WEST VIRGINIA

DIVISION OF HIGHWAYS

SUPPLEMENTAL SPECIFICATIONS

TO ACCOMPANY THE 2000 EDITION
OF THE STANDARD SPECIFICATIONS

TO OBTAIN 2000 SPECIFICATIONS

ISSUED JULY 1, 2000

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DIVISION 100
GENERAL PROVISIONS

SECTION 105
CONTROL OF WORK

105.2 - PLANS AND WORKING DRAWINGS:

DELETE THE 5TH PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Working drawings for steel and timber structures shall consist of shop detail, erection and other working plans, showing details, dimensions, sizes of material, and other information necessary for complete fabrication and erection of the work. The Division will require shop lists for structural steel to be submitted in a format as set forth by the Engineer.

SECTION 107
LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

ADD THE FOLLOWING SECTION:

107.26 - NOTIFICATION OF ABATEMENT, DEMOLITION OR RENOVATION:

In accordance with state and federal regulations, the Contractor shall submit a "Notification of Abatement, Demolition or Renovation" to the address shown below prior to the commencement of demolition or renovation of any building or bridge. This notification is required regardless of the presence of asbestos.

If a building or bridge contains asbestos, the notification process as outlined in the Special Provision for Section 681, Asbestos Abatement shall be followed.

For buildings or bridges that do not contain asbestos, ***only the notification form*** must be submitted to the West Virginia Division of Environmental Protection (DEP) and the United States Environmental Protection Agency (EPA) at the address given below. All notifications must be made a minimum of 10 working days prior to the commencement of demolition or renovation operations. Particular attention is to be made to the "Schedule" section of the form. If for any reason, demolition or renovation cannot begin on the date as submitted, the DEP, Office of Air Quality must be notified at the address below:

West Virginia Division of Environmental Protection
Office of Air Quality
7012 MacCorkle Avenue, S.E.
Charleston, West Virginia 25304-2943
Attn: Mr. W. Leonard Womble
Asbestos Program Manager
Telephone: (304) 926-3647
Fax: (304) 926-3739
e-mail: LWOMBLE@MAIL.DEP.STATE.WV.US

United States Environmental Protection Agency
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029
Attn: Asbestos Coordinator
Telephone: (215) 814-2100

The Project Engineer will have a copy of all asbestos inspection reports available at the field office. The Contractor shall provide copies of all notifications and correspondence to the Project Engineer.

If an asbestos inspection report indicates that there is no asbestos present on a bridge scheduled for demolition or renovation, the need for a trained individual to be on site during either process is waived.

However, the Contractor shall have an individual trained in accordance with the provisions as set forth in 40 CFR Part 61, Subpart M on site to observe building demolition and file a report with the Project Engineer indicating if any suspect (asbestos containing) material was encountered during demolition. A copy of the individuals current training certification must be attached to this report.

DIVISION 400
BITUMINOUS PAVEMENTS

SECTION 401
HOT-MIX ASPHALT BASE, WEARING, AND PATCHING AND LEVELING COURSES

DELETE THE SUBSECTION AND SUBSTITUTE WITH THE FOLLOWING:

401.2 - MATERIALS:

IN THE TABLE ADD AN ASTERISK (*) AFTER THE WORD "COARSE AGGREGATE". IMMEDIATELY BELOW THE TABLE ADD THE FOLLOWING:

* The total shale, coal and other lightweight deleterious material and friable particles shall not exceed 3%. The total thin elongated pieces shall not exceed 5%.

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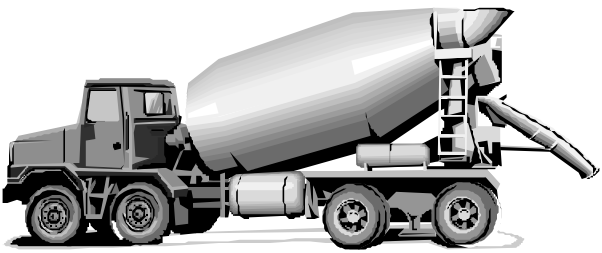

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DIVISION 500
RIGID PAVEMENT

SECTION 506
CONCRETE PAVEMENT REPAIR

DELETE ENTIRE SECTION AND SUBSTITUTE THE FOLLOWING:

506.1 - DESCRIPTION:

This work shall consist of the removal and replacement of deteriorated concrete pavement and patches at locations as shown on plans or as specified by the Engineer.

506.2 - MATERIALS:

Materials shall meet the requirements of Division 501 or 601, and as follows:

Joint sealer 708.3

An accelerating admixture meeting the requirements of AASHTO M 194 may be used.

An approved epoxy grout shall be used to firmly anchor dowel bars in 30 minutes. Bond breaker material shall be supplied from approved sources.

506.3 – PROPORTIONING:

The concrete produced shall meet the requirements of 501, except that the design compressive strength for Special Concrete Pavement Repair shall be 2000 psi (13.8 Mpa) prior to opening traffic. When concrete is to be overlayed with asphalt the requirements of 601 may be substituted. The Contractor shall submit the mix proportions and recent test data for compressive strength at specified age for the concrete to be used.

506.4 - TESTING:

When the strength of concrete specimens representing the concrete placed indicate that the concrete has attained the design strength, that concrete represented by the specimens may be put into service.

506.5 - CONDITIONING EXISTING SUBBASE:

Prior to placing the concrete for the rigid replacement, any subbase material that is disturbed below the desired level of cleanout shall be removed and the patch area compacted to the satisfaction of the Engineer. The Contractor shall replace the removed subbase material with concrete

integral to pavement replacement up to a maximum 1-inch (25 mm) depth. In event soft areas are encountered in the subbase or subgrade, the Engineer may require replacement of subbase and subgrade with 307001-* subbase material and installation of underdrains. The cost of replacing the subbase and subgrade shall be paid for as item 506003-*. The cost of installation and method of installation of underdrains shall be as a per section 606.

506.6 - PLACING CONCRETE:

The concrete shall be placed in the patch using a metal chute; the free fall shall not be more than 3 ft. (1 m.). If the concrete does not fall into its final position in the patch, it shall be moved by means of shovels; raking is prohibited. The concrete shall be worked with tampers, spades or other tools to completely fill the patch area. Maximum effort will be used to ensure that the area beneath the existing concrete pavement is completely filled, internal vibration will be used.

Following the placing of the concrete, the surface will be struck off to finished grade by means of an adjustable steel or wooden template and floated to a smooth finish.

506.7 - CURING:

In accordance with section 501.14. Where early opening to traffic is required, insulation mats may be used over the repairs during curing will be used to accelerate strength gain.

506.8 - RIDE ACCEPTANCE:

During finishing operations deviations in adjacent lanes which are also to be repaired shall not be transferred to the new construction. The Contractor shall furnish and use straightedges to check the surface tolerance. For patches 10 ft. (3 m) or more in length, a 10 ft. (3 m) straightedge shall be used. Shorter straightedges shall be used for patches less than 10 ft. (3 m) in length.

The minimum length straight edge shall be 6 ft. (1.8 m). Section 501.12.6 shall govern except the shorter straightedges shall be used for shorter patches. The concrete pavement should be finished to match existing texture.

Surface tests on patches shall be performed as follows:

As soon as the concrete has hardened sufficiently, the pavement surface shall be tested with a 10 ft. (3 m) straightedge. The straightedge shall be placed in successive positions parallel to the road centerline matching existing wheel paths. Areas showing high spots of more than ¼ inch (7 mm), but not exceeding ½ inch (14 mm) in 10 ft. (3 m) shall be marked and ground down with an approved grinding tool to an elevation where the surface deviations will not be more than ¼ inch (7 mm) in 10 ft. (3 m). Where the deviations exceeds ½ inch (14 mm), either high or low, the areas shall be removed and replaced at the discretion of the Engineer and at the Contractor's expense. All areas or sections so removed shall not be less than 6 ft. (1.8 m) in length nor less than full width of the traffic lane involved.

Any remaining portion of the slab adjacent to the joints that is less than 6 ft. (1.8 m) in length shall also be removed and replaced. Where concrete repairs are made that are to be overlayed the smoothness criteria is waived for the concrete repair.

506.9 - METHOD OF MEASUREMENT:

The quantity of concrete pavement repair to be paid for will be the number of square yards (meters) complete in place and accepted.

506.10 -BASIS OF PAYMENT:

The quantity of special concrete pavement repair, determined as provided above, will be paid for at the contract unit price which shall constitute full compensation for the furnishing, hauling and placing of all materials, including admixtures, the removal and disposal of old concrete, all labor, tools, equipment, and incidentals necessary to complete the item.

506.11 - PAY ITEM:

ITEM	DESCRIPTION	UNIT
506001-*	CONCRETE PAVEMENT REPAIR	SQUARE YARD (METER)
506003-*	REMOVE AND REPLACE EXISTING AGGREGATE BASE COURSE	CUBIC YARD (METER)

* Sequence Number

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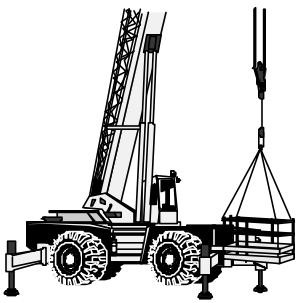

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DIVISION 600
INCIDENTAL CONSTRUCTION

SECTION 601
STRUCTURAL CONCRETE

601.11 - FINISHING CONCRETE SURFACES:

ADD THE FOLLOWING SUBSECTION:

601.11.5 - Finishing Concrete Decks For the Placement of Specialized Overlay:

When the plans require the placement of a Specialized Concrete Overlay, per Section 679, on a newly placed concrete deck, the concrete surface shall be intentionally roughened. The surface shall be raked and roughened to provide a surface profile that will facilitate the bond of the specialized concrete overlay. Floating of this surface shall be minimized to avoid formation of bleed water on the surface.

SECTION 602
REINFORCING STEEL

602.9 - METHOD OF MEASUREMENT:

DELETE THE TABLE AND REPLACE WITH THE FOLLOWING:

TABLE 602.9

Bar Designation	Weight Per Lin. Ft. in Lb. (Mass kg per meter)	Bar Designation	Weight Per Lin Ft. in Lb. (Mass kg per meter)
# 3 (10)	0.376 (.560)	# 9 (29)	3.400 (5.060)
# 4 (13)	0.668 (.994)	# 10 (32)	4.303 (6.404)
# 5 (16)	1.043 (1.552)	# 11 (36)	5.313 (7.907)
# 6 (19)	1.502 (2.235)	# 14S (43)	7.650 (11.38)
# 7 (22)	2.044 (3.042)	# 18S (57)	13.600 (20.24)
# 8 (25)	2.670 (3.973)		

SECTION 604
PIPE CULVERTS

604.14-PAY ITEMS:

DELETE ALL AFTER THE PAY ITEM TABLE AND INSERT THE FOLLOWING:

* Sequence Number
** Class designated by Roman numerals

Note: For Aluminum Box Culverts, haunch and crown plate thicknesses as specified on the Plans.

Note:

Y = a letter, if present, designating base metal thickness or type of elliptical concrete pipe in accordance with the following table.

Z = a one digit number designating metal pipe corrugations or Roman numerals designating concrete pipe class or a one digit number designating elliptical concrete pipe class in accordance with the following table.

	Mil Thickness	
Y	Steel	Aluminum
A	64 (1.63)	60 (1.52 mm)
B	79 (2.0)	75 (1.90 mm)
C	109 (2.77)	105 (2.67 mm)
D	138 (3.51)	135 (3.43 mm)
E	168 (4.27)	164
F	188 (4.78)	---
G	218 (5.54)	---
H	249 (6.32)	---
J	4 BOLTS/FT (13 BOLTS/M) 280 (7.11)	--
K	6 BOLTS/FT (19 BOLTS/M) 280 (7.11)	100 (2.54 mm)
L	8 BOLTS/FT (26 BOLTS/M) 280 (7.11)	125 (3.18 mm)
M	313 (7.95)	150 (3.81 mm)
N	375 (9.52)	185 (4.41 mm)
P	---	200 (5.08 mm)
Q	---	225 (5.72 mm)
R	---	250 (6.35 mm)

Z	**Metal Corrugations**	**Pipe Class**
1	1½"x ¼" (37.5 x 6.25 mm)	---
2	2⅔" x ½" (66.8 x 12.5 mm)	---
3	3" x 1" (75 x 25 mm)	---
5	5" x 1" (125 x 25 mm)	---
6	6" x 2" (150 x 50 mm)	---
7	7½" x ¾" x ¾" (190 x 19x 19)	---
I or 1	---	I
II or 2	---	II
III or 3	---	III
IV or 4	---	IV
V or 5	---	V

Y	**Concrete Pipe**
H	Horizontal Elliptical
V	Vertical Elliptical

SECTION 612
TUNNEL LINER PLATE PIPE

612.9-PAY ITEMS:

DELETE PAY ITEM TABLE AND SUBSTITUTE THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
612001-*	"size" TUNNEL LINER PLATE PIPE, 2-FLANGE DESIGN, Y	LINEAR FOOT (METER)
612002-*	"size" TUNNEL LINER PLATE PIPE, 4-FLANGE DESIGN, TYPE "type", Y	LINEAR FOOT (METER)

* Sequence Number

SECTION 615
STEEL STRUCTURES

615.1.3-Inspection:

DELETE THE 1ST PARAGRAPH AND REPLACE WITH THE FOLLOWING:

Structural steel shall be inspected in the fabrication shop. The Contractor shall furnish the Engineer with a copy of all mill orders and shop lists showing heat numbers to be used for each piece. Mill test reports that document the chemical analysis and physical test results for each heat of steel to be used in the work shall also be furnished. Final approval of the material in the shop will not be given until the above data is approved.

ADD THE FOLLOWING SUBSECTION:

615.2.1-Shop Drawings: The Contractor shall submit copies of the detailed shop drawings to the Engineer for approval. Shop drawings shall be submitted sufficiently in advance of the start of the work to allow time for review by the Engineer and corrections to be made by the Contractor without delaying the work. Upon completion of the work, reproducible, full-size tracings of the original drawings shall be delivered to the Engineer. The size of the original drawings shall be 22 inches (559 mm) x 34 inches (864 mm), including margins, unless otherwise permitted. The shop drawings submitted for approval may be of a reduced size.

The title block of all sheets of the shop drawings shall contain at a minimum the following: state project number, federal project number, bridge name, bridge (design) number, prime contractor's name and fabricator's name.

Shop drawings shall give full detailed dimensions and sizes of component parts of the structure and details of all miscellaneous parts, such as pins, nuts, bolts, drains, etc.

Where specific orientation of plates is required, the direction of rolling of plates shall be shown.

Shop drawings shall specifically identify each piece that is to be made of steel which is to be other than AASHTO M 270 (M270M) Grade 36 (245) steel.

ADD THE FOLLOWING SECTION:

SECTION 616
PILING

616.1-DESCRIPTION:

This work shall consist of furnishing and driving concrete, or steel bearing piles, of the kind and dimensions designated, to the required bearing or penetration in accordance with these Specifications and in reasonably close conformity with the lines and spacing shown on the Plans or established by the Engineer.

616.2-MATERIALS:

Materials shall conform to the requirements specified in the following sections/subsections:

MATERIAL	SUBSECTION
*Steel Bearing Piles and Splices	709.12
Prestressed concrete piles	603
Precast concrete piles	601
Steel Pile Points	709.50

*The piling section shall be of the H form and with total flange width substantially equal to the depth of the section. No section shall have a thickness of metal less than 0.4 inches (10 mm), nor a depth less than 8 inches (200 mm).

CONSTRUCTION METHODS

616.3-PREPARATION FOR DRIVING:

616.3.1-General: Piles shall not be driven until required excavation or embankment is completed. Material forced up between the piles shall be removed to correct elevation, without cost to the Division, before concrete for the foundation is placed.

616.3.2-Caps: The heads of all concrete piles shall be protected by caps of approved design, preferably having a rope or other suitable cushion net to the pile head, and fitting into a casting which, in turn, supports a timber shock block when the nature of the driving is such as to unduly injure them. A cast or structural steel cap or driving head shall be used for driving steel piles, if required, to keep the pile heads from upsetting excessively under hard driving conditions.

616.4-EQUIPMENT FOR DRIVING:

616.4.1-General: When a steam or air hammer is used for driving any type of piles, both the volume and pressure of steam or air recommended by the manufacturer of the hammer, as well as the rated number of strokes per minute, shall be maintained at all times to insure full energy of the driving blows.

Before pile driving is started, the Contractor shall provide written certification to the Engineer that the pile hammer, air compressors, and air valves have been inspected and found to be in good working condition.

In case the required penetration is not obtained by the use of a hammer complying with the minimum requirements in 616.4.2 and 616.4.3, the Contractor shall provide a heavier hammer or resort to jetting at their own expense, unless jetting is specifically prohibited.

616.4.2-Hammers for Steel Piles: Gravity hammers for driving steel piles shall weigh not less than 2,000 and 3,000 lb. (907 to 1,360 kg) respectively, and in no case shall the weight of the hammer be less than the combined weight of the driving head and pile, unless noted otherwise on the Plans. The fall shall be so regulated as to avoid injury to the piles and in no case shall exceed 15 ft. (4.5 m).

