

FRENCHTOWN CHARTER TOWNSHIP
FLOOD CONTROL DEVICES ENGINEERING DESIGN STANDARDS ORDINANCE
Ord. No. 208; Date of Adoption: September 11, 2007

An Ordinance to establish design specifications, standards and requirements for the construction, installation and repair of Flood Control Devices as required by the Frenchtown Charter Township Flood Control Device Ordinance.

THE CHARTER TOWNSHIP OF FRENCHTOWN HEREBY ORDAINS:

Section 1. Intent, Purpose, Short Title and Interpretation.

1. This Ordinance is intended to provide detailed specifications for the design and construction of Dikes, Advanced Measures Barriers, Clay Berms, Seawalls and any other Flood Control Devices in the Township and shall be known as the Frenchtown Charter Township Flood Control Devices Engineering Design Standards Ordinance.

2. The provisions of this Ordinance shall be held to be the minimum requirements adopted for the promotion and preservation of the public health, safety and general welfare of the Township. These regulations are not intended to repeal, abrogate, annul, conflict or in any manner interfere with existing regulations or laws except that these regulations shall prevail in cases where they impose a greater restriction than is provided by other regulations or law. These regulations are subject to periodic review and revision as deemed necessary to remain current with standards set forth by the various review agencies.

3. This Ordinance shall apply to improvements where existing flood control measures are deemed to require maintenance and or replacement as stipulated within the Frenchtown Charter Township Flood Control Devices Ordinance as amended.

Section 2. Definitions.

1. "Advanced Measures Barrier" shall refer to the Detroit Beach Dikes, which are controlled by the U.S. Army Corps of Engineers and theof Frenchtown Charter Township.
2. "Army Corps" or "USACOE" shall mean United States Army Corps of Engineers and its agents and representatives.
3. "Building Official" shall mean the Building Official of Frenchtown Charter Township or his authorized representative.
4. "DNR" shall mean the Michigan Department of Natural Resources and its agents and representatives.

5. "Engineering Standards" shall mean the design and construction standards for the Flood Control Devices, as established in this document and as prepared by the Frenchtown Charter Township Resort District Authority Engineer.
6. "Flood Control Devices" shall include any structure whose primary purpose is to prevent or control erosion or prevent or control the inundation or flooding on property affected by waters or levels of the Great Lakes or their connecting waters and tributaries as affected by levels of the Great Lakes and shall include earthen and clay berms, advanced measures dikes, operation foresight dikes, seawalls, jetties, and other barriers of which the primary purpose is flood control and protection.
7. "IGLD" shall mean International Great Lakes Datum.
8. "MDEQ" shall mean the Michigan Department of Environmental Quality and its agents and representatives.
9. "MDOT" shall mean the 2003 Michigan Department of Transportation Construction Specifications.
10. "NOAA" shall mean National Oceanic and Atmospheric Administration.
11. "Property Owner" shall mean the owner or owners of record of the real property in the Township on which the Flood Control Device is located.
12. "Resort District Authority" shall mean the Resort District Authority of Frenchtown Charter Township.
13. "Resort District Engineer" shall mean the Frenchtown Charter Township Resort District Authority Engineer.
14. "Township" shall mean Frenchtown Charter Township in Monroe County, Michigan.
15. "Township Engineer" shall mean the Frenchtown Charter Township Engineer who shall be responsible to review all flood control device plans and documents on behalf of the Township, which shall include reviews required of the Frenchtown Charter Township Resort District Engineer.

Section 3. Permits and Approvals.

1. No existing Flood Control Device shall be altered, repaired, demolished, removed or new Flood Control Device constructed and installed without having prior written approval and receiving permits from the following officials and or agencies, as applicable. Certain types of rehabilitation or improvements to the Flood Control Device may not require a permit. The following is a list of offices and or agencies that may require permits and

approvals. The owner is responsible to investigate and secure all required approvals prior to commencing construction.

- a. Township Building Official
- b. Township Engineer
- c. Army Corps of Engineers
- d. MDEQ
- e. Monroe County Drain Commissioner, SESC

2. Upon completion of the Flood Control Device construction installation, the Property Owner's engineer shall submit the Engineer's Certificate as included in these specifications in Appendix A.

Section 4. Plan Format.

