

APPENDIX AA

DETERMINATION OF THE HYDRAULIC LINE

AA-1. Flow Criteria. The flows which are named below will be used in the determination of the hydraulic line for the identification and marking of hazardous waters adjacent to Civil Works structures.

a. Navigation Locks and Dams. The discharge corresponding to ordinary highwater, a recognized flow throughout the Corps of Engineers to define limits of Federal jurisdiction, will be used. Should the ordinary highwater discharge exceed the maximum navigation discharge at a project, the latter will be used. (In any case, the worst case scenario must be used.)

b. Flood Control and Storage Dams. The annually-released bankfull flow, (alternately known as the non-damaging discharge), will be used. However, the customary flow of the project will be used, if less than bankfull.

c. Local Flood Reduction Projects, Hydroelectric Plants, Training Structures, Intakes and Pumping Stations. The one-year discharge (i.e., the maximum flow which has a 100% chance of occurring each year), will be used.

AA-2. Upstream of Structures.

a. Navigation, Flood Control/Storage, and Local Flood Reduction Projects. The hydraulic line will be determined where the drawdown commences upstream of the dam, chute, drop structure, or diversion - for prescribe flow in paragraph 1 above. Said location will delineate the beginning of the accelerating velocity of approach and the change in water-surface slope due to the presence of the dam or structure.

(1) Frequently, this location has been seen to occur at a distance upstream equal to about three times the head on the crest of the dam for fixed crests dams with straight approaches, and a variable amount for gated dams that can be computed or observed depending on the schedule of gate openings. However, each project must be analyzed on its own merits to locate the hydraulic line.

(2) Where channel curvature or constrictions exist, the hydraulic line will be located to include these effects, where pertinent.

(3) For lock intake areas, the hydraulic line will be set upstream at a distance at least equal to twice the water passage opening.

b. Hydroelectric Plants, Intakes, Training Structures, and Pumping Stations.

(1) For pump stations, submerged inlets, and hydroelectric plants, the hydraulic line will be set at a distance equal to twice the width of the structure intake.

(2) For training structures such as dikes and spurs, the hydraulic line will be set at least an amount upstream equal to two times the greatest dimension of the structure.

AA-3. Downstream of Structures.

a. Navigation Projects, Flood Control/Storage Dams, and Local Flood Reduction Projects. The hydraulic line will be determined at a location beyond which all the flow filaments move in a downstream direction and for the prescribed flow criteria in paragraph 1 above. This location, depending on the individual design considerations, may fall within or beyond the terminus of the project structure. Data from site-specific model studies should be used where test conditions are still applicable; otherwise, this location will be determined based on hydraulic jump or other appropriate calculations. For lock discharge areas, the hydraulic line will be set beyond boil and eddy limits which are strong enough to capsize a vessel and/or draw an object to the source.

b. Hydroelectric Plants, Training Structures, Outlets, and Pumping Stations. The hydraulic line will be set:

(1) beyond boil and eddy limits (defined above in paragraph AA-3a.) as determined by on-site observation for pump stations, submerged outlets, and hydroelectric projects; and

(2) at least two lengths downstream of the largest dimension of dikes and spurs for training structures.

AA-4. Individual Considerations. Where multiple-type structures coexist, the hydraulic line for each component shall be computed using the criteria in this appendix. The hydraulic line farthest from the facility will be considered the hydraulic line for that facility.