Establishments), 3 (Schoolhouse Regulations), 4 (Food Establishments - not restaurants), , Subchapter 14 (Day Care Facilities), and Subchapter 16 (Rental Housing Health Code).

SUBCHAPTER 2. ADMINISTRATION

§ 1-201. Rules of Practice - Permit Programs

A. Applications: Application for permits should be submitted to the appropriate Agency regional office. See map of regional office areas attached as Appendix 1-2A.

B. Review of Applications: Division conducts an initial review of applications for permits to determine completeness. Technical engineering review of an application is conducted by engineers or technicians in either the regional office or in Waterbury.

C. Permit Issuance or Denial: Decisions as to whether a permit is issued or denied rests ultimately with the Commissioner. Division decisions in all cases shall be the responsibility of the Director. The Director may assign responsibility for permit issuance and denial to engineers or technicians. Decisions are based on a project's compliance with these rules.

D. Informal Appeals: An applicant may request that a decision made in a regional office be reviewed by the Engineering Manager. Decisions of the Engineering Services Section may be informally appealed to the Director using the following procedures:

1) The decision of the Engineering Services Section shall be issued in writing within the time requirements specified in § 1-201(I).

2) The applicant shall submit a written statement to the Director requesting reconsideration of the decision stating which aspects of the decision are at issue, the reasons why the applicant believes the decision to be in error and the decision requested of the Director.

3) As soon as possible but within 15 days, the Director shall convene a meeting with the applicant and her/his representatives and Division personnel. The Director may call on other individuals within or outside the Department who have expertise appropriate to the case to assist in her/his review.

4) The Director shall issue a decision to the applicant in writing within five days of the meeting. This time period may be extended if the applicant agrees.

5) The applicant may request that the decision of the Director be reviewed by the Commissioner who may hold additional meetings at her/his discretion or act on the basis of the record.

6) The informal appeal is not intended to delay an applicant in making a formal appeal which may be filed concurrently with or in lieu of an informal appeal.

E. Formal Appeals: An appeal of the issuance, denial, renewal, revocation, suspension, annulment, or withdrawal of a subdivision, water supply and wastewater, campground or mobile home park permit is to the Water Resources Board pursuant to 3 V.S.A. §2873(c)(4) with the exception of the denial or revocation of a mobile home permit. Any person aggrieved by the denial or revocation of a mobile home park permit may appeal to the superior court in the county in which the mobile home park is located pursuant to 10 V.S.A. §6233. All other program decisions under these rules are appealable to the State court system if provided for by law.

F. Revocation of Permits:

The Commissioner may revoke a permit.

1) Basis for Revocation: Violation of permit conditions, false or misleading information submitted in support of the permit, violation or failure to comply with the provisions of these rules or authorizing statutes.

2) Petition for Revocation: Petitions for revocation shall be addressed to the Commissioner and shall set forth the name and address of the petitioner, his interest in the matter, and a brief statement outlining the basis for revocation of the permit. A copy of the petition for revocation shall be sent by the petitioner to the permit holder and landowner. The Division may file a petition and participate in revocation proceedings.

3) Party Status: The Commissioner shall determine the right of the petitioner or other persons requesting party status to participate in the proceedings. In determining party status, the Commissioner shall consider whether a person or his property is directly affected by the permitted project.

4) Notice of Revocation Hearing: Notice of a Petition for Revocation of a permit shall be sent to the permit holder. The notice shall be issued at least two weeks prior to hearing and shall contain: 1) legal authority for revocation; 2) a brief statement of facts upon which the proposed action is based; 3) that the Commissioner shall hold a hearing for the purpose of determining whether the permit shall be revoked. The notice shall include the date, time, and place where the hearing will be held.

5) Hearing: Hearing in a contested case shall be conducted by the Commissioner. Any party to the revocation proceedings shall appear himself or shall be represented by an attorney at law. The burden of proceeding and of proving that the permit or decision should be revoked shall be upon the party supporting a petition for revocation. The admissibility of evidence in all revocation proceedings shall be determined under criteria set forth in 3 V.S.A., §810. Upon request of a party, a hearing shall be transcribed by a qualified stenographer or recorded on an electronic sound device at the election of the party. If transcription by a stenographer is requested, the request shall be in writing and filed at least 10 days before the hearing. Costs shall be borne by the requesting party. The requesting party shall provide one copy of the transcript to the Commissioner without cost; other parties wishing a copy shall reimburse the requesting party on a prorated basis. Cross-examination of any witness shall be done only by an attorney who has entered his appearance or by a party to the proceedings that is not represented by counsel, unless the Commissioner directs otherwise.

6) Examination of Evidence, Decision and Order: Examination of evidence, decision and order shall be governed by the provisions of 3 V.S.A. §811 and §812. A final decision shall be made within 20 days after the adjournment of the hearing. Copies shall be sent to the permit holder, other parties, the legislative body of the municipality, and municipal and regional planning commissions.

7) Voluntary Revocation: The current permit holder may voluntarily waive the right to have a petition and hearing prior to having the permit administratively revoked by the Division Director.

G. Petition for Declaratory Ruling: On petition of the Division or of a person who may be affected by a statute or rule administered by the Division, the Commissioner shall issue a declaratory ruling as to

the applicability of any statutory provision or any rule as provided for in 3 V.S.A. §808.

1) Form and Contents: The petition shall contain the name, address, and telephone number of the petitioner, the signature of the petitioner, the designation of the specific provision or rule in question, together with a statement of the controversy or uncertainty involved, a statement of the petitioner's interest in the subject matter, including the reasons for the submission of the petition, a statement of the petitioner's contentions, and a memorandum of legal authorities in support of such position or contention.

2) Commissioner's Action: The Commissioner shall act within 30 days in the disposition of any petition for declaratory ruling.

3) Hearing: Although in the usual course of disposition of a petition for a declaratory ruling, a hearing will not be required, the Commissioner may in her/his discretion order such proceeding set down for hearing. Any person who desires a hearing on a petition for a declaratory ruling shall set forth in detail in her/his request the reasons why the matters alleged in the petition, together with supporting affidavits or other written evidence and briefs or memoranda of legal authorities, will not permit the fair and expeditious disposition of the petition, and, to the extent that such request for a hearing is dependent upon factual assertions, shall accompany such requests by affidavits establishing such facts. In the event that a hearing is ordered by the Commissioner, the hearing shall be conducted in accordance with Subsection (4) herein.

4) Hearing Procedure: Hearings on petitions for declaratory rulings shall be conducted in accordance with the provisions of 3 V.S.A., §§809-814, and sections referenced herein, except that the burden of proceeding and proof that the contentions in the petition are correct shall be upon the petitioner.

5) Record of Declaratory Rulings: All declaratory rulings shall be issued in writing. The Department shall maintain a file of all rulings and make copies of the rulings available to the public at cost.

H. Project Review Sheet:

1) The project review sheet is a form used by the Division and Environmental Board staff to provide information to applicants about the jurisdiction of Division and Act 250 programs as applied to the specific project described by the applicant and to give general information about other State and local permit requirements which may apply.

2) A prospective applicant should request a project review sheet from the permit specialist or district coordinator in the early planning stages of a project so that potential regulatory requirements may be evaluated.

3) Determinations of jurisdiction on Division programs are appealable to the Director within 30 days of issuance.

I. Consideration of Applications:

1) Within 10 days of receipt of an application, the Division shall send a notice of receipt to the applicant and the municipal planning commission, or the Division may return the application as inadequate for review. When an application is returned, the Division shall state deficiencies which must be corrected before submitting.

2) Within 60 days of issuance of the notice of receipt, the Division shall issue a written decision on the case. The decision shall be in the form of a Permit for approvals; a Denial of Application for denials; or a review letter specifying the Division's evaluation of the information submitted and any further information needed to complete the review.

3) The Division shall reply to a response to a review letter issued under (2) above within 30 days of receipt.

4) For subdivision applications, a permit will be issued to the applicant if the Division fails to act in compliance with subsection (2) above.

J. Issuance and Denial of Permits:

1) If the Division approves an application, it shall issue a permit to the applicant enabling the project to proceed in accord with the terms of the permit as approved. No person shall proceed with a project except in accord with the terms and conditions of the permit.

2) The Division may deny an application for one or more of the following reasons. Denials shall be issued in writing, stating the reasons for denial.

a. when the site conditions are not suitable for on-site water or subsurface sewage disposal systems or where an unreasonable burden will be placed on a municipal sewer or water system;

b. when the proposed project does not meet the technical requirements or basic regulations set forth in these rules;

c. when the information submitted is not sufficient to make a determination that the proposed project can be developed in accord with these rules;

d. when the information submitted is determined to be in error;

e. when conditions exist or may be created which may endanger public health;

f. when an innovative system proposed under § 1-203 does not meet the purposes stated in § 1-101.

3) The Division may issue a permit to the applicant subject to conditions consistent with the purposes of these rules.

4) The Division shall forward a copy of each permit or denial to the municipal planning commission or municipal clerk in municipalities without a planning commission.

K. Continuity of Permit Conditions: Permits issued under these rules shall run with the land and shall be binding on the permittee and each successor in interest.

L. Consultant Qualifications:

1) Vermont Registered Professional Engineers knowledgeable in the field of sanitary engineering may prepare the technical evaluations and designs required by these rules.

2) Certified site technicians may submit technical information to the extent consistent with

the requirements of their certifications issued under § 1-204 of these rules.

3) Where hydrogeologic studies are required, they shall be performed by a qualified hydrogeologist.

M. Simplified Procedures for Minor Projects

1) For minor projects as defined in § 1-102(N) where the consultant submits a certification with the application stating that the project complies in all respects with these rules, the Division may issue a permit without detailed review with a condition stating that the Division relied solely upon the certification and application as submitted and that the permit may be revoked if it is determined that the project does not comply with these rules as certified.

a. The following shall be included in any certification submitted under this section:

"I hereby certify that the application submitted herewith is for a minor project as defined in the Vermont Environmental Protection Rules, § 1-102(N), that all the information submitted with the application is true and correct, and that the design of this project complies in all respects with Chapter 1 of the Vermont Environmental Protection Rules."

b. False or misleading certification under this section shall be a violation of these rules, and the statute(s) under which the application is filed, by the person completing the certification.

2) For projects that require a permit but which present a negligible potential for adverse environmental impact, the Division may issue a permit without requiring submission of the detailed information normally submitted with an application.

§ 1-202. Variances

A. General: Requests for variances shall be accompanied by plans and specifications for the proposed system for which a variance is being requested and a statement of the grounds for the request. The disposition of the variance request shall be in writing and shall state the reasons for a denial or the specifications and conditions of any approval.

Approval of a variance under this section or of an innovative system under § 1-203 shall not relieve the applicant of the responsibility of complying with all other applicable State and local laws, rules or ordinances, including Title 10 V.S.A. Chapter 47, Water Pollution Control. In the event that a variance or innovative system may result in a discharge to the waters of the State requiring a permit under 10 V.S.A., Chapter 47 or action by the Board, compliance with Chapter 47 or Board action shall precede issuance of approval by the Division.

B. Grounds for Variances: Variances from the technical requirements of these rules may be granted upon finding that:

1) The proposed wastewater treatment disposal system is intended to eliminate an existing health hazard, public nuisance, or source of pollution from an existing structure.

2) Site conditions exist which render strict compliance impossible;

3) There are no other feasible means of legally treating and disposing of the sewage; and

4) A system can be constructed which will function in a satisfactory manner so as not to create a health hazard, public nuisance or source of pollution.

§ 1-203. Innovative Systems

A. General: These rules provide criteria and guidelines related to the design, construction and operation of the regulated development. A project which complies with these criteria shall be granted a permit.

The Department encourages innovation and the Director may exempt projects from the specific criteria and guidelines of these rules in order to permit innovative projects in individual cases where the project complies with the provisions in (B).

Requests for approval of innovative systems shall be filed, in writing, with the application, stating the manner in which the design varies from the specific criteria of these rules and the basis for finding that the design meets the criteria set forth in (B). The request shall be reviewed by the Engineering Services Section and then by the Director using the procedures set forth in § 1-203(D) of these rules.

The Department shall maintain a file available to the public of all decisions issued under this Section.

B. Innovative System Criteria: The Director shall permit an innovative system if it is found that:

1) the proposal is designed to achieve the purpose of these rules as set forth in § 1-101; and

2) the proposed design is based on established engineering principles and can be expected to perform with the same level of reliability and environmental protection as systems designed using criteria and guidelines included in these rules; and

3) the public and persons using the project are protected from health hazards, pollution and increased costs in the event the innovative system does not meet the purposes of these rules.

C. Bonding: The Director may require bonding or other surety of an appropriate amount to ensure performance or replacement of an innovative system in the event that it fails to meet the purposes of these rules.

Surety or bonding shall be established for a specified time period in each case.

D. Decision: The Director shall make a decision to permit or deny an innovative system in writing and shall state the reasons therefore. The Director may authorize the Engineering Services Section to issue or deny approval under this section. A copy of the decision granting a permit for an innovative system shall be posted for at least one month in the offices of the municipality in which the project is located.

§ 1-204. Certification of Site Technicians

A. General: Certification allows a site technician to:

1. Submit applications to the Division for single lot subdivisions. As used in this section, "single lot subdivision" shall mean dividing a parcel of land so that not more than one additional parcel of less than 10 acres in area is created from the original parcel within any 24 month period.

2. Prepare designs for individual water supplies and individual on-site sewage disposal

systems serving single family residences with a design flow of no more than 600 gallons per day, and to prepare any associated application for municipal approval required by a municipal sewage ordinance adopted pursuant to chapter 102 of Title 24.

3. Perform reviews for a municipality of applications required by a municipal sewage ordinance adopted pursuant to chapter 102 of Title 24. A site technician acting on behalf of a municipality may not perform a review of an application or system design that he or she prepared.

Procedure for obtaining certification is governed by these rules.

B. Application: To be eligible for certification as a site technician, an applicant must:

1) Submit a completed and signed application form, which shall be provided by the Division;

2) Submit with the application, a written resume of work and educational experience relevant to the work required to be done in the submittal or review of an application as provided under §1-204(A) of these rules; and

3) Pay appropriate fees as specified in Title 3 V.S.A. §2822.

Applications must be received at least three weeks prior to the examination. The applicant may submit references furnished from persons having professional knowledge of the applicant, such as registered professional engineers, soil scientists, land surveyors, geologists, and certified site technicians.

C. Demonstration of Ability: Opportunities for applicants to demonstrate ability to prepare applications for permits for single lot subdivisions shall be offered at least once a year at a time and place publicly announced at least six weeks before the examination.

Demonstration of ability shall consist of both written and field examinations prepared by the Division and shall be adequate to distinguish between the following types of certification.

D. Types of Certification:

1) Type A - a site technician certified under this section may do all aspects of site evaluation and application preparation for single lot subdivisions but may not design site modifications as defined in Subchapter 1-7 of these rules.

2) Type B - site technicians certified under this section may design site modifications in accordance with Subchapter 1-7 for single lot subdivisions in addition to the work authorized under the Type A certification.

E. Certification: When the Division makes a decision to certify or deny certification of a person to be a site technician, notice shall be furnished in writing to the applicant within ten (10) days of the decision. The Division shall issue a certification number for each site technician.

F. Review by the Commissioner: The Commissioner, or a duly authorized representative of the secretary, may review, on a random basis or in response to a complaint, the test procedures employed by a site technician, the systems designed by a site technician, the designs approved or recommended for approval by a site technician, and any work associated with the performance of these tasks.

G. Disciplinary action: The Commissioner, after a hearing, in accordance with Chapter 25 of Title 3, may suspend, revoke or impose conditions on a site technician's certification. Notice of that revocation

shall be included in the next environmental notice bulletin. This proceeding may be initiated on the secretary's own motion or upon a written request which contains facts or reasons supporting the request for suspension or for revocation. Cause for imposing conditions, suspension, or revocation is any one or more of the following :

1 False or misleading information submitted in support of an application.

2) Misrepresentation of any relevant fact at any time.

3) Negligence or incompetence in completing the work necessary for an application, a design, or the review of an application.

A hearing on revocation shall be held by the Commissioner or a person designated by the Commissioner to be hearing officer. The hearing is a contested case, and shall be governed by the provisions of the Vermont Administrative Procedures Act, 3 V.S.A, §809-814.

H. Rules of Conduct: Site technicians shall be objective and truthful in reports, statements, or testimony submitted in support of an application or review performed within their authority. All relevant and pertinent information shall be included in such reports, statements or testimony.

I. Prior Certification Clause: Site technicians certified prior to the effective date of these rules shall remain certified, but are subject to the imposition of conditions, suspension or revocation procedures and are not entitled to a Type B certification without first passing the examination.

J. Renewals: Site Technicians shall maintain their certification by filing a renewal fee every two years.

§ 1-205. Fees

Fees for the submission of applications and certifications to the Division are specified in Title 3 V.S.A. §2822.

1-206. Local Administration of Subdivision Program

A. Pursuant to 24 V.S.A, §4493, upon the request of a municipality, the Commissioner shall delegate the authority to regulate subdivisions within the jurisdiction of these rules to a municipality where:

1) The Commissioner finds that the municipality has adopted bylaws under Subchapter 6 of 24 V.S.A., Chapter 117 which are in conformance with or more effective in carrying out the purposes of Subchapter 1-3 of these rules; and

2) The Commissioner finds that the municipality has adequate administrative and enforcement capabilities.

B. Upon making the affirmative findings required in (A) above, the Commissioner shall certify to the clerk of the municipality that all or a designated portion of the subdivision program shall not apply in that municipality.

C. Delegation may be revoked by the Commissioner after opportunity for hearing and upon a finding that the municipality has failed to adequately administer or enforce a program. Grounds for revocation shall include:

1) failure to apply the standards in the bylaws or maintain the administrative capability upon which the delegation was based; or

2) failure to take administrative or court action to enforce compliance of the bylaws or conditions of a permit.

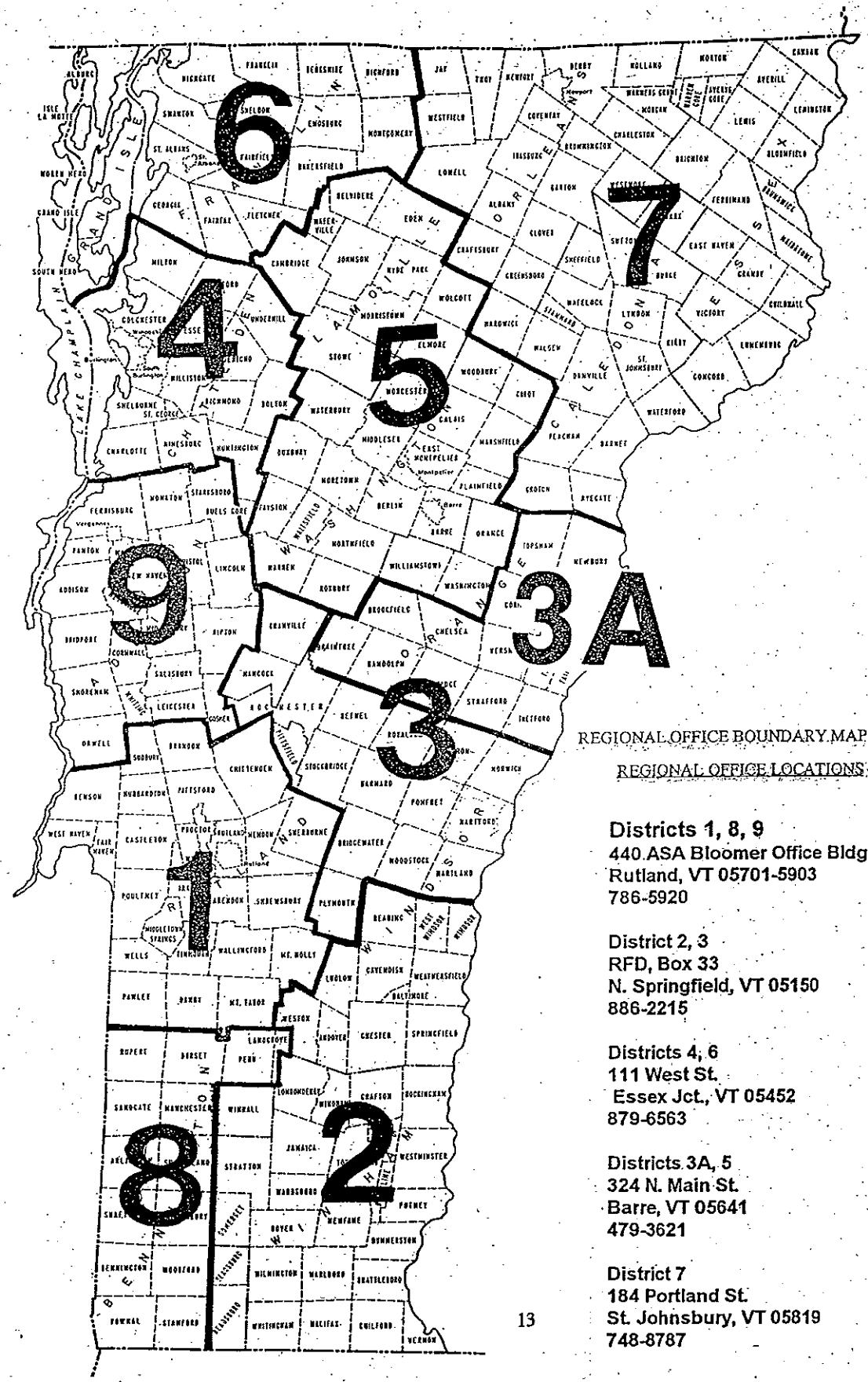
D. Where a delegation has been made to a municipality and this municipality fails to enforce its bylaws, the Commissioner may bring action to enforce the subdivision rules as though no delegation had been made, and any penalty or forfeiture collected shall be for the benefit of the State.

E. A municipality requesting delegation may enter into a written delegation agreement with the Commissioner to establish coordination and provide that the Division shall give technical assistance to the municipality and review some projects because of their size or technical complexity.

F. A copy of each permit issued by a municipality under this section shall be filed with the Division.

G. The Division shall maintain a list of municipalities to which delegation has been made.

APPENDIX 1-2A



REGIONAL OFFICE BOUNDARY MAP

REGIONAL OFFICE LOCATIONS

Districts 1, 8, 9
440 ASA Bloomer Office Bldg
Rutland, VT 05701-5903
786-5920

District 2, 3
RFD, Box 33
N. Springfield, VT 05150
886-2215

Districts 4, 6
111 West St.
Essex Jct., VT 05452
879-6563

Districts 3A, 5
324 N. Main St.
Barre, VT 05641
479-3621

District 7
184 Portland St.
St. Johnsbury, VT 05819
748-8787

SUBCHAPTER 3. SUBDIVISIONS

§1-301. General

This subchapter will be used in the review of subdivisions subject to the jurisdiction set forth below.

§1-302. Definitions

A. "Building development" and "development" means the construction or installation of any structure or building, the useful occupancy of which requires the installation of plumbing, of a water supply system or of a sewage disposal system.

B. "Existing subdivision" means a subdivision:

1) which has been approved by a municipality pursuant to the administration of a subdivision ordinance or bylaw prior to September 18, 1969; or

2) concerning which a plat thereof, prepared by an engineer or land surveyor, has been filed for record in the town clerk's office of the town in which the subdivision is situated, on the basis of which plat, one or more lots depicted thereon have been conveyed or made the subject of a contract for sale prior to September 18, 1969; or

3) which was not of record on September 18, 1969, but which the Division accepted as a subdivision existing on that date on the basis of evidence submitted to the Division prior to July 1, 1970;

4) involving a parcel which on March 5, 1973, contained two or more structures which were used on or before that date as primary single or two family residences, but only to the extent that the proposed subdivision would create a boundary between two such structures; or

5) involving up to two individual parcels subdivided out of the same parcel and described by deeds which were recorded between September 18, 1969 and March 5, 1973.

C. "Parcel" means any contiguous land owned or controlled by a person. Tracts or lots of land owned by a person which have in common one or more points on any boundary or which are divided only by easement or interests consisting of less than fee simple ownership shall be deemed to be contiguous land for purposes of this subchapter except that:

1) tracts or lots of land which are divided by State or municipal highway rights-of-way or surface waters with a drainage area greater than 10 square miles shall not be deemed contiguous;

2) tracts or lots of land which were acquired by their owner with the same boundaries as they are to be conveyed shall not be deemed contiguous to any other parcel owned by that person; and

3) a subdivision which is created by State or municipal condemnation for highway or utility construction, shall not require a permit.

D. "Subdivision" means:

1) the dividing of a parcel of land by sale, gift, lease, mortgage foreclosure, court ordered partition or filing of a plot plan on the town records where the act of division creates one or more

parcels of land of less than 10 acres in area, but excluding leases subject of the provisions of Chapter 153 of Title 10 relating to mobile homes. Subdivision shall be deemed to have occurred on the conveyance of the first lot or the filing of a plot plan on the town records, whichever shall first occur; or

2) the commencement of building development with intent to subdivide, as defined in subsection (1) of this section, such that the building development will be located upon a parcel of land less than 10 acres in size.

Note: When subdivision creates a retained lot of ten acres or larger in size, approval of the retained lot is not required.

§ 1-303. Existing Subdivision -- Permit Required for Modification or Extension. Approved Lots, System Construction in Approved Municipalities

A. This subchapter shall not apply to existing subdivisions except that no person shall alter, modify, or extend a subdivision or an existing subdivision without first complying with these rules and with local subdivision ordinances insofar as they pertain to public health or health related factors.

