

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
PILE SPLICING

BFS:MJF

1 of 3

APPR:CER:MJC:09-28-12
FHWA:APPR:11-30-12

Delete subsection 705.03.C.2.d on page 375 of the 2012 Standard Specifications for Construction, in its entirety and replace it with the following:

- d. **Pile Splicing.** Piles considered to be primary members or part of the superstructure, as defined by the Engineer, must follow the current AASHTO/AWS D1.5:2010, Bridge Welding Code (as modified by the current FUSP 12SP707(A), *Structural Steel and Aluminum Construction*) and are subject to 100 percent ultrasonic testing (UT). Piles considered to be primary members will be stated on the contract plans. Piles not considered to be primary members include all other piles on the plans not identified as primary members. Pile welding must be performed in accordance with the American Welding Society (AWS) D1.1:2010, Structural Welding Code – Steel (as modified by the current FUSP 12SP707(A), *Structural Steel and Aluminum Construction*), hereafter called AWS D1.1, except as modified herein.

Do not splice timber piles. Provide steel piles in full length sections or splice them as shown on the plans and approved by the Engineer. The Contractor may provide piling and splices as required to obtain the required nominal pile driving resistance and penetration. Piles spliced using complete penetration butt welds must develop the full moment capacity of the pile section across the splice location. Piles must be welded as detailed in the contract plans.

- i) **Welder Certification.** Agencies approved by the Department may perform welder certification tests for welding piles. Welders must pass the welder certification tests and present a certificate to the Engineer prior to welding on Department projects. The Engineer may witness the testing and will not accept welder tests by non-approved agencies. Welder certification remains in effect for 2 years, unless the welder does not engage in welding for at least 3 months, or a specific reason exists to question the welder's ability. The Engineer may require a confirming certification test during the progress of the work.

Submit Welding Procedure Specifications (WPS) in accordance with AWS D1.1 and a Quality Control Plan (QCP) for the welding of pile splices either in paper or portable document format (PDF) for review by the Structural Fabrication Engineer. Provide the Department with 10 working days for each review period. Do not perform pile welding until the WPS and QCP have been approved by the Structural Fabrication Engineer. Perform welder certification tests in accordance with AWS D1.1, Section 4 on mill certified plate of the required steel grade and thickness.

- ii) **Welding Requirements.** Perform welding in accordance with AWS D1.1 by the Shielded Metal Arc Welding (SMAW) process using E7015, E7016, or E7018 electrodes. Do not

use Gas Metal Arc Welding (GMAW), or other gas shielded processes. The Engineer may approve Submerged Arc Welding (SAW) or other processes for welding.

Blast clean or grind contact surfaces, joints, and surrounding area before welding. Remove loose mill scale, paint, galvanizing, grease, oil, rust, moisture, and other contaminants from base metal before welding. Grind joints before welding to remove pitting, kerfs and irregularities. Prepare joints and remove all foreign material in accordance with AWS D1.1, Section 5.

For the alternate pile splice detail, bring the splicer sleeves into as close contact with the pile sections as practical. If the separation between the pile section and splicer sleeve exceeds 1/16 inch, increase the legs of the fillet weld by the amount of the separation distance, which must not exceed 3/16 inch. Misalignment of pile splices or lack of full bearing contact for partial penetration groove welds requires approval of the Engineer. Smoothly transition weld profiles by grinding stop-start areas or other irregularities.

Do not perform pile welding when the ambient temperature is below 0 degrees F or during periods of precipitation, unless heating and housing the area as approved by the Engineer. When the ambient temperature is below 32 degrees F, preheat the pile metal a minimum distance of 3 inches in all directions from the weld joint to a minimum of 70 degrees F and maintain the temperature during welding.

Storage and use of electrodes must be in accordance with AWS requirements. Dry all electrodes in an oven at a minimum of 500 degrees F for a minimum of 2 hours before use unless from a hermetically sealed container. Store the electrodes in a hot box at a minimum of 250 degrees F after drying. Use electrodes within 2 hours of exposure to the atmosphere or redry as described above. Do not redry electrodes more than one time. Do not use electrodes that have been wet.

