

Appendix 9-A

Symbols and Acronyms

Revised September 2026

If you require assistance accessing this information or require it in an alternative format, contact the Michigan Department of Transportation's (MDOT) Americans with disabilities Act (ADA) coordinator at Michigan.gov/MDOT-ADA.

Symbols

Symbol	Definitions	Units
d	Depth of water, measured from SWEL	ft
d_s	Depth of scour	ft
D_{50}	Median size of armor stone	ft
g	acceleration of gravity	ft/s ²
H	Maximum breaking wave height	ft
H	Design wave height	ft
$H_{\max}$	Maximum wave height	ft
H_s	Significant wave height near the toe of slope	ft
θ	Slope angle	degree
K_D	Empirical stability coefficient (= 2.2 for riprap gradations)	-
n	Number of stones per layer	-
ξ_{op}	Surf similarity parameter	-
r	Roughness coefficient (= 0.55 for stone revetments)	-
$R_{u,2\%}$	Runup level exceeded by 2% of incoming waves	ft
S_f	Specific gravity of stone	-
t	Thickness of stone layer	ft
T_p	Wave period, peak period	sec
W	Weight of all armor stones in a revetment	lb
w_r	Unit weight of stone (= 156)	lb/cft
W_{50}	Median weight of armor stone	lb
$W_{50, \text{underlayer}}$	Median weight of underlayer stone	lb
$y_{\max}$	Difference of the SWEL and depth-limited wave crest elevations	ft

Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ADT	Average Daily Traffic
AEP	Annual Exceedance Probability
ARI	Annual Recurrence Interval
CEM	Coastal Engineering Manual
EGLE	Michigan Department of Environment, Great Lakes, and Energy
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HEC	Hydraulic Engineering Circular
MDOT	Michigan Department of Transportation
NAVD88	North American Vertical Datum of 1988
NFHL	National Flood Hazard Layer
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
SWEL	Stillwater Elevation
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey
VPD	Vehicles Per Day