

**SECTION IV-03 \_\_\_\_\_ Standard Specifications for Highway Bridges**  
**Page 1 Foundations**

**IV-03.01 Foundations**

**IV-03.01.01 Allowable Pile Loadings**

The maximum allowable pile loads for various types of pile are as follows:

Steel H-pile:

Commonly used sizes:	HP10 x 42 - - - -	78 tons	(56 tons, 36 ksi)
( $F_y = 50$ ksi)	HP12 x 53 - - - -	97 tons	(70 tons, 36 ksi)
	HP14 x 73 - - - -	134 tons	(97 tons, 36 ksi)
	HP14 x 102 - - - -	188 tons	(135 tons, 36 ksi)

These allowables are based on  $0.25F_y$  (12,500 psi) and can be increased to  $0.33F_y$  if the additional requirements of AASHTO are met.

Timber Pile:

<u>Butt Diameter</u>	<u>Capacity</u>
10"	20 tons
12"	24 tons
14"	28 tons
16"	32 tons

These capacities are based on the table on page 45 of the Eleventh Edition (1973) of the AASHTO's "Standard Specifications for Highway Bridges."

Steel Encased Concrete (SEC) Pile:

AASHTO loads for SEC piling are based on  $0.25F_y A_s + 0.40f'_c A_c$  where  $F_y = 35,000$  psi and  $f'_c = 3000$  psi. The area of steel ( $A_s$ ) is computed assuming  $1/16$ " of steel is corroded off of the outside diameter of the pipe. When driving the steel shell of SEC pile, care shall be taken not to exceed the allowable driving stress on the steel.

The allowable driving stresses on pile shall be according to the AASHTO specifications.

Sometimes the soil conditions cannot support the maximum pile loads. The designer shall consult with the Geotechnical Engineer to determine the allowable pile loads.

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**Page 2 Abutments**

**IV-03.02 Abutments**

**IV-03.02.01 Earth Pressure on Abutment Walls**

Use 1,000 pounds per square foot on integral abutment walls, 650 psf on integral wing walls. For integral abutments, use  $B_E = 1.0$  for walls and wings. Use 40 psf equivalent fluid pressure on other walls, or a value calculated by Rankine or Coulomb theory of lateral earth pressure.

**IV-03.02.02 Scour Design**

AASHTO 4.4.5.2 may apply.

**IV-03.02.03 Design Loads**

Abutments shall be designed for AASHTO HS25 live load. Also, use military loading if it controls on mainline Interstate bridges. One half of the first section of approach slab shall be included in the dead load. For prestressed girder bridges, the load from the deck to the substructure shall be designed assuming the spans are simple. If the foundation report indicates significant settlement, negative skin friction shall be addressed.

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**Page 3 Piers**

**IV-03.03 Piers**

**IV-03.03.01 Pile Embedment**

Design according to AASHTO 4.5.15.

**IV-03.03.02 Ice Pressure [3.18.2]**

Stream crossing piers shall be designed for an ice pressure of 200 psi, assuming 4'-0" ice thickness on the Missouri River and 3'-0" ice thickness on other streams.

**IV-03.03.03 Design Loads**

Piers shall be designed for AASHTO HS25 live load. Also, use military load if it controls on mainline Interstate bridges. For prestressed girder bridges, the load from the deck to the substructure shall be designed assuming the spans are continuous.