

DIVISION 700 – STRUCTURES**SECTION 701 – DRIVEN PILING****701.04, line 85**

If the nominal driving resistance is to be determined by dynamic pile load test in accordance with 701.05(b) or static load test in accordance with 701.05(c), the Engineer will use the wave equation analysis method for driving system approval. To be approved, the proposed driving system shall obtain the nominal driving resistance between the specified blow count range of 30 and 120 blows per foot, and shall maintain driving stresses below the specified driving stress limits for the pile type being driven. If wave equation predicted driving stresses are greater than specification limits or the wave equation blow count for the nominal driving resistance is outside the specified blow count range, the Contractor shall modify or replace the proposed equipment until subsequent wave equation analyses indicate the piles can be driven to the nominal driving resistance within the allowable blow count range and within driving stress limits.

701.05, line 374**(b) Dynamic Pile Load Test**

Dynamic monitoring will be performed for the purpose of obtaining the nominal driving resistance, pile driving stresses, pile integrity, and pile driving system performance. Dynamic monitoring will be conducted by PDA in accordance with ASTM D4945. PDA will be performed on the first pile driven. The length of the pile used in the dynamic pile load test shall be a minimum of 10 ft greater than the estimated length of production piles ~~in order~~ to provide for variation in soil conditions. The Contractor shall assist the Department in obtaining dynamic measurements with the PDA during initial pile driving and during pile restrikes. If a static load test is required, the dynamic pile load test shall be performed on the same pile as the pile used in the static load test. The restrike for the dynamic pile load test on a static load test pile shall be performed within 48 h of completion of the static load test.

701.08, line 575

When the nominal driving resistance is determined in accordance with 701.05(a), for acceptance, the Engineer will record, at a minimum, the number of hammer blows per inch or per foot of pile movement for the last 24 in. of driving. When the nominal driving resistance is determined in accordance with 701.05(b), for acceptance, the Engineer will record the blow count per inch or foot of pile movement, ~~and~~ the associated hammer stroke for the last two consecutive feet of driving, and the final pile tip elevation ~~as per~~ *accordance with* the pile driving criteria established through the dynamic pile load test.

701.09, line 742**(f) Pouring Concrete**

After all water and other foreign substances have been removed from the pipe piles and the final approval given, reinforcing bars, if specified, shall be placed, and the pipe piles shall be filled with ~~e~~Class A concrete in the presence of the Engineer. Concrete shall be deposited into pipe piles in a stream with a cross-sectional area that is no more than approximately 50% of the area of the pipe pile to prevent air pockets from forming. At a minimum, concrete shall be vibrated in the upper 25 ft of the pipe piles. Concrete shall not be placed in pipe piles until all pile driving has progressed beyond a radius of 15 ft from

the pile to be filled. All pile driving within the above limits shall be discontinued until the concrete in the last pile cast has cured for a minimum of 48 h.

701.10, line 762

Piles which have been bent, or otherwise damaged, during installation shall be considered unsatisfactory unless the nominal driving resistance is proven by load tests performed by the Contractor. If such tests indicate inadequate pile resistance, corrective measures such as the use of the bent piles at reduced pile resistance, installation of additional piles, strengthening of the bent piles, or replacement of the bent piles shall be ~~done~~*performed* as approved by the Engineer.

SECTION 702 – STRUCTURAL CONCRETE**702.08, line 266**

During the period of mixing, the drum shall rotate at the speed for ~~and~~*which* it was designed, ~~which~~. *The speed of the drum* shall be no less than 14 and no more than 20 revolutions per minute. If this procedure does not mix the concrete thoroughly, a sufficient additional number of turns at the same rate shall be made until a thorough mixing of the ingredients is obtained.

702.08, line 282

Structural concrete shall be mixed only in such quantities as ~~are~~ required for immediate use and shall be placed while fresh ~~and~~ before initial set has occurred. Hand mixing will not be allowed except in an emergency and then only with permission. Hand mixing shall be done on a watertight platform in such manner and so continued to ensure a homogeneous mixture of the required consistency. Hand mixed batches shall not exceed 1/2 cu yd in volume.

702.09, line 314

Approval may be refused or previous approval may be withdrawn for a truck mixer or for a part of equipment not functioning in such ~~a~~ manner as to produce and deliver uniform concrete to the site of the work at a uniform rate.

702.09, line 441

4. If the requirements of 702.09(d)3 are not met when the non-agitating equipment is operated at minimum capacity for the maximum time of haul and with the concrete mixed the minimum time, the equipment may still be used when operated using smaller loads, shorter hauls, or longer mixing times, or combinations thereof, ~~which enables~~ in accordance with 702.09(d)3 ~~to be met~~.

702.10, line 467

The Contractor shall submit a description of the ~~intended~~ pumping procedures ~~which it intends to use~~, *intended to be used* and ~~shall~~ notify the Engineer ~~as to the pumping of those~~ procedure at least 24 h in advance of concrete placement.

702.15, line 891

Horizontal construction joints in the shafts of reinforced piers, retaining walls, and abutments, other than abutments for arch bridges, may be made only if approved. Where

such joints show on an exposed surface, special care shall be taken to make the joints truly straight, clean, and watertight. To avoid visible joints ~~so far as possible~~ on exposed faces, the top surface of the concrete shall be finished to the underside of a strip nailed to the form work for the exposed surface of the concrete, the strip to be placed as directed. If such a horizontal joint intersects any coping or any sloping surface where a featheredge would be formed, an inclined bulkhead shall be placed to make the joint normal to the sloping surface ~~for a distance~~ of no less than 6 in. or, if there is a coping, no less than the depth of the coping. Horizontal construction joints will not be allowed in the stems of concrete T-beams or at the junction of T-beam stems and flanges.

SECTION 703 – REINFORCING BARS

703.02, line 17

The sizes and lengths of reinforcing bars shall be marked plainly to facilitate inspection and ~~checking~~ *verification*.

703.04, line 25

703.04 Protection of Materials

Plain and epoxy coated reinforcing bars shall be protected from damage during storage, handling, installation, and concrete placement. Plain and epoxy coated reinforcing bars shall not be stored in direct contact with the ground. Epoxy coated reinforcing bars shall be protected from exposure to ultraviolet light and moisture during storage. Once placed into the work, epoxy coated reinforcing bars shall not be exposed to ultraviolet light for more than 21 days prior to placement of concrete. At the time of concrete placement, reinforcing bars shall be free of dirt, loose rust or scale, grease, oil, or other foreign substance. If the Engineer suspects the epoxy coating has been damaged by exposure to ultraviolet light, a sample will be obtained and will be tested in accordance with 910.01(b)9.

SECTION 704 – CONCRETE FLOOR SLABS

704.04, line 34

704.04 Placing Reinforcement and Concrete

Applicable provisions of 703 shall apply to placing reinforcing bars. No concrete shall be placed until the reinforcement ~~is entirely and securely in place and~~ has *all* been *placed, secured*, inspected, and approved. Walkways shall be in accordance with 702.20(a). Placing of reinforcement during placing of concrete will not be allowed without prior written approval. Splices, when allowed, shall be at locations of least tension in the steel.

704.08, line 186

The cost of forms, curing, finishing, preformed expansion joints within structure limits, slab bridge floor drains, and necessary incidentals shall be included in the cost of the pay items.

SECTION 707 – PRECAST CONCRETE AND PRECAST PRESTRESSED CONCRETE STRUCTURAL MEMBERS

707.04, line 294

A permanent record of the force applied to, and measured elongation obtained for,

each prestressing strand shall be provided. The record shall also identify the strand and structural member to which the record applies. The accuracy of this record shall be certified by the fabricator's production supervisor that it accurately represents the force applied and measured elongation. The certified record shall be provided to the Engineer prior to shipment.