Steam or air hammers used for driving steel piles shall develop an energy per blow, at each full stroke of the piston, of not less than 12,000 ft.-lb. (16.3 kJ) unless noted otherwise on the Plans.

616.4.3-Hammers for Concrete Piles: Steam or air hammers used for driving precast concrete piles with a mandrel shall develop an energy per blow, at each full stroke of the piston, of not less than 15,000 ft.-lb. (20.3 kJ) or not less than one foot-pound for each pound of weight driven.

616.4.4-Leads: Pile driver leads shall be constructed in such a manner as to afford freedom of movement to the hammer, and they shall be held in position by guys or still braces to insure firm support to the pile during driving to the lowest point the hammer must reach.

616.4.5-Water Jets: When water jets are used, the numbers of jets and the volume and pressure of water at the jet nozzles shall be sufficient to freely erode the material adjacent to the piles. The plant shall have

sufficient capacity to deliver at all times at least 100 psi (689 kPa) pressure at two ¾ in. (19 mm) jet nozzles.

616.5-METHOD OF DRIVING:

Precast concrete piles shall be driven by means of a combination of steam or air hammer and water jet, but the water jet may be omitted if approved by the Engineer. Other piles shall preferably be driven with an approved steam or air hammer, an approved diesel hammer, or a combination of these hammers, and water jet, except that jetting of steel piles will not be permitted unless special written permission of the Engineer is obtained. The jets, if used, shall be withdrawn before the desired penetration is reached, and the piles shall be driven with the hammer to secure the final penetration.

Pile driver leads shall be used in driving unless otherwise directed by the Engineer in writing. Underwater hammers may be used only when held in rigid leads extending to the full depth.

616.6-ACCURACY OF DRIVING:

All piles shall be driven with a variation of not more than 2%. from the vertical or from the batter line indicated. The plan elevation for cut off shall be measured from the lowest point of the pile head with a maximum deviation of 2 inches (50 mm) above plan cut off providing this deviation does not interfere with other construction requirements. The cut off shall be made at right angles to the pile. The concrete cover from the face of the concrete to any face of the pile shall not be less than 9 inches (225 mm) except on the side the pile penetrates the structure. Additional concrete cover may be monolithically added to the structure to maintain the minimum 9 inches (225 mm) cover at no cost to the Division.

616.6.1-Foundations: The location in plan for piles in foundations may have a maximum deviation of 6 inches (150 mm) from that shown in the contract documents except as provided in 616.6.2.

616.6.2 - Abutments with Single Lines of Piles: The location in plan for piles in an abutment with a single line of piles may have a maximum deviation of 3 inches (75 mm) from that shown in the contract documents.

616.6.3-Combination Pile And Trestle Bents: The location of the top of a combination pile and trestle bent may have a maximum plan deviation of 1 1/2 inches (38 mm).

616.7-DEFECTIVE PILES:

The procedure incident to the driving of piles shall not subject them to excessive and undue abuse producing crushing and spalling of concrete or deformation of the steel. Any pile driven out of its proper location or any pile damaged by reason of internal defects or by improper driving shall be removed or, at the option of the Engineer, a second pile may be driven

adjacent thereto if this can be done without detriment to the structure. All piles so driven shall be at the expense of the Contractor.

616.8-DETERMINATION OF BEARING VALUES:

616.8.1-Loading Tests: When required, the size and number of piles shall be determined by actual loading tests. In general, these tests shall consist of the application of a test load placed upon a suitable platform supported by the pile, together with suitable apparatus for accurately measuring the load and the settlement of the pile under each increment of load. The safe allowable load shall be considered at 50% of that load which produces a permanent settlement not greater than 3 in. (75 mm), measured at the top of the pile, after 48 hours of application. This maximum settlement shall not be increased by a continuous application of the test load for a period of 60 hours. In general, one pile for each group of 100 piles shall be tested.

616.8.2-From Blow Count at Refusal: The size of piles, energy rating of hammer, and design load will be designated on the Plans. All piles shall be driven to refusal into the foundation strata as indicated by the estimated pile lengths or pile tip elevations. Refusal is defined as the equivalent of 20 blows for 1 in. (25 mm) of penetration with a power hammer developing the minimum designated foot pounds per blow. The minimum number of blows in the last inch of penetration shall be as specified on the Plans. If a larger hammer is used, the Engineer will specify the blow count to determine refusal.

616.9-PRECAST CONCRETE PILES:

616.9.1-General: Precast concrete piles shall be constructed in accordance with the size, shape, and reinforcement, shown on the Plans.

Class B concrete shall be used, and the applicable provisions of 601 shall govern.

616.9.2-Formwork: Forms for precast concrete piles shall conform to the general requirements for concrete form work as provided in 601. Forms shall be accessible for tamping and consolidation of the concrete. Under good weather conditions, side forms may be removed 24 hours after placing concrete, but the entire pile shall remain supported for at least seven days and shall not be subjected to any handling stress until the concrete has set for at least 14 days or for a longer period in cold weather, according to the judgment of the Engineer. Where control cylinders are made, bottom forms may be removed when the concrete has developed a compressive strength of 2,000 psi (14 MPa).

616.9.3-Placing and Finishing: Piling may be cast in either a vertical or horizontal position. Special care shall be taken to consolidate the

concrete around the reinforcement and to avoid the formation of stone pockets, honeycomb, or other such defects. To secure uniformity and remove surplus water, the concrete in each pile shall be placed continuously and shall be compacted by vibrating or by other means satisfactory to the Engineer. The forms shall be overfilled, the surplus concrete screeded off, and the top surfaces finished to uniform, even texture similar to that produced by the forms.

As soon as the forms are removed, concrete piles shall be pointed with a 1 to 2 mortar and finished. Trestle piling exposed to view shall be finished above the ground line in accordance with the provisions governing the finishing of concrete columns. Foundation piling and that portion of the trestle piling which will be below the ground surface shall not be finished except by pointing as specified.

616.9.4-Curing: Concrete piles shall be cured in accordance with the general provisions governing the curing of concrete as specified in 601. As soon as the piles have hardened sufficiently, they shall be removed from the forms and placed in a curing pile, separated from each other by wood spacing blocks. No pile shall be driven until it has cured for at least 21 days and in cold weather for a longer period as determined by the Engineer.

616.9.5-Handling: Removal of forms, curing, storing, transporting, and handling precast concrete piles shall be done in such a manner as to avoid excessive bending stresses, cracking, spalling, or other injurious results. Piles shall be lifted by means of suitable bridles or slings attached to the pile along its length. The arrangement shall be such that no stresses in excess of 12,000 (82.7 MPa) psi are developed in the reinforcement, and the maximum compressive stress in the concrete is not over 600 psi (4 Mpa) allowing 100 % of the calculated load for impact and shock.

616.10-PRESTRESSED CONCRETE PILES:

Prestressed concrete piles shall conform to the requirements of 603.

616.11-STEEL PILING:

616.11.1-General: Steel piles shall consist of structural steel shapes of the kind and size specified. Full-length steel piles shall be used where practicable. Splicing of piles is permitted subject to the approval of the Engineer and shall be in accordance with this Specification. The number of welded connections in the length of a pile shall be preferably as few as practicable.

616.11.2-Splicing Steel Piles: If splices are made in steel piles by welding, the abutting surfaces must be true planes. The top surface of the lower pile shall be straightened if bent during the driving process or cut off (flame cutting permitted, 615.4.3.2.2) below the bent portion if it cannot be satisfactorily straightened. The bottom surface of the upper pile shall be

beveled on the inside edges of the flanges and along one edge of the web. The bevel shall be made at an angle of approximately 40° with the horizontal. A surface of ⅛ in. (3 mm) may be left unbeveled. The upper pile shall be securely clamped to the lower pile and separated therefrom ⅛ in. (3 mm), care being taken to make the axis of the two piles coincide. The entire periphery of the pile joint shall then be butt welded, by properly certified welders, with sufficient passes to completely fill the joint, the slag of each pass being removed before beginning the next pass.

616.11.3-Cutting off Steel Piles: Steel piles shall be cut off at the required elevation. If capping is required, the connection shall be made according to details shown on the Plans.

616.12-PREDRILLED PILING:

Holes shall be drilled or bored through the fill material to original ground or into the rock strata, when specified on the Plans, before driving the piles. The predrilled holes for H-piling shall have a diameter of approximately 85 % of the depth of the pile section when the piling is not required to penetrate into rock and shall be a minimum of 100 % of the diagonal dimension of the pile section when the piling is required to be socketed into rock. Holes for round piles may vary from 2 inches (50 mm) less to 4 inches (100 mm) more than the diameter of the pile, the exact diameter to be approved by the Engineer to produce satisfactory pile driving results.

All voids remaining after driving operations shall be filled with concrete sand or other aggregate of a size no larger than No. 8. Test requirements for this material are waived, except that the material shall be dry and free flowing in order to fill the voids around the piles to the satisfaction of the Engineer.

616.13-EXTENSIONS OR "BUILD-UPS":

Extensions, splices or build-ups on concrete piles, when necessary and permitted by the Engineer, shall be made as follows:

After the driving is completed, the concrete at the end of the pile shall be cut away, leaving the reinforcement steel exposed for a length of 40 diameters. The final cut of the concrete shall be perpendicular to the axis of the pile. Reinforcement similar to that used in the pile shall be securely fastened to the projecting steel and the necessary formwork shall be placed, care being taken to prevent leakage along the pile. The concrete shall be of the same quality as that used in the pile. Just prior to placing concrete, the top of the pile shall be thoroughly wetted and covered with a thin coating of neat cement, retempered mortar or other suitable bonding material. The forms shall remain in place not less than seven days and shall then be carefully removed and the entire exposed surface of the pile finished as specified in 616.9.3.

616.14-METHOD OF MEASUREMENT:

The number of linear feet (meters) of piles of the type specified to be paid for will be the actual length of piles remaining in the finished structure. All cut-offs remain the property of the Contractor for disposition.

Extension, splices, or "build-ups" will not be measured for payment as such, but, they will be included as footage in the length of piling remaining in the finished structure. In determining the amount to be included, no allowance will be made for cut-offs necessary to accomplish the extensions, splices, or "build-ups".

"Pile Loading Tests" will be measured separately and will be the actual number of tested piles in place.

616.15-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for furnishing all materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work. The cost of preboring, filling of voids, splicing, and metal shoes or points shall be included in the price bid for the piles.

Loading tests will be paid for at the contract unit price for "Pile Loading Tests", or, in the absence of such a price bid, they will be paid for as extra work.

616.16-PAY ITEMS:

ITEM	DESCRIPTION	UNIT
616003-*	CONCRETE PILES	LINEAR FOOT (METER)
616004-*	"size" STEEL BEARING PILES, DRIVEN	LINEAR FOOT (METER)
616005-*	STEEL BEARING PILES, PRE-DRILLED AND DRIVEN	LINEAR FOOT (METER)
616007-*	PILE LOADING TESTS	PER PILE
616016-*	SHEET PILING LEFT IN PLACE	LINEAR FOOT (METER)
616017-*	SHEET PILING, DRIVEN	LINEAR FOOT (METER)

* Sequence number

SECTION 625
DRILLED CAISSON FOUNDATIONS

DELETE THE ENTIRE SECTION AND ADD THE FOLLOWING:

625.1 - DESCRIPTION:

The work of this section includes the furnishing of all materials and the construction of foundations consisting of reinforced concrete caissons placed within drilled excavations. Each drilled caisson foundation shall consist of a shaft section, with the lower portion in a drilled rock socket and

with the upper portion in a steel casing. This casing will normally be removed during concrete placement unless otherwise shown in the plans or directed by the Engineer.

625.2 - TESTS AND SUBMITTALS:

The Contractor shall deliver all submittals required by this specification to the Engineer no later than one month prior to constructing any drilled caissons shown in the plans. No drilled caissons shall be constructed prior to the Engineer's review and acceptance of all submittals and test hole results.

625.2.1 - Experience:

1) A satisfactory record of experience in drilled caisson construction is considered to be of the utmost importance in obtaining a satisfactory drilled caisson installation. The installation of the drilled caisson is required to be performed by a contractor or specialty subcontractor specializing in installing drilled caissons and having experience with caissons of similar length, diameter, and subsurface conditions as those shown in the contract documents.

2) The Contractor shall submit data on at least two projects performed during the past ten years, for which the Contractor (or the Subcontractor if applicable) has installed drilled caissons of a range of diameters and lengths similar to those shown in the plans, in similar quantities, and under similar subsurface conditions. The list of projects shall contain names and phone numbers of owners' representatives who can verify the participation in those projects.

3) The Engineer shall review and approve the Contractor's (Subcontractor's) caisson. If in the opinion of the Engineer the Contractor's qualifications are not adequate, the Contractor shall submit to the Engineer a proposed method of obtaining the necessary qualifications.

4) The installation of all components of the drilled caisson including; drilling, reinforcement placement, concrete placement, and required wet hole condition work, casing installation and removal, slurry placement, and any other work required to complete the drilled caisson, shall be performed by the approved contractor or specialty subcontractor.

625.2.2 - Site Inspection: A signed statement shall be submitted affirming that the Contractor (or the Subcontractor if applicable) has inspected the project site and the available subsurface information including any available soil or rock samples.

625.2.3 - Installation Plan: The Contractor shall submit an Installation Plan for review by the Engineer. This plan shall provide information on the following:

a) Name and experience record of the drilled caisson superintendent in charge of drilled caisson operations for this project.

b) List of proposed equipment to be used on the project, including barges, cranes, templates, drill rigs, drills, augers, bailing buckets, final cleaning equipment, slurry desanding equipment, slurry pumps, core sampling equipment, welding equipment, tremie or concrete pumps, casing, etc.

c) Details of overall construction operation sequence and the sequence of caisson construction in the piers and/or the abutments; taking due care not to damage fresh concrete by drilling in the immediate vicinity too quickly.

d) Method for maintaining drilled caisson position and alignment during excavation, and details and sequencing of caisson excavation.

e) Details of casing and splices to be used, including calculations (signed and stamped by a Professional Engineer knowledgeable in drilled caissons) showing ability of casing to withstand anticipated hydraulic and earth pressures and to withstand stresses due to installation without undue deformation. Description for withdrawal of casings to demonstrate that concrete will not be lifted during withdrawal.

f) When the use of slurry is anticipated, details of the methods to mix, circulate, and desand slurry. Any request to use a slurry displacement method for the construction of caissons shall also provide information for the Engineer's approval as follows:

1. Detailed description of proposed construction method.
2. Concrete mix, as modified for use with the slurry displacement method.
3. Components and proportions in proposed slurry mixture.
4. Tests proving slurry mixture will not degrade rock or interfere with bond.
5. Methods to agitate slurry mixture prior to concrete placement.
6. Methods to clean slurry mixture for re-use.
7. Disposal methods for used slurry.

g) Details of methods to mechanically clean the caisson excavation.

h) Details of reinforcing cage fabrication and placement including support of the reinforcing cage during handling, after installation, and during concrete placement, along with methods and devices that will be used to center the reinforcing cage and maintain concrete cover over the bars.

i) Details of concrete placement including proposed operational procedures for free-fall, tremie, pumping or other methods.

j) Sample of proposed drilled caisson report, proposed drilled caisson log, and proposed Preinstallation core hole log.

k) Welding procedures and qualifications of welders and tackers as specified in ANSI/AWS D1.1 for casing steel and in ANSI/AWS D1.4 for reinforcing steel.

l) Preinstallation Coring procedure.

m) Qualifications and experience record of firm proposed to perform Preinstallation Coring, including experience record of the supervisor designated to oversee the work.

n) Mix design for concrete and for non-shrink grout.

o) Plan to minimize vibration and wheel loads in the vicinity of newly placed caissons.

p) Plan for compliance with applicable environmental regulations, including but not limited to the protection of river water from degradation due to material excavated from drilled caisson locations or due to other harmful erosion, protection of the environment from slurry spillage or discharge if slurry is used, and general environmental protection of the area from all operations related to drilled caissons.

q) The Contractor's proposed Safety Plan per Section 625.5.2.7.

The Engineer will evaluate the Drilled Caisson Installation Plan for conformance with the Plans, Specifications, and this Special Provision. Within 14 days after receipt of the plan, the Engineer will notify the Contractor in writing of any additional information required and/or changes necessary to meet the contract requirements. All procedural approvals given

by the Engineer shall be subject to trial in the field and shall not result in any additional cost to the Division if they fail to perform also shall not relieve the Contractor of the responsibility to satisfactorily complete the work as detailed in the Plans and Specifications.

625.2.4 - As-Built Records: Within 24 hours of the completed construction of each drilled caisson, the Contractor shall submit a report on the actual location, alignment, elevation, and dimensions of the drilled caisson, and will also submit a completed drilled caisson log as specified herein.

