BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Bridge Deck Patching

Priority Preservation Support Unit
Bridge Preservation
Bureau of Bridges and Structures

2023 Michigan Bridge Week Conference – Maintenance Track

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Agenda

- Bridge Maintenance Manual
- Deck Patch Scoping
- Patch Preparation
- Patch Installation
- Material Selection
  - Rapid Set Concretes

Bridge Maintenance Manual

Table of Contents

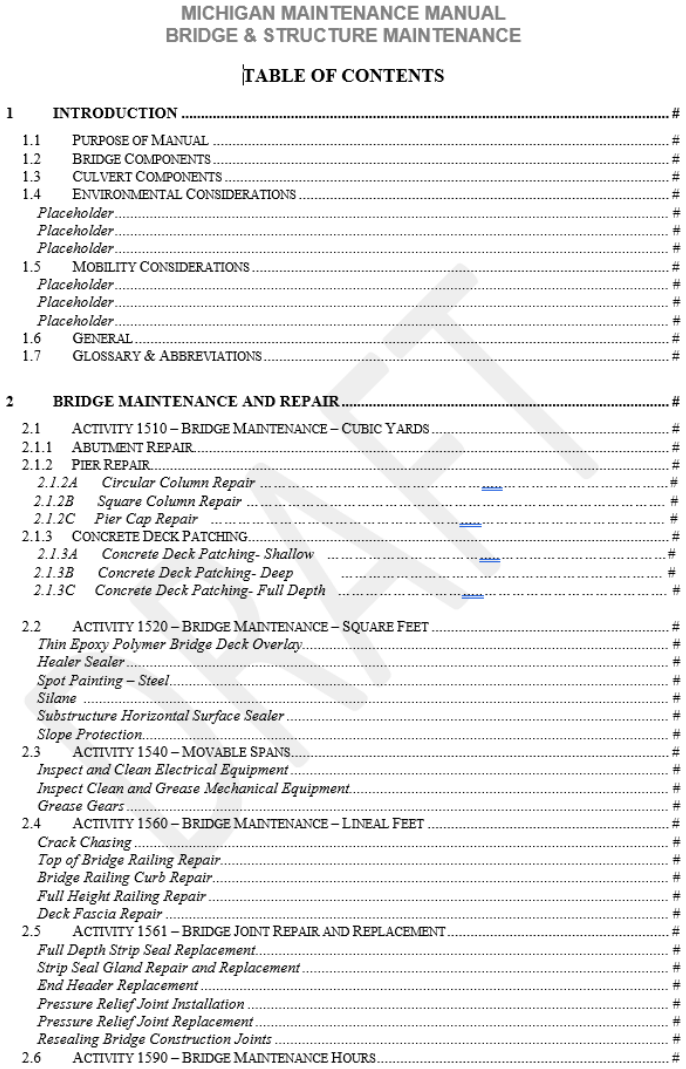
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



MICHIGAN MAINTENANCE MANUAL
BRIDGE & STRUCTURE MAINTENANCE

TABLE OF CONTENTS

Bridge Maintenance Manual

Table of Contents

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

MICHIGAN MAINTENANCE MANUAL
BRIDGE & STRUCTURE MAINTENANCE

Bridge Maintenance Manual

Concrete Deck Patching

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Bridge Maintenance Manual

Shallow Deck Patching

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

MICHIGAN MAINTENANCE MANUAL
BRIDGE & STRUCTURE MAINTENANCE
ACTIVITY 1510 – BRIDGE MAINTENANCE – CUBIC YARDS

Section 2.1.3A – Concrete Deck Patching - Shallow

General Notes
- Verify all dimensions in the field prior to ordering materials or building forms.

Prior to Commencement of Work
- Field review of deck surface. Check for delamination / spalls on the surface. The deck bottom should be in good condition with only a few minor cracks.

Concrete Material Selection
- Transpo T-17- 100% reactive, rapid setting, solvent free methyl methacrylate (MMA) polymer concrete patching material used for repair of partial depth decks.
- Kwik Bond – PPC 1121 – a premixed polymer concrete made of a Polyester binder resin and graded aggregates with a High Molecular weight methacrylate primer system that creates a bond line of the substrate for a rapid setting, concrete patching material used for repair of partial depth decks.
- EChem – EP Patch – three component, high performance, multi-purpose, non-shrink, epoxy patching mortar material used for repair of partial depth decks

Safety
Review environmental, training and safety procedures.
Review MMUTCD prior to setting up traffic control.

Michigan Department of Transportation 2020 Standard Specifications for Construction
- Section 712 – Bridge Rehabilitation – Concrete
- Section 905 – Steel Reinforcement
- Section 1004 – Concrete Grade Mixtures
- Section 1005 – Mortar and Grout Mixtures
- Section 1006 – Concrete Patching Repair

Special Provisions and Supplemental Specifications
N/A

Bridge Maintenance Manual

Shallow Deck Patching

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

RECOMMENDED EQUIPMENT
5 (2 TRAFFIC REGULATORS INCLUDED)

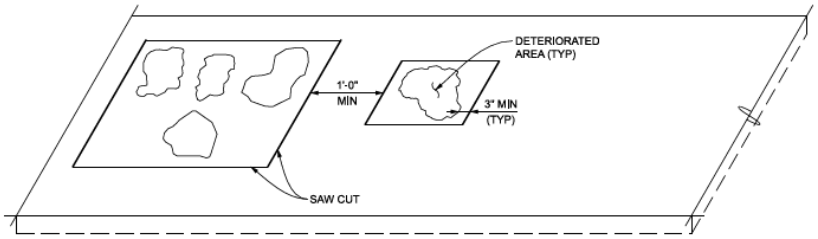
MATERIALS
CONCRETE
MISCELLANEOUS BRIDGE TOOLS
- SOUNDING HAMMER
- CONCRETE SAW
- 60LB PNEUMATIC HAMMER(S)