B. If an individual sewage system is required for a lot subdivided pursuant to a permit issued under these rules, the person developing that lot may install a system approved by the municipality without further review or approval by the Division, provided that the municipal ordinance has been approved by the Commissioner of Health pursuant to the Vermont Health Regulations, Chapter 5, Subchapter 10, Part II or by the Department of Environmental Conservation pursuant to Title 24 VSA, Chapter 102.

§1-304. New Subdivisions - Permit Required

No proprietor of land shall subdivide it, or otherwise establish and create a subdivision, without first obtaining a permit from the Wastewater Management Division ;

Exceptions:

A. No permit will be required for a lot which contains a primary single family residence, or a public building with design flows of domestic type sewage of 300 gallons per day or less, constructed there prior to March 5, 1973, when the following conditions exist:

1) the structure is served by a public water supply approved by the Water Supply Division or a private water supply which has been tested and has tested negative for the presence of Total Coliform; and

2) the structure is served by a municipal sewage disposal system approved by the Department; or has a functioning on-site sewage disposal system not causing apparent pollution or a health hazard where the existing disposal field complies with one of the following:

a) is at least 100 feet from any property boundary created by conveyance;

b) is at least 100 feet from the boundary created by an easement which allows for the installation of a replacement water supply or wastewater disposal system for the homestead exempt lot within the easement area; or

c) has a fully complying replacement area designed by a qualified consultant which is shown to meet the requirements of Subchapter 1-7 of this rule.

If the sewage disposal system is an outhouse or other system not requiring interior plumbing and conventional subsurface disposal, the 100 feet will be measured from the location where a subsurface disposal system would likely be installed.

3) This exemption does not apply to seasonal camps.

B. When a subdivision is created by court ordered partition, the person(s) receiving title, not the court, shall comply with the permit requirements of these rules.

§1-305. Deferral of Permit

A. The purchaser of an unimproved lot of land less than 10 acres in area may waive developmental rights thereto involving the construction or erection of any building or structure, the useful occupancy of which would require the installation of plumbing and sewage treatment facilities. Upon the filing of an application consisting of a plot of the parcel and a statement signed by the purchaser of the parcel that waives developmental rights, the Division may issue to the proprietor, a deferral of permit for conveyance of the parcel. No structure or building, the useful occupancy of which will require the installation of plumbing and sewage treatment facilities may be constructed or erected on a lot subject to a deferral of permit, unless the lot owner first obtains a permit as required by these subdivision regulations. The terms and conditions of the deferral shall be binding on the purchaser and all successors in title. A parcel purchased under the provisions of this section may not be resold unless a subdivision permit is obtained, or the waiver of developmental rights is included in the deed or lease and notice of the purchaser's name and address is filed with the Division prior to conveyance.

Any waiver of developmental rights shall be made a term of any contract of sale or of lease of the parcel, and shall be recited in any deed in the form as follows:

"Waiver of Developmental Rights"

"In order to comply with State of Vermont Environmental Protection Rules, Chapter 1 on the subdivision of lands and disposal of waste including sewage, the grantee shall not construct or erect a structure or building on the parcel of land conveyed herein, the useful occupancy of which will require the installation of plumbing and sewage treatment facilities or convey this land without first complying with said State regulations. The grantee by acceptance of this deed acknowledges that this lot may not qualify for approval of development under the appropriate environmental protection or health regulations and that the State may deny an application to develop the lot."

B. Retained Parcel Deferral

When a parcel retained by the subdivider is subject to the permit requirements of these rules, the procedures in subsection (A) above may be used. The restrictions in this permit shall be binding upon the retaining landowner and any future landowner and the "Waiver of Developmental Rights" shall be included in any deed, contract or lease transferring the retained parcel unless a subdivision permit is obtained prior to transfer.

§1-306. Existing Seasonal Camps

A. "Existing seasonal camps" shall mean two or more structures, such as summer cottages, constructed or erected prior to June 1, 1970, which have not been used as a primary single family dwellings but have been in use as seasonal camps since that date.

B. A person may subdivide a single parcel containing existing seasonal camps if a subdivision permit is obtained or if:

1) any existing sewage disposal and water supply facilities are functioning without causing a health hazard or source of pollution; and

2) an application is submitted to the Division and approved showing a design for replacement sewage disposal and water supply facilities which meet the technical standards of these rules; and

3) the applicant has provided a legal mechanism which insures that the existing structure will remain in seasonal use unless approval for conversion to primary residential occupancy is issued by the Division; and

4) no unimproved lots less than 10 acres in size are created without a permit as a result of the subdivision.

§1-307. Application for Permits

Application for a permit to subdivide land shall be made to the Division by the landowner intending to do so. It is recommended that a preliminary investigation be made to determine that substantial compliance with the appropriate site and environmental requirements can be attained. Each application shall include the following:

A. Site Report

The application shall include a written site report containing the following information:

1) Name and location of the proposed subdivision, alteration, modification, or extension.

2) Name and address of the landowner.

3) Statement of the purpose of the subdivision, alteration, modification, or extension, and the intended use of the land after subdivision; such as residential, single family, 2-family, multiple housing, commercial, industrial, recreational, or agricultural.

4) Statement of the type of water system to be provided, or intended to be used in the subdivision; such as individual system on each lot, community system, or municipal system.

5) Statement of the type of sewage disposal system to be provided, or intended to be used in the subdivision; such as individual subsurface system on each lot, community subsurface system, or municipal system.

6) Statement of existing use of adjacent properties including the locations of water supplies and sewage disposal facilities.

7) Certified report of a qualified consultant including a highway location map and five foot interval contour map at a scale of 1" = 100' or less, showing the location of all standing and flowing waters and wetlands (including but not limited to lakes, ponds, rivers, streams, swamps, bogs, sedge meadows, and marshes) and artificial water impoundments, present or proposed, within or immediately bordering the land of the subdivision, together with the consultant's statement of whether any areas of such subdivisions lie within the flood plain. In cases where the subdivision may be subject to flooding, this report shall include the location on the lots of any flood plain designated by the Secretary of the Agency of Natural Resources or other official flood

plain studies or calculations and measurements to show the flood plain level. At the discretion of the Wastewater Management Division, the applicant may be required to submit additional information verifying the location of the flood plain.

8) It is recommended that proposed sewage disposal areas be flagged at the corners and well locations flagged at the site prior to filing an application.

9) Such additional and supplementary information necessary to determine compliance with these rules, as the Wastewater Management Division may request after reviewing the application.

B. Plans and Specifications

The application shall also include a detailed plat of the proposed subdivision, alteration, modification, or extension, drawn to a scale of 1" = 100' or larger showing the locations and dimensions of the land involved; all existing and intended lots and exempt lots, streets, water and sewer systems, location of the sewage disposal and replacement areas required for individual sewage disposal facilities, if intended; parks, playgrounds, parking areas, if intended; rivers, streams, brooks, water supplies, wells, springs and any lakes, ponds, or wetlands, natural or artificial, existing or intended, and shall show the slope as naturally occurring, and any proposed alterations at five foot contour intervals. The surface drainage system shall be included on the plat as naturally occurring, and as altered by roadways or any drainage grading or improvement, installed or proposed.

C. Soil Data

1) If a subdivision, or any portion of a subdivision, is to be served by a central sewage disposal system operated by a municipality of the State, no soil data is required for individual lots served by the central sewage system.

2) Soil and site evaluation information as described in Section 1-707(A) shall be prepared by a qualified consultant and submitted with the application.

§1-308. Environmental Requirements

A. Water Supply

It is recommended that wherever feasible, every lot in a subdivision be served by a public community water supply system approved by the Department of Environmental Conservation's Water Supply Division in accord with Chapter 21 of the Environmental Protection Rules, the Vermont Water Supply Rule.

If service to each lot by a public community water supply is not proposed, the water source, and the water system shall meet the requirements of Chapter 21 of the Environmental Protection Rules, the Vermont Water Supply Rule.

B. Sewage Disposal

The Division shall not grant a subdivision permit unless it is satisfied that if the proposed plans are followed, the sewage and drainage from the subdivision will be safely and effectively disposed of through lawful and proper means.

It is recommended that, whenever feasible, the sewage and drainage of every lot in a subdivision shall be disposed of by means of a public sewerage and drainage system approved by the Department of

Environmental Conservation in accordance with 10 V.S.A., Chapter 47.

If use of a public sewerage system is not proposed, the following criteria shall be used by the Division to determine the suitability of the subdivision lands for the disposal of sewage:

1) Minimum Required Area

Each lot shall contain a minimum required area of suitable soil sufficient for building sites, and for present and future sewage disposal use in a location that will be isolated properly from streams, storm drains, lakes, wells, property lines, embankments, driveways, parking areas and other features which may adversely influence the operation and maintenance of an individual sewage disposal system, or create a condition of hazard to the public health or cause pollution of ground or surface waters. The minimum required area of each lot shall be sufficient to permit the safe and effective use of a subsurface disposal system sited and designed in accord with the criteria outlined in Subchapter 1-7. These minimum required areas for each lot are :

a. Subdivision with a private water system on lot: 20,000 ft^2.

b. Subdivision with a private water system off lot or a public water system: 10,000 ft^2.

2) Elevation: Ninety percent of the minimum required area of each lot shall be at least 1 foot above the flood plain of any lake or stream affecting the subdivision.

§ 1-309. Construction of Regulatory Amendments of 1973

A. The provisions of the amendments to the subdivision regulations adopted on the fifth day of March 1973, shall not affect any act done, liability or penalty incurred, or lien created, or affect any suit instituted, under provisions of the subdivision regulations in effect prior to the effective date of these rules. Where a parcel has been improved between March 5, 1973 and the effective date of these amendments, and subdivision is proposed, the improved lot must meet the requirements of the rules. Any existing septic system must meet the requirements for isolation distances with respect to water supplies, depth to bedrock, and depth to seasonal water table. Any existing system must be functioning properly without backup, surfacing, or discharge to surface waters. Any reconstructed septic system must be located in the approved continuous area.

B. In determining the number of parcels conveyed by a person, of those parcels of land conveyed from September 18, 1969 to November 8, 1972, only parcels of land of ten acres or less in area shall be counted.

SUBCHAPTER 4. WATER SUPPLY AND WASTEWATER DISPOSAL

§ 1-401. General

This subchapter will be used in the review of projects subject to the permit requirements of 10 V.S.A., Chapter 61. Approval or exemption of a project under this subchapter does not alleviate the need for approval under any other permit program.

§ 1-402. Definitions

A. " Building under the jurisdiction of this subchapter" means those buildings defined in Title 10 V.S.A., § 1953, as a structure used for human habitation or occupation that requires a potable water supply and wastewater disposal facilities. Examples include: but are not limited to dwellings of two or more units, places of employment, hospitals, nursing homes, motels and hotels, restaurants, filling stations, boarding homes and rooming houses, places of public assembly, stores, shops, offices, manufacturing and industrial facilities in which persons are employed, condominiums and apartments. "Building under the jurisdiction of this subchapter" shall not mean family day care homes, pre-existing mobile home parks, or a single family residence or seasonal residence on its individual lot.

B. "Commencement of construction" means any work involving the physical construction, alteration, or erection of a building including foundation excavation, foundation or building construction, and shall include site work which involves or may affect any portion of existing or proposed sewage disposal or water supply facilities for the building.

§ 1-403. Permit Required

A. Approved Plans Required; Exceptions

1) Plans and specifications necessary for the review of water supply, sewage disposal, and plumbing serving new buildings under the jurisdiction of this subchapter and additions or alterations to buildings under the jurisdiction of this subchapter shall be submitted to the appropriate regional office. Written approval shall be obtained prior to commencement of construction or erection of a building under the jurisdiction of this subchapter unless the Division has determined in writing that water and sewerage facilities are not required and that the submission of plans is not necessary. The site plan shall include at a minimum scale of 1" = 100', a 5 foot interval contour map of the building site showing all property lines, streams, lakes, ponds, water supplies, wells, springs, water lines, sewer lines, roads, buildings, drainage ways, storm sewers and parking areas. The plans shall show drainage and contours as naturally occur and as altered by the project.

2) Site and Foundation Work Approval. Site work and foundation construction may commence prior to final approval of any facet of the plans and specifications only if the Division issues written authorization for the commencement of such foundation work. Such authorization may be granted only if the Division finds that commencement of foundation work, including the location of the foundation on the land, will not inhibit the proper planning design and construction of water supply and sewage disposal facilities. Such authorization shall be either granted or denied within 21 days of submission of a written request for such authorization together with plans and information adequate to make the above finding.

3) Home occupations, Self-employment. In addition to §1-201(M), when reviewing a home occupation or project where the only employee(s) will be the owner and/or owner's immediate family, and the public does not have general access to the facility, the Division may determine that

the potential for adverse effect under the criteria of these rules is sufficiently remote that the requirements of the rules should be waived. In such cases, the Division may issue a permit with conditions prohibiting expansion of the project until a revised permit is issued for the expansion.

B. Alterations

Plans and specifications for any alteration of or addition to water supply systems, or sewage disposal systems serving a building under the jurisdiction of this subchapter shall be submitted to the Division and approved before commencement of construction, unless otherwise authorized in writing by the Division. Any alteration of or addition to a building under the jurisdiction of this subchapter which will change the type of use of the building, or increase the number of people using it over the original design capacity for water or sewage shall require approval of the Division before commencement of construction of or erection of the alterations or additions.

C. Buildings under the jurisdiction of this subchapter which will also require a license from the Vermont Department of Health, shall comply with the construction standards of this chapter for sewage disposal and Chapter 21 of the Environmental Protection Rules for water supply. Other aspects of construction or operation of these facilities shall comply with the other applicable Vermont Department of Health requirements.

D. Facilities Required

Buildings under the jurisdiction of this subchapter shall have a water supply which complies with the standards set forth in the Environmental Protection Rules, Chapter 21; and sewage disposal facilities which comply with the standards set forth in Subchapter 1-7 of this rule unless otherwise authorized by the Division under these regulations. Buildings under the jurisdiction of this subchapter and additions to buildings under the jurisdiction of this subchapter shall be designed to comply with these rules.

E. Construction

Buildings under the jurisdiction of this subchapter shall be constructed in accordance with the plans and specifications approved by the Division. Changes in the approved plans and specifications shall require prior approval of the Division. One copy of the approved plans and specifications shall be kept at the construction site for reference by the contractor and authorized State and municipal personnel.

§.1-404 Water Supply

A. Buildings under the jurisdiction of this subchapter shall be provided with an adequate volume of potable water. The water supplied to potable water outlets shall meet the drinking water quality requirements of Environmental Protection Rules, Chapter 21. All buildings under the jurisdiction of this subchapter in which people reside, are employed, entertained, lodged, served food or congregate shall be provided with potable water delivered through a pipe system under adequate pressure for the facilities to be served. Where it would be unreasonable to require potable water under pressure due to the infrequency or briefness of occupancy, or the availability of a nearby potable water supply point, the Division may determine that a water system for the building is not required.

B. Water supplies for buildings under the jurisdiction of this subchapter shall adhere to the criteria set forth in the Environmental Protection Rules, Chapter 21 .

§1-405. Sewage Disposal and Treatment

Sewage disposal facilities for buildings under the jurisdiction of this subchapter shall adhere to the design

criteria of Subchapter 1-7 of these rules. Sewage disposal facilities for projects with total design flows in excess of 6500 gallons per day shall either comply with the requirements of the Environmental Protection Rules, Chapter 14, the Indirect Discharge Rules, or obtain a letter from the Indirect Discharge Section of the Wastewater Management Division indicating that the proposed project is not under the jurisdiction of Chapter 14. Facilities designed for the subsurface disposal of process or non domestic type wastewater shall comply with the requirements of the Underground Injection Control Rules.

§1-406 . Toilets

A. Each building under the jurisdiction of this subchapter shall have at least one functional water closet and one functional lavatory, or more fixtures where required by regulation applicable to the particular type of planned occupancy. Where it would be unreasonable to require a water closet and lavatory because of the infrequency or briefness of occupancy, or the availability of a nearby toilet, the Division may authorize the use of privies, chemical toilets, or incinerators or determine that the requirement for toilet facilities is unwarranted. Where privies are proposed, they shall have a durable, water tight vault.

B. Each building under the jurisdiction of this subchapter shall have the number of plumbing fixtures required by the Vermont Plumbing Code.

§1-407. Review of Conversion of Existing Buildings

When a project involves the renovation, reconstruction or an addition to a building constructed prior to June 1, 1970, the following shall apply.

A. If there will be an increase over past demands on the water supply, or sewage disposal systems serving the building, the Division shall require that those systems be reconstructed, if necessary, to meet the standards of these regulations as they apply to new construction.

B. If the Division determines that; 1) the proposed project will not increase demands on sewer, or water services over past use; and 2) the systems have functioned reliably in the past without causing pollution or a health hazard, approval of the use of existing facilities will be issued. In addition to the evidence necessary to make this determination with respect to the water supply system, the water supply may not be approved unless a chemical and bacteriological test of the supply shows that it meets the Chapter 21 water quality standards. With respect to on-site sewage disposal facilities, any evidence of surfacing or backup of the systems will be grounds for determining that it has not functioned properly. Neither the existing water supply nor the existing sewage disposal system need to meet the design criteria for new construction in order to comply with the provisions of this section.

If it is determined that either the water supply or the sewage disposal system have not functioned properly, the Division shall require that the system be repaired or replaced in accordance with the provisions of Subchapter 1-7 and Chapter 21 of these rules.

C. Subsection (B) above shall not limit the authority of the Department of Health with respect to facilities licensed by that Department.

§1-408. Public Schools

A. Design flows for the expansion of sewage disposal systems serving existing public schools may be based on the historical rate of septic system loading, upon showing that there currently is sufficient capacity for periods of peak demand and there is a strong likelihood of sufficient capacity for future periods of peak demand.

B. Replacement area requirements, for sewage disposal systems, in Subchapter 1-7 may be waived for existing public schools if the system design includes sufficient safety factors to protect the primary area.

§ 1-409 Holding Tanks

The Department shall approve the use of sewage holding and pumpout tanks, including tanks made of plastic when it has been determined that:

A. The building or buildings to be served by the holding tank are existing or proposed buildings which are publicly owned;

B. The plan for construction and operation of the holding tank will not result in a public health hazard or environmental damage; and

C. The consultant demonstrates that an economically feasible means of meeting current standards is significantly more costly than sewage holding and pumpout tanks; based on a projected twenty (20) year life of the project.

SUBCHAPTER 5. CAMPGROUNDS

§ 1-501. General

This subchapter will be used in the review of campgrounds subject to the jurisdiction set forth below.

§ 1-502. Definitions

The term "campground" means any tract or parcel of land occupied by more than three (3) automobile trailers, campers, recreational vehicles, tent sites or temporary cabins for a brief period for vacation or recreational purposes. There shall be no distinction made between non-commercial (no charge, no service) and commercial operations. A mobile home used as a residence is considered to be a dwelling and this subchapter is not applicable.

Bonafide "primitive" or "wilderness" camping areas are specifically excluded from the requirements of these regulations, unless, upon review by the Division, it is determined that such a project is likely to create a health hazard, public nuisance, or source of pollution.

§ 1-503. Plans and Specifications

Plans or drawings showing lots, water supply, sewage, and bathroom ventilation shall be submitted to the Division for review. Alteration of the campground, including construction of additional campsites or change in the type of campsites, which results in additional design flows for the water or sewage disposal system, will require a permit under this subchapter. No campground shall be constructed or opened to the public until plans have been approved and a permit issued.

§ 1-504. Site

Each individual camp site shall be at least 2,500 square feet in size, with a minimum width of 25 feet. Each site shall be dry, clean and well drained, and all distances between components of the water supply and wastewater disposal system shall conform to the isolation distance requirements of Subchapter 1-7 and Chapter 21 of the Environmental Protection Rules.

§ 1-505. Water

A. Water from a source approved in compliance with Chapter 21 of the Environmental Protection Rules shall be supplied. The water shall be available at the faucets or from approved water supply risers or both. No water supply riser shall be located within 10 feet of a sewer connection. A faucet shall be provided within 400 feet of any dependent site. Common drinking vessels at such faucets shall not be permitted.

B. If water from a pipe system is not available, water may be obtained from a spring or a well that is developed and protected in a manner approved by the Division.

§ 1-506. Sewage

A. Sewage shall be disposed of in a manner which will not create a nuisance or public health hazard. The methods of disposal shall be in accordance with Subchapter 1-7 of the Environmental Protection Rules.

B. At least one dumping station shall be provided per campground, unless all sites have individual sewer connections or the project consists entirely of tent sites (which excludes all use by automobile trailers, campers, and recreational vehicles). Each dumping station shall serve no more than 100 dependent sites, and shall be supplied with piped water under pressure for flushing and cleaning of the concrete apron

after each use.

§ 1-507. Toilets

All dependent sites shall be within 400 feet of a toilet facility. These may be either water-carried toilets or vault-type privies. One water closet or privy seat shall be provided to serve 10 or fewer trailers or tent sites each.

§ 1-508. Bathing Facilities

When showers or baths are provided, all plumbing shall conform to the Vermont Plumbing Code.

SUBCHAPTER 6. MOBILE HOME PARKS

§ 1-601. General

This subchapter will be used in review of mobile home parks subject to the jurisdiction of 10 V.S.A., Chapter 153.

§ 1-602. Definitions

The following words and phrases shall have the meaning ascribed to them in this section unless the context clearly indicates otherwise:

A. "Mobile home" means a prefabricated dwelling unit which:

1) is designed for long term and continuous residential occupancy;

2) is designed to be moved on wheels, as a whole or in sections;

3) on arrival at the site, is complete and ready for occupancy, except for incidental unpacking, assembly, connections with utilities, and placing on support or a permanent foundation, or installation as a unit in a previously prepared structure;

4) contains the same type of water supply and waste disposal as immovable housing.

B. "Mobile home park" means any parcel of land under single or common ownership or control which contains, or is designed, laid out or adapted to accommodate, more than two mobile homes. Nothing herein shall be construed to apply to premises used solely for the storage or display of mobile homes.

C. "Mobile home lot" means a parcel of land provided for the placement of a single mobile home and the exclusive use of its occupants.

D. "Existing mobile home park" means any mobile home park, and the mobile home lots thereof, established and existing prior to July 1, 1970, and having obtained a permit to establish and exist under the rules of the State Board of Health then in existence.

§ 1-603. New Mobile Home Park - Permit Required

No person shall lay out or otherwise establish and create a mobile home park without first having obtained a permit from the Division and complying with local zoning or subdivision ordinances insofar as they pertain to zoning, land use, public health, or health related factors.

§ 1-604. Existing Mobile Home Park
Permit Required for Modification or Extension

No person shall alter or modify an existing mobile home park by creating additional sites without first having obtained a permit from the Division and complied with local zoning or subdivision ordinances insofar as they pertain to zoning, land use, public health, or health related factors.

§ 1-605. Exemption: Storage, or Display of Mobile Homes, Subdivisions

A. This regulation shall not be construed as applying to premises used solely for the storage or display

of unoccupied or uninhabited mobile homes.

B. These rules do not apply to single mobile homes on: lots or parcels approved under the provisions of Subchapter 1-3 of the Environmental Protection Rules; subdivisions exempt under § 1-302(B); or parcels over 10 acres in size.

§ 1-606. Basic Regulations

A. Mobile home lots in a mobile home park shall not be located within a floodway and the pad shall be at or above the flood plain elevation.

B. A minimum of 8,000 square feet of lot area shall be provided for each mobile home, including at least 5,000 square feet for each mobile home site, plus at least 3,000 square feet for each mobile home in common open space, exclusive of roads. Such common open space shall be accessible to all residents of the mobile home park, and shall have a minimum dimension of 30 feet.

D. At least two trees (of at least 1" caliper) shall be planted on each mobile home lot. All trees required under this subsection shall be suitably maintained by the owner or lessee. In the event of the demise of any tree so required, it shall be replaced at the earliest practical time by the owner.

E. At least one off-street parking space shall be provided for each mobile home, and at least one off-street parking space shall be provided for each two mobile homes for visitor parking. The space need not be paved. The space may be included in the minimum lot area requirement and shall be indicated on the site plan.

F. All buildings which are not physically connected must be at least 15 feet apart, except as otherwise permitted by these regulations.

§ 1-607. Bonuses for Improved Facilities and Layout

In any case where better facilities or an improved site plan is provided in accordance with this section, the required site area may be reduced as follows:

A. The required lot area for mobile home parks shall be reduced by five percent of the total area otherwise required under § 1-606(C) of this regulation for each of the following facilities which are provided in such park:

1) central recreational building;

2) central laundry and drying facilities;

3) central television antenna system;

4) central maintenance shed;

5) underground utilities, including fuel storage.

B. Public facilities to be provided by the owner will be considered sufficient when:

1) a laundry is provided with sufficient washing and drying facilities, which may be coin operated, to assure that an adequate number of the occupants of all mobile homes within the park may utilize such facilities simultaneously;

2) a recreation building shall be of sufficient size as to accommodate an adequate number of the occupants of all mobile home lots simultaneously;

3) a central maintenance shed shall contain sufficient mechanical equipment and maintenance equipment to provide maintenance service to all mobile home lots and shall be of sufficient size to contain under cover all such equipment at the same time.

C. Any bonus or reduction in lot size granted under this section shall apply to the total 8,000 square foot requirement.

§ 1-608. Specific Site Requirements

A. All roads within the mobile home park shall be of sufficient width and suitable grade and alignment so as to permit two way vehicular traffic at all times. The design of roads shall be adequate to provide for the utilization of police, fire, ambulance, and other emergency vehicles. Proper traffic control signs shall be established, including stop or yield right-of-way signs, as is consistent with the public safety. All entrances to, or exits from, State or town highways shall be approved by the district highway engineer or town selectmen, as applicable.

B. Suitable provisions shall be made for the protection of pedestrian traffic. The Division may require the installation of suitable sidewalks.

