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Owner: Major Projects - Technical Standards	Section	**Table of Contents**	
Revised 2017-11-21	Type	**Guidelines**	**Doc BM100 Approved Products**
	Title	**Approved Products**	

Introduction

The products listed in this document have been approved by the Saskatchewan Ministry of Highways and Infrastructure and are subjected to the following conditions.

- These products can only be used for their intended purpose within the limits given by the manufacturer. At no time shall the limits of the products be exceeded.
- Products should not be used in a manner contrary to manufacturers intended use or warranty conditions, without prior written approval from the Ministry.
- Appropriate safe work procedures and precautions are to be taken in accordance with OH&S, WHIMS and the manufacturers' guidelines for the material use.
- The Ministry assumes no responsibility for the use, application, installation, or storage of the product(s) and will not accept liability of any nature whatsoever that may be suffered by anyone for the foregoing reasons.
- Listing of any product in the list shall not be considered as an endorsement of a given product, or in any way a guarantee of adequate performance relative to the specific Contract requirements.
- Absence from this list of a brand of product does not necessarily imply that it does not meet the MHI Specifications or work requirements.
- The Ministry allows for the use of alternate products. The products may not be used until considered suitable by the Ministry.
- The Approved Products list is updated on a yearly basis. Requests to add new products to the list can be submitted by email to allan.hegedus@gov.sk.ca.

Change History

November 21, 2017

1.2 Set Retarders

- Product Pozzolith 100XR name change to MasterSet R100

2.1 Structural Steel Coating Systems

- Amercoat Canada now PPG Industries
- Added Amercoat 240 and Amercoat 450H
- Endura Manufacturing Company name change to Endura Paint

3.1 Horizontal Patching

- Added MasterEmaco T1060, MasterEmaco T1061, and Verispeed

3.2 Vertical and Overhead Patching

- Added EucoRepair V100

4.1 Galvanic Anodes

- Galvashield XP produced by Vector Corrosion Technologies, not Emaco Intact Anodes
- Added Euclid Sentinel Galvanic Anodes, and MaterProtect 8065CP/8105CP/8150CP
- Vector Galvanode Zinc Ribbon renamed Galvanode ZincSheet

5.2 Curing Compounds

- Added MasterKure CC 180 WB

6.1 Cementitous Dowel Bonding

- CGM Building Products name change to CMP Specialty Products
- Removed Pro Anchoring Cement 100, no longer available

6.1 Epoxy Dowel Bonding

- Added MasterEmaco ADH 326

7.1 Epoxy Mortar to Old Concrete

- MasterEmaco ADH 1490 name change to MasterWeld ADH 1490

7.2 Old Concrete to New Concrete

- MasterEmaco ADH 1490 name change to MasterWeld ADH 1490

7.3 Old Concrete to Old Concrete

- MasterEmaco ADH 1490 name change to MasterWeld ADH 1490

9 Concrete Crack Repair

- Added 9.2 Epoxy section

11.1 Biodegradable Erosion Control

- Bonded Fiber Matrix name change to Soil Guard Bonded Fiber Matrix
- Added ECS – 2 Double Net Straw, ECSC – Double Net Straw/Coconut, and ECC – 2 Double Net Coconut

11.4 Woven Geotextile

- Removed Geotex 2X2HF
- Removed Geotex 4X4
- Added Geotex 102F, Geotex 3X3HF, Geotex 315ST, Geotex 2X2UF, Geotex 3X3UF, Geotex 4X4UF

11.5 Silt Fencing

- Nilex Amoco 2130 name change to Nilex Silt Fence
- Removed Layfield Wire Back Silt Fence, Layfield Silt Fence, AGES Premium Silt Fence, and AGES Premium Paged Wire Back Silt Fence, no longer available.
- Added Layfield SF124, Armtec Heavy Duty Silt Fence

14.2 Preformed Rubber Sheet

- Removed Ultraflex Butyl Membrane, no longer available

14.3 Rubberized Asphalt Membrane

- Removed PermaQuik 6100, no longer available

14.7 Modular Short Span Bridges

- Tamco TWP name change to Tamco TW-60
- Removed Tamko Bridgeguard, no longer available

16.2 Zinc Rich Paint

- Removed Clearco High Performance Zinc Spray

17.1 Anti-Graffiti Paint Systems

- Removed Hi-Slik Anti-Graffiti Coating System, no longer available
- Added Sherwin-Williams Anti-Graffiti Coating

18 Subsurface Drainage

- Z-Drain name change to DrainStar Z-Drain

1 Concrete Admixtures

1.1 Air Entraining Admixtures

1.1.1 Typical Usage

1.1.1.1 Air entrainment shall be used where concrete is subject to frequent cycles of freezing and thawing in the presence of moisture or de-icing chemicals.

1.1.2 Application

1.1.2.1 Powder air entrainment shall be measured by mass, liquid air entrainment shall be measured by mass or volume.

1.1.2.2 Volumetric measurement shall be within an accuracy of ±3% of the required amount or 30 ml, whichever is greater. Mass measurement accuracy shall be within ±3% of the required amount.

1.1.2.3 The air content of concrete shall, if necessary, be brought up to the specified range by the concrete supplier, by the addition of air entraining agent in the field. Mixing shall follow to ensure proper dispersion.

1.1.3 Sampling

1.1.3.1 Sampling shall be at the point of discharge.

1.1.3.2 Do not obtain samples from the very first or last portions of the batch discharge.

1.1.3.3 Water shall not be added to the batch at any time after sampling has started.

1.1.3.4 Start tests for air content within 5 minutes after sampling is completed.

1.1.4 Specifications

1.1.4.1 Air-entraining admixtures shall conform to the requirements of ASTM C 260.

1.1.5 Approved Product/Manufacturer

Darex II AEA.....Grace Concrete Products

Daravair 1400.....Grace Concrete Products

MasterAir AE 90.....BASF

MasterAir VR 10.....BASF

1.2 Set Retarder

1.2.1 Typical Usage

1.2.1.1 Set Retarders are to be used where haul times prevent placing of concrete with the limits stated in Standard Specification 6300 – Concrete for Bridge Work or the Special Provisions of the Contract.

1.2.1.2 Set Retarder must be compatible with the water reducing, air entraining and superplasticizing admixtures.

1.2.2 Application

1.2.2.1 Powder air entrainment shall be measured by mass, liquid air entrainment shall be measured by mass or volume.

1.2.2.2 Volumetric measurement shall be within an accuracy of ±3% of the required amount or 30 ml, whichever is greater. Mass measurement accuracy shall be within ±3% of the required amount.

1.2.3 Standards

1.2.3.1 The Set Retarder shall conform to the requirements ASTM C 494 requirements for Type B, retarding, or Type D, water-reducing and retarding (hydration stabilizing), admixtures.

1.2.4 Approved Product/Manufacturer

MasterSet DELVO.....BASF

MasterSet R100.....BASF

Eucon HC.....Euclid Chemical

Eucon LR .....Euclid Chemical

Eucon NR.....Euclid Chemical

1.3 Superplasticizer

1.3.1 Typical Usage

1.3.1.1 Superplasticizer can be used for the following situations;

- Thin section placements,
- Areas of closely spaced and congested reinforcing steel,
- Tremie pipe placements,
- Pumped concrete,
- Areas where conventional consolidation methods are impracticable or cannot be used,
- When concrete contains silica fume.

1.3.2 Application

1.3.2.1 Powder superplasticizer shall be measured by mass, liquid superplasticizer shall be measured by mass or volume.

1.3.2.2 Volumetric measurement shall be within an accuracy of ±3% of the required amount or 30 ml, whichever is greater. Mass measurement accuracy shall be within ±3% of the required amount.