BLASTING ABRASIVE
STRUCTURAL ADHESIVE
#4, #5, AND #6 REBAR (TYP)
GALVANIC ANODES
FAST-SETTING CONCRETE
FORM LUMBER
FORM FASTENERS
COATED WIRE TIES

AVERAGE DAILY PRODUCTION
2 CUBIC YARDS

EQUIPMENT

QTY	CODE	DESCRIPTION
1	02/03	DUMP TRUCK
1	03	BRIDGE/TOOL TRUCK
1	04	TRUCK
1	12	FLASHING ARROW
1	19	COMPRESSOR
1	04	SHADOW VEHICLE
1	53	SANDBLASTER
		OPTIONAL
1	04	CRANE TRUCK
1	04	SCISSOR BED/AERIAL TRUCK
1	04	REACHALL
1	12	PORTABLE SIGNALS
1	38	SKID LOADER
1	67	TRAILER
1	04	ATTENUATOR



STEP 1

1. SOUND DECK, MARK DELAMINATED, SPALLED AND/OR DETERIORATED AREAS ON THE DECK SURFACE.
2. MARK LIMITS OF REMOVAL TO ENCOMPASS DETERIORATED AREA PLUS 3" MINIMUM ON ALL SIDES. PATCHES MUST BE AS SQUARED OFF WITH NO ACUTE ANGLES. IF TWO PATCHES THAT ARE LESS THAN 1 FT APART, THE TWO PATCHES MUST BE COMBINED INTO ONE PATCH.
3. SAW CUT THE DECK TO A DEPTH OF 1" ALONG THE LIMITS OF REMOVAL. EXTEND SAW CUT 1" BEYOND INTERSECTION LINES.

Bridge Maintenance Manual

Shallow Deck Patching

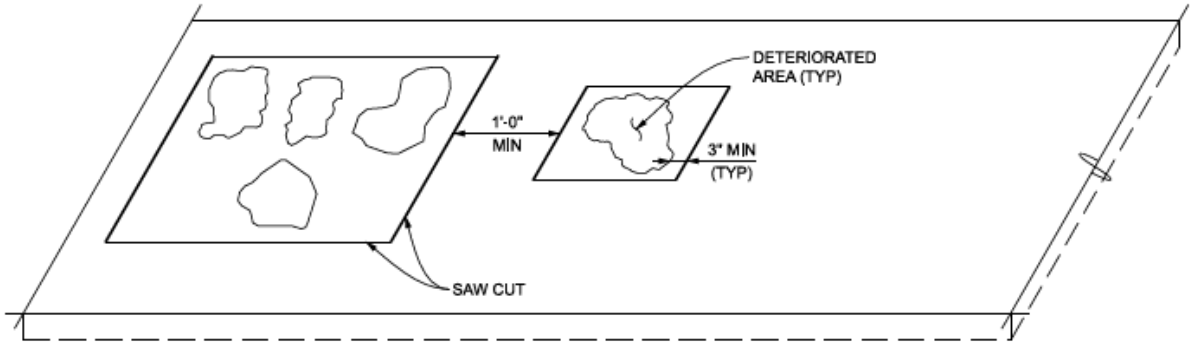
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



STEP 1

1. SOUND DECK, MARK DELAMINATED, SPALLED AND/OR DETERIORATED AREAS ON THE DECK SURFACE.
2. MARK LIMITS OF REMOVAL TO ENCOMPASS DETERIORATED AREA PLUS 3" MINIMUM ON ALL SIDES. PATCHES MUST BE AS SQUARED OFF WITH NO ACUTE ANGLES. IF TWO PATCHES THAT ARE LESS THAN 1 FT APART, THE TWO PATCHES MUST BE COMBINED INTO ONE PATCH.
3. SAW CUT THE DECK TO A DEPTH OF 1" ALONG THE LIMITS OF REMOVAL. EXTEND SAW CUT 1" BEYOND INTERSECTION LINES.

Bridge Maintenance Manual

Shallow Deck Patching

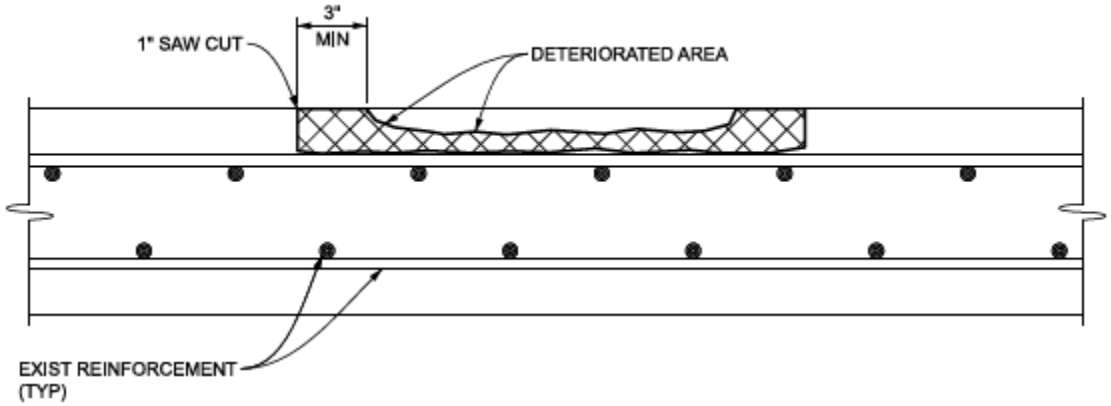
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



STEP 2

1. FOR REMOVING SUPERSTRUCTURE CONCRETE ON STEEL BEAM BRIDGES, MACHINE-MOUNTED HYDRAULIC OR PNEUMATIC EQUIPMENT MAY BE USED. USE MANUAL PNEUMATIC HAMMERS TO REMOVE THE BRIDGE DECK OVER CONCRETE BEAMS. LIMIT MANUAL PNEUMATIC HAMMER TO 60 POUND MAXIMUM.