SECTION 709 – PORTLAND CEMENT CONCRETE SEALERS

709.04, line 33

709.04 Surface Preparation

The surface to be sealed shall be thoroughly cleaned of all foreign materials by sandblasting if the surface is a bridge deck or older existing concrete, or by air blasting for all other surfaces, just prior to sealing. The air compressor shall be equipped with suitable separators, traps, or filters which remove water, oil, grease, or other substances from the air lines. If ~~rain~~ sufficient ~~rain occurs~~ to uniformly wet the surface ~~occurs~~ after the cleaning operations and prior to the sealing, the surface to be sealed shall be re-sandblasted or re-airblasted.

SECTION 710 – PATCHING CONCRETE STRUCTURES AND REPOINTING MASONRY IN STRUCTURES

710.03, line 101

(d) Curing

~~For patched areas that require forms, if~~ forms *used for patched areas* may be removed after 24 h and surfaces cured in accordance with 702.22 or the forms may be left in place for 72 h and no additional curing will be required. Patched areas that do not require forms shall be cured in accordance with 702.22.

SECTION 711 – STEEL STRUCTURES

711.08, line 165

If the manufacturer's mill test reports are not available, tests shall be made with no additional payment, and four certified copies of such tests shall be furnished. Four copies of an affidavit shall be furnished which shall state that the materials to be used for members not designated for calculated stress and not to be marked in accordance with ASTM A6, article 18, are in accordance with the requirements of the specifications for the materials as shown on the plans. The fabricator shall have on file the mill test reports for the material from which these members were obtained. Those items of structural steel which are considered as being in the category of members not requiring mill test reports and for which tests may not be required shall be listed on the working drawings. Approval of working drawings will indicate if it is ~~satisfactory~~ *acceptable* to waive testing of the items listed.

711.14, line 269

Description of Discontinuity	Repair Required
All discontinuity of 1/8 in. max. depth.	None. Depth shall be explored as directed.
Any discontinuity over 1 in. in length with depth over 1/8 in. but not greater than 1/4 in.	Remove and weld.
Any discontinuity over 1 in. in length with depth over 1/4 in. but not greater than 7/16 in.	Remove completely and weld. Aggregate length of welding not over 20% of plate edge length being repaired.
Any discontinuity over 1 in. in length with depth greater than 7/16 in.	Plate rejected. Defective portion may be removed and the remainder may be used in 7/16 in. depth.

711.24, line 383**711.24 Subpunching and Reaming of Field Connections**

Holes in all field connections and field splices of main members of trusses, arches, continuous beam spans, bents, each face of towers, plate girders, and rigid frames shall be subpunched, or subdrilled if subdrilling is required in accordance with 711.21. These subsize holes shall subsequently be reamed while assembled, or reamed to a template, in accordance with 711.44. All holes for floor beams and stringer field end connections shall be subpunched and reamed to a steel template or reamed while assembled. Reaming or drilling full size **of** field connection holes through a steel template shall be **doneperformed** after the template has been located as to position and angle, and bolted firmly in place.

711.25, line 399**711.25 Accuracy of Punched or Subdrilled Holes**

Before any reaming is **doneperformed**, the punching, subpunching, or subdrilling shall be so accurate that after assembling, a cylindrical pin 1/8 in. smaller in diameter than the nominal size of the punched hole may be entered perpendicular to the face of the member, without drifting, in at least 75% of the contiguous holes in the same plane. If the requirement is not fulfilled, the badly punched pieces will be rejected. If a hole does not pass a pin which is 3/16 in. smaller in diameter than the nominal size of the punched hole, this will be cause for rejection.

711.34, line 583**711.34 Annealing and Stress Relieving**

Structural members which are indicated in the contract to be annealed or normalized shall have finished machining, boring, and straightening performed **subsequent toafter** heat treatment. Normalizing and full annealing shall be in accordance with ASTM A941. The temperatures shall be maintained uniformly throughout the furnace during the heating and cooling so that the temperatures at two points on the member differ by no more than 100°F at any one time.

711.55, line 858**711.55 Delivery of Materials**

If the contract is for erection only, the materials used in the finished structure will be provided at the place designated and loaded or unloaded as specified. Material required to be unloaded, shall be unloaded promptly on delivery to the place designated. The Contractor shall be responsible for demurrage charges.

SECTION 713 – TEMPORARY BRIDGES AND APPROACHES

713.04, line 42

The temporary bridge shall be built to an elevation of not less than that shown on the plans. It shall have a clear length opening no less than shown or otherwise designated. ~~Unless otherwise specified, all~~ timber and piles may be treated or untreated, ~~unless otherwise specified.~~

713.10, line 110

713.10 Basis of Payment

The accepted quantities of temporary bridge and approaches, or temporary pipe and approaches will be paid for at the contract lump sum price for the work, complete in place and later removed as specified. HMA mixtures for temporary pavement will be paid for as the type of mixture specified, in accordance with 610.06, complete in place. Guardrail installed along approaches will be paid for at the contract unit price per linear foot. Guardrail end treatment will be paid for at the contract unit price per each for the type specified. Temporary pavement markings will be paid for in accordance with 801.18.

SECTION 716 – TRENCHLESS PIPE INSTALLATION

716.01, line 47

(g) Microtunneling

A remote-controlled trenchless construction method that simultaneously installs pipes as the soil is excavated. This method provides continuous support of the excavation face with slurry pressure to balance groundwater and earth pressures.

SECTION 719 – TILE DRAINS

719.04, line 61

When an existing tile drain is encountered on permanent right-of-way, it shall be replaced in the following manner. If the tile is intercepted by a side ditch prior to crossing proposed pavement, it shall be replaced between the right-of-way line and the ditch with non-perforated drain tile and a 10-foot ~~ft~~ long terminal pipe section of drain tile with a rodent screen. If the tile is to outlet into a storm sewer, it shall be replaced between the right-of-way line and the storm sewer with pipe in accordance with 715.02(b). If the tile is to outlet at a side ditch after crossing the proposed pavement, it shall be replaced between the right-of-way line and the ditch with pipe in accordance with 715.02(a) with a rodent screen. If the tile is to be maintained across the right-of-way, it shall be replaced from right-of-way line to right-of-way line with pipe in accordance with 715.02(a).

SECTION 721 – AUTOMATIC DRAINAGE GATES

721.03, line 12

The gate shall be constructed to offer minimum resistance to water flowing through it. When the water elevation in the outlet stream is 1/2 in. or more above or below the bottom of the valve, the valve shall open or close, ~~as the case may be~~ depending on the ~~direction of flow~~. The valve shall be able to resist a head of at least 10 ft.

SECTION 722 – CONCRETE BRIDGE DECK OVERLAYS

722.05, line 74

The yield will be checked using the 1/4 cu yd box method as follows. The chute shall be cleaned and the box shall be positioned to receive the discharged concrete. The mixer shall be operated until the cement counter indicates that 1/4 cu yd of concrete has been produced. The contents of the box shall be consolidated and struck off. Where the box is not essentially full, the gates shall be adjusted and the procedure shall be repeated until the actual and calculated volumes of concrete agree. Yield tests shall be run on the first load of each truck and every third ~~truck~~ load ~~per truck~~ thereafter. The air content shall be tested on the first load of each truck prior to placing concrete onto the deck. Additional tests will be required after making any adjustments.

722.10, line 469

Existing expansion joints shall be maintained throughout the overlayment unless otherwise shown on the plans. A construction dam or bulkhead, equal in thickness to the joint width, shall be installed to the required grade and profile prior to placing the overlay. Screed rails for the finishing machine shall be placed to the required profile, and anchored for stability both vertically and horizontally. Screed rails shall not be treated with a bond breaking compound.

SECTION 724 – BRIDGE EXPANSION JOINTS**724.02, line 28**

Rapid Setting Patching Materials.....901.07

724.03, line 87**(c) Installation of Type PCF Joint**

Where an existing joint is to be replaced, the existing joint and adjacent concrete shall be removed to the limits shown on the plans. Additional concrete removal to ensure sound concrete adjacent to the joint area shall be as directed. Patching of adjacent concrete shall use bridge deck patching concrete or rapid setting patching materials.