625.2.5 - Test Hole: A test hole shall be drilled at the location and to the diameter and depth shown in the plans. The test hole shall be unreinforced but shall otherwise be constructed the same as other drilled caissons in the plans. This shall include casing extraction if required by the project or the Contractor's proposed installation plan. CSL testing will not be required for the test hole, however the Contractor may, at his own expense perform CSL testing. The Contractor shall revise his methods and equipment as necessary during construction of the test hole when he is unable to carry out the requirements of the plans. Completed test holes shall be left in place except that the top of the caisson shall be removed to a depth of 2 ft (600 mm) below final ground line. Disturbed areas at the site of the test hole shall be restored to their original condition. If the Contractor fails to demonstrate the adequacy of his methods or equipment, the Engineer shall require additional test holes be provided at the Contractor's expense.

625.2.6 - Nondestructive Testing

625.2.6.1 - General Requirements: The nondestructive testing method known as Crosshole Sonic Logging (CSL) shall be used on any drilled caisson which is constructed with the placement of concrete underwater or as required in the plans. The testing shall not be conducted until at least twenty-four hours after placement of concrete is concluded in the caisson, and will be completed within 14 calendar days after such placement.

The CSL tests shall be conducted by the Engineer with the cooperation of the Contractor. The Contractor shall provide suitable working space and access to every tested caisson and shall provide a reliable 1000-watt generator for use by the Engineer.

625.2.6.2 - Preparation for Testing: To accommodate the CSL test requirements, the Contractor shall install a number of tubes in each caisson to be tested. The number of tubes per caisson shall be as tabulated below:

TABLE 625.2.6.2

Caisson Diameter	Number of Tubes	Tube Spacing
Up to 42" (1 049 mm)	3	120º
42" to 60" (1 050 mm to 1 499 mm)	4	90º
60" to 96" (1 500 mm to 2 399 mm)	6	60º
96" (2 400 mm) and larger	8	45º

The tubes shall be per section 625.4.4. Each tube shall have a round, regular internal diameter free of defects or obstructions including defects or obstructions at pipe joints; in order to permit the free, unobstructed passage of 1½ inch (35 mm) diameter source and receiver probes. The tubes shall be watertight and free from corrosion with clean internal and external faces to ensure passage of the probes inside and a good bond with the concrete outside.

Each tube shall be fitted with a watertight shoe on the bottom and a removable cap or plug on the top. The tubes shall be securely attached to the interior of the reinforcing steel cage. The tubes are typically wire-tied to the reinforcing cage every 40 inches (1 000 mm), or otherwise secured such that the tubes stay in position during placement of the cage and during placement of concrete. The tubes shall be installed in each shaft in a regular, symmetric pattern such that the tube spacing in degrees will correspond to that shown in the table above.

The tubes shall be as near to parallel as possible. They shall extend from 6 inches (150 mm) above the caisson bottom to at least 40 inches (1 000 mm) above the caisson top. No tube may be allowed to rest on the bottom of a drilled excavation. If the caisson top is sub-surface, then the tubes shall extend at least 2 ft (600 mm) above the ground surface or above the water surface if the ground surface is below water. Any joints required to achieve full length tubes shall be made watertight. Care shall be taken during placement of the reinforcing steel cage so as not to damage the tubes.

After placement of the cage, and before placement of concrete, the tubes shall be filled with clean water and the tube tops shall be capped or sealed to keep debris or other foreign matter out of the tubes. Care shall be exercised in the removal of caps or plugs so as not to apply excess torque, hammering, or other stresses that could break the bond between the tubes and the concrete.

625.2.6.3 - CSL Logging Procedures: Before placement of concrete, the Contractor shall investigate at least one tube per shaft. This investigation is to make sure that there are no bends, crimps, obstructions or other impediments to the free passage of the testing probes. A record of the tube length or lengths, including a note of the projection of the tubes above the top of the shaft shall be made. The Contractor shall provide information on the

shaft bottom and top elevations, length and construction dates to the Engineer prior to the CSL tests.

The Contractor shall make the caisson and the caisson site available to the Engineer for the conduct of the CSL tests. Any defects indicated by tests shall be evaluated by the Engineer and further tests may be conducted in regard to the extent of such defects. Any time required by such tests will be considered incidental to the work and will not be cause for extra compensation related to a claim or extension of contract.

625.2.6.4 - CSL Testing Results: The CSL test results will be compiled into a caisson integrity testing report for each caisson. The report will summarize and analyze any defect zones indicated on the logs. A copy of each report will be provided to the Contractor.

625.2.6.5 - Evaluation of CSL Test Results: The Engineer will evaluate the CSL test results and will determine whether or not the drilled caisson as constructed is acceptable. If the Engineer determines that the drilled caisson is acceptable based on the CSL tests, then the caisson and the caisson site will be turned back to the Contractor and further construction may proceed.

The acceptance of each drilled caisson shall be the decision of the Engineer, based on the results of the caisson integrity testing report and other information on the caisson placement. Rejection of a caisson shall require conclusive evidence that a defect exists in the caisson, which will result in inadequate or unsafe performance under service loads. If the Non Destructive Testing records are complex or inconclusive, the Engineer may require the Contractor to verify caisson conditions, in accordance with 625.2.6.6. If a defect is confirmed, the Contractor shall pay for all coring and grouting costs. If no defect is encountered, compensation for all coring and grouting will be in accordance with 104.3 and 109.4 of the Standard Specifications.

In the case that any caisson is determined to be unacceptable, the Contractor shall submit a plan for remedial action to the Engineer for approval. Any modifications to the foundation caisson and load transfer mechanisms caused by the remedial action will require calculations and working drawings stamped by a professional engineer registered in the State of West Virginia for all foundation elements affected. All labor and materials required to perform remedial caisson action shall be provided at no cost to the Division and with no extension of the contract time.

625.2.6.6 - Evaluation by Core Drilling: A drilled caisson that is found to be unacceptable shall be cored by the Contractor using double tube core barrels. One or more core holes shall be drilled at the location(s) as determined by the Engineer. A core sample shall be taken from each defect location, at a length specified by the Engineer. An accurate log of the core shall be kept and the core shall be crated and properly marked showing the caisson depth at each interval of core recovery. The core along with five copies of the coring log shall be provided to the Engineer.

If the quality of the caisson, as represented by the core samples, is determined to be acceptable, then the caisson and the caisson site will be turned back to the Contractor and further construction may proceed. If the quality of the caisson is determined to be unacceptable, then the Contractor shall proceed in accordance with 625.2.6.5.

625.3 - DIMENSIONAL REQUIREMENTS:

The dimensional requirements for Placement Tolerances and Caisson Diameters shall be met prior to placement of reinforcing steel. The Contractor shall submit his corrective plan for any deviation from the caisson location, alignment and elevation tolerances, and reinforcement dimensional requirements to the Engineer for approval. The cost of any corrective action shall be borne by the Contractor.

625.3.1 - Placement Tolerances: For any drilled caisson the maximum permissible deviation from plumb shall be 2% or a ratio of 2:100 with respect to a truly vertical axis. For any drilled caisson at its top, the maximum deviation of the center shall be 3 inches (75 mm) from its project plan location.

625.3.2 - Caisson Diameters: Rock sockets shall be of a minimum diameter equal to the caisson diameter shown in the plans. Casings, extending upward from the rock surface, shall have a minimum inside diameter equal to the caisson diameter shown in the plans, but may be larger in diameter to expedite the Contractor's operations.

625.3.3 - Bottom Excavation: Excavation equipment and methods shall provide the completed caisson excavation with a flat bottom. The cutting edges of excavation equipment shall be normal to the vertical axis of the equipment within a tolerance of plus or minus 1¼ in. per 40 in. (30 mm per 1 000 mm) of diameter.

625.3.4 - Caisson Cutoff Elevations: For any drilled caisson the maximum permissible deviation from finished top of shaft elevation shall be minus 3 inch (75 mm) and plus 1 inch (25 mm).

625.3.5 - Reinforcement: After all concrete has been placed, the top of the reinforcing steel cage shall be no more than 4 inches (100 mm) above, and no more than 2 inches (50 mm) below, the plan elevation. An absolute minimum clearance of 3 inches (75 mm) to the reinforcing steel is strictly required.

625.4 - MATERIALS:

625.4.1 - Concrete: Concrete for the drilled caissons shall be Class "B" (modified) and shall conform to the requirements of Section 601 of the

Standard Specifications, except for those requirements which are superseded by this Special Provision.

The design 28-day compressive strength shall be not less than 4500 psi (31 Mpa) unless shown otherwise in the plans. The Contractor will prepare a mix design to attain this strength, retaining the basic characteristics of Class "B" concrete. Slump for dry placement will be 7 inches (175 mm) plus-or-minus 1 inch (25 mm). Unless otherwise specified in the plans, the cement shall be Type I.

For placement of caisson concrete by tremie or pumping, the cement content shall be increased to 8 bags per cubic yard (435 kg/m³), the slump shall be 8 inches (200 mm) plus-or-minus 1 inch (25 mm) and shall maintain a slump in excess of 4 inches (100 mm) throughout the concrete placement, and the maximum aggregate size shall be 1 inch (25 mm).

625.4.2 - Reinforcing Steel: Reinforcing steel for main vertical bars and ties shall conform to Section 709.1, deformed type, grade 60 (400). Reinforcing steel for use as spirals shall conform to Section 709.1, plain type, grade 60 (400).

625.4.3 - Casing: Metal casing shall be used whenever required to prevent caving of the soil material or to exclude ground water. Casing shall be metal, of unit or sectional construction, be strong enough to withstand handling stresses, withstand the pressures of concrete and of the surrounding earth and ground water, and prevent seepage of water. Also, the casing used shall be selected by the Contractor to control dimensions and alignment of excavations within tolerances, to seal the casing into impervious materials, and to execute all other construction operations.

Casing pipe shall conform to ASTM A 252/A 252M, Grade 2, for either temporary or permanent application.

Any required casing splices shall be welded in accordance with Section 625.2.3 e) of this specification with no interior splice plates, producing true and straight casing. All welding shall be in accordance with ANSI/AWS D1.1.

Permanent casing is required in all caissons where noted on the plans. All temporary casing shall be removed during placement of concrete unless otherwise noted on the plans. Should the Contractor be unable to remove the temporary casing, the Contractor shall pressure grout the annular space between the casing and soil. Materials and methods for grouting operation shall be submitted to the Engineer for approval for the grouting operation at no additional cost to the Division.

625.4.4 - CSL Testing Tubes: Tubes required for CSL Tests shall be ASTM A53, Grade B, nominal 2 inch (50 mm) diameter. Hydrostatic test requirements are waived. Threaded Couplings shall be used per ASTM A 865.

625.5
625.5 - CONSTRUCTION:

625.5.1 - General: The following sequence describes a generalized construction method that is expected to be appropriate for the installation of the drilled caissons. Deviations will be permitted with the Engineer's approval.

a) Excavate to top of shaft elevation.

b) Drilling of a "Preinstallation Core Hole" prior to drilling of caisson hole. The drilling and sampling of the preinstallation core holes shall be done by use of double tube core barrels. Additional preinstallation core holes in other locations may be required where directed by the Engineer. Such additional core holes shall be paid for at the contract unit bid price. The preinstallation core hole will be drilled from the ground surface, downward a distance equal to the caisson diameter below the expected bottom of rock socket. Its purpose is to assure that the rock just below the socket is sound and able to carry the loads that will be imposed on it.

A preinstallation core hole is a 2 inches (50 mm) nominal diameter hole, with coring, where the quality of the rock core and the rate of drilling are used to determine if there is satisfactory rock of sufficient type and thickness, and to locate the presence of open joints, voids, soft rock or other deleterious material. Logs of the core hole shall be provided to the Engineer within 24 hours of completion of coring. All cores shall be maintained by the Contractor until completion of the project and shall then become the property of the Engineer.

c) Drilling of cased hole through the soil overburden down to top of competent rock. Seating bottom of casing to minimize entry of ground water.

d) Drilling of rock socket to the minimum diameter shown in the plans and to a depth shown on the drawings or otherwise directed by the Engineer.

e) Cleaning of the drilled hole, particularly the rock socket and the inside face of the casing; inspection of the hole and approval for placement of the caisson material.

f) Placement of the pre-assembled cage of reinforcing steel and securing it in place against movement during concreting and during casing withdrawal. It also must be secured in such a way that the minimum clear cover over the bars is maintained. Placement of tubes as required for CSL testing.

g) Placement of concrete in either dry or wet conditions. In the case of dry conditions, concrete placement shall be by the free-fall method with the concrete carefully directed down the center of the caisson without striking the casing, the reinforcing steel, the CSL tubes or the sides of the rock socket. In the case of wet conditions, concrete placement shall be by tremie or pumping with the mix adjusted accordingly. If the temporary casing is to be removed it shall be withdrawn carefully and slowly so as not to leave any voids in the concrete and so as not to dislocate any reinforcing steel. Any concrete not meeting this specification's slump requirements shall be rejected.

h) For any parts of any caisson that extend above either the existing or permanent grade, that portion shall be placed by use of forms of the diameters shown in the plans. Curing, stripping, and finishing shall be the same as for other structural concrete. Casing may be used as forms.

i) Turning the site over to the Engineer for CSL testing if required. Cooperation with the Engineer in the conduct of the testing, as specified herein. Corrective measures for any unacceptable caissons. Removal of water from the CSL tubes and filling with an approved grout. All core holes must be filled with an approved grout.

625.5.2 - Excavation:

625.5.2.1 - Scope : The Contractor shall drill one preinstallation core hole at each caisson location unless otherwise noted on the plans. The Contractor shall perform all excavations required for the caissons and the rock sockets, through whatever materials are encountered, to the dimensions shown in the plans, or required by the site conditions, or directed by the Engineer. The Contractor shall make each caisson excavation available to the Engineer for inspection, providing tools, equipment, and safety measures as hereinafter specified. Based on preinstallation core hole information or on general inspection of the rock socket, the Contractor shall drill the rock socket deeper if directed by the Engineer.

625.5.2.2 - Excavation through Overburden: Unless otherwise shown in the plans, drilled caisson excavations in the overburden shall be vertical bored holes extending from the ground surface down to the surface of competent rock. Temporary or permanent casings may be required down to the competent rock surface and shall be seated in rock in a manner that prevents caving and minimizes the entry of ground water. In the event of a groundwater condition, appropriate measures shall be taken subject to the Engineer's approval. Such measures may include pumping from within the

excavation, external dewatering, or excavation through a slurry-filled hole until the casing can be seated and sealed. In cases in which the water is difficult to control, the Engineer may permit wet excavation which could require later inspection by diving methods and would require later placement of concrete by underwater methods.

625.5.2.3 - Excavation in Rock: Rock sockets shall be excavated to the dimensions and depths shown in the plans, forming a flat bearing area at the bottom of the socket. Each socket shall be excavated into continuous rock for the indicated length, by use of methods subject to the Engineer's approval. Blasting methods will not be permitted.

Upon completion of each rock socket excavation, the Engineer may (1) accept the socket, or (2) order deeper excavation based upon preinstallation core hole data or general inspection of the socket. The adequacy of each socket will depend on the soundness of its bottom surface and on the soundness of its underlying layers. The Contractor shall drill required preinstallation core holes as directed and shall excavate sockets to the depth directed by the Engineer.

Contractor is cautioned not to over-drill the rock sockets. Unauthorized over-drilling will be at the Contractor's expense. In the case where over-drilling would bring the caisson base too close to a coal seam or other weak layer, then drilling must be extended through such weak layer, at the Contractor's expense, to a satisfactory deeper bearing level as determined by the Engineer.

No portion of the rock socket shall be exposed to drilling fluid or groundwater for more than 96 hours. Any portion of the rock socket exposed to drilling fluid or water for more than 96 hours, and any portion of the rock socket which, in the opinion of the Engineer, has deteriorated due to exposure to air or water, shall be reamed with an approved grooving tool to a depth of not less than ¼ in. (6 mm), or as directed by the Engineer. Reaming of the socket, if necessary, is considered incidental to the cost of drilling the rock socket, and no separate payment will be made for this work.

625.5.2.4 - Providing for Socket Inspection: Upon completion of the excavation of each rock socket, and upon mechanical cleaning of the socket, the Contractor shall make the socket available to the Engineer for inspection. The Contractor shall provide suitable access for inspection, electric lighting, devices for checking dimensions, alignment and plumbness, ventilation equipment, the protective cage, radio communication, and auxiliary safety line. The air in the caisson shall be tested for noxious and/or explosive gases prior to and during entry of inspection personnel, to assure a safe working environment.

625.5.2.5 - Disposal of Materials: Disposal of excavated materials shall be accomplished under the general provisions of Section 207.6 of the Standard Specifications.

625.5.2.6 - River Area: Drilled caisson construction in the river shall employ whatever special methods the Contractor finds necessary for access and for accomplishing the work. These methods may include cofferdams, temporary sand islands, or other suitable measures. The Contractor will be responsible for conforming to all regulatory and environmental requirements related to the river and for obtaining any permits that are required by his river operations.

