DEQ	Water Resources Division POLICY AND PROCEDURE		DEPARTMENT OF ENVIRONMENTAL QUALITY
Original Effective Date: September 28, 1995 Revised Date: June 30, 2016	Subject: Part 323 – Field Review of High Risk Erosion Area Permit Applications		Category: ☒ Internal/Administrative ☐ External/Non-Interpretive ☐ External/Interpretive Type: ☐ Policy ☒ Procedure ☐ Policy and Procedure
	Program Name: Water Resources Program		
	Number: WRD-024	Page: 1 of 10	

A Department of Environmental Quality (DEQ) Policy and Procedure cannot establish regulatory requirements for parties outside of the DEQ. This document provides direction to DEQ staff regarding the implementation of rules and laws administered by the DEQ. It is merely explanatory; does not affect the rights of or procedures and practices available to the public; and does not have the force and effect of law. DEQ staff shall follow the directions contained in this document.

PURPOSE:
To establish a technical procedure for staff to determine the required setback distance when reviewing high risk erosion area (HREA) permit applications for structures on Great Lakes shorelines.

AUTHORITY:
Part 323, Shorelands Protection and Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

R 281.21 and R 281.22 of the Great Lakes Shorelands Administrative Rules as promulgated pursuant to Part 323 of the NREPA.

DEFINITIONS:
"Elevation contour (EC)" for the high risk erosion area program represents the 50-year flood elevation for each lake in 1992. EC (feet) Lake Huron 582.9, Lake Michigan 583.7, Lake Superior 604.4 International Great Lakes Datum (IGLD 1985).

"Erosion hazard line (EHL)" is identified as the line along the shoreland that is the landward edge of the zone of active erosion or the line where the IGLD 1985 contour for the lake as stated in R 281.21(1)(c) meets the shoreland, whichever is furthest landward. EC (IGLD 1985) (feet) Lake Huron 582.9, Lake Michigan 583.7, Lake Superior 604.4.

"Foredune," as defined in MCL 324.35301(e), means one (1) or more linear dune ridges that are parallel and adjacent to the shoreline of a Great Lake and are rarely greater than 20 feet in height. The lakeward face of a foredune is often gently sloping and may be vegetated with dune grasses and low shrub vegetation or may have an exposed sand face.

"High bluff" means a bluff or dune that is more than 25 feet in height measured from the appropriate EC set forth in the definition of erosion hazard line. [R 281.21(1)(d)]

"HREA" means an area of the shoreland where the landward edge of the zone of active erosion has been receding at an average rate of one-foot-per-year or more, based on a minimum of 15 years.

"Low bluff" means a bluff or dune that is 25 feet or less in height measured from the appropriate EC set forth in the definition of erosion hazard line. [R 281.21(1)(e)]

“Projected Recession Distance (PRD)” is the distance in feet measured landward of the EHL as calculated during the most recent county-wide recession rate study. This distance includes an additional 15 feet to provide protection from severe short-term losses. [R 281.22(2)]

“Required Setback Distance (RSD)” means the least distance a permanent structure can be constructed from the EHL without a special exception. [R 281.21(1)(l)]

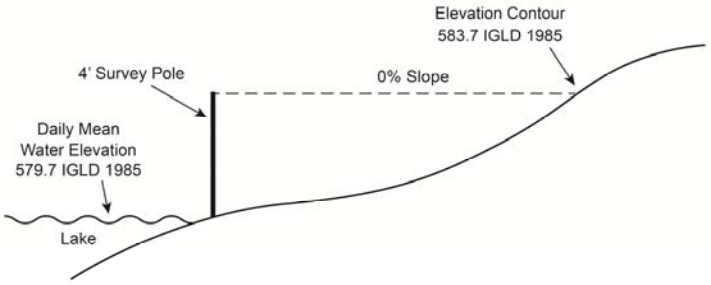
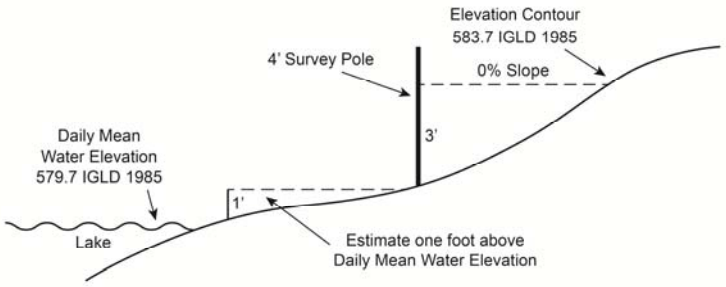
EQUIPMENT:
The equipment used to measure slope and distance along the shoreline must gather data that is accurate and reproducible. This procedure uses a clinometer, two 4-foot survey poles and a measuring tape. The review may also include a topographic survey signed and sealed by a licensed professional surveyor and submitted by the applicant. If the surveyor does not have a seal they should sign the survey with their license number in the signature block. The applicant or their agent may propose other methods, which will be reviewed by the field staff processing the permit application on a case-by-case basis. In the event that the applicant’s or agent’s measurements differ significantly from the field staff’s measurements, the field staff may direct the applicant to have a licensed surveyor perform a topographic survey of the proposed project area.