§ 1-609. Applications for Permits

Applications for permits to establish or create a mobile home park, or to alter, modify or expand an existing mobile home park, shall be made by the person intending to do so to the Division. Each application shall include the following:

A. Plans and Specifications: The application shall include a detailed plat of the proposed mobile home park, alteration, modification, or extension drawn to scale showing the location and dimensions of the land involved, all lots, streets, water and sewer systems if intended; proposed sites for individual water and sewage disposal facilities, if intended; required buffer zones, open space, playgrounds, parking areas, water courses and other bodies of water, natural or artificial, existing trees within proposed mobile home lots, and shall show the contour of the land involved, drawn on a scale of five foot contour intervals. In the case of property bordering on or including permanent flowing or standing waters, or where the high ground water elevation is within six feet of the existing or proposed ground surface level, the Division may require the plat to depict existing and proposed contour of the land on a scale of two foot contour intervals.

B. Site Report: The application shall also include a written site report containing the following information:

1) name and precise location of the proposed mobile home park, alteration, modification, or extension;

2) name and address of the applicant and nature of his interest in the property involved;

3) statement of the type of water system to be provided or intended to be used in the mobile home park, whether individual system, community system, or municipal system. The statement shall also specify the location of the nearest municipal water system and whether it is available and feasible to use it;

4) statement of the type of sewage disposal system to be provided or intended to be used in

the mobile home park such as individual system on each lot, community system, or municipal system. If a sewage disposal system other than a municipal system is proposed the application shall include a design of such facilities in accordance with Subchapter 1-7 of the Environmental Protection Rules.

5) statement of existing use of adjacent properties and intended use of adjacent undeveloped lands, if known:

6) certified report of a professional engineer indicating the location of the flood plain and floodway elevations on the mobile home park site when appropriate;

7) certified report of a professional engineer, including an updated U.S.G.S. quadrangle map, or map of equal detail and scale, designating the location of all flood plain areas, rivers, streams, creeks, lakes, ponds, wetlands, drains, lagoons, canals, and artificial water impoundments, present and proposed, within or adjacent to the mobile home park;

8) statement of evidence of availability of water of good potable quality and adequate quantity for domestic use and the means used to determine the same;

9) statement of proposed surface drainage system, which report shall include storm drainage flow direction of the mobile home park and adjacent properties and evidence that existing drainage systems, natural or man-made, are of sufficient size to contain maximum runoff from the site without flooding or erosion;

10) such addition and supplementary information as the Division may request after initial review of the application.

§ 1-610. Environmental Requirements

A. Sewage Disposal: Sewage disposal facilities shall be provided for every site and shall comply with the design criteria of Subchapter 1-7 of the Environmental Protection Rules.

B. Water Supply: Water supply shall be provided for every site and shall comply with the design criteria of Chapter 21 of the Environmental Protection Rules.

SUBCHAPTER 7. SEWAGE DISPOSAL

§ 1-701. General

Wherever feasible, it is recommended that projects subject to the jurisdiction of these rules connect to municipal sewer facilities approved by the Department. For projects proposing on-site sewage disposal, the following standards and criteria shall apply.

§ 1-702. Consultant

A qualified consultant shall be responsible for and supervise the gathering of support data and the preparation of plans and specifications involving the design of all sewage treatment and disposal facilities. Where projects propose innovative systems per §1-203 of this Chapter , a pre-design conference with Division personnel to discuss proposed design concepts is recommended.

§ 1-703. Indirect Discharge Permits and Underground Injection Control Permits -- Requirements for Soil-based Systems

A) Indirect Discharge Permits:

Systems designed to dispose of greater than 6,500 gallons per day of sewage, or to land apply non-sewage wastewater may be under the jurisdiction of the Indirect Discharge Rules. For projects with greater than 6,500 gallons per day flows, or land application of non-sewage wastewaters, the applicant shall contact the Indirect Discharge Section for a jurisdictional ruling. If the project is under the jurisdiction of the Indirect Discharge Rules, then an Indirect Discharge Permit will be necessary for the wastewater disposal system, and a Water Supply and Wastewater Disposal or Subdivision permit shall be required for the wastewater collection, septic tanks, grease traps and conveyance systems.

B) Underground Injection Control Permits:

Systems designed for the subsurface disposal of non-sewage waste may be under the jurisdiction of the Underground Injection Control Rules. Projects designed for the subsurface discharge of non-sewage wastewater shall contact the Water Supply Division for a jurisdictional ruling. If an Underground Injection Control permit is required, then an Underground Injection Control permit will be necessary for the non-sewage wastewater disposal system, and a Water Supply and Wastewater Disposal permit shall be required for the wastewater collection, septic tanks, grease traps and conveyance systems.

§ 1-704. Allowable Treatment and Disposal Systems

Three acceptable methods for sewage treatment where final disposal of the effluent is land application are septic tank systems, tertiary treatment systems, and spray systems. These methods and general criteria for each specific system are described below.

A. Septic Tank System

1) Septic tank system: septic tank treatment followed by discharge to one or more disposal fields.

2) The design of septic tank systems shall adhere to the requirements of § 1-707.

Additional treatment or design modifications may be required for projects involving septic tank systems when the Division finds through hydrologic investigations or other evidence, that without such changes the system will not function in accordance with the purposes of these rules or surface or groundwater quality will be substantially or unreasonably affected.

B. Tertiary Treatment System

1) Tertiary treatment system: tertiary treatment of the wastewater followed by discharge to one or more subsurface disposal fields. For the purposes of these rules, tertiary treatment means sewage treatment producing an effluent with no more than 10 mg/l biochemical oxygen demand and 10 mg/l suspended solids average monthly, 15/15 maximum weekly and 18/18 maximum daily. The design of tertiary treatment systems shall adhere to the requirements of § 1-709.

2) Where tertiary treatment systems will discharge into drainage basins of lakes, ponds, reservoirs or other impoundments, and in the opinion of the Department the effects of disposal are likely to accelerate the eutrophication process in these bodies of water, tertiary treatment shall produce an effluent of less than 1.0 mg/l average monthly total phosphorus, 2 mg/l maximum daily.

3) Additional tertiary treatment of the wastewater, which may include nitrogen removal or viral disinfection, may be required when large volumes are to be disposed of in geologic formations, the results of which in the opinion of the Division would have the effect of polluting or contaminating Vermont's surface or ground water resources or prohibiting its use for water supply purposes.

C. Spray System

1) Spray system: secondary treatment of the wastewater followed by discharge to one or more spray disposal fields.

2) The maximum allowable size of each spray disposal field shall be determined on a case by case basis through an engineering/ hydrogeologic evaluation of the disposal site. The aerobic treatment system shall produce an aerobic and well oxidized effluent having a maximum of 30 mg/l biochemical oxygen demand (BOD) and less than 30 mg/l suspended solids. Disinfection producing effluent as pathogen free as chlorination with a residual free available chlorine of 1.0 mg/l, or a 4.0 mg/l total residual chlorine, after a 20 minute contact time shall be provided. Designs for spray systems shall adhere to the requirements of § 1-710.

§ 1-705. Design Flow

When determining the design flow for a project, Appendix 1-7A shall be followed. Projects which use conventional water saving plumbing fixtures including maximum 3½ gallon per flush toilets, maximum 2 g.p.m. low flow showerheads and faucet aerators will be given a 10% reduction in design flow.

When determining design flows for a particular establishment, the Division may determine that there is sufficient justification for requiring higher or lower flow values. In reviewing proposals for reduction in design flow, the Division shall consider the nature and design of the project, whether multiple units will moderate peak flows, past experience on existing projects and metered flows, as well as design safety factor allowances in the Appendix 1-7A figures and the potential for future fluctuations in flows. Seasonal variations in occupancy will not normally be the basis for reduction in design flows. Consideration will include the operation of the fixture, project type, effluent quality, and hydraulic reduction.

When collection and building sewers exceed 500 feet in total length, the design flow shall include allowance for infiltration. New collection systems shall be estimated for infiltration at 300 gallons/inch diameter/mile of pipe/day.

§ 1-706. Building Sewers, Sewer Collection Systems and Lift Stations

Appendix 1-A, Design Guidelines, provides acceptable criteria for the design of these components. If the professional engineer proposes an alternative, it will be approved if the proposed design will be as reliable as the Appendix 1-A design. When proposing an alternative, the professional engineer shall state the basis of the design and evaluate its reliability.

Approval of a municipal sewer extension under these rules will constitute approval under 10 V.S.A. §1271, when applicable.

§ 1-707. Septic Tank Systems

A. Soil and Site Evaluation: A soil and site evaluation shall be conducted by a qualified consultant. The consultant shall prepare a soil and site evaluation report including the necessary tests and investigations in the following specific areas: soil excavation, percolation testing, site and terrain investigation, groundwater contour and water supply investigations, and hydrogeologic investigations. The soil and site evaluation shall include the consultant's written statement that the proposed design for each disposal system complies with these rules unless approval is requested under § 1-202 or § 1-203.

1) Soil Excavations: The consultant shall locate excavations to establish with accuracy the soils conditions across the primary and replacement sewage disposal areas. The minimum number of excavations for most sites will be two for the primary and two for the replacement area, though three total may be sufficient if the primary and replacement areas are adjacent. In most cases, more excavations will be necessary to properly evaluate for systems with flows greater than 600 gallons per day or when initial investigation identifies a highly varied soil condition. Fewer excavations will be approved by the Division if the consultant demonstrates that the soils are uniform. The Division may require additional investigations and excavations to be conducted within each proposed disposal field site to determine uniform suitability of soils or adequacy of depth over bedrock, impervious soils, and the highest seasonal ground water table. Excavations shall be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests and, if suitable, at what depth the percolation test shall be conducted. All soils information derived from excavations on the project shall be submitted. Primary and replacement areas shall be tested to a depth of at least seven feet below the ground surface or four feet below the bottom elevation of the lowest portion of the disposal field, whichever is deeper. Where the disposal site has been mapped by the Natural Resources Conservation Service, U.S. Department of Agriculture, consultants are encouraged to consult and to submit the soils information .

a. Location: Each excavation shall be accurately located on the plan.

b. Soil Description: Soil profile descriptions shall be written for each excavation. The thickness of the different soil horizons shall be indicated. Horizons shall be differentiated on the basis of color, texture, soil mottles, density and bedrock. Depth shall be measured from the ground surface.

c. Determination of Groundwater Depth: A principal leachfield design criterion is the depth of unsaturated soil which provides the treatment zone for the wastewater applied to the leachfield. This unsaturated treatment zone is defined as the soil between the leachfield infiltration surface and the limiting site factor. The limiting site factor may

be an impervious layer of soil, ledge or bedrock, or the seasonal high groundwater. Groundwater levels are indicated by the free water surface in an unlined hole. Groundwater depths vary over the year and from year to year. Usually the highest level of groundwater is experienced in the spring of the year during snow melt. The exact time of this high level varies from year to year as does its actual height. To permit a practical method for site evaluation for groundwater levels, soil mottling, staining and gleying have been established as the best indicator of seasonal high groundwater.

Soil mottling is evident as intermixed colors in a soil horizon that results from alternating periods of oxidation and reduction environments at that elevation in the soil profile. This is most likely due to periodic saturation of the soil by groundwater. Since mottling represents something of an "average" level of seasonal high groundwater, staining on coarse sands and gravels, and gleyed soil horizons may also represent the level of seasonal high groundwater. There may be other factors on a particular site that may cause or have caused soil mottling, staining or gleying; however, absent rigorous scientific evidence to the contrary, the highest level of soil mottling, staining or gleying shall be considered the seasonal high groundwater level of the site for purposes of sewage system design under these rules.

On sites where there is a substantive scientific question as to the cause for the existence or absence of soil mottling, staining or gleying, other methods may be used to assess the level of seasonal high groundwater. If further investigations are proposed by a qualified consultant or required by the Department, a plan of study for the site shall be prepared by the consultant and approved by the Department before any work begins. Assessments of drainage patterns, vegetation, soil textures, relief, watershed and groundwater level monitoring data will all be considered in such a plan.

Groundwater monitoring may be conducted on a site, if a plan of location and installation of monitoring wells and measurement schedules are agreed upon by the qualified consultant and the Department in advance. For plans involving spring seasonal high groundwater monitoring, all plans must be submitted to the Department by February 1st. The groundwater monitoring plan must have a reasonable expectation of providing useful and representative data of groundwater conditions on the site. Data collected from groundwater monitoring shall be evaluated against weather conditions over the period of measurement and data from other sites. In years with unusual seasonal groundwater patterns, actual monitoring data may not be representative of long-term seasonal high groundwater. The seasonal snowfall, precipitation and nearby groundwater levels must not exceed one standard deviation below the mean values for each, during the monitoring period.

Seasonal high groundwater in Vermont usually occurs during spring snow melt and runoff. The minimum groundwater monitoring periods for spring high groundwater shall be March 1 through May 31. Groundwater levels shall be measured at least weekly over this period, with no more than seven days between any two consecutive measurements. When groundwater comes to the critical depth for the sewage system proposed for the site, measurement frequency shall increase to no more than four days between any two measurements, until it drops below the critical depth. Groundwater monitoring data shall be evaluated against seasonal snowfall, precipitation during the groundwater monitoring period, general groundwater data from nearby monitoring sites, and the pattern of groundwater levels over the monitoring period.

To prove that soil mottling, staining or gleying are not indicative of seasonal high

groundwater, the monitoring data must show that the groundwater does not exceed the critical level by zero to 6 inches for more than 30 days, by 6 to 12 inches for more than 20 days, by 12 to 18 inches for more than 10 days, or by more than 18 inches at any one time. These are the cumulative number of days between March 1 and May 31. Each reading will represent a time period equal to the number of days between one half the time since the prior reading to one half the time to the next reading.

The critical level is 36 inches below the bottom of the system for subsurface systems in accordance with §1-708, Disposal Fields. The critical levels are 24 inches below ground surface for mound systems and 36 inches below ground surface for at-grade systems constructed in accordance with §1-714, Site Modifications. The critical level is 24 inches below the bottom of the disposal system or the ground surface, which ever is more restrictive, for systems preceded by a sand filter constructed in accordance with §1-715, Sand Filters.

On some sites, due to low permeability soils, perched water tables may form in upper soil horizons. For the purpose of sewage system designs under these rules, perched water tables are the seasonal high groundwater. The consultant may analyze these in the same manner as any other type of groundwater table.

For a period of six months after the effective date of these rules a qualified consultant may submit seasonal high water table monitoring results, with a complete application, following either the monitoring criteria in this subsection or the monitoring criteria as listed in the Environmental Protection Rules effective 9/10/82, chapter 7 section §7-07A(1)(d). Applications submitted more than six month after the effective date of these rules, where seasonal high water table monitoring is a part of a complete application must either follow the monitoring criteria of this subsection or receive prior Department approval for an alternate monitoring proposal.

d. Impervious Subsoil: All disposal systems shall have a minimum of three feet below the bottom of stone to a subsoil with a percolation rate of slower than 60 minutes per inch.

e. For the purposes of these rules, "bedrock" shall mean both solid impervious ledge, and loose slabby weathered rock and shale which are not soil and provide essentially no treatment of sewage effluent. All disposal systems shall have a minimum of four feet of separation between the bottom of the system and bedrock.

2) Percolation Testing: Percolation tests shall be conducted in representative locations within each disposal field using the test procedures in Appendix 1-7C. Normally two percolation tests are necessary in each the primary and replacement disposal systems, while more tests may be required for large disposal fields.

For the purpose of designing disposal fields, fragipans will be considered impervious unless the consultant submits a percolation test or other adequate data to justify the use of another value.

3) Site and Terrain Investigation: A site and terrain investigation shall be conducted for the purpose of sizing the area to meet minimum isolation distances between various system components, as listed in Appendix 1-7-D, and evaluating the terrain to determine surface drainage problems and suitability of ground slope. The site and terrain investigation shall demonstrate that sufficient area of suitable soils exist on favorable terrain for the purpose of accommodating both

primary and replacement disposal fields. The maximum ground slope for any disposal system shall be 20%.

The Division may require a hydrogeologic evaluation when the evaluation is necessary, usually due to severe limitations for on-site sewage disposal, limited area or close proximity to embankments or areas of groundwater discharge, to determine that the proposed system will function in accordance with the requirements of these rules. The study shall include evaluations in the following specific areas: direction of ground water movement; ground water recharge and discharge points; local and regional aquifers; hydraulic and physical nature of the unconsolidated sediments at the site; and groundwater mounding. Said evaluation and report shall be performed by a hydrogeologist.

B. Septic Tanks:

1) Sizing of the Septic Tank: The following table gives the minimum sizes for septic tanks based on daily flow.

TABLE I

MINIMUM SIZES FOR SEPTIC TANKS

Design Flow, Gal/Day	Liquid Capacity*
Less than 667	1,000 gallons minimum**
667 - 1,500	1.5 times Design Flow
1,500 - 6,500	Use V = 1,125 + 0.75 Q

Where Q = Design Flow
V = Liquid Capacity

* Where garbage grinders or disposals are proposed, it is recommended that the septic tank capacity be increased by a factor of up to 25 percent to provide additional storage for the expected increase in solids.

** Unless a smaller tank can be justified by the consultant.

2) Specifications and Maintenance. See Appendix 1-A, §A-06.

3) Location of Septic Tanks: Minimum isolation distances between septic tanks and water supplies, septic tanks and property lines and septic tanks and dwellings, shall conform to the requirements of Appendix 1-7D. Septic tanks shall be located so as to be accessible by scavenger vehicles to facilitate the removal of sludge and scum when pumping of this material becomes necessary.

C. Dosing and Pressure Distribution System Design

1. Dosing is recommended for all systems and may be required when the design sewage flow requires more than 500 lineal feet of distribution line.

2. Dosing may be accomplished by either pumps or siphons.

3. In a system using pressure distribution, the field shall be dosed . The size of the dosing

pumps and siphons shall be selected to maintain a minimum pressure of one (1) psi (or 2.3 feet of head) at the end of each distribution line with a maximum of 15% discharge rate differential between any two points with the distribution system. The design shall provide uniform distribution throughout the field. A 5:1 ratio between the minimum dose volume and the volume of the distribution network is required for pressure distribution systems.

4. The pressure distribution pipe shall be rigid plastic pipe, schedule 40 or 80, with one inch or greater diameter.

D) Grease Interceptor: An approved grease interceptor shall be installed in the waste line leading from sinks, drains, and other fixtures or equipment in restaurants, cafeterias, bars and clubs; hotel, factory or school kitchens or other establishments where grease introduced into the drainage system would be of particular concern.

1. Each grease interceptor shall have an approved rate of flow which is not less than that given below for the total number and size of fixtures connected or discharging into it and the total capacity in gallons discharging into any interceptor shall not exceed 2½ times the gallons per minute flow rate of the interceptor.

GREASE INTERCEPTORS

Total Number of fixtures Connected	Maximum capacity of fixtures connected, Gallons	Required Rate of flow per minute, Gallons	Grease Retention Capacity Pounds
1	50	20	40
2	65	25	50
3	90	35	70
4	125	50	100

For the purpose of this section, the term fixture shall mean and include each plumbing fixture, appliance, apparatus or other equipment required to be connected to a grease interceptor.

2. Each grease interceptor shall be vented as required in the Vermont Plumbing Code and each fixture discharging into a grease interceptor shall be individually trapped and vented in an approved manner except that an approved grease interceptor may be used as a fixture trap for a single fixture when the horizontal distance between the fixture outlet and the grease interceptor does not exceed 40 feet and the vertical tail pipe or drain does not exceed 2½ feet.

3. Each grease interceptor shall be so installed and connected that it shall be at all times, easily accessible for inspection, cleaning and removal of the intercepted grease.

4. Interceptors shall be maintained in efficient operating condition by periodic removal of the accumulated grease. No such collected grease shall be introduced into any drainage piping.

5. Each grease interceptor shall be constructed of durable materials and shall have a full size gas tight cover which can be easily and readily removed.

6. No water jacketed grease interceptor shall be approved or installed.

7. Each grease interceptor shall have an approved water seal of not less than two (2) inches in depth or the diameter of its outlet, whichever is the greater.

§ 1-708. Disposal Fields

Three types of disposal systems are approvable under these rules. These are: (A) absorption trenches, (B) seepage beds, and (C) seepage pits where volumes do not exceed 1,000 gallons per day. All disposal system designs shall provide for a primary system and a replacement disposal area meeting the design requirements of these rules. A design of the replacement system may be required to show that the replacement area meets the requirements of these rules.

A. Absorption Trenches: Disposal fields with trenches of 48" or less in width, which dispose of settled wastewater in the soil are referred to as absorption trenches. The basis of design is the bottom area of the trench.

Trenches shall extend no deeper than 36" below ground surface. Trenches shall have crushed stone extending 2" above, and 12" below the distribution pipe. Crushed stone depth below the pipe may be reduced to 6" if application rates in §7-08(B)(1)(d) are used. Prefabricated chambers, with a minimum H-10 structural load rating, may be used instead of crushed stone. The distribution pipe shall be either 4" diameter rigid perforated pipe, not exceeding a slope of one or two inches in 100' and, unless dosed, not exceeding 100' in length,or shall be small pipe under pressure. Untreated building paper, six inches of uncompacted straw, hay, or one layer of filter fabric shall be placed over the crushed stone and covered with 6" to 12" of fill, the top 2" of 4" of which should be topsoil.

Trenches shall be designed at least 6' on center when measured on a horizontal plane, but in no case shall there be less than 4' of undisturbed native material between adjacent trenches. Trenches on sloping ground shall be laid parallel to the ground contours. A distribution box or pipe manifold system shall be required to insure equal distribution to all lines.

1) Absorption Trench Design

a. All absorption trench systems and replacement areas shall comply with all isolation requirements in Appendix 1-7D.

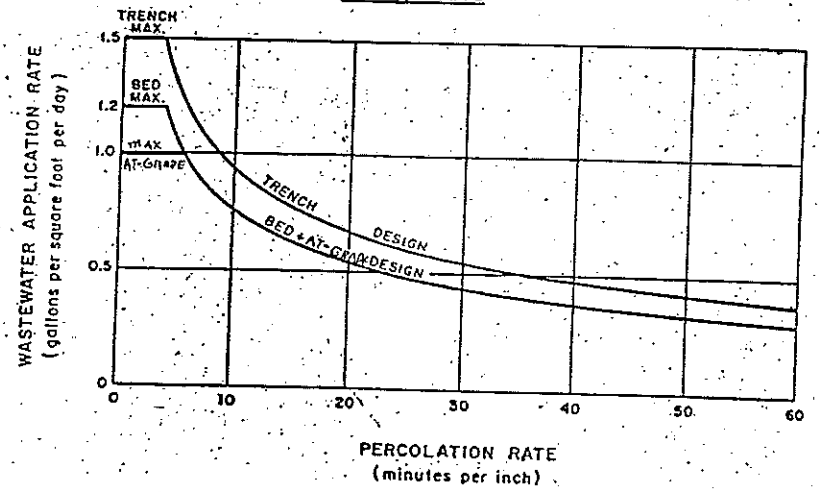
b. Each system shall have a primary system design and a replacement area which comply with all requirements. If the replacement area for an absorption trench system is between the primary trenches there shall be a minimum of 4 feet of native undisturbed soil between the sidewalls of the primary and replacement trenches.

c. Absorption trenches shall be sized on the following basis using the trench bottom area only. The design shall be based on the second slowest percolation rate for the site. Sizing shall be based on Table 2 and the formula,

$$Q = \frac{3}{\sqrt{t}}$$

where Q equals the wastewater application rate in gallons per square foot per day, and t equals the percolation rate in minutes per inch. Required absorption area shall be determined by dividing the project design flows (gallons per day) by Q (gallons per square foot). The maximum application rate shall be 1.5 gallons per square foot per day.

TABLE 2
DISPOSAL FIELD
Sizing Curve



d. A reduction in the disposal field area may be allowed for absorption trenches and chamber trenches, where the depth of crushed stone exceeds the normal 12 inch depth below the distribution pipe invert, as follows:

PERCENT OF STANDARD DISPOSAL AREA REQUIRED

(For absorption trenches)

Depth of Crushed Rock Below Distribution Pipe	Trench Width 12"	Trench Width	Trench Width 18"	Trench Width 24"	Trench 36"	48"
18 inches	60%		64%	66%	71%	75%
24 inches (maximum)	50%		54%	57%	62%	66%

e. The maximum land slope for construction of soil absorption trenches shall be 20%. No absorption trench shall be constructed in fill material, except in compliance with the site modification requirements (§ 1-714). On sloping land, each absorption trench shall be constructed parallel to the ground contour.

f. Absorption trenches shall not be constructed in soils having a percolation rate slower than 60 minutes per inch. For soils with a percolation rate faster than 1 minute per inch, § 1-714(F) shall be followed.

g. The maximum volume of sewage to be disposed of in any single absorption trench field shall be 5,000 gallons. When design flows exceed 5,000 gallons per day, multiple independent disposal fields shall be used.

h. When a septic tank disposal system using absorption trench disposal exceeds 5,000 gallons per day, two 100% dual alternating disposal fields shall be used. The

fields shall be alternated annually during the summer months.

2) Materials

a. Coiled perforated plastic pipe shall not be used when installing absorption systems.

b. Pipe used for distribution lines shall meet the American Society for Testing and Materials (ASTM) standard or those of an equivalent testing laboratory. Fittings used in the absorption fields shall be compatible with the materials used in the distribution lines.

c. Crushed stone shall be clean, durable and be no smaller than three-fourths or larger than one and one-half inches in diameter.