1.3.3 Sampling

1.3.3.1 Slump tests shall be performed prior to the addition of a superplasticizer.

1.3.4 Specifications

1.3.4.1 Superplasticizer admixtures shall conform to the Specification for Chemical Admixtures for Concrete, ASTM C 494, Type F, and Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete, ASTM C1017 Type I.

1.3.5 Approved Product/Manufacturer

MCI-2007 Liquid Super Corr .....Cortec Corporation

MCI-2007 Powder Super Corr.....Cortec Corporation

Daracem 19 .....Grace Concrete Products

1.4 Water Reducer

1.4.1 Typical Usage

1.4.1.1 Water reducing admixture will be used in all concrete.

1.4.2 Application

1.4.2.1 Powder Water Reducer shall be measured by mass, liquid Water Reducer shall be measured by mass or volume.

1.4.2.2 Volumetric measurement shall be within an accuracy of ±3% of the required amount or 30 ml, whichever is greater. Mass measurement accuracy shall be within ±3% of the required amount.

1.4.3 Specifications

1.4.3.1 The Water Reducer shall conform to the Specification for Chemical Admixtures for Concrete, ASTM C 494, Type A water-reducing or Type D water-reducing and retarding admixture.

1.4.4 Approved Product/Manufacturer

WRDA 82 .....Grace Concrete Products

MasterPozzolith 322 .....BASF

MasterPolyheed 997.....BASF

2 Coating Systems

2.1 Structural Steel Coatings Systems

2.1.1 Typical Usage

2.1.1.1 Structural steel coating systems are to be used on all structural steel including diaphragms and bracing a minimum distance on 3.0 m from the ends of girders at expansion joints and the complete exterior face of girders on overpasses. Surfaces of structural steel that are subject to water runoff from the deck shall be coated. Structural steel surfaces in contact with concrete shall be excluded.

2.1.2 Application

2.1.2.1 Coating systems shall be applied as per the manufacturer's recommendations.

2.1.3 Surface Preparation

2.1.3.1 Surfaces must be clean and dry. Employ adequate methods to remove dirt, dust, oil and all other contaminants that could interfere with adhesion of the coating.

2.1.3.2 Oil or grease should be removed in accordance with SSPC-SP1 solvent cleaning.

2.1.3.3 All surfaces shall then be blast cleaned in accordance with the requirements of the Steel Structures Painting Council Surface Preparation Specification SSPC-SP6, No. 6 Commercial Blast Cleaning, which is to be interpreted to mean that all foreign matter and mill scale is removed except for slight shadows, streaks or discolorations caused by rust stain or mill scale oxide binder.

2.1.4 Approved Product/Manufacturer

PPG Industries
Amercoat 68 HS - first coat
PSX 700 - second coat

PPG Industries
Americoat 68 HS – first coat
Americoat 240 – second coat
Americoat 450H – third coat

Carboline Canada - 1
Carbozinc 859 - first coat
Carboguard 893 - second coat
Carbothane 134 HG - third coat

Carboline Canada - 2
Carbozinc 11 & 11 FG - first coat
Carboguard 893 - second coat
Carbothane 134 HS - third coat

International Paints - 1
Cathacoat 313 - first coat
Bar-Rust 231 - second coat
DevThane 389 - third coat

International Paints - 2
InterZinc 52 - first coat
Intergard 475HS - second coat
Interthane 990 - third coat

Endura Paint
MC Zn Zinc Rich - first coat
EX 2C Midcoat Clear 100 - second coat
EX 2C Topcoat - third coat

Sherwin Williams 1
Zinc Clad III HS -first coat
Macropoxy 646 - 100 - second coat
Acrolon 218 HS Acrylic Polyurethane - third coat

Sherwin Williams 2
Corothane I Preprime - first coat
Corothane I MIO-Zinc Primer - second coat
Corothane I Ironox A - third coat

Termarust Technologies
TR2100 HRCSA

Wasser Corporation
MC-Zinc100 - first coat
MC-Miomastic 2.8 - second coat
MC-Ferrox A 100 - third coat

3 Concrete Patching

3.1 Horizontal Patching

3.1.1 Typical Usage

3.1.1.1 Horizontal patches are used to repair flat areas such as bridge deck potholes or curb top spalls. These products are generally used during the summer when good weather conditions prevail. Traffic or overlay may be placed after the appropriate amount of curing.

3.1.2 Application

3.1.2.1 Horizontal patch grouts are designed to be poured into place.

3.1.2.2 Refer to manufacturers recommendations for approved application temperatures.

3.1.3 Surface Preparation

3.1.3.1 Concrete/Mortar

3.1.3.1.1 Remove all deteriorated concrete, dirt, oil, grease, and all bond inhibiting materials from surface. Be sure repair area thickness is not less than the manufacturers' recommendations. Preparation work should be done by high pressure water blast, scabbler, or other appropriate mechanical means to obtain an exposed aggregate surface. Saturate surface with clean water. Substrate should be saturated surface dry (SSD) with no standing water during application.

3.1.3.2 Reinforcing Steel

3.1.3.2.1 Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water after mechanical cleaning.

3.1.4 Approved Product/Manufacturer

Basalite Rehab Mix ..... Basalite Concrete Products

Basalite Traffic Patch ..... Basalite Concrete Products

MasterEmaco T 545 ..... BASF

MasterEmaco T 310 CI ..... BASF

MasterEmaco T1060 ..... BASF

MasterEmaco T1061 ..... BASF

Verispeed ..... The Euclid Chemical Company

Five Star Highway Patch ..... Five Star Highway Products

Planitop 18 ..... MAPEI

Planitop 25 ..... MAPEI

Rapid Set Cement ..... CTS Cement Manufacturing Corporation

Rapid Set Concrete Mix ..... CTS Cement Manufacturing Corporation

Rapid Set DOT Repair Mix ..... CTS Cement Manufacturing Corporation

Rapid Set DOT Repair Mortar ..... CTS Cement Manufacturing Corporation

Target Fast Set Patching Concrete ..... Target Products Ltd.

TARGET Match Patch ..... Target Products Ltd.

TARGET Traffic Patch Fine and Coarse ..... Target Products Ltd.

SikaTop 122 Plus ..... Sika Corporation

3.2 Vertical and Overhead Patching

3.2.1 Typical Usage

3.2.1.1 Overhead or vertical patches are used to repair areas such as high load damage to precast girders, spalling on the underside of bridge decks, vertical faces of curbs, pier caps, abutment seats and backwalls. These products are generally used during the summer when good weather conditions prevail.

3.2.2 Application

3.2.2.1 Overhead and vertical patch materials are designed to be applied by trowelling rather than forming.

3.2.2.2 Refer to manufacturers recommendations for approved application temperatures.

3.2.3 Surface Preparation

3.2.3.1 Concrete/Mortar

3.2.3.1.1 Remove all deteriorated concrete, dirt, oil, grease, and all bond inhibiting materials from surface. Be sure repair area is not less than the manufacturer's recommendations. Preparation work should be done by high pressure water blast, scabbler, or other appropriate mechanical means to obtain an exposed aggregate surface. Saturate surface with clean water. Substrate should be saturated surface dry (SSD) with no standing water during application.

3.2.3.2 Reinforcing Steel

3.2.3.2.1 Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water after mechanical cleaning.

3.2.4 Approved Product/Manufacturer

Basalite Fast Patch ..... Basalite Concrete Products

MasterEmaco N425 .....BASF

MasterEmaco N400 .....BASF

MasterEmaco N400 RS.....BASF

MasterEmaco S487 SP .....BASF

EucoRepair V100.....The Euclid Chemical Company

Planitop 15 .....MAPEI Inc.

Planitop 21 .....MAPEI Inc.