General Requirements

1. A general plan having a scale not exceeding $1" = 30'$ shall be provided, showing the total parcel and indicating the location of all improvements shown in the detailed plans. Superimposed on this general plan shall be one (1) foot contours of the area, including the area at least 25 feet outside of the development parcel. Street names, lot lines and parcel numbers shall be shown on all plans.

2. Plans submitted shall be on 24 inch by 36 inch white prints having blue or black lines, and shall be neatly and accurately prepared. The plan sheets shall have a maximum horizontal scale of $1" = 30'$. The maximum vertical scale for profile views is to be $1" = 5'$.

3. Separate plan sheets are required (as a minimum) for:

- a. Title sheet indicating the location of the site, parcel legal description, property owner and adjacent property owner names, addresses and telephone numbers.
- b. General plan of the existing site and geometrics including sufficient detail to appropriately show the type and extent of existing flood control device on the property and adjacent properties
- c. Site plan of the proposed improvements
- d. Demolition and Improvement details, sections and profiles
- e. Existing and proposed site grading
- f. Soil erosion and sedimentation control plan

4. Elevations shall be on IGLD datum. A minimum of one (1) permanent benchmark for the work shall be indicated on the plans. The benchmark shall be located on the site such that construction activities shall not destroy the designated site benchmark.

5. All plans submitted shall bear the signature and seal of the professional engineer responsible for the design, who shall be licensed in the State of Michigan, unless otherwise waived by the Township. Examples of plans not requiring an engineer's seal would include minor rehabilitation and non-structural improvements.

6. Complete plans with required executed application forms shall be submitted and all required review fees paid to the Township (deleted "Building Official") prior to scheduling the plan review. A minimum of two (2) complete sets of plans shall be submitted with the application form.

Section 5. Flood Control Devices.

1. The following are suggested and acceptable types of Flood Control Devices that may be considered to meet the provisions of the Frenchtown Charter Township Flood Control Device Ordinance as amended. The type of flood control device selected shall take into consideration the existing type of flood control devices on adjacent property, the device must provide a structural and water tight connection with the existing adjacent flood control devices, the current and or established high water elevation, the potential wave run-up effects on the structure, turbulent flow conditions, ice conditions, whether the structure is to accommodate boat davits, patio areas and or stepped terrace features for aesthetics and/or Property Owner access to the water.

- a. Earthen clay berm
- b. Reinforced concrete dike
- c. Steel sheet piling dike
- d. Precast reinforced concrete panel dike
- e. Stepped terrace and/or patio dike
- f. Boat Davit
- g. Other types of structures deemed acceptable by the USACOE for Great Lakes Flood Control and as approved by Frenchtown Charter Township.

Section 6. Minimum Design Requirements for Flood Control Devices.

1. Flood Control Device Top Elevation: All Flood Control Devices shall be designed and installed to provide the established minimum top flood control elevation as stipulated in the Frenchtown Charter Township Flood Control Device Ordinance as amended.

2. Design High Water Elevation: The designer must investigate with the USACE, NOAA and or any other agency involved with Great Lakes water level analysis whether new studies and or new criteria have been established to require higher Design High Water Elevations for the flood control device as established in item 1 of this article. The elevations stated in item 1 of this article must be used as the minimum criteria for establishing the top elevation of a Flood Control Devices.

3. Wave Overtopping: To minimize the potential of a Flood Control Device from being overtopped is to add a design wave to the Design Water Elevation. The top elevations as established by the Flood Control Device Ordinance as amended and item 1 of this article have taken into consideration Design High Water Elevations and wave overtopping as established through May 2007. New Flood Control Devices proposed must evaluate whether there is any change that would require higher structure elevation requirements due to the Design High

Water elevation and wave overtopping. Wave overtopping factors that will need to be evaluated may include but not necessarily be limited to the following:

- a. Design High Water Elevation established by the USACOE and NOAA
- b. "Hindcast Wave Information for the Great Lakes: Lake Erie" USACOE , 1991
- c. Wind velocity, duration and direction
- d. Growth, propagation & decay energy
- e. Return period
- f. Depth of water at the flood control device location

4. Existing Soil Conditions and Depth of Rock: Appropriate analysis shall be provided to establish the type and classification of soils currently on the site and whether those soils will be adequate to support the proposed Flood Control Structure. The investigation shall also establish whether the soils will prevent the passage of water under the flood control device from the lake or tributary such that the proposed Flood Control Structure could be undermined and be subject to destruction or fail to perform as a Flood Control Structure.

