



# Iowa Department of Transportation

## SPECIAL PROVISIONS FOR LRFD PILE DESIGN AND PLANNED PILE RETAPS

Cedar County  
STP-130-2(14)--2C-16

Effective Date  
September 18, 2012

**THE STANDARD SPECIFICATIONS, SERIES 2009, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

### **090221.01 DESCRIPTION.**

This project uses the Load and Resistance Factor Design (LRFD) methodology for piling design. Planned pile retaps may be specified to investigate and verify set-up factors.

### **090221.02 MATERIALS.**

Apply the requirements of Section 2501 of the Standard Specifications.

### **090221.03 CONSTRUCTION.**

#### **A. Pile Design Bearing Notes.**

1. The plan piling construction control values are required nominal axial bearing resistance based on the calibrated Load and Resistance Factor Design (LRFD) methodology. A WEAP analysis and bearing graph will be prepared by the Office of Construction that gives the relationship between blow count and nominal axial bearing resistance.
2. For the contractor's bidding purposes, particularly the sizing of the pile driving hammer the previous design methodology (service load with a factor of safety) bearing values are given below. These values shall not be used for construction control and are only given for comparative purposes.

#### **B. West Abutment**

The design bearing for the West abutment piles is 37 tons.

1. **Pier #1 and Pier #2 – For pile driving after excavation to the base of the encasement.**  
Pier piles are designed to accommodate the absence of scourable soils above the 100 year scour elevation shown in these plans. Piles shall be driven to 78.5 tons based on theoretical driving resistance. This includes 6.3 tons of resistance in the scourable layers, and 72.2 tons of resistance for dead and live load bearing capacity.

- 2. Pier #1 and Pier #2 – For pile driving before excavation to the base of the encasement.**  
Pier piles are designed to accommodate the absence of scourable soils above the 100 year scour elevation shown in these plans. Piles shall be driven to 85.7 tons based on theoretical driving resistance. This includes 13.5 tons of resistance in the scourable layers, and 72.2 tons of resistance for dead and live load bearing capacity.

**C. East Abutment**

The East abutment piles are designed to accommodate downdrag force due to soil consolidation under the new earth fill. The piles shall be driven to 37.8 tons based on theoretical driving resistance. This includes 3 tons of resistance in and above the compressible layer, 3 tons of resistance for downdrag forces and 31.8 tons of resistance for dead and live load bearing capacity.

**D. Planned Retaps.**

**1. General.**

- a. Piling that shall have planned retaps are designated in the plans.
- b. The contractor shall perform the specified pile retaps at the time period specified in the plans, 1-day, 3-days, or 7-days.
- c. Piling specified for planned retaps shall be logged by the Engineer.
- d. Driving should be stopped for piling specified for planned retaps when the pile reaches the required nominal axial bearing resistance at the End Of Drive (EOD). At the last planned retap for a respective pile the pile should be driven to full penetration or refusal.
- e. If the pile specified for a planned retap does not achieve the required nominal axial bearing resistance at the EOD, a different pile in the same substructure unit will be selected by the Engineer for a planned retap(s). Battered piling should not be selected for a planned retap.
- f. If the pile specified for a planned retap reaches refusal during initial drive or reaches refusal during a planned retap subsequent retaps will not be performed. A different pile in the same substructure unit may be selected by the Engineer for a planned retap or the planned retap will be deleted from the contract.

**2. Pile Acceptance.**

- a. Piling with planned retaps that achieve the required nominal axial bearing resistance at the EOD will be considered acceptable regardless of the results of the planned retaps.
- b. Piling that are not scheduled for planned retaps and do not reach the required nominal axial bearing resistance at the EOD shall have an elective retap or pile extension in accordance with Section 2501 of the Standard Specifications. No payment will be made for elective retaps.

**090221.04 METHOD OF MEASUREMENT.**

The Engineer will count the number of planned retaps performed for each specified time period.

**090221.05 BASIS OF PAYMENT.**

Payment for Planned Retaps will be at the contract unit price for each Planned Retap. Payment is full compensation for the specified work, including the time necessary to wait to perform the Planned Retap.