

GENERAL NOTES

LAKE COUNTY
LAK-90-6.71

OHIO
FHWA REGION 5

173
182

STRUCTURE NOTES (CONT.)

ITEM SPECIAL - PATCHING CONCRETE BRIDGE DECK OVERLAYS WITH QSC

- A. **DESCRIPTION:** THIS ITEM SHALL CONSIST OF FURNISHING THE NECESSARY LABOR, MATERIALS AND EQUIPMENT TO REPAIR CONCRETE BRIDGE DECK OVERLAYS AND BACKWALL TOPS, INCLUDING THE REMOVAL OF LOOSE AND UNSOUND CONCRETE AND BITUMINOUS PATCHES, THE SURFACE PREPARATION AND THE MIXING, PLACING, FINISHING, CURING, COMPRESSIVE STRENGTH TESTING, AND SEALING OF ALL THE PATCHES.
- B. **REMOVAL OF UNSOUND CONCRETE:** THE ENGINEER SHALL SOUND THE WEARING SURFACE AND BACKWALL TOPS AND OUTLINE THE AREAS TO BE REMOVED. SOUNDING MAY HAVE TO BE DELAYED UNTIL THE DECK IS SUFFICIENTLY DRY TO PERMIT DETECTION OF ALL AREAS OF DELAMINATION. THE PERIMETER OF ALL REMOVAL AREAS SHALL BE SAWED TO DEPTH OF 2" TO PRODUCE A VERTICAL OR SLIGHTLY UNDERCUT FACE. ADDITIONAL SAW CUTS MAY BE REQUIRED TO FACILITATE REMOVAL. SAW CUTS SHALL NOT EXTEND BEYOND THE LIMITS OF THE PATCH. COOLING WATER FROM WET SAWING AND DUST FROM DRY SAWING SHALL NOT BE ALLOWED TO CONTAMINATE THE EXPOSED PATCH HOLES; THEREFORE, SAWING SHALL NOT BE PERFORMED WITHIN 200 FEET OF REPAIR AREAS FROM WHICH THE OLD MATERIAL HAS BEEN REMOVED. ALL PATCHES OTHER THAN SOUND CONCRETE AND ALL OBVIOUSLY LOOSE AND DISINTEGRATED CONCRETE SHALL BE REMOVED. THE UNSOUND CONCRETE MAY BE REMOVED BY CHIPPING OR HAND DRESSING. CHIPPING HAMMERS SHALL NOT BE HEAVIER THAN THE NOMINAL 35-POUND CLASS AND SHALL BE OPERATED AT AN ANGLE OF LESS THAN 45 DEGREES MEASURED FROM THE SURFACE OF THE DECK. CONCRETE SHALL BE REMOVED IN A MANNER THAT PREVENTS CUTTING, ELONGATING OR DAMAGING REINFORCING STEEL. WHERE THE BOND BETWEEN THE CONCRETE AND A PRIMARY REINFORCING BAR HAS BEEN DESTROYED, OR WHERE MORE THAN ONE HALF OF THE PERIPHERY OF SUCH A BAR HAS BEEN EXPOSED, THE ADJACENT CONCRETE SHALL BE REMOVED TO A DEPTH THAT WILL PROVIDE A MINIMUM 3/4 INCH CLEARANCE AROUND THE BAR EXCEPT WHERE OTHER REINFORCING BARS MAKE THIS IMPRACTICABLE. REINFORCEMENT WHICH HAS BECOME LOOSE SHALL BE ADEQUATELY SUPPORTED AND TIED BACK INTO PLACE.

- C. **SURFACE PREPARATION:** CLEANING SHALL CLOSELY PRECEDE APPLICATION OF THE PATCHING MATERIAL. THE SURFACE TO BE PATCHED AND THE EXPOSED REINFORCING STEEL SHALL BE THOROUGHLY CLEANED WITHIN 24 HOURS PRIOR TO PATCHING BY ABRASIVE BLASTING FOLLOWED BY AN AIR BLAST. BLASTING ABRASIVES CONTAINING MORE THAN 1% FREE SILICA SHALL NOT BE ALLOWED. IT MAY BE NECESSARY TO USE HAND TOOLS TO REMOVE SCALE FROM THE REINFORCING STEEL.

