State of Vermont
Department of Environmental Conservation

Instructions for Completing Application for Authorization to Construct or Alter a Dam

10 V.S.A. Chapter 43

*Note: Please be aware that other VT Agency of Natural Resources (ANR) permits may be needed for your project, and it is your responsibility to secure any other required permits. To help assist in determining other VT ANR permits that might be needed, use VT ANR's Permit Navigator Tool by going to the VT Department of Environmental Conservation website (dec.vermont.gov). Please be aware that your project may require other local, state, or federal permits outside of VT ANR's jurisdiction which are not covered by the VT ANR Permit Navigator Tool. Failure to secure all necessary permits in advance of construction can result in significant impacts to your project's final scope and can take additional processing time. *

Applications including the application form, plans, specifications, and supporting documentation can be submitted electronically in PDF format via email to Dam Safety Program Staff or other acceptable electronic transfer method. The application fee currently must be provided via postal mail to Department of Environmental Conservation, Dam Safety Section, 1 National Life Drive, Montpelier, VT 05620-3510. The Department reserves the right to request scaled hardcopy plan sets, if determined necessary.

Item 1: **Applicant.** The applicant(s) must be the owner(s) of the dam and land upon which the dam is or will be located. If there is more than one owner, all owners must be listed and become joint applicants.

Item 2: **Legal Entity.** Complete only if applicant is not applying as an individual, e.g., corporation, partnership, municipality, etc.

Item 3: **Contact.** Person to contact regarding this application if other than applicant.

Item 4: **Land Ownership and Flowage Rights.** Complete *Schedule A* and provide any required documentation.

Item 5: Project Description

a. Check appropriate box.

b. Name of existing dam, if any, or name of applicant or pond as appropriate. Please use the name of the dam and State identification number as listed in the Vermont Dam Inventory.

c. Name of town(s) in which the **dam** is located.

d. Name of water course (river, stream, lake or pond) on which the dam is or will be located. If the dam is an off-stream structure or on an unnamed watercourse, indicate that it is on an unnamed tributary of the nearest named watercourse.

e. Drainage area in acres at the dam.

f. Indicate type of dam, e.g., earthfill, concrete gravity, earthfill-stonewall, stone masonry, timber crib, etc.

g. Surface area of impoundment in acres (A), at Normal Liquid Level (NLL) and with liquid level at Top of Dam/lowest non-overflow part of structure (i.e Maximum Liquid Level or MLL).

h. Storage in acre-feet (AF). NOTE: One acre-foot is equal to 43,560 cubic feet and 500,000 cubic feet is approximately 11.48 AF. Provide storage values for both NLL and **top of dam/lowest non-overflow part of structure/MLL**, (i.e. top of non-overflow part of dam or zero freeboard condition). Storage is the volume of liquid and sediment that could potentially be released downstream in the case of a complete dam failure. It includes all impounded liquids (including sediments) from the lowest point along the downstream toe of the dam (usually the original bed of the stream or watercourse) to the principial spillway crest for NLL and the top of the non-overflow part of the structure for MLL. Liquid and sediments stored below the lowest part of the dam, whether natural storage or manmade storage created through dredging need not be included.

i. The maximum height is the vertical distance from the lowest point along the downstream toe of the dam (usually the original bed of the stream or watercourse) to the top of the non-overflow part of the structure.

j. Indicate, for existing lakes, ponds or dams if the existing normal water level will be raised or lowered and by how much. If there is no existing lake or pond or dam, indicate N/A.

k. Provide a detailed narrative of the project, including an overall description of the project and its purpose and the main components of the project.

l. Describe the method of construction. Include such things as any proposed manipulation of water levels and any diversions of water into or out of the pond.

Item 6: **Engineer.** List name, address, telephone, and Vermont P.E. license number for engineer providing design and construction supervision services. Sections 1080(4), 1083(b) and 1090 of the statute require that the dam owner retain the services of a professional engineer, registered in Vermont, who has experience in the design and investigation of dams to design and monitor construction or alteration of any dam requiring approval from the department under 1082.

It is desirable, but not necessary, that the design engineer also provide the required construction monitoring. The applicant's engineer monitoring construction will submit via email on a **weekly** basis to the Dam Safety Program, a brief summary with observations and representative photographs that document the work including any materials testing results and instrumentation readings.

Item 7: **Estimated Construction Cost.** Estimated construction cost – exclusive of cost of land.

Item 8: **Estimated Start and Completion Dates.** Indicate when you would anticipate beginning the project and when it would be completed.

