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DIVISION 700**701.00 CHECKLISTS****701.01 PILES AND PILE DRIVING CHECKLIST***SSHC References**Section 703 -- Piles and Pile Driving*
*705 -- Precast/Prestressed**Concrete Structural Units**1002 -- Portland Cement Concrete*
1004 -- Portland Cement
1025 -- Steel Wire for Prestressed
Concrete Units

Inspection Crew

Project Manager (PM)
Construction Technician

Equipment

Saximeter

Material Procedures

Check that all piling is acceptable for driving.

Material certifications and/or reports should be given to Project Manager and evaluated before use.

Steel Piling

Steel bearing and sheet piling must be stored on suitable skids [6 inch (150 mm)] ground clearance recommended) and should be kept clean. Don't allow weeds and foreign material in storage sites.

Concrete Piling

Piling must be adequately supported when stored and handled to prevent excess deflection. The surface finish of concrete piling that will be exposed at the completion of driving (bent piles in concrete slab bridges) shall not be damaged or discolored.

Cast-in-Place Concrete
Piles Procedures

Check shells immediately before placing any concrete (shape and accumulation of water). Use a drop cord.

Treated Timber

Notify Materials & Research if timber piling appears damaged. The Project Manager or inspector must obtain approval to reject timber piling.

Piling certification procedures are found in the *Materials Sampling Guide*.

Pile Driving Procedures

The contractor should build a frame (sometimes called a checkerboard) to hold each pile in the exact position for driving.

Before driving any piles, the inspector should perform the following duties:

1. Verify that piles will be driven exactly as shown in the plan pile layout.
2. Check pile spacing, and record heat numbers (steel pile), code identification (concrete pile) and other pertinent information. Document points and splices.
3. Verify cut-off elevations against a permanent reference.

Confirm that the Project Manager, inspector and contractor understand:

1. How to check penetration depth at any point.
2. How to take and record bearing tests data with saximeter.
3. How to determine the cut-off elevation for individual piles.

SSHC Subsection 703.03, Paragraph 2. allows bearing piling to be driven with a gravity hammer for the first half of the penetration when bearing does not exceed one-third of the design bearing.

Concrete sheet piling shall be driven with a preapproved hammer.

Do not allow pilot holes or preliminary jetting to be greater than 10 ft (3 m).

Gravity hammers used to drive piling to final cut-off elevation shall be preapproved. The fall of gravity hammers shall be regulated so as to avoid damage to the piles. Hammer fall shall not exceed 15 ft (5 m) for wood and steel bearing piles, or 8 ft (2.4 m) for precast concrete piles and shells for cast-in-place piles.

Do not allow hammer fall to damage piles.

Leads are required on all driven piles. Leads shall be held in proper alignment.

Swinging leads are permitted with steam, air or diesel hammers.

Bearing and Sheet Piles
Procedures

Guyed, braced, or fixed leads are required with gravity hammers.

1. Frequently check the pile for plumbness or for required batter. Do not allow a variation of more than 1-inch/50 inches (1 mm/50 mm) of pile during driving.
2. Tops shall not be out of line more than 3 inches (75 mm).
3. Adjacent sheets shall be in line within a ½ inch (12 mm) tolerance.
4. The inspector should observe the pile carefully while it is being driven. A sudden increase in the penetration may indicate a broken or collapsed pile.
5. Remove and replace all broken, split, or misplaced piles. If removal is impractical, contact the Construction Division for instructions on the procedure to be followed.
6. Lead with the tongue or ball end of sheet piles to keep the groove or socket clean.
7. The options when a pile is at cut-off elevation, and not at design bearing are:
 - a. If less than 10% of the piles in any group fail to reach bearing, the average pile bearing may be adequate to support the structure.
 - b. Additional piling may be added to the group.
 - c. Extend the piling and drive to obtain design bearing.
 - d. Determine a soil set up factor and then drive to cut-off elevation.
 - e. Use pile-driving analyzer to determine bearing.
 - f. Run a load test to check if bearing capacity is obtained.

Notify the Construction Division when two or three consecutive piling do not attain design bearing.

8. a. Record pile data on the M&R spreadsheet.

b. E-mail a copy of the spreadsheet to M&R (O. Qudus) and to Construction Division (B. Caples).

c. Do not use contractor provided charts for determining bearing.