2. SANDBLAST CONCRETE TO REMOVE LOOSE DEBRIS AND ESTABLISH PROFILE FOR CONCRETE ADHESION.

Bridge Maintenance Manual

Shallow Deck Patching

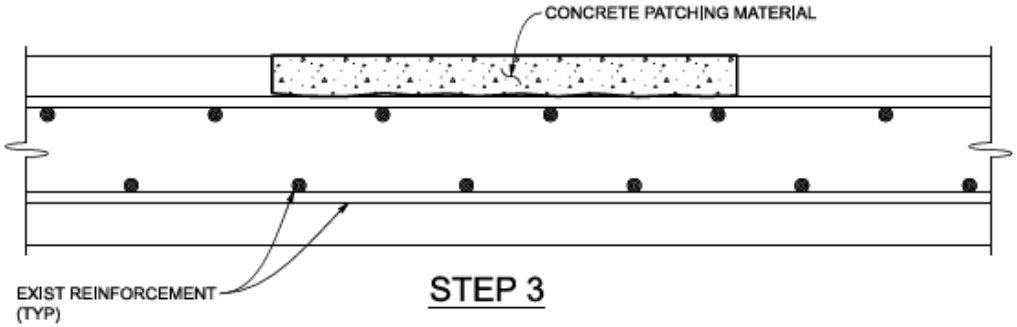
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



STEP 3

1. IF PATCH IS ADJACENT TO EXISTING JOINT INSTALL EDGE FORMS ADEQUATE TO MAINTAIN THE EXISTING JOINT LINE. APPLY PRIMER PER MANUFACTURER'S RECOMMENDATIONS.
2. FOR RAPID SET CONCRETE PATCHING MIXTURES, PLACE, CONSOLIDATE, FINISH AND CURE PER MANUFACTURER'S RECOMMENDATIONS. AFTER FINISHING BROOM THE CONCRETE.
3. SHORTENED CURE TIMES MAY BE ALLOWED FOR NON-SCHEDULED EMERGENCY REPAIRS.

Bridge Maintenance Manual

Appendix

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

CASTEK INC. — A TRANSPO INDUSTRIES COMPANY

Technical Data Sheet

MMA Polymer Concrete Patching Material

T-17

T-17 is a 100% reactive, rapid setting, solvent-free methyl methacrylate (MMA) polymer concrete system that can be used as a repair for partial or full depth patching, grouting, and structural repairs. This system is to be used on horizontal concrete surfaces, on grade, above and below grade.

The polymer concrete consists of a two-component system. The T-17 liquid component consists of a solvent free 100% reactive, low viscosity methyl methacrylate (MMA). The T-17 powder component consists of a prepackaged blend of sand, inert fillers, polymers, and initiators. The material can be applied at a minimum ½" (13mm) thickness. For deeper patching, the T-17 should be extended with a special aggregate.

Application Procedure

Surface Preparation: All surfaces that are to receive T-17 must be thoroughly clean, dry and free of all dirt, grease, rust and other contaminates that might interfere with the proper adhesion of the polymer concrete. All damaged or deteriorated concrete shall be removed using jack-hammers or any other means and cut back to sound concrete. All surfaces must be thoroughly shot-blasted or sandblasted prior to applying T-17.

Priming: Priming is done with T-41s MMA primer using either rollers or brushes at a rate of 0.01gal/ft² (0.4L/m²). The primer resin is mixed with an appropriate amount of powder hardener (BPO) as shown in Table 1. The primer coat must be allowed to cure tack-free before application of the patching material.

Table 1: Mixing Instructions for T41-s Primer

Ambient Temperature °F (°C)	No. of 1oz (30g) Bags of BPO per gal (3.79L) of T41-s Resin
14 – 35 (-10 – 2)	6
36 – 55 (2 – 13)	5
56 – 75 (13 – 24)	4
76 – 104 (24 – 40)	3

T-17 Mixing: For small batches, the material can be mixed in a polyethylene bag that is available upon request. This is done by adding the powder, a pre-measured amount of liquid component to the bag, twisting the top with both hands so as to leave a small air space above the material, holding the bag closed with one hand and using the other to agitate the components in the bag until completely mixed. After powder and liquid are mixed, additional aggregate should be added and repeat mixing procedure.

For larger mixing, a rotary drum mortar mixer may be used. The inside of the mixer should be clean and dry. Add appropriate amount of Transpo T-17 liquid to the mixer, the Transpo T-17 powder component, and mix until uniform consistency. Next, add the additional coarse aggregate and re-mix for another minute. The amount of aggregate and resin added per bag of Transpo T-17 powder depends on the depth of the patch. Refer to Table 2:

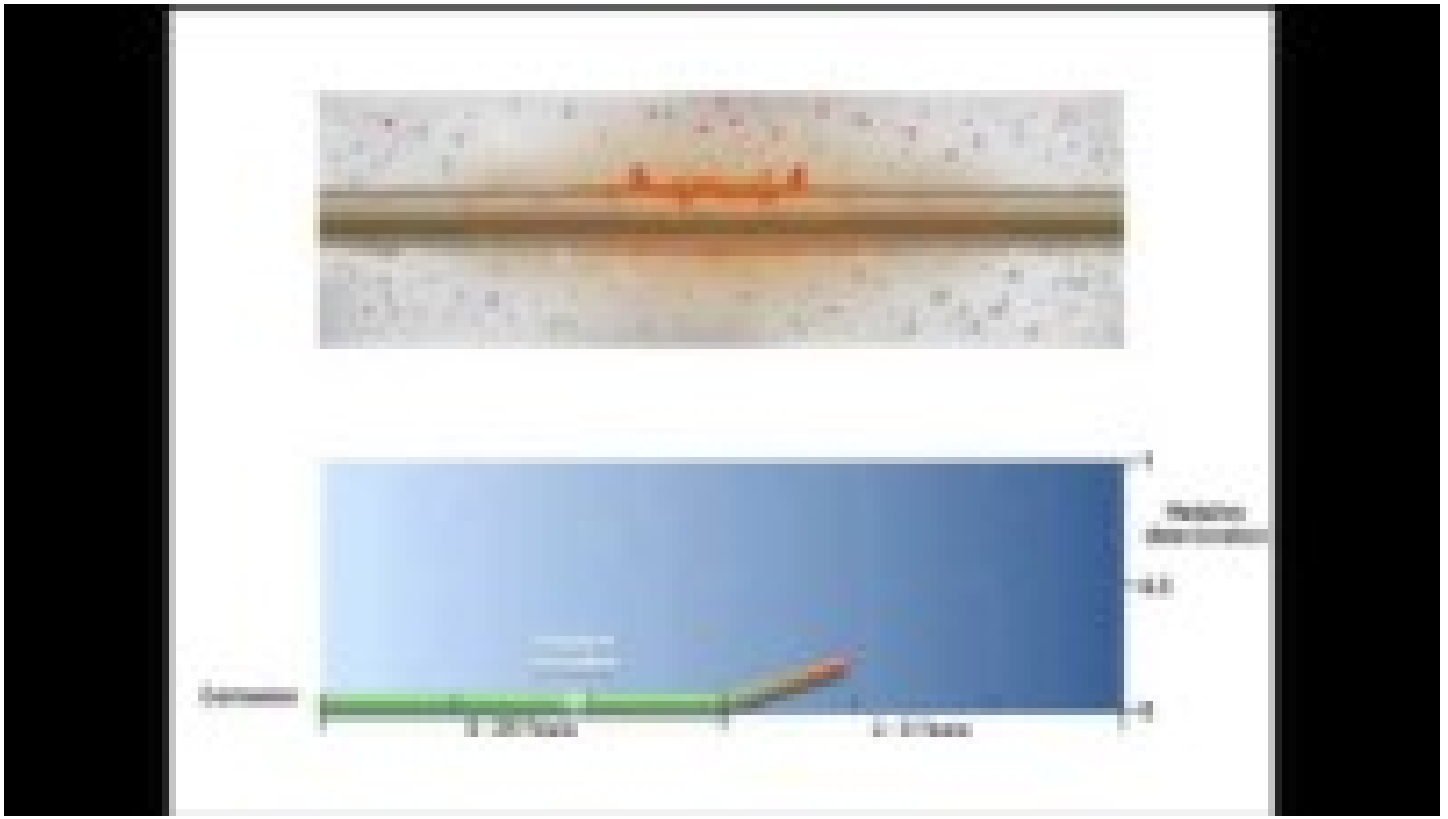
Table 2: Mixing Instructions for T-17 per 50 lb (22.7 kg) bag of T-17 Powder

Depth of Patch in (mm)	Amt. Extension	Agg. Size in (mm)	Amt. Agg. lb (kg)	T-17 Liquid gal (L)		Yield ft³(m³)
2 (51) and above	100%	3/4 x 3/8 (19 x 10)	50 (22.7)	0.875 (3.3)	112 OZ	0.72 (0.07)
½ - 2 (13 – 51)	50%	3/8 x 3/16 (10 x 5)	25 (11.3)	0.75 (2.8)	96 OZ	0.56 (0.05)
Less than ½ (13)	0%	-	-	0.625 (2.4)	80 OZ	0.40 (0.03)

TRANSPO The Smart Solutions Company

Deck Patch Scoping

Deck Deterioration



Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

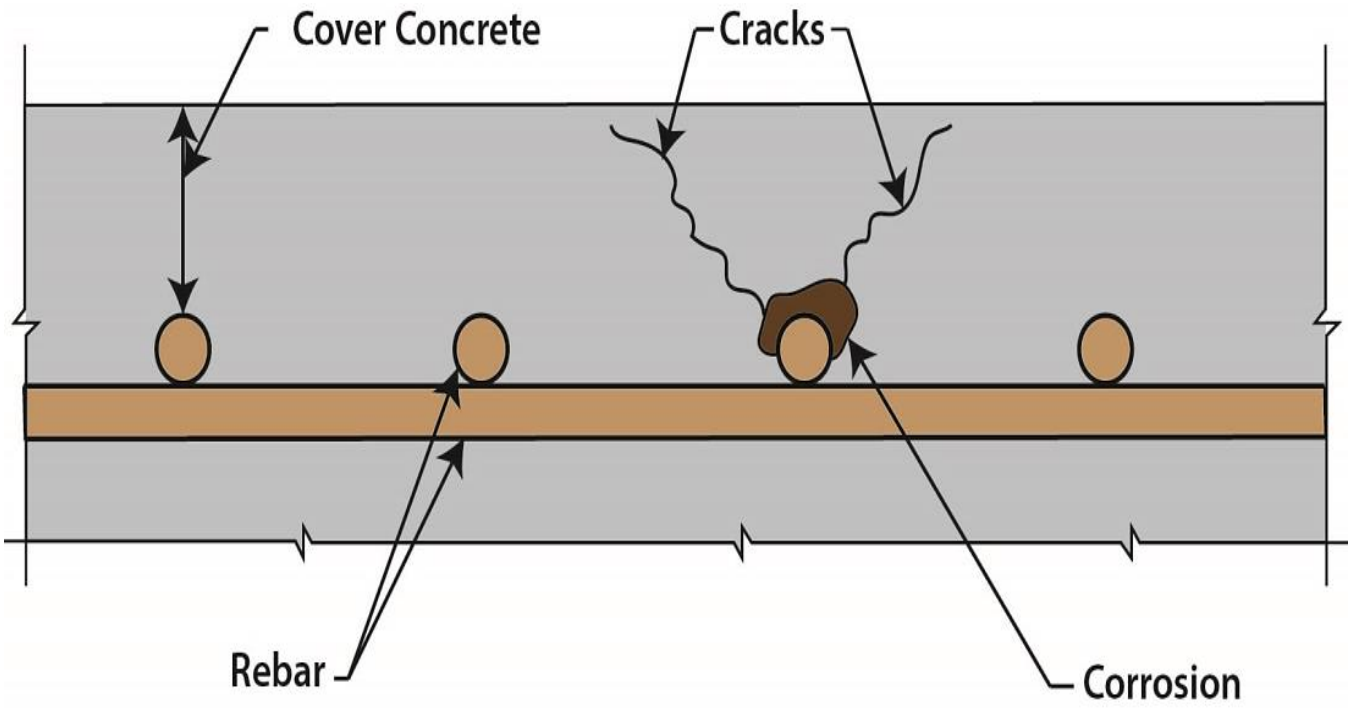
Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Deck Patch Scoping