Planitop 23 .....MAPEI Inc.

Rapid Set DOT Cement .....CTS Cement Manufacturing Corp.

Rapid Set Mortar Mix .....CTS Cement Manufacturing Corp.

TARGET SC100D.....Target Products Ltd.

TARGET SC100W .....Target Products Ltd.

SikaTop 111 Plus ..... Sika Corporation

SikaTop 121 Plus ..... Sika Corporation

SikaTop 123 Plus ..... Sika Corporation

3.3 Form and Pour/Pump

3.3.1 Typical Usage

3.3.1.1 Form and Pour/Pump patches are used to repair areas similar to those described in 400-2. In addition, it could also be used on vertical surfaces such as walls, columns, and beam sides and bottoms. Patching materials have high self-compacting properties, high viscosity and low yield.

3.3.2 Application

3.3.2.1 They are designed to be poured or pumped into formed repairs.

3.3.2.2 Refer to manufacturers recommendations for approved application temperatures.

3.3.3 Surface Preparation

3.3.3.1 Concrete/Mortar

3.3.3.1.1 Remove all deteriorated concrete, dirt, oil, grease, and all bond inhibiting materials from surface. Be sure repair area thickness is not less than the manufacturer's recommendations. Preparation work should be done by high pressure water blast, scabbler, or other appropriate mechanical means to obtain an exposed aggregate surface. Saturate surface with clean water. Substrate should be saturated surface dry (SSD) with no standing water during application.

3.3.3.2 Reinforcing Steel

3.3.3.2.1 Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high-pressure washed with clean water after mechanical cleaning.

3.3.4 Approved Product/Manufacturer

MasterEmaco S 440 MC.....BASF

Sikacrete-08 SCC..... Sika Canada Inc.

Planitop 15 .....MAPEI Inc.

4 Corrosion Protection

4.1 Galvanic Anodes

4.1.1 Typical Usage

4.1.1.1 Galvanic Anodes are designed to neutralize or slow down new corrosion cells around reinforcing steel in concrete repair work (patching).

4.1.2 Application

4.1.2.1 Galvanic Anodes typically tied to existing reinforcing in a concrete repair/rehab project and then encased in new concrete.

4.1.3 Approved Product/Manufacturer

Galvashield XP ..... Vector Corrosion Technologies

Euclid Sentinel Galvanic Anodes ..... The Euclid Chemical Company

MaterProtect 8065CP/8105CP/8150CP .....BASF

Galvanode ZincSheet ..... Vector Corrosion Technologies

Vector Galvanode DAS ..... Vector Corrosion Technologies

5 Concrete Curing

5.1 Curing Blankets

5.1.1 Typical Usage

5.1.1.1 As soon as the concrete has set sufficiently, any exposed concrete surfaces shall be protected by covering with burlap or other satisfactory material and kept moist. Curing shall continue for a period of not less than as described in Standard Specification 6300 or in the Special Provisions.

5.1.2 Approved Product/Manufacturer

Burlap

ConKure.....Raven Industries

Transguard 4000 ..... Reef Industries

5.2 Curing Compounds

5.2.1 Typical Usage

5.2.1.1 Curing compounds are used to seal the surface of fresh concrete and prevent rapid loss of moisture. These consist of liquids containing film-forming polymers (curing compounds).

5.2.2 Application

5.2.2.1 Curing compounds should be applied immediately after concrete finishing.

5.2.2.2 Curing compounds shall be applied evenly at the coverage recommended by the manufacturer, however, additional coats shall be applied if tests show areas that are insufficiently covered. To ensure complete coverage, approximately 50 percent of the quantity for a given area shall be applied in one direction and the remainder at the right angles to this direction.

5.2.2.3 Coverage is adequate if the surface repels water placed on it. Curing compounds, when used on a surface where a bond is required shall be removed by blast cleaning.

5.2.3 Specifications

5.2.3.1 Curing compounds shall meet the requirements of ASTM Standard C309; Liquid, Membrane-Forming Compounds for Curing Concrete.

5.2.4 Approved Product/Manufacturer

MasterKure CC 180 WB.....BASF

1100-CLEAR .....W.R. Meadows

1300-CLEAR .....W.R. Meadows

1600-WHITE .....W.R. Meadows

Kurez DR VOX.....Euclid Chemical

Kurez DR-100.....Euclid Chemical

Kurez VOX White Pigmented .....Euclid Chemical

Clear Resin Cure J11W.....Dayton Superior

Resin Cure with Dye J11WD.....Dayton Superior

6 Dowel Bonding

6.1 Cementitious

6.1.1 Typical Usage

6.1.1.1 Cementitious bonding agents may be used to bond anchor rods, dowels, reinforcing and other similar material to existing concrete components.

6.1.2 Application

6.1.2.1 Bonding agents should be applied as per the manufacturers' recommendations.

6.1.2.2 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

6.1.3 Hole Preparation

6.1.3.1 The application area should be clean and sound.

6.1.3.2 Drill a hole into the concrete that will allow enough room for the fixture as per the manufacturers' recommendations. When possible, undercut and roughen the walls of the hole to insure a strong bond. Follow the manufacturers' recommendations for size and depth of hole.

6.1.3.3 Blow or vacuum all loose particles from the hole.

6.1.3.4 Dampening the hole may be required before placing the fixture.

6.1.4 Approved Product/Manufacturer

Quick Rok ..... Ameristar Fence Products

In-Pakt Construction Grout..... King Packaged Materials Co.

In-Pakt Precision CT Grout ..... King Packaged Materials Co.

In-Pakt Precision Grout..... King Packaged Materials Co.

MasterFlow 100 .....BASF

MasterFlow 816 .....BASF

Pro Grout 90..... CMP Specialty Products

Pro Grout 100..... CMP Specialty Products

Speed E Roc.....W. R. MEADOWS, INC.

6.2 Epoxy

6.2.1 Typical Usage

6.2.1.1 Epoxy bonding agents may be used to bond anchor rods, dowels, reinforcing and other similar material to existing concrete components.

6.2.2 Application

6.2.2.1 Epoxy bonding agents should be applied as per the manufacturers' recommendations.

6.2.2.2 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

6.2.3 Hole Preparation

6.2.3.1 Typically holes oversized by more than 3 mm are not recommended.

6.2.3.2 The application area should be clean and sound.

6.2.3.3 Drill a hole into the concrete that will allow enough room for the fixture as per the manufacturers' recommendations. When possible, undercut and roughen the walls of the hole to insure a strong bond. Follow the manufacturers' recommendations for size and depth of hole.

6.2.3.4 Blow or vacuum all loose particles from the hole.

6.2.4 Approved Product/Manufacturer

AC100+ Gold.....Powers Fasteners

Chem-Stud .....Powers Fasteners

Hammer-Capsule .....Powers Fasteners

AT .....Simpson Strong-Tie Company Inc.

MasterEmaco ADH 326.....BASF

MasterEmaco ADH 327 RS.....BASF

Dural 452 LV ..... Euclid Chemical Company

Dural 452 MV ..... Euclid Chemical Company

Dural 452 GEL ..... Euclid Chemical Company

EUCO 452 LV ..... Euclid Chemical Company

EUCO 452 MV ..... Euclid Chemical Company

EUCO 452 GEL ..... Euclid Chemical Company

Five Star HP Epoxy Grout ..... Five Star Products

G5 High Strength Epoxy ..... ITW Red Head

HIT-RE 500 ..... Hilti USA

Prime Gel 2500 Quick Bond ..... Prime Resins

Sure Anchor J-50 ..... Dayton Superior

Sure Anchor I J51 ..... Dayton Superior

Sure Bond J58 ..... Dayton Superior

Unitex Anchoring Cement ..... Dayton Superior

Pro-Poxy 50 ..... Dayton Superior

Pro-Poxy 100 ..... Dayton Superior

Pro-Poxy 200 ..... Dayton Superior

Pro-Poxy 300 ..... Dayton Superior

Pro-Poxy 300 Fast ..... Dayton Superior

Rezi-Weld 1000 ..... W.R. Meadows

Rezi-Weld Gel Paste State ..... W.R. Meadows.