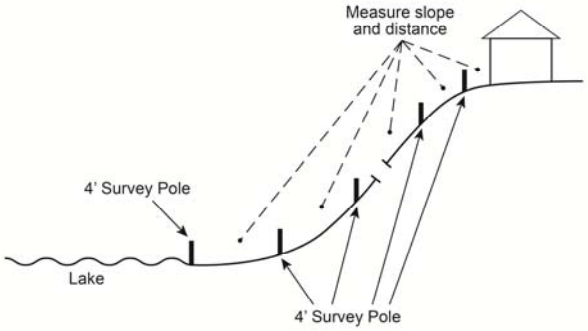
POLICY:
The geomorphic characteristics of Great Lakes shorelines are continually changing due to erosion caused by wave action, fluctuating water levels, storm events, groundwater seepage, frost, and people. An approach has been developed to address the wide variety of shoreline characteristics encountered along the Great Lake shorelines. This approach meets the requirements of Part 323 and the promulgated rules.

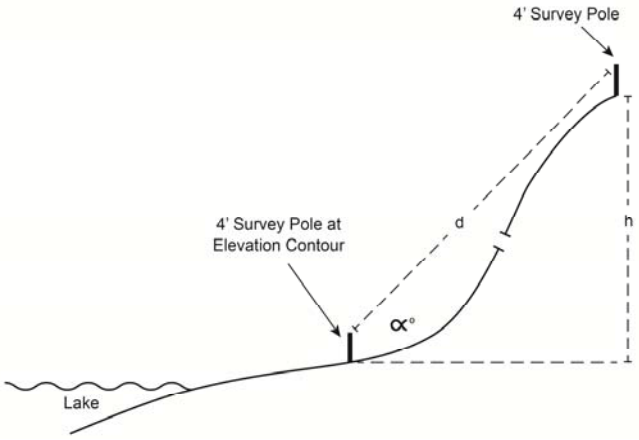
PROCEDURE:

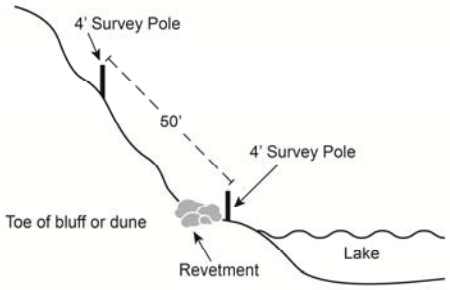
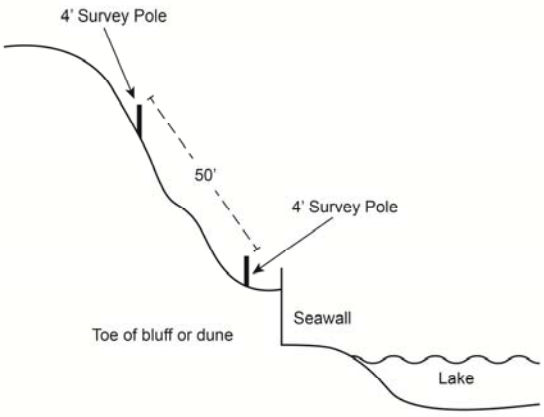
Step	Does What
1	Before the site inspection, the field staff processing the permit application identifies the 30-year and 60-year PRDs for the designated parcel.
2	Before the site inspection, determines the current daily mean water level for the lake from the United States Army Corps of Engineer’s (USACE) website. www.lre.usace.army.mil > Water Levels > Current Conditions.
3	Onsite identifies the dune or bluff to be measured. This feature will be the first lakeward facing slope that is not a foredune or the beach.