Deck Deterioration



Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Deck Patch Scoping

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Visually inspect deck surface & bottom for all areas of deterioration

Deck Patch Scoping

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Sound area to be patched and/or around patch area to identify all unsound concrete

Deck Patch Scoping

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

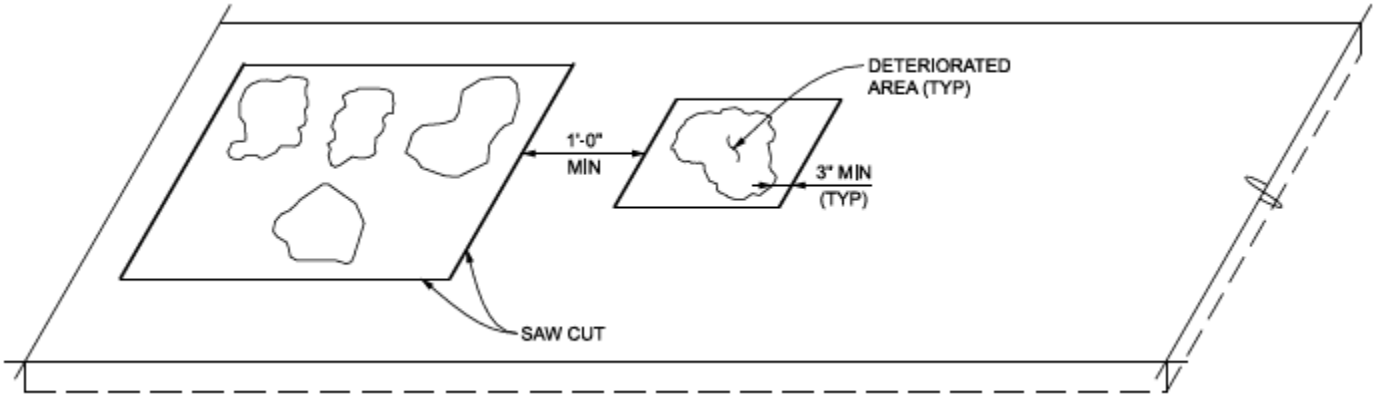
Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Sound area to be patched and/or around patch area to identify all unsound concrete



Patch Preparation

Saw Cutting

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

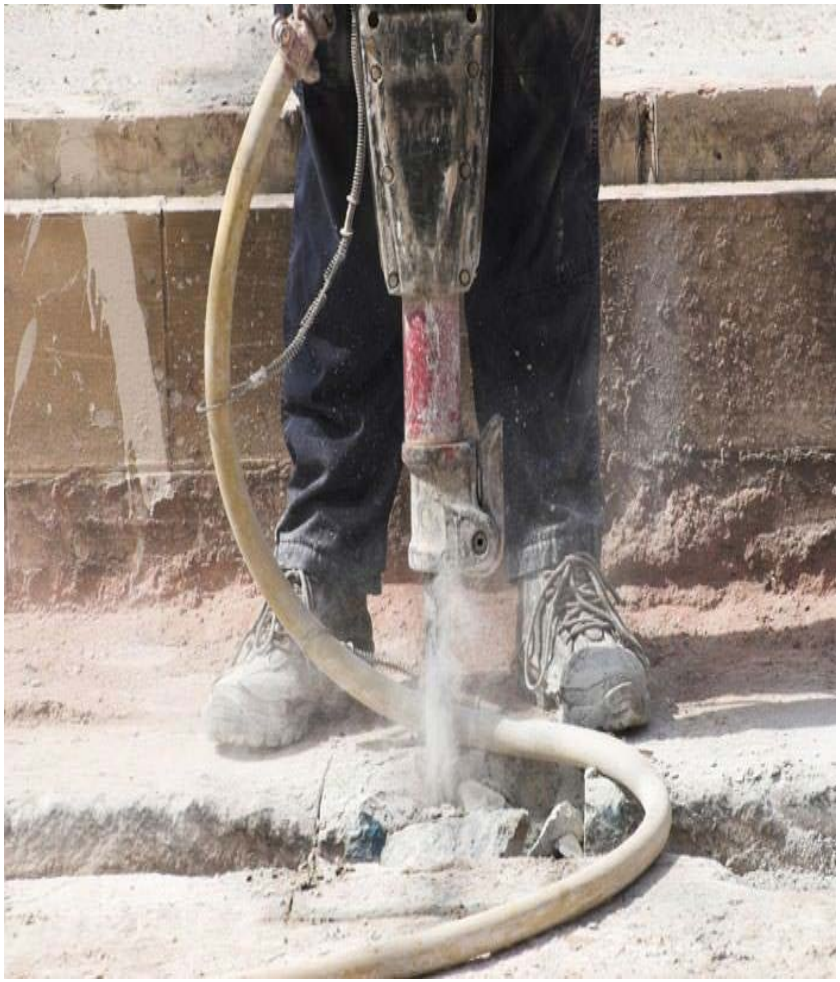
Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Chip Limits of Deterioration



Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Ensure to chip all unsound concrete

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Ensure to chip all unsound concrete