3) Construction

a. A distribution box or header shall be installed between the septic tank and the absorption trenches. The header shall be of watertight construction.

b. The distribution box shall be set level and arranged so that effluent is evenly distributed to each distribution line. Adequate provision shall be taken to assure stability and provide access for inspection of the distribution box.

c. Each distribution line shall connect individually to the distribution box and exit at the same slope for the first 18 inches from the box.

d. The pipe connecting the distribution box to the distribution line shall be of a tight joint construction laid on undisturbed earth or properly bedded through its length.

e. If a header is used, there should be an equal number of distribution lines spaced evenly on both sides of the junction of the leader to the header.

f. When the trenches have been excavated, the sides and bottom shall be raked to scarify any smeared soil surfaces. Construction equipment not needed to construct the system should be kept off the area to be utilized for the absorption trench system to prevent undesirable compaction of the soils. Construction shall not be initiated when the soil moisture content is high. (If a fragment of soil occurring approximately 9" below the surface can easily be rolled into a wire, the soil moisture content is too high for construction purposes.)

g. At least 6" of crushed stone shall be placed in the bottom of the trench.

h. The distribution line shall be carefully placed on the bedding at a uniform slope and covered with at least 2" of stone.

i. The ends of distribution lines shall be capped or plugged or, when they are at equal elevations, they should be connected.

B. Seepage Beds: Disposal fields more than 48" in width are referred to as seepage beds. The basis of design is the bottom area of the bed. The maximum size of any single seepage bed shall not exceed 2,000 gallons per day, the seepage bed shall not be authorized as an acceptable disposal field when the

percolation rate is slower than 60 minutes per inch.

Beds shall extend no deeper than 36" below ground surface. The bed shall have crushed stone extending at least 2" above and 6" below the invert of the distribution pipe. Prefabricated chambers, with a minimum H-10 structural load rating may be used instead of crushed stone. The crushed stone shall be covered with untreated building paper, a 6" layer of uncompacted hay or straw, or one sheet of filter fabric, and then between 6" and 12" of soil, the top 2" to 4" of which should be topsoil. The pipe shall be either 4" diameter perforated pipe with a slope not exceeding 2" in 100' and, unless dosed, with a maximum length of 100'; or small pipe pressure distribution pipe. The distribution piping shall be spaced not greater than 6' on center and no greater than 3' from the bed sidewall.

1) Seepage Bed Design

a. All seepage bed designs and replacement areas shall comply with all isolation requirements in Appendix 1-7D.

b. Seepage beds shall not be constructed in fill except in compliance with the mound requirements (§ 1-714).

c. Long, narrow beds laid out parallel to the ground slope are preferable to maximize dispersion.

d. Seepage beds shall be sized based on bottom area only. The design shall be based on the second highest percolation rate for the site. The loading rate shall be determined by the formula $Q = 0.8 \times (3 / \sqrt{t})$, or 0.8 times the value derived from Table 2 with a maximum application rate of 1.2 gallons per square foot per day.

e. Seepage beds shall not be installed on land with a slope greater than 10%.

f. In soils with a percolation rate faster than 1 minute per inch, § 1-714(F) shall be followed.

g. All seepage bed systems having design flows greater than 3,000 gallons per day shall have 100% dual alternating beds. The beds shall be alternated annually during the summer.

h. The floor and distribution lines of the seepage bed shall be level.

2) Materials

a. Coiled perforated plastic pipe shall not be used.

b. Pipe used for distribution lines shall meet the appropriate ASTM standard or those of an equivalent testing laboratory. Fittings shall be compatible with the materials used in the distribution lines.

c. Crushed stone shall be clean, durable and shall be no smaller than three-fourths or larger than one and one-half inches in diameter.

d. The distribution lines within the bed shall be uniformly spaced no more than 6' apart.

e. The distribution lines within the bed shall be placed no more than 3' from the sidewall of the bed.

f. The bottom of the bed shall be at least 18" and no more than 36" below the finished grade.

3) Construction

a. A distribution box or header shall be installed between the septic tank and the bed. The header shall be of watertight construction.

b. The distribution box shall be set level and arranged so that effluent is evenly distributed to each distribution line. Adequate provisions shall be taken to assure the stability and provide access for inspection of the distribution box.

c. Each distribution line shall connect individually to the box when a distribution box is used and exit at the same slope for the first 5' to 10' from the box.

d. The pipe connecting the distribution box or header to the distribution line shall be of tight joint construction laid on undisturbed earth or properly bedded throughout its length.

e. If a header is used, there should be an equal number of distribution lines spaced evenly on both sides of the leader to the header.

f. When the bed has been excavated, the sides and bottom shall be raked to scarify any smeared soil surfaces and the loose material removed. Construction shall not be initiated when soil moisture content is high (see §7-08.A.3.f.).

g. At least 6" of crushed stone shall be placed in the bottom of the bed.

h. The distribution line shall be carefully placed on the bedding with no slope and covered with at least 2" of crushed stone. Prior to covering, the distribution network should be tested with water for even distribution.

C. Seepage Pits: Disposal fields of the deep soil system variety, commonly of cylindrical shape and lined with a suitable structural material having perforations to allow passage of treated wastewater into the surrounding soil are referred to as seepage pits. Seepage pits are sometimes referred to as dry wells. Seepage pits may be used only when total design flows are less than 1,000 gallons per day. The basis of design is the sidewall area of the pit as taken from the invert of the influent pipe to the pit bottom. Seepage pits may be of any shape; they shall be of precast concrete or other inert material of sufficient strength to withstand normal structural loadings. Seepage pits shall be surrounded by at least six inches of crushed stone around the perimeter wall.

Seepage pits shall be as shallow as possible consistent with the objective of utilizing the best possible soil strata, and maintaining an aerobic soil environment and 3' above the seasonal high ground water.

1) Design and Location

a. Seepage pits shall not be located in soils having a percolation rate slower than 10 minutes per inch.

b. The design basis shall be the vertical wall area below the invert with no allowance for the bottom area.

c. The design shall be based on the second slowest percolation rate in the vertical stratum.

Percolation Rate* (Second Slowest)	Loading Rate/Day Gal/Sq. Ft.
1-5	1.2
6-10	0.9

*Seepage pits may not be used in soils with a percolation rate faster than 1 minute or slower than 10 minutes per inch.

d. When more than one seepage pit is used, they shall be separated by undisturbed soil equal to at least twice the pit diameter or five feet whichever is greater.

e. The access to the seepage pit shall be within 12" of final grade.

f. When more than one seepage pit is used, a distribution box shall be installed between the septic tank and all seepage pits.

g. The distribution box shall be set level so that the effluent is evenly distributed to each seepage pit.

h. The distribution box shall be connected individually to each seepage pit with pipe of watertight construction at least 4" in diameter, and sloped at least one-eighth inch per foot.

i. When more than one seepage pit is used, each pit shall have an equal effective area.

j. The minimum dimension inside of the lining of any seepage pit shall be two feet.

2) Construction

a. Seepage pits shall include a lining constructed of durable material that will permit free passage of waste without excessive plugging while still excluding the entry of surrounding soil.

b. The lining and cover of any seepage pit shall be capable of supporting the normal loads imposed. The cover shall be removable or equipped with a manhole at least 18" in diameter.

c. The lining shall be surrounded by at least 6" of crushed stone ranging in size from three-fourths to one and one-half inches. The thickness of stone shall not exceed the diameter of lining.

d. At least 6" of crushed stone shall be placed in the bottom and under the lining.

e. The top of the stone or gravel surrounding the lining shall be covered by an

uncompacted 6" layer of hay, straw, untreated building paper, or a single sheet of filter fabric. Impervious plastic or treated building paper shall not be used.

D. Isolation Distances: Determining suitable isolation distances between components of septic tank systems and property lines, water supplies, or other items as listed in Appendix 1-7D is the responsibility of the qualified consultant, though the minimum isolation distances delineated in Appendix 1-7D shall apply unless a reduced distance is approved by the Division.

§ 1-709. Tertiary Treatment Systems

A tertiary treatment system consists of a facility providing tertiary treatment and disposal field which disposes of the treatment effluent. Tertiary treatment systems shall be used for sewage treatment and disposal according to the provisions of §1-704 of these regulations.

A. Treatment Facilities: Treatment facilities shall be designed in accordance with "Recommended Standards for Sewage Works" of the Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, 1990 Edition. Treatment facilities shall produce effluent quality as specified in § 1-704.

B. Soil and Site Evaluation: A soil and site evaluation shall be conducted under supervision of a qualified consultant. The consultant shall prepare a soil and site evaluation report which shall include sufficient investigations to demonstrate that the proposed disposal field can adequately dispose of the volumes of treated wastewater without creating a public health hazard, nuisance, or discharge to the State's waters. Such evaluations shall also include investigations as required in the following paragraphs. Also included in the report shall be the consultant's written opinion regarding the suitability of the soil and site to satisfactorily treat and dispose of the proposed volume of wastewater.

Soils Investigation: The soils investigation and report shall demonstrate, when analyzed by subsurface flow technique and flow net analysis, that the site has sufficient depth, width, areal extent, and permeability to effectively accept and transmit the wastewater from the disposal site. Investigations should include, but not necessarily be limited to: sieve analysis; laboratory or field permeability measurements; in-place soil densities; percolation tests; borings with samples from various depths and mapping ground water contours. Testing shall be sufficient to establish the consistency of the soils on the site. Failure to demonstrate that the soils have the capability to effectively accept and dispose of the proposed volume of wastewater shall be reason for rejection of said site.

C. Sizing the Tertiary Treatment Disposal Field: The disposal field for tertiary treatment systems shall follow the loading rates and design criteria specified for filtrate disposal systems in §1-715A(3)(b) of this subchapter unless the consultant submits to the Division adequate justification for another rate utilizing sieve analysis, permeabilities, subsurface flow calculations (unsaturated flow theory), long term acceptance rates, additional treatment, in which case, the allowable loading rate may be increased to that justified value.

It shall be demonstrated that the proposed wastewater loadings will not raise the resulting water table to within one (1) foot of the natural ground surface within a 150 foot radius of the disposal field. The water table resulting from ground water mound beneath the disposal field shall not be closer than three (3) feet to the bottom of the infiltrative surface of the disposal system.

Disposal fields in excess of 5,000 gallons per day shall be dual alternating.

D. Isolation Distances: Determining isolation distances between components of treatment disposal systems, property lines, water supplies and other physical features, is the responsibility of the consultant.

For large systems, the soil investigations/investigations required in § 1-707 will not be likely to provide the necessary data for the selection of suitable isolation distances. In the absence of data or professional judgments which conclude that increased distances are necessary to secure added protection, the isolation distances above, below and in Appendix 1-7D shall be used.

There shall be an isolation distance of 300 feet or more between the water surface of a treatment pond and a habitation, and 250 feet or more between the water surface of a treatment pond and a property line.

E. Monitoring and Operation: The submission of plans and specifications shall include a detailed plan of sludge handling methods and identification of the ultimate sludge disposal site. The sludge handling plan and disposal site shall be reviewed for approval by the Department. A detailed Operation and Maintenance Manual of the entire wastewater treatment disposal system shall also be submitted for review and approval. The monitoring and operation of all tertiary treatment rate disposal systems shall adhere to the requirements of §1-711.

§ 1-710. Spray Systems

A spray system is a system disposing of treated wastewater by surface application to the land using ae dispersion (sprinklers) to distribute the sewage evenly. Spray systems may be used for wastewater treatment and disposal per the provisions of §1-704(C).

A. Treatment for Spray Systems: Sewage shall be treated in secondary treatment facilities designed in accordance with "Recommended Standards for Sewage Works" of the Great Lakes - Upper Mississippi River Board of State Sanitary Engineers, 1990 Edition, providing an effluent at all times of not less than 30 mg/l BOD and 30 mg/l total suspended solids. Disinfection with 20 minute chlorine contact time immediately prior to spraying and a 1.0 ppm chlorine residual at the spray nozzle, or a total 4.0 mg/l total residual chlorine (or other equivalent disinfection method acceptable to the Division) shall be required.

B. Soil and Site Evaluation: A soil and site evaluation shall be conducted under the supervision of a qualified consultant. The consultant shall prepare a soil and site evaluation report in the following specific areas to properly locate and design a spray disposal system. The soil and site evaluation shall also include the consultant's written opinion regarding the suitability of the soil and site to satisfactorily treat and dispose of the proposed volume of wastewater.

1) Soil Investigation: An acceptable full-time spray disposal site should have a fragipan or other impeding layer (silt or clay) beneath a more permeable overburden to prevent direct recharge to an unconfined aquifer or bedrock. A relatively flat site with impermeable soils at the ground surface may sometimes be utilized for spray disposal at lower than normal wastewater applications. Such application rates should be consistent with seepage and evaporation rates expected in the area.

There shall be sufficient soils investigations on the site to establish that the fragipan or impeding layer is continuous on the site. Investigations shall also indicate the nature of the soil overlying the impeding layer. Said soils investigations shall include, but not necessarily be limited to: in-place densities, sieve analysis, horizontal and (when necessary) vertical permeability analysis.

Bedrock recharge areas or unconfined aquifer areas shall not be considered acceptable spray disposal sites. The Division may require that all spray disposal sites have a positive on-site soils identification by an employee of the U.S.D.A. Soil Conservation Service, or other competent hydrogeologist or soils technician.

2) Hydrogeologic Investigation: A hydrogeologic investigation shall be conducted on each spray disposal site by a hydrogeologist. Such an investigation shall include the submission of data in the following specific areas.

a. The character and thickness of unconsolidated sediments overlying bedrock at the site shall be provided. The saturated zones in the soil profile shall be indicated, including possible perched water tables, and regional or artesian aquifers at the site. Geophysical testing can be utilized.

b. The direction of ground water movements to and from the site, and points or areas of ground water discharge or recharge shall be determined and located on a contour map for local and regional ground water regimes.

c. All surface waters and water supplies within 500 feet of the proposed disposal site shall be located on a contour map and, for water supplies, the following information shall be obtained through house to house survey, well drilling records, observations, or whatever means are necessary.

1. owner of the supply, whether in use or not, and use as to potable, industrial or agricultural;

2. type of supply: drilled or dug well, artesian or not, spring or stream;

3. well boring logs when available, depth of casing, depth to aquifer material, and material - i.e., gravel, bedrock, and if available, the predominant bedrock material.

d. Any possible effects of the spray disposal system on quality or quantity of any local or regional aquifers, and water supplies shall be evaluated. Hydraulic relationships between the disposal site and identified water supplies shall also to be evaluated and addressed as to the possible effects on the quality or quantity of the supply.

C. Sizing the Spray Disposal Field: The maximum spray disposal site application shall be 2 inches per week over the actual wetted area, with a minimum of 24 hours of rest between applications. The capacity of full-time spray disposal sites shall be calculated on the basis of lateral flow downslope over the impeding layer while maintaining a minimum of one (1) foot of unsaturated soil between the ground surface and the resulting water table. Calculations of spray field capacity shall be made using recognized subsurface flow equations.

Maximum hourly wastewater application rate shall be 0.25 inches per hour based on the actual wetted area. Maximum acceptable slope for a spray disposal site shall be 25 percent. There shall be a minimum of 5 feet between the wetted area of laterals of sprinklers in the direction of surface water run-off. Spraying during the winter shall be conducted during daylight hours, when air temperatures exceed 10 o F. The pumping system shall be sized to deliver the average daily wastewater flow to the spray field in not more than eight (8) hours.

The spray disposal and storage system shall be sized so that the system can operate effectively without having to spray during the spring run-off months.

D. Isolation Distances: There shall be no spray disposal of treated wastewater within a Class A watershed as defined by the Vermont Water Resources Board's REGULATIONS GOVERNING WATER CLASSIFICATION AND CONTROL OF QUALITY, effective March 7, 1978, and as supplemented by

the rulings of the State Board of Health. Other controls regarding isolation distances for spray disposal systems are delineated below.

1) The wetted area from any sprinkler in a spray disposal system shall not be closer than 100 feet to the edge of any surface water.

2) Spray disposal areas shall be well isolated from road, habitation, and other places open to the general public. Isolation distances are dependent upon the intended use and disposition of the treated effluent, degree of treatment provided, and local meteorological, vegetative and topographical system. The wetted area shall not be permitted closer than 200 feet from habitation, property lines, roads, or areas frequented by the public.

3) No portion of a spray disposal area shall be permitted closer than 200 feet to any water supply.

4) The spray disposal area shall be restricted from the public access by fencing and posting of signs, or other means acceptable to the Division, so that the public will be warned against entering the area and possible direct contact with the spray area.

E. Multiple Use: Any planned multiple use of the effluent or disposal area will be evaluated on its own merits, and approvals granted at the discretion of the Division, with such conditions and additional controls as required. When waivers to specific requirements of these rules are necessary in order to approve a multiple use, (e.g., waiver of isolation distance requirements for snowmaking on ski trails or irrigation of golf courses), the waiver will be granted under § 1-203 upon a showing by the applicant that the environmental or health concerns covered in this section to be waived have been adequately addressed in the multiple use design.

F. Storage: When required by the Division, full-time spray disposal systems will have a storage capacity capable of storing a minimum two months sewage.

Seasonal spray disposal system facilities shall have sufficient storage capacity to allow for effective operation with a minimum acceptable storage capacity being 30 days of flow.

G. Monitoring and Operation: A detailed Operation and Maintenance Manual on the complete wastewater treatment and disposal system shall be submitted for Division review and approval. Sludge handling methods and the ultimate disposal site shall be identified by the engineer and approved by the Division. Monitoring and operation for a spray disposal system shall be as required in §1-711.

§ 1-711. Monitoring and Operations

Monitoring and operation of wastewater treatment and disposal systems shall adhere to the requirements of paragraphs A through C below:

A. Septic Tank Disposal Systems: The operation and maintenance of a septic tank disposal system shall be that considered necessary to maintain an effective wastewater treatment and disposal system. At the discretion of the Division, the owner may be required to install and maintain a ground water sampling and monitoring program considered necessary to detect contamination and degradation of ground water and surface water and water supplies.

B. Tertiary Treatment Disposal Systems: The treatment facilities of tertiary treatment disposal systems shall be operated by a qualified wastewater treatment facility operator and the facilities shall be operated and maintained in a manner satisfactory to the Division. Operations reports, including flow

received, volumes disposed of, and results of testing necessary to maintain plant efficiency, shall be reported to the Division on a monthly basis. System owners shall maintain a ground water sampling and monitoring program to detect contamination and degradation of ground or surface water and water supplies.

C. Spray Disposal System: The treatment facilities of spray disposal systems shall be operated by a qualified wastewater treatment facility operator and the facilities shall be operated and maintained in a manner satisfactory to the Division. Operation reports, including flows received, volumes disposed of, and results of testing necessary to maintain plant efficiency and demonstrate the reliability of the treatment system, shall be submitted to the Division on a monthly basis. Owners of such systems will be required to install ground water monitors and maintain a ground water sampling and analysis program to detect contamination and degradation of ground or surface water and water supplies.

§ 1-712. Construction

The construction of wastewater treatment and disposal systems shall conform to the plans and specifications approved by the Division. When the Division determines that the scope, complexity, or size, of the proposed facility justifies it, construction shall be accomplished under the supervision of a registered professional engineer who shall report, in writing to the Division, that construction was completed in conformance with the approved plans and specifications or specify any deviations from the approved plans, specifications or permit conditions.

§ 1-713 On-Farm Treatment and Disposal of Food Processing Wastewaters

Rules for soil-based disposal of non-sewage wastewater flows are outlined in §1-703 , with the exception of Accepted Agricultural Practices as defined by the Vermont Department of Agriculture and Farm Markets. For projects which generate food-processing wastewater from Accepted Agricultural Practices, the wastewater may be land-applied according to guidelines or procedures adopted by the Secretary.

§ 1-714. Site Modifications

A. General: Depending upon the severity of site limitations, it may be possible to convert marginal or unsuitable sites to sites which comply with the specific requirements of these regulations. Applicants may submit plans for the treatment and disposal of sewage which involves modifications to an existing site designed to bring a non-conforming site into conformance with standards applicable for the type of system proposed. Cuts or fills of 1' or less shall not be considered site modifications for the purposes of this section.

Site conditions which may be improved by some degree of site modification are shallow depth to impervious layer, seasonal high ground water level, shallow depth to bedrock and excessive slope.

Acceptable site modifications may include the installation of curtain drains to lower the water table, mound system construction and regrading of the site.

In the following, restrictions placed on site modifications apply only in cases where the site modifications are necessary to overcome limitations of an otherwise unacceptable site. The restrictions do not apply to modifications designed to enhance the functioning of a system on a complying site.

B. Application Procedures and Standard Requirements

1) All site modifications must be designed by a qualified consultant.

2) All plans for site modifications shall be submitted on a accurate contour map with at least two (2) foot contour intervals. A scale of not greater than 20 feet per inch is recommended. A

plan may be rejected if the scale is not adequate for review. Existing and proposed ground contours shall be shown along with a permanent benchmark.

3) Approval for construction of the site modifications will be dependent upon the final testing and review of the final plans. If the design is acceptable, the Division will issue a permit.

4) Site modifications will not be permitted on sites with less than two (2) feet of native soil over bedrock or ledge or other strata having a percolation rate slower than 120 minutes per inch.

5) Site modifications will not be permitted on sites having a seasonal high water table within two (2) feet of the ground surface. Exception: sloping sites with a perched seasonal high ground water table 18" or more from the ground surface may be approved for a mound system no larger than 600 gallons per day, mounds using trenches shall not use more than two trenches per system, if the consultant concludes and the Division agrees that a curtain drain will lower the ground water table to 2' or more.

6) All sites requiring modifications must show on the plans that there is sufficient area set aside, on the site with the necessary testing, that it could be utilized for the installation of a replacement wastewater disposal system.

7) Except where specifically permitted otherwise, site modifications shall be constructed under the supervision of a qualified consultant in accordance with the approved plans. Upon completion of construction, the supervising consultant shall report in writing to the Division, that the modification has been constructed in accordance with the approved plans. After receipt of the report, a final approval will be issued if all aspects of the construction are satisfactory.

Failure to construct the site modifications under the supervision of a qualified consultant shall be a basis for revoking approval for the project.

8) For site modifications involving flows of more than 2,500 gpd, the Division may require such additional design or construction specifications as may be necessary to insure the proper functioning of the system.

C. Curtain or Dewatering Drains.

1) General: Curtain or dewatering drains may be used to lower permanent or perched seasonal high water tables, which prevent compliance with the required wastewater disposal system design requirements.

Drains are highly dependent upon their design and construction and site conditions for continued adequate performance. Prior to designing such drains, it is recommended that the consultant consult such references as Drainage of Agricultural Land by the U.S.D.A. Soil Conservation Service and these rules for design requirements and expected performance standards.

a. When a drain is proposed to lower a seasonal high water table, it must be installed and tested during spring conditions to demonstrate its effectiveness before approval of the sewage disposal system. The requirement for spring testing may be waived if the Division concludes that the consultant has provided sufficient evidence to show that the drain will work effectively and that spring testing is not necessary.

b. The qualified consultant shall submit a plan to the Division to show the drain and the proposed location of the sewage disposal system. After approval of the design by the

Division, the drain must be installed and tested before approval will be issued by the Division, unless an exception has been granted in accordance with subsection (a) above.

c. A plan of location of monitoring wells and schedule of measurement shall be approved by the Division.

2) Design Criteria

a. All design criteria must be detailed as to plan, profile, discharge location, and typical section. When considered necessary to establish the effectiveness of the proposed drain, the Division may request supporting information, including permeability and sieve analysis of the soils at the site.

b. The drain shall be constructed of material sufficient to transmit the water from the site and to prevent clogging of the drain and decrease of its effectiveness. The acceptable material shall be crushed stone, perforated or other porous pipe, and filter fabric material to prevent clogging. Other designs of graded material to prevent clogging may be approved when supported with sufficient information.

c. If the curtain or foundation drain is downslope of the disposal field, the disposal field shall not be closer than 75 feet to the drain. If the curtain or foundation drain is upslope of the disposal field, it shall be 35' if possible, and a minimum of 20 feet to the disposal field. These distances may be reduced if the consultant provides adequate data and analysis to show the effluent from this system will not enter the drain, or increased if effluent will enter the drain.

d. All sites utilizing drains shall have monitors installed to monitor their effectiveness. The location and design shall be detailed on the plans.

e. The outlet of all drains shall be constructed to prevent erosion and clogging.