625.5.2.7 - Safety Measures: Safety of all persons is to be considered an objective of the utmost importance on this project. Therefore, the Contractor will take whatever measures are necessary to protect his own personnel, his subcontractors' personnel, the Engineer or other agents of the state, regulatory personnel, and others including the general public. The following list is presented as representative of issues that the Contractor must address. It is not intended as all-inclusive and does not relieve the Contractor of conforming to other regulations, laws, requirements, or other measures reasonably required for safe excavating operations. The Contractor shall develop a safety plan in accordance with these requirements and provide this plan to the Engineer for his review.

a) Any required equipment within an excavation shall be operated by air or electricity. The use of gasoline-driven engines or diesel engines within an excavation will not be permitted. All lighting shall be electric and precautions shall be taken in regard to potential short circuits of electric current within ground water.

b) The Contractor will take precautions to assure that no explosive or noxious gases are present. Fresh air shall be supplied into the excavation and foul air shall be removed whenever any personnel are present in the hole.

c) A safety harness or chair lift, with separate safety line, protective cage, and two-way radio communication shall be used for any entry into an excavation.

d) No open excavation shall be left unattended. During non-working hours excavations shall be protected by the use of solid, safe covers that are firmly fastened in place.

625.5.3 - Reinforcing Steel Installation: Prior to installation of reinforcing steel, the steel cage shall be checked and cleaned of any materials that would tend to prevent bonding. The excavated hole shall also be checked and any remaining or newly deposited debris shall be removed. Immediately upon the Engineer's approval of the condition of the cage and his acceptance

of the socket, and just prior to placement of concrete, the fully assembled cage of reinforcing steel shall be installed into the excavation.

The cage will consist of longitudinal (vertical) bars, spiral or tie bars, cage stiffener bars as required, spacing devices, and any other appurtenances required to maintain alignment, shape, and clearances. Cages shall include steel tubes in shafts where CSL testing is to occur. Each cage shall be placed in one unit by lowering into the hole in a manner that will prevent distortion. Concrete spacers or other approved noncorrosive spacing devices shall be used at sufficient intervals (near the bottom and at intervals not exceeding 10 ft (3 000 mm) along the caisson) to ensure concentric spacing for the entire cage length. The minimum number of centering devices at each level shall be three. All steel centering devices with less than 3 inches (75 mm) of concrete cover shall be epoxy coated. The cage shall be supported from the top by use of a ground surface frame or other positive means. Setting the cage on the socket bottom without support will not be permitted. The Contractor may with the approval of the Engineer, remove the top support after sufficient concrete has been placed to adequately support the cage vertically and prevent distortion or racking of the cage.

All intersections of drilled caisson reinforcing steel shall be tied with cross or "figure 8" ties. The reinforcing steel in the caisson shall be 100% tied and supported so that the reinforcing steel will remain within allowable tolerances for position. Unless otherwise shown in the plans, splicing shall be by mechanical connectors or couplers which develop at least 125% of yield strength of the reinforcing bar. No more than 50% of the longitudinal reinforcing shall be spliced within 60 bar diameters of any lapped splice location or within 2 ft (600 mm) of any mechanical splice or coupler location. Cage stiffener bars shall be used as required to provide a reinforcement cage of sufficient rigidity to prevent racking, permanent deformations, etc. during installation. If the concrete is to be placed by the free-fall method, these bars must first be removed.

In the event that the caisson has been excavated below the anticipated tip elevation, the reinforcing cage may be extended at the tip (low) end by lap splices, mechanical connectors, or welded splices in conformance with the Standard Specifications. In this instance, splices need not be staggered and 100% of the reinforcing bars may be spliced at a given location. Lap splice lengths shall be as shown in the plans or approved by the Engineer.

Prior to placing the reinforcement cage, the Contractor shall demonstrate to the satisfaction of the Engineer that the fabrication and handling methods to be used will result in a reinforcing cage placed in the proper position, with the proper clearances, and without permanent bending or racking of the reinforcement cage.

The elevation of the top of the steel cage shall be checked before and after the concrete is placed. If the rebar cage is not maintained within the specified tolerances, corrections shall be made by the Contractor to the satisfaction of the Engineer. No additional caissons shall be constructed until the Contractor has modified his rebar cage support system in a manner satisfactory to the Engineer.

625.5.4 - Placement of Concrete: Prior to concrete placement, the Contractor shall make all necessary arrangements to assure the uninterrupted delivery of concrete so that there will not be any cold joints in the caissons. Placement of concrete shall generally conform to the applicable portions of Section 601.10 of the Standard Specifications. The rate of placement of concrete, as related to the height of fresh concrete at any time, will be subject to the Engineer's approval. The placement method will be developed by the Contractor, taking account of set time, hydraulic pressures and casing removal.

The placement of concrete in dry conditions shall be by a free-fall method. The height of free fall is not limited, but segregation of the concrete is not permitted. In order to qualify as a dry condition the caisson excavation must meet two requirements. The first requirement is the infiltration rate shall not exceed ¼ in. (6 mm) of depth per minute as measured in the bottom 18 inches (450 mm) of the rock socket. The second requirement is that at the time of concrete placement the depth of water in the bottom of the rock socket shall not exceed 2 in. (50 mm). The dry concrete placement method may be used only when the sides and the bottom of the caisson excavation remain stable without detrimental caving, sloughing or swelling, and water can be satisfactorily removed prior to inspection and prior to placing concrete.

In a case where the Engineer determines that dry conditions cannot be attained, he will require placement by the wet placement method shown in the approved Installation Plan. The casing shall be filled with clean water to an elevation not less than 4 feet (1 200 mm) above the water elevation outside the casing, to provide a positive water pressure inside the casing. Concrete will then be placed by conventional tremie or pumping methods. Tremie or pump placement methods shall not utilize aluminum parts which would be in contact with the concrete.

Tremies used to place concrete shall consist of a tube of sufficient length, weight, and diameter to discharge concrete at the caisson base elevation. The tremie inside diameter shall not be less than 10 inches (250 mm). The inside and outside surfaces of the tremie shall be clean and smooth to permit both flow of concrete and unimpeded withdrawal during concreting. The wall thickness of the tremie shall be adequate to prevent crimping or sharp bends which restrict concrete placement.

The tremie used for concrete placement shall be watertight. Concrete placement shall not begin until the tremie is placed at the caisson base elevation. Valves, bottom plates, or plugs may be used only if concrete discharge starts within approximately 2 inches (50 mm) above the excavation bottom. Plugs shall either be removed from the excavation or be of a material approved by the Engineer which will not cause defects in the caisson if not removed.

The discharge end of the tremie shall be constructed to permit the free radial flow of concrete during placement operations. The tremie discharge end shall remain at or near the bottom of excavation as long as practicable during

concrete placement. The tremie discharge end shall remain immersed as deep as practicable in the concrete, consistent with the Contractor's construction methods, and shall be immersed at least 10 ft (3 000 mm) in concrete at all times after starting the flow of concrete. The flow of the concrete shall be continuous. The concrete in the tremie shall be maintained at a positive pressure differential at all times to prevent water or slurry intrusion into the caisson concrete.

All pump lines shall have a minimum diameter of 4 inches (100 mm) and shall be constructed with watertight joints. Concrete placement shall not begin until the pump line discharge orifice is at the caisson base elevation. A plug or similar device shall be used to separate the concrete from the fluid in the hole until pumping begins. The plug shall either be removed from the excavation or be of a material approved by the Engineer which will not cause a defect in the caisson if the plug is not removed. The discharge orifice shall remain at least 10 ft (3000 mm) below the surface of the fluid concrete.

If at any time during the concrete pour, the tremie line orifice or the pump line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the entire drilled caisson shall be considered defective. In such case, the Contractor shall remove the reinforcing cage and concrete, complete any necessary sidewall removal directed by the Engineer and repour the caisson. All costs of replacement of defective caissons shall be the responsibility of the Contractor and shall be at no cost to the Department.

After the concrete level has reached the required top elevation, it will be forced to overflow in the case of tremie or pump placement, leaving only fresh, uncontaminated concrete. In the case of placement by free fall (dry conditions), the concrete will be continued high enough to compensate for any settlement due to removal of casing.

The top 10 ft (3 000 mm) of each drilled caisson shall be vibrated except, when more than 10 ft (3 000 mm) is to be exposed above the ground line or the riverbed, then the entire exposed portion shall be vibrated. Exposed portions of each drilled caisson shall be cured in accordance with Section 601.12 of the Standard Specifications.

625.5.5 - Removal of Casing: Removal of the casing from a shaft may occur gradually as concrete is placed. In all cases, extraction of casing shall begin within one hour from the beginning of concrete placement in the cased portion of the shaft. Insofar as possible, casing extraction shall be done at a slow uniform rate by application of a steady vertical upward pull in the direction of the axis of the shaft. To facilitate extraction, tapping on the casing, exertion of temporary downward pressure, slight rotation, or the controlled use of a vibratory hammer will be permitted, but care must be taken to avoid harmful impacts or disturbances to the fresh concrete. Vibration or rodding may not be used to break the casing loose for extraction.

If, during extraction of casing, upward movement of concrete and/or reinforcing steel occurs, the Engineer shall be notified immediately. If he considers the movement to be minor, he may permit the extraction of the

casing to continue. If, however, the movement is deemed significant and indicative of squeezing of the surrounding soil thus resulting in a reduction of the caisson diameter, then he may order the casing to be left in place, or he may permit extraction to proceed and order a later non-destructive load test, or may order other procedures as appropriate at no additional cost to the Division.

For the upper portions of drilled caissons that will be exposed and visible, the casing may remain in place as a form until the concrete has attained a strength that enables it to stand alone without further deformation. Casing shall then be removed.

625.6 - INSPECTION OF SOCKETS:

625.6.1 - Depth of Rock Socket: Each rock socket shall be drilled to the shaft diameter shown in the plans unless otherwise directed by the Engineer based on subsurface conditions encountered.

The top elevation of competent rock must be confirmed as the socket drilling is started. The effective "top elevation" is based on observation of the boundary zone where broken or weathered rock becomes competent rock, and is also influenced by the presence of any shale or coal seams. Based on that elevation, and the information from the preinstallation core hole, the Engineer will determine the final depth of socket and bottom elevation. The drilled rock socket will then be inspected per 625.5.2.3 and will either be accepted or drilled deeper as determined by the Engineer.

625.6.2 - Inspection Under Water: In a case where it is considered unfeasible to dewater a caisson, the Contractor shall provide drilled caisson logs and screenings to the Engineer for evaluation. If this material is not sufficient for a proper judgement, the Engineer will reserve the right to order an inspection by diving or other methods either through a separate specialty subcontractor or through the Contractor in which case compensation would be under Sections 104.3 and 109.4 of the Standard Specifications. Any time required for inspection under water will be considered incidental to the work and will not be cause for extra compensation related to a claim or extension of contract time.

625.7 - METHOD OF MEASUREMENT:

Drilled caissons and Rock Socket foundations will be measured by the linear foot (meter). Drilled Caissons are the portion from the finished top of each caisson to the top of competent rock. Rock Socket is the portion from the top of competent rock to the bottom of the caisson as shown in the plans or as directed by the Engineer. Each measured caisson is to be complete in place, accepted, and ready to function. "Top of caisson" is the top of concrete as shown in the plans. "Top of competent rock" is as tabulated in the drilled shaft schedules in the plans unless a difference of one 1 foot (300 mm) or more is found during drilling.

Drilled Caisson test hole will be measured in Lump Sum basis.

625.8

Preinstallation core hole shall be measured by the linear foot (meter) based upon actual length drilled. The plan quantity shall be based on one core hole, per drilled caisson, measured from the top shaft elevation to one caisson diameter below the bottom of rock socket unless otherwise noted in the plans. No payment shall be made for additional length of Preinstallation core hole drilled above the top of the drilled caisson.

625.8 - BASIS OF PAYMENT:

The accepted quantities of drilled caisson foundations, measured as provided above, will be paid for at the contract unit price per linear foot (meter); complete in place including excavation, slurry if required, temporary or permanent metal casing, steel reinforcing, concrete, curing, and any required forming and finishing. No additional payment will be made for temporary casing that remains in place and pressure grouting due to the Contractor's inability to stabilize a drilled excavation, for the need to place concrete by tremie or pumping, for the need to use slurry for drilling, or for extra excavation and concrete that may be required due to drilling diameters larger than the minimum diameters specified. No additional payment will be made for methods employed to gain access to drilled caisson construction or for means required to provide a dry working environment within the drilled caissons. Tubes for CSL testing, other responsibilities related to testing and inspection assistance are incidental, with no separate payment being made.

Drilled caisson test holes will be paid for at the contract lump sum price for each such hole.

Preinstallation core hole will be paid for by the linear foot (meter).

625.9 - PAY ITEMS:

ITEM	DESCRIPTION	UNIT
625001-*	DRILLED CAISSONS "D" DIAMETER	LINEAR FOOT (METER)
625003-*	"D" ROCK SOCKET FOUNDATION LINEAR	LINEAR FOOT (METER)
625004-*	"D" DRILLED CAISSON TEST HOLE	LUMP SUM
625005-*	PREINSTALLATION CORE HOLE	LINEAR FOOT (METER)

* Sequence number

D = Diameter of drilled caisson, in inches (millimeters)

SECTION 626
RETAINING WALL SYSTEMS

626.7.1 - General:

DELETE THE 1ST PARAGRAPH SUBSTITUTE THE FOLLOWING:

The unit of measurements shall be the gross area in square feet (square meters) lying in a plane outside the front face of the structure as determined by the dimensions in the contract documents. The gross area shall not include barriers, footings, or leveling pads. The gross area shall be the number of square feet (square meters) established in the proposal, subject to adjustment as provided in Sections 104.2 and 109.2 of the Standard Specifications. No adjustment of pay

quantity shall be allowed for changes in wall design to facilitate the Contractor's methods of construction of wall type.

SECTION 640
FIELD OFFICE AND STORAGE BUILDING

DELETE THE ENTIRE SECTION REPLACE WITH THE FOLLOWING:

640.1-DESCRIPTION:

This work shall consist of furnishing and maintaining in good condition suitable offices for the exclusive use of the Engineer as a field office or for making field tests, a storage building for concrete cylinder curing tanks, and equipment for the field office, all in accordance with these Specifications.

640.2-MATERIALS:

Not specified.

640.3-LOCATION AND TIME OF ERECTION:

The field office and storage building shall be set up at approved locations on or in the immediate vicinity of the Project. They shall be separated from any building used by the Contractor.

The field office and storage building shall be set up, equipped, and made ready for use at least three days prior to the beginning of the work on the project.

640.4-FIELD OFFICE:

640.4.1-General: The office shall be entirely enclosed, waterproofed, and sealed inside with wall board which will provide efficient insulation against heat and cold. The building shall have a pitched roof and two ventilating louvers, one in each gable, in order to provide for circulation of air between roof and ceiling. The floors shall be double thickness, with building paper between layers, and the ceiling height shall be not less than 7 feet (2.1 m). All doors, both interior and exterior, shall be equipped with locks. Windows, to furnish natural light, shall be constructed to open and close and shall be provided with latches. Screens shall be provided for all windows and exterior doors, and the building shall be generally flytight. The screen doors shall be equipped with springs and latches.

The office shall be provided with an approved type of heating and cooling equipment that will maintain a comfortable seasonable temperature throughout the project life. It shall be furnished with satisfactory electric lighting and lighting service. A minimum of two duplex convenience outlets shall be provided in each room. The building shall be provided with neat, sanitary, enclosed toilet with exhaust fan accommodations for the exclusive use of the Engineer, and such facilities shall meet the

requirements of the State Department of Health or other authorities having jurisdiction. It shall be stocked with lavatory and sanitary supplies at all times during the period of the Contract.

The office shall be attractively painted on the outside and shall be provided with a sign at least 4 feet (1.2 m) by 1 ft. (300 mm), with the sign content as follows:

FIELD OFFICE--THE WEST VIRGINIA DIVISION OF HIGHWAYS

The letters shall not be less than 3 inches (75 mm) high and shall be white on a black background. The sign shall have a white border at least 1½ in. (38 mm) wide.

The office shall be equipped per section 640.10 and shall include OSHA approved steps and entrance porch with railing.

640.4.2-Large field office: The large field office shall have a minimum floor space of 800 sq. ft. (80 sq. meters). This may be accomplished by the use of two (2) standard field offices or one large equivalent office. The office shall contain the following additional equipment:

1) One office-type desk having at least two drawers on each side and one secretarial-type desk each having minimum top dimension of 30 in. by 60 in. (750mm by 1500mm).
2) One plan rack.
3) One utility table 30 in. (750mm) high and having top dimensions not less than 30 in. by 72 in. (750 mm by 1800 mm)
4) One sanitary-type water cooler supplied with water that shall be kept cooled electrically or with gas.
5) One desk model electronic adding machine with, tape totaling a minimum of 10 digits.
6) One desk model, and two hand held model electronic calculators (all equipped with scientific functions), with a minimum entry of 10 digits and a minimum readout of 10 digits.