724.03, line 99

The joint area shall be cleaned as specified herein and in accordance with the manufacturer's guidance. Existing surfaces that will be in contact with the new joint shall be sandblasted and cleaned of all old joint seals, old materials or devices, bituminous material, dirt, grease, and all other deleterious material over the total area of the opening to receive the new joint in accordance with the manufacturer's recommendations. All areas to be in contact with the new joint shall be sound, clean, dry, and frost free. The use of heat will not be allowed to dry the adjacent surfaces. Bridge deck patching concrete shall be cured a minimum of seven days and rapid setting patching materials shall be cured a minimum of three days prior to installing the joint. Shorter cure durations will be allowed if approved in writing by the joint and sealant manufacturer and shown on the working drawings.

SECTION 725 – SLIP LINING OF EXISTING PIPE**725.06, line 137****(c) Profile Wall HDPE Liner Pipe**

Profile Wall HDPE liner pipe joined using extrusion welding shall be in accordance with ASTM F894. The Contractor shall propose and describe in the QCP a destructive test, such as but not limited to a bend strap test, to demonstrate that an operator can produce an extrusion welded joint that will not fail. Destructive testing shall be performed on two flat pieces of HDPE sheet stock that has been butt welded together to verify the extrusion gun is working properly and that the operator can produce an extrusion welded joint that will not fail. Once an extrusion welded joint is produced on a test section that passes the destructive test, each subsequent joint fabricated that same day by that operator will be visually inspected for acceptance. A destructive test in accordance with the QCP shall be conducted on the test section at the beginning of each day that profile wall HDPE liner pipe joining is being ~~done~~ performed.

SECTION 729 – HEAT STRAIGHTENING OF STEEL MEMBERS IN THE FIELD

729.04, line 57

(c) Results and Reporting

At the conclusion of the testing, the NDT testing technician shall provide a report of each impact location tested; one report per location.

The following information shall be included in the report:

1. location of the test on the structure, using nomenclature matching the contract plans;
2. date of examination and testing;
3. technician's name, certification, and signature;
4. examination results and findings. If no cracks are found, this shall be stated in the report;
5. the medium used, manufacturer, ~~and~~ color, and
6. a high quality photo with a scale reference and location label. The photo shall be taken immediately after the testing and the reports shall be submitted daily to the Engineer.

SECTION 731 – MECHANICALLY STABILIZED EARTH RETAINING WALLS

731.02, line 17

The MSE retaining wall system shall be selected from the QPL of Retaining Wall Systems. A retaining wall system manufacturer will be considered for inclusion on the QPL by following ITM 806, Procedure J. The quantities shown in the Schedule of Pay Items will be the same for each MSE retaining wall system. The MSE retaining wall panels shall be constructed as shown on the ~~panels~~ working drawings, based on the requirements herein.

731.02, line 31

The Contractor shall determine the final leveling-pad layout and step elevations that provide the wall envelope shown on the plans. The Contractor shall use this information to provide a final horizontal plan and vertical elevation profile along the front face of the wall to account for the wall envelope shown on the plans. The final coping or top-of-wall elevations shall be at or above those shown on control line 1 on the plans. The final top-of-leveling-pad elevations shall be at or below those shown on control line 3 on the plans. Leveling-pad steps shall be in 2.5 ft increments. The top of the leveling pad elevation shall be a minimum of 1.0 ft above the ordinary high water mark, OHWM, or the groundwater table elevation, whichever is higher. The leveling pad dimensions shall typically be 12 in. wide and 6 in. thick and as shown on the working drawings.

731.07, line 361

After proofrolling has been completed and all unsuitable foundation material has been removed and replaced, compaction of the portion of the foundation beneath the reinforced backfill zone will be verified by dynamic cone penetrometer, DCP, testing in accordance with ITM 509.

SECTION 734 – PERMANENT EARTH RETENTION SYSTEM FOR CUT-WALL APPLICATION

734.08, line 263

The costs of all professional services, labor, excavation, structure backfills, equipment, materials, tests, and QCP shall be included in the cost of this work. All incidentals necessary to design, construct, and monitor the wall including all drainage required by the wall design and all temporary construction facing or permanent facing, if applicable, and correction required by the wall design of deficiencies which may be required to prevent damage or excessive movement of the wall, shall be included in the cost of this work. No additional payment will be made for the costs of providing and taking corrective actions.

SECTION 735 – TEMPORARY WIRE-FACED MECHANICALLY STABILIZED EARTH RETAINING WALLS

735.05, line 71

735.05 Materials

Materials shall be in accordance with the following:

Admixtures for Use in Concrete	912.03
Air-Cooled Blast-Furnace Slag	901.09
Alignment Pins.....	910.07(d)

DIVISION 800 – TRAFFIC CONTROL DEVICES AND LIGHTING**SECTION 801 – TRAFFIC CONTROLS FOR CONSTRUCTION AND MAINTENANCE OPERATIONS****801.02, line 57**

~~A visual inspection will be the~~ basis for use for traffic paint, durable pavement marking materials, temporary marking tape Type II, glass beads, barrels, barricades, construction warning lights, steel posts, temporary panel signs, traffic signs, except non-ground mounted signs, tubular markers, and wood sign posts used for temporary traffic control ~~will be visual inspection.~~

801.03, line 75**801.03 General Requirements**

The applicable requirements of the MUTCD shall apply to the installation and materials for traffic control devices subject to the requirements of 107.08 and 107.12. When the plans do not include a maintenance of traffic plan, the Engineer will provide such a plan to the Contractor. The Contractor shall be responsible for the field layout, placement, operation, maintenance, *inspection*, and removal of temporary traffic control devices.

801.04, line 200

Trailers in accordance with 910.14(f) may be used as supports for portable construction signs. The trailer shall be located to hold the sign in a proper position. The position of the tongue shall ~~be so as to~~ cause no hazard to traffic. Wheel chocks other than sandbags shall not be used. The tongue may be pinned to reduce wind-induced rolling if designed to pull up or break from vehicle impact. During non-working hours, trailers with signs that do not apply to existing conditions shall be stored in accordance with 107.08(c).

Sign posts and their foundations shall be located and constructed to hold signs in a proper position, to resist swaying, or turning, ~~orto prevent~~ displacement, and to minimize the hazard to motorists. No rigidly fixed sign supports will be allowed in exposed areas where it would be practicable to utilize a breakaway or yielding type design. Signs shall be completely covered or removed when the message does not apply.

801.09, line 350

Permanent drums shall be left in place after the contract is complete, and shall become the property of the Department. They shall be installed just prior to final acceptance of the contract.

801.13, line 671**801.13 Temporary Illumination**

The temporary highway illumination shall be in accordance with applicable requirements of 807, except as modified herein.

801.15, line 847

Only qualified flaggers who have been trained on the operation of the AFAD shall operate the AFAD. ~~AFAD operators and~~ shall provide written proof that they have been trained by the AFAD manufacturer. Two trained flaggers shall be available on-site to provide flagging in case of an AFAD malfunction. The flagger operating the AFAD shall

be positioned to have an unobstructed line of sight to approaching traffic and the AFAD. A single flagger may be used to control both approaches to the work site if adequate unobstructed sight distance exists between the AFAD operator and both approaching directions of traffic and both AFADs.

801.16, line 877

(a) Temporary Mounted Construction Signs, **TTCS**

When the vertical mounting height for TTCS is between 12 in. and 18 in. to the bottom of the sign, tripod supports may be used. Temporary mounted construction signs, which are mounted on portable supports such as sign stands and tripods may be used for the construction signs in a temporary traffic control zone. The bottom of a temporary mounted construction sign shall be at least 12 in. above the traveled way. Signs on tripod supports shall be installed so that the angle from vertical does not exceed 30°.

801.18, line 1053

Temporary pavement message markings placed will be paid for at the contract unit price per each, for the message specified. Longitudinal and transverse temporary pavement markings and temporary buzz strips, will be paid for at the contract unit price per linear foot of material, complete in place.