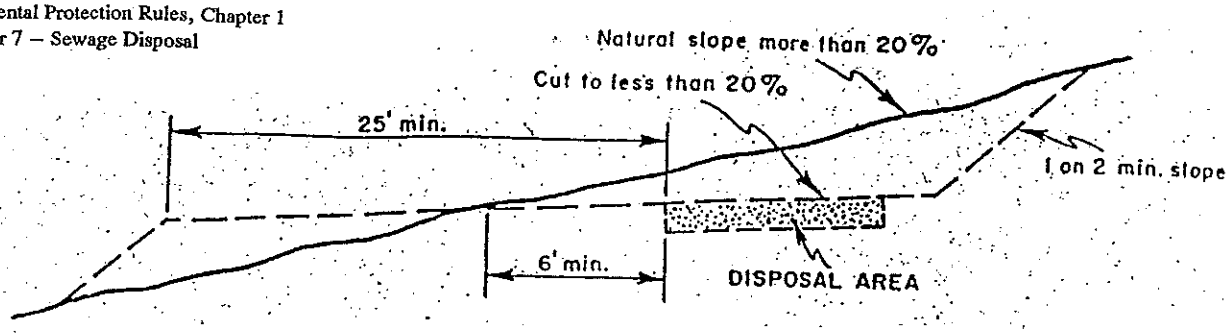
D. Excessive Slope

1. In some cases, sites with slopes exceeding 20% may be regraded and reshaped to provide adequate soil absorption sites. Prior to regrading, soil excavations shall be performed to show that there is a sufficient amount of soil over the seasonal high water table and ledge of the alteration.

a) The alteration for primary and replacement area shall be complete and soil excavation and percolation tests performed before any alternate sites can receive final approval.

b) The sewage disposal system shall not be installed in the fill area of an alternate site, though the area of fill may be used as a portion of the required 25 foot separation from the crown of a natural slope. There shall be a minimum of 6 feet of natural soil between the edge of a system and the downslope side of the altered areas.

c) Site Protection. All altered slope areas shall be altered such that surface water drainage will be diverted away from the system areas. In some cases, this may require the use of grassed waterways or other means of diverting surface waters. All disturbed areas shall be seeded or sodded with grass and appropriate steps shall be taken to control erosion. A conceptual design sketch for altering slopes is provided here:



E. Mound Wastewater Disposal System

1) General: Mound wastewater disposal systems may be considered whenever site conditions preclude the use of a subsurface system. Due to the nature of this alternative system, actual selection of mound location, size of mound, and construction techniques must be thoroughly considered and the criteria established in this section carefully followed.

a. All mound wastewater disposal systems must be designed by a qualified consultant.

b. The consultant shall prepare a contour map using a contour interval of not more than two feet. A scale of not greater than 20 feet per inch is recommended. All details of the mound system, including but not limited to toe of slope, surface drains, curtain drains, existing and proposed contours, and trench details shall be shown on the plans.

c. The plans shall show that there is sufficient area separate from the primary mound site on the lot to allow for construction of a replacement mound which meets all mound requirements. The toe of the replacement mound shall not be closer than 10 feet to the primary mound on the sides or closer than 25 feet on the uphill or downhill side.

A permanent benchmark shall be established and shown on the plans.

d. A minimum of two (2) test pits and two (2) percolation tests shall be conducted for the primary area and the same in the replacement area for a total of a minimum of four (4) for each site.

e. For mounds serving projects generating more than 1,000 gallons per day of sewage, a hydrogeologic study of the disposal area must be conducted to demonstrate the capability of the site to dispose of the volume of sewage to be generated. The ground water level at the downhill toe of the mound shall be raised no closer than one (1) foot below the ground surface and the ground water mound beneath the mound system shall be no closer than three (3) feet below the bottom elevation of the disposal system within the mound.

For projects generating 2,000 gallons per day or more of sewage, dual alternating mound systems shall be required.

2) Site Requirements:

a. Soils where the high groundwater level, bedrock, or other strata having a percolation rate slower than 120 minutes per inch occurs within twenty-four inches of natural grade, are not suitable for mounds. The site must be free of these limitations beyond the toe of a mound (primary and replacement) for a distance of twenty-five (25)

feet in the downslope direction and ten (10) feet on all other sides. Mounds shall be constructed upon undisturbed naturally-occurring soils. A crest site is preferred, no mound shall be located in a depression which could act as a natural surface or ground water collection area.

b. Sites with Trees and Large Boulders: Generally, sites with large trees, numerous smaller trees or large boulders are unsuitable for the mound system because of difficulty in preparing the surface and the reduced infiltration area beneath the mound. Rock fragments, tree roots, stumps and boulders occupy space, within the mound area, thus reducing the amount of soil for proper purification. If no other site is available, then it is recommended to cut the trees at ground level, leaving the stumps. A larger mound area may be necessary if too many stumps are involved, so that sufficient soil is available to accept the effluent.

c. The minimum isolation distance to drinking water supplies per Appendix 1-7D shall be measured from the edge of the minimum required effective basal area of the mound system.

d. Mounds shall be located at least 50 feet from any stream, watercourse, lake, or impoundment as measured from any toe of the mound.

e. Mounds shall be located a minimum distance of 10 feet as measured from the toe of the mound from buildings, driveways, or any other subsurface obstruction except that this distance shall be 25 feet downgradient of the mound. Mounds shall be located a minimum distance of 10 feet as measured from the toe of the mound or 25 feet as measured from the edge of the disposal system within the mound, whichever is greater from property lines except that the distance from the downgradient toe of the mound to property lines shall be a minimum of 25 feet. No future construction activity may take place in the effluent dispersal area described in this section as long as the mound is in use.

f. Separation may be required between mounds to prevent hydraulic interference in the disposal area.

3) Fill Material: The fill material from the natural soil plowed surface to the top of the trench or bed shall be sand texture with one of the following sieve analyses:

a.

Sieve Number	Opening (mm)	Percent Passing, by Weight
10	2.000	85 - 100
40	0.420	25 - 75
60	0.240	0 - 30
100	0.149	0 - 10
200	0.074	0 - 5

b.

Sieve Number	Opening (mm)	Percent Passing, by Weight
4	4.750	95 - 100

8	2.380	80 - 100
16	1.190	50 - 85
30	0.590	25 - 60
50	0.297	10 - 30
100	0.149	2 - 10

or

c.

Sieve Number	Opening (mm)	Percent Passing, by Weight
10	2.000	85 - 100
40	0.420	30 - 50
200	0.074	0 - 10

The fill material must meet specifications a, b, or c. Interpolation of analyses is not permitted. Fill material b is ASTM Specification C-33 and is intended for manufactured material.

Note: Mound systems approved under the September 10, 1982 Environmental Protection Rules may use the fill material allowed under this subsection without redesign.

4) Design

a. There shall be a minimum of one (1) foot of fill material and two (2) feet of naturally occurring soils between the bottom elevation of the disposal system within the mound and the highest elevation of the limiting soil conditions.

b. Sufficient depth of fill material shall be placed to provide for four feet of vertical separation between the bottom elevation of the disposal system within the mound and creviced or permeable bedrock .

c. Mound systems shall utilize pressure distribution with absorption trench distribution design, or seepage beds with a maximum 10' width and shall not be installed on land with a slope greater than twenty (20) percent. The systems shall be installed with the long dimension of the system parallel to the land contour. Spacing between trenches shall be no less than 4'. For trench designs, the minimum trench length shall be twice the dimension across the top of the mound from the outside to outside of the trenches.

d. The required trench or bed bottom area shall be based upon a maximum application rate of 1.0 gallons/day/square foot.

e. The required effective basal area of the mound for soils with a percolation rate of 61 to 120 minutes per inch is to be calculated on a maximum application rate of 0.24 gallons/day/square foot. The effective basal area is the area downslope of the long dimension of the disposal field.

f. The required effective basal area of the mound for soils with a percolation rate of 0 to 60 minutes per inch is to be calculated on an application rate of 0.74 gallons/day/square foot.

g. The land area 25' downgradient of the elevated sand mound is the effluent dispersal area and soil in this area may not be removed or disturbed except as specified

herein.

h. The area of sand fill shall be sufficient to extend one (1) foot beyond the edge of the required absorption area before the sides are shaped to the acceptable slope.

i. The acceptable slope for mounds shall be 1 on 3. The mound fill shall extend beyond the effective basal area.

j. Mounds may be approved for sites where the naturally occurring soil has been removed or where fill has been placed over the naturally occurring soil. In both cases the remaining naturally occurring soil needs to comply with the soil and siting criteria for mound systems.

5) Pressure Distribution System Design

a. Pressure distribution shall be required for the mound system.

b. The field shall be dosed a minimum of two times per day. The size of the dosing pump or siphon shall be selected to maintain a minimum pressure of one pound per square inch or 2.3 feet of head at the end of each distribution line.

c. The pressure distribution pipe shall be rigid plastic pipe, Schedule 40 to 80 with a minimum of diameter of one (1) inch. The pipe shall provide a single row of holes, minimum 1/4 inch diameter, on center along the length of the pipe with the last hole in the end cap. A design that assures uniform distribution throughout the field shall be provided. There shall be a minimum of one opening in the distribution piping per 50 square feet of seepage area. The distribution network shall be designed such that the difference in discharge rate between any two orifices is not greater than 15%. All joints and connections shall be solvent cemented.

d. The pressure distribution pipe shall be placed in crushed stone with the holes downward. The material used to cover the top of the stone shall be untreated building paper, a six-inch, uncompacted layer of hay or one layer of filter fabric. Plastic or treated building paper shall not be used.

e. The ends of all distribution pipes shall be capped.

f. A minimum of a five to one ratio of dose volume to the volume of the distribution network is required.

6) Construction

a. The mound system shall be reviewed through the critical stages of construction by a qualified consultant. Prior to the commencement of construction and prior to use of the system, the permittee shall advise the Division in writing who the reviewing consultant shall be. Upon completion of construction, the consultant shall report in writing to the Division that the system was constructed in accordance with the approved plans. Upon completion of plowing of the mound area and prior to the placing of the fill material, the consultant shall inspect the site preparations. This shall be specifically addressed in the consultant's report. Upon completion of the installation of the distribution piping, the network shall be tested with clean water to assure that distribution is complete and equal and to demonstrate that the difference in discharge rate between

any two orifices is less than 15%.

b. A plan showing the test locations and any calculations shall be included with the report.

c. To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal area. However, after placement of a minimum of six (6) inches of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. (If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.)

d. Above-ground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line from the pump chamber to the point of connection with the distribution piping header shall be installed. The area shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing of the mound area is completed, the area should be fenced to prevent vehicles and equipment from entering the plowed area, unless the fill material is going to be in place within 24 hours of the plowing. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the site by creating furrows that are parallel to ground contour.

e. The area surrounding the mound shall be graded to provide diversion of surface run-off waters.

f. Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill needed for the mound to a minimum depth of twenty-one (21) inches above the plowed surface, more fill may be required if bedrock is a limiting factor. This depth will permit excavation of trenches or bed to accommodate the crushed stone (9") necessary for the distribution piping. After hand leveling of the absorption area, the stone shall be placed into the trench, hand leveled and the distribution pipe installed. The consultant shall direct the testing of the distribution system. After installation of the distribution system, the entire mound is to be covered with top soil native to the site, or of similar characteristics to support vegetation found in the area. Crown the entire mound with cover of soil less permeable than the mound fill, covering with 12" on the side of the mound. Native soil from the site is normally suitable for cover material, though the top 2" - 4" of this cover should be top soil. The entire mound shall be seeded, sodded, or otherwise provided with vegetative cover, to assure stability of the installation.

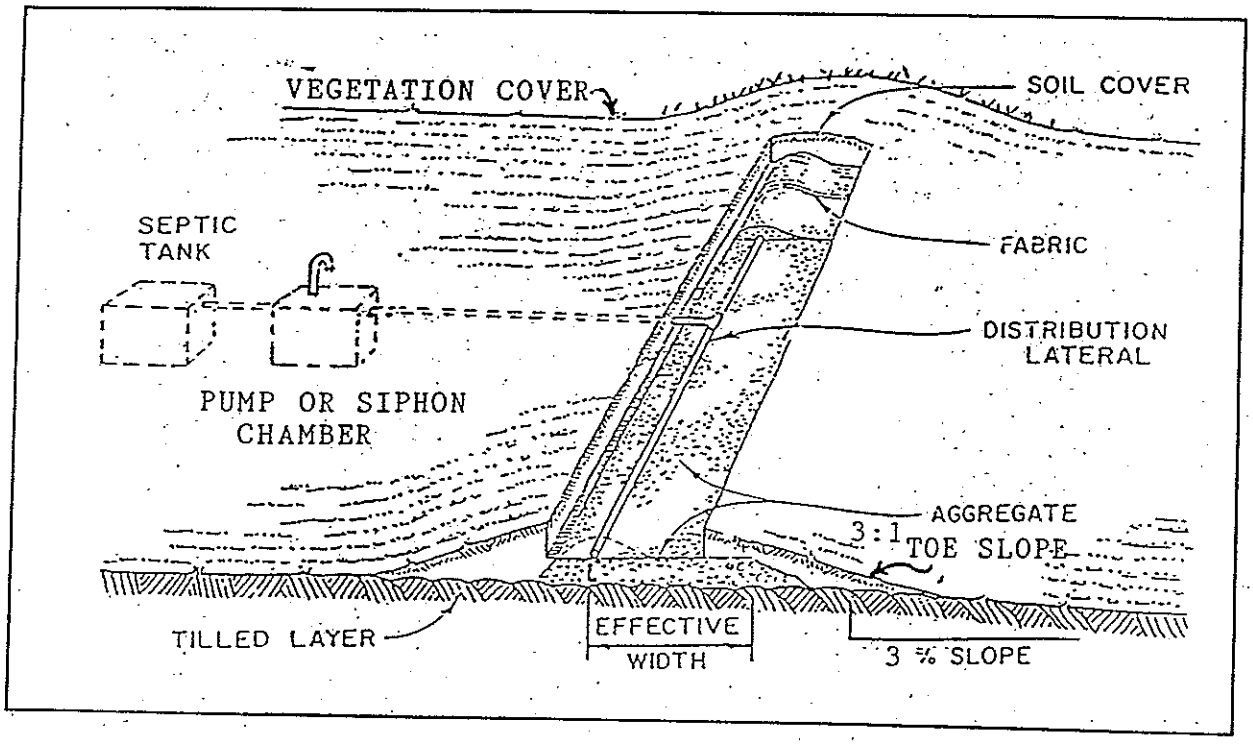
F. Rapidly Permeable Soils: For soils with a percolation rate of faster than one minute per inch, treatment shall be provided with (1) a mound; or (2) an absorption trench or seepage bed system backfilled with at least one foot of sandy fill material between the bottom of the crushed stone and the native soil. The fill shall have a percolation rate of three minutes per inch or slower. The application rate shall be based on the percolation rate of the fill in place.

G. At-Grade Wastewater Treatment & Disposal Systems

1) General: At-grade systems may be used on sites that are not suitable for in-ground

systems because of inadequate depths to water table, bedrock or impermeable soil and offer an alternative to mound systems. At-grade systems are constructed by tilling the ground surface and placing the stone aggregate directly on the tilled surface. The stone aggregate is not placed subsurface as in an in-ground system and no sand is placed under the aggregate as in a mound system. Figure 7.1 shows the layout of a typical at-grade system for a sloping site.

Figure 7.1 Typical At-Grade Wastewater Treatment & Disposal System for a Sloping Site.



2) Site Requirements:

a. Sites with either a high groundwater level or a soil strata having a percolation rate slower than 60 minutes per inch (mpi) or faster than 1 mpi within 36 inches of natural grade are not suitable for at-grade systems. Also, soils that have bedrock within 48 inches of natural grade are not suitable. The site must be free of these limitations beyond the edge of the fill for a distance of 10 feet on all sides. At-grade systems shall not be located in a depression or swale that could act as a natural surface water collection or runoff area.

b. Generally, sites with large trees, numerous small trees or large boulders are unsuitable for at-grade systems because of the difficulty in preparing the ground surface and the reduced infiltration area. If no other site is available, all trees shall be cut flush with the ground, leaving the stumps. Stumps shall not be removed as removal of the stumps creates channels where the roots existed and may allow inadequately treated effluent to reach groundwater or bedrock. A larger area shall be designed if numerous stumps and/or boulders are involved so that sufficient soil surface is available to accept

the effluent.

c. The maximum slope allowable for at-grade systems is 12 percent.

d. Cut sites that meet the other site requirements for at-grade systems are acceptable. Sites with excessive slopes which have received approval from the Division for cutting shall receive permit approval when the qualified consultant submits a written report stating that the cut(s) has been completed as approved.

e. Filled sites may be approved by the Division for at-grade systems on a case-by-case basis where the existing original soil under the fill meets the other site requirements for at-grade systems.

f. At-grade systems are not allowed on sites having a percolation rate faster than 1 mpi within the 3 feet of soil below the bottom of the system. Replacing the excessively drained soil with filter sand is not allowed for at-grade systems.

g. At-grade systems shall comply with the isolation distances in Appendix 1-7D of these rules with the disposal field measurements taken from the edge of the stone aggregate.

h. The site shall have sufficient area for primary and replacement systems which meet all siting and design requirements.

3) Site Evaluation:

a. A sufficient number of test pits and percolation tests shall be located in the primary and replacement system areas. Generally, a minimum of two acceptable test pits and two percolation tests are necessary for each area unless the Division agrees to fewer tests based on the uniformity of soils in the proposed areas. Large systems will require a greater number of test pits and percolation tests. Each test pit shall be excavated at least four feet deep into native soil. On fill sites proposed for at-grade systems, the test pits shall be excavated through the fill and into native soil a minimum of four feet.

b. Percolation tests shall be conducted in the most restrictive soil strata within the 3 feet below the bottom of the stone aggregate elevation. In addition to dense soil strata, soils with percolation rates faster than 1 mpi are restrictive. Percolation tests shall follow the procedure described in Appendix 1-7C. For fill sites being proposed for at-grade systems percolation tests shall be conducted in the most restrictive strata within the three feet of native soil under the fill. Additional tests may be required within the fill material.

4) Design:

a. The qualified consultant shall prepare a one-foot interval contour map having a recommended scale of 20 feet per inch or less. All details of the primary and replacement systems, including but not limited to plan and cross-sectional views, pump or siphon chambers, construction materials, surface drainage, distribution system, existing and proposed contours, elevations and construction installation notes shall be shown on the plans.

b. The minimum size of the effective infiltration area shall be based on the second slowest percolation rate using the following formula: square footage of effective

infiltration area = ($3/\sqrt{t}$) (0.8) where t is the second slowest percolation rate. The maximum loading rate shall be 1.0 gallons per day per square foot. The effective infiltration area is the area upon which at least 6 inches depth of stone aggregate is placed and does not include the tail end of the stone aggregate, the side slope fill areas or the portion of the stone aggregate that is upslope of the distribution pipe on sites with slopes of 3 to 12 percent. All system sizing calculations shall be submitted with the application.

c. At-grade systems shall be laid out parallel to ground contour and should be designed to be long and narrow to minimize the linear loading rate. The maximum effective infiltration area width shall be 6 feet and the minimum effective infiltration area width shall be 3 feet for at-grade systems.

d. A minimum length to width ratio of 2:1 shall be provided for at-grade systems. The system length and width shall be determined by measuring from the outer edges from the six inch depth of the stone aggregate. The width dimension includes the separation distance (6 ft. minimum) between individual infiltration areas for systems having more than one infiltration area. The width does not include the two feet of stone aggregate upslope from the distribution pipe for systems on slopes of 3 to 12 percent.

e. A minimum of 6 inches of washed, clean ¾"-1½" stone aggregate shall be placed under the distribution pipe and at least 2 inches of stone aggregate shall be placed above the crown of the distribution pipe. Filter fabric or similar material shall be placed over the top of the stone. The stone shall be covered with a minimum of 12 inches of permeable soil, the upper 2 to 4 inches of which shall be loam topsoil and the remainder of a fine sandy loam to medium sand texture. All four sides of the fill area shall be designed to slope away at a pitch that is not steeper than 3:1. The design shall indicate that a vegetated cover is to be maintained over all portions of the system.

f. The distribution pipe shall be placed in the center of the effective infiltration area on sites with less than 3 percent slopes (figure 1-7.2) and placed at the upper side of the effective infiltration area on sites with slopes that are 3 to 12 percent. (figure 1-7.3).

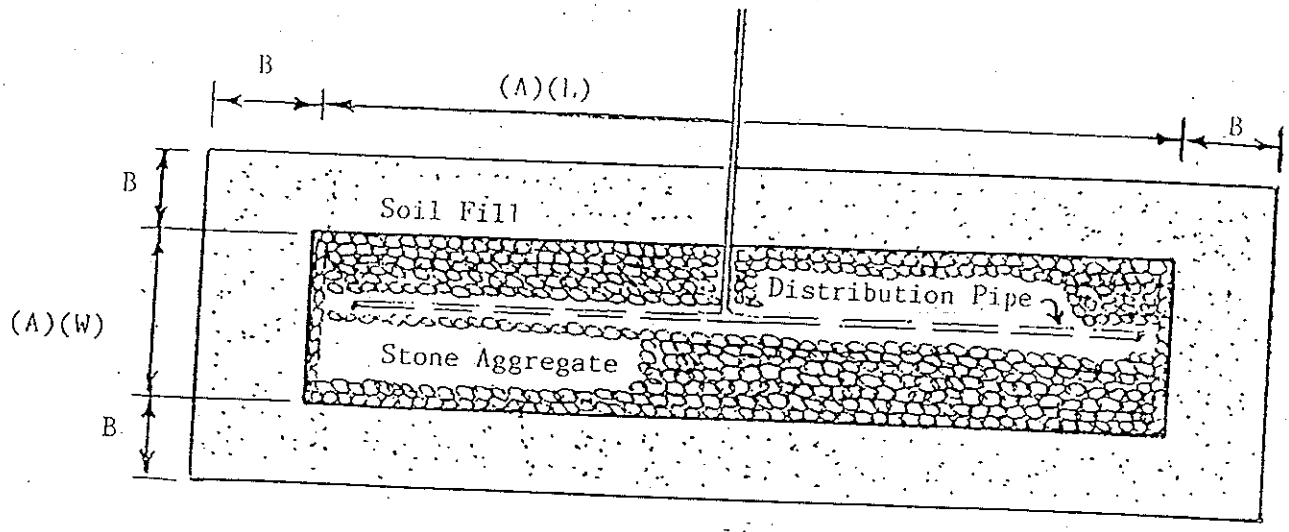
g. On sites with slopes that are 3 to 12 percent, only the area directly under the distribution pipe to the downslope limit of the 6-inch depth of stone aggregate shall be used to meet the effective infiltration area square footage requirement (figure 1-7.3).

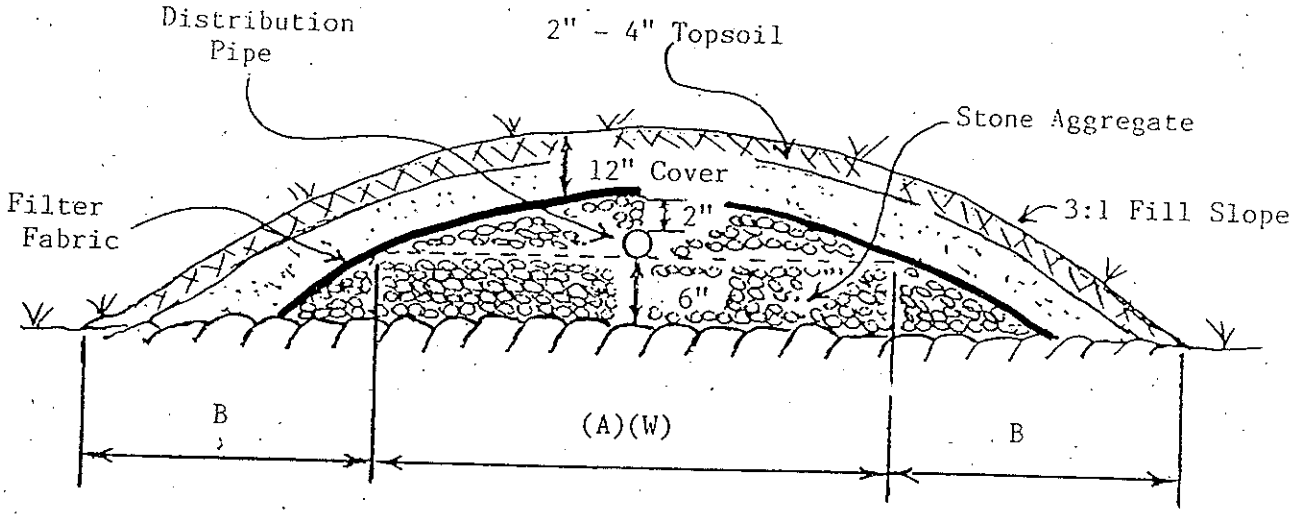
h. All at-grade systems shall be pressurized and dosed by pump or siphon as described in subsection §1-707 C(2-4) of these rules. Pressure distribution hydraulic calculations including but not limited to friction loss, elevation head and pump/siphon sizing shall be submitted for review.

i. Where more than one effective infiltration area is used, there shall be at least 6 feet of separation between the tail edges of the stone aggregate in each effective infiltration area (figure 1-7.3).

j. At-grade systems receiving more than 2,000 gpd of design wastewater flow shall require a hydrogeologic study showing that a minimum of 36 inches of unsaturated native soil is maintained between the bottom of the stone aggregate and the groundwater mound beneath the system. At-grade systems that are closer than 25 feet to each other as measured from the edge of stone aggregate shall be evaluated as one system for purposes of determining the need to conduct a hydrogeologic study.