Sikadur 31, Hi-Mod Gel CA ..... Sika Co.

Sikadur 52 ..... Sika Co.

Sika AnchorFix-2 Arctic ..... Sika Co.

Sika AnchorFix-2001 ..... Sika Co.

Sika AnchorFix-3001 ..... Sika Co.

Speed Bond 1 ..... Prime Resins

Ultrabond 1300 ..... Adhesive Technologies

Ultrabond 2300 ..... Adhesive Technologies

Ultrabond HS200 ..... Adhesives Technology

7 Epoxy Bonding

7.1 Epoxy Mortar to Old Concrete

7.1.1 Typical Usage

7.1.1.1 Pressure-injection of cracks in structural concrete, masonry, etc. Gravity-feed cracks in horizontal concrete and masonry. Epoxy resin binder for epoxy mortar patching and overlay of interior, horizontal surfaces. Seal interior slabs and exterior above-grade slabs from water, chlorides, and mild chemical attack; also improves wearability.

7.1.2 Application

7.1.2.1 Epoxy bonding agents should be applied as per the manufacturers' recommendations.

7.1.2.2 Follow manufacturers' recommendations for minimum and maximum neat bondline thicknesses.

7.1.2.3 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

7.1.3 Preparation

7.1.3.1 Surface must be clean and sound. It may be dry or damp, depending on manufacturers' recommendations, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles and disintegrated materials. Blast clean, shot blast or use other approved mechanical means to provide an open roughened texture.

7.1.4 Approved Product/Manufacturer

Pro-Poxy 100 ..... Dayton Superior

Pro-Poxy 200 ..... Dayton Superior

Pro-Poxy 300 ..... Dayton Superior

Sure Anchor I J-51 ..... Dayton Superior

MasterWeld ADH 1490 ..... BASF

Rezi-Weld 1000 ..... W.R. Meadows

7.2 Old Concrete to New Concrete

7.2.1 Typical Usage

7.2.1.1 Epoxy bonding agents designed to bond old concrete to new concrete are typically used for deck rehabilitations or bonding fresh concrete to new concrete at a cold joint.

7.2.1.2 Epoxy bonding agents may also be used for grouting bolts, dowels, and rebar into concrete, stone, and masonry. Filling joints and voids in masonry. Bonding concrete to dissimilar materials such as steel and plastics.

7.2.2 Application

7.2.2.1 Epoxy bonding agents should be applied as per the manufacturers' recommendations.

7.2.2.2 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

7.2.2.3 Preparation

7.2.2.4 Substrate can be dry or damp, depending on manufacturers' recommendations, although dry surfaces provide optimum results. New concrete must be fully cured to manufacturers' recommendations.

7.2.2.5 Remove grease, wax, oil contaminants, and curing compounds. Follow with mechanical cleaning.

7.2.2.6 The prepared surface must be clean, free of dust, and textured to provide mechanical bond. Remove the surface skin of all finished or formed concrete.

7.2.2.7 Remove weak, contaminated, or deteriorated concrete by shotblasting, bushhammering, gritblasting, scarifying, or other suitable mechanical means. Follow mechanical cleaning with vacuum cleaning.

7.2.3 Approved Product/Manufacturer

Sure Bond J58 ..... Dayton Superior

Pro-Poxy 100 ..... Dayton Superior

Pro-Poxy 200 ..... Dayton Superior

MasterWeld ADH 1490 ..... BASF

MasterEmaco ADH 1090 RS ..... BASF

MasterEmaco ADH 327 RS ..... BASF

Sikadur 32 Hi-Mod ..... Sika Corp.

Sika Armatec 110 EpoCem ..... Sika Corp

UltraBond 2100 ..... Adhesive Technologies

7.3 Old Concrete To Old Concrete

7.3.1 Typical Usage

7.3.1.1 Pressure-injection of cracks in structural concrete.

7.3.2 Application

7.3.2.1 Epoxy bonding agents should be applied as per the manufacturers' recommendations.

7.3.2.2 Follow manufacturers' recommendations for minimum and maximum neat bondline thicknesses.

7.3.2.3 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

7.3.3 Preparation

7.3.3.1 Clean the surface immediately surrounding the crack with a wire brush to achieve proper bond. Remove all dust, debris, oil and any other contaminants from the crack by blowing out with clean, oil-free compressed air. For best results crack must be dry at the time of injection. If water is seeping from crack, steps must be taken to stop the flow in order to achieve desired repair.

7.3.4 Approved Product/Manufacturer

Sure Anchor J-50 ..... Dayton Superior

Sure Anchor I J51 ..... Dayton Superior

Propoxy 100 ..... Dayton Superior

Propoxy 200 ..... Dayton Superior

Propoxy 300 ..... Dayton Superior

Propoxy 300 Fast ..... Dayton Superior

MasterWeld ADH 1490 ..... BASF

MasterEmaco ADH 326 ..... BASF

Crackbond LR 32 ..... Adhesive Technologies

Dural 452 Gel ..... Euclid Chemical Company

Dural 452 LV ..... Euclid Chemical Company

Dural 452 MV ..... Euclid Chemical Company

Prime Gel 2500 Quick Bond ..... Prime Resins

Speed Bond 1 ..... Prime Resins

Rezi-Weld 1000 ..... W.R. Meadows

Rezi-Weld Gel Paste State ..... W.R. Meadows

Sikadur 31, Hi-Mod Gel CA ..... Sika Co.

Ultrabond 2100 ..... Adhesive Technologies

8 Epoxy Injection

8.1 Epoxy

8.1.1 Typical Usage

8.1.1.1 Epoxy Injection Resin primary use is for repairing concrete and masonry through pressure injection and gravity feed.

8.1.2 Application

8.1.2.1 Epoxy bonding agents should be applied as per the manufacturers' recommendations.

8.1.2.2 Follow the manufacturers' recommendations for minimum and maximum crack widths.

8.1.2.3 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

8.1.3 Preparation

8.1.3.1 Clean the surface immediately surrounding the crack with a wire brush to achieve proper bond. Remove all dust, debris, oil and any other contaminants from the crack by blowing out with clean, oil-free compressed air. For best results crack must be dry at the time of injection. If water is seeping from crack, steps must be taken to stop the flow in order to achieve desired repair.

8.1.4 Approved Product/Manufacturer

Sure Inject J56 ..... Dayton Superior

MasterInject 1380 ..... BASF

Crackbond LR321 ..... Adhesive Technology

Dural Injection Gel ..... Euclid Chemical Company

Rezi-Weld LV ..... W.R. Meadows

SealBoss – 4000 QuickSeal ..... SealBoss

SealBoss – 4040 LV Epoxy Resin ..... SealBoss

Sikadur 35, Hi Mod LV ..... Sika Corporation

Sikadur 31, Hi-Mod Gel CA ..... Sika Corporation

Sikadur 52 ..... Sika Corporation

9 Concrete Crack Repair

9.1 Methyl Methacrylate

9.1.1 Typical Usage

9.1.1.1 Methyl methacrylate primary use is for repairing cracks in concrete structures through gravity feed. The very low viscosity and surface tension of the filler allows it to easily penetrate and fill deep cracks in the concrete substrate.