SECTION 802 – SIGNS

802.07, line 133

- a. All tightening shall be in the star pattern order as shown on the plans, or in accordance with the FHWA “Guidelines for the Installation, Inspection, Maintenance and Repair of Structural Supports for Highway Signs, Luminaires, and Traffic Signals”.
- b. All leveling nuts shall be brought into contact with the base plate. While holding the **levelling** nut with a wrench, the top nut shall be brought to a snug-tight condition in full contact with the base plate. The **levelling** nut shall be brought to a snug-tight condition. This process shall be repeated for the remaining top and **levelling** nuts.
- c. After all top and **levelling** nuts are made snug-tight, the top nuts and base plate shall then be marked, and the nuts further tightened, **and** pretensioned, by a minimum 1/6 turn for bolt diameters that are 1 3/4 in. or greater or a minimum 1/3 turn for bolts **diameters that are** less than 1 3/4 in. **in diameter**.
- d. For span structures, the top nuts shall be inspected for proper fit no sooner than 10 minutes after the installation of the truss or span on the end bents or columns. Nuts found not to be in a snug-tight condition or nuts that have loosened, based on a visual inspection of the relative position marks, shall be tightened by repeating the steps above.

SECTION 803 – WELDING ALUMINUM ALLOYS

803.02, line 21

803.02 Materials

Materials shall be in accordance with the following:

Electrodes.....	924.01
Filler Material.....	924.01
Shielding Gases.....	924.01
Welding Rods Supplies.....	924.01

803.03, line 82

The size of the electrode, voltage and amperage, welding speed, gas or gas mixture, and gas flow rate shall be suitable for the thickness of the material, design of joint, welding position, and other circumstances attending the work. Gas metal-arc welding shall be ~~doneperformed~~ with direct current, reverse polarity. Gas tungsten-arc welding shall be ~~doneperformed~~ with alternating current or with direct current, straight polarity.

SECTION 805 – TRAFFIC SIGNALS

805.03, line 84

All existing painted metallic signal equipment to be reused, such as pedestals, bases, controller cabinets, signal weatherheads, *and* pipe arms, shall be cleaned and *coated* with two coats of *yellow in* accordance with 909.02(c). Existing metallic signal heads to be reused shall be *coated* with two coats of black *or yellow as* directed by the Engineer and in accordance with 909.02(c). Aluminum poles and signal support structures shall not be painted.

[Note: shown italics - previously approved changes by the SC]

805.03, line 97

Existing signal handholes to be removed, ~~shall be filled~~ after removing rings and covers, ~~shall be filled~~ with B borrow with a minimum of 4 in. of concrete on top to bring it up to grade in a sidewalk area. Surfaces shall be finished and broomed. Otherwise, they shall be filled with acceptable material conforming with the surrounding area.

805.03, line 105

All electrical wiring terminations and splices, controller and cabinet set-up, ~~and~~ testing, review, and turn-on of all operational apparatus at each location shall be done by or in the presence of and under the responsible charge of an employee of the Contractor who holds an IMSA Traffic Signal Construction Technician Level II certification or an IMSA Traffic Signal Field Technician Level II certification. Installation, inspections, troubleshooting, maintenance, and repair of these systems shall be accomplished by, or in the presence of and under the responsible charge of, an employee of the Contractor who holds an IMSA Traffic Signal Construction Technician Level II certification. Supervision of non-electrical, traffic signal related construction work and traffic control shall be ~~doneperformed~~ by a person holding, at a minimum, an IMSA Work Zone Temporary Traffic Control Technician certification or an equivalent certification approved by the Department.

805.03, line 128

Electrical work shall be executed in accordance with the requirements of the National Board of Fire Underwriters, the State Fire Marshal, and the power company which will furnish the electric service. The work shall be in accordance with any local regulations that may apply. The Department will arrange and provide for power service which the power company will bring to the point designated on the plans. Prior to the start of construction, the schedule of activities shall be coordinated with the power company, and they The power company shall be contacted again at least 14 days prior to the time the service work is to be completed.

805.07, line 259

The tagging material and fastening will be subject to approval prior to proceeding with this work. The color-coded wires shall be connected properly. The white wire shall be the common or ground. Wire used for all identical indications of any individual phase shall be color coded and, where possible, shall use red wire to connect red lenses, orange wire to connect yellow lenses, and green wire to connect green lenses. Signal heads shall be assembled and wired before being installed. The testing of the loops shall be documented in the Loop Testing Table provided by the State.

805.08, line 279

Additional detector loop amplifier units and detector racks shall be supplied as directed by the Engineer. Additional detector racks shall include all cables and harnesses including, but not limited to, a SDLC cable for each added rack, interface panels, and a BIU to provide a complete and functional installation. Additional auxiliary BIU panels shall include all cables and harnesses including, but not limited to, a SDLC cable for each additional auxiliary BIU panel, terminal strip on BIU panel, and a BIU to provide a complete and functional installation.

805.09, line 355

After installation of the loop wire, the saw-cut shall be sealed with a joint sealant material. The sealant shall be poured into the saw-cut making a water tight watertight seal. The joint sealant material shall be installed in accordance with the manufacturer's recommendations and 906.02. However, the joint configuration shall not apply. A copy of the sealant manufacturer's written application instructions shall be submitted to the Engineer prior to any sealant operations. If the Contractor elects to use a sealant complying with 906.02(a)2, the sealant material shall be heated in a kettle or melter constructed as a double boiler with the space between the inner and outer shells filled with oil or other heat-transfer medium. This melter shall have a positive temperature control and a mechanical agitator.

SECTION 807 – HIGHWAY ILLUMINATION

807.03, line 54

Working drawings for conventional light poles shall show the outside shaft diameter, height, wall thickness, mast arm length and rise, mast arm diameter and thickness, handhole details, grinding details, materials required, and complete anchor-bolt details including bolt circle-projection and hardware. If a breakaway base is required, its details shall be shown.

When requested, sufficient design data shall be furnished with the drawings to

verify that **the** conventional light pole is in accordance with wind load, deflection, vibration, and breakaway requirements. All of the above shall be based on the light pole details shown on the plans. After approval, the Engineer shall be advised of where changes to the Installation Summary sheets are being made because of existing roadside conditions. Where necessary, additional light pole working drawings shall be submitted for approval.

807.07, line 122**(b) Foundation Excavation**

If possible, excavation for concrete foundations shall be accomplished by means of drilling with an auger of sufficient size to admit the width of the foundation. Work shall be so scheduled that all open excavations are poured with concrete during the work day they are dug. No excavations shall remain open over night, or over a weekend, or holiday. Accumulated water shall be removed from the excavation before concrete is poured. If class X material is encountered, foundation excavation shall be completed in accordance with 206.02(b).

807.06, line 180

Conduit for service supply shall be mounted on a service pole, either company or State owned, near the right-of-way line. For simple supply circuits, one straight, **and** continuous, conduit riser shall be used. The top end shall terminate with a weatherhead device, and the lower end shall terminate at least 2 ft below ground level with a threaded grounding bushing fitting. Unless otherwise directed, the weatherhead shall be 24 ft above the ground. However, the actual elevation of the weatherhead shall meet the requirements of the utility concerned.

807.11, line 459

~~As shown on the plans, should the ring provide more luminaire attachment positions than luminaires to be installed, counterweights of the same weight of the luminaire shall be installed on those positions.~~
If the ring, as shown on the plans, provides more luminaire attachment positions than there are luminaires to be installed, counterweights of the same weight as the luminaire shall be installed on those positions.

807.12, line 463**807.12 Grounding**

Ground wire shall be No. 4 AWG solid bare copper. Ground rods shall be 1/2 in. diameter by 8 ft long copper weld ground electrodes except where larger sizes are specified. The top of the ground rod shall be driven at least 6 in. below grade. Ground rods shall not be installed within the light pole sign structure, or high mast tower foundations.

The ground wire shall be connected to the top or side of the ground rod. The ground rod, **to** ground wire connection shall be made by a thermo weld process. The wire and ground rod shall be free of oxidized materials, moisture, and other contaminants prior to inserting the wire and the ground rod into the properly sized mold. The welding material shall sufficiently cover and secure the conductor to the rod. The completed connection shall be non-porous.