640.4.3-Standard Field Office: The standard field office shall have a minimum floor space of 400 sq. ft. (40 square meters) and shall contain two rooms, each with a minimum plan dimension of 20 ft. by 10 ft. (4 by 5 meters). One room shall contain sufficient floor area to include such soil equipment necessary to perform the various compaction control tests as may be required as the work progresses.

640.4.4-Small Field Office: The small field office shall have a minimum floor space of 250 sq. ft. (23.2 sq. m) and shall contain two rooms, each with a floor space of approximately 10 ft. by 12 ½ ft. (3.1 by 3.75 m).

640.4.5-Minimal Field Office: The field office shall have a minimum floor space of 100 square feet (9.3 square meters) with a minimum plan dimension in one direction of 6 ft. (1.8 m). When a sanitary enclosed toilet is not provided, a chemically treated portable toilet shall be provided. The office shall be furnished with a desk, chair, one fireproof filing cabinet equipped with locks, one desk top copier capable of producing 8½ x 11 and 8½ by 14 copies and a phone, fax and answering (message) machine that utilizes the same phone line. The door for the field office shall be provided with a suitable lock. A sanitary water cooler using bottled water or approved equal shall be provided. The requirements of sections 640.10 and 640.11 shall not apply.

640.5-STORAGE BUILDING:

The storage building for concrete cylinder tanks shall have a minimum floor space of 80 sq. ft. (7.4 m) preferably 8 feet by 10 feet (2.4 by 3.1 m). The ceiling height shall not be less than 7 feet (2.1 m). The storage building shall be well insulated and capable of maintaining a reasonably constant temperature. It shall be provided with water, as required, and satisfactory electric lighting. Chairs, tables, and stools, as required, shall be furnished.

The Contractor shall furnish curing tanks with sufficient capacity to handle peak cylinder curing requirements. The tanks shall be equipped with thermostatically controlled units which are capable of maintaining specification water temperature in the tanks, and power shall be furnished.

640.6-INSURANCE:

By the time the field office is made available to the Engineer, the Contractor shall have furnished the Engineer with evidence that insurance has been obtained and is in effect which will protect the Division to the extent of $20,000.00 (non-deductible) against any loss of its property in the field office and storage building as a result of fire or theft.

This insurance must be kept in effect until office has been vacated, and the evidence of renewal of the policy as necessary must be forwarded to the Engineer.

640.7-MAINTENANCE:

The Contractor for the duration of the project shall maintain the field office and storage building in good condition and appearance. No compensation will be allowed for loss by fire or by vandalism caused by non-Division personnel or for loss due to normal wear and tear.

640.8-REMOVAL:

After all field records pertinent to the project have been completed, the office and storage building shall be removed and disposed of by the Contractor and the site cleaned up and left in a neat and acceptable condition. The field office and storage building shall be allowed to remain for 45 days after final acceptance of the project, and shall be completely removed prior to 60 days after final acceptance of the project.

640.9-ALTERNATE FOR OFFICE BUILDING:

The Contractor, in lieu of the field office building, may furnish adequate trailer space equivalent to the minimum floor space requirements. Minimum requirements for heat, lights, toilet facilities, insurance, maintenance, etc., shall be furnished for the trailer as for the office building.

640.10-EQUIPMENT:

The following equipment shall be furnished for any field office.

1) One office-type desk having at least two drawers on each side and one secretarial-type desk each having minimum top dimension of 30 in. by 60 in. (750 by 1 500 mm).
2) One filing cabinet when the total project bid is less than $1,000,000; two filing cabinets when the total project bid is $1,000,000 and less. than $3,000,000; and three filing cabinets when the total project bid is $3,000,000 or more. Cabinets shall be fireproof, four-drawer, legal size, and equipped with locks.
3) One plan rack.
4) One utility table 30 in. (750 mm) high and having top dimensions not less than 30 in. (750 mm) by 72 in. (1 800 mm)
5) One sanitary-type water cooler supplied with water that shall be kept cooled electrically or with gas.
6) One closet extending the full height from floor to ceiling measuring not less than 24 by 30 in. (600 by 750 mm) in plan, having at least two shelves, and equipped with a lock.
7) One desk model electronic adding machine with tape totaling a minimum of 10 digits.
8) One desk model, and two hand held model electronic calculators (all equipped with scientific functions), with a minimum entry of 10 digits and a minimum readout of 10 digits.
9) Comfortable chairs and stools as required.
10) The Contractor shall provide at their own expense all utilities and janitor service. Telephone service, limited to the best available local facilities, shall be furnished unless Plan notes require alternate communication facilities.
11) Provide two telephones for a large or standard office and one telephone for a small office. One answering (message) machine shall be provided.
12) One table top copier meeting the following minimum requirements:
    a) Produce 8½ in. by 11 in. (A4 and A3), 8½ in. x 14 in. and 11 in. x 17 in. copies.
    b) Reduction and enlargement features.
    c) Produce a minimum of 10,000 copies per month.
    d) The Contractor shall provide all service and maintenance of the copier.

d) The Contractor shall provide all service and maintenance of the copier.

13) Provide one facsimile data processing unit that is compatible with Division's facsimile equipment.

14) If any of the equipment items are included as "in-built" in the field office or trailer, they may be omitted from the list.

640.11-COMPUTER SYSTEM FOR FIELD OFFICE:

Provide one (1) desktop computer system composed of the following minimum components.

1. The Contractor shall supply one (1) desktop computer with the following minimum components:
   a) Pentium II (Tower or Desktop) or greater
   b) 32 MB RAM upgradeable to 64 using onboard memory
   c) 512 K L2 Cache
   d) 4.0 GB Hard Drive
   e) 24 x CD ROM may be omitted if item "k" is a CD/RW
   f) 3.5" diskette
   g) 4 MB AGP video
   h) 101 enhanced keyboard and Mouse
   i) 17" non-Interlaced color monitor with .28 mm or less dot pitch with 1024x768 resolution
   j) 1 - 56K V.90 Internal Fax/Modem
   k) Internal tape backup (minimum 250 MC-1/4" removable data cartridge media) or CD R/W (4x write, 8x read minimum)
2. The Contractor shall supply one (1) laser printer with the following minimum components:
   a) 10 pages per minute
   b) 2 MB memory
   c) Parallel interface
   d) Post Script emulation (Level 2)
   e) Standard tray with minimum capacity of 200 sheets
3. The following accessories shall be supplied:
   a) Dust cover for all equipment
   b) Surge protector
   c) One (1) box (10 disks) Floppy diskettes
   d) One (1) box (5 cartridges) ¼" removable data cartridges (If tape drive provided) or 1 box (10 disc) CDR if CD R/W is provided
   e) Mouse and mouse pad
4. The following software shall be supplied:
   a) One (1) Windows 95 or NT 4.0 package
   b) One (1) Tape backup package for Windows (latest version)
   c) One (1) Procomm, Plus communication package for Windows (latest version)
   d) One (1) Microsoft Office package '97
   e) If the Contract documents specify the use of a CPM Schedule, the Contractor shall furnish one (1) CPM software package,

SureTrak Project Manager for Windows by Primavera Systems, Inc. (latest version). This desktop computer system, including hardware, software and manuals, will be furnished and maintained throughout the life of the project and shall be removed when the field office has been vacated by the Division of Highways project staff in accordance with 640.8.

The Contractor shall be responsible for all service and maintenance of the entire desktop computer system, including hardware and software. Replacement equipment shall be provided within five (5) working days of breakdown, theft or damage at no additional cost to the Division.

640.12-METHOD OF MEASUREMENT:

The "Large Field Office and Storage Building", "Standard Field Office and Storage Building" shall include the field office and the storage building and shall be measured as one complete unit and paid by the month. The "Small Field Office" and "Minimal Field Office" shall be measured as one complete unit and paid for by the month. The "Building Equipment" and "Computer System for Field Office" will be measured as complete units and paid as a lump sum unit.

640.13-BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for furnishing, erecting, insuring, maintaining and removing the field office and storage building computer system, and sanitary conveniences for the Engineer; all labor and materials, and all other work necessary and incidental thereto. Monthly telephone invoices will be paid by the Engineer. The field office, storage building equipment, computer system, furniture, fixtures, and facilities shall remain the property of the Contractor and shall be removed in accordance with 640.8 and the area dressed and restored.

640.14 - PAY ITEMS:

ITEM	DESCRIPTION	UNIT
640001-*	STANDARD FIELD OFFICE AND STORAGE BUILDING	MONTH
640002-*	LARGE FIELD OFFICE AND STORAGE BUILDING	MONTH
640003-*	BUILDING EQUIPMENT	LUMP SUM
640004-*	COMPUTER SYSTEM FOR FIELD OFFICE	LUMP SUM
640005-*	MINIMAL FIELD OFFICE	MONTH
640006-*	SMALL FIELD OFFICE	MONTH

* Sequence number

SECTION 642
TEMPORARY POLLUTION CONTROL

642.6 - TEMPORARY PIPE, CONTOUR DITCHES, BERMS, SLOPE DRAINS, DITCH CHECKS AND SILT FENCE:

DELETE THE FOURTH PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Ditch checks shall be constructed of log, stone or similar device to control velocity and to aid in erosion and sediment control. Silt fence and bales of hay or straw will **not** be permitted for use in ditches. Silt fence and bales of hay or straw can be used elsewhere on projects provided that they are embedded and staked as detailed in the Erosion and Sediment Control Manual wherever they are used.

642.7 - METHOD OF MEASUREMENT:

DELETE THE FIFTH PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Ditch checks will be measured by the unit.

SECTION 653
VINE AND GROUND COVER PLANTING

653.9 - PAY ITEMS:

DELETE THE SECTION AN INSERT THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
653001-*	VINES, FAST GROWING, “scientific name”	EACH
653002-*	VINES, MEDIUM GROWING, “scientific name”	EACH
653003-*	VINES, CLUMP TYPE, “scientific name”	EACH
653004-*	GROUND COVERS, “scientific name”	EACH
653005-*	WATER FOR PLANTS	THOUSAND GALLON (LITER)

* Sequence Number

SECTION 654
TREE AND SHRUB PLANTING

654.17 - PAY ITEMS:

DELETE THE SECTION AN INSERT THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
654001-*	TREE, DECIDUOUS, “scientific name”	EACH
654002-*	TREE, ORNAMENTAL FLOWERING, “scientific name”	EACH
654003-*	SHRUB, DECIDUOUS, “scientific name”	EACH
654004-*	SHRUB, EVERGREEN, “scientific name”	EACH
654005-*	TREE, EVERGREEN, “scientific name”	EACH
654006-*	WATER FOR PLANTS	THOUSAND GALLON (LITER)

* Sequence Number

SECTION 656
SEEDLING PLANTING

656.8 - PAY ITEMS:

DELETE THE SECTION AN INSERT THE FOLLOWING:

ITEM	DESCRIPTION	UNIT
656001-*	SEEDLING, “scientific name”	EACH

* Sequence Number

SECTION 657
ROADSIDE SIGN SUPPORTS

657.2.2.9 – Anchor Bolts:

DELETE THE SECOND SENTENCE AND SUBSTITUTE THE FOLLOWING:

Anchor bolts (unless otherwise directed on the Plans) shall be fabricated from high strength steel, meeting the requirements specified in ASTM F 1554, Grade 55.

SECTION 658
OVERHEAD SIGN STRUCTURES

658.2.2.1 – Galvanized Steel:

IN THE SECOND SENTENCE OF THE EIGHTH PARAGRAPH, CHANGE ASTM A1554, GR. 105 TO ASTM F 1554, GRADE 105.

SECTION 662
ROADWAY LIGHTING

662.2.13.1.6 – Anchor Bolts:

IN THE SECOND SENTENCE, CHANGE ASTM A1444 GR.55 TO ASTM F 1554, GRADE 55.

662.2.13.3.5 – Anchor Bolts:

IN THE SECOND SENTENCE, CHANGE ASTM A1554 GR.55 TO ASTM F 1554, GRADE 55.

ADD THE FOLLOWING SECTION:

SECTION 679
OVERLAYING OF PORTLAND CEMENT CONCRETE BRIDGE DECKS

679.1 - DESCRIPTION:

The work shall consist of furnishing and placing a specialized concrete overlay to a designated grade line. Unless otherwise indicated on the plans, the Contractor may place any one of the specialized overlays allowed by the terms of this specification. Only one type of overlay will be allowed on any one structure.

679.1.1 - Other Work: The following work, as required by the contract plans, may also be performed under the terms of this section:

a) Clean the bridge deck
b) Bridge deck repair
c) Clean exposed reinforcing steel
d) Support and tie reinforcing steel
e) Place slab reconstruction concrete
f) Abutment backwalls and approach slabs repair (same as bridge deck or as shown in the plans.)
g) Hydrodemolition of existing deck surface

679.1.2 - Definitions:

679.1.2.1 - Specialized Concrete Overlay: Two types of specialized concrete overlay are permitted as follows:

1) **Latex Modified Concrete:** A portland cement concrete to which an approved styrene butadiene latex admixture has been added.

2) **Microsilica Concrete:** A portland cement concrete to which an approved Microsilica admixture has been added.

679.1.2.2 - Slab Reconstruction Concrete: Slab reconstruction concrete is that concrete placed completely around exposed reinforcing bars.

679.1.2.3 - Curing Hour: A curing hour is any hour, beginning with the hour of placement, during which the ambient air temperature at the concrete surface remains at, or above, 45° F (7° C) as measured by a recording thermometer.

679.1.2.4 - Curing Temperature: This is the air temperature at the concrete surface, or the air temperature between the concrete surface and its protective covering.

679.2 - MATERIALS:

679.2.1 - General: Materials used in the manufacture of specialized concrete overlays shall meet the requirements specified in Section 601.2 of the Specifications and as required herein.

679.2.1.1 - Fine Aggregate: Fine aggregate shall be silica sand meeting the requirements of Sections 702.1.2 through 702.1.5 and 702.6 of the Specifications.

679.2.1.2 - Coarse Aggregate: Coarse aggregate shall be AASHTO Size No. 8 crushed stone or gravel conforming to Section 703 of the Specifications.

679.2.1.3 - Latex Admixture: Formulated latex modifier shall meet the requirements of Section 707.5 of the Standard Specifications.

679.2.1.4 - Microsilica Admixture: Microsilica Admixture shall meet the requirements of Section 707.4.3 of the Standard Specifications.

679.2.1.5 - Bonding Grout: Bonding Grout shall consist of the actual modified concrete being used, with the coarse aggregates removed, mixed with sufficient water to form a slurry. The consistency of the slurry shall be such that it can be applied to the prepared concrete surfaces with a stiff bristle broom in a thin, even coating that will not run or puddle. The bonding grout shall be applied using a stiff broom and worked into all areas of the slab.

679.2.1.6 - Class K Concrete: Class K Concrete shall meet the requirements of Section 601 of the Specifications except that coarse aggregate shall meet the requirements of 679.2.1.2.

679.2.1.7 - Curing Materials:

Burlap: This shall meet the requirements of Section 707.7 of the Specifications.

Quilted Covers: These shall be clean and free of defects, providing a water retention blanket over the concrete. Acceptance will be based on visual inspection.

Polyethylene Curing Covers: These shall meet the requirements of Section 707.6 of the Specifications.

Plastic Coated Fiber Blankets: These shall be clean and free of defects, providing a water retention blanket over the concrete. Acceptance will be based on visual inspection.

679.2.1.8 - Replacement Bars: Reinforcing bars shall be Grade 60 and shall meet the material requirements of Section 602 of the Specifications. Replacement bars shall be spliced to existing bars using either minimum 30-bar diameter lap splices or approved mechanical connectors.

679.2.2 - Specialized Concrete Mix Design and Testing: Specialized concrete shall consist of a homogeneous mixture of cement, fine aggregate, coarse aggregate, latex or microsilica admixture, chemical admixtures and water.

The Contractor shall determine mixture proportions in general accordance with ACI 211.1, "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete." Establishment of mixture proportions shall be coordinated with the manufacturer of the latex or microsilica admixture.

Design mixture testing shall include air content, slump, and compressive strength results at 28 days and results of rapid chloride permeability tests. For establishment of mixture proportions, rapid chloride permeability tests shall be made on representative samples cured for 28 days in accordance with ASTM C31, then prepared and tested in accordance with AASHTO T277 at an age of 35 to 42 days. The results of this test should not exceed 750 coulombs.

The 28-day compressive strength of the test mix that satisfies the 750 coulomb threshold, shall be used as the basis for acceptance of the Specialized Concrete Overlay permeability requirements. Concrete for any slump test shall be deposited in a manner and location that excludes the effects of vibrations caused by traffic and concrete placement operations.

The total concrete constituents shall contribute less than 0.10% water soluble chloride ion by weight of cement. Use one brand and/or one source for any concrete constituent.

The Contractor shall obtain a written statement from the manufacturer of the latex or microsilica admixture that confirms the compatibility of the

material combination and the sequence in which they are combined. The written statement, along with the results of all required tests, shall be furnished to the Engineer prior to the pre-construction meeting (refer to 679.2.2.3). Substantiating data showing compliance with the requirements of this specification shall also be submitted. This data shall also include the sources of coarse and fine aggregates as well as the brands of all admixtures to be used.