Soil Setup Factor

1. Two representative piles shall be driven to 2 ft (600 mm) above cut-off elevation (see SSHC 703.07 para 4.f.).
2. The piling at cut-off+2 ft (600 mm), will be rested for 36 hours and then driven to cut-off elevation with a "warm" hammer.
3. The Project Manager will record the penetration for each ten blows of the hammer until cut-off is reached.
4. Record data and call it in to the Construction Division.
5. The factor and a decision on what action to take will be sent back to the Project Manager.
6. Construction Division recommendations shall be recorded under the Remarks Section of the pile driving record.

Bearing Capacity Procedure

1. Determine bearing at or just prior to the pile reaching final penetration.
2. When determining bearing, the inspector shall be certain that all of the following conditions exist:
 - a. For single action, the hammer shall have a free fall.
 - b. The head of the pile shall be free from crushed or broomed fibers.
 - c. The penetration of the pile shall be at a reasonably quick and uniform rate.
 - d. There is not excessive bounce of the hammer. Deduct twice the height of the bounce from "H" pile for gravity or stream hammers. No deduction is made for diesel hammers.

	<ul style="list-style-type: none"> e. If the driving is stopped for more than 2 hours, the pile shall be driven at least 1 ft (300 mm) before the bearing capacity is determined. f. For batter piles driven with gravity hammers, see <i>SSHC Subsection 703.03</i>, Paragraph 4 for bearing determination.
	<ul style="list-style-type: none"> 3. The energy values for common diesel hammers presently in use are listed in <i>SSHC Subsection 703.03</i>, Paragraph 4. If the contractor intends to use a hammer not listed, the Construction Office should be contacted to obtain the appropriate energy value. 4. For bearing capacity computations the mass of the driving cap may be taken from the manufacturer's freight bill or measured. The mass of the pile shall be determined as follows: <ul style="list-style-type: none"> a. Mass per foot (meter) times length at time bearing is determined. b. Volume of pile times 44 lb/ft³ (703 kg/m³). c. Volume times 150 lb/ft³ (2400 kg/m³). 5. The reference point should be an object with a fixed elevation or horizontal distance from the pile. Mark the point where the reference intersects the pile. After the required number of blows, mark another line at reference intersection and the distance between the two lines is penetration. Average penetrations can be computed from several measurements.
Steel "H"	
Timber	
Concrete	
Reference Points	
Pile Driving Analyzer Procedures	<ul style="list-style-type: none"> 1. Contact the Construction Division to schedule personnel and equipment.
Static Pile Load Test Procedures	<ul style="list-style-type: none"> 1. The Department will furnish the equipment and personnel for conducting the test. The contractor shall unload, erect, dismantle and reload the testing equipment. Payment for this work shall be by the each for each test. 2. If a temporary anchor pile is required. It will be paid for as extra work.

Method of Measurement
Procedures

1. If required bearing is obtained at minimum penetration and this is shorter than the order length, the contractor should be encouraged to continue driving until the order length has been driven. Usually he/she will want to drive this extra length to avoid payment deduction. Discontinue driving beyond minimum penetration when:
 - a. Practical refusal is reached.
 - b. Further driving may result in damage to the pile.
2. If practical refusal is reached before minimum penetration, discontinue driving and notify the District Construction Engineer or the Construction Division and do not cut off the pile without their approval.
3. No payment will be made for pile length driven beyond the order length without PM approval.
4. When steel "H" pile and steel pile shells are driven to the exact cut-off elevation without crimping or damage to the top of the pile, they need not be cut off. Length of pile cut-off (measured as provided in *SSHC Subsection 703.05*) shall be paid at 60% of the piles unit price.
5. It will be necessary to pay for pile cut-off only under the following conditions:
 - a. When practical refusal is reached before minimum penetration and the pile cannot be driven or jetted further.
 - b. The contractor elects to stop driving after reaching bearing and minimum penetration but before the order length is driven.

6. MASS FOR PRESTRESSED CONCRETE BEARING PILE

For computing bearing capacity required on M&R Pile Bearing spreadsheet.

Pile Type	Constant Section	
	Mass Per Meter of Pile (Kilogram) (lb)	
I	220	(485)
II	298	(657)
IV	315	(694)

(See Appendix 1. DR97-Pile Driving Record)

Critical Construction Areas

1. Proper placement and length.
2. Permanent reference point.
3. Removal of broken/collapsed piles.
4. Achieving design bearing capacity.