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Check Edges

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Clean Patch Areas

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Clean Patch Areas

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Reinforcement Steel

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Patch Preparation

Full Depth Patch

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Poor Formwork

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Patch Preparation

Proper Bracing

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Preparation

Galvanic Anodes

Patch Preparation

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Patch Installation

Material Placement

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

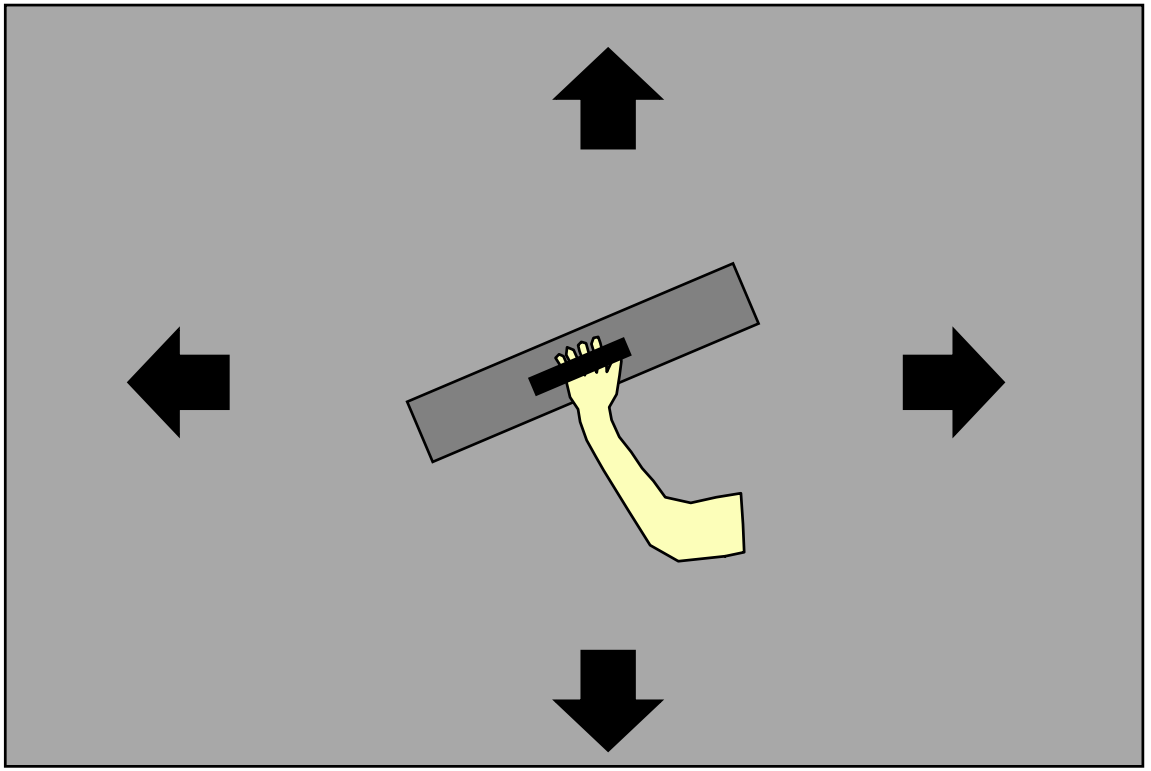
Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Installation

Finishing



Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Installation

Finishing

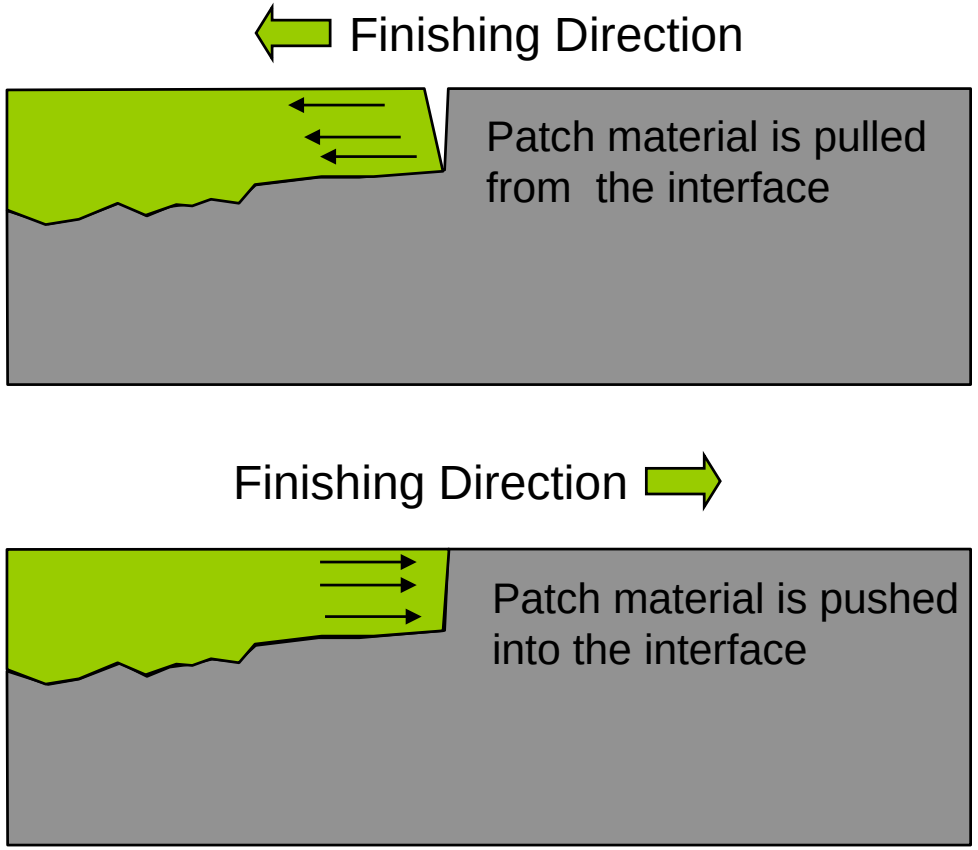
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



Patch Installation

Curing

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Patch Installation

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Deck Patching

SFT Partial Depth QTY: _____
SFT Full Depth QTY: _____
Qty Anodes QTY: _____
LFT Epoxy Reinforcement QTY: _____
☐Product Trial