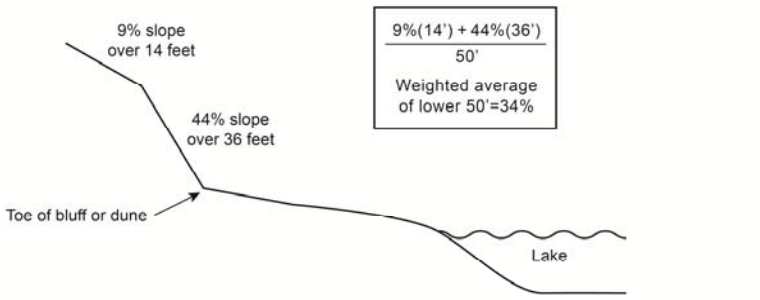
Step	Does What
4	Measures distance from top of the lakeward facing slope to the lakeward edge of the proposed permanent structure.
5	***Determining the EC***
5a	Calculates the elevation difference between the Lake's EC IGLD 1985 as stated in the definition of erosion hazard line and the current daily mean water elevation determined from the USACE website in step 2. Example: Lake Michigan EC = 583.7 feet IGLD 1985 Current Daily Mean Elevation = 579.7 feet IGLD 1985 4 feet The Lake Michigan EC is 4 feet above the water's elevation on this day.

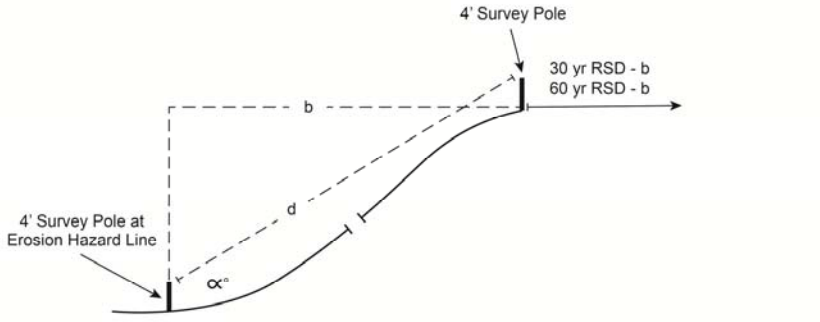
Step	Does What
5b	Onsite places a survey pole at the daily mean water elevation which is at the water's edge. Places the clinometer along the side of the survey pole at the approximate height needed to locate the EC on the slope. Shoots at 0% or 0 degrees to the point where the slope intersects with the line of sight from the clinometer. This is the EC on the slope.  Staff may estimate the location of the current mean water elevation by placing the pole above the swash zone. Estimates the number of feet above the current mean water elevation to the base of the survey pole. Subtracts this estimate from the total number of feet to determine where on the survey pole to place the clinometer and determine the location of the EC. 
6	Determines location of the EHL. This line is the EC from step 5 or the edge of the zone of active erosion whichever is further landward. Signs of active erosion from wind, water, ground water seepage, or other erosive forces may include slumping banks, slumping vegetation or exposed roots.

Step	Does What
7	***Gathering Slope and Distance Data*** This data will be used to determine the height of the dune or bluff in step 8, to calculate the slope multiplier (if needed) in step 9, and to identify the location of the required setback on the parcel or lot in steps 13 and 14. Reads each step to ensure data is collected correctly to meet the goal of the step.
7a	Working landward from the shoreline, and along the shortest straight line distance to the bluff or slope, places poles a distance apart and having a direct line of sight. Lines up the clinometer with the tops of both poles. Measures and records slope and units, percent or degrees. Measures and records the distance (feet) between the poles. When the slope and distance are recorded, maintains the position of the most landward pole and move the lakeward pole landward. Continues measuring to the lakeward edge of the proposed structure. Slope (%) = tan (degrees) x 100 Slope (degrees) = $\tan^{-1}$ (% / 100) 
8	***Determining Dune or Bluff Height***
8a	Measures the distance from the top of the 4-foot survey pole located at the EC to the top of the 4-foot survey pole located at the top of the lakeward facing slope. For areas with wide foredunes multiple measurements may be needed between the EC and top of the primary bluff, see step 7.