679.2.2.1 - Latex Modified Concrete: The following test criteria must be met for all latex modified concrete pours placed at the structure. This testing shall be performed by the Contractor or his designated representative and certified results provided to the Engineer prior to final acceptance of the project.

Chloride Permeability (a)	1000 coulombs @ 90 days, maximum (per AASHTO T277)
Compressive Strength,(b)	not less than 80% of 28-day compressive strength of the approved test mix
Water/(Cement + fly ash) Ratio (c)	0.40 by weight, maximum
Portland Cement Content (d)	658 lb/cu. yd., minimum (390 kg/m³, minimum)
Latex Admixture Content (e)	24.5 gal/cu. yd., minimum (121 liters/m³, minimum)
Air Content (f)	6.5% maximum (Per AASHTO T152)
Slump	4.0 inches ± 2.0 inches (100 mm ± 50 mm)

- Note (a) Chloride permeability test shall be performed and the results tabulated and submitted to the Engineer. These results will not be used for acceptance provided the compressive strength requirements are satisfied.

- Note (b) The minimum compressive strength for the overlay concrete shall be 80% of the 28-day compressive strength of the approved test mix. However, the minimum 28-day compressive strength shall be 4,000 psi (28 Mpa). Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor's expense.

- Note (c) The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.

- Note (d) An equal volume of fly ash may be substituted for cement to a maximum of 1¼ bags per cubic yard (meter). When fly ash is used,

equivalent volumes of fly ash shall be considered as cement for purposes of determining the proportioning ratios.

- Note (e) Latex sampling shall be in accordance with 707.5.

- Note (f) The initial mix design shall be based on an expected air content range of 3% to 6%. The mixture proportions shall be determined using actual conditions for fineness modulus and bulk specific gravities (saturated surface dry for aggregates).

679.2.2.2 - Microsilica Concrete: The following test criteria must be met for all microsilica concrete pours placed at the structure. This testing shall be performed by the Contractor or his designated representative and certified results provided to the Engineer prior to final acceptance of the project.

Chloride Permeability (a)	1000 coulombs @ 90 days, maximum (per AASHTO T277)
Compressive Strength,(b)	not less than 80% of 28-day compressive strength of the approved test mix
Water/(Cement + microsilica + fly ash) Ratio (c)	0.37 by weight, maximum
Portland Cement Content (d)	680 lb/cu.yd., minimum (404 kg/m³, minimum)
Microsilica Content (e) (Dry Weight)	50 lb./cu. Yd., minimum (30 kg/m³, minimum)
Air Content	7.0% (plus or minus 1.5%) (Per AASHTO T152)
Slump	6.5 inches ± 1.5 inches (165 mm ± 40 mm)
High Range Water Reducer(Superplasticizers) (f)	As needed for workability, slump and water/cementitious ratios

- Note (a) Chloride permeability test shall be performed and the results tabulated and submitted to the Engineer. These results will not be used for acceptance provided the compressive strength requirements are satisfied.

- Note (b) The minimum compressive strength for the overlay concrete shall be 80% of the 28-day compressive strength of the approved test mix. However, the minimum 28-day compressive strength shall be 4,000 psi (28 Mpa). Overlay concrete with a compressive strength of less than this acceptance level may be removed and replaced at the contractor's expense.

- Note (c) The amount of added water shall be adjusted to provide slump at or below the prescribed limit. The water portion of all admixtures shall be included as part of the water/cement ratio.

- Note (d) An equal volume of fly ash may be substituted for cement to a maximum of 1 ¼ bags per cubic yard. When fly ash is used, equivalent volumes of fly ash shall be considered as cement for purposes of determining the proportioning ratios.

- Note (e) Microsilica sampling shall be in accordance with 707.4.3.

- Note (f) A high range water-reducing admixture is required to improve workability. No more than two additions of the admixture shall be made, and the total quantity shall not exceed the manufacturer's maximum dosage rate. Each time high range water reducer is added, the concrete shall be mixed an additional minimum of 30 revolutions. The total number of revolutions shall not exceed 300.

679.2.2.3 - Pre-Pour Meeting: The Contractor shall schedule a meeting prior to the start of the concrete work. The Engineer, Construction Manager, Prime Contractor, Concrete Contractor, Concrete Finisher, and the Concrete Supplier shall attend. Topics of discussion shall include specialized concrete mixture proportions, batching, transporting, handling, placing, finishing and curing.

679.2.2.4 - Test Slab Requirements: After obtaining the Engineer's approval of mixture proportions and at least one week before any slab reconstruction concreting or overlay is to be placed, the Contractor shall make one or more trial batches of the specialized concrete of the size to be hauled or mixed at the site. The trial shall simulate transportation and job site conditions, utilizing proposed material and methods of placing, finishing and curing. The test slab shall be constructed the same as the actual work (depth, reinforcing steel, etc.) and shall be at least one lane width wide and of a length to allow the use of the contractor's entire paving train from placement to finishing. The test slab location shall be as shown in the plans or as approved by the Engineer. The prime intent is to familiarize the concrete finishing crew with the handling, finishing and curing characteristics of the concrete. Batching, placement and texturing shall be in strict accordance with this specification. Additional reference test slabs may be constructed as necessary to provide an acceptable standard of reference. This standard of reference shall serve throughout the project construction period as the basis of acceptance of the actual as-built work. This Item may be deleted at the discretion of the Engineer.

679.2.3 - Equipment: All equipment proposed for use shall have the Engineer's approval prior to its usage.

679.2.3.1 - Cutting Equipment: Shall consist of a high pressure water jet (hydrodemolishing) system per the following requirements.

679.2.3.1.1 - Hydrodemolishing Equipment: The hydrodemolishing system shall be self-propelled, completely programmable, designed for high production concrete removal, and capable of removing precise depths of sound concrete. Hydrodemolishers shall be capable of removing concrete from around and below the steel reinforcement. Lances shall be of a type intended to remove rather than scarify concrete. Individuals certified by the equipment manufacturers shall operate the removal equipment.

All removal equipment shall be capable of operating at a noise level of less than 90 decibels at a distance of 50 feet (15 m) from the noise source. The Contractor shall monitor noise levels throughout the project to insure compliance, if required by the Engineer. No separate or additional payment will be made for monitoring -noise levels.

Potable or filtered water may be used. Filtered water shall have all visible solids and oils removed that could prevent a proper bonding with the remaining concrete. When filtered water is used, the Contractor shall wash the bridge deck with potable water in water blasting equipment as soon as all the concrete debris have been cleaned up. This water blasting shall be in addition to any other water blasting that may be required by any other special provisions.

The Contractor shall shield his operations to prevent injury or damage from flying or falling debris. The Contractor shall provide a method for handling expected and unexpected blow-through of the deck. This method shall provide for the containment of runoff water and debris, and the protection of the area under the bridge deck. The Contractor shall be responsible for any injury or damage caused by his operations.

679.2.3.1.2 - Hydrodemolishing Equipment Demonstration: Two trial areas will be designated by the Engineer to allow the Contractor to demonstrate that the equipment, personnel, and methods of operation can meet the requirements of this specification. The demonstration shall follow any roto-milling permitted by this specification. No separate or additional payment will be made for this demonstration.

The first trial area will consist of approximately 30 square feet (9 m^2) of sound concrete. The hydrodemolisher shall be calibrated to remove sound concrete to the depth specified in the contract documents without damaging the underlying sound concrete. After removing the sound concrete in the first trial area, the hydrodemolisher shall be moved to the second trial area. This area will consist of deteriorated or defective concrete. This trial will determine whether this unsound concrete will be completely removed with the above calibration.

If the equipment is deemed inadequate for use, the Contractor shall obtain another hydrodemolisher for a subsequent demonstration. When satisfactory results are obtained, production removal may proceed. No

adjustment in the completion date of the project will be considered due to delays in obtaining suitable equipment.

If concrete is not being adequately removed during production work, recalibration of the equipment will be required.

679.2.3.2 - Blastcleaning Equipment: Blastcleaning Equipment shall be capable of removing rust from reinforcing bars, laitance, and small chips of partially loosened concrete. Certain qualities of rust are not necessary to be removed (refer to Section 679.3.3).

679.2.3.3 - Proportioning and Mixing Equipment: Shall consist of the following:

679.2.3.3.1 - Latex Modified Concrete: Self-contained, continuous mixing and proportioning mobile units shall be used. A minimum of two units shall be supplied. The requirements of Sections 679.2.3.4 and 679.2.3.5 shall apply.

679.2.3.3.2 - Microsilica Concrete: An approved concrete batch plant, mobile mixer or truck mixer shall supply all concrete. The requirements of Section 601 of the Specifications shall apply, except as modified herein.

When microsilica densified powder is used, the densified powder shall be weighed using an approved cement scale or supplied in bags, the weight of each bag shall be clearly marked on the bag. The densified powder shall be last in the weighing sequence and the tolerance for each material draw weight shall be based upon the total weight of cement plus densified powder. Batching tolerance for the cement plus densified powder shall be 0.5%.

When microsilica slurry is used, the slurry shall be added prior to the initiation of the batching sequence using calibrated proportioning equipment approved by the Engineer. Batching tolerance of the slurry shall be 2%.

679.2.3.4 - Mobile Mixer Units: Each unit shall be self-propelled and shall be capable of carrying sufficient unmixed material to produce on site, no less than 6 cubic yards (4.5 cubic meters) of specialized concrete.

The Engineer will inspect each unit. A unit not functioning in a manner the Engineer considers acceptable shall be repaired. If repair is impractical, the unit shall be replaced. All costs associated with delays attributable to mobile mixer replacement shall be borne by the Contractor. No extension of time, for the purpose of replacing unacceptable mixers, will be granted. Conditions which will automatically designate a unit unacceptable are: hydrated cement deposits; broken, bent, loose or scalloped mixing paddles; mixing paddles worn 20% in any dimension; mixing paddles heavily caked with mortar; and admixture or water delivery system out of tolerance.

Proportioning devices shall deliver the materials within the following tolerances:

Coarse Aggregate	2%
Fine Aggregate	2%
Cement + fly ash	0% to 4 %
Water	2%
Cement + microsilica powder	0.5%
Microsilica Slurry	2%
Latex Admixture	1%
Other Admixtures	3%

The unit shall be capable of positive measurement of cement being introduced into the mix.

There shall be positive control of the flow of water into the mixing chamber. Water flow shall be indicated by a flowmeter and readily adjustable to provide for minor variations in aggregate moisture. The system shall be equipped with a bypass valve, or hose, for determining proportioning accurately. Also, there shall be a positive control of the flow of admixture into the mixing chamber. The admixture discharge pipe shall be readily accessible for determining proportioning accuracy.

The units shall be capable of being calibrated to automatically proportion and blend all components of indicated composition on a continuous or intermittent basis as required by the finishing operation, and shall discharge mixed material through a conventional chute directly in front of the finishing machine.

A sufficient number of self-propelled mixers shall be available at the job site to insure that not more than 30 minutes shall elapse between the placement of batches.

679.2.3.5 - Mobile Mixer Unit Testing: The units shall be calibrated by the Contractor to accurately proportion the approved mix design prior to placing the mix. The Engineer may require recalibration of any mixer as deemed necessary. Yield tests shall be performed by the Contractor for each mixer for each day's operation and when there appears to be a change in the mix. Certification of the calibration by an approved testing authority will be accepted as evidence of this accuracy if the yield is shown to be true within a tolerance of 1.0% according to the following test:

With the cement yard set on zero and all controls set for the approved design mix, activate the mixer and discharge mixed material into a 0.25 cubic yard (meter) container 1 yard (meter) square by 9 inches (250 mm) tall. When the container is level-struck full, making provision for settling the material into all corners, the cement yard shall show the discharge for a 0.25 cubic yard (meter) pour within the tolerance specified (refer to 679.2.3.4). No calibration shall be performed while it is raining.

679.2.3.6 - Placing and Finishing Equipment: This shall include adequate hand tools for the placement of plastic concrete and for working down to approximately the correct level for the auger strike-off. A self-propelled finishing machine will be required to place and finish all concrete, except in areas inaccessible to the machine.

The finishing machine shall be capable of forward and reverse motion under positive control. Provisions shall be made for raising the screeds to clear the screeded surface, if traveling in reverse.

The machine shall be capable of placing full width, in one operation, the pours shown in the plans. The finishing machine shall be equipped with a vibrating device to consolidate the concrete, a power driven strike-off auger, a power driven finishing roller, and a pan float. The vibrating device shall vibrate at a frequency between 50 Hz and 115 Hz. A sufficient number of suitable portable lightweight or wheeled work bridges shall be required and used behind the finishing operation for touch-up work, surface texturing and curing cover placement.

Approved manual type screeds, metal plates equipped with electric vibrators, or hand held vibrators shall be used to consolidate and finish small inaccessible areas and slab reconstruction concrete.

Supporting rails shall be required. Rails may be two inch by 2 in. (50 mm) perforated steel bar stock, 2 in. (50 mm) pipe rail, or approved equal. They shall exhibit no bends or kinks. Rail supports shall be fully adjustable (not shimmed) to obtain the correct profile. Rail supports are subject to the requirements of 679.3.7.2.

When placing concrete adjacent to a previously completed pour, the side of the finishing machine adjacent to the completed pour shall be equipped to travel on the completed lane on rail supports only.

The placing and finishing equipment shall be designed so that the elapsed time between depositing concrete and final finishing shall not exceed 10 minutes.

679.2.3.7 - Recording Thermometer: The Contractor shall supply a continuous recording thermometer capable of recording temperatures in the 30 - 100° F (2 - 30° C) range. It shall likewise provide a recording capability over a 24-hour continuous period, minimum. The Contractor shall provide any ancillary equipment, supplies and labor necessary for calibration of this equipment.

679.2.3.8 - Compressors Or Water Flushing Equipment: Equipment used for surface preparation shall be of such size and capacity to thoroughly remove all foreign material from the surface being prepared.

679.2.3.9 - Saw Cutting Equipment: Only multi-bladed saw cutting equipment, using circular saw blades, will be permitted for final deck finish operations. The Engineer may allow the use of single blade circular saw equipment only where such equipment is necessary to complete the work as required.

679.2.3.10 - Fogging Equipment: Fogging equipment shall be available for use in accordance with these specifications. The fogging nozzles shall produce an atomized mist. Fogging nozzles shall incorporate compressed air to create the mist. Hand held or hand operated equipment shall be permitted when the Contractor has demonstrated that his operator has been trained in its use.

679.3 - CONSTRUCTION METHODS:

679.3.1 - Removal of Existing Deck Surface: Prior to concrete deck removal operations, asphaltic patches or bituminous overlays shall be removed by hydrodemolishing, roto-milling, or other approved methods. All debris from patch or overlay removal shall be legally disposed.

To facilitate hydrodemolishing, up to one half of the total depth of concrete to be removed may be removed using roto-milling machines. If the Contractor chooses to use roto-milling, he shall determine the depth to the top mat of reinforcing steel using methods acceptable to the Engineer. The roto-milling operation shall be conducted in a manner that does not damage the existing reinforcing mats. If in the judgement of the Engineer the reinforcing mat is being damaged the remainder of the deck removal shall be by hydrodemolishing.

One pass of the hydrodemolisher shall be made to remove all concrete within the limits shown and to the depth specified in the contract documents. Care shall be exercised to avoid removing sound concrete beyond the specified depth.

Following the first pass of concrete deck removal, the Contractor shall sound the deck using chain drags and outline remaining areas of delaminated and unsound concrete for removal subject to the approval of the Engineer. Aerosol spray paint for outlining shall be provided by the Contractor. Edges around these concrete removal areas shall be vertical or slightly undercut. A second pass of the hydrodemolisher shall be made to remove the above concrete.

During the second pass, lances may be substituted for the hydrodemolisher in areas inaccessible or otherwise inconvenient to hydrodemolishing. Chipping hammers will be permitted by the Engineer only in areas demonstrated by the Contractor to be inaccessible to the hydrodemolisher and lances. Chipping hammers shall weigh less than 30 pounds and only chisel bits shall be used. Chipping hammers heavier than the nominal 15-pound (6.5-kilogram) class shall not be used to remove concrete from beneath any reinforcing bar.

Debris shall be removed directly following any concrete removal operations. Removal of debris shall be accomplished by hand and vacuum methods. All debris shall become the property of the Contractor and shall be legally disposed. The Contractor shall exercise care to avoid damage to the remaining concrete or exposed reinforcement.

679.3.2

The Contractor shall provide for the collection and disposal of all runoff water generated by the removal process. The Contractor shall obtain all required permits and shall comply with applicable local, state, and federal regulations concerning such water disposal. The Contractor shall make provision for the safe handling of runoff water insofar as it may constitute a physical hazard on the adjacent or underlying traveled roadway surface.

Water will not be allowed to enter storm sewers, bridge drainage, downspouts, fingerdams, or any other drainage area of the deck surface. The Contractor shall exercise care to protect existing berm slopes from scouring by water jets or runoff water.

The Contractor shall provide adequate lighting to allow for the safe conduct of night removal operations, and shall obtain the Engineer's approval for same, exercising care to avoid any hazardous glare in the direction of oncoming traffic.