CONTAMINATION OF THE AREA TO BE PATCHED BY CONSTRUCTION EQUIPMENT OR FROM ANY OTHER SOURCE SHALL BE PREVENTED BY PLACEMENT OF A CLEAN 4-MIL POLYETHYLENE SHEET (OR ANY OTHER COVERING AS APPROVED BY THE ENGINEER) ON THE SURFACE OF THE DECK FOLLOWING THE AIR BLAST CLEANING.

WHERE REINFORCING STEEL IS EXPOSED, THE CONTRACTOR SHALL PROVIDE ADOQUATE SUPPORTS FOR THE CONCRETE MIXER SO THAT REINFORCING STEEL AND ITS BOND WITH THE CONCRETE WILL NOT BE DAMAGED BY THE WEIGHT AND MOVEMENT OF THE CONCRETE MIXERS, OR SHALL PROVIDE MEANS TO CONVEY CONCRETE FROM THE MIXER TO THE PATCH LOCATIONS.

FOR PATCHES WHICH DO NOT USE WATER AS THE ACTIVATOR, THE PREPARED SURFACE SHALL BE DRY. FOR PATCHES WHICH REQUIRE WATER AS THE ACTIVATOR THE PREPARED SURFACE SHALL BE LEFT IN THE CONDITION AS RECOMMENDED BY THE MANUFACTURER. ANY ADDITIONAL SURFACE PREPARATION SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR THE PATCHING MATERIAL WHICH IS USED.

- D. **MATERIALS:** OVERLAYS SHALL BE PATCHED WITH QUICK SET CONCRETE (QSC) WHICH SHALL CONFORM TO THE FOLLOWING REQUIREMENTS:

WATER: AS PER 499.02

THE AGGREGATE SHALL MEET THE FOLLOWING REQUIREMENTS:

1. AGGREGATE SHALL MEET THE GRADING REQUIREMENTS OF TABLE 703-1 OF THE CMS FOR NO. 8, 89, 9 OR A COMBINATION THEREOF.
2. MAXIMUM PASSING OF NO. 200 - NOT TO EXCEED 0.2%.
3. ABSORPTION - NOT MORE THAN 2%.
4. SOUNDNESS LOSS - NOT MORE THAN 2%.

QUICK SETTING CONCRETE PATCHING MATERIALS WITH HIGH STRENGTH AND HIGH BONDING QUALITIES SHALL BE USED FOR PERMANENT REPAIRS TO CONCRETE.

THE DELIVERED MATERIAL SHALL BE A COMPLETE DRY MIX REQUIRING MIXING WITH WATER OR ACTIVATOR TO FORM THE PATCHING MATERIAL PRIOR TO PLACEMENT. 50 POUNDS OF THE DRY MIX SHALL YIELD A MINIMUM OF 0.4 CUBIC FEET OF THE PATCHING MATERIAL WHEN MIXED IN THE AMOUNT DESIGNATED ON THE SHIPPING CONTAINER. THE COLOR OF THE MIXED PATCHING MATERIAL SHALL BE CEMENT GRAY. THE DRY MIX SHALL BE CAPABLE OF BEING MIXED AND THE PATCHING MATERIAL USED WITHOUT SACRIFICE IN QUALITY OF THE FINISHED PROJECT. WITHIN A TEMPERATURE RANGE FROM 32 TO 90 DEGREES FAHRENHEIT. THE NEAT MIXED PATCHING MATERIAL SHALL BE CAPABLE OF USE TO A MINIMUM DEPTH OF 1/2 INCH AND SHALL BE CAPABLE OF EXTENSION BY ADDING UP TO 50 PERCENT BY WEIGHT OF 1/4 TO 1/2 INCH AGGREGATE.