9.1.2 Application

9.1.2.1 Methyl methacrylate crack fillers should be applied as per the manufacturers' recommendations.

9.1.2.2 Follow the manufacturers' recommendations for minimum and maximum crack widths.

9.1.2.3 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

9.1.3 Preparation

9.1.3.1 Clean the surface immediately surrounding the crack with a wire brush to achieve proper bond. Remove all dust, debris, oil and any other contaminants from the crack by blowing out with clean, oil-free compressed air. For best results crack must be dry at the time of application. If water is seeping from crack, steps must be taken to stop the flow in order to achieve desired repair.

9.1.4 Specifications

9.1.4.1 Methyl methacrylate crack fillers shall have a viscosity less than 110 Centipoise.

9.1.5 Approved Product/Manufacturer

Sealate T-70 MX-30 Crack Healer/Sealer .....Transpo Industries, Inc.

Transpo T-78 Polymer Crack Healer/Sealer.....Transpo Industries, Inc.

9.2 Epoxy

9.2.1 Typical Usage

9.2.1.1 Certain epoxies can be used for repairing cracks in concrete structures through gravity feed. The very low viscosity and surface tension of the filler allows it to easily penetrate and fill deep cracks in the concrete substrate.

9.2.2 Application

9.2.2.1 Epoxy crack fillers should be applied as per the manufacturers' recommendations.

9.2.2.2 Follow the manufacturers' recommendations for minimum and maximum crack widths.

9.2.2.3 Follow the manufacturers' recommendations for minimum and maximum ambient temperatures.

9.2.3 Preparation

9.2.3.1 Clean the surface immediately surrounding the crack with a wire brush to achieve proper bond. Remove all dust, debris, oil and any other contaminants from the crack by blowing out with clean, oil-free compressed air. For best results crack must be dry at the time of application. If water is seeping from crack, steps must be taken to stop the flow in order to achieve desired repair.

9.2.4 Approved Product/Manufacturer

Masterinject 1000.....BASF

CCS Epoxy Healer/Sealer.....ChemoCo Systems

Sikadur 35 Hi-Mod LV..... Sika

Sikadur 524..... Sika

Sikadur 55 SLV..... Sika

Dural 335 .....Tamms

10 Fibre Wrap Systems

10.1 Fibre Reinforced Polymer

10.1.1 Typical Usage

10.1.1.1 Fibre reinforced polymer wrap systems may be used to strengthen and/or protect concrete structures.

10.1.1.2 The fibre system can be made from glass or carbon fibres.

10.1.2 Application

10.1.2.1 Prior to placing the fabric, the concrete surface is typically primed and sealed. Follow manufacturers' recommendations for priming and sealing.

10.1.2.2 The fabric is impregnated with an epoxy. On larger projects, the impregnation process may be accomplished using a mechanically driven fabric saturator or similar device. The fabric may also be manually saturated by hand using a roller prior to placement. In either case, installation of this system should be performed only by a specially trained contractor.

10.1.3 Surface Preparation

10.1.3.1 Surface must be clean and sound. It may be dry or damp, but free of standing water and frost. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, disintegrated materials and other bond inhibiting materials from the surface. Consult the manufacturers' data sheets for additional information on surface preparation.

10.1.3.2 Existing uneven surfaces must be filled with an appropriate repair mortar.

10.1.3.3 Blast clean, shotblast or use other approved mechanical means to provide a roughened, open-textured surface. Round all corners to 1/2" radius. In certain "contact critical" applications and at the engineers

discretion, a thorough cleaning of the substrate using low pressure sand or water blasting may be sufficient.

10.1.3.4 The adhesive strength of the concrete must be verified after surface preparation by random pull-off testing (ASTM D-4541) at the discretion of the engineer. Minimum tensile strength as per the manufacturers' recommendations.

10.1.4 Approved Product/Manufacturer

Sika wrap HEX 103C..... Sika Corporation

Tyfo Fibrwrap Systems..... Fyfe

11 Erosion Control

11.1 Biodegradable Erosion Control

11.1.1 Typical Usage

11.1.1.1 Biodegradable erosion control provides a biodegradable, environmentally safe erosion control that enhances germination by protecting the seed and promoting plant growth while preventing erosion.

11.1.2 Application

11.1.2.1 Biodegradable erosion control is designed to be applied using traditional hydro seeding equipment.

11.1.3 Approved Product/Manufacturer

Soil Guard Bonded Fiber Matrix ..... Mat Inc.

Geotex 4X6 ..... Propex

ECS – 2 Double Net Straw ..... East Coast Erosion Control

ECSC – Double Net Straw/Coconut ..... East Coast Erosion Control

ECC – 2 Double Net Coconut ..... East Coast Erosion Control

Geo-Jute ..... Clearflow Enviro Systems

11.2 Geomats

11.2.1 Typical Usage

11.2.1.1 Geomats are designed for protection and growing of grass on slopes subject to surface erosion. Typical areas are roadway ditches, slope protection, storm and irrigation channels, and lakes banks.

11.2.2 Application

11.2.2.1 Geomats are composed of two layers of geogrid placed above and below a single central layer, mechanically folded so to give thickness and three-dimensionality to the geomat.

11.2.2.2 The layers are held in place by mechanically stitching them together with a highly resistant polypropylene yarn during the manufacturing process.

11.2.3 Approved Product/Manufacturer

Tenax Multimat 100.....Tenax

MacMat.....Maccaferri

11.3 Non-Woven Geotextile

11.3.1 Typical Usage

11.3.1.1 Non-woven geotextiles can be used for the filtration of soils in drainage applications by retaining soil particles while allowing for the free flow of water, separation and stabilization in road and railway construction, prevention of soil movement in erosion control measures.

11.3.1.2 Typically non-woven geotextile is used under the rip rap on bridges.

11.3.2 Application

11.3.2.1 Non-woven geotextiles shall be installed in accordance with the manufacturer's recommendations or as directed by the Engineer.

11.3.3 Specifications

11.3.3.1 The non-woven geotextile filter fabric shall meet the specifications and physical properties as listed below.

Non-Woven Geotextile Minimum Average Roll Values (MARV)	
Grab Strength (ASTM D4632)	875 N
Elongation (Failure) (ASTM D4632)	50 %
CBR Puncture Strength (ASTM D6241)	550 N
Trapezoidal Tear (ASTM D4533)	350 N
Burst Strength (ASTM D3786)	2.7 MPa
Permittivity (ASTM D4491)	1.2 s^{-1}
Apparent Opening Size (ASTM D4751)	0.2 mm max.
Flow Rate (ASTM D4491)	4482 l/min/m^2
UV Resistance (ASTM D4355)	70% after 150 hrs of exposure
Minimum Fabric Lap to be 300 mm	

11.3.4 Approved Product/Manufacturer

Mirafi HP Seriese.....TenCate Geosynthetics America

Geotex 801OR ..... Propex

Geotex 801HUV ..... Propex

Geotex 861 ..... Propex

Nilex 4553.....Nilex

Nilex 4508E .....Nilex

11.4 Woven Geotextile

11.4.1 Typical Usage

11.4.1.1 Woven geotextiles are primarily used in road building and embankment construction but can also be used in most applications requiring the separation of one type of soil from another. Woven geotextiles can also be used in sediment control products such as floating silt curtains and silt fence.

11.4.2 Application

11.4.2.1 Woven geotextiles shall be installed in accordance with the manufacturer's recommendations or as directed by the Engineer depending on the required usage.