807.12, line 505

A Type I service for supply of electrical energy shall consist of a conduit riser to a weatherhead. This conduit shall be grounded at the lower end by means of a standard strap

grounding connection to the ground wire and ground rod. A Type II service shall consist of a multiple number of conduits from underground to the bottom of the service cabinet and a single conduit to a weatherhead from the top of the service cabinet. All of these conduits shall be connected by a single ground wire from the grounding terminal to a grounding bushing for each conduit within the interior of the service cabinet. **In addition a4** ground wire from the grounding terminal of the service cabinet shall be connected through a conduit to a ground rod.

807.13, line 531

1. Roadway Luminaires

Each luminaire shall be leveled in both directions in the horizontal plane after the light pole has been erected and adjusted. Rotary adjustment of the mast arm and vertical adjustment of roadway luminaires to obtain an installed level position in both directions shall be accomplished by means of the bolted saddle arrangement used to attach the luminaires to the mast arm. For certain light source types, such as metal halide, lamp socket positions may be shown on the plans by type of Illuminating Engineering Society of North American, IES, and light pattern. The specified lamp socket position or comparable arrangement of LEDs shall be used to obtain the desired light pattern delivery. Proper connections shall be made to provide operation at the voltage being supplied. Replacements needed because of faulty or incorrect voltage connections shall be made with no additional payment. All roadway luminaires provided for an intersection, interchange, or contiguous highway segment shall be the same type, model, and wattage.

807.13, line 591

(b) Warranty

A non-prorated manufacturer's written warranty, against loss of performance, defects in materials, and defects in workmanship, shall be provided to and in favor of the Department. The warranty shall cover a period of 10 years from the date of shipping of the luminaire. The warranty shall cover all components of the luminaire, including but not limited to driver and light source. ~~Loss of performance is defined to include, but is not limited to, the luminaire or any of its components falling out of compliance with the specification in place at the time of installation, which includes, but is not limited to, the following: there is no light output from 10% or more of the LEDs, the luminaire is operating below the lumen maintenance curve, or the color temperature shifts more than 500K outside of the specified color temperature range.~~ *Loss of performance is defined as the luminaire or any of its components falling out of compliance with the specification in place at the time of installation. Loss of performance includes, but is not limited to, no light output from 10% or more of the LEDs, the luminaire operating below the lumen maintenance curve, or the color temperature shifting more than 500K outside of the specified color temperature range.* The warranty shall stipulate that repaired or replacement luminaires shall be shipped to the appropriate Department District Office, at no cost to the Department, within 30 days after the manufacturer's receipt of failed luminaires. Replacement luminaires shall be the same model or a model that is equal to, or better, in terms of photometrics, energy consumption, and reliability. Warranty documents shall include the manufacturer's name, address to which failed luminaires are to be shipped for replacement, and the contact person's name, phone number, and email address. Warranty documents shall provide the estimated life cycle of the lamp, LEDs, plasma emitter and power driver. A Type C certification in accordance with 916 shall be provided for the luminaires.

807.19, line 883

The cost of the pole, lowering system including winch assembly, power cable, and support cable, concrete pad, luminaire ring, anchor bolts and nuts, lightning rod assembly, grounding system, and all incidental materials necessary to complete the installation shall be included in the cost of high mast tower.

SECTION 808 – PAVEMENT TRAFFIC MARKINGS**808.01 Description**

This work shall consist of furnishing and installing, or removing, pavement traffic markings and snowplowable raised pavement markers in accordance with the MUTCD, these specifications, and as shown on the plans. Markings shall be installed as required unless written approval is obtained from the District Traffic Engineer to make modifications at specific locations.

808.03, line 28**808.03 General Requirements**

Permanent pavement markings shall be placed on the surface course in a standard pavement marking pattern. Center lines shall be placed on two-way, two-lane roads. Lane lines shall be placed on multi-lane divided roads, and both center lines and lane lines shall be placed on multi-lane undivided roads.

The pavement shall be cleaned of all dirt, oil, grease, excess sealing material, excess pavement marking material and all other foreign material prior to applying new pavement traffic markings. New paint pavement markings may be placed over sound existing markings of the same color. New thermoplastic, preformed plastic, or multi-component markings may be applied over sound existing markings of a compatible type if allowed by manufacturer's recommendations, a copy of which shall be supplied to the Engineer prior to placement; otherwise, existing markings shall be removed in accordance with 808.10 prior to placement of the new markings. Removal of pavement marking material shall be in accordance with 808.10. The pavement surface shall be dry prior to applying pavement traffic markings.

808.04, line 90

The center line of a two-lane, two-way roadway, where passing is allowed in one direction only, shall be marked with a double line, consisting of a broken line and a solid line. The broken line and the solid line shall be spaced 6 in. apart on the state highway system, 6 in. apart on all other roads, and shall be equally offset on opposite sides of the geometric centerline unless a different spacing is approved by the Engineer. The solid line shall be offset toward the lane where passing is prohibited. The broken line shall be offset toward the lane where passing is allowed.

808.04, line 129**(e) Markings in Retrofitted Corrugations**

In sections where corrugations are being placed in the existing surface, all existing pavement markings shall be removed in accordance with 808.10 and any existing sealants shall be removed by routing or grinding. Temporary pavement markings placed in accordance with 801.12 shall be offset a sufficient distance from the longitudinal joint so

as ~~to~~ not to obstruct the installation of the corrugations or the application of the liquid asphalt sealant.

808.07, line 177

For contracts with completion dates when conditions do not ~~enable~~ allow application of the specified marking materials, or grooving for durable marking materials, other materials may be substituted with an appropriate unit price adjustment if approved by the Engineer.

When directed, the Contractor shall provide the Department with original copies of all necessary current manufacturer's installation manuals prior to beginning installation work, ~~and n~~o installation work shall begin prior to the Department's receipt of these manuals. These manuals shall become the property of the Department.

808.07, line 314

Durable pavement marking materials used for barrier lines, pavement messages, and transverse markings shall be surface applied unless otherwise indicated on the plans.

1. Grooving for Durable Pavement Markings

a. Application

The pavement shall be grooved prior to the placement of longitudinal durable pavement markings, excluding bridge decks and approach slabs. The groove or recess shall be installed in a single pass using dry cut equipment that utilizes diamond cutting blades and ~~that~~ is approved by the pavement marking manufacturer. If there are no markings on the pavement, a guide line shall be placed using paint without glass beads as a template for the grooving operation. The groove shall be at least 1 in. and no more than 2 in. wider than the pavement marking to be placed.

808.07, line 333

The depth of the groove shall be in accordance with the manufacturer's recommendations and shall be, at minimum, 5 mils greater than the thickness of the marking material, including exposed glass beads, up to maximum allowable depth of 150 mils. A continuous groove shall not be allowed for broken or dotted lane lines. The groove may extend up to 3 in. at either end of a lane line. Grooves shall be no closer than 2 in. to the edge of a longitudinal joint.

808.07, line 361

b. Equipment

The equipment used for the application of thermoplastic markings shall consist of a kettle for melting the material and an applicator for applying the markings. All of the equipment required for melting and applying the material shall maintain a uniform material temperature within the manufacturer specified limits, without scorching, discoloring, or overheating any portion of the material.

A truck-mounted machine shall be equipped with the following: ~~an air blast device for cleaning the pavement ahead of the marking operation; a guide pointer to keep the machine on an accurate line; at least two spray guns which can be operated individually or simultaneously; agitators; a control device to maintain uniform flow and application; an~~

~~automatic device which will provide a broken line of the required length; and an automatic bead dispenser which is synchronized with the marking application.~~

- (1) an air blast device for cleaning the pavement ahead of the marking operation,*
- (2) a guide pointer to keep the machine on an accurate line,*
- (3) at least two spray guns which can be operated individually or simultaneously,*
- (4) agitators,*
- (5) a control device to maintain uniform flow and application,*
- (6) an automatic device which will provide a broken line of the required length, and*
- (7) an automatic bead dispenser which is synchronized with the marking application.*

808.10, line 553

When a blast method is used to remove pavement markings, the residue, including sand, dust, and marking material, shall be vacuumed concurrently with the blasting operation or removed by other approved methods. Accumulation of sand, dust, or other residual material, which might interfere with drainage or constitute a traffic hazard, will not be allowed.