When a bridge deck has an asphalt overlay, the stated depth of removal shall be measured from the bottom of the asphalt overlay.

When full depth removal is necessary, the forming shall be performed in accordance with Sections 104.3 and 109.4 of the Specifications.

679.3.2 – Removal of Newly Placed Deck Surface: The finished deck surface shall be shotblasted in preparation for a mechanically bonded surface. Shotblasting shall remove the upper surface of the deck to the satisfaction of the engineer. This may require approximately ⅛ in. to ¼ in. (3 to 6 mm) of the concrete to be removed. In all cases the surface laitance shall be removed to provide a solid profile on which to bond the overlay. The cost of shot-blasting of the concrete deck shall be considered incidental to the Specialized Concrete Overlay.

679.3.3 - Preparation of Surface: Blastcleaning shall be performed to thoroughly clean all horizontal and vertical receiving surfaces. Surfaces, which will be in contact with the specialized concrete overlay, shall have laitance and partially loosened chips of concrete removed by blastcleaning, which shall produce a bright, clean appearance. The edge of previously placed pours shall be similarly treated to promote bond.

All reinforcing steel, or other steel, which is to be in contact with the new concrete, shall be cleaned of all grease, dirt, concrete mortar and injurious rust. Injurious rust is defined as all scale, loose rust deposits, or all rust not firmly bonded to steel. Rust and concrete deposits, which in the Engineer's opinion, cannot be removed by blastcleaning, will be considered firmly bonded and may remain. Any portion of a reinforcing bar judged by the Engineer to have any more than 50% section loss shall be replaced at no additional cost to the Division. A light coating of orange colored rust that forms on the reinforcing steel, after blastcleaning is not considered detrimental to bond and may remain unless the time limit that follows is exceeded, or if ordered to be removed by the Engineer.

All debris from the blastcleaning operation shall be removed. After removal, the exposed reinforcing steel shall be supported and tied. Rustproof chairs shall be provided. If a continuous length of 6 ft. (1.8 m) or more of reinforcing bar is exposed, the Engineer may require supports and positive tie-downs at a maximum spacing of 4 ft. (1.2 m). Positive tie-downs shall consist of anchors drilled into the structural slab and connected to the reinforcing bars. Replacement bars shall be spliced to existing bars using either minimum 30 bar diameter lap splices, approved mechanical connectors, or a welded splice as directed by the Engineer. Welded splices, if approved, shall be in accordance with ANSI/AWS Structural Welding Code - Reinforcing Steel D1.4. The Engineer shall be allowed sufficient time to inspect the work after the supporting and tying of the reinforcing steel has been completed.

Blastcleaning operations may be commenced in an area after necessar y concrete removal, per Section 679.3.1 or Section 679.3.2, as applicable, has been completed. If more than 48 hours elapse from the termination of any blastcleaning operation to slab wetting, blastcleaning shall be repeated per the Engineers direction regardless of the apparent condition of the receiving surfaces.

679.3.4 - Structural Slab Wetting: The structural slab surface and any other porous surface, which will be in contact with new concrete, shall be prewetted with water. All standing water in depressions or areas of concrete removal shall be blown out with oil-free compressed air. The surface shall be thoroughly wetted to a saturated condition and shall be visibly moist when placement begins.

679.3.5 - Placement Preconditions: Slab reconstruction concrete, or overlay concrete, shall be placed only after all of the following preconditions are satisfied:

The Contractor has submitted to the Engineer, in writing, the proposed sequence of operations, equipment, number of personnel, and category of personnel to be used during the concrete placement.

a) All concrete removal operations in the placement area are complete and approved.

b) Deck drains have been cleaned of all debris and plugged.

c) Blastcleaning has been completed on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span long.

d) Any additional blastcleaning, if required, has been completed and approved on an area large enough to require one working day for concrete overlay placement. In no case shall this be less than one span long.

e) Slab temperature and wetting requirements are met.

679.3.6 - Placing, Finishing and Curing Slab Reconstruction Concrete: Slab reconstruction concrete shall be placed separately from overlay concrete except when both of the following conditions are, in the opinion of the Engineer, present:

a) Areas of exposed reinforcing steel do not exceed 5% of the total slab area ready to be overlayed.

b) Individual areas of exposed reinforcing shall not exceed 25 square feet (7.5 m) in area.

When these two conditions are present, slab reconstruction concrete may be placed integrally with overlay concrete.

The Contractor has the following choices of concrete placed as slab reconstruction concrete:

Overlay Type	Slab Reconstruction Concrete
Latex Modified	Latex Modified or Class K
Microsilica	Microsilica or Class K

Slab reconstruction concrete placed integrally with overlay shall match the Specialized Concrete Overlay.

Bonding grout shall be placed against all vertical surfaces receiving slab reconstruction concrete. The perimeter of these surfaces shall be nearly vertical or slightly undercut.

When Class K Concrete is used as reconstruction concrete, a self-contained mobile mixer meeting the requirements of 679.2.3.4 may be used to provide the concrete.

After blastcleaning is completed, the Contractor shall place slab reconstruction concrete in the locations where reinforcing bars have been exposed. The concrete shall be consolidated by internal vibration in accordance with Section 601.10.3 of the Specifications. It shall be finished to the level of the surrounding concrete, or to the middle of the reinforcing steel, whichever is higher. The surface of the new concrete shall be intentionally roughened to a raked finish. Placement of slab reconstruction concrete in accordance with this subsection shall not relieve the Contractor of the requirements to provide the minimum required thickness of overlay material.

679.3.6.1 - Slab Reconstruction Concrete Curing Requirements: Curing shall be accomplished in the following manner:

Latex Modified Concrete. Curing shall be performed in accordance with 679.3.7.5.1.

Microsilica and Class K Concrete. Curing shall be by means of quilted covers, or plastic coated fiber blankets. Quilted covers, if used, shall be kept wet for the entire curing period in accordance with 679.3.7.5.2. The wet curing period shall be 72 curing hours.

The use of membrane curing compounds shall not be allowed.

679.3.6.2 - Removal of Slab Reconstruction Concrete Surface: The slab reconstruction concrete surface shall be blastcleaned per the requirements of Section 679.3.3 prior to the placement of the overlay.

679.3.7 - Placing and Finishing Specialized Concrete Overlay:

679.3.7.1 - General: The following requirements shall apply for specialized concrete overlay placements:

a) The normal overlay thickness shall be as shown on the plans. Under any circumstances, the overlay shall not be less than 1¼ inches (31 mm).

b) The prepared surface of the structural slab shall be protected from contamination by any source.

c) Concrete may be mixed at the point of deposition.

d) When placing Specialized Concrete Overlays on a newly placed deck, the deck concrete shall be a minimum of 28 days old. The sidewalks, parapets, or curbs shall be a minimum of 7 days old.

679.3.7.2 - Finishing Equipment: Supporting rails upon which the finishing machine travels shall be placed outside the area to be overlayed. Said rails shall be supported at spacings sufficient to prevent any deflections. If deflections occur, support spacings shall be reduced, or rails shall be replaced by more resistant rail material. Anchorage of supporting rails shall provide for horizontal and vertical stability. The Engineer may require positive anchorage. A hold-down device shot into the prepared surface, or new overlay, will not be permitted. Supporting rails shall not be treated with parting compounds or release agents to facilitate their removal.

Immediately prior to the beginning of overlay operations, the finishing machine shall be operated over the full length of the bridge segment to be overlayed. This test run shall be made with the screed adjustment set to its finishing position. While operating the finishing machine during the test, the screed rails shall be checked for deflection and the minimum overlay thickness confirmed. The clearance shall be checked with the use of 1 ¼ inches (31 mm) thick filler blocks attached to the bottom of the screed

during the test run. All necessary corrections shall be made prior to any concrete placement.

679.3.7.3 - Placement: The following requirements shall apply during placement of the Specialized Concrete Overlay:

No concrete shall be placed unless surface slab temperature requirements of 679.4.6 and 679.4.7 are met. So that the use of hand tools will be kept to a minimum, concrete shall be deposited as nearly as possible to its final position. Internal vibrators shall not be used for moving concrete into position.

a) A pencil type vibrator shall be used along all construction joints to further consolidate the concrete to prevent voids.

b) The new concrete shall be placed slightly above final grade. It shall then be struck-off, screeded, and finished to final grade.

c) The finished surface, before texturing, shall be uniformly smooth, dense and even. Variations in pavement surface in excess of ⅛ in. (3 mm) above, or below, the proper finished elevation, or surface irregularities of more than ⅛ in. in 10 feet (3 mm in 3 m), will not be accepted.

d) At transverse and longitudinal construction joints, the overlay placement shall be continued beyond the joint location a distance at least equal to the placement depth, and shall be allowed to stand free or shall be formed. After the overlay has cured, the concrete shall be sawed to a depth of ¾ in. ± ⅛ in. (19 mm ± 3 mm). The overlay material beyond the saw cut shall be chipped out to the level of the original prepared surface, or to the level of the reinforcing bars, whichever is higher. The chipped face of the construction joints shall not undercut the saw cut and shall have a slope of approximately 45°. Chipping hammers shall weigh less than 30 lb. (15 kg), and only chisel bits shall be used.

e) A construction dam, or bulkhead, shall be installed in case of a delay in the placement operations exceeding 30 minutes duration. During any delays of 30 minutes or less, the placement shall be protected from drying with several layers of wet burlap. If the concrete placement is stopped, or delayed, for 90 minutes or more, further placement shall be discontinued and may be resumed only upon the approval of the Engineer. When a placement delay greater than 90 minutes occurs, the Contractor shall saw and seal a control joint in the overlay.

f) Adequate precautions shall be taken to protect freshly placed concrete from rainfall. All placement operations shall stop when it starts to

rain. The Engineer may order removal and replacement of material damaged by rainfall in accordance with 679.4.9.

g) The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted.

679.3.7.4 - Surface Texturing: The surface of the specialized concrete overlay shall be uniformly smooth, dense and even. The surface shall then be given a suitable texture with an approved burlap drag.

The Contractor shall texture in a transverse or longitudinal direction. Once begun, the direction of texturing shall not change. All texturing shall be performed prior to the beginning of curing operations. Only one pass of the drag over the finished area will be permitted. Texturing shall be in strict accordance with the time requirements of 679.3.7.5 for applying wet burlap.

If texturing is done in the transverse direction, the Contractor shall texture by hand methods as soon as practicable after finishing machine passage.

If texturing is done in the longitudinal direction, the burlap drag shall be a seamless strip and shall be attached to the work bridge such that the surface of the concrete is textured as soon as practicable after finishing machine passage. Small areas, inaccessible to the attached drag, may be textured by hand methods.

The finishing movement and resulting progress of the burlap drag shall be done in a manner so as to prevent ridges or gouges from forming in the concrete surface. The drag shall be weighted and the contact area changed as required to produce a texture acceptable to the Engineer. The drag shall be cleaned as required; to remove all hardened concrete particles.

Texture resulting from the drag shall stop within 1 ft. (300 mm) of curbs or parapets.

679.3.7.5 - Curing: It is the nature of specialized concrete overlay material to quickly form a plastic film at the surface upon drying. This film is to be protected from drying and cracking by prompt covering with wet burlap. Regardless of the type of concrete placed, the use of membrane curing compounds will not be allowed. Floor drains shall be immediately unplugged to permit the deck to drain.

The overlay surface shall be completely covered with clean, wet burlap. The burlap shall be thoroughly saturated over its entire area, but shall be drained of excess water before application. Burlap shall be lapped a minimum of 1 ft. (300 mm) and shall lay flat. Failure to apply wet burlap within 10 minutes after the concrete has been placed will be cause for rejection of the work as determined by the Engineer. The Engineer may extend time if the plastic film has not formed or the Contractor's fogging operation adequately protects the film.

679.3.7.5.1 – Curing Latex Modified Concrete: A layer of 4-mil (0.1 mm) thick white polyethylene film shall be placed over the burlap as soon as

possible. The overlay shall then be wet cured for 48 curing hours. Care shall be exercised to ensure the burlap remains saturated for the 48-hour cure period. Plastic coated fiber blankets may be substituted for the polyethylene film, but shall not replace the initial wet burlap. The film (or fiber blankets) shall be anchored along all edges and internally to prevent the loss of moisture and from being displaced. After the wet cure, the polyethylene film and burlap shall be removed and the concrete shall be air-cured for 48 hours.

679.3.7.5.2 – Curing Microsilica Concrete: Care shall be exercised to ensure that the burlap is well drained. Burlap shall be continuously wet for a period of 96 curing hours by means of automatic intermittent sprinkling or a continuous wetting system.

679.4 - CONSTRUCTION LIMITATIONS AND REQUIREMENTS:

679.4.1 - Stockpiling Aggregates: All aggregates shall be stockpiled at the concrete mixing site or another location approved by the Engineer.

Stockpiles shall be completely covered and no additions to approved stockpiles are permitted.

The free moisture content of each aggregate type, at the time of batching, shall not exceed 7% of the saturated-surface dry weight of the fine or coarse aggregate or 8% total for both aggregates.

Fine and coarse aggregates, which are stored in piles or bins, shall be kept entirely separated.

679.4.2 - Storage and Handling of Cement: Suitable provisions shall be made to prevent the loss of cement during handling. Cement to be stored shall be kept in suitable weatherproof enclosures, which will protect the cement from dampness. Cement, which has developed lumps in storage, shall not be used.

679.4.3 - Vehicular and Equipment Restrictions: The operation of vehicles and equipment on or over, the structural slab area where concrete removal operations have been started is subject to the following restrictions:

679.4.3.1 - Vehicle Weight Limits: Vehicular traffic is limited to necessary construction equipment. No vehicle or construction equipment weighing in excess of 7000 lb., (48 Mpa), shall be allowed to operate on, or over, any area of structural slab which exhibits unprotected, fully exposed reinforcing steel.

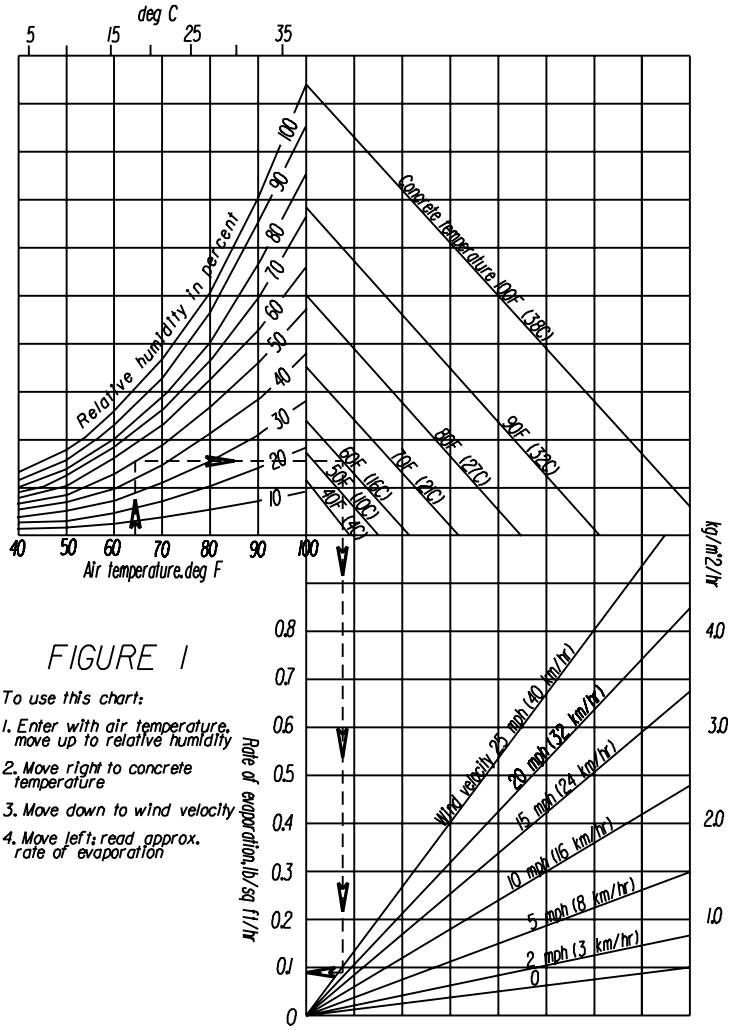
679.4.3.2 - Runways: Properly supported runways shall be provided where concrete transporting devices operate over exposed reinforcing steel and expansion devices.

679.4.3.3 - Reinforcing Steel Protection: Exposed reinforcing steel shall be protected from concrete transporting devices so that no debonding,

loosening, bending, or breaking occurs. Reinforcement that is damaged by any of the Contractor's operations shall be removed and replaced to the satisfaction of the Engineer and at no additional cost to the Division.

679.4.3.4 - Construction Loading Limitations During Curing: No load shall be permitted on new concrete until the specified curing period(s) has been completed. No structural slab concrete removal work shall be performed on structural slab areas adjoining new concrete during the time the new concrete is curing.