NOTE: For most projects the work should be scheduled to be completed during one construction season (generally May 15– October 15). For projects that require more than one construction season, a longer construction period may be approved provided there are adequate provisions to safely "winter over" the uncompleted project. If project is to be phased, provide detailed schedule.

Item 9: **Financial Information.** Complete *Schedule B.*

Item 10: **Right of Entry.** Complete *Schedule C.*

Item 11: **Public Good.** Complete *Schedule D.*

Item 12: **Documents and Schedules Attached.**

A. The following items are required for all applications:

1. Basis of Design Report. A written report that provides, at a minimum, the following:
    - A statement of project goals and objectives.
    - A detailed description of the existing dam, including its configuration, construction and operation history and historic performance (if applicable)
    - A detailed description of all inspections, material testing, evaluations, and analyses completed.
    - A detailed description of the proposed project including project components, alternatives, anticipated construction sequencing, etc.

2. Location map. Show location of dam on aerial imagery or U.S. Geological Survey topographic map.

3. Schedules A, B, C, and D.

4. Plans and Specifications. Complete and detailed engineering plans and specifications signed, sealed and dated by a Vermont licensed Engineer must accompany the application. Plan sets must include a cover sheet including the project name, location, State dam identification number, National Inventory of Dams identification number (if applicable), current or proposed hazard potential classification of the dam, and a table of contents of the plan set. Written technical specifications are preferred and strongly encouraged. On small/simple low risk projects, specifications on the plan sheets may be permitted. Detailed technical specifications sections such as cofferdam, earthwork, cast-in-place concrete, gates and valves, mechanical, etc. are anticipated.

   NOTE: Prior to submitting the application, the department encourages the applicant's engineer to discuss with the Dam Safety Program, preliminary design concepts and parameters before completing the detailed plans and specifications. A pre-design meeting with the Dam Safety Program is strongly advised. For large, complicated, or high-risk projects, additional design meetings between the design team and the Dam Safety Program may be recommended.

B. The following items are generally required for all new construction and most reconstruction and alterations. A pre-design meeting with the Dam Safety Program can help identify which of the following may or may not be required.

1. Subsurface Exploration Information. Provide soil boring/rock coring and test pit logs, laboratory analyses of subsurface materials for foundation, embankment, filters, spillways, etc. Identify geologic challenges and risk factors. Provide filter design analyses as appropriate. Filter gradation requirements should be designed in accordance with NRCS (formerly SCS), *Part 633, National Engineering Handbook, Chapter 26, Gradation Design of Sand and Gravel Filters* (May 1994 or later revisions), or other appropriate standard nationally recognized by the engineering profession as suitable for dams.

2. Structural/stability analysis. Depending on the dam type, analyses that evaluate existing and proposed stability of embankments, slopes, walls, weirs, and structures under normal and extreme loading conditions. All proposed conditions must meet minimum allowable factors of safety based on Federal guidance such as that by the U.S Army Corps of Engineers (USACE).

3. Hydrology and Hydraulics. Provide detailed H&H study of site and basin hydrology and project hydraulics showing adequate freeboard, spillway

capacity and drain capacity to support downstream hazard classification using appropriate and generally accepted methodologies.

4. Storage and Surface Area Data. Provide area-capacity curves or tables for full range of storage controlled by the dam.

5. Dam Breach Analysis and Flood Inundation Mapping. Provide breach analysis and inundation mapping for determination of downstream hazard classification, for sizing spillways and outlet works, and, where appropriate, for use in preparation of Engineering Action Plans (EAP).

   The breach analysis may be done by generally accepted methods in accordance with Federal guidance such as that by the USACE, Bureau of Reclamation, Natural Resources Conservation Service (NRCS), Federal Emergency Management Agency (FEMA) or the Federal Energy Regulatory Commission (FERC).

5. Spillway Design Flood (SDF)

   SDF and outlet works capacities should be consistent with guidelines or service criteria established by Federal agencies such as the USACE, NRCS, and the Bureau of Reclamation for a given size and hazard classification. Prescriptive SDF shall be in accordance with those in FEMA P-94 (August 2013).

   Freeboard as appropriate, but not less than 1.5 feet with routed SDF inflows and not less than 3.0 feet from lowest non-overflow part of the dam crest during NLL.

6. **Operation and Maintenance (O&M) Manual.** Prepare O&M manual for dam owner/operator. Include, as appropriate, project description, records, photos; operating practices for gates, spillways, etc.; maintenance practices; inspections, frequency for owner/operator and owner's engineer; inspection check lists; recordkeeping, etc.

7. **First Filling Plan.** Provide a plan to be followed by the dam owner and his engineer to monitor dam during first filling following construction or modification.

