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**SUPPLEMENTAL SPECIFICATIONS:**

ALL REFERENCE TO SS 933 APPEARING THROUGHOUT THESE PLANS OR THE PROPOSAL SHALL BE CONSIDERED TO READ 705.21 .

**PROPOSAL NOTES:**

PATCHING CONCRETE BRIDGE DECKS

**1/4" EPOXY WATERPROOFING OVERLAY FOR BRIDGE DECKS**

THIS SPECIFICATION DESCRIBES A TWO COMPONENT 100% SOLID, FLEXIBLE EPOXY SYSTEM AND A SPECIAL AGGREGATE DESIGNED TO PROVIDE A MINIMUM ONE QUARTER INCH (1/4") THICK BRIDGE DECK OVERLAY FOR THE PURPOSE OF PROVIDING A WATERPROOFING SYSTEM WHICH REMAINS FLEXIBLE AT ALL OPERATING TEMPERATURES AND A NON-SKID SURFACE.

**MATERIALS**

**FORMULATION**

THE MATERIAL SHALL BE A TWO COMPONENT EPOXY OR AN EPOXY DERIVED CO-POLYMER SYSTEM CONSISTING OF SIMPLE VOLUMETRIC MIXING RATIOS SUCH AS ONE TO ONE OR TWO TO ONE. FOR THE REMAINDER OF THIS SPECIFICATION, THE MATERIAL SYSTEMS SHALL BE REFERRED TO AS 'EPOXY'.

THE EPOXY SYSTEM SHALL BE FORMULATED TO PROVIDE FLEXIBILITY IN THE SYSTEM WITHOUT ANY SACRIFICE OF THE HARDNESS, CHEMICAL RESISTANCE OR STRENGTH OF THE EPOXY SYSTEM.

**PROPERTIES**

**ADHESION TO CONCRETE:** A WHEN THE FINISHED SYSTEM (INCLUDING AGGREGATE) HAS BEEN APPLIED AS PER MANUFACTURERS RECOMMENDATION AND TESTED ACCORDING TO ACI METHOD 503R-30, IT SHALL HAVE 100% FAILURE IN CONCRETE. THE PREPARED SPECIMENS, (MINIMUM OF 3) SHALL BE CONDITIONED FOR 7 DAYS AT 75 PLUS/MINUS 2 F PRIOR TO TESTING.

**HARDNESS:** THE EPOXY MATERIAL, WHEN TESTED ACCORDING TO ASTM D 2240, SHALL HAVE A SHORE D HARDNESS BETWEEN 50 TO 75. THREE SAMPLES SHALL BE PREPARED ON A STRUCTURALLY SOUND SURFACE WITH A MINIMUM THICKNESS OF 3 MM (0.12IN) AND ALLOWED TO CURE FOR 7 DAYS AT 75 PLUS/MINUS 2 F PRIOR TO PERFORMING THE INDICATED TESTS.

**ABRASION RESISTANCE:** ABRASION RESISTANCE SHALL BE EVALUATED ON TABOR ABRADER WITH A 1000 GRAM LOAD AND CS-17 WHEEL. DURATION OF THE TEST SHALL BE 1000 CYCLES. THE WEAR INDEX SHALL BE CALCULATED BASED ON ASTM C 501 AND WEAR INDEX OF THE CATALYZED MATERIALS SHALL BE UNDER 80. THE TEST SHALL BE RUN ON CURED SAMPLES OF MATERIAL WHICH SHALL BE APPLIED AT A FILM THICKNESS OF 15 TO 20 MIL TO A STAINLESS STEEL (316) PLATE. THE FILM SHALL BE ALLOWED TO CURE FOR 7 DAYS AT 75 PLUS/MINUS 2 F PRIOR TO PERFORMING THE INDICATED TEST.

**TENSILE STRENGTH:** WHEN TESTED ACCORDING TO ASTM D 638, THE EPOXY MATERIAL SHALL HAVE A TENSILE STRENGTH NOT LESS THAN 2500 PSI. THE TYPE IV, SEMI-RIGID SPECIMENS, SHALL BE CAST IN THE SPECIFIED MOLD AND PULLED AT A RATE OF 0.20 INCHES PER MINUTE BY A SUITABLE DYNAMIC TESTING MACHINE. THE SAMPLES (MINIMUM OF 3) SHALL BE ALLOWED TO CURE AT ROOM TEMPERATURE FOR AT LEAST 7 DAYS AT 75 PLUS/MINUS 2 F PRIOR TO PERFORMING THE INDICATED TEST.

