

7.2 ConnDOT Design Practices

7.2.1 General

- Channel designs and/or designs of highway facilities that impact channels shall satisfy the policies of the Federal Highway Administration applicable to flood plain management if Federal funding is involved.
- Coordination with Federal, State, and local agencies concerned with water resources planning shall have high priority in the planning and design of highway facilities.
- Safety of the general public shall be an important consideration in the selection of cross-sectional geometry of artificial drainage channels.
- Stability is the goal for all channels that are located on highway right-of-way or that impact highway facilities.
- Environmental impacts of channel modifications, including disturbance of fish habitat, wetlands, and stream bank stability shall be assessed.

7.2.2 ConnDEP Requirements

The following definitions and design criteria for open channels taken from Section 25-68h-3(d)(2) through (6) of the **Flood Management Statutes and Administrative Regulations** shall be incorporated into all ConnDOT projects:

- **Open Channels.**

The analysis and design of open channels shall be consistent with the type of channel and its intended purpose. Channels shall be classified as local drainage channels or as watercourse channels, depending on use, and shall be classified as alluvial or non-alluvial based upon their geologic characteristics.

- **Type A open channels** are local drainage channels with a primary purpose of conveying urban, parking lot and road runoff from small watersheds, frequently with intermittent flow and limited ecological value and are intended to convey their design flow within their banks. The following shall be included as required:

- Freeboard allowances shall be provided in proportion to the potential damages that could occur in the event of overtopping
- The use of impervious linings is discouraged except for very high velocity flow and steep slopes

- **Type B open channels** are natural perennial watercourses or man made channels planned to simulate a natural watercourse. The following shall be included where appropriate:

- Shall have minimum flow capacity of a flood equal to at least 25 year frequency flood.
- Shall have an inner channel to concentrate low flows with a capacity of a 2 year frequency flood.
- Shall have water surface profiles prepared for the 2, 25, and 100 year frequency floods.
- Shall consider the hydraulic capacity of floodplains.
- Shall have a sediment transport capacity similar to upstream and downstream channels.

- Shall be designed to minimize the use of artificial linings for flows in excess of the two year frequency flood.
 - Shall encourage ecological productivity and variety.
 - Shall be visually compatible with its surroundings.
 - The alignment and slope shall be compatible with natural channels in similar site conditions.
 - Variations in width, depth, invert elevations, and side slopes are encouraged for aquatic and visual diversity.
 - Straightening channels and decreasing their length is discouraged.
 - The cross sections used to define the channel and floodplain geometry for water surface profile computations shall be located upstream and downstream of hydraulic structures, at changes in bed slope or cross section shape, and generally at intervals of not more than ten times the width of the 100 year floodplain.
 - The friction coefficients used in the hydraulic analysis are to assume maximum seasonal vegetation conditions, and should be adjusted to the depth of flow.
- **Channel restoration** plans shall be prepared for all open channel work. The plan shall help restore and/or create an aquatic habitat suitable for fisheries, while maintaining or improving water quality, recreation, aesthetics and flow capacity. Coordination with the Fisheries and Wildlife Units of ConnDEP is recommended. The channel restoration plan shall include, as appropriate:
 - Avoidance of barriers to fish movement
 - Formation of pools and riffles
 - Provision for areas of sheltered flow with use of deflectors, boulders, low check dams
 - Preservation of stream bank vegetation and establishment of new vegetation
 - Use of clean bed materials of a suitable size
 - Schedule work to minimize conflicts with spawning, stocking, and fishing seasons
 - Removal of excess debris
- **The design of rock riprap** in channels with uniform flow shall be based upon the tractive force methods defined in both this manual and the Connecticut Guidelines for Erosion and Sediment Control.
- The hydraulic analysis and modification of watercourses **prone to ice jams or floods due to ice** should be coordinated directly with the ConnDEP.
- **The water surface profiles of open channels in coastal areas** shall consider the potential combined occurrence of tides, storm surges, and peak runoff. The starting water elevation for the base flood in watersheds with times of concentration of over 6 hours shall be the ten year frequency tidal surge level.