Index 471-030 Fender Systems - Prestressed Concrete Piles & FRP Wales

Design Criteria

Structures Design Guidelines (SDG) 3.14

Design Assumptions and Limitations

Do not use this fender system unless approved by the District for use on the specific project.

Standard Plans Index 471-030 includes a fully designed Fender System with 14" square prestressed concrete piling having a maximum **"Energy Capacity" of 50 ft-kip"**.

Refer to ***SDG*** 3.14 for additional Fender System design criteria, assumptions and limitations.

Use this standard with Index 510-001.

Plan Content Requirements

In the Structures Plans:

Include Index 471-030 on waterways where a fender system is required and no barge traffic is present

Prepare and include in the plans supplemental project specific designs and details for the following items:

- Electrical service for navigation lights including conduit path from bridge to fender system and identification of service point. Coordinate design with Index 510-001 and Specifications Section 510.
- Access ladders and catwalks from bridge to fender system are optional and may be included at the discretion of the District.

Designate in the plans the type of decking material to be used for catwalks: 2" x 12" Plastic Lumber or Fiberglass Open Grating. Catwalk decking material shall be determined by the District.

Complete the following "Data Tables" and include them in the plans. One "Estimated Bill of Materials Table" and one "Fender System Table of Variables" are required for each Fender System location within a project. For projects with multiple fender systems or configurations, clearly note which Fender System the Tables are applicable to. See ***FDM*** **115** for more information regarding use of Data Tables.

Base the Minimum Pile Tip Elevations on the minimum embedment of 20 feet for the 14" square prestressed concrete piles into soil having a blow count (N) greater than 6.

Provide the required Clearance Gauge details in the plans adjacent to the Data Tables. Specify the numeral height, sign dimensions, foot marks and intermediate foot marks (when required), based on coordination with the USCG District Commander, 33 CFR 118.160 and the USCG Bridge Lighting and Other Signals Manual.

Table for use with Index 471-030 Fender Systems - Prestressed Concrete Piles:

ESTIMATED BILL OF MATERIALS FENDER SYSTEM - PRESTRESSED CONCRETE PILES STANDARD PLANS INDEX 471-030			Table Date 07-01-11
MARK	NO. REQ'D.	UNIT	QUANTITY
A1		MB	
A2		MB	
A3		MB	
A4		MB	
A5		MB	
A6		MB	
B		MB	
C		MB	
D		MB	
* E		MB	
F1		MB	
F2		MB	
F3		MB	
F4		MB	
F5		MB	
F6		MB	
G1		MB	
G2		MB	
H1		MB	
H2		MB	

NOTE: For Member Marks, Sizes and Dimensions see Standard Plans Index 471-030, Sheet 7.

Bill of Materials Table above is for an entire fender system (left and right fenders).

* Provide 2'-6" wide Fiberglass Open Grating for full length of fender in lieu of 2" X 12" Plastic Lumber when called for in Plans. Provide Stainless Steel Mounting Hardware and install per Manufacturer's recommendations. See Index 471-030 for notes. Include the cost of Fiberglass Open Grating and miscellaneous items required to install the grating in the price for Plastic Marine Lumber (Non-Reinforced).

FENDER SYSTEM TABLE OF VARIABLES INDEX 471-030		Table Date 07-01-11
CONTROL POINTS	STATION	OFFSET Lt. or Rt.
A		
B		
C		
D		
DIMENSION "L"		
CLEAR CHANNEL WIDTH		
CHANNEL SKEW ANGLE		
MHW or NHW ELEVATION		
MLW or NLW ELEVATION		
PILE CUTOFF ELEVATION		
MINIMUM PILE TIP ELEVATION LEFT FENDER		
PILE LENGTH LEFT FENDER		
MINIMUM PILE TIP ELEVATION RIGHT FENDER		
PILE LENGTH RIGHT FENDER		
NUMBER OF WALE ROWS		

NOTE: Work this Table with Standard Plans Index 471-030.

Table for use with a Drilled Shaft Foundation:

PILE DATA TABLE																	Table Date 01/01/16						
INSTALLATION CRITERIA								DESIGN CRITERIA									PILE CUT-OFF ELEVATIONS						
PIER or BENT NUMBER	PILE SIZE (in.)	NOMINAL BEARING RESISTANCE (tons)	NOMINAL UPLIFT RESISTANCE (tons)	MINIMUM TIP ELEVATION (ft.)	TEST PILE LENGTH (ft.)	REQUIRED JET ELEVATION (ft.)	REQUIRED PREFORM ELEVATION (ft.)	FACTORED DESIGN LOAD (tons)	FACTORED DESIGN UPLIFT LOAD (tons)	DOWN DRAG (tons)	TOTAL SCOUR RESISTANCE (tons)	NET SCOUR RESISTANCE (tons)	100-YEAR SCOUR ELEVATION (ft.)	Ø COMPRESSION	Ø UPLIFT	PILE 1	PILE 2	PILE 3	PILE 4	PILE 5	PILE 6	PILE 7

$$\frac{\text{Factored Design Load + Net Scour Resistance + Down Drag}}{\text{Ø}} \leq \text{Nominal Bearing Resistance}$$

UPLIFT RESISTANCE – The ultimate side friction capacity that must be obtained below the 100 year scour elevation to resist pullout of the pile (Specify only when design requires uplift capacity).
TOTAL SCOUR RESISTANCE – An estimate of the ultimate static side friction resistance provided by the scourable soil.
NET SCOUR RESISTANCE – An estimate of the ultimate static side friction resistance provided by the soil from the required preformed or jetting elevation to the scour elevation.
100-YEAR SCOUR ELEVATION – Estimated elevation of scour due to the 100 year storm event.

PILE INSTALLATION NOTES [Notes Date 7-01-13]:

Contractor to verify location of all utilities prior to any pile installation activities.

Minimum Tip Elevation is required for lateral stability.

When a required jetting elevation is shown, the jet shall be lowered to the elevation and continue to operate at this elevation until the pile driving is completed. If jetting or preforming elevations differ from those shown on the table, the Engineer shall be responsible for determination of the required driving resistance.

No jetting will be allowed without the approval of the Engineer.

The Contractor should not anticipate being allowed to jet piles below the 100-year scour elevation or required jet elevation, whichever is deeper.

At each Bent, pile driving is to commence at the center of the Bent and proceed outward.

Payment

Include quantity for Composite Marine Lumber 10" X 10" Wales Mark A under Pay Item for Plastic Marine Lumber (Reinforced). Include quantity for all other Plastic Lumber under Pay Item for Plastic Marine Lumber (Non-Reinforced).

In AASHTOWare Project Preconstruction™ (formerly TRNS*PORT), include estimated quantities for the Index 471-030 fender systems.

Item number	Item Description	Unit Measure
471-1-1	Fender System, Plastic Marine Lumber, Reinforced	MB
471-1-2	Fender System, Plastic Marine Lumber, Non-Reinforced	MB
455-34-2	Prestressed Concrete Piling, 14" Sq.	LF