**TENSILE ELONGATION:** THE ELONGATION PRODUCED AT THE BREAK IN THE TENSILE STRENGTH TEST MUST BE A MINIMUM OF 30 PERCENT.

**COMPRESSIVE STRENGTH:** WHEN TESTED ACCORDING TO ASTM C 109, THE CURED EPOXY MATERIAL (INCLUDING AGGREGATE) SHALL HAVE A COMPRESSIVE STRENGTH NOT LESS THAN 5000 PSI. THREE SAMPLES SHALL BE CAST AND TESTED USING THE SPECIFIED SIZE AND AMOUNT OF AGGREGATE. THE SAMPLES SHALL BE CONDITIONED FOR 7 DAYS AT 75 PLUS/MINUS 2 F BEFORE PERFORMING THE INDICATED TEST. THE RATE OF COMPRESSION OF THESE SAMPLES SHALL BE NO MORE THAN 0.5 INCHES PER MINUTE.

**WATER ABSORPTION:** WHEN TESTED AS PER ASTM D 570 THE CURED EPOXY SYSTEM SHALL NOT EXCEED THE WATER ABSORPTION OF 0.5 PERCENT. SAMPLE SPECIMENS SHALL BE PREPARED ACCORDING TO SECTION 4.1 AND ALLOWED TO CURE AT 73.4 PLUS/MINUS 3.6 F AND 50 PLUS(OR)MINUS 5% RELATIVE HUMIDITY. TESTS ARE THEN TO BE CARRIED OUT AS PER SECTION 6.1.

**FLEXURAL CREEP AT LOW TEMPERATURE:** WHEN TESTED AS PER CALIFORNIA TEST 419, THE CURED EPOXY SYSTEM SHALL HAVE A MINIMUM TOTAL MOVEMENT OF .0060 INCHES OVER SEVEN DAYS.

**AGGREGATE**

AGGREGATE FOR ALL LAYERS SHALL BE BAUXITE, CRUSHED GRANITE, ALUMINUM OXIDE, FLINT, WASHINGTON STEILACOOM, TUFF-GRANE TYPE A (FURNISHED BY EMERI-CRETE, INC., PORTSMOUTH, N.H.) OR OTHER AGGREGATE AS RECOMMENDED BY THE MANUFACTURER OF THE OVERLAY SYSTEM, PROVIDED IT HAS MOH SCALE HARDNESS OF 7 OR MORE AND MEETS THE FOLLOWING GRADATION:

SIEVE SIZE	% PASSING
NO. 6	95-100
NO. 10	10-35
NO. 20	0-3

**REPAIR OF SPALLED AREAS**

DECK PATCHING SHALL BE PERFORMED AS OUTLINED IN PROPOSAL NOTE ENTITLED 'PATCHING CONCRETE BRIDGE DECKS'.

THE PATCHING MATERIAL SHALL BE A QUICK SETTING CEMENTITIOUS MORTAR MEETING THE REQUIREMENTS OF 705.21, TYPE 2.

ALL PATCHES SHALL BE ALLOWED TO CURE A MINIMUM OF 14 DAYS BEFORE THE OVERLAY IS PLACED. TRAFFIC SHALL BE ALLOWED TO USE THE BRIDGE DURING THE CURING PERIOD OF THE PATCHES.

THE BRIDGE SHALL BE OPEN TO TRAFFIC DURING ALL NON-WORKING HOURS. THEREFORE, PATCHING MUST BE SCHEDULED AND PERFORMED ACCORDINGLY. EXCEPTIONS TO THIS WOULD BE OTHER CONSTRUCTION ACTIVITIES ON THE APPROACH ROADWAY WHICH PREVENT OPENING THE ROAD TO TRAFFIC.

**PREPARATION**

AFTER ALL PATCHES HAVE CURED FOR A MINIMUM OF 14 DAYS, THE ENTIRE DECK SHALL BE CLEANED BY SHOTBLASTING TO REMOVE ANY OIL, DIRT, RUBBER OR ANY OTHER POTENTIALLY DETRIMENTAL MATERIAL SUCH AS CURING COMPOUND AND LAITANCES WHICH WOULD PREVENT BONDING AND CURING OF THE EPOXY MATERIAL.