808.11, line 572

(b) Location

Marker locations shall be accurately laid out and will be subject to approval prior to the installation operation. Markers shall not be located on surfaces that show visible evidence of cracking, checking, spalling, or failure of underlying materials. Markers shall not be located within the intersection of a public road. Any marker location, which falls on any of the restricted areas, shall be moved a longitudinal distance not to exceed 10% of the required marker spacing. If this adjusted location still falls within a restricted area, then that marker location shall be deleted. Marker locations shall be as shown on the plans.

808.11, line 600

Installation of markers on new concrete pavement, ~~or~~ bridge decks, or on newly overlaid bridge decks shall not be ~~done~~ performed until after the pavement or bridge deck is ready to be opened to traffic as specified elsewhere herein.

808.11, line 612

The markers shall be removed with a jackhammer or other approved equipment. The area of the pavement or bridge deck disturbed by the marker removal shall not exceed 3 in. in depth or extend more than 3 in. out from any side of the marker base. The marker removal operation shall stop if it is determined that excessive damage is occurring to the pavement, or bridge deck.

808.12, line 662

Snowplowable raised pavement markers will be measured by the number ~~of units~~ placed or removed. Prismatic reflectors will be measured by the number ~~of units~~ furnished and installed. Each two-way prismatic reflector will be measured as one reflector. No measurement will be made ~~of~~ for the adhesive or the hole patching material used in the

placement or removal of snowplowable raised pavement markers.

808.13, line 718

No additional payment will be made for the removal ~~and~~ or replacement of markings that fail to meet the performance or warranty conditions ~~of~~ *in accordance with* 808.07 and 808.09.

SECTION 809 – ITS CONTROLLER CABINETS AND FOUNDATIONS**809.05, line 37****809.05 Cabinet Wiring**

Wiring within ITS cabinets shall be neatly arranged and ty-wrapped, or enclosed in expandable braided polyester sleeving. All cabinet wiring harnesses shall be neat, firm, routed, and mechanically supported to minimize crosstalk, electrical interference, and to prevent inadvertent pulling. AC power cables shall be routed and bundled separately from shielded control cables which include, but are not limited to, logic voltage, video cables, and RF cables.

809.06, line 64**809.06 Field Testing**

Cabinets and ITS components shall be field tested in accordance with the field test procedure furnished by the Department. ~~and if~~ The test results shall be submitted to the ITS Electronics Technician of the Operations Support Division. The Contractor shall record all test readings, in triplicate, on the field test procedure form. The Contractor shall complete, sign, and date the forms before submitting them to the ITS Electronics Technician.

DIVISION 900 – MATERIALS DETAILS**SECTION 901 – PCC MATERIALS****901.01(b)2a, line 49****a. General Requirements**

Cements shall comply with the applicable requirements of 901 and will be accepted by certification from qualified manufacturers or distributors. The manufacturer is defined as the plant producing the cement. A manufacturer or distributor shall become qualified by establishing a history of satisfactory quality control of cement produced as evidenced by results of tests performed by a testing laboratory which is regularly inspected by the Cement and Concrete Reference Laboratory of the ~~National Institute of Standards and Technology~~ NIST. Proof of such inspection shall be furnished upon request. All certifications shall be prepared by the manufacturer or distributor in accordance with the applicable requirements of 916. If a manufacturer or distributor elects to supply portland cement with a higher sulfur trioxide content in accordance with footnote B from Table 1 in AASHTO M 85, they shall supply all the required supporting data to the Department's Division of Materials and Tests prior to supplying such cement. A QPL of Cement Sources will be maintained by the Department.

901.02(b)1, line 188

For each 2,000 t produced, a complete AASHTO M 295 analysis shall be performed on a sample ~~composited~~ *composed* randomly from the daily samples. The method of randomization shall be subject to approval by the Department.

901.03(b)1, line 279**1. Requirements**

Slag cement shall be in accordance with ASTM C989 for grade 100 or 120.

For each 2,500 t produced, a complete ASTM C989 analysis shall be performed on a sample ~~composited~~ *composed* randomly from the daily samples. The method of randomization shall be subject to approval by the Department.

901.04(b)2, line 385**2. Frequency of Testing**

- a. The manufacturer shall obtain a minimum of one sample for each 400 t of material produced. Test results for moisture content and loss on ignition shall be furnished for each sample.

901.05, line 459**(a) Requirements**

Chemical anchor systems shall be in accordance with the following:

1. Chemical anchor systems shall be two-part systems which are capable of anchoring deformed steel reinforcing bars and grouting load transfer dowels.

901.06(a), line 486

1. PCC sealer/healers shall be two-part systems, capable of sealing and healing cracks in PC pavement.

901.09, line 562

901.09 Air-Cooled Blast Furnace Slag ACBF for Retaining Walls

If ACBF or coarse aggregate is used, and soil, B borrow, structural backfill, or coarse aggregate is to be placed above the ACBF or coarse aggregate, a single layer of geotextile shall be placed on top of the ACBF or coarse aggregate in accordance with 616.11.

901.10(a)1, line 599

~~Prior to beginning casting,~~ Ground-reinforcement connection hardware and reinforcing bar lifting devices shall be set in place and secured ~~prior to beginning casting,~~ in accordance with the dimensions and tolerances shown on the working drawings.

a. Production Control Testing and Inspection

The manufacturer shall provide for all testing and inspection services during each day's production of the panels. The frequency of production control testing shall be based on a lot of 50 panels, or fraction thereof, for each day's production. Sampling and testing of the plastic concrete shall be in accordance with 505.01, or the ASTM equivalent. A minimum of one water/cementitious ratio, slump, air content, and relative yield tests shall be run per production lot, per day. A minimum of two 6 in. by 12 in. cylinders shall be cast per day's production lot for compressive strength determination. Cylinders shall be cured in the same manner as the panels they represent. Relative yield, air content, and slump of the concrete shall be in accordance with 702.05. Compressive strength shall be determined in accordance with AASHTO T 22 or ASTM C39, with lot acceptance based on the average of 2 cylinders tested at an age no greater than 28 days. Panels shall not be shipped until the compressive strength meets or exceeds the 28-day requirement.

901.10, line 648**e. Concrete Finish**

The concrete surface for the front panel face shall have a surface finish produced from contact with the form. The rear face of the panel shall be screeded to eliminate open pockets of aggregate and surface distortions ~~in excess of exceeding~~ 1/4 in.

901.10(a)1h, line 705

- (3) Defects in the physical characteristics of the concrete, such as broken or chipped concrete, ~~or~~ color variations, or dunnage marks on the front face due to excessive form oil or other reasons.

SECTION 904 – AGGREGATES**904.02(a), line 101****(a) For Portland Cement Concrete**

Fine aggregate for use in PCCP or bridge decks shall be natural sand. Fine aggregate for other PCC shall be natural sand or crushed limestone, dolomite, gravel, or ACBF.

Natural sand, which has been used as foundry sand, when tested in accordance with ITM 215, and complying with IDEM Class III or Class IV in accordance with 329 IAC ~~10-7-410-28-8~~ may be used in precast concrete units or precast concrete pipe. When foundry sand is used, the precast concrete manufacturer shall maintain a copy of the Waste Classification issued by IDEM and an indemnification statement shall accompany the precast items to each contract.

(b) For HMA Mixtures

Fine aggregates for use in HMA shall be natural sand or crushed limestone, dolomite, gravel, sandstone, SF, or ACBF. SF sand may be used in HMA surface mixtures. SF sand may only be used in HMA base and HMA intermediate mixtures if SF, in accordance with 904.01, is used to produce the SF sand. The amount of crushed limestone sand shall not exceed 20% by volume of the total aggregate used in HMA surface mixtures with ESAL counts equal to or greater than 3,000,000, except limestone sands manufactured from aggregates on the QPL of Polish Resistant Aggregate Sources will not be limited. If soundness testing cannot be conducted, the aggregate shall come from a Category I source in accordance with ITM 203.