8. **Emergency Action Plan (EAP).** An EAP is required for all HIGH and SIGNIFICANT hazard structures and recommended for all dams. The EAP should be developed in coordination with the affected municipalities and Emergency Managers and be acceptable to them. Coordination with Vermont Emergency Management is also recommended.

Item 13: **Application Fee Enclosed.** Compute from fee Schedule and submit a check payable to *State of Vermont*.

Title 32: Taxation and Finance Chapter 009: Appropriations

§ 710. Payment of State agency fees

(a) Notwithstanding any other provision of law, the Agency of Transportation, any cooperating municipalities, and their contractors or agents shall be exempt from the payment of fee charges for reviews, inspections, or nonoperating permits issued by the Department of Public Safety, a District Environmental Commission, and the Agency of Natural Resources for any projects undertaken by or for the Agency and any cooperating municipalities for which all or a portion of the funds are authorized by a legislatively approved transportation construction, rehabilitation, or paving program within a general appropriation act introduced pursuant to section 701 of this title except for those fees established under 3 V.S.A. § 2822(j)(2)(A)(iii), (j)(10), (j)(11), and (j)(26).

(b) Notwithstanding any other provision of law, no fees shall be charged for reviews, inspections, or nonoperating permits issued by the Department of Public Safety, a District Environmental Commission, and the Agency of Natural Resources for:

(1) Any project undertaken by the Department of Buildings and General Services, the Agency of Natural Resources, or the Agency of Transportation which is authorized or funded in whole or in part by the capital construction act introduced pursuant to section 701a of this title except for those fees established under 3 V.S.A. § 2822(j)(2)(A)(iii), (j)(10), (j)(11), and (j)(26).

(2) Any project undertaken by a municipality, which is funded in whole or in part by a grant or loan from the Agency of Natural Resources or the Agency of Transportation financed by an appropriation of a capital construction act introduced pursuant to section 701a of this title except for those fees established under 3 V.S.A. § 2822(j)(2)(A)(iii), (j)(7)(A) and (B), (j)(10), (j)(11), and (j)(26). However, all such fees shall be paid for reviews, inspections, or permits required by municipal solid waste facilities developed by a solid waste district which serves, or is expected to serve, in whole or in part, parties located outside its own district boundaries pursuant to 10 V.S.A. chapter 159. (Added 1993, No. 59, § 20, eff. June 3, 1993; amended 1993, No. 233 (Adj. Sess.), § 57, eff. June 21, 1994; 1995, No. 148 (Adj. Sess.), § 4(c)(1); 1999, No. 148 (Adj. Sess.), § 86, eff. May 24, 2000; 2003, No. 115 (Adj. Sess.), § 115, eff. Jan. 31, 2005; 2005, No. 103 (Adj. Sess.), § 2, eff. April 5, 2006; 2015, No. 64, § 45.)

Item 14: **Signature.** Sign, date and provide typed name and title. If more than one applicant/owner, **all** parties must sign.

Dam Design

The department expects all dams will be designed in accordance with generally accepted, modern engineering practices by qualified and experienced professional engineers **licensed in the State of Vermont**. Although, the department has not formally adopted specific design criteria, the following general standards are used by the department:

1. **Low level outlets.** All new and reconstructed dams must have an adequate low level (bottom) outlet that is operable from the surface and is of sufficient size to drain the reservoir. Slide gates or gate valves are preferred. “Flap valves” are unacceptable.

2. **Corrugated Galvanized Metal Pipe (CGMP).** CGMP is not acceptable for spillways, low level outlets or drains or any potentially pressurized application in new or reconstructed dams. CGMP is acceptable but not recommended for use in toe drain systems.

3. **Seepage Control.** The department places strong emphasis on adequate seepage control to prevent piping (internal erosion) and instability of embankments, structures, foundations and abutments of dams.

   All conduits and structures passing through earth dams must be protected by properly designed mineral filters. In accordance with modern practice, rigid anti-seep collars or diaphragms are no longer to be used on conduits.

   Mineral filter design should be in accordance with NRCS (SCS) Chapter 26, NEH (See Item 12, B-1) or other appropriate standard nationally recognized by the engineering profession as sustainable for dams.

   Filter fabrics should not be used to wrap piezometer screws or as filter material within or on the upstream face of dams, or within any portion of the embankment. (Ref: Corps of Engineers, EM 1110-2-1901, 9/30/86, *Seepage Analysis and Control for Dams*.

Notes:

(1) The department may request other information from the applicant it considers necessary to properly review the application.

(2) The department will notice the application in accordance with 10 VSA Chapter 170, Standard Procedures.

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