ONLY AREAS THAT THE SHOTBLASTING EQUIPMENT CANNOT REACH (I.E., ALONG CURBS AND MEDIAN WALLS) WILL THE USE OF SANDBLASTING BE PERMITTED TO AN EXTENT SATISFACTORY TO THE EPOXY MANUFACTURER AND ENGINEER. THIS SHOULD BE PERFORMED PRIOR TO THE SHOTBLASTING WHENEVER APPLICABLE AND PRACTICAL. ABRASIVES CONTAINING MORE THAN 1% FREE SILICA WILL NOT BE ALLOWED (NO SILICA SAND). IF IT RAINS ON THE PREPARED SURFACE, THE SURFACE SHALL BE REBLASTED.

TRAFFIC SHALL NOT BE ALLOWED ON ANY PORTION OF THE DECK WHICH HAS BEEN SHOTBLASTED OR ON AREAS WHERE ALL COATS HAVE NOT ALREADY BEEN PLACED. THE OVERLAY APPLICATION EQUIPMENT, HOWEVER, WILL BE ALLOWED TO DRIVE ON THE DECK SURFACE DURING APPLICATION, PROVIDED PLANKING OR SIMILAR PRECAUTION IS TAKEN TO INSURE THAT THE DECK SURFACE WILL NOT BECOME CONTAMINATED OR OTHERWISE DAMAGED.

**TEST PATCH**

PRIOR TO PLACING THE FIRST COURSE, THE CONTRACTOR SHALL USE THE TEST METHOD PRESCRIBED IN ACI 503R - APPENDIX A OF THE ACI MANUAL OF CONCRETE PRACTICE (MODIFIED AS PER VIRGINIA TRANSPORTATION RESEARCH COUNCIL, MICHAEL M. SPRINKEL, 804-293-1941) TO DETERMINE THE CLEANING PRACTICE (SIZE OF SHOT, FLOW OF SHOT, FORWARD SPEED OF SHOTBLAST MACHINE, AND NUMBER OF PASSES) NECESSARY TO PROVIDE A TENSILE BOND STRENGTH GREATER THAN OR EQUAL TO 250 PSI OR A FAILURE AREA, AT A DEPTH OF 1/4 IN. OR MORE INTO THE BASE CONCRETE, GREATER THAN 50% OF THE TEST AREA. A TEST RESULT SHALL BE THE AVERAGE OF THREE TESTS ON A TEST PATCH OF APPROXIMATELY 1 FT X 3 FT, CONSISTING OF TWO COURSES.

ONE TEST RESULT MUST BE OBTAINED FROM EACH SPAN OR 200 SQUARE YARDS, WHICH EVER IS THE SMALLER AREA. THE ENGINEER WILL DESIGNATE THE LOCATION OF THESE TEST PATCHES. TO PROVIDE ASSURANCE THAT THE CLEANING PROCEDURE, MATERIALS, INSTALLATION PROCEDURE, AND CURING PERIOD WILL PROVIDE THE DESIRED OVERLAY, TEST PATCHES SHALL BE INSTALLED WITH THE SAME MATERIALS, EQUIPMENT, PERSONNEL, TIMING, SEQUENCE OF OPERATIONS, AND CURING PERIOD PRIOR TO OPENING TO TRAFFIC, THAT WILL BE USED FOR THE INSTALLATION OF THE OVERLAY. THE CLEANING PRACTICE, MATERIALS AND INSTALLATION PROCEDURE WILL BE APPROVED IF ONE PASSING TEST RESULT IS OBTAINED FROM EACH TEST AREA.

IF THE CLEANING PRACTICE, MATERIALS AND INSTALLATION PROCEDURE ARE NOT ACCEPTABLE, THE CONTRACTOR MUST REMOVE FAILED TEST PATCHES AND MAKE THE NECESSARY ADJUSTMENTS AND RE-TEST ALL AREAS AT NO ADDITIONAL COST TO THE DEPARTMENT UNTIL SATISFACTORY TEST RESULTS ARE OBTAINED.

**APPLICATION OF OVERLAY**

ALL SURFACES TO BE OVERLAID SHALL BE DRY AT THE TIME OF APPLICATION. IMMEDIATELY BEFORE APPLYING THE EPOXY MATERIAL, ALL PREPARED SURFACES SHALL BE CLEANED WITH COMPRESSED AIR TO REMOVE DUST AND DEBRIS.