SOLUBLE CHLORIDES AND/OR SOLUBLE SULFATES IN SUFFICIENT QUANTITIES TO CAUSE CORROSION OF REINFORCING STEEL OR DAMAGE TO PORTLAND CEMENT CONCRETE. THE DRY MIX SHALL NOT CONTAIN OR REACT CHEMICALLY TO FROM ANY SUBSTANCES WHICH ARE HAZARDOUS OR OFFENSIVE TO WORKMEN, WHEN THE MATERIAL IS HANDLED AND/OR USED IN ACCORDANCE WITH ACCEPTED PROCEDURES.

THE MIXED PATCHING MATERIAL SHALL MEET THE FOLLOWING REQUIREMENTS:

SETTING TIME (ASTM C 266) **
INITIAL SETTING TIME SHALL BE 10 MINUTES MINIMUM
COMPRESSIVE STRENGTH (ASTM C 109) **
1 HOUR 2,000 PSI MINIMUM
24 HOURS 5,000 PSI MINIMUM
7 DAYS 7,000 PSI MINIMUM

COMPRESSIVE STRENGTH (ASTM C 39) *
1 HOUR 2,000 PSI MINIMUM
24 HOURS 3,500 PSI MINIMUM
7 DAYS 6,000 PSI MINIMUM

FLEXURAL STRENGTH (ASTM C 78) *
4 HOUR 200 PSI MINIMUM
3 DAYS 500 PSI MINIMUM

FREEZE AND THAW TEST (ASTM C 666, PROCEDURE A) **
300 CYCLES DURABILITY FACTOR 79% MINIMUM

- * THE TEST SPECIMENS SHALL BE EXTENDED 50 PERCENT BY DRY MORTAR WEIGHT WITH AGGREGATE.
- ** THE MORTAR SHALL BE TESTED AS RECEIVED WITH NOTHING ADDED EXCEPT THE AMOUNT OF WATER DESIGNATED ON THE SHIPPING CONTAINER.

THE MIXED PATCHING MATERIAL SHALL BE SUITABLE FOR FINISHING WITH HAND TOOLS. IT SHALL NOT REQUIRE SPECIAL CURING PROCEDURES.

THE NET WEIGHT OF EACH DELIVERED CONTAINER OF DRY MIX SHALL BE 50 POUNDS OR LESS. THE DRY MIX SHALL BE PACKAGED IN STRONG MOISTURE RESISTANT BAGS OR OTHER SUITABLE CONTAINERS CAPABLE OF WITHSTANDING NORMAL SHIPPING AND HANDLING WITHOUT DAMAGE. THE CONTAINER SHALL BE CAPABLE OF PROTECTING THE DRY MIX FOR A PERIOD OF NOT LESS THAN 6 MONTHS WHEN STORED IN A DRY CONDITION. COMPLETE MIXING INSTRUCTIONS SHALL BE PRINTED ON EACH CONTAINER.

THE MANUFACTURER SHALL CERTIFY THAT THE DRY MIX FURNISHED AND DELIVERED COMPLIES WITH THIS SPECIFICATION AND SHALL FURNISH SUPPORTING TEST RESULTS FROM A RECOGNIZED LABORATORY.

- E. **PLACING:** QSC PATCHES SHALL BE PROPORTIONED, MIXED, BONDED AND PLACED PER THE MANUFACTURER'S RECOMMENDATIONS WHEN THE AMBIENT TEMPERATURE IS ABOVE 40 DEGREES F. COARSE AGGREGATE, WHICH HAS BEEN CLEANED, DRIED AND BAGGED, SHALL BE ADDED AT A RATE OF 30 POUNDS OF AGGREGATE PER 50 LBS. OF DRY QSC MORTAR.

IF PLACEMENT OF THE PATCHES IS TO BE MADE AT NIGHT, THE CONTRACTOR SHALL SUBMIT A PLAN WHICH PROVIDES ADEQUATE LIGHTING FOR WORK AREA. THE PLAN SHALL BE SUBMITTED AT LEAST 15 CALENDAR DAYS IN ADVANCE AND BE APPROVED BY THE ENGINEER BEFORE CONCRETE IS PLACED. THE LIGHTS SHALL BE DIRECTED SO THAT THEY DO NOT AFFECT OR DISTRACT APPROACHING TRAFFIC.