904.02(g), line 163

When ~~steel slag~~ SF is used for snow and ice abrasives, and payment is on a tonnage basis, the pay quantity shall be adjusted in accordance with 904.01.

904.03(d), line 241:**1. HMA Coarse Aggregate**

- a. ESAL Category 2 and Type B surface mixtures. All coarse aggregate types including ACBF—~~slag~~, SF ~~slag~~, sandstone, crushed dolomite, polish resistant aggregate, crushed stone, ~~and/or~~ gravel may be used.
- b. ESAL Category 3 and Type C surface mixtures. ACBF—~~slag~~, SF—~~slag~~, sandstone, crushed dolomite, polish resistant aggregate or any combination thereof shall be used. Crushed stone or gravel shall not be used unless the aggregate is classified as a crushed dolomite or polish resistant aggregate.
- c. ESAL Category 4 and Type D surface mixtures. High friction aggregates including ACBF ~~slag~~, SF ~~slag~~, sandstone, or aggregates in accordance with ITM 221 shall be used and, at a minimum, shall comprise 50% by volume of the coarse aggregate.

904.04, line 318**(a) Dumped Riprap**

Dumped riprap shall be broken concrete, masonry, ~~or~~ stone removed from an old structure, ~~;~~ broken pieces removed from concrete pavement, base, or monolithic brick pavement, ~~;~~ ~~or~~ broken rock from class X, class Y, unclassified excavation, or solid rock excavation. Material provided from sources outside the right-of-way shall be coarse aggregate, Class F or higher.

904.04, line 333**(d) Uniform Riprap**

The material shall be coarse aggregate, Class F or higher in accordance with 904.03(a). Gradation shall be in accordance with 904.04(f). Either ~~Type Uniform~~ A or ~~Type Uniform~~ B may be utilized.

SECTION 906 – JOINT MATERIALS**906.02(a)1c, line 34**

The sealants which are self-leveling shall be identified as such on the QPL of Joint Sealants and will not require tooling. Sealants not identified as self-leveling on the QPL shall be tooled or applied to wet the joint faces. Sealants which are not self-leveling will not position properly in the joint under their own weight. A backer rod as set out herein shall be used to control sealant configuration and facilitate tooling. Joint configurations shall be as shown on the plans. After a

joint has been sealed, all surplus joint sealer on the pavement surfaces shall be promptly removed. Traffic shall not be allowed over sealed joints until the sealer is tack free.

The sealant shall be delivered in containers **plainly legibly** marked with manufacturer's name or trademark.

906.02(a)2, line 53

Property	Requirements
Cone Penetration at@ -25°C, mm	90 maximum
Softening Point, °C	80 minimum
Bond, non-immersed	Three 12.5 ±0.2 mm specimens pass 3 cycles at 50 % ext. at@ -29°C
Resilience, %	60 minimum
Asphalt Compatibility	Pass

906.02(a)3, line 68

Property	ASTM Test Method	Requirements
Tensile strength, minimum, psi (MPa), min.	D412	2000 (13.8)
Elongation at break, minimum, %, min.	D412	250
Hardness, Type A durometer, points	D2240	55 ±5
Oven aging, 70 h at@ 212°F (100°C) <i>Tensile strength, loss, %, max.</i> <i>Elongation, loss, %, max.</i> <i>Hardness, Type A durometer, points change</i>	D573	20 20 0 to +10
Tensile strength, loss, maximum, %		20
Elongation, loss, maximum, %		20
Hardness, Type A durometer, points change		0 to +10
Oil Swell, ASTM Oil 3, 70 h at@ 212°F (100°C) , Weight change, maximum, %, max.	D471	45
Ozone resistance 20 % strain, 300 ppm in air, 70 h @ 104°F (40°C)	D1149	no cracks
20 % strain, 300 ppm in air, 70 h - at 104°F (40°C)		no cracks
Low-temperature stiffening, 7 days at@ 14°F (-10°C) <i>Hardness, Type A durometer, points change</i>	D2240	0 to +15
Hardness, Type A durometer, points change		0 to +15
Low-temperature recovery, 72 h at@ 14°F (-10°C) , 50 % deflection, minimum, %, min.	D2628	88
Low-temperature recovery, 22 h at@ -20°F (-29°C) , 50 % deflection, minimum, %, min.	D2628	83
High-temperature recovery, 70 h at@ 212°F (100°C) , 50 % deflection, minimum, %, min.	D2628	85
Compression-deflection, at 80 % of nominal width, minimum, lbf/in. (N/m), min.	D2628	3.5 (613)

906.02(b), line 97

(b) Backer Rod

The rod ~~is to act~~ as a bond breaker, to control the thickness of the bead, and to provide support for any required tooling of the sealant.

906.07, line 189

Structural steel shall be in accordance with ASTM A36, ASTM A242, ASTM A588, ASTM A1011, or ~~ASTM A575 grades~~ M 1010 or M 1020 ~~in accordance with ASTM A575~~.

SECTION 907 – CONCRETE, CLAY, AND PLASTIC DRAINAGE COMPONENTS**907.07, line 143**

The joint membrane shall be supplied in ~~11 in. minimum~~ roll widths ~~of a minimum of 11 in.~~ Joint membrane shall be installed in accordance with all manufacturer's installation instructions including surface preparation and primer materials. The joint membrane shall be protected by a release paper.

907.11, line 176

A certification in accordance with 916 shall be provided for the material for the sealing of joints of bell and spigot, or tongue and groove concrete or clay pipe, or culverts furnished under this specification. The material shall not contain asbestos fibers.

907.28, line 349

Reinforced thermosetting resin pipe and accompanying fittings shall be in accordance with ASTM D2996 for the specified sizes. The short-term rupture strength hoop tensile stress shall be a minimum of 30,000 psi. All pipes shall be pigmented resin throughout the wall thickness. The color of the pipe shall match color No. 26400 of SAE-AMS-STD-595. Painting, gel-coating, or exterior coating of the pipe to obtain the specified color shall not be ~~done~~ performed. Pipe shall be tested in accordance with ASTM G154 for 2,500 h of accelerated weathering following cycle 2 as defined in Appendix X2. After testing, the surface of the pipe shall show no fiber exposure, crazing, or checking, and may have only a slight chalking or color change. An adhesive recommended by the manufacturer shall be used for joining pipe and fittings. A Type A certification in accordance with 916 shall be provided for reinforced thermosetting resin pipe ~~and~~ fittings. The results of the following shall be shown on the certification.

SECTION 909 – COATINGS, PAINTS, AND LIQUID EPOXY

[Note: "Coatings, Paints" - previously approved changes by SC]

909.02(a), line 44

Both inorganic zinc primer and organic zinc primer for use on ~~faying~~ ~~tightly fitting~~ surfaces at all slip-critical structural bolted connections using ASTM F3125, ~~Grade A325 or Grade A490~~, high strength heavy hex bolts in primary members shall meet ~~Class B~~ slip coefficient in accordance with Test Method to Determine the Slip Coefficient for Coatings Used in Bolted Joints as adopted by the Research Council on Structural Connections.

SECTION 910 – METAL MATERIALS**910.01, line 3****910.01 Reinforcing Bars, Dowel Bars, and WWR****(a) General**

Unless otherwise specified, bars for concrete reinforcement shall be deformed billet steel, Grade 60. Tie bar assemblies used in lieu of bent tie bars shall be in accordance with the minimum total ultimate strength and minimum total yield strength requirements specified for bent tie bars. Bend test and elongation will not be required. Coiled reinforcing bars shall only be used for fabrication of spiral and ring reinforcement or for rectangular ties and stirrups. When approved by the Engineer, coiled reinforcing bars may also be used for supports in accordance with 703.06.

910.02(h), line 299

3. Turned Bolts

The surface of the body of turned bolts shall meet the ANSI roughness rating value of 125. Heads and nuts shall be hexagonal and standard dimensions for bolts of the nominal size specified or the next larger nominal size. The diameter of threads shall be equal to the body of the bolt or the nominal diameter of the bolt specified. Holes for turned bolts shall be carefully reamed. Bolts furnished shall provide for a light driving fit. Threads shall be entirely outside of the holes. A washer shall be provided under the nut.