- iii) Weld Inspection. Remove slag from all weld passes including finished welds. Surface of welded joints must be sufficiently uniform, surface should not be coarse or contain, ripples, sharp corners, interpass valleys, underfill or undercut. Welds must not contain cracks, lack of fusion, excessive porosity, or lack of penetration. Verify fillet weld size using a fillet weld gage.

Repair cracked welds or welds the Engineer determines are unacceptable. Repair welds in accordance with AWS D1.1, Section 5.26. Grind all arc strikes and tack welds to base metal. Peening is not permitted. Repair unacceptable welds at no additional cost to the Department.

Nondestructive testing (NDT) of pile welds will be determined by the Engineer if visual inspection and any necessary repairs do not result in an acceptable weld. NDT will be performed in accordance with AWS D1.1. The Contractor must blast clean or grind welds before the NDT can be performed. The Engineer will determine the frequency, location, and type of NDT to be performed for each weld. Generally, liquid dye penetrant or magnetic particle testing is performed for fillet and partial penetration butt welds, whereas ultrasonic testing (UT) is performed for complete penetration butt welds. The Engineer may perform additional NDT of any or all welds in accordance with AWS D1.1. All costs associated with performing NDT will be paid by the Department if initial testing indicates an acceptable weld. If testing identifies defects warranting rejection, the Contractor must repair the welds and hire qualified NDT personnel to retest the welds

until the welds are acceptable to the Engineer. All costs associated with performing the initial test, weld repairs and retests of unacceptable welds must be paid by the Contractor. No additional compensation will be granted for delays, down-time, or idle equipment and labor for NDT of pile welds.

NDT will be performed by personnel qualified as Level III, Level II or Level I (working under the direct supervision of the NDT Level II) in accordance with the latest *American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A* to perform all tests. The Engineer may witness NDT.

Add the following pay item in subsection 705.04, on page 380 of the Standard Specifications for Construction:

Pay Item	Pay Unit
Pile, Steel, Splice	Each

Delete the 9th paragraph in subsection 705.04.A.1, page 381 of the 2012 Standard Specifications for Construction.

Add the following subsection 705.04.A.8, on page 381 of the 2012 Standard Specifications for Construction.

8. **Pile, Steel, Splice** includes all work and materials required to splice and inspect steel H and CIP shell piles in accordance with AWS D1.1 (except as modified herein), the MDOT Standard Specifications for Construction, and the MDOT approved weld procedure. Payment for pile splices, including test and production piles, will be limited to the following formula: One splice will be paid for the first 80 linear feet of pile with a maximum of one additional splice for each 40 linear foot increment, thereafter. The number of paid splices must not be more than the average of one splice per 40 lineal feet of pile based on the estimated pile tip elevation as indicated on the plans. Additional splices required for additional pile length needed to achieve the required bearing capacity as directed by the Engineer, will be paid for at the contract unit price, but limited to one splice per 40 lineal feet of additional pile.

Furnished pile up to 40 feet in length must not contain more than 3 shop or field splices. Furnished pile in excess of 40 feet in length must not contain more than 4 shop or field splices. Should pile be furnished with shop welded splices, the contractor must furnish a shop inspection report from a Certified Welding Inspector (CWI) indicating all welds meet AWS D1.1 and give two weeks notice to the Engineer before beginning work in the shop. All shop welding must be done in accordance with AWS D1.1 (except as modified herein), the MDOT Standard Specification for Construction, and the MDOT approved weld procedure. MDOT reserves the right to conduct Ultrasonic Testing (UT) on shop or field welded splices. Work associated with shop or field splices will not be paid for separately, but included in the above unit price.

Payment for splices on piles considered to be primary members must include the cost of the required NDT for acceptance per AWS D1.5.