THE APPLICATION OF THE EPOXY SYSTEM SHALL NOT BE MADE WHEN IT HAS RAINED OR SNOWED WITHIN 24 HOURS PRIOR TO APPLICATION AND RAIN OR SNOW IS FORECAST WITHIN 8 HOURS AFTER APPLICATION. IF RAIN OCCURS DURING THE APPLICATION, ALL OPERATIONS SHALL CEASE AND THE SURFACES ALLOWED TO DRY, BEFORE CONTINUING.

THE MINIMUM TEMPERATURE AT WHICH THE EPOXY CAN BE APPLIED IS TO BE 50F AND RISING.

THE EPOXY MANUFACTURER SHALL HAVE A REPRESENTATIVE ON THE JOB SITE AT ALL TIMES WHO, UPON CONSULTATION WITH THE ENGINEER, MAY SUSPEND ANY ITEM OF WORK THAT IS SUSPECT AND DOES NOT MEET THE REQUIREMENTS OF THIS SPECIFICATION. RESUMPTION OF WORK WILL OCCUR ONLY AFTER THE EPOXY MANUFACTURER'S REPRESENTATIVE AND THE ENGINEER ARE SATISFIED THAT APPROPRIATE REMEDIAL ACTION HAS BEEN TAKEN BY THE CONTRACTOR.

THE OVERLAY SYSTEM SHALL BE APPLIED ON ALL DECK AREAS USING METERING, MIXING AND DISTRIBUTION MACHINERY APPROVED BY THE EPOXY MANUFACTURER. THE APPLICATION MACHINE SHALL FEATURE POSITIVE DISPLACEMENT VOLUMETRIC METERING PUMPS. THE RESIN SHALL BE STORED IN TEMPERATURE CONTROLLED RESERVOIRS CAPABLE OF MAINTAINING 100 F PLUS/MINUS 10 F TO INSURE OPTIMUM MIXING. RATIO CHECK VERIFICATION AT THE PUMP OUTLETS AS WELL AS CYCLE COUNTING CAPABILITIES TO MONITOR OUTPUT WILL BE STANDARD FEATURES.

THE NUMBER OF LAYERS (MINIMUM OF TWO) AND THE APPLICATION RATES OF THE EPOXY IN THE VARIOUS LAYERS SHALL BE AS RECOMMENDED BY THE MANUFACTURER IN ORDER TO ACHIEVE A MINIMUM OVERLAY THICKNESS OF 1/4" MEASURED FROM THE HIGHEST POINT ON THE DECK SURFACE TO THE TOP OF EPOXY (NOT THE PEAKS OF THE AGGREGATE).

APPLICATION OF THE EPOXY: AFTER MIXING OF THE COMPONENTS, THE EPOXY SHALL BE EVENLY DISTRIBUTED ON THE CLEAN, DRY DECK SURFACE AT THE RATE AS RECOMMENDED BY THE MANUFACTURER.

APPLICATION OF AGGREGATE: AFTER THE APPLICATION OF THE EPOXY, BROADCASTING OF THE AGGREGATE ON DECKS SHALL BE BY AUTOMATED DISPENSER DEPOSITING THE AGGREGATE ONTO THE DECK IN A UNIFORM MANNER AS DIRECTED BY THE EPOXY MANUFACTURER.

THE AGGREGATE SHALL BE BROADCAST AT A RATE IN EXCESS OF THAT NEEDED TO COVER THE SURFACE SO THAT NO WET SPOTS APPEAR. THE AGGREGATE MUST BE DROPPED VERTICALLY IN SUCH A MANNER THAT THE LEVEL OF THE EPOXY WILL NOT BE UNDULY DISTURBED.

WHEN WORKING WITHIN THE CONFINES OF ONE LANE, (I.E. AGGREGATE TRUCK DRIVING OVER FRESHLY PLACED EPOXY AND AGGREGATE) PLANKING OR 3/4" PLYWOOD SHALL BE PLACED UNDER THE WHEELS OF THE TRUCK OR ANY OTHER EQUIPMENT TO DISTRIBUTE THE LOAD AND PREVENT DISPLACEMENT OF THE FRESH EPOXY.

CONSOLIDATION: (IF REQUIRED BY MANUFACTURER) A HAND OPERATED ROLLER AS APPROVED BY THE EPOXY MANUFACTURER AND THE ENGINEER SHALL BE USED AT SURFACE TEMPERATURE BELOW 60 F WITHIN TEN MINUTES AFTER THE APPLICATION OF THE AGGREGATE TO EVENLY CONSOLIDATE THE AGGREGATE INTO THE EPOXY.