11.4.3 Specifications

11.4.3.1 The woven geotextile filter fabric shall be in accordance with the following table:

Woven Geotextile Minimum Average Roll Values (MARV)	
Grab Strength (ASTM D 4632)	1400 N min.
Elongation (ASTM D 4632)	< 50% min.
Sewn Seam Strength (ASTM D 4632)	1260 N min.
Tear Strength (ASTM D 4533)	500 N min.
Puncture Strength (ASTM D4833)	500 N min.
Permittivity (ASTM D 4491)	0.05 s^{-1} min.
Apparent Opening Size (ASTM D 4751)	0.43 mm max.
Ultraviolet Stability (ASTM D4355)	50% after 500 hrs of exposure
Minimum Fabric Lap to be 1000 mm	

11.4.4 Approved Product/Manufacturer

Mirafi HP370 .....TenCate Geosynthetics America

Mirafi HP665 .....TenCate Geosynthetics America

Geotex 102F..... Propex

Geotex 3X3HF ..... Propex

Geotex 4X6 ..... Propex

Geotex 315ST ..... Propex

Geotex 2X2UF ..... Propex

Geotex 3X3UF ..... Propex

Geotex 4X4UF ..... Propex

Layfield LP315 .....Layfield

Comtrac P 80/80 .....US Construction Fabrics

11.5 Silt Fencing

11.5.1 Typical Usage

11.5.1.1 Silt fence is used around the perimeter of construction areas to help protect streams, rivers, lakes and other aquatic resources as well as terrestrial resources from contamination by silt, sediment and construction debris.

11.5.2 Application

11.5.2.1 To ensure optimal performance, silt fence is best installed in an excavated 15 cm x 15 cm trench. Stakes should be pounded in until the fabric reaches the bottom of the trench.

11.5.2.2 Always install with the posts facing downhill, so runoff pushes the fabric against the posts, not away from them.

11.5.2.3 The trench should be backfilled by a backhoe or other earth moving equipment.

11.5.2.4 When installing several lengths of silt fence end to end, overlap the edges of the fabric at least 45 cm.

11.5.3 Specifications

Silt Fence Properties	
Maximum Post Spacing (ASTM D 4632)	2 m
Elongation (ASTM D 4632)	< 50%
Grab Strength Machine Direction (ASTM D 4632)	550 N
Grab Strength X-Machine Direction (ASTM D 4632)	450 N
Permittivity (ASTM D 4491)	0.05 s^{-1} min.
Apparent Opening Size (ASTM D 4751)	0.60 mm max. average roll value
Ultraviolet Stability (% retained strength) (ASTM D 4355)	70% after 500 hrs. of exposure

11.5.4 Approved Product/Manufacturer

Nilex Silt Fence.....Nilex Inc.

Layfield SF124..... Layfield Construction Products

Armtec Heavy Duty Silt Fence .....Armtec

11.6 Gabions

11.6.1 Typical Usage

11.6.1.1 Gabions are used to stabilize shorelines, stream banks or slopes against erosion. Other uses include retaining walls, temporary floodwalls, silt filtration from runoff, for small or temporary/permanent dams, river training, or channel lining. They may be used to direct the force of a flow of flood water around a vulnerable structure.

11.6.2 Application

11.6.2.1 Gabions shall be assembled as per the manufacturers' recommendations.

11.6.3 Surface Preparation

11.6.3.1 All stumps, roots, debris and rocks shall be removed and disposed of prior to placing gabions. Excavation to accommodate gabion installation shall be carried out to the lines and levels as specified on the plans.

11.6.4 Specifications

11.6.4.1 Gabion units shall be manufactured from wire in accordance with Federal Specification QQ-W-461G, "Wire Steel, Carbon (Round, Bare and Coated)" and shall be soft tempered. Additional requirements of the wire for gabion units are given in Table 1.

11.6.4.2 Mattresses and baskets shall be cubical in shape and shall be assembled from independent rectangular faces laced or clipped together. Each face shall be a non-raveling wire mesh woven with a double twist into regular hexagonal openings measuring approximately 75 mm X 100 mm. The edges of each face shall be self-edged by weaving the mesh around a reinforcing wire in a manner designed to prevent slippage. The self-edging shall be secure at all points so that joints formed by tying adjacent faces along the self-edges shall be at least as strong as the internal mesh.

11.6.4.3 Gabion basket and mattress shall be supplied, complete with diaphragms and dividers from among the various sizes listed in Tables 2 and 3.

11.6.4.4 Galvanizing shall conform to ASTM A641/A641M-03.

Table 1
Wire Requirements for Gabion Units

Property*	Type		
	Galvanized Basket	Galvanized and PVC Coated Basket	Galvanized and PVC Coated Basket
Netting Wire dia. (mm)	2.9	2.65	2.2
Self-edge Wire dia. (mm)	3.85	3.4	2.65
Binding Wire dia. (mm)**	2.2	2.2	2.2
Zinc coating (gm/m^2)	245	245	245
PVC coating (mm)	---	0.42	0.42

Note (*): The allowable tolerance on all properties is ± 3%.
Note (**): Galvanized clips with a wire diameter of 2.90 mm may be used with galvanized baskets.

Table 2
Gabion Basket Sizes and Dimensions

Dimensions and Volumes					
Size No.	Number of Diaphragms	Length (m)	Width (m)	Depth (m)	Capacity (m3)
1	1	2	1	0.3	0.6
2	1	2	1	0.5	1
3	1	2	1	1	2
4	2	3	1	0.3	0.9
5	2	3	1	0.5	1.5
6	2	3	1	1	3
7	3	4	1	0.3	1.2
8	3	4	1	0.5	2
9	3	4	1	1	4

Table 3
Gabion Mattress Sizes and Dimensions

Dimensions and Areas						
Size No.	**No. of Dividers**	**No. of Diaphragm**	**Length (m)**	**Width (m)**	**Depth (mm)**	**Plan Area (m^2)**
10	1	18	30	2	230	60
11	2	27	30	3	230	90

11.6.5 Approved Product/Manufacturer

Maccaferri Gabions and Mattresses.....Maccaferri Inc.

Modular Gabions and Mats.....MGS a dv. of C. E. Shepherd Company

12 Grouts

12.1 Non-Shrink Grout

12.1.1 Typical Usage

12.1.1.1 Non-shrink grouts can be used under base plates, grouting between precast units, and grouting cap splices.

12.1.2 Application

12.1.2.1 Non-shrink grouts can be placed at various consistencies ranging from dry pack to fluid by adjusting the quantity of mixing water.

12.1.2.2 Manufacturer's maximum recommended slump shall not be exceeded.

12.1.2.3 Follow manufacturer's recommendations for maximum and minimum temperatures.

12.1.3 Surface Preparation

12.1.3.1 All grease, oil laitance, ice or snow and foreign deposits shall be removed from all surfaces with which the grout will come in contact. The concrete shall be roughened to the extent that it does not present a smooth surface, which would impede the bond of the grout to the foundation. All dust and loose particles shall be removed by sandblasting, high pressure waterblasting or other suitable means.

12.1.3.2 Concrete foundations less than 28 days old shall be kept wet for at least 12 hours, and older foundations for a minimum of 24 hours before placing grout. All free-standing water shall be removed from concrete surfaces prior to grouting.

12.1.3.3 All items to be grouted into place shall be properly positioned and anchored prior to grouting.

12.1.3.4 Grout thickness shall not less than the manufacturers recommendations.

12.1.4 Approved Product/Manufacturer

1260 MG-Krete Series ..... IMCO Technologies Inc.

Basalite Non-shrink Grout ..... Basalite Concrete Products

CPD Non Shrink Grout ..... CPD Concrete Products

MasterEmaco T 545 .....BASF

Flowcrete..... Target Products

Machine Base Grout ..... Target Products

Portland Expanding Grout ..... Target Products

TRAFFIC PATCH Fine and Coarse ..... Target Products

1118 Unsanded Fume Grout ..... Target Products

Rapid Set Cement All .....CTS Cement

SikaGrout 212 ..... Sika Corporation

Sika M-bed Standard..... Sika Corporation

Sika Pronto 11..... Sika Corporation

13 Concrete Sealers

13.1 Penetrating Sealers

13.1.1 Typical Usage

13.1.1.1 Penetrating sealers is used on concrete to reduce the rate of chloride attack on the reinforcing steel corrosion thereby extending service life and reducing life-cycle structure costs of the bridge (preventative maintenance).