THE PATCHING MATERIAL SHALL BE PLACED, CONSOLIDATED AND FINISHED TO THE ADJACENT GRADE. THE PATCHES SHALL BE HAND VIBRATED AND LEVELED WITH A STRAIGHTEDGE LONG ENOUGH TO SPAN THE PATCH. THE SCREED SHALL BE PLACED PARALLEL TO THE BRIDGE CENTERLINE SO THAT THE DECK PROFILE REMAINS CONSISTENT WITH THE WORN SURFACE.

THE CONTRACTOR SHALL TEST THE SURFACE OF THE PLASTIC CONCRETE FOR TRUENESS AND FOR BEING FLUSH WITH THE EDGES OF THE ADJACENT SURFACES BY USE OF A STRAIGHTEDGE. THE STRAIGHTEDGING SHALL BE DONE BY PLACING THE STRAIGHTEDGE PARALLEL TO THE BRIDGE CENTERLINE WITH THE ENDS RESTING ON THE EXISTING WEARING SURFACE ADJACENT TO THE PATCH AND DRAWING THE STRAIGHTEDGE ACROSS THE PATCH. THE STRAIGHTEDGE SHOULD BE IN CONTACT WITH THE ADJACENT EXISTING SURFACE WHILE DRAWING IT ACROSS THE PATCH. ANY HIGH OR LOW AREAS EXCEEDING 1/8 INCH IN 10 FEET SHALL BE CORRECTED. IF ANY CORRECTIONS ARE MADE, THE SURFACE SHALL BE RECHECKED.

- F. **FINISHING:** AFTER THE PATCHES HAVE BEEN CONSOLIDATED AND FINISHED THEY SHALL BE TEXTURED IN ACCORDANCE WITH SECTION 451.09 OF THE CMS.
- G. **CURING:** QSC PATCHES SHALL BE CURED FOR A MINIMUM OF 2 HOURS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. 2000 PSI COMPRESSIVE STRENGTH SHALL BE VERIFIED WITH A PROPERLY CALIBRATED IMPACT REBOUND HAMMER, PROVIDED BY THE CONTRACTOR, PRIOR TO OPENING TO TRAFFIC.
- H. **INSPECTION AND SOUNDING OF CONCRETE PATCHES:** AFTER CURING AND BEFORE FINAL ACCEPTANCE, ALL PATCHED AREAS SHALL BE SOUNDED. ALL UNSOUND AREAS SHALL BE REMOVED AND REPATCHED ACCORDING TO THIS NOTE. AREAS EXHIBITING CRACKS SHALL BE SEALED IN ACCORDANCE TO: TREATING CONCRETE BRIDGE DECKS WITH GRAVITY-FED RESIN.
- ALL SEALING AND REPLACEMENT OF REJECTED AREAS WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AND INCLUDED IN THE UNIT BID PRICE FOR THIS ITEM.
- I. **METHOD OF MEASUREMENT:** THE QUANTITY SHALL BE THE ACTUAL AREA IN SQUARE YARDS OF THE EXPOSED SURFACE OF ALL PATCHES, IRRESPECTIVE OF THE DEPTH OF THE PATCH, COMPLETE. IN PLACE AND ACCEPTED.
- J. **BASIS OF PAYMENT:** PAYMENT SHALL BE MADE AT THE CONTRACT PRICE BID FOR:

ITEM	UNIT	DESCRIPTION
SPECIAL	SQ. YD.	PATCHING CONCRETE BRIDGE DECK OVERLAYS WITH QSC.

ITEM SPECIAL - VANDAL PROTECTION FENCE

THE VANDAL PROTECTION FENCE, 8 FEET STRAIGHT, SHALL BE CONSTRUCTED USING POLYVINYL CHLORIDE (P.V.C.) COATED, CLASS 2B FABRIC.