Concrete Mixture

☐BASF – 10-60 Rapid Mortar ☐MDOT -7 Sack Latex Patching Concrete C-L
☐ MDOT - Concrete Grade D ☐ Castek - T17
☐ MDOT -9 Sack High Early Latex Patching Concrete - C-L-HE ☐ Other - MDOT QPL

Equipment:

Material:	Cost:

Personnel:	Hours:

Comment:

Material Selection

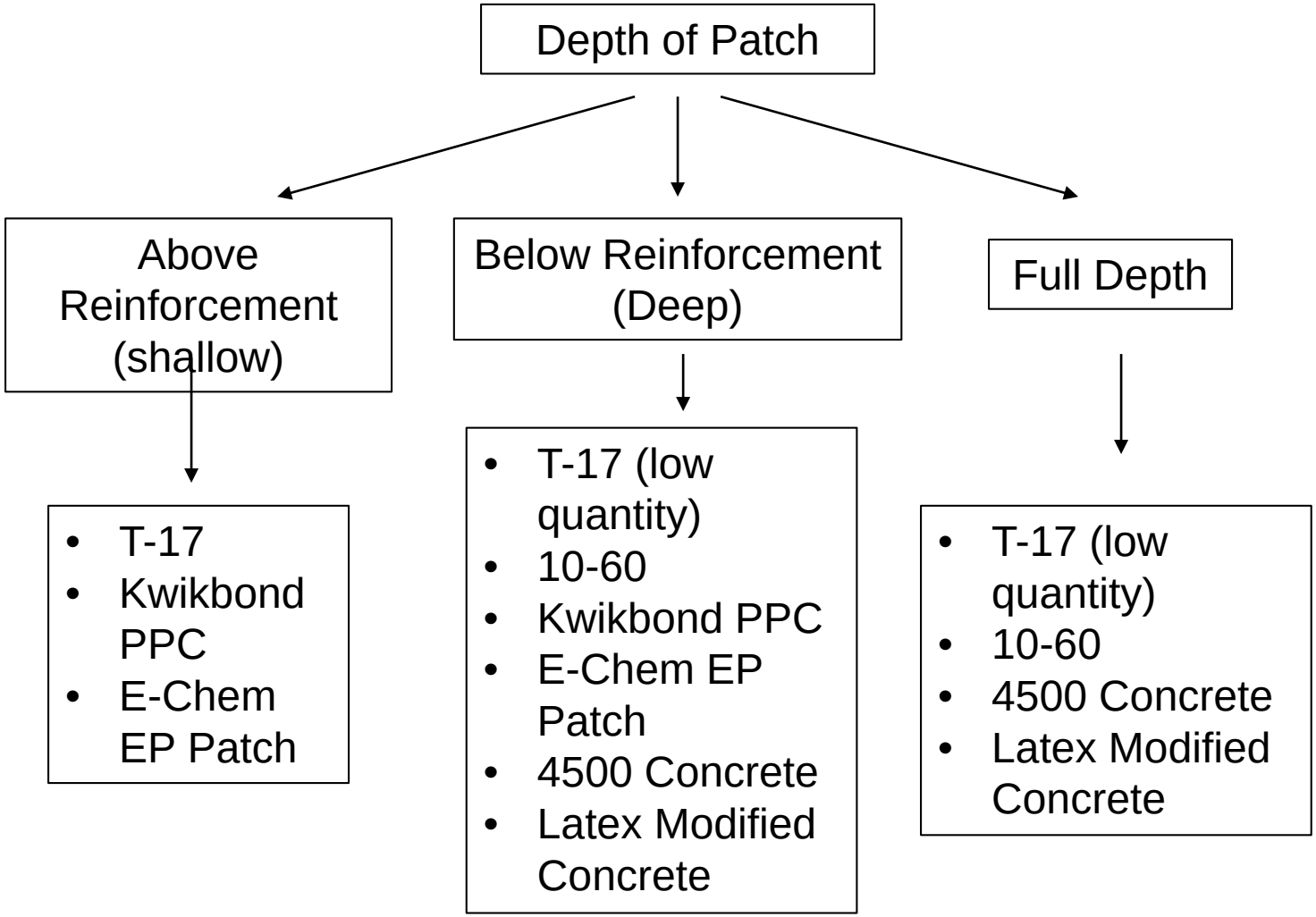
Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710



BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Material Selection

Rapid Cure Time

- MasterEmaco T 1060 by BASF – Rapid Mortar
  - 2-3 Hours
- Castek T-17
  - 2-3 Hours
- Kwikbond Polymers – PPC Easy Patch
  - 2-3 Hours
- Echem – EP Patch
  - 3-5 Hours

Longer Cure Time

- MDOT – 4500 Concrete
  - 7 Day (wet)
- Latex Modified Concrete
  - 48 Hours wet & 48 hours dry

Rapid Set Concretes

BASF 1060

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

BASF 1060

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Technical Data Guide

MASTER® BUILDERS SOLUTIONS

3 03 01 00 Maintenance of Concrete

MasterEmaco® T 1060

Very rapid-setting cement-based concrete repair mortar

FORMERLY 10-60 RAPID MORTAR

PACKAGING
MasterEmaco T 1060
50 lb (22.6 kg) polyethylene-lined bags
3,000 lb (1,360 kg) bulk bags

MasterEmaco T 1060DR
50 lb (22.6 kg) polyethylene-lined bags

YIELD
0.43 ft³ (0.012 m³) per 50 lb (22.6 kg)
- WHEN EXTENDED 50%:
0.57 ft³ (0.016 m³)
- WHEN EXTENDED 100%:
0.77 ft³ (0.022 m³)

STORAGE
Store in unopened containers in cool, clean, dry conditions

SHELF LIFE
- 50 LB BAGS:
1 year when properly stored
- 3,000 LB BULK BAGS:
6 months when properly stored

VOC CONTENT
0 g/L less water and exempt solvents

DESCRIPTION
MasterEmaco T 1060 is a one-component, shrinkage-compensated, very rapid-setting, cement-based mortar. It is designed for repairing horizontal concrete surfaces where high early strength gain is required. MasterEmaco T 1060DR is a reduced dust version available separately.