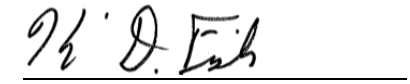
Step	Does What
8b	Determines the angle, using a clinometer, from top of the 4-foot survey pole located at the EC to top of the 4-foot survey pole located at top of the lakeward facing slope. Notes the units of the clinometer readings, degrees or percent. 
8c	Determines the bluff height by multiplying distance between the EC and top of the lakeward facing slope (hypotenuse), with sine of the angle from the EC to top of the lakeward facing slope. Calculates bluff height (h) in feet $h = d * (\sin \alpha)$ where d (feet) is the distance measured up the slope. where α (degrees) is the angle of the bluff face.
8d	If the dune or bluff height is greater than 25 feet, the bluff is a high bluff. Goes to step 8e. If the dune or bluff height is 25 feet or less, the bluff is a low bluff. Goes to step 12.
8e	Determines if the bluff is greater than 100 feet in height (from step 8a) and the lakeward facing slope is greater than 60 percent (from step 8b). If no, the slope multiplier must be calculated to determine the RSD.

Step	Does What
9	***Calculate Slope Multiplier***
9a	Locates the base of the dune or bluff. The base (or toe) of the dune or bluff is located at the slope break noted where there is substantial change in the moderately low slope of the beach to the steeper slope of the dune or bluff face. In areas where there are numerous smaller lakeward features identify the primary lakeward facing dune or bluff.
9b	Places a survey pole at the toe of the primary dune or bluff.
9c	From the toe, measures 50 feet up the slope and places the second survey pole. Using a clinometer, measures the slope between the two poles. For bluffs less than 50 feet in height, measures the slope from the toe to the top of the bluff.
9d	When there is a revetment – measures from the base of the revetment. 
9e	When there is a seawall, or retaining wall, near the toe of the bluff measures from the toe that has formed behind the wall. Does not include the structure in measurements or calculations. 

Step	Does What
9f	When the primary bluff or dune is irregular, measures the angle and the distance at the different slope breaks. Calculates the weighted average of all slopes within the lower 50 feet of the bluff. 
9g	Use the slope (%) measurement of the lower 50 feet for the multiplier in step 10.
10	If the bluff height is greater than 25 feet (step 10) and the percent slope over the lower 50 feet of the primary bluff is >25 % (step 11g), calculates the setback multiplier to determine the RSDs according to R 281.21 (l)(ii). To calculate the setback multiplier (m) m = 1 + {[slope(%) from step 9g – 25%] * 0.05} The multiplier (m) cannot exceed 2. Example: A 70-foot high bluff has a slope of 38% over the lower 50 feet. m = 1 + [(38%-25%) * 0.05] m = 1 + (13%*0.05) m = 1 + 0.65 m = 1.65
11	Calculates the RSDs by multiplying the PRDs (step 1) by the setback multiplier (step 10). Example: If 30-year PRD = 110 feet then the 30-year RSD = 110 x 1.65 = 182 feet. If the 60-year PRD = 205 feet then the 60-year RSD = 205 x 1.65 = 338 feet.

Step	Does What
12	***Identifying the Location of the Required Setback from EHL***
12a	Measures the horizontal distance of the RSD from the EHL. This requires determining the horizontal distances between the EHL, top of bluff and RSD. To calculate the horizontal distance (b, feet) between the EHL and the top of the bluff. b = d * (cos α) where d (feet) is the distance measured up the slope where α (degrees) is the angle of the bluff face. Subtracts horizontal distance from the RSD to yield the distance to measure landward from top of slope. RSD – b = distance landward of top of bluff Example: For a high bluff with a 30º angle of the bluff face and 140 feet between the toe and top of bluff. 30-year RSD of 182 feet and 60-year RSD of 338 feet as a result of step 13. b = 140 (cos 30°) b = 121 feet 182-121= 61 feet from top of bluff to meet 30 yr RSD 338-121= 217 feet from top of bluff to meet 60 yr RSD 
13	Determines location of the 60-year RSD from the EHL.
14	Determines location of the 30-year RSD from the EHL.

DIVISION CHIEF APPROVAL:



Kimberly Fish, Acting Chief
Water Resources Division