ITEM SPECIAL - LOW PRESSURE EPOXY INJECTING DELAMINATED CONCRETE

THIS WORK SHALL CONSIST OF LOW - PRESSURE EPOXY INJECTION OF DELAMINATED BOTTOM COVER CONCRETE OF BRIDGE DECKS IN ACCORDANCE WITH THESE SPECIFICATIONS, IN REASONABLY CLOSE CONFORMITY WITH THE PLANS AND MANUFACTURER'S RECOMMENDATIONS AS DIRECTED BY THE ENGINEER. THE LOCATIONS OF DELAMINATIONS ARE MARKED BY PAINT UNDER THE BRIDGE DECKS.

THIS INJECTION RESIN SHALL BE SIKADUR 52 INJECTION RESIN, DURALCRETE LV, POLY-CARB MARK-10 INJECTION RESIN OR THERMAL-CHEM INJECTION RESIN PRODUCT NO. 2, THE BONDER SHALL BE THERMAL-CHEM BONDER PRODUCT NO. 4, POLY-CARB MARK 8 NON-SAG EPOXY BONDER, DURAL CRETE GEL, OR SIKADUR HI-MOD GEL(SIKADUR 31). ALL MATERIAL SHALL BE STORED AND INCORPORATED IN THE WORK AS RECOMMENDED BY THE MANUFACTURER. A MANUFACTURER'S REPRESENTATIVE SHALL BE PRESENT AT THE JOB SITE UNTIL SUCH TIME AS HE AND THE ENGINEER ARE SURE THAT THE CONTRACTOR IS QUALIFIED IN ALL ASPECTS OF EPOXY PRESSURE GROUTING.

PORTS SHALL BE INSTALLED IN CLEAN HOLES VACUM-DRILLED (TO PREVENT FINES FROM BEING IMPACTED INTO THE CRACK), 3 INCHES DEEP IN THE DECK BOTTOM SO THAT THE EPOXY WILL PENETRATE THE HOLLOW PLANE. THE FIRST PORT SHALL BE LOCATED NEAR THE EDGE OF THE OUTLINED UNSOUND AREA. ADDITIONAL PORTS SHALL BE PLACED AT DISTANCES SLIGHTLY GREATER THAN THE DISTANCE FROM THE FIRST PORT TO THE VOID EDGE. PORT PLACEMENT MUST ENSURE THAT THE GROUT FACE REACHES THE EDGE OF THE VOID BEFORE REACHING THE NEXT PORT. PORTS AND VISIBLE CRACKS SHALL BE SEALED WITH BONDER TO PREVENT EMISSION OF INJECTION RESIN. THE BONDER SHALL CURE 24 HOURS PRIOR TO INJECTION OF EPOXY RESIN.

THE RESIN SHALL BE INJECTED ONLY WHEN THE DECK IS DRY AND ITS TEMPERATURE IS ABOVE 50° F. THE INJECTION RESIN SHALL BE AT 70° F.

THE EPOXY INJECTION EQUIPMENT SHALL BE CAPABLE OF INJECTING THE MATERIAL INTO THE PORTS AT LOW PRESSURES OF 14 TO 20 PSI. THE INJECTION EQUIPMENT SHALL BE CAPABLE OF METERING, MIXING AND INJECTING THE EPOXY RESIN ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.

THE INJECTION SHALL COMMENCE AT THE EDGE OF THE DELAMINATION AND CONTINUE UNTIL THE EPOXY RESIN APPEARS AT THE NEXT PORT. MOST INCOMPLETELY FILLED VOIDS ARE CAUSED BY THE OPERATOR STOPPING THE INJECTION PROCESS PREMATURELY. THEREFORE, A STEADY, LOW PRESSURE SHALL BE MAINTAINED ON THE EPOXY UNTIL A STEADY CLEAR FLOW APPEARS AT THE NEXT PORT. THEN THE INJECTION NOZZLE IS REMOVED, THE PORT CLOSED AND THE INJECTION CONTINUED FROM PORT TO PORT UNTIL THE VOID IS COMPLETELY FILLED. SINCE THE GROUT FACE IS MOVING UNDER VISCOUS FLOW CONDITIONS WHICH ARE GOVERNED BY FLUID SURFACE FRICTION, THE INJECTION PROCESS IS SLOW. REGARDLESS, INJECTION PRESSURE SHALL BE 20 PSI MAXIMUM SO THAT BOTTOM COVER CONCRETE IS NOT BLOWN OFF. PROGRESS OF THE EPOXY SHALL BE CHECKED WITH A TAPPING HAMMER.