SECTION 911 – WOOD MATERIALS

911.01, line 14

2. Dimension Lumber

Lumber from 2 in. to, but not including, 5 in. thick and 2 in. or more wide is dimension lumber.

SECTION 915 – BRIDGE PILES AND BEARINGS

915.04, line 227

TABLE A

POLYISOPRENE, OR NATURAL RUBBER, QUALITY CONTROL TESTS

PHYSICAL PROPERTIES		
ASTM D2240	Hardness (Durometer Type A)	55 ±5
ASTM D412	Tensile Strength, min., ksi	2.25
	Ultimate Elongation, min. %	425
HEAT RESISTANCE		
ASTM D573, 70 h, @ 158°F	Change in Durometer Hardness, max. points	10
	Change in Tensile Strength, max. %	-25
	Change in Ultimate Elongation, max. %	-25
COMPRESSION SET		
ASTM D395, Method B	22 h @ 158°F, max. %	25
OZONE		
ASTM D1149	25 ppm ozone in air by volume, 20% strain, 100°F ±2°F / 40°C ± 1°C, 4824 h, mounting procedure, D-518 Method B, Procedure A-B1 Static Strain	No Cracks
LOW-TEMPERATURE BRITTLENESS		
ASTM D746, Procedure 9.1.2	Grades 0 and 2	
	Grade 3, Brittleness @ -40°F	No Failure
INSTANTANEOUS THERMAL STIFFENING		
ASTM D1043	Grades 0 and 2, Tested @ -32°C	Stiffness at test temperature shall not

	Grade 3, Tested @ -40°F	exceed four times the stiffness measured at 74°F.
LOW-TEMPERATURE CRYSTALLIZATION		
Quad Shear Test as Described	Grade 3, 14 Days @ -15°F	Stiffness at test time and temperature shall not exceed four times the stiffness measured at 74°F with no time delay. The stiffness shall be measured with a quad shear test rig in an enclosed freezer unit. The test specimens shall be taken from a randomly selected bearing. A $\pm 25\%$ strain cycle shall be used. A complete cycle of strain shall be applied within a period of 100 s. The first 0.75 cycle of strain shall be discarded. The stiffness shall be determined by the slope of the force deflection curve for the next 0.50 cycle of loading.

TABLE B
POLYCHLOROPRENE, OR NEOPRENE, QUALITY CONTROL TESTS

PHYSICAL PROPERTIES		
ASTM D2240	Hardness (Durometer Type A)	55 \pm 5
ASTM D412	Tensile Strength, min., ksi	2.25
	Ultimate Elongation, min. %	375
HEAT RESISTANCE		
ASTM D573, 70 h, @ 212°F	Change in Durometer Hardness, max. points	15
	Change in Tensile Strength, max. %	-15
	Change in Ultimate Elongation, max. %	-40
COMPRESSION SET		
ASTM D395, Method B	22 h @ 212°F, max. %	35
OZONE		
ASTM D1149	25 ppm ozone in air by volume, 20% strain, 100°F \pm 2°F / 40°C \pm 1°C, 4824 h, mounting procedure, D-518 Method B, Procedure ABI Static Strain	No Cracks
LOW-TEMPERATURE BRITTLINESS		
ASTM D746, Procedure 9.1.2	Grade 3, Brittleness @ -40°F	No Failure
INSTANTANEOUS THERMAL STIFFENING		
ASTM D1043	Grade 3, Tested @ -40°F	Stiffness at test temperature shall not exceed four times the stiffness measured at 74°F.
LOW-TEMPERATURE CRYSTALLIZATION		
Quad Shear Test as Described	Grade 3, 14 Days @ -15°F	Stiffness at test time and temperature shall not exceed four times the

		stiffness measured at 74°F with no time delay. The stiffness shall be measured with a quad shear test rig in an enclosed freezer unit. The test specimens shall be taken from a randomly selected bearing. A $\pm 25\%$ strain cycle shall be used. A complete cycle of strain shall be applied within a period of 100 s. The first 0.75 cycle of strain shall be discarded. The stiffness shall be determined by the slope of the force deflection curve for the next 0.50 cycle of loading.
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SECTION 917 – QUALITY ASSURANCE AGGREGATE CERTIFICATION

917.01 General Requirements

An aggregate source will be authorized to ship products in the status of a Certified Aggregate Producer who is in accordance with the ~~required standards~~ **requirements** of ITM 211. This will consist of a program which will require the aggregate source to make a commitment to product quality management. Approval to participate in the program will be based on the following criteria:

917.01, line 19

Specific details of the CAPP are contained in ITM 211. Additional details about the program are included in the CAPP Training Manual for Producer Technicians. A Certified Aggregate Producer shall operate in accordance with both ~~of these~~ publications.

917.03, line 56

(c) Step 3

The aggregate source will be included on the QPL of Certified Aggregate Producers following satisfactory performance during the trial phase and successful completion of the trial phase audit. Achieving such status shall be accompanied by the inherent responsibility to operate within the tenets of ITM 211. The Certified Aggregate Producer shall produce material at a compliance requirement of a minimum of 95% of the appropriate specifications. The Department will monitor such compliance through periodic in-depth inspections and annual audits of the production site and source records. Initial and ongoing certification is contingent upon the effectiveness of the producer's QCP as evidenced by the quality and uniformity of the products which are prepared in accordance with the ~~appropriated~~ specifications and ITM 211.

917.04, line 98

Notice of removal from Certified status will be in written form, ~~and~~ **and** will be issued by the Department's Division of Materials and Tests, ~~and~~ **The notice** will identify the reasons for the removal. Effective immediately upon receipt of such notification, no further aggregate shipments shall be made on a certified basis.

SECTION 922 – TRAFFIC SIGNAL MATERIALS AND EQUIPMENT

922.10, line 1127

The polebands shall fit the pole as planned. The wire rope shall not be in contact with any 90° edges or with any threads on the band. The pole band material shall be **in accordance with**

~~ASTM A572, grade 50; ASTM A606; or ASTM A36~~ with minimum yield of 50,000 psi ~~in accordance with ASTM A606, ASTM A36, or ASTM A572 grade 50.~~ The minimum width of the bands shall be 3 in. and the bands shall be capable of supporting the pole design load. Each half of the band shall be stamped with the corresponding size number.

922.18, line 1465

922.18 Entrance Switch

The entrance switch shall be a double pole, 50A, 120V AC circuit breaker in a NEMA Type 3R enclosure in accordance with NEMA 250-2008. The minimum dimensions of the enclosure shall be 5 in. wide, 3 3/4 in. deep, and 9 1/4 in. high. A 1 in. rain-tight detachable hub shall be supplied in the top of the enclosure. The enclosure shall have knockouts on the sides, bottom and back with diameters of 7/8 in. to 1 3/4 in. The enclosure shall contain the circuit breaker, an insulated solid bar for connection of AC neutral, a separate lug for attachment of earth ground, have provisions for a padlock, and shall be surface mounted.

SECTION 923 – TEMPORARY TRAFFIC CONTROL DEVICES

923.04(a), line 190

Solar power assisted flashing arrow signs to be used shall be selected from the QPL of Solar Power~~ed~~ Traffic Control Devices.

923.05, line 203

Portable changeable message signs shall be capable of displaying 3 lines with 8 characters per line. Letter height shall be a minimum of 18 in. The sign shall have automatic dimming capability for nighttime operation. Portable changeable message signs shall be selected from the QPL of Solar Power~~ed~~ Traffic Control Devices.

SECTION 925 – ITS CONTROLLER CABINET

925.01, line 64

The latching mechanism shall be a three-point cabinet latch with nylon rollers. The center catch and pushrods shall be zinc-plated or cadmium-plat~~ed~~ steel. Pushrods shall be turned edgewise at the outer supports and shall be 1/4 by 3/4 in., minimum. The nylon rollers shall have a minimum diameter of 3/4 in. and shall be equipped with ball bearings.