The soil condition investigation must also include a sufficient number of rock bores and or cores to establish the depth to rock at the Flood Control Device location. The design of the Flood Control Device must indicate that there is adequate soil depth to anchor the structure or show if required how the structure will be anchored into the rock surface.

5. Scour Toe Protection: Evaluation of scour caused by turbulent waters and or wave action at the toe of the Flood Control Device must be provided in the structure design analysis. Wherever scour will be present, the Flood Control Device shall be provided adequate scour and toe protection. Scour and Toe Protection may include the use of quarry stone, concrete armor units, concrete blocks, embedded toes, geotextile filter cloth, riprap, other suitable materials and or any combination of the preceding materials. Such scour and toe protection shall be provided in accordance with recommended standards and practices as established by the USACOE for Great Lakes applications.

6. Wave Deflectors: At locations where wave action is anticipated, the designer shall evaluate the need to provide a method for the wave to be deflected back towards the lake surface to minimize the affects of the waves cascading over the top of the Flood Control Device. Such devices may include the use of an angular or beveled deflector plate near the top of the flood control structure or provide a suitable structure top width and slope to collect the cascading water from the wave that will sheet drain back to the lake.

7. Tie-Backs and Anchorage: All Flood Control Devices shall be evaluated for the need to provide additional anchorage for the device to maintain its structure integrity for the purpose intended. Use of Tie-backs and or other forms of structural anchorage as established within the USACOE standards and practices for Flood Control Devices shall be included in the structural design.

8. Drainage Analysis: Within the design of the Flood Control Device, appropriate hydraulic analysis shall be provided to collect subsurface as well as surface drainage water from the Flood Control Device and from around any dwelling structures on the site. The

collected drainage waters shall be routed by means of surface sheet drainage and or storm tile systems and discharged to the nearest available storm sewer system with adequate capacity to handle the storm water flow. Storm sewers, under drains and or storm drainage from the site shall be provided in accordance with the Frenchtown Charter Township Engineering Design Standards Ordinance as amended.

9. Grading, Soil Erosion, and Sedimentation: Plans shall be in conformance with current requirements of the Monroe County Drain Commissioner's Office and provisions of the State of Michigan "Soil Erosion and Sedimentation Control Act," Part 91 of Public Acts 451 of 1994, as amended. Permits shall be obtained from the Monroe County Drain Commissioner's office prior to being issued the permit from the Township Building Official.

The provisions of the Frenchtown Charter Township Engineering Design Standards Ordinance as amended relating to Grading, Soil Erosion, and Sedimentation Control shall be applicable under this provision.

10. Turf Surfaces: All earth surfaces that will not be covered with an approved erosion control device or hard surface shall be provided an appropriate grass turf surface in accordance with current MDOT Standards.

11. Earthen Clay Berm Dike: Earthen clay berm dikes may be considered for locations needing flood protection from non-turbulent waters associated with backwater and tributary areas of the Great Lakes. Earthen clay berms shall be constructed of naturally occurring clay soil. The clay soil shall be placed in lifts not exceeding 9" non-compacted depth and compacted to meet or exceed 90% compaction of maximum dry density as determined by the modified proctor test, or 95% of maximum dry density as determined by the standard proctor method, as well as the moisture content limit of optimum or greater. The method of compaction shall be as called out on the plans by the design engineer.

The soil properties which will be confirmed for clay to be used in Flood Control Device construction are soil classification by the Unified Soil Classification System (ASTM D2487-83), Atterberg limits (ASTM D4318-84), natural moisture content (ASTM D2216-80), and the modified proctor moisture-density relation (ASTM D1557-78) or standard proctor moisture density relationship (ASTM D698-78). Further, remolded permeability less than 1×10^{-7} centimeters per second at 90% of the modified proctor or 95% of the standard proctor maximum dry density shall be confirmed.

Prior to placement of the clay material, the subgrade shall be tested to confirm that the base material is equal to or greater than the requirements of the clay dike material. Any subgrade material found unsuitable shall be removed and replaced with acceptable clay material and or installation of seepage / permeability dams as specified by the design engineer.

The surfaces of clay earth berms shall be provided suitable protective measures to protect against soil erosion and sedimentation. The measures shall be as designed by the engineer to protect the surface against any anticipated condition that could affect the structure. The protective measures may include any one or a combination of grass turf, sod, riprap,