THE OUTLINED INJECTED VOIDS SHALL BE SOUNDED WITH A HAMMER BY THE ENGINEER. ANY REMAINING UNSOUND AREAS SHALL BE PORTED AND REINJECTED AT NO ADDITIONAL COST TO THE STATE. ALL PORTS SHALL BE CUT OFF FLUSH WITH THE SURFACE. ALL EQUIPMENT, LABOR AND MATERIALS REQUIRED BY THE ENGINEER TO ACCOMPLISH THIS WORK SHALL BE SUPPLIED BY THE CONTRACTOR.

ALL REMOVAL OPERATION ON THE DECK MUST BE COMPLETE BEFORE BOTTOM CAN BE INJECTED.

THIS SPECIFICATION LIMITS THE INJECTING PRESSURE TO 20 PSI MAX. TO PREVENT BLOWING THE DELAMINATION OFF THE DECK. IF THE CONTRACTOR PREFERENCES TO UTILIZE A HIGHER PRESSURE INJECTION PROCESS INSTEAD OF THE LOW PRESSURE HEREIN REQUIRED, HE SHALL SUBMIT HIS PROPOSED METHOD OF PREVENTING BLOW OFF OF THE SURFACE TO THE DIRECTOR FOR APPROVAL. NO HIGH PRESSURE INJECTION WILL BE PERMITTED WITHOUT WRITTEN APPROVAL FROM THE DIRECTOR.

NO VEHICULAR TRAFFIC INCLUDING THE CONSTRUCTION TRAFFIC WILL BE PERMITTED ON A BRIDGE DECK WHICH HAS RECEIVED TOP SURFACE INJECTION UNTIL THE EPOXY HAS CURED SUFFICIENTLY TO DEVELOP DESIGN STRENGTH. TIME REQUIRED TO CURE WILL DEPEND ON THE EPOXY FORMULATION AND WILL BE DETERMINED BY THE MANUFACTURER. A MINIMUM OF 6 HOURS IS REQUIRED. THIS INFORMATION WILL BE PROVIDED TO THE ENGINEER.

THE FOOTAGE UNDER THIS ITEM SHALL BE THE NUMBER OF SQUARE FEET OF DELAMINATED DECK BOTTOM CONCRETE THAT ARE SATISFACTORILY LOW-PRESSURE EPOXY INJECTED AND ACCEPTED.

THE ACCEPTED QUANTITIES OF LOW PRESSURE EPOXY INJECTED CONCRETE WILL BE PAID FOR AT THE CONTRACT UNIT BID PRICE PER SQUARE FOOT. WHICH PRICE AND PAYMENT SHALL BE FULL COMPENSATION FOR FURNISHING AND PLACING ALL MATERIALS, SOUNDING THE INJECTED AREAS, SUPPLYING THE MANUFACTURER'S REPRESENTATIVE AND ALL OTHER MATERIAL, LABOR AND EQUIPMENT NECESSARY TO COMPLETE THIS WORK ACCORDING TO SPECIFICATIONS.

THIS ITEM IS A CONTINGENCY QUANTITY. IF NO VOIDS ARE FOUND, THIS ITEM SHALL NOT BE PERFORMED.

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STRUCTURE NOTES

LAK-90-0711

LAK-90-0767

LAK-90-1031

LAK-90-1007

LAK-90-1151

LAKE COUNTY OHIO

DESIGNED	DRAWN	CHECKED	REVIEWED	REVISED
R.J.K.	R.L.	K.P.	R.C.T.	
DATE				SHEET