NDR Tests

1. Test pile.
2. Bearing capacity.
3. Pile Driving Analyzer.

Inspector's Records and Forms

1. Pile Record M&R spreadsheet
2. Hammer Data Sheet

701.02

CONCRETE CONSTRUCTION CHECKLIST

SSHC References: *Section 704 Concrete Construction*

Section 1002 Portland Cement Concrete
Section 1010 White Opaque Polyethylene Film and
Burlap--Polyethylene Sheeting For Curing
Concrete
Section 1011 Burlap For Curing Concrete
Section 1014 Joint Sealing Filler
Section 1015 Preformed Joint Filler
Section 1016 Preformed Polychloroprene
Elastomeric Joint Seals
Section 1033 Aggregates

Inspection Crew:

Lead Inspector

Inspection Equipment:

Slump Cone
Air Meter (pressure)
Cylinder Molds and Lids
Rod
Mallet
Strike Off Bar
Ruler

Placement Procedures:

1. Preplacement check of equipment.
2. Check condition and placement of steel.
3. Check Form setting and alignment. Verify location coordinates and orientation.
4. Have contractor wet grade and forms before concrete placement.
5. Test concrete for air content, slump, and make cylinders when mix changes, as a minimum according to Sampling Guide.
6. Watch concrete placement for compliance with specifications. Do not allow free fall greater than 5 ft (1.5 m).
7. Do not use water as a finishing aid; use an approved chemical finishing aid/evaporation retardant.
8. Check curing operation.

Construction Critical
Area:

1. Take pictures of any pavement under bridge before work begins.
2. Achievement of concrete consolidation without segregation.
3. The time between loads of concrete.
4. Trucks that segregate concrete or have cement balls must not be used.

NDR Tests:

1. NDR T 23 Making and Curing concrete test specimens.
2. NDR T 119 Slump of Portland Cement Concrete.
3. NDR T 141 Sampling of Fresh Concrete.
4. NDR T 152 Air Content of Freshly Mixed Concrete by the Pressure Method.

701.03 CONCRETE BRIDGE FLOORS CHECKLIST

SSHC References:

Section 706 Concrete Bridge Floors
Section 1002 Portland Cement Concrete
Section 1010 White Opaque Polyethylene Film and
Burlap--Polyethylene Sheeting For
Curing Concrete
Section 1011 Burlap For Curing Concrete
Section 1014 Joint Sealing Filler
Section 1015 Preformed Joint Filler
Section 1016 Preformed Polychloroprene
Elastomeric Joint Seals
Section 1033 Aggregates

Inspection Crew:

Project Manager
 Placement Inspector
 Plant Inspector

Inspection Equipment:

Slump Cone
 Air Meter (pressure)
 Cylinder Molds and Lids
 Rod
 Mallet
 Strike Off Bar
 Ruler
 10 ft (3 m) straightedge
 Anemometer
 Thermometer
 Hygrometer

Placement Procedures:

1. Preplacement check of equipment.
2. Check condition and placement of steel. Enter in SiteManager the date steel was verified.
3. Check Form setting and alignment.
4. Check slab thickness.
5. Check deck for cleanliness
6. Have contractor wet deck forms and grade under approach slabs before concrete placement.

(Note: It's best to place deck and approach slabs at the same time.)

7. Test concrete for air content and make cylinders when mix changes, as a minimum according to Sampling Guide.
8. Watch concrete placement for compliance with specifications.
9. Do not use water as a finishing aid; use an approved chemical finishing aid/evaporation retardant.
10. Check surface with straightedge. Remove depressions and irregularities.
11. Check tining operation.
12. Check cure operation.
13. Make sure a water service and tanks are available to soak burlap.

Construction Critical Area:

1. Take pictures of any pavement under the deck before work begins.
2. Maintain a uniform roll, of about 4 inches (100 mm), of concrete ahead of the front screed and a minimum of a 2 inch (50 mm) roll ahead of the rear screed.
3. The time between loads of concrete.
4. Trucks that segregate concrete or have cement balls must not be used.
5. Avoiding placement when temperatures and wind velocities may cause plastic shrinkage cracking. (*SSHC Table 706.01*)
6. Vibrate concrete uniformly. Establish good pattern and adjust as necessary.
7. The timing of cure application.

Safety Areas:

NDR Tests:

1. NDR T 23 Making and Curing concrete test specimens.
2. NDR T 119 Slump of Portland Cement Concrete.
3. NDR T 141 Sampling of Fresh Concrete.
4. NDR T 152 Air Content of Freshly Mixed Concrete by the Pressure Method.