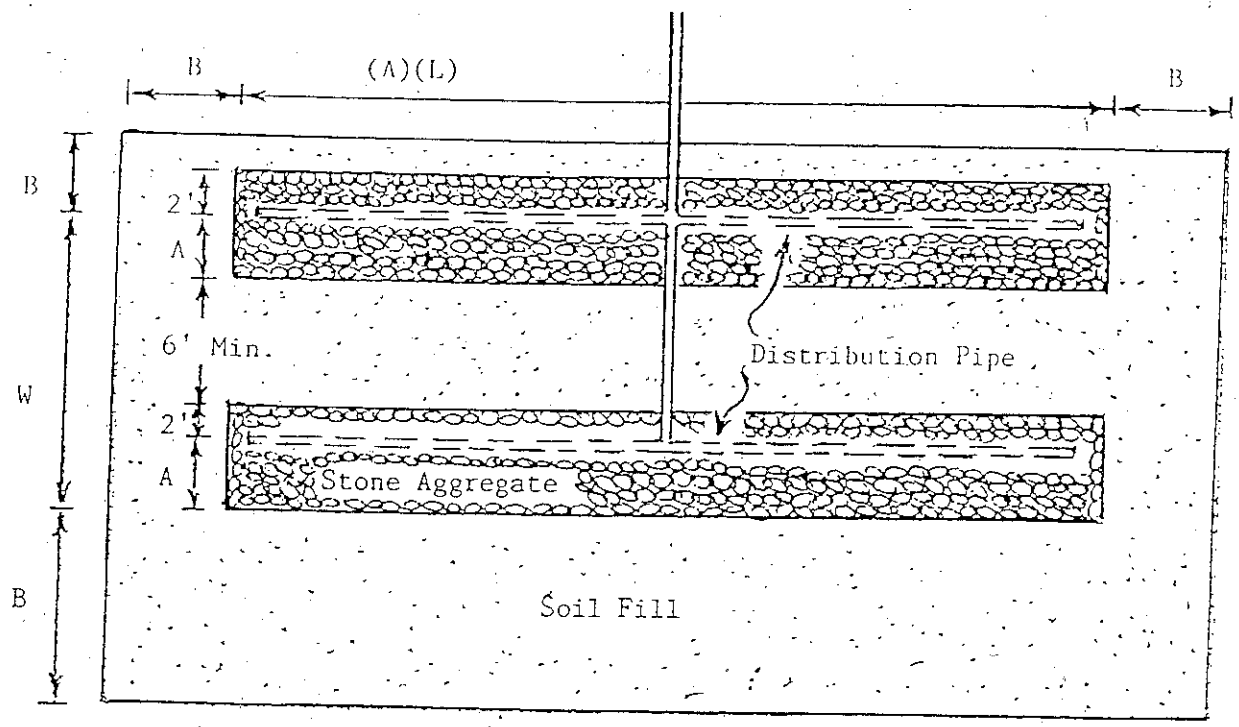
Figure 7.2 Plan and Cross Sectional Views of an At-Grade System Having One Infiltration Area on a Level Site (less than 3 percent).

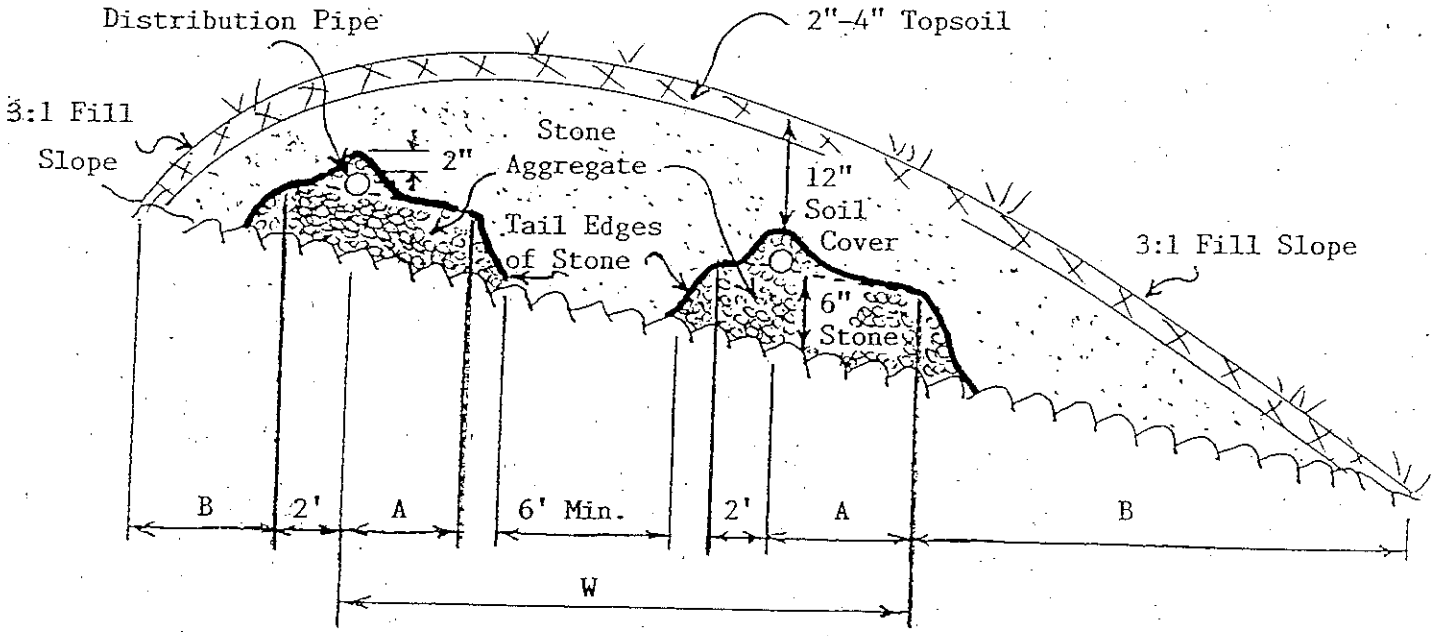




A. Effective infiltration Area (min. of 6 inches of stone)
B. Side slope (3:1)
L. System Length
W. System Width

Figure 7.3 Plan and Cross Sectional Views of an At-Grade System Having Two Infiltration Areas on a Sloping Site (3 to 20 percent).





A. Effective infiltration Area (min. of 6 inches of stone)
B. Side slope (3:1)
L. System Length
W. System Width.

k. For at-grade systems receiving 3,000 gpd or more of design wastewater flow, dual alternating systems shall be required. The dual alternating system requirement applies if either the primary or the replacement systems have design flows of 3,000 gpd or design or more. At-grade systems that are closer than 25 feet to each other as measured from the edge of stone aggregate shall be evaluated as one system for purposes of determining the need to have dual alternating systems. Exception: Favorable results of a hydrogeologic study that has received prior approval by the Division may be used to justify a reduction in the 25-foot separation distance.

l. Where primary and replacement at-grade systems are placed next to each other, the systems shall be at least 10 feet apart when placed end-to-end as measured from the stone aggregate and at least 25 feet apart when placed in the same flow path as measured from the edge of the filled area.

m. A surface water diversion swale shall be shown on the plans upgradient of the system on sites with slopes that are 3 to 12 percent.

n. The area for 25 feet downgradient of the at-grade system as measured from the lower edge of the fill shall not be disturbed by any construction activity including but not limited to building construction, roadways and parking areas.

o. Where subsurface drains (including building perimeter drains) are located downslope of an at-grade system, the stone aggregate in the system shall be at least 75 feet from the drain.

5) Construction Practices:

a. The surface water diversion swale (mandatory for sites with slopes of 3 to 12 percent) should be installed prior to constructing the at-grade system to keep surface water runoff away from the system area while it is under construction.

b. Construction of the system and/or tilling shall not take place when the soil moisture is high in the system area. If the soil at 9 inches below grade can be rolled into the shape of a wire, the soil moisture content is too high for construction to begin.

c. To prevent compaction, construction equipment shall not be moved across and downslope of the system area before and after tilling.

d. Vegetation shall be cut close to the ground and removed from the area to be tilled. Tree stumps shall be cut flush with the ground and the roots left in place. On wooded sites, the forest litter should be raked off if more than an inch thick. The system area shall be tilled, preferably by mold board or chisel plow to a depth of 6 to 8 inches, parallel to ground contour. During plowing, the soil should be thrown upslope to provide a proper interface between the soil and stone aggregate. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the site by creating furrows that are parallel to ground contour.

e. The forcemain may be installed before tilling or after tilling when the forcemain enters the system at the upslope side of the system. When the forcemain enters the system at the downslope side, the forcemain should be installed before tilling. If practical, forcemains should connect to the distribution pipe from the ends of the

distribution pipe or from the upslope side of the system. In either situation, the forcemain should be installed by working from the upslope edge of the system.

f. Upon completion of the tilling and before placing the stone aggregate, the qualified consultant shall inspect the site preparations.

g. Construction should begin immediately after the tilling by placing the stone aggregate. The pressure distribution pipe should be laid level on top of the stone and caps installed at the ends of the pipe. Upon completion of the distribution piping, the qualified consultant shall test the system with clean water. The test shall show that a minimum pressure of 2.3 feet of head is present at the ends of the pipe and that the difference in discharge rate between the two orifices with the greatest difference in discharge rates is not greater than 15 percent. After connecting the distribution pipe to the forcemain, the distribution pipe shall be covered with at least 2 inches of clean stone aggregate. The stone aggregate shall be covered completely with filter fabric or similar material (not building paper, straw, newspaper, plastic, tar paper, etc.).

h. The stone aggregate shall be covered with a minimum of 12 inches of soil but not more than 18 inches, with the upper 4 to 6 inches of soil being loam and the remainder of the fill being of a fine sandy loam to medium sand texture. The soil cover shall be placed at a maximum slope of 3:1. A vegetated cover free of large brush and trees shall be maintained over the system.

i. Prior to use of the system, the qualified consultant shall submit a written report to the Division stating that the system has been installed according to the approved plans and permit. The report shall specifically address the inspection of the site preparations and include numerical results of the orifice discharge rate comparison and pressure test.

§ 1-715 SAND FILTERS

Sand filters are intended for use in conjunction with a septic tank system. They allow for a reduction in the final disposal requirements due to the additional treatment of the wastewater stream.

The reductions in disposal requirements are based on a sand filter effluent quality that meets secondary effluent standards; with no more than 30 mg/l biochemical oxygen demand (BOD_5) and no more than 30 mg/l total suspended solids (TSS).

This subsection specifically addresses the use of two different sand filter types: the intermittent sand filter and the recirculating sand (gravel) filter.

A. General Requirements

1) Wastewater Strength

a) Intermittent sand filters may be used for residential and other low strength domestic wastewater meeting the following parameters:

1. Septic tank effluent shall be considered to be low strength where the concentrations of the BOD_5, TSS and oil and grease (O&G) comply with the following:

a. BOD_5 <230 mg/l

b. TSS <150 mg/l

c. O&G <25 mg/l

2. Residential wastewater is presumed to meet the requirements as set in §7.15 (A)(1)(a)(1)

b) Recirculating sand filters may be used for moderate strength domestic wastewater when the concentrations of the BOD_5, TSS and O&G comply with the following:

1. BOD_5 <400 mg/l

2. TSS <150 mg/l

3. O&G <25 mg/l

2) Container Design & Construction

a) The filter container shall be water tight to prevent ground water from infiltrating into the filter and to prevent effluent exfiltration from the filter.

b) Reinforced concrete shall be used; unless other materials having equivalent function, workmanship, watertightness and at least a twenty (20) year service life can be documented. Flexible membrane liner materials may be used provided they comply with the following requirements.

1. Flexible membrane liner materials must have properties which are at least equivalent to thirty (30) mil un-reinforced polyvinyl chloride. To be approved for installation, flexible membrane liner materials must:

a. Have field repair instructions and material which are provided to the purchaser with the liner;

b. Have factory fabricated "boots" suitable for field bonding onto the liner to facilitate the passage of piping through the liner in a waterproof manner; and

c. Be compatible with the wastewater being treated.

c) All tanks associated with a sand filter system, including septic and dosing tanks and any pumping vaults, shall have an at-grade access provided by a watertight manhole or riser not less than eighteen (18) inches in diameter, unless approved by the Department.

d) Testing of the container components including septic tanks, pump chambers, recirculation tanks and filter containers for watertightness is required.

1. After installation all tanks shall be watertight. Each tank shall be tested by filling to a point at least two inches, but not more than three inches, above the point of riser connection to the top of the tank. During the test there shall

not be a measurable leakage over a twenty four (24) hour period. Other leakage testing methods may be approved by the Department.

2. After installation the filter container shall be watertight. The container shall be tested by filling to a point at least one (1) foot above the outlet invert,after the outlet has been plugged. During the test there shall not be a measurable leakage over a twenty four (24) hour period. Other leakage testing methods may be approved by the Department.

3) Siting Requirements

a) Filter Location

1. Filters must be protected from both ground water and surface water infiltration.

2. For the purpose of determining the minimum isolation distance to other site features, the filter container shall be comparable to a septic tank and must maintain the insolation distances set forth in Appendix 1-7D for septic tanks.

b) Filtrate Disposal Systems

1. General: Filtrate disposal systems shall be designed to hydraulically transmit the filtrate away from the filtrate disposal system. Except for criteria specifically addressed in this subsection, (§1-715(A)(3)(b), the criteria as described within each specific disposal system type must be followed.

2. Siting Requirements: Sites where the seasonal high ground water table, bedrock or impervious soil having percolation rates slower than 120 minutes per inch occurs within twenty-four inches of the natural grade are not suitable for filtrate disposal systems.

3. Design

a. General - All types of disposal systems permitted by §1-708, §1-714(E), (F) & (G) are acceptable as filtrate disposal systems for sand filter effluent meeting the requirements of this subchapter. Unless specifically addressed in §1-715 (A)(3)(b) and (c), the design standards of each individual filtrate disposal system must conform with requirements of §1-708, §1-714(E), (F) or (G) depending on the type of disposal system proposed.

b. The following requirements apply to all sand filtrate disposal systems and supersede the corresponding requirements listed in §1-708, §1-714(E), (F) or (G).

1) There shall be a minimum of two (2) feet of naturally occurring soils between the bottom elevation of the filtrate disposal system and the highest elevation of the limiting soil conditions.

2) A linear loading rate of no more than 4.5 gallons per

linear foot of filtrate disposal system is to be used unless a site specific hydrogeologic analysis is performed. A hydrogeologic analysis shall demonstrate that:

a) An unsaturated soil zone of at least eighteen (18) inches is maintained beneath the filtrate disposal system: and

b) The mounded watertable is at least one (1) foot below grade at the downhill toe of the filtrate disposal system.

Note: Filtrate disposal areas located more than twenty five (25) feet apart may be considered hydraulically isolated from each other for the purpose of this subsection.

c) The following requirements refer to specific variations of design criteria based on system type:

1. Variations of the requirement of §1-708 Disposal Fields:

a. Filtrate disposal systems may be constructed in soils having a percolation rate faster than 120 minutes per inch. §1-714(F) shall be followed for soils with a percolation rate faster than 1 minute per inch.

b. Application Rates are limited to no more than twice the normal rate as defined in §1-708

1) For filtrate disposal systems designed under §1-708(A) where the percolation rates are less than 60 minutes per inch the filtrate disposal system sizing shall be based on the formula 2 times Q where Q is as defined in §1-708 (A)(1) with a maximum application rate of 3.0 gallons per day per square foot.

2) For all other filtrate disposal systems designed under §1-708, the filtrate disposal system sizing shall be based on the formula 2 times Q where Q is as defined in §1-708 (B)(1)(d) with a maximum application rate of 2.4 gallons per day per square foot.

2. Variation to the requirements of §1-714(E), (F) or (G).

Filtrate disposal systems designed under §1-714 (E), (F) or (G) shall be sized in accord with §1-715(A)(3)(C)(1)(b)(2).

4) Monitoring

a) Wastewater Quality: The sand filter system shall be designed for waste water sample collection before and after the sand filter.

b) Wastewater Quantity: All sand filter systems shall have the capability of measuring and recording the totalized wastewater flow and the totalized flow to the filter.

c) An annual inspection shall be performed by a qualified consultant. At a minimum the following criteria should be addressed in an inspection report.

1. Use and age of system including the average daily flows:

2. The recirculation ratio;

3. Mechanical or electrical malfunctions;

4. Neglect or improper use; and

5. Flushing of the laterals;

A written report of the annual inspection shall be submitted to the Department within 30 days of the inspection following the first and second years of operation.

5) Operation & Maintenance Manuals: A user's manual for the sand filter system shall be developed and/or provided by the system designer at the time that the system installation "as-built" drawing is completed. These materials shall contain the following as a minimum:

a) Diagrams of the system components and their location.

b) Explanation of general system function, operational expectations, owner responsibility and other information as appropriate.

c) Specifications of all electrical and mechanical components installed (occasionally components other than those specified on the plans are used).

d) Names and telephone numbers of the system designer, local health authority, supplier/installer, and/or the management entity to be contacted in the event of a failure.

e) Information on the periodic maintenance requirements of the sewage system: septic tank, dosing and recirculating/mixing tanks, sand filter unit, pumps, switches, alarms, disposal unit and other information as appropriate.

f) Information on "trouble-shooting" common operational problems that might occur. This information should be detailed and complete as needed to assist the system owner make accurate decisions about when and how to attempt corrections of operational problems and when to call for professional assistance.

g) Information on the safe disposal of discarded filter media.

h) For proprietary sand filter devices, a complete maintenance and operation document shall be developed and provided by the manufacturer. This document shall include all the appropriate items mentioned above, plus any additional general and site-specific information useful to the system owner, and/or the maintenance person.

6) All systems using a sand filter must be designed by a professional engineer.

B. Intermittent Sand Filters: In addition to the applicable requirements of §1-715(A), the following system specific criteria apply to design:

1) Underdrain system

a) The base of the filter container shall be level or constructed at a grade of one (1) percent or less towards the underdrain piping.

b) The underdrain piping shall be installed in the interior of the filter container at the lowest elevation. The piping shall be on a grade of one (1) percent or less to the point of passage through the filter container.

c) The underdrain piping and filter container bottom shall be covered with a minimum of six (6) inches of washed clean 3/4" - 1 1/2" stone aggregate.

d) Other underdrain systems may be proposed by a professional engineer and approved after review by the department.

2) Filter Media

a) A minimum of twenty-four (24) inches of approved sand filter soil media shall be placed over the underdrain system. The sand filter soil media complying with the specification listed below shall be approvable:

Sieve	Opening (mm)	Percent Passing Number (by Weight)
3/8	9.500	100
4	4.750	95-100
8	2.380	80-100
16	1.190	45-85
30	0.590	15-60
50	0.297	3-15
100	0.149	0-4

Other filter media along with technical justification for the substitution may be proposed by a professional engineer. The Department will review the proposal and may approve of the use of other filter media.

b) The area of the sand filter shall be based on a maximum loading rate of 1.25 gallons per day per square foot.

3) Distribution System

a) Above the filter media there shall be a minimum of three (3) inches of washed, clean 3/4 to 1 1/2" stone aggregate below the distribution laterals, and sufficient stone above the laterals equal to or covering the orifice shields to provide a smooth even cover.

b) Within the zone described in §1-715(B)(3)(a) a pressurized distribution system shall be constructed in accord with the following requirements:

1. Distribution laterals shall be spaced on maximum thirty (30) inch

centers. Orifices shall be placed such that there is at least one orifice for each six (6) square feet of sand surface area;

2. The ends of the distribution laterals shall be designed and constructed with a means to perform flushing of the piping, collectively or individually, through the operation of a non-corrosive and accessible valve. The flushed effluent may be discharged to the septic tank or into the sand filter.

3. The diameters of the distribution manifold and laterals shall not be less than one half (1/2) inch diameter and shall be constructed of schedule 40 or 80 (or equivalent) piping.

4. The orifices shall not be less than 1/8" in diameter. All orifices shall be covered by a removable, protective, durable, noncorrosive shield.

4) Filter Dosing

a) The dose volume shall not exceed ten (10) percent of the daily design flow.

b) The system shall not dose more than once in a 30 minute period.

c) Head calculation shall include maximum static lift, pipe friction and a residual head of five (5) feet at the furthest orifice.

d) There shall be no more than a ten (10) percent flow variation between any two orifices.

e) The pumping system shall be protected from solids by a filter apparatus that will not allow the passage of solids larger in size than 1/8 inch.

f) The pump station designed to dose the filter shall be designed with storage equal to the one (1) day design flow above the high water alarm.

5) Internal Pump Option: Where the effluent from a sand filter is to be discharged by means of a pump to another treatment unit, a distribution unit, or to an absorption facility, the design and construction of the filter may include provisions for an internal pump station, providing the following conditions are met:

a) The location, design, and construction of the pump station does not conflict with rules for design, construction and operation of a sand filter system;

b) The pump and related apparatus shall be housed in a corrosion resistant vault designed to withstand the stresses placed upon it and not allow the migration of drain media, sand, or underdrain media to its interior. The vault shall have a durable, attached floor. The vault shall provide watertight access to finished grade with a diameter equal to that of the vault and designed to receive treated effluent from an elevation equal to that of a gravity discharging sand filter;

c) The depth of underdrain media and the operating level of the pump cycle and alarm shall not allow effluent to come within two inches of the bottom of the sand filter media. The pump off level shall not be lower than the invert of the perforations of the underdrain piping;

d) The internal sand filter pump shall be electronically linked to the sand filter dosing apparatus in such a manner as to prevent effluent from entering the sand filter in the event the internal sand filter pump fails.

C. Recirculating Sand (Gravel) Filters. Recirculating Sand Filters are recommended for domestic wastewater of low to moderate strength as defined in §1-715(A)(1)(b) of this subchapter. They are not recommended for seasonal residences or projects designed for periodic use. Projects that will experience periodic shut downs should take into account the cooling effect on the recirculating effluent and the effect of the filters going anaerobic and becoming odoriferous as a result.

In addition to the applicable requirements of §1-715(A), the following system specific criteria apply to recirculating sand filter design:

1) Underdrain system

a) The base of the filter container shall be level or constructed at a grade of one (1) percent or less towards the underdrain piping.

b) The underdrain piping shall be installed in the interior of the filter container at the lowest elevation. The piping shall be on a grade of one (1) percent or less to the point of passage through the filter container.

c) The underdrain piping and filter container bottom shall be covered with a minimum of six (6) inches of washed clean 3/4" - 1 1/2" stone aggregate.

d) Other underdrain systems may be proposed by a professional engineer and approved after review by the department.

2) Filter Media

a) A minimum of thirty-six (36) inches of approved filter media shall be placed above the underdrain system.

b) The filter media shall be a soil material complying with the following sieve analysis:

Sieve	Opening (mm)	Percent Passing Number (by Weight)
3/8	9.500	100
4	4.750	60-100
8	2.380	7-75
16	1.190	0-5
30	0.590	0-3
50	0.297	0-2

Other filter media along with technical justification for the substitution may be proposed by a professional engineer. The Department will review the proposal and may approve of the use of other filter media.

c) The area of the recirculating sand filter shall be based on either a hydraulic

loading rate or wastewater strength as described below. The maximum loading rate is the lessor of 1 or 2 below:

1. The maximum hydraulic loading rate shall be 5 gallons per day per square foot; and

2. The maximum waste strength loading rate, (expressed as gallons per day per square foot) shall be determined using the formula LR = $1150/BOD_5$ where LR equals the loading rate and BOD_5 equals the wastewater strength of the septic tank effluent.

3) Distribution System

a) Above the filter media there shall be a minimum of three (3) inches of washed, clean 3/4 to 1 1/2" stone aggregate below the distribution laterals, and sufficient media above the laterals equal to or just covering the orifice shields to provide a smooth even cover.

b) Within the zone described in §1-715(C)(3)(a) a pressurized distribution system shall be constructed in accord with the following requirements:

1. Distribution laterals shall be spaced on maximum twenty-four (24) inch centers. Orifices shall be placed such that there is one orifice for each four (4) square feet of sand surface area;

2. The ends of the distribution laterals shall be designed and constructed with a means to perform flushing of the piping, collectively or individually, through the operation of a non-corrosive and accessible valve. The flushed effluent may be discharged to the septic tank or into the sand filter.

3. The diameters of the distribution manifold and laterals shall not be less than one half (1/2) inch diameter, and shall be constructed of schedule 40 or 80 (or equivalent) piping.

4. The orifices shall not be less than 1/8" in diameter. All orifices shall be covered by a removable, protective, durable, noncorrosive shield.

4) Recirculation/Dilution Tank and Dosing: The recirculation tank receives septic tank effluent and overflow from the filter. The tank shall have sufficient capacity to provide one (1) day's emergency storage above a high water alarm level.

The recirculation tank and dosing system shall comply with the following requirements:

a) The system shall be designed with a minimum recirculation ratio of not less than four (4). The recirculation ratio is the daily volume of recycled effluent divided by the daily design flow;

b) The filter should be wetted 48 times per day and not more than once in a thirty (30) minute period. The minimum resting period between doses shall be twenty (20) minutes.

c) The system should be designed to meet the following criteria:

1. The minimum wet volume in the recirculation tank should be at least eighty (80) percent of the daily design flow;

2. The system shall be designed so that one hundred (100) percent of the filter effluent returns to the recirculation tank when the liquid volume of the tank is less than eighty (80) percent of the daily design flow. In addition to a high water alarm, a low water alarm shall be designed and installed to shut down the pump and notify the owner when the liquid level of the recirculation tank is less than fifty (50) percent of the daily design flow.

d) Head calculations shall include maximum static lift, pipe friction and a residual head of five (5) feet at the furthest orifice.

e) There shall be no more than a ten (10) percent flow variation between any two orifices.

f) The pumping system shall be protected from solids by a filter apparatus that will not allow the passage of solids larger than the diameter of the orifices.

§ 1-716. Disposal of Wastes from Pump-Out Facilities for Marine Sanitary Holding Tanks

A. Where direct hookup to a municipal sewage treatment facility is available or site conditions permit, disposal of wastes from these facilities shall be in conformance with the normal design requirements of this subchapter.

B. Where it is not feasible to comply with Subsection (A) above, removal of wastes by septage tank truck or similar scavenger vehicle shall be permitted under the following conditions:

1) General Requirements

a. An on-site storage tank capable of storing the waste from the peak seven day period shall be provided;

b. The storage tank shall have a pump out station readily accessible to scavenger vehicles;

c. Plumbing for the pump out facility shall comply with The Vermont Plumbing Code, and the facilities shall be maintained and operated in a sanitary manner at all times;

d. The use of scavenger vehicles for disposal of waste shall be permitted for the waste from the boat pump out only. Wastes from any new public buildings at the site must be disposed in accordance with these rules.

2) Responsibility for Waste Disposal: The applicant shall be responsible for providing that the waste will be properly disposed of at a site that is located and capable of operation in a manner approvable by the Agency.

3) Submissions

a. The applicant shall submit a site plan to scale showing the location and size of the holding tank, distance to lakes and streams, and distance to buildings. The nature or use of the buildings shall be labelled.

b. For waste volumes in excess of 500 gallons per peak day, a contract with a waste hauler and an approved disposal facility is preferred and may be required at the discretion of the Division. Where waste is to be taken to a municipal treatment facility, a letter from the municipality that it will accept the waste shall be included with the application.

