



# INDIANA DEPARTMENT OF TRANSPORTATION

*Driving Indiana's Economic Growth*

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## **Geotechnical Design Memorandum No. 2010-01**

January 8, 2010

**TO:** All Geotechnical Consultants

**FROM:** Athar Khan, P.E.  
Manager, Office of Geotechnical Engineering

**SUBJECT:** Maximum Nominal Soil Resistance for Common Piles

**EFFECTIVE:** January 1, 2010

When performing pile analyses please make note that the maximum nominal soil, geotechnical resistance shall be based on the following attached table. The nominal driving resistance may exceed these limits for friction piles if proven by a drivability analyses. It is not necessary to address the structural design in the geotechnical report.

For piles seated on bedrock with minimal penetration in rock; driven through soils, and with lesser difficulty of driving, a drivability analyses is not required, and the structural resistance will control the design. The nominal soil resistance for H piles driven to hard rock may be increased to 65 percent of the nominal structural resistance,  $P_n$ , if approved by the INDOT Office of Geotechnical Engineering.

Any questions please contact Mir Zaheer at (317) 610-7251 ext 224 or via email [MZaheer@indot.in.gov](mailto:MZaheer@indot.in.gov)

mz  
File: Attachment

*h/Geotech Memorandum/2010-01 Max Pile Capacities.doc*

**Maximum Nominal Soil Resistance  $R_{n \max}$**   
**(Geotechnical Axial Capacities) for Common Piles**

Pile Type	Section Area	Maximum Nominal Soil Resistance	
		$R_{n \max}$	
	Inch. sq	Kips	
10x42 HP	12.4	341	
10x57 HP	16.8	462	
12x53 HP	15.5	426	
12x63 HP	18.4	506	
12x74 HP	21.8	600	
12x84 HP	24.6	677	
14x73 HP	21.4	589	
14x89 HP	26.1	718	
14x102 HP	30.0	825	
14x117 HP	34.4	946	
14" Pipe pile SEC***	***	420	
16" Pipe pile SEC***	***	480	

Notes: *Please note the resistance factor,  $\Phi_{dyn}$ , for calculating the pile geotechnical capacities by the field methods. (With PDA  $\Phi_{dyn} = 0.70$  and with gates formula  $\Phi_{dyn} = 0.55$ )*

\*\*\* The maximum nominal capacity and the maximum factored capacity shall be dependent on drivability and the shell thickness. The minimum shell thickness shall be 0.25 inch for 14" O.D and 0.312" for 16" O.D.

The maximum nominal soil resistance can be taken from the above table. From this value back calculate the maximum factored soil resistance with applicable geotechnical losses.

The maximum nominal driving resistance shall be calculated from the maximum nominal soil resistance with the applicable geotechnical losses included.

Factored design load,  $Q_F$ , shall be less than the factored design soil resistance,  $R_R$ .

$R_{n \max}$  Maximum nominal soil resistance, i.e. (geotechnical long term capacity)

$R_{R \max}$  Maximum factored design soil resistance

$R_{ndr \max}$  Maximum nominal driving resistance

$R_n$  Nominal soil resistance equal to or less than the  $R_{n \max}$  (Long term capacity)

$R_R$  Factored design soil resistance equal to or less than the  $R_{R \max}$

$R_{ndr}$  Nominal driving resistance equal to or less than the  $R_{ndr \max}$