679.4.4 - Concrete Placement Limitations: The plastic concrete, as discharged from the mobile mixer or delivery unit, shall be at a temperature of 50° F (10° C), minimum. If conditions are such that, in the opinion of the Engineer, this minimum may not be met, the provisions of Section 601.9.1 of the Specifications will apply. If the evaporation rate exceeds 0.10 lb./sq. ft. per hour (see Figure 1), the Contractor shall make provisions (i.e. wind breaks, fogging, etc.) to reduce the rate prior to placing concrete.


deg C
5
15
25
35
Relative humidity in percent
100
90
80
70
60
50
40
30
20
10
Concrete temperature 100F (38C)
90F (32C)
80F (27C)
70F (21C)
60F (16C)
50F (10C)
40F (4C)
40
50
60
70
80
90
100
Air temperature,deg F
FIGURE 1
To use this chart:
1. Enter with air temperature, move up to relative humidity
2. Move right to concrete temperature
3. Move down to wind velocity
4. Move left; read approx. rate of evaporation
Rate of evaporation,lb/sq ft/hr
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Wind velocity 25 mph (40 km/hr)
20 mph (32 km/hr)
15 mph (24 km/hr)
10 mph (16 km/hr)
5 mph (8 km/hr)
2 mph (3 km/hr)
0
kg/m2/hr
1.0
2.0
3.0
4.0

679.4. 5 - Concrete Pavement at Night: If placement of any concrete is to be made at night, a plan which provides adequate lighting for the work area shall be submitted at least 14 days before concrete is placed for the Engineer's approval

679.4.6 - Hot Weather Provisions: The requirements of ACI 855, Hot Weather Concreting, shall apply except no concrete shall be placed when the ambient air temperature or deck surface temperature, after prewet, is above of 85° F (30° C). Concrete may be placed at an ambient air temperature of 85° F (30° C), if the deck temperature, after prewet, is no higher than 85° F of 85° F (30° C), and falling temperatures are predicted, and then only if the prediction indicates a temperature of under of 85° F (30° C) for the placement period. The time limitations for the placement of wet burlap, as required by 609.3.7.5, shall also apply.

679.4.7 - Cold Weather Provisions: No concrete shall be placed if the ambient air temperature or deck surface temperature, after prewet, is below 50° F (10° C), except as noted. Concrete may be placed at an ambient air temperature of 50° F (10° C) if the deck surface temperature, after prewet, is no less than 50° F (10° C) and rising air temperatures are predicted, and then only if the prediction indicates a temperature of over 50° F (10° C) for the eight hours immediately after placement. If air temperatures are such that the minimum temperature will not be met, the Contractor may place concrete if external heat is provided (refer to 679.4.8).

If the curing temperature drops below 45° F (7° C) during the curing period, then the surface shall be enclosed and external heat shall be provided in accordance with the provisions of 679.4.8. The time required for tenting will not be counted as curing time. Once external heat provisions are required, they shall remain on the surface until curing is complete, regardless of the ambient air temperature.

If curing temperature falls below 32° F (0° C), at any time during the curing period, the concrete will be rejected.

Continuous wetting shall be replaced by wetting at regular intervals if, in the opinion of the Engineer, expected air temperatures could result in freezing of run-off water.

679.4.8 - External Heat Provisions: The provisions of ACI 306, Cold Weather Concreting, and the following modifications shall apply:

a) Temperature limits shall be maintained for 168 curing hours.

b) If the concrete is latex modified concrete, then steam equipment shall not be used to supply external heat after the initial 48 curing hours.

c) Enclosures for heat retention shall be properly vented to prevent surface disintegration from carbon dioxide gas.

d) Continuous wetting will not be required, but the burlap shall be kept wet by wetting at regular intervals in a manner satisfactory to the Engineer for microsilica concrete.

679.4.9 - Defective or Damaged Concrete: After the overlay has been cured, the Contractor in the presence of the Engineer shall sound the deck in order to detect delaminated areas. All defective or damaged concrete, as determined by the Engineer, shall be repaired or replaced at no additional cost to the Division. Defects shall include but not be limited to delaminations, cracking, tearing, damage or other imperfections. The Contractor shall propose repair methods for approval by the Engineer. All concrete requiring removal and replacement, as determined by the Engineer, shall be removed by sawcutting the perimeter to a depth of ¾ in. ± ⅛ in. (19 mm ± 3 mm). Damaged concrete shall then be chipped out to the level of the original prepared surface. The chipped face shall not undercut the sawcut and shall have a slope of approximately 45°. Chipping hammers shall weigh less than 30 pounds (15 kg), and only chisel bits shall be used. The prepared surface shall be blastcleaned prior to applying the overlay concrete.

679.5 - FINAL BRIDGE DECK FINISH:

679.5.1 – Straightedge Test: After defective or damaged concrete has been repaired and cured in accordance with 679.4.9 and before opening to traffic, the bridge deck shall be grooved perpendicular (or radial) to the centerline of the roadway. Prior to grooving, the entire deck shall be checked by the Contractor in the presence of the Engineer with an approved straightedge not less than 10 ft. (3 m) long. The straightedge shall be laid parallel to the centerline and half-lapped along lines approximately 5 feet (1.5 m) apart to cover the entire deck surface. Surface irregularities of more than ⅛ in. in 10 feet (3 mm in 3 m) shall be removed by grinding. Grinding shall leave a smooth surface within the straightedge tolerance.

679.5.2 – Finished Deck Grooving: After corrective grinding and before opening to traffic, grooves shall be cut into the concrete using a mechanical saw. These grooves shall be 0.10 inch (2.5 mm) wide and 0.25 inch (6 mm) deep. Groove spacing shall be 1.5 inches (37 mm) center to center. No later than one week prior to grooving operations, the Contractor shall provide the Engineer with two accurate, easily readable gauges with which to verify groove dimensions. Groove depth and spacing tolerances are limited to ±1/16 inch (1.5 mm). Groove width tolerances are +0.02 inch (.5 mm) and -0.0 inch (0 mm). Grooves shall be cut continuously across the deck to within 1 ft. (300 mm) of gutter lines or drainage structures. Grooves shall also be continuous across the full width of the deck surface including construction joints. Grooves shall terminate

within 1 in. (25 mm) of any exposed metal component or elastomeric concrete of an expansion joint. When the deck is skewed and the contractor is using gang blades to saw the grooves, the maximum distance (measured perpendicular to the centerline of the expansion joint) from the last groove termination in the pass to the expansion joint shall be 1 ft., 8 inches (200 mm). Radial grooving shall be performed in increments limited to 12 ft. (3.6 m) of bridge length.

679.6 - METHOD OF MEASUREMENT:

679.6.1 - General: The quantity of work performed for Specialized Concrete Overlay shall be measured in cubic yards (meters) of material complete in place and accepted. If the material is delivered in a mobile mixer, the pay quantity will be based on the printed ticket from the mixer. If the material is delivered from a central batch plant or truck mixer, the pay quantity will be based on the printed batch tickets as required in AASHTO M 157, Section 16, with adjustment for waste. The contractor and the engineer shall agree in advance on a method to determine the volume of the waste.

Test Slab will be measured on a lump sum basis complete in place. This shall include the complete execution of work required herein, regardless of the number of test slabs constructed. This item may be deleted at the discretion of the Engineer.

The quantity of work performed for Slab Reconstruction Concrete shall be measured in Cubic yards (meters) of material complete in place and accepted. Slab Reconstruction Concrete placed monolithic with the overlay shall be included in the overlay quantity. Concrete that is placed separately from the overlay shall be the volume as indicated by the batch quantity tickets for the ready-mix trucks or portable mixers adjusted for any material not incorporated into the work.

Removal of Existing Deck Surface shall be measured in square yards (square meters) of deck area that is to be overlayed. Existing concrete or asphalt removal shall be considered incidental to Removal of Existing Deck Surface as specified herein.

679.7 – BASIS OF PAYMENT:

The quantities, determined as provided above, will be paid for at the contract unit price bid for the items listed below. The price and payment shall be full compensation for all material removal and for furnishing and placing all the materials and doing all the work herein prescribed in an acceptable manner including all labor, tools, equipment, supplies and incidentals necessary to complete the work.

679.7.1 - Rideability Price Adjustments: Section 601.15.2 of the Standard Specifications shall apply to the finish requirements of the specialized concrete overly.

679.8 - PAY ITEMS:

ITEM	DESCRIPTION	UNIT
679002-*	SPECIALIZED CONCRETE OVERLAY	CUBIC YARD (METER)
679003-*	REMOVAL OF EXISTING DECK SURFACE	SQUARE YARD (METER)
679005-*	SLAB RECONSTRUCTION CONCRETE	CUBIC YARD (METER)
679006-*	TEST SLAB	LUMP SUM

* Sequence number

SECTION 689
METALIZING STEEL

689.4 - APPLICATION OF METALLIC COATING:

ADD TO THE END OF THE FIRST PARAGRAPH:

The steel shall be cleaned with sharp, angular grit, to at least a near white finish meeting SSPC-SP-10. No shot will be allowed as the blasting abrasive. The profile of the anchor pattern shall be 2-4 mils (50-100 µm).

DIVISION 700
MATERIALS DETAILS

SECTION 705
ASPHALT MATERIALS

705.5 – PERFORMANCE GRADED BINDERS:

DELETE ALL AFTER THE FIRST SENTENCE.

SECTION 707
CONCRETE ADMIXTURES, CURING AND COATING MATERIALS

707.4.3 - Microsilica Admixture:

DELETE THE CONTENTS OF THE FOLLOWING SUBSECTION AND INSERT THE FOLLOWING:

The microsilica admixture shall be supplied in either a densified powder or slurry form or a blend of portland cement and densified powder. The slurry shall be homogeneous and agitated as necessary to prevent separation. The microsilica admixture will be accepted at the work site provided it meets all of the following requirements:

a) Manufacturer's written certification that the material supplied meets all of the requirements of AASHTO M307.

The microsilica slurry admixture shall be maintained in storage above the temperature of 32° F (0° C). Slurries exposed to temperatures of 32° F (0° C) or lower shall be removed and replaced at no additional cost to the Department. Water in the slurry shall meet the requirements of Section 601.2 of the Specifications.

b) Only one brand from one source shall be supplied.

INSERT THE FOLLOWING SUBSECTION:

707.5 - Latex Admixture: Formulated latex modifier shall be Dow Modifier A, Tylac 97-314 (Thermoflex 8002), BASF Latex 1186 or Deco-Ray 4776. The manufacturer of these products shall certify that the latex being supplied is of equal formulation to that supplied to the FHWA Turner-Fairbank Highway Research Station for initial approval. Other Styrene-Butadiene latex modifiers may be used provided they have been tested in accordance with and meet the acceptance criteria of the testing program outlined in Report No.

FHWA-RD-78-35 of the Federal Highway Administration. The manufacturer shall certify that the latex being supplied meets the acceptance criteria used in the testing program. Only one brand shall be supplied. Samples taken at the job site shall contain a minimum of 46% solids in the latex when tested in accordance with MP 679.03.00.

The latex admixture shall be agitated as necessary to prevent separation of the emulsion. It shall be maintained in storage within the temperature range of 35°F (2° C) to 85° F (29° C). Admixture obtaining temperatures outside the foregoing limits shall be removed and replaced at no additional cost to the Division.

SECTION 709
METALS

709.15 - COATED DOWEL BARS & DOWEL BASKET ASSEMBLIES:

DELETE THE SUBSECTION AND INSERT THE FOLLOWING:

Coated dowel bars shall meet the requirements of AASHTO M254 except that the steel used to make the dowel bars shall meet the requirements of Section 709.1. Additionally, the coating applicator shall meet the requirements of Section 709.1.2 and the saw cut ends of the coated dowel bars shall be touched-up with a coating material in accordance with the requirements of Section 602.6.2.

SECTION 711
PAINTS, COATINGS, OILS, AND INKS

DELETE THE 2ND PARAGRAPH AND INSERT THE FOLLOWING:

General Requirements: The finished products shall not settle excessively nor cake in the container, shall be readily mixed with a paddle to a smooth uniform paint of specified consistency and working properties. The product shall not thicken, liver, skin, or curdle. The paint shall have a storage life of at least 12 months. No product may have VOC's in excess of 3.5 lb./gal (420 kg / m²).

711.20.1 – General:

DELETE THE 7TH SENTENCE.

"The use of an intermediate coat shall be the option of the top coat manufacturer."

711.22-INORGANIC ZINC RICH LOW VOC SYSTEM:

DELETE THE WORD “INORGANIC” FROM HEADING.

711.22.1-General:

DELETE ALL AFTER THE FIRST PARAGRAPH AND INSERT THE FOLLOWING:

All products are to have a VOC of 2.8 lbs (1.02 kg) Max. except the primer, which can go to 3.5 lbs (1.52 kg) Max. The fabricator responsible for the major portion of the painting will choose the paint system.

711.22.2-Primer:

DELETE THE SENTENCE AND INSERT THE FOLLOWING:

The primer shall meet the requirements of 711.6 or 711.20.2.

711.22.4.1-Requirements:

DELETE THE CONTENTS AND SUBSTITUTE THE FOLLOWING:

i. Dry Hard - 24 Hours Maximum
ii. Color - Shall meet the requirements of 711.20.4.1 (iv).
iii. Gloss - Shall meet the requirements of 711.20.4.1 (iv).

SECTION 715
MISCELLANEOUS MATERIALS

715.23 - GABIONS:

DELETE THE CONTENTS. SUBSTITUTE THE FOLLOWING:

Welded wire fabric gabions shall conform to ASTM A974 and non-welded (twisted) wire mesh gabions shall conform to ASTM A975. Additionally, the use of fastner rings in the assembly of the gabion baskets may be permitted by the Engineer, providing the rings have at least the same tensile strength, zinc coating, and size as the wire used in the body of the gabion.

715.24.2-Permanent Erosion Matting:

DELETE THE CONTENTS AND SUBSTITUTE THE FOLLOWING:

715.24.3

The matting shall consist of a machine produced mat of 100% ultraviolet stabilized polymeric or other suitable fibers resistant to degradation and having uniform thickness and mass per unit area throughout. The matting shall conform to the following:

Property[1]	Test Method	Type A	Type B	Type C
Minimum Mat Thickness	ASTM D1777	0.35 in. (9 mm)	0.50 in. (13 mm)	0.50 in (13 mm)
Minimum (Wide Width) Tensile Strength	ASTM D4595	145 x 110 lb/ft (2.16 x 1.6 kN/m)	170 x 130 lb/ft (2.5 x 1.5 kN/m)	3100 x 2000 lb/ft (45 x 29 kN/m)
Maximum Elongation	ASTM D4595	50%	50%	50%
Minimum Porosity (Calculated)		95%	95%	95%
Resiliency	ASTM D1777	80%	80%	80%
Ultraviolet Stability	ASTM D4355	80%	80%	80%

[1] Property values are reported as minimum average roll values (MARV)

Tractive Force (Shear Stress) Performance Specification

Type A Matting shall have the ability to prevent soil loss where the maximum channel shear stress ranges from 0-4 lb/ft^2 (0-20 kg/m^2) in a vegetated state, @ 0.5 hours peak flow duration.

Type B Matting shall have the ability to prevent soil loss where the maximum channel shear stress ranges from 0-6 lb/ft^2 (0-29 kg/m^2) in a vegetated state, @ 0.5 hours peak flow duration.

Type C Matting shall have the ability to prevent soil loss where the maximum channel shear stress ranges from 0-8 lb/ft^2 (0-39 kg/m^2) in a vegetated state, @ .5 hours peak flow duration.

715.24.3 Acceptance:

DELETE THE CONTENTS AND SUBSTITUTE THE FOLLOWING:

Acceptance of temporary erosion control matting shall be based upon the manufacturer's written certification that the erosion control mat used is well suited to the particular site to be protected and upon the Division's visual inspection of the material. Acceptance of permanent erosion control matting shall be based upon certified test data with each shipment of matting. Compliance of this data with the requirements specified will be the basis of acceptance.

715.42.9.1.4 – Material incorporated into the Support:

DELETE THE FIRST SENTENCE OF THE FOURTH PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Anchor bolts shall be fabricated from steel meeting the requirements of ASTM F 1554, Grade 55.

715.42.9.2.2 – Material incorporated into the Support:

DELETE THE FIRST SENTENCE OF THE FOURTH PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Anchor bolts shall be fabricated from steel meeting the requirement of ASTM F 1554, Grade 55.

715.42.9.4.1 - Type E1:

DELETE THE FIRST SENTENCE OF THE THIRD PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Anchor bolts shall be fabricated from steel meeting the requirement of ASTM F 1554, Grade 55.

715.42.9.4.2 – Type E2:

DELETE THE FIRST SENTENCE OF THE THIRD PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Anchor bolts shall be fabricated from steel meeting the requirements of ASTM F 1554, Grade 55

715.42.9.4.3 – Type E3:

DELETE THE FIRST SENTENCE OF THE THIRD PARAGRAPH AND SUBSTITUTE THE FOLLOWING:

Anchor bolts shall be fabricated from steel meeting the requirements of ASTM F 1554, Grade 55.