13.1.1.2 By applying penetrating sealers to existing concrete surfaces, the permeability of the concrete is reduced. The permeability of the concrete is one of the most important factors which will effect the rate of deterioration of rebar corrosion, alkali-aggregate reaction, carbonation, and the effects of freeze-thaw cycles of which all could occur at the same time.

13.1.1.3 Penetrating sealers are products that are absorbed into the surface of the concrete and react with the concrete to form a hydrophobic (or water repelling) surface. No film is formed; therefore pores in the concrete are not blocked.

13.1.1.4 Penetrating sealers are typically applied to;

- Solid shaft river piers to 600 mm below the lowest water level’
- Inside vertical and top surfaces of curbs, barriers, and sidewalks,
- Top surfaces of concrete deck and roof slabs which do not receive a waterproofing membrane,
- Top surfaces of abutment seats and pier caps,
- Approach slab concrete which will be covered by a wearing surface only.

13.1.2 Application

13.1.2.1 Penetrating sealers may be applied using a brush, roller or low pressure spray depending on the manufacturer's recommendations.

13.1.3 Surface Preparation

13.1.3.1 Have the concrete cleaned by washing, power sweeping and whatever method the contractor chooses to remove all dirt, sand, clay and other debris from the deck. Shotblasting and or sandblasting is not required.

13.1.3.2 Before the penetrating sealer is applied, the deck must be allowed to dry and this may take 1 to 3 days depending upon weather conditions, air temperature, sunshine, last rainfall, type of concrete surface, porosity of the concrete and relative humidity in the air. In order to obtain maximum waterproofing in the concrete, the deck has to be very dry before application of penetrating sealer.

13.1.3.3 The coverage rate of the sealer needs to be calculated depending on the type of sealer used. The Approved Products List indicates the minimum application rate for each product under ideal conditions. For best results the application rate as indicated on the penetrating sealer product information sheet should be increased by 30% to allow for variable concrete condition.

13.1.3.4 Check for compatibility of the products on previously sealed concrete surfaces. Sealers should be kept in airtight drums and should be stirred to mix the active ingredient prior to use.

13.1.3.5 Product to be used within the manufacturer's specified shelf life.

13.1.4 Approved Product/Manufacturer

Product Name	**Manufacturer**	**Application Rate (ml/m^2)***
Sikagard SN-40 Lo-VOC	Sika Canada Inc.	225
Sikagard 740 W	Sika Canada Inc.	165
Sikagard SN 100	Sika Canada Inc.	200
MasterKure CC 250 XS	BASF	200
MasterKure CC 1315WB	BASF	200
MasterProtect H 200	BASF	235
MasterProtect H 400	BASF	210
MasterProtect H 1000	BASF	165
Protectosil 300 S	Evonik Industries	400
Protectosil BHN	Evonik Industries	140
Sealmaster Concrete Sealer	Sealmaster	210

*Application rate is based on high range provided in the product data sheets. Actual application rates may vary depending on surface condition of concrete.

13.2 Pigmented Coating Sealer

13.2.1 Typical Usage

13.2.1.1 Pigmented coatings sealers are products that bond to the surface of the concrete and form a film. The waterproofing properties of the coating are generally independent of the concrete properties, although the coating must remain adhered to the concrete for the coating to function.

13.2.1.2 Pigmented sealers are used for coating areas that are exposed to the public, covers graffiti and offers good esthetics. These sealers are used on concrete that are cured for 28 days or older.

13.2.1.3 The following surfaces shall receive a pigmented sealer finish;

- Exposed surfaces of abutment seats except top surface,
- Pier caps except top surface,
- Exterior faces of curtain walls/wingwalls,
- Cast-in-place walls,
- MSE wall copings,
- Grade separation piers except top surfaces,
- Exterior concrete girder faces,
- Exposed end surfaces of cast-in-place concrete diaphragms,
- Underside of the deck overhang to top flange of girder,
- Exterior surfaces of deck slab, curb, barrier, and sidewalk.

13.2.2 Application

13.2.2.1 Pigmented coating sealers may be applied using a brush, roller or low pressure spray depending on the manufacturer's recommendations.

13.2.2.2 Sealers shall be applied in minimum two coats totaling the approved film thickness.

13.2.2.3 Required film thicknesses are for relative comparison of products on laboratory concrete. Application rates must be adjusted to suit field conditions and application methods. Surfaces shall be immediately back rolled when spray applied.

13.2.2.4 Surface Preparation

13.2.2.5 Have the concrete cleaned by washing, power sweeping and whatever method the contractor chooses to remove all dirt, sand, clay and other debris from the deck. Shotblasting and or sandblasting is not required.

13.2.2.6 Before the pigmented coating sealer is applied, the deck must be allowed to dry and this may take 1 to 3 days depending upon weather conditions, air temperature, sunshine, last rainfall, type of concrete surface, porosity of the concrete and relative humidity in the air. In order to obtain maximum waterproofing in the concrete, the deck has to be very dry before application of penetrating sealer.

13.2.2.7 The Approved Products List indicates the minimum DFT for each product under ideal conditions. For best results the DFT indicated for the pigmented sealer product should be increased by 30% to allow for variable concrete conditions.

13.2.2.8 Check for compatibility of the products on previously sealed concrete surfaces. Pigmented sealers should be kept in airtight drums and should be stirred to mix the active ingredient prior to use.

13.2.2.9 Product to be used within the manufacturer's specified shelf life.

13.2.3 Approved Product/Manufacturer

Product Name	**Manufacturer**	**Min. DFT mils (Min. WFT mils)**
MasterProtect HB 300 SB	BASF	6.5 (18)
Sikagard Color A50 Lo-VOC *	Sika Canada Inc.	4.5 (9.0)

* If sprayed, product shall be applied in three coats of approximately 3 Mils WFT. No thinning of material is permitted.

14 Bridge Deck Waterproofing

14.1 Primer

14.1.1 Typical Usage

14.1.1.1 Primer is to be applied to concrete deck surfaces prior to installation of a hot applied rubberized asphalt membrane waterproofing system.

14.1.2 Surface Preparation

14.1.2.1 The surface preparation shall consist of shot blasting the concrete deck, abutment slabs and sand blasting up the vertical face of concrete traffic barriers or curbs to a height of 100 mm above the slab surface and any portion of the slab which cannot be shot blasted.

14.1.2.2 The concrete deck will have spray painted reference marks. Surface preparation will be considered acceptable when the shot blasting effort used to prepare the deck is sufficient to remove the painted reference marks completely from the concrete surfaces.

14.1.2.3 All loose material shall be removed with a jet of oil free compressed air.

14.1.2.4 At the end of shot and sand blasting each day, the debris material left on the deck shall be removed and disposed of appropriately.

14.1.3 Application

14.1.3.1 The primer shall be applied according to the manufacturer's recommendations.

14.1.3.2 Primer shall be cut back, prior to application, with an equal volume of gasoline or other approved alternative cut-back asphalt product.

14.1.3.3 The Contractor shall apply the primer to the clean, dry concrete slabs and up the vertical face of concrete traffic barriers or curbs to a height 80 mm above the slab, at a rate of not less than 0.25 litres per square metre.

14.1.3.4 Primer shall not be applied to wet or damp concrete surfaces, or to surfaces which have not been sufficiently dried to prevent egress of water vapor which would prevent development of a good bond to the surface.