PRODUCT HIGHLIGHTS
- Extra low permeability helps minimize chloride intrusion
- Very rapid-setting so that structures can be opened to vehicular traffic in 1 hour
- Low residual moisture, can be coated in as little as 4 hours
- Excellent resistance to freeze/thaw cycling
- Shrinkage-compensated, minimizing cracking from drying shrinkage, reducing stress at the bond line
- Can be extended up to 100% by weight, providing higher yields
- Proprietary cement blend bonds to carbonated and noncarbonated concrete substrates

APPLICATIONS
- Interior and exterior
- Horizontal surfaces
- Applications requiring high early-strength gain
- Structural concrete repairs
- Partial and full-depth repairs

SUBSTRATES
- Concrete

HOW TO APPLY
SURFACE PREPARATION
CONCRETE
1. Concrete must be structurally sound and fully cured (28 days).
2. Saw cut the perimeter of the area being repaired into a square with a minimum depth of 1/2" (13 mm).
3. Refer to current ICRI Guideline no. 310.2R for surface prep requirements to permit proper bond.

REINFORCING STEEL
1. Remove all oxidation and scale from the exposed reinforcing steel in accordance with ICRI Technical Guideline No. 310.1R.
2. For additional protection from future corrosion, coat the prepared reinforcing steel with MasterProtect P 8100 AP.

www.master-builders-solutions.com/en-us

A brand of MBCC GROUP

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Rapid Set Concretes

BASF 1060

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

BASF 1060

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

Castek – T-17

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES
SPANNING SAFETY
CONNECTING EFFICIENTLY
and STRUCTURES

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

Castek – T-17

CASTEK® A TRANSPO INDUSTRIES COMPANY INC.

Technical Data Sheet

MMA Polymer Concrete Patching Material
T-17

T-17 is a 100% reactive, rapid setting, solvent-free methyl methacrylate (MMA) polymer concrete system that can be used as a repair for partial or full depth patching, grouting, and structural repairs. This system is to be used on horizontal concrete surfaces, on grade, above and below grade.

The polymer concrete consists of a two-component system. The T-17 liquid component consists of a solvent free 100% reactive, low viscosity methyl methacrylate (MMA). The T-17 powder component consists of a prepackaged blend of sand, inert fillers, polymers, and initiators. The material can be applied at a minimum ½" (13mm) thickness. For deeper patching, the T-17 should be extended with a special aggregate.

Application Procedure

Surface Preparation: All surfaces that are to receive T-17 must be thoroughly clean, dry and free of all dirt, grease, rust and other contaminates that might interfere with the proper adhesion of the polymer concrete. All damaged or deteriorated concrete shall be removed using jack-hammers or any other means and cut back to sound concrete. All surfaces must be thoroughly shot-blasted or sandblasted prior to applying T-17.

Priming: Priming is done with T-41s MMA primer using either rollers or brushes at a rate of 0.01gal/ft² (0.4L/m²). The primer resin is mixed with an appropriate amount of powder hardener (BPO) as shown in Table 1. The primer coat must be allowed to cure tack-free before application of the patching material.

Table 1: Mixing Instructions for T41-s Primer

Ambient Temperature °F (°C)	No. of 1oz (30g) Bags of BPO per gal (3.79L) of T41-s Resin
14 – 35 (-10 – 2)	6
36 – 55 (2 – 13)	5
56 – 75 (13 – 24)	4
76 – 104 (24 – 40)	3

T-17 Mixing: For small batches, the material can be mixed in a polyethylene bag that is available upon request. This is done by adding the powder, a pre-measured amount of liquid component to the bag, twisting the top with both hands so as to leave a small air space above the material, holding the bag closed with one hand and using the other to agitate the components in the bag until completely mixed. After powder and liquid are mixed, additional aggregate should be added and repeat mixing procedure.

For larger mixing, a rotary drum mortar mixer may be used. The inside of the mixer should be clean and dry. Add appropriate amount of Transpo T-17 liquid to the mixer, the Transpo T-17 powder component, and mix until uniform consistency. Next, add the additional coarse aggregate and re-mix for another minute. The amount of aggregate and resin added per bag of Transpo T-17 powder depends on the depth of the patch. Refer to Table 2:

Table 2: Mixing Instructions for T-17 per 50 lb (22.7 kg) bag of T-17 Powder

Depth of Patch in (mm)	Amt. Extension	Agg. Size in (mm)	Amt. Agg. lb (kg)	T-17 Liquid gal (L)	Yield ft³(m³)
2 (51) and above	100%	3/4 x 3/8 (19 x 10)	50 (22.7)	0.875 (3.3) 112 OZ	0.72 (0.07)
½ - 2 (13 – 51)	50%	3/8 x 3/16 (10 x 5)	25 (11.3)	0.75 (2.8) 96 OZ	0.56 (0.05)
Less than ½ (13)	0%	-	-	0.625 (2.4) 80 OZ	0.40 (0.03)

TRANSPO The Smart Solutions Company

Rapid Set Concretes

Castek – T-17

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

Castek – T-17

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Rapid Set Concretes

Castek – T-17

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

BUREAU of BRIDGES and STRUCTURES

SPANNING SAFETY CONNECTING EFFICIENTLY

Jason DeRuyver, P.E
Engineer Manager
Priority Preservation Support Unit
Bridge Preservation
(517) 242-2988

Jacob Creisher, P.E.
Statewide Bridge Engineer
(517) 243-7821

Aaron Porter
Statewide Bridge Support & Maintenance Coordinator
(517) 242-5788

Thomas Ranck
Statewide Bridge Engineer
(517) 242-2077

Cliff Graves
Statewide Concrete Specialist
(517) 275-1710

Questions?????