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JOB NO. SHEET NO.
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Coastal Flood Loads :

ASCE 7-22 Supplement 2 & ASCE 24-24 Ultimate Loads

Flood Design Class :	2	Mean Recurrence Interval (MRI)	500 yrs
Zone:	V Zone	Annual Exceedence Probability (AEP)	0.20%
Location:	All Other Coastal Sites	Code required freeboard =	1.0 ft
100com or FIRM BFE =	15.0 ft	H above SWEL =	70%
Local Established freeboard =	2.0 ft	Saltwater weight γ =	64.0 pcf
Local Established Flood EL (FEcom) =	17.0 ft	Cmri_100=	1.25
		Cmri_500=	-
Flood Elevation Calculation:	Only the MRI stillwater EL (SWELmri) is known	Cvmax =	1.35
SWELmri =	12.50 ft	Chc =	1.30
Ground EL after erosion (Ge)=	8.00 ft	Cbr =	0.78
Δslr =	2.00 ft	Cv =	0.5
EL of local datum (Zdatum) =	0.00 ft	C_T =	12.1
Design Stillwater MRI EL (SWELmri) =	14.50 ft		
Design Stillwater Flood Depth (df) =	6.50 ft		
MRI Breaking Wave Height (Hb) =	5.07 ft		
Calculated Hdesign =	5.07 ft	Hdesign = Hb. Wave is breaking.	
FEmri + Δslr =	18.05 ft		
BFE + code freeboard =	16.00 ft		
DFE =	18.05 ft		
Required Minimum Structure EL =	**18.05** ft	= V Zone Req'd Min EL at bottom of lowest horiz member	

Design Flood Velocity (V) =	7.23 ft/s	
but not greater than 10*Cvmax =	13.50 ft/s	df is greater than 3 ft, debris
V =	7.23 ft/s	impact and debris damming
Wave Period (Tp) =	4.80 sec	design is required, see
Wave length (L) =	66.0 ft	ASCE7.

Scour Depth

Column or Pile cross section:	Round	Cm =	2
Pile or column diameter =	18.0 in	Cd =	0.7
Pile or column spacing =	8.1 ft	Cbw =	1.75
Pile/Col Scour depth (Sm) =	3.00 ft	ϕm =	0.5
Breaking Wave Scour at Walls (Sm) =	5.07 ft		

Wave Loads

Vertical Piles or columns: W = 0.85 < 1 so wave is nonbreaking on pile/column
Nonbreaking Wave Force (Fm) = 864. lb force at the design stillwater elevation

Breaking Wave Loads on non-elevated walls

a* = 0.8
1.5 Hdesign = 7.6 ft
hc > Hdesign

hc = 42.0 ft

Location	Dynamic	Hydrostatic	Total pressure	
p1 =	554	0	554	psf
p2 =	0	0	0	psf
p3 =	462	416	878	psf

NOTE: If water is in the buiklding on the other side of the wall then the hydrostatic pressure will be reduced by the water pressure from the other side of the wall.

Breaking Wave Loads on elevated walls

hc = 42.0 ft
a = -3.0 ft

Location	Dynamic	Hydrostatic	Total pressure	
p1 =	554	0	554	psf
p2 =	0	0	0	psf
p3 =	462	0	462	psf
p4 =	512	192	704	psf

For non-vertical walls, multiply the pressures by (sin a)^2 to determine the horizontal component of the force. Where "a" is the wall angle.

Vertical hydrostatic force (buoyancy) (Fb) = 64 pcf times the submerged volume of the structure.
Moving water can exert a hydrodynamic drag force (Fdrag) on a structure. See ASCE 7 for design.

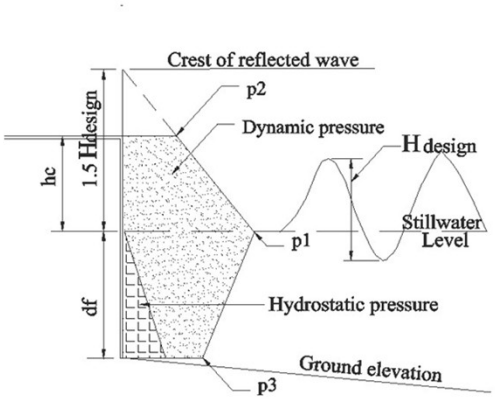
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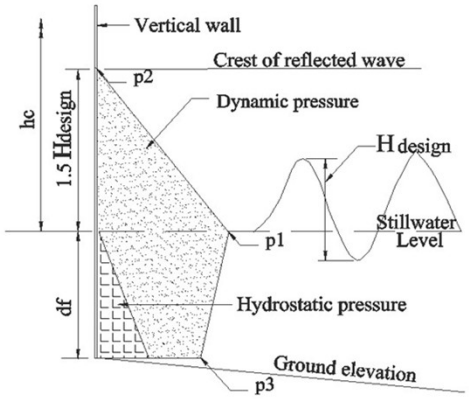
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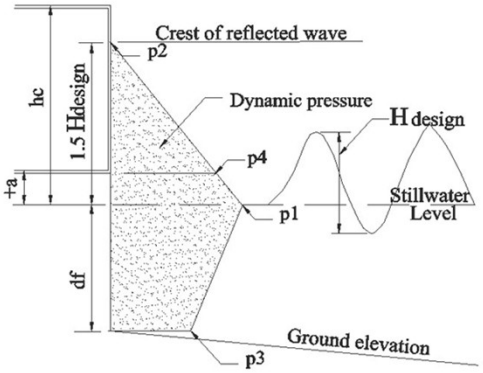
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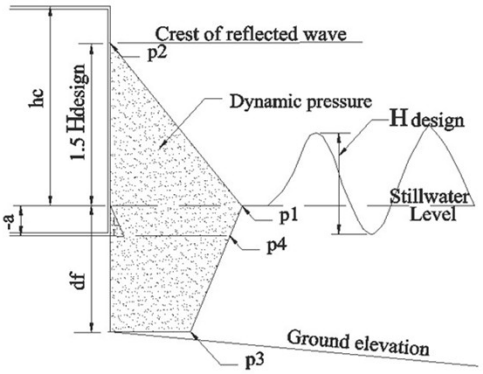
Wall at Ground Level
hc < Hdesign



Wall at Ground Level
hc > Hdesign



Building above Stillwater (positive a)



Building above Ground (negative a)