APPENDIX 1-7A - FLOW QUANTITIES[a]

ESTABLISHMENT	GALLONS/PERSON/DAY (unless otherwise noted)
Assembly Areas, Conference Room	5
Airports (per passenger)	5
Bathhouses and Swimming Pools	5
Bowling Alley (no food service)(per lane)	75
Camps:	
Campground with central comfort stations (4 people/site)(per site)	100
With flush toilets, no showers (4 people/site)(per site)	75
Construction camps (semi-permanent)	50
Day camps (no meals served)	15
Resort Camps (night & day) with limited plumbing	50
Cafeterias (per seat)	50
Churches:	
Sanctuary seating x 25%	5
Church suppers	8
Cottages	50
Country Clubs (per resident member)	100
Country Clubs (per non-resident member present)	25
Day Care Centers:	
Without meals:	15
With one meal:	20
With two meals:	25
Dentists:	
Staff Member	35
Per Chair	200
Doctor's Office:	
Staff Member	35
Patient	10
Dwellings[b]:	
Staff Member	75
Boarding Houses	50
Addition for non-resident boarders	10
Multiple Dwellings (condominiums, townhouses, clustered housing) (minimum 2 people/bedroom)	75
Rooming Houses (per occupant bed space)	40
Single Family Dwellings (per bedroom)	150
Factories (gallons per person, per shift, exclusive of industrial waste)	15
Gyms:	
Participant	10
Spectator	3
Hairdressers:	
Operator	10
Per Chair	150
Hospitals (per bed space)	250
Hotels with Private Baths[c] (per person sleeping space)	50
Institutions other than hospitals (per bed)	125

ESTABLISHMENT	GALLONS/PERSON/DAY (unless otherwise noted)
Laundries, self-service (gallons per machine)	500
Mobile Home Parks:	
For disposal systems serving 4 or fewer trailers (per space)	450
For disposal systems serving 5 or more trailers (per space)	250
Motels with bath, toilet[c] (per person sleeping space)	50
Picnic Parks (toilet wastes only/picnicker)	5
Restaurants (toilet and kitchen wastes/seat, including restaurant and bar seats	30
Additional per seat for restaurant serving 3 meals per day	15
Restaurants (fast food - see cafeterias	
Schools:	
Boarding	100
Day, without gyms, cafeterias, or showers	15
Day, with gyms, cafeterias, and showers	25
Day, with cafeteria, but without gyms or showers	20
Service Stations (first set of gas pumps)	500
(each set thereafter)	300
Sewer Line Infiltration (where applicable) 300 gal/in pipe/dia/mile/day	
**Shopping Centers/Stores:	
Large Dry Goods	5 GPD/100 ft²
Large Supermarkets with meat department without garbage grinder	7.5 GPD/100 ft²
Large Supermarket with meat department with garbage grinder	11 GPD/100 ft²
Small Dry Good Stores (in shopping centers)	100 GPD/store
Subdivision per lot (or 150 per bedroom, whichever is greater	450
Theaters:	
Movie (per auditorium seat)	5
Drive-in (per car space)	5
Travel Trailer Parks without individual water & sewer hookups	
Comfort Station (per trailer space)	90
Dumping Station (per trailer space)	35
Travel Trailer Parks with individual water & sewer hookups (per trailer space)	125
Veterinary Clinic (3 or less doctors):	
without animal boarding	750/clinic
with animal boarding	1,500/clinic
Workers:	
Construction (at semi-permanent camps)	50
Day at schools and offices (per shift)	15

[a] Use eighty (80) percent of above design flows for projects to be connected to Municipal Wastewater Treatment Facilities. Note that this design flow reduction applies only to the wastewater flow and DOES NOT apply for a project's associated water supply system design flows.

[b] Elderly housing may be calculated at 1.5 people per bedroom

[c] Does not include laundry or restaurant waste.

APPENDIX 1-7B - Seasonal High Water Table Separations

Disposal System Size	Separation to Water Table
In-ground and at-grade systems, 1 to 2,000 gallons per day and mounds up to 1,000 gallons per day	3 feet of separation to the identified seasonal high water table on-site.
In-ground systems and at-grade systems, over 2,000 gallons per day and mounds more than 1,000 gallons per day	Separation shall be 3 feet to the ground water mound developed from the effluent disposal when added to the seasonal high water table at the site. When a hydrogeologic study is not required, sufficient site analysis shall be submitted to establish the elevation of the ground water mound.

APPENDIX 1-7C - PERCOLATION TEST PROCEDURES

The following procedure is to be used for determining the percolation value required by these rules.

A. Depth of Test - Tests shall be taken entirely within the most dense, least permeable soil identified within one (1) to three (3) feet below the bottom of the infiltrative surface of the proposed leachfield.

B. Type of Test Holes - The test hole will be unlined, shaped like a vertically oriented cylinder with a diameter of 6 - 8 inches and a depth of 10 inches.

C. Preparation of Test Hole - Using a sharp instrument, carefully scrape the sidewalls of the hole to remove any smeared soil surface. This is particularly important in soils which have a significant silt or clay content. Place one (1) inch of clean crushed stone in the bottom of the hole to reduce scouring. When possible, instead of pouring water directly from a bucket into the hole, use a hose to siphon water out of a suitably located reservoir to provide a high degree of control over the rate of water entering the hole, to minimize scouring.

D. Percolation Test Measurements - To begin the test, fill the hole with water up to a level six (6) inches above the stone and allow it to drop the distance specified in the table below for seven (7) consecutive runs. After each run, bring the water up to the six (6) inch level. The time of each run, the refill time between each run, and the total elapsed time must be accurately recorded.

WATER LEVEL DROPS FOR EACH TEST RUN OF THE PERCOLATION TEST PROCEDURE

Soil Texture:	Coarse to Medium Sand	Fine Sand to Silt Loam	Silts to Clay Loam
Anticipated Percolation Rate (min/in)	1 - 10	10 - 60	60 - 120
Drop (inches)	2	1	1/2

E. Determining the Percolation Rate - The rate of drop for each run is plotted, on graph paper with logarithmic scales on both axes (log/log graph paper), against the cumulative time of the seven runs, including the refill times. The best straight line is fitted to the seven data points and extrapolated out to one (1) day (1440 minutes) of cumulative time. The rate of drop after 1440 minutes is the percolation rate.

APPENDIX 1-7D - Minimum Isolation Distances a,

Item	Horizontal Distance (feet) Disposal Field	Septic Tank	Sewer
Drinking water supply source	b		
Drilled well	50	50	
Gravel pack well, shallow well or spring	b	75	75
Lake and pond impoundment - standing water	50	25	25
River, streams	50	25	10
Drainage swales, roadway ditches	25	--	--
Main or municipal water lines	50	50	d
Service water lines	25	25	d
Roadways, driveways, parking lots	10	5	c
Top of embankment, or slope greater than 30%	25	10	--
Property line	25[1]	10	10
Trees	10	10	10
Other disposal field or replacement area	10[2]	--	--
Foundation, footing drains, curtain drains	35[3]	10	--
Public water supply (e)	f	f	f
Suction water line	100	50	50

These distances may be reduced when evident that the distance is unnecessary to protect an item or increased if necessary to provide adequate protection.

APPENDIX 1-7D (cont.)

General Criteria Regarding Isolation Distances

a. Isolation distances apply regardless of property line location and ownership.

b. Separation between drinking water sources and leachfields shall be determined by the methods in the Vermont Water Supply Rule, Appendix 21-A, Part 11, §11.4.

c. Sewers under roads, driveways, or parking lots may require protective conduits or sleeves.

d. Separation of pressure water lines considered as "service connections" and sewer lines shall adhere to the Vermont Plumbing Code. Separation of pressure water lines (considered to be part of a public water system as defined by the Vermont Water Supply Rule) and sewer lines shall adhere to the requirements of the Vermont Water Supply Rule.

e. This refers to Public Community Water Systems, as defined in the Vermont Water Supply Rule.

f. Contact the Department of Environmental Conservation's Water Supply Division, 103 South Main Street, Waterbury, Vermont.

Specific Criteria for Isolation Distances

1. For mound systems, the limit of mound fill must be 25 feet from any downhill property line and 10 feet from all property lines on the side or uphill.

2. No disposal field or replacement area shall be closer than 10 feet to one another except as allowed for trench systems in § 1-708(A).

3. If a curtain or foundation drain is downslope of the disposal field, the disposal field cannot be closer than 75 feet to the drain. If the curtain or foundation drain is upslope of the disposal field, it shall be 35' if possible, and a minimum of 20 feet to the disposal field. These distances may be reduced if the consultant provides adequate data and analysis to show that effluent from this system will not enter the drain or increased if effluent will enter the drain.

APPENDIX 1-7E

Required information for plan submission under Environmental Protection Rules:

I. General Information

A) Name and location of proposed project. Identification of project in terms of type and size of facility the project is serving and wastewater flows to be generated by facility.

B) Name and address of applicant.

C) Name and address of consultant.

D) Statement of the existing use of adjacent properties.

II. Site Plan

A) A detailed plot plan of the proposed project drawn to an accurate scale and showing the location of all existing or proposed buildings or building remnants, existing or proposed bodies of water, all streams, drainage courses, wetlands, ledge outcrops, all parking areas, roads or highways and all existing and proposed embankments, property lines and lot dimensions and a North arrow. The scale of the plan should be clearly indicated. Plot plans and building site plans should be drawn to a scale of at least 1" - 100' and plans for sewage disposal systems should be drawn to a scale of at least 1" = 30'. The plan must be signed by the preparer.

B) All existing or proposed water supplies, sources and other water appurtenances such as pipelines, pumphouses, reservoirs, within the specified limits of the project as stated in the appropriate subsection for the type of system proposed shall be shown on the scaled plot plan.

C) All existing or proposed wastewater treatment and disposal systems such as septic tanks, treatment units, sewers, pump stations, siphons, and disposal fields shall be shown on the scaled plot plan.

D) The plot plan shall have a minimum of five (5) foot contour intervals and 90% of the contours shall be accurate within one-half contour interval and no inaccuracies shall exceed one contour interval. The consultant shall be responsible for the accuracy of the contour on the plot plan in areas of the project where contours are of critical importance (disposal areas, sewer lines, etc.). Photogrammetric contour maps may be used to show the general contour of the land in less critical areas. The plot plan shall include existing and proposed contours after completion of the project. A permanent bench mark shall be established and shown on the plans.

III. Soil Data

A) The consultant shall submit the results of all soils tests or investigations taken within the project limits. The specific tests and information submitted shall be as required in the appropriate subsection for the system proposed. The consultant shall certify the accuracy of the test results and the adequacy of the design of the proposed system.

IV. Basis of Design - Calculations

A) The consultant shall include with the submission, a copy of his basis of design for the complete water supply system and wastewater treatment and disposal system, including justification for the basis of any unusual design proposed. The calculations shall include all values used and any

assumptions made.

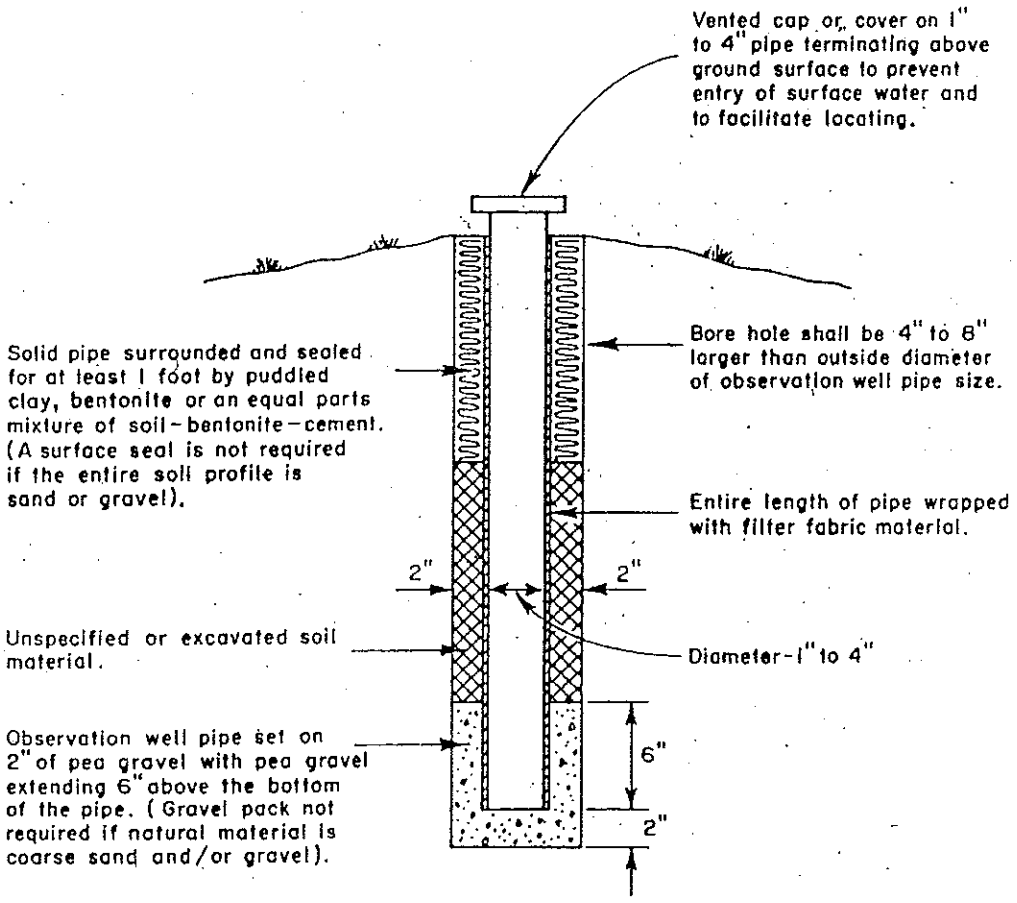
V. Detailed Plans and Specifications

A) Each submission shall contain plans, and materials and construction specifications sufficient for construction of the system and shall include where necessary, all materials to be used and specifications, all invert elevations, final grades, details of all tanks, buildings, treatment units, pipelines, sewer lines, pumps, make, size and model numbers of all equipment to be used, specifications on methods of installation, performance standards, quality of workmanship, structural details where required, and any other information necessary for adequate construction of the system.

APPENDIX 1-7F

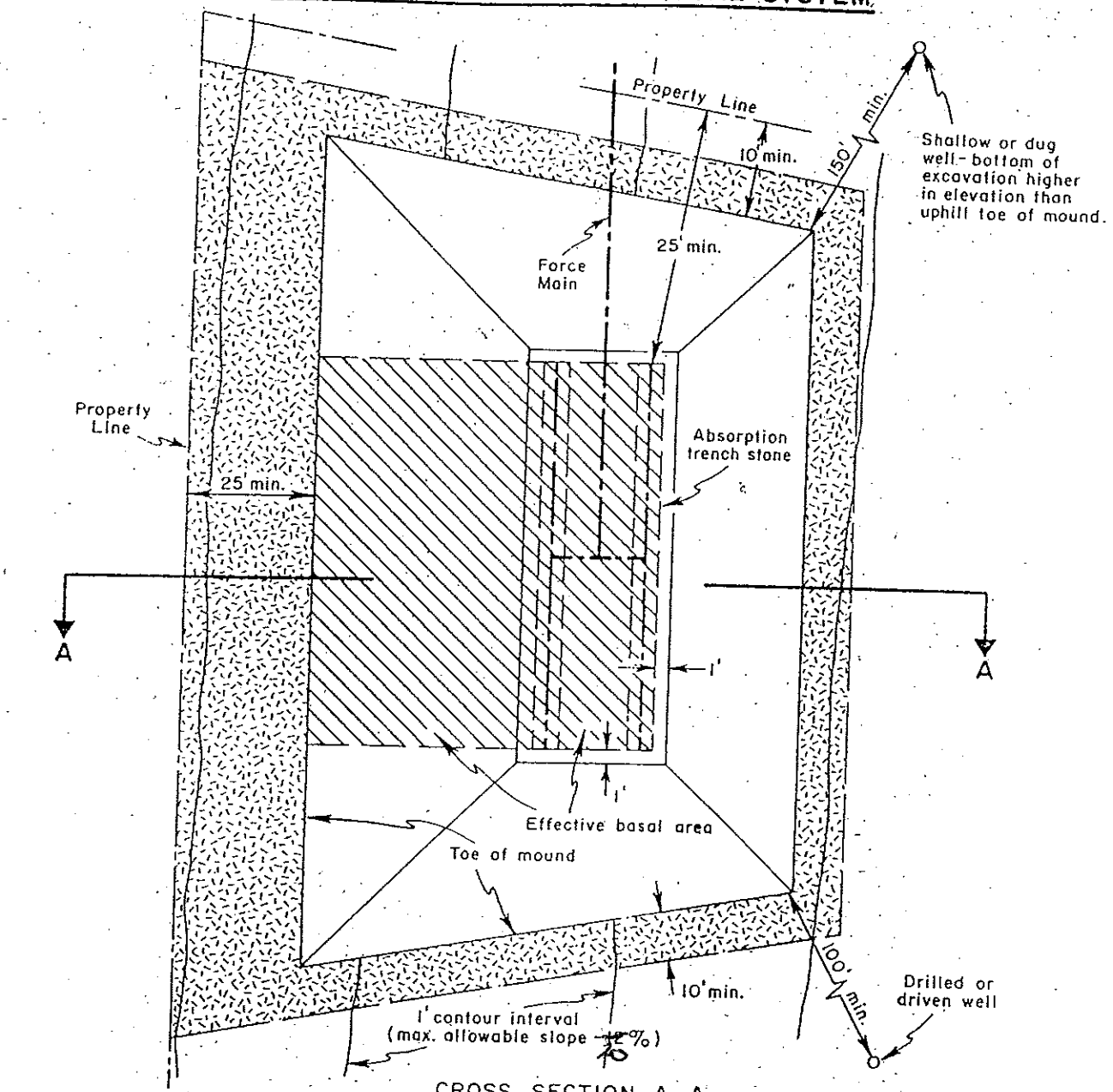
RECOMMENDED

TYPICAL OBSERVATION WELL



APPENDIX 1-7G

MOUND WASTEWATER DISPOSAL SYSTEM



Soil cover less permeable than sandfill with 2"-4" topsoil to be seeded and mulched.

Soils with 2' to seasonal water table, ledge or soil with perc. rate greater than 120 min./in.

Sandfill (see section 7-14, para. E-3).

SUBCHAPTER 8, On-Site Sewage Ordinances

§ 1-801 General

This subchapter is adopted pursuant to Title 24 V.S.A. and is designed to serve as the minimum guidelines for municipal on-site sewage ordinances which are approved by the Department of Environmental Conservation, dealing with the design, installation, operation, and maintenance of individual, on-site septic systems for wastewater treatment and disposal. The Department encourages municipalities to use these regulations when they are creating or revising a sewage ordinance.

These regulations shall be used as a minimum standard for approval of all newly proposed municipal health ordinances for on-site wastewater disposal and any revisions to existing ordinances. In those municipalities without municipal ordinances these regulations may be used as a guideline for proper installation of individual, on-site wastewater and disposal systems.

At the discretion of the permit granting authority, and authorized in writing, deviations from the design specifications in Sections 1-708 of these regulations may be allowed. Such deviations will only be allowed if the minimum soil and site requirements of Section 1-707 and the performance standards of Section 1-802 will be met. The Department may revoke a municipality's authority to allow design deviations if it finds that this authority has resulted in inadequate protection of health.

Deviations from these regulations may be authorized in writing by the permit granting authority where proposed wastewater treatment disposal systems are designed to eliminate health hazards, public nuisances or sources of pollution from existing structures and where physical limitations are such that compliance with these regulations cannot otherwise be accomplished. In such cases, systems will be designed to comply to the fullest extent possible with the performance standards of Section 1-802 of these regulations.

In applying for approval of proposed an on-site sewage ordinance, or amendments thereto, any town may include alternative wastewater treatment and disposal systems to those which appear in these regulations and which will meet the performance standards in Section 1-802. The proposed alternatives shall be reviewed by the Department of Environmental Conservation which shall make recommendations to the Town Board of Health on whether the proposal complies with the performance standards. The Town Board of Health will approve the use of alternative systems within 30 days of application if it finds that the system will meet the performance standards of Section 1-802.

§ 1-802 Performance Standards

The purpose of these regulations is to prevent health hazards and environmental damage caused by the improper treatment and disposal of wastewater. Individual, on-site wastewater treatment and disposal systems shall be designed, constructed and operated so as to:

1. prevent the creation of health hazards;

2. prevent surfacing sewage or the pollution or contamination of drinking water supplies, groundwater and surface water;

3. insure the provision of adequate drainage as related to the proper functioning of sewage disposal; and

4. insure that facilities are designed and constructed in a manner which will promote sanitary and healthful conditions during operation and maintenance.

§ 1-803 Definitions

"Innovative System" means sewage treatment and disposal systems approved by the Department as specified by §1-203 of this rule.

"On-Site Sewage Ordinance" means a regulation adopted by a Vermont municipality in accord with Title 24 V.S.A. Chapter 102 - On-Site Sewage Systems and adopted under the provisions of Title 24 V.S.A. Chapter 59 - Adoption and Enforcement of Ordinances and Rules.

"On-Site Sewage Treatment and Disposal System" means a septic tank and leaching field system utilizing natural soil to treat and disperse sewage in such a manner to protect public health , and both groundwater and surface water from contamination.

§ 1-804 Minimum Technical Standards

The criteria for soil and site evaluation and on-site sewage treatment and disposal system in Subchapter 7 of these regulations shall be the minimum standards adopted under municipal on-site sewage ordinances. A municipality may adopt more stringent requirements.

§ 1-805 Innovative Systems

The criteria for innovative on-site sewage systems in §1-203 of this rule shall provide the minimum standard for review and approval of innovative systems under municipal on-site sewage ordinance.

APPENDIX 1-A

DESIGN GUIDELINES

Introduction

Following are guidelines for use in the design of systems subject to the Environmental Protection Rules, Chapter 1, Small Scale Wastewater Treatment and Disposal Rules. Professional Engineers are encouraged to use equally or more effective technologies or practices in the design of systems under these guidelines.

1-A-01. Building Sewers

The building sewer is that part of the drainage system extending from a building drain to a public sewer, private sewer, septic tank system, or other treatment system. A sewer serving one building and less than 300 linear feet will be considered a building sewer. All other sewers will be considered sewer collection systems.

A. Materials: The building sewer shall be constructed in a manner which will prevent leaking, breaking or clogging. Acceptable materials for the sewer are rubber-ring-jointed or cast iron (CI) sewer service pipe. Other materials may be proposed for acceptance by the Division.

B. Sizing & Slope: Building sewers shall be sized based on procedures outlined under A-02. Minimum building sewer size is 4 inches and minimum slope is 1/4 inch per foot.

C. Manholes: Building sewers discharging to a collection sewer shall be connected through a manhole constructed in accordance with A-02 or with a wye fitting so as to direct flow and minimize in-line turbulence. The junction of more than two individual building sewers shall be made with a manhole.

D. Cleanouts: Cleanouts shall be provided at each horizontal change in direction of the building sewer greater than 45 degrees and at intervals of not more than 100 feet. Building sewer changes in direction which exceed 45 degrees should be made with two 45 degree ells or long sweep fittings. Manholes are acceptable in lieu of cleanouts. Where building sewers to be installed at a depth of less than 3 feet under driveways are anticipated, extra heavy cast iron or other high strength pipe acceptable to the Division shall be required.

E. Leakage: Building sewers shall meet the leakage standards prescribed in Section 1-A-02 J.

1-A-02. Sewer Collection Systems

A. A sewer collection system is that system of sewers that transport wastewater from building sewers to the wastewater treatment/disposal system.

B. No connections of roof drains, area drains, foundation drains, cellar drains or other clean water sources or any storm drains will be allowed to building or collection sewers.

C. Building and collection sewers carrying raw or untreated wastewater shall be sized as follows:

1) Collection sewers shall be a minimum of 6" diameter.

2) The flow rate to be used in sizing the sewer shall be based on the full occupancy design daily flows for the facilities connected as derived from Appendix 1-7A times the following factors.

a. For design flows less than 10,000 gpd, a factor of 5.

b. For design flows over 10,000 gpd, a factor derived from Table I.

TABLE I

Peaking Factors

Design Flow	Peaking Factor
10,000 gpd	4.2
100,000 gpd	3.8
500,000 gpd	3.2
1,000,000 gpd	3.0

3) Sewers shall be sized for the above derived flow rate to provide a minimum velocity of 2 feet per second when flowing full using the Kutter formula or other acceptable formula and friction coefficients appropriate for the pipe materials proposed, considering surface deterioration over the expected useful life of the pipe.

Kutter's Formula

$$V = \frac{\frac{1.81}{n} + 41.67 + \frac{.0028}{S_e}}{1 + \frac{n}{\sqrt{R}}\left(41.67 + \frac{.0028}{S_e}\right)} \sqrt{R S_e}$$

V is the mean velocity of flow
R is the hydraulic radius
Se is the slope of energy grade line
n is the coefficient of roughness

D. Depth: In general, sewers should be sufficiently deep to receive sewage from basements and to prevent freezing. A bury depth of at least four feet should be maintained. This depth should be increase to at least five feet in areas to be plowed during winter months. Where the engineer finds he cannot maintain these burials without significant expense, he may propose less depths with mitigating measures to protect the sewer for Division approval.

E. Slope, Velocity: All sewers shall be designed and constructed to provide mean velocities, when flowing full, of not less than 2.0 feet per second. Regardless of the formula used or friction factors used in the design of the sewers, all sewers shall be installed with at least the slopes shown in Table II.