14.1.3.4.1 Drying of the concrete surface shall not be expedited by application of a torch or by other means.

14.1.3.5 The structure shall be primed as soon as possible following the blast cleaning operation to minimize contamination of the deck in the interim. Any surface contamination which accumulates in the interim between blast cleaning and priming shall be removed prior to priming.

14.1.4 Specifications

14.1.4.1 The primer shall conform to requirements of the rubberized asphalt membrane manufacturer.

14.2 Preformed Rubber Sheet

14.2.1 Typical Usage

14.2.1.1 Preformed rubber sheets are used to protect construction joints between the approach slabs and abutment slabs and on the bridge deck prior to installation of the deck waterproofing membrane system.

14.2.2 Surface Preparation

14.2.2.1 The bridge deck shall be primed in accordance with BC 1600-1.

14.2.2.2 The primer shall be completely dry before the preformed rubber sheet is installed.

14.2.3 Application

14.2.3.1 Spread a 3 mm thick layer of hot applied rubberized asphalt membrane in a 400 mm wide strip, centred on the construction joint, across the prepared deck width and continue 70 mm up the face of the traffic barriers or curbs.

14.2.3.2 Place a 300 mm wide preformed rubber sheet into the membrane, while the membrane is still tacky.

14.2.3.3 The sheet shall extend across the prepared deck width and 30 mm up the face of the traffic barriers or curbs.

14.2.3.4 Apply an additional 3 mm thick layer of hot applied rubberized asphalt membrane over the rubber sheet and extending 50 mm beyond the edges of the rubber sheet.

14.2.3.5 Refer to BC 1600-3 for the hot-applied rubberized asphalt specifications.

14.2.4 Specifications

14.2.4.1 The preformed rubber sheets shall be 300 mm wide.

14.2.5 Approved Product/Manufacturer

Bakor 990-25 .....Henry Company Canada Inc.

Flex Flash UN ..... Hydrotech Membrane Corp.

14.3 Rubberized Asphalt Membrane

14.3.1 Typical Usage

14.3.1.1 Hot-Applied Rubberized Asphalt Membrane Waterproofing System shall be used to protect new and rehabbed concrete bridge deck.

14.3.2 Surface Preparation

14.3.2.1 The bridge deck shall be primed in accordance with BC 1600-1.

14.3.2.2 The primer shall be completely dry before the rubberized asphalt membrane may be applied.

14.3.2.3 Construction joints shall be treated in accordance with BC 1600-2.

14.3.2.4 The base coat of hot applied rubberized asphalt membrane shall not be applied to wet surfaces, or to surfaces which have not been sufficiently dried to prevent egress of water vapour which would prevent development of a good bond to the surface.

14.3.3 Application

14.3.3.1 The cakes of rubberized asphalt membrane shall be melted in a melting kettle. The melting kettle shall keep the contents continuously agitated until the material can be drawn free flowing and lump free at a temperature not exceeding that recommended by the membrane manufacturer.

14.3.3.2 After the rubberized asphalt has been melted, the Contractor shall draw 100 litres of the rubberized asphalt from the kettle as a test. The rubberized asphalt may be returned to the kettle after the test.

14.3.3.3 A protective sheet shall be placed under the kettle to catch any drippings.

14.3.3.4 A base coat of hot applied rubberized asphalt membrane shall be applied to the clean, dry, blast cleaned and primed deck surface. The base coat shall be carried 80 mm up the vertical face of the barriers.

14.3.3.5 The base coat shall have a minimum thickness of 2 mm with a maximum local variation of ± 1 mm.

14.3.3.6 A reinforcing sheet shall be applied between the base and top coat of rubberized asphalt membrane as per BC 1600-4.

14.3.3.7 A top coat of hot rubberized asphalt membrane shall be applied over the reinforcing sheet and shall extend up the vertical face of concrete traffic barriers or curbs to a height of 80 mm above the slab surface.

14.3.3.8 The top coat shall be approximately equal in thickness to the base coat.

14.3.3.9 The top coat in combination with the base coat and the reinforcing sheet shall provide a minimum total membrane thickness of 5 mm with a maximum local variation of ±1 mm.

14.3.3.10 At no point shall the combined thickness of the two coats of the hot applied rubberized asphalt membrane and the reinforcing sheet be less than 5 mm.

14.3.3.11 A coverage test shall be conducted periodically throughout the operation to ensure compliance with the specified application rate.

14.3.4 Specifications

14.3.4.1 The rubberized asphalt shall be hot applied rubberized asphalt meeting the requirements of the Ontario Ministry of transportation's OPSS 1213 Specification.

14.3.4.2 The asphalt membrane shall be supplied in cakes ready for melting and application.

14.3.4.3 The Contractor shall submit to the Department, prior to start of operations, a product data sheet and MSDS for the rubberized asphalt membrane to be used. A copy of the MSDS shall be kept on site by the Contractor while the product is being applied and/or stored on site.

14.3.5 Approved Product/Manufacturer

790-11 Hot Rubberized Asphalt .....Henry Company Canada Inc.

Beamalastic 1213 BDM.....Bemac Products, Div. of McAsphalt Industries Ltd.

Hydrotech MM 6125..... Hydrotech Membrane Corp.

Ultraseal 3750 MTO .....Ultraseal Construction Products Ltd.

TREMproof 6100 BM..... Tremco

14.4 Reinforcing Sheet

14.4.1 Typical Usage

14.4.1.1 The reinforcing sheet shall be applied between the base and top coat of hot-applied rubberized asphalt.

14.4.2 Surface Preparation

14.4.2.1 The base coat of hot-applied rubberized asphalt shall be applied prior to the installation of the reinforcing sheet as per BC 1600-1.

14.4.3 Application

14.4.3.1 The reinforcing sheet shall be tight and wrinkle free and shall come in full contact with the membrane base coat.

14.4.3.2 All edges of the reinforcing sheet shall be lapped a minimum of 50 mm.

14.4.3.3 The reinforcing sheet shall extend up the vertical face of concrete traffic barriers or curbs to a height of 70 mm above the slab surface.

14.4.4 Specifications

14.4.4.1 The reinforcing sheet shall be spun bonded sheet structure composed of 100% continuous polyester fibres bonded together at the crossover points.

14.4.5 Approved Product/Manufacturer

Polyester Fabric .....Henry Company Canada Inc.

Tremco Reemay ..... Tremco

14.5 Protection Board

14.5.1 Typical Usage

14.5.1.1 The protection board is placed on top of the waterproofing membrane to protect the membrane during paving operations.

14.5.2 Surface Preparation

14.5.2.1 The hot-applied rubberized asphalt shall be applied prior to the installation of the reinforcing sheet as per BC 1600-3.

14.5.3 Application

14.5.3.1 Protection board shall be laid onto the completed membrane immediately after the top coat has been applied, while it is still tacky.

14.5.3.2 The protection board shall come in full contact with the membrane.

14.5.3.3 The protection board shall be oriented perpendicular to the centreline of the bridge and shall be placed starting at the concrete traffic barriers or curbs and proceeding towards the centre line of the roadway.

14.5.3.4 The longitudinal (parallel to the centreline of the bridge) joints of successive protection boards shall be staggered a minimum of 150 mm.

14.5.3.5 The protection boards shall be placed with all edges overlapping 12 mm ± 6 mm.

14.5.3.6 The protection boards shall be trimmed to fit within 6 mm of the concrete traffic barriers or curbs and deck drains.

14.5.4 Specifications

14.5.4.1 Protection board shall be 3.6 ± 0.4 mm in thickness.

14.5.4.2 Protection board shall consist of spun glass fibres not cellulose reinforcing fibres.

14.5.4.3 