701.04 STEEL STRUCTURES CHECKLIST

<i>SSHC References:</i>	<i>See SSHC Table 708.01</i>
Other References:	AWS Standard Specifications. (ANSI/AASHTO/AWS D1.5 Bridge Welding Code)
Inspection Crew:	Fabrication Inspector Project Manager (PM) Lab Inspector
Inspection Equipment:	Skidmore-Wilhem Calibrator
Shop Procedures:	<ol style="list-style-type: none">1. Check Fabricators QC Plan.2. Make sure QC Plan is followed.3. The mill order list or the Certified Mill Test Reports must be furnished before fabrication begins.4. Document all actions not in compliance with the QC Plan or Standard AWS procedures.5. Welding symbols are shown in Section 708.
Field Construction Procedures:	<ol style="list-style-type: none">1. Confirm steel was inspected on site and in shop. Enter date in SiteManager.2. Sample bolts and send to M&R.3. Heavy hexhead bolts require heavy hexhead nuts and a hardened washer under the element that is turned.4. Check all bolts, washers, and nuts to make sure there is proper and correct marking on each. (See CM Subsection 704.03)5. M&R personnel will calibrate the contractor's wrenches but they need at least 7-days advance notice.6. Before the contractor begins steel erection, the Project Manager will make a final check of span lengths, skew angles, and bearing point elevations.7. Also, take pictures of pavement under any structure where equipment will be lifting members.8. Lead sheets [? inch (3 mm) thick] shall be placed between steel and concrete at all bearing points.9. Rockers, rollers, expansion devices, etc., shall be set according to the temperature at time of installation. (See Plans.)10. Check matchmarks on all girders, separators, angle braces, etc.11. Verify that drift pins do not enlarge holes or distort the metal.12. Stop the contractor from hammering if it appears the metal will be damaged or injured.13. The Construction Division will be notified of all major misfits and determine what procedures will be allowed.

701.05 CONCRETE BRIDGE DECK REPAIR WITH SILICA FUME CONCRETE

SSHC References:

Section 710 -- Concrete Bridge Deck With Silica Fume Concrete
Section 1002 -- Portland Cement Concrete
Section 1010 -- White Opaque Polyethylene Film and White Burlap—Polyethylene Sheeting For Curing Concrete
Section 1011 -- Burlap For Curing Concrete
Section 1014 -- Joint Sealing Filler
Section 1015 -- Preformed Joint Filler
Section 1016 -- Preformed Polychloroprene Elastomeric Joint Seals
Section 1033 -- Aggregates

Inspection Crew:

Placement Inspector
Plant Inspector

Inspection Equipment:

Slump Cone
Air Meter (pressure)
Cylinder Molds and Lids
Rod
Mallet
Strike Off Bar
Ruler
10 ft (3 m) straightedge
Anemometer
Thermometer
Hygrometer

Placement Procedures:

1. Preplacement check of equipment.
2. Check condition and placement of steel.
3. Check Form setting and alignment.
4. Check slab thickness.
5. Check deck for cleanliness.
6. Have contractor wet deck and forms before concrete placement.
7. Test concrete for air content and make cylinders when mix changes, as a minimum according to Sampling Guide.
8. Watch concrete placement for compliance with specifications.
9. Do not use water as a finishing aid; use an approved chemical finishing aid/evaporation retardant.
10. Check surface with straightedge. Remove depressions and irregularities.
11. Check tining for conformance to specification.
12. Check cure operation.

Construction Critical Area:

1. Check finish machine (template & rails).
2. Check repair areas.
3. Deck shall be uniformly wet, without puddles prior to placement.
4. Bonding grout shall not be allowed to dry out.
5. Maintain a uniform roll, of about 4 inches (100 mm), of concrete ahead of the front screed and a minimum of a 2 inch (50 mm) roll ahead of the rear screed.
6. The time between loads of concrete.
7. Trucks that segregate concrete or have cement balls must not be used.
8. Avoiding placement when temperatures and wind velocities may cause plastic shrinkage cracking (see SSHC Figure 710.01).
9. Fogging system should be operating from time concrete is finished until wet burlap is in place.
10. Check tining operation.
11. The timing of wet burlap application.

Safety Areas:

NDR Tests:

1. NDR T 23 Making and Curing concrete test specimens.
2. NDR T 119 Slump of Portland Cement Concrete.
3. NDR T 141 Sampling of Fresh Concrete.
4. NDR T 152 Air Content of Freshly Mixed Concrete by the Pressure Method.