TABLE II

Minimum Slopes

Pipe Size (inches)	Slope (feet/100 feet)
6"	0.60
8"	0.40
10"	0.28
12"	0.22
15"	0.15

Sewers shall be laid with uniform slope and straight alignment between manholes.

Where velocities greater than 15 feet per second are attained, special provisions shall be made to protect against displacement by erosion and shock.

Sewers on 20 percent slopes or greater shall be anchored securely with concrete anchors or equal, space as follows:

1) Not over 36 feet center to center on grades 20 percent and up to 35 percent;

2) Not over 24 feet center to center on grades 35 percent and up to 50 percent ; and

3) Not over 16 feet center to center on grades 50 percent and over.

F. Changes in Pipe Size: When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation.

Sewer extensions should be designed for projected flows even when the diameter of the receipt sewer is less than the diameter of the proposed extension. The Agency may require a schedule for future downstream sewer relief.

G. Materials: Generally, rubber-ring-jointed PVC, AC or ductile iron (DI) gravity sewer pipe of the proper class is acceptable. Other materials may be approved by the Division.

1) Sewer joints shall be designed to minimize infiltration and to prevent the entrance of roots throughout the life of the system.

2) All sewers shall be designed to prevent damage from superimposed loads. Proper allowance loads on the sewer shall be made because of the width and depth of trench. Where necessary, to withstand extraordinary superimposed loading, special bedding, concrete cradle or special construction may be used.

H. Trenching: Ledge, rock, boulders, and large stones shall be removed to provide a minimum clearance of four inches below and on each side of all pipe(s).

I. Bedding:

1) Bedding classes A, B, or C, as described in American Society for Testing and Materials (ASTM) C12-77 or Water Pollution Control Federation Manual of Practice (WPCF MOP) No. 9* shall be used for all rigid pipe provided the proper strength pipe is used with the specified bedding to support the anticipated load.

*Note: WPCF MOP No. 9 is a joint publication with the American Society of Civil Engineers (ASCE) which lists it as "Manuals and Reports on ENGINEERING PRACTICE No. 39." See Page A-18 for the address of the ASCE.

2) Bedding classes I, II, or III, as described in ASTM 02321-74(80) shall be used for all flexible pipe provided the proper strength is used with the specified bedding to support the anticipated load.

3) Backfill shall be of a suitable material removed from excavation except where other material is specified. Debris, frozen material, large clods or stones, organic matter, or other unstable materials shall not be used for backfill within two feet

of the top of the pipe.

J. Leakage Tests: When tested, the leakage inward and outward of a gravity sewer including manholes shall not exceed 200 gallons per inch of pipe diameter per mile per day. Upon completion of construction, a sewer line shall be tested in accordance with one of the following procedures:

1) Water testing

a. Plug or cap all service laterals, stubs, and fittings. Place adequate bracing to withstand thrust forces.

b. A tapped plumber's plug should be inserted in the downstream manhole inlet sewer. The water supply connection is made at this point, but never directly from a public water supply system or hydrant unless a backflow preventer is used.

c. A stand pipe is tightly connected at the upstream end of the sewer. The height of the stand pipe shall be at least two feet higher than any point in the sewer or two feet higher than the highest known ground water table, whichever is higher. A manhole may be used as a stand pipe.

d. Water is added at the downstream connection in order to avoid trapping air bubbles or pockets. The line shall be filled to the elevation designated in the stand pipe.

e. Allow the line to stand with water for at least a two hour stabilization period or such shorter period as may be required to achieve stabilized readings of water loss over three consecutive 15 minute periods. This allows air to escape and absorption to take place.

f. Fill the sewer line to the reference mark and continue the test for at least one hour. Maintain the minimum head throughout the test, adding any volume of water required and including that volume in the leakage.

g. Convert the leakage to the units specified.

2) Air testing

a. Procedures

1. Determine the test time for the section of line to be tested using Table III or IV or the formulas in Chart I.

2. Plug all openings in the test section.

3. Add air until the internal pressure of the line is raised to approximately 4.0 pounds/square inch (psi) greater than the average pressure of any ground water. After this pressure is reached, allow the pressure to stabilize. The pressure will normally drop as the air temperature stabilizes. This usually takes 2 to 5 minutes depending on the pipe size. The pressure may be reduced to 3.5 psi before starting the test.

4. When the pressure has stabilized and is at or above the starting test pressure of 3.5 psi above the pipe, start the test. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test. If a 1.0 psi drop does not occur within the test time, the line has passed the test.

b. Test time

1. Table III shows the required test time, T, in minutes/100 feet of pipe for each nominal pipe size. Test times are for a 1.0 psi pressure drop from 3.5 to 2.5 psi. Table III has been established using the formulas contained in Chart I.

2. If the section of line to be tested includes more than one pipe size, calculate the test time for each size and add the test times to arrive at the total test time for the section.

3. It is not necessary to hold the test for the whole period when it is clearly evident that the rate of air loss is less than the allowable.

TABLE III MINIMUM TEST TIME FOR VARIOUS PIPE SIZES

(Insert)

CHART I

FORMULAS AND ALLOWABLE AIR LOSS STANDARDS

Calculate the required test time at a given allowable air loss as follows:

(Insert)

Calculate air loss with a timed pressure drop as follows:

(Insert)

Symbols:

D = nominal size, in.
K = 0.371 x 10 3 for inch-pound units
K = 0.534 x 10 6 for S.I. units
L = length of line of one pipe size, ft.
Q = air loss, ft 3/min., and
T = time for pressure to drop 1.0 psi, min.

An appropriate allowable air loss, Q, in cubic feet per minute, has been established for each nominal pipe size. Based on field experience, the Q's that have been selected will enable detection of any significant leak. Table IV lists the Q established for each pipe size.

TABLE IV ALLOWABLE AIR LOSS FOR VARIOUS PIPE SIZES

(Insert)

For further information regarding the Air Testing procedures, refer to ASTM Standard C828-80.

K. Manholes

1) Location: Manholes shall be installed at the end of each line, at all changes in grade, size or alignment, at all intersections, and at distances not greater than 300 feet.

2) Drop Type: A drop pipe should be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and the manhole invert is less than 24 inches, the invert should be filleted to prevent deposition of solids.

Drop manholes should be constructed with an outside drop connection. Inside drop connections (when necessary) shall be secured to the interior wall of the manhole and provide access for cleaning. Where inside drops are used, the manhole diameter shall be increased to allow adequate access.

Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete and supported by the manhole base.

3) Diameter: The minimum diameter of manholes shall be 48 inches; large diameters are preferred for connection to large diameter sewers. A minimum access diameter of 22 inches shall be provided.

4) Flow Channel: Flow channels shall be provided in the base of all manholes and the flow channel through manholes should be made to conform in shape and slope to that of the sewers.

5) Manholes shall be of the pre-cast concrete or poured-in place concrete type. Manholes shall be waterproofed on the exterior.

6) Inlet and outlet pipes shall be joined to the manhole with a rubber-gasketed flexible watertight connection that allows differential settlement of the pipe and manhole wall to take place.

Grouting is not an acceptable connection. All manhole connections, including building sewers, shall be constructed to this standard.

7) Watertight manhole covers are to be used wherever the manhole tops may be flooded by street runoff or high water. Locked manhole covers may be desirable in isolated easement locations where vandalism may be a problem.

8) All manholes shall be tested for leakage. Leakage testing of gravity sewers utilizing the water testing procedures takes into account the leakage from one manhole in the test section. Otherwise, manholes shall be tested for leakage in accordance with the following procedure:

After the manhole has been assembled in place, all lifting holes and exterior joints shall be filled and pointed with an approved non-shrinking mortar. All pipes and other openings into the manhole shall be suitably plugged and the plugs placed to prevent blowout.

Each manhole shall be checked for infiltration by filling with water to the top of the cone section. A stabilization period of one hour shall be provided to allow for absorption. At the end of this period, the manhole shall be refilled to the top of the cone, if necessary, and the measuring time of at least six hours begun. At the end of the test period, the manhole shall be refilled to the top of the cone measuring the volume of water

added. This amount shall be converted to a 24 hour rate and the leakage determined on the basis of depth. The leakage for each manhole shall not exceed one gallon per vertical foot for a 24 hour period for exfiltration and there shall be no visible infiltration.

9) Location of Sewers on Streams

a. Cover Depth: The top of all sewers entering or crossing streams shall be at a sufficient depth below the natural bottom of the stream bed to protect the sewer line. In general, the following cover requirements must be met:

1. One foot of cover is required where the sewer is located in rock;

2. Three feet of cover is required in other material. In major streams, more than three feet of cover may be required; and

3. In paved stream channels, the top of the sewer line should be placed below the bottom of the channel pavement.

b. Horizontal Location: Sewers located along streams shall be located outside of the stream bed and sufficiently removed therefrom to provide for future possible stream widening, minimize pollution by siltation during construction, and allow future access for repair and maintenance of sewers.

c. Structures: The sewer, manholes, gate boxes, or other structures shall be located so they do not interfere with the free discharge of flood flows of the stream. No manholes or other access structures shall be located within the normal flow channel of the stream.

d. Alignment: Sewer crossing streams should be designed to cross the stream as nearly perpendicular to the stream flow as possible and shall be free from change in grade. Sewer systems shall be designed to minimize the number of stream crossings.

e. Construction - Materials: Sewers entering or crossing streams shall be constructed of cast or ductile iron pipe with mechanical joints and they shall be constructed so they will remain watertight and free from changes in alignment or grade. Material used to backfill the trench shall be stone, coarse aggregate, washed gravel, or other materials which will not cause siltation.

10) Aerial Crossings: Support shall be provided for all joints in pipes utilized for aerial crossings. The supports shall be designed to prevent frost heave, overturning and settlement.

Precautions against freezing, such as insulation and increased slope, shall be provided. Expansion jointing shall be provided between above-ground and below-ground sewers.

For aerial stream crossings, the impact of flood waters and debris shall be considered. The bottom of pipe should be placed no lower than the elevation of the fifty (50) year flood.

11) Water Line Separation

a. Horizontal Separation: Sewers shall be laid at least

ten feet horizontally from any existing or proposed water main. The distance shall be measured edge to edge.

Where impossible or impracticable, due to ledge, boulders or other unusual conditions, to maintain the ten foot sewer - water pipe horizontal separation between sewer and water lines, the water line may be in a separate trench or on an undisturbed earth shelf in the sewer trench provided that the bottom of the water line is at least 18 inches above the top of the sewer. Wherever impossible or impractical to maintain the 18 inch vertical separation, the sewer line shall be constructed to normal water line standards and pressure tested to 50 psi for 15 minutes prior to backfilling. No leakage shall be allowed for this test.

b. Crossings: Sewers crossing water mains shall be laid beneath the water main with at least 18 inches vertical clearance between the outside of the sewer and the outside of the water main. When it is impossible to maintain the 18" vertical separation; 1) the crossing shall be arranged so that one full length of sewer is centered above or below the water line with sewer joints as far as possible from water joints; 2) the sewer pipe must be constructed to water main standards for a minimum distance of 20 feet either side of the crossing or a total of three pipe lengths, whichever is greater; 3) the section constructed to water main standards must be pressure tested to maintain 50 psi for 15 minutes without leakage prior to backfilling beyond one foot above the pipe to assure water tightness; 4) where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to prevent damage to the water main.

1-A-03. Sewage Lift Stations

A. Flooding: Sewage pumping station structures and electrical and mechanical equipment shall be protected from physical damage from the one hundred (100) year flood. Sewage pumping stations should remain fully operational and accessible during the twenty-five (25) year flood.

B. Equipment Removal: Provision shall be made to facilitate removal of pumps, motors, and other mechanical and electrical equipment.

C. Pump Removal: Submersible pumps shall be readily removable and replaceable without dewatering the wet well or disconnecting any piping in the wet well.

D. Construction: Submersible pumps and motors shall be designed specifically for raw sewage use, including totally submerged operation during a portion of each pumping cycle.

E. Pumping Units: Lift stations receiving an average daily flow of less than 2,000 gal/day may be equipped with a single pumping unit, provided that replacement pumps are readily available, and one day's emergency storage is provided above the alarm level in the wet well. All other lift stations shall contain alternating duplex pumping units with each unit capable of pumping the maximum flow the station is expected to receive.

F. Pump Openings: For pumps handling raw sewage, except where grinder pumps are used, pumps shall be capable of passing spheres of at least three inches in diameter, and pump suction and discharge piping should normally be at least four inches in diameter. Pumps handling only settled wastewater shall be capable of passing 1 1/2" spheres. However, the Division will entertain proposals for smaller pumps where the engineer can demonstrate that such pumps are satisfactory for the

particular wastewater to be pumped, based on actual operating experience.

G. Priming: Generally, the pump shall be so placed that under normal operating conditions, it will operate under a positive suction head.

H. Electrical Equipment: Electrical systems and components (e.g., motors, lights, cables, conduits, switchboxes, control circuits, etc.) in raw sewage wet wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors may be present shall comply with the National Electrical Code R, 1981 Edition, requirements for Class I, Group D, Division 1 locations. In addition, equipment located in the wet well shall be suitable for use under corrosive conditions. Each flexible cable shall be provided with watertight seal and separate strain relief. A fused disconnect switch located above ground shall be provided for all pumping stations. When such equipment is exposed to weather, it shall meet or exceed the requirements of weatherproof equipment as specified by the National Electrical Manufacturers Association (NEMA). Standard 3R shall be used as a minimum and is specified in Publication #250-1979, "Enclosures for Electrical Equipment - 1,000 Volt Maximum." See Page A-18 for the address.

I. Intake: Each pump should have an individual intake. Wet well design should be such as to avoid turbulence near the intake. Intake piping should be as straight and short as possible.

Where turned-down bellmouth inlets or submersible pumps are used, the bottom of the inlets should be placed a sufficient distance above the wet well floor to minimize inlet head losses, but close enough to the wet well floor to assure inlet velocities sufficient to prevent solids deposition.

J. Pumping Rates: The pumps selected shall be capable of providing the following pumping rates:

1) The minimum pumping rate shall not be less than 5 gallons per minute.

2) For average daily flows less than 10,000 gallons per day, the maximum rate shall be 5 times the average design flow.

3) For average design flows greater than 10,000 gallons per day, the maximum flow rate shall be determined by multiplying the average design flow by the appropriate peaking factor from Table I (Peaking Factors).

K. Pump controls

1) Location: The pump control system shall be located away from the turbulence of incoming flow and pump suction.

2) Setting: The '2nd pump-on' level and 'alarm-on' level shall be at the same elevation.

L. Valves

1) Suction Line: Suitable shutoff valves shall be placed on the suction line of each pump except on submersible.

2) Discharge Line: Suitable shutoff and check valves shall be placed on the discharge line of each pump. The check valve shall be located between the shutoff valve and the pump. Check valves shall be suitable for the material being handled. Valves shall be capable of withstanding normal pressure and water hammer.

3) Location: Valves may be located in wet wells only where single pump units are allowed. On all duplex unit pumping

stations, the valves shall be in a separate valve pit adjacent to the wet well. This valve pit shall also contain a valved connection to allow the use of a portable pump for lift station bypassing during emergency conditions. The valve pit shall be provided with a drain to the soil or the wet well. If the pit is drained to the wet well, an effective method of preventing sewage from entering the pit during surcharged wet well conditions shall be provided.

M. Wet Wells

1) Size: For lift stations handling raw sewage and receiving more than 20,000 gallons per day average design flow, the size of the wet well shall be such that with any combination of inflow and pumping the cycle of operation of each pump will not be less than 5 minutes and the retention time in the wet well should not be more than 30 minutes at average design flow. For raw sewage lift stations receiving less than 20,000 gallons per day, the retention time in the wet well will not be more than 30 minutes at average design flow. These requirements do not apply for lift stations handling only settled wastewater.

Emergency storage or emergency power must be provided at all lift stations for power outage. Storage should be provided above the high water alarm level of the wet well, in the wet well or in an adjacent tank. The volume of storage should equal the design sewage flow for a period in excess of the longest power outage in the last five years which would have affected the proposed site, or four hours, based on a 16 hour delivery rate, whichever is greater.

The emergency storage volume may overflow into the connecting sewer lines providing that the sewage does not back up into building basements or fixtures, back up into septic tanks or over top manholes or the wet well.

Emergency storage will be a minimum of one day for all lift stations with a single pump.

2) Floor Slope: For all raw wastewater pump stations except submersible pump types, the wet well floor shall have a minimum slope of one to one to the hopper bottom. The horizontal area of the hopper bottom shall be not greater than necessary for proper installation and function of the inlet.

3) Ventilation

a. Dry Wells: Ventilation may be either continuous or intermittent. Ventilation, if continuous, shall provide at least six complete air changes per hour, if intermittent, at least 30 complete air changes per hour.

b. Wet Wells: For lift stations receiving less than 20,000 gallons per day design flow gravity ventilation is acceptable. For flows greater than 20,000 gallons per day design flow, forced ventilation shall be used. Forced ventilation may be either intermittent or continuous. Ventilation, if continuous, shall be capable of providing at least 12 complete air changes per hour, if intermittent, at least 30 complete air changes per hour. Air changes shall be forced into the wet well rather than exhausted from the wet well.

N. Alarm Systems: Alarm systems shall be provided for pumping stations. The alarm shall be activated in cases of pump failure, use of the lag pump, high water in wet well, or other evidence of pump station malfunction. Audio and visual alarms shall be provided. Alarms shall be located in a normally frequented area.

1-A-04. Force Mains

A. Velocity: The force main shall be sized to maintain a minimum hydraulic velocity of 2 feet per second with one pump on. The minimum force main size shall be 1 1/2 inch diameter.

B. Air Relief Valve: An automatic air relief valve shall be placed at high points in the force main to prevent air locking.

C. Termination: Force mains should enter the gravity sewer system at a point not more than 2 feet above the flow line of the receiving manhole.

D. Design Pressure: Force mains and fittings, including reaction blocking, shall be designed to withstand normal pressure and pressure surges (water hammer).

E. Design Friction Losses: Friction losses in force mains shall be based on the Hazen-Williams formula* or other acceptable method. Selected friction factors shall be representative of pipe materials selected, considering surface deterioration over the expected useful life of the pipe.

*Hazen-Williams Formula

$V = 1.32\ C\ R.63\ S.54$

R is the hydraulic radius
S is the slope of the energy grade line
C is the coefficient of roughness

F. Separation from Water Mains: There shall be a minimum 10 foot horizontal separation between water mains and force mains. A minimum 18 inch vertical separation between the outside pipe surfaces shall be maintained where force mains cross water mains. Force mains shall cross water mains at or near right angles with one full length of water pipe centered on the force main so both end joints are at maximum separation from the force main. Special structural support for the water main and the force main may be required.

G. Pressure Test: Upon completion of construction of a force main, the line shall be pressure and leakage tested in accordance with the following procedure.

PRESSURE TEST

After the pipe has been laid, all newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 x the highest working pressure in the section.

Test Pressure Restrictions. Test pressures shall:

1. Not be less than 50 psi at the highest point along the test section.
2. Not exceed pipe or thrust restraint design pressures.
3. Be of at least 2 hour duration.
4. Not vary by more than 5 psi.
5. Not exceed twice the rated pressure of the valves when the pressure boundary of the test section includes closed gate valves.

Pressurization. Each valved section of pipe shall be filled with water slowly and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the

test gauge, shall be applied by means of a pump connected to the pipe.

Air Removal. Before applying the specified test pressure, air shall be expelled completely from the pipe and valves.

Examination. All exposed pipe, fittings, valves, and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, or valves, that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated.

H. Leakage Test

LEAKAGE TEST

A leakage test shall be conducted concurrently with the pressure test.

Leakage Defined. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain pressure within 5 psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water.

Allowable Leakage. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

(Insert)

L is the allowable leakage, in gallons per hour; N is the number of joints in the length of pipeline tested; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gage.

1-A-05. Soil Mottles

Mottling represents the average seasonal high water table over many years produced by the seasonal fluctuation of the water table. The presence of mottling is a definite indication of the seasonal high water table. However, mottling does not occur in all soils. The absence of mottling does not necessarily indicate that the seasonal high water table is not a problem.

The soil mottling should be described in abundance, size, contrast, and color of the mottles in the following manner:

A. Abundance. Shall be described as "few" if the mottled color occupies less than 2% of the exposed surface; "common" if the mottle color occupies from 2% to 20% of the exposed surface; or "many" if the mottled color occupies more than 20% of the exposed surface.

B. Size. Size refers to the length of the mottle measured along the longest dimension and shall be described as "fine" if the mottle is less than 5mm; "medium" if the mottle is from 5mm to 15mm, or "coarse" if the mottle is greater than 15mm.

C. Contrast. Contrast refers to the difference in color between the soil mottle and the background color of the soil and is described as "faint" if the mottle is evident but recognizable only with close examination; "distinct" if the mottle is readily seen but not striking; or "prominent" if the mottle is obvious and one of outstanding features on the horizon.

D. Color. The color(s) of the mottle(s) shall be given.

Observed Ground Water: Ground water shall be observed and reported at the highest level the ground water rises in the soil excavation or at the highest level of sidewall seepage in the excavation. Measurements shall be made from the ground surface. Soil above the water level in the excavation shall be checked for the presence of mottles or color patterns indicative of soil saturation.

Color Patterns Not Indicative of Seasonal High Groundwater: One foot exception. Soil profiles that have an abrupt textural change with finer textured soils overlying more than 4 feet of unmottled, or coarse sand can have a mottled zone in the finer textured material. If the mottled zone is less than one foot thick and is immediately above the textural change, then a soil absorption system may be installed in the loamy sand or coarser material below the mottled layer.

Other Color Patterns: Soil mottles can occur that are not due to zones of seasonal or periodic soil saturation. Examples of such soil conditions not limited by enumeration are:

A. Soil mottles formed from uneven weathering, of glacially deposited material, or glacially deposited material may be naturally gray in color. This may include concretionary materials in various stages of decomposition;

B. Deposits of lime in a profile derived from highly calcareous parent materials;

C. Soil mottles that are usually vertically oriented along old or decayed root channels with dark organic stain usually present in the center of the mottled area.

1-A-06. Septic Tank Specifications & Maintenance

A. Specifications

1) Materials: Septic tanks shall be watertight, structurally sound, and constructed of materials not subject to extensive corrosion or decay. Heavy gauge steel, reinforced concrete and fiberglass are considered the normal construction materials. Steel tanks shall be continuous and watertight. Precast concrete tanks shall have a minimum wall thickness of 3 inches and shall be adequately reinforced to facilitate handling. When precast slabs are used as covers, they shall be watertight, have a thickness of at least 3 inches, and be adequately reinforced. For fiberglass tanks, the manufacturer may be required to substantiate the structural soundness of the tank by submitting an approved laboratory report which relates to structural testing of the tank.

2) Tank Properties: Adequate tank capacity is required above the liquid tank level to provide for that portion of the scum which floats above the liquid. Although some variation is to be expected, on the average, about 30 percent of the total scum will accumulate above the liquid line. In addition to the provision for scum storage, one inch is usually provided at the top of the tank to permit free passage of gas back to the inlet and house vent pipe.

For tanks having straight, vertical sides, the distance between the top of the tank and the liquid line should be equal to approximately 20% of the liquid depth. In horizontal, cylindrical tanks, an area equal to approximately 15 percent of the total circle should be provided above the liquid level.

3) Access to Tank: Adequate access must be provided to each compartment of the tank for inspection and cleaning. Both the inlet and outlet devices shall be accessible. Access shall be provided to each compartment by means of either a removable cover or a manhole of at least 16 inches in diameter. Each tank shall have one manhole access to grade. Covers should be tight fitting and exposed covers designed to prevent entry by children.

4) Inlet: The inlet invert shall enter the tank at least 3 inches above the liquid level in the tank to allow for momentary rises in liquid level during discharges to the tank. A vented

inlet tee, or baffle, shall be provided to direct the incoming wastewater downward. It shall penetrate at least 6 inches below the liquid level, but in no case shall the penetration be greater than that allowed for the outlet device.

5) Outlet: It is important that the outlet device penetrate just far enough below the liquid level of the septic tank to provide a balance between sludge and scum storage volume. The outlet device retains scum in the tank, but at the same time, it limits the amount of sludge that can be accommodated without scouring, which results in sludge discharging in the effluent from the tank. The outlet device should generally extend to a distance below the surface equal to 40 percent of the liquid depth. For horizontal, cylindrical tanks, this should be reduced to 35 percent.

B. Maintenance

1) At least once a year, the depth of sludge and scum in the septic tank should be measured. The tank should be pumped if: 1) the sludge is closer than twelve inches to the outlet baffle; 2) the scum layer closer than three inches to septic tank outlet baffle. (Note: Following septic tank cleaning in units over 5,000 gallons, all interior surfaces of the tank should be inspected for leaks and cracks).

2) At least once a year, dosing tanks and distribution boxes should be opened and settled solids removed as necessary and the dosing tank or distribution box checked for levelness.

3) Toxic or hazardous substances should in general not be disposed of in septic systems. These substances may pass through the system in an unaltered state and contaminate groundwater or remain in the septage and subsequently contaminate the soil or crops at the site of ultimate disposal.

ORGANIZATIONS WHICH PUBLISH THE CODES AND MATERIAL STANDARDS INCORPORATED BY REFERENCE IN THESE RULES

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345 East 47th Street
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ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103
Tel: 215-299-5450

BOCA Building Officials and Code Administrators International, Inc.
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4051 W. Flossmoor Road
Country Club Hills, Illinois 60478-5795

CISPI Cast Iron Soil Pipe Institute

1499 Chain Bridge Road
McLean, VA 22101
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Manas National Plumbing Code, Illustrated, 1968 Edition
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