REMOVAL OF EXCESS AGGREGATE: AFTER THE OVERLAY HAS HARDENED, REMOVAL OF ALL LOOSE AND EXCESS AGGREGATE WITH A POWER VACUUM OR OTHER METHOD SHALL BE MADE PRIOR TO THE APPLICATION OF SUBSEQUENT COATS.

APPLICATION OF ADDITIONAL LAYERS: MAY BE MADE IMMEDIATELY AFTER THE PRECEDING LAYER HAS COMPLETELY HARDENED AND ALL EXCESS AGGREGATE HAS BEEN REMOVED. THE TIME BETWEEN EACH COAT WILL VARY DEPENDING ON THE TEMPERATURE AND CIRCUMSTANCES OF THE PROJECT.

JOINTS IN THE OVERLAY (I.E., BETWEEN TWO ADJACENT LANES) SHALL BE STAGGERED AND OVERLAPPED 3" MINIMUM BETWEEN SUCCESSIVE LAYERS SO THAT NO RIDGES APPEAR.

TRAFFIC SHALL BE ALLOWED ON THE FINAL LAYER AFTER THE SYSTEM HAS CURED (AS DETERMINED BY THE MANUFACTURER) AND AFTER REMOVAL OF ALL EXCESS, LOOSE AGGREGATE, UNLESS OTHER CONSTRUCTION ACTIVITIES PREVENT THE RE-OPENING TO TRAFFIC.

**STORAGE AND HANDLING:**

**EPOXY MATERIAL:** EPOXY MATERIAL SHALL BE TRANSPORTED TO THE JOB SITE IN THEIR ORIGINAL CONTAINERS INSIDE A DRY, TEMPERATURE CONTROLLED FACILITY MAINTAINED AT A MINIMUM TEMPERATURE 60 F AND NOT TO EXCEED 120 F. THE CONTAINERS SHALL BE IDENTIFIED AS "PART A - CONTAINS RESIN" AND "PART B - CONTAINS CURING AGENT" AND SHALL BE CLEARLY MARKED WITH THE NAME AND ADDRESS OF THE MANUFACTURER, NAME OF THE PRODUCT, MIXING PROPORTIONS AND INSTRUCTION, LOT AND BATCH NUMBERS, DATE OF MANUFACTURE, AND QUANTITY CONTAINED THEREIN. MATERIAL SAFETY DATA SHEETS SHALL ACCOMPANY EACH SHIPMENT AND THE DRIVER MUST HAVE A READY ACCESS TO THEM.

**JOB SITE STORAGE:** THE EPOXY MATERIAL SHALL BE STORED ON THE JOB SITE IN A DRY, TEMPERATURE CONTROLLED FACILITY WITHIN THE TEMPERATURE RANGE OF 60 F TO 120 F. IF THE EPOXY MATERIAL IS TRANSPORTED OR STORED ON THE JOB IN THE APPLICATION MACHINE TANK, THE MATERIAL MUST ALSO BE MAINTAINED WITHIN THE ABOVE TEMPERATURE RANGE.

**HANDLING OF EPOXY ON THE JOB:** PROTECTIVE GLOVES, CLOTHING, BOOTS, AND GOGGLES SHALL BE PROVIDED BY THE CONTRACTOR TO WORKERS AND INSPECTORS DIRECTLY EXPOSED TO THE EPOXY MATERIAL. MATERIAL SAFETY DATA SHEETS SHALL BE PROVIDED TO ALL WORKERS AND INSPECTORS AS OBTAINED FROM THE MANUFACTURER. DISPOSAL OF ALL MATERIAL CONTAINERS SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

**AGGREGATE:** ALL AGGREGATE SHALL BE STORED IN DRY, MOISTURE FREE ATMOSPHERE. THE AGGREGATE SHALL BE FULLY PROTECTED FROM ANY CONTAMINANTS ON THE JOB SITE AND SHALL BE STORED SO AS NOT TO BE EXPOSED TO RAIN OR OTHER MOISTURE SOURCES.

DESIGN AGENCY  
O.D.O.T. DISTRICT 12  
PRODUCTION DEPARTMENT

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GENERAL NOTES  
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S.R. OVER KELLOGG CREEK

LAKE COUNTY  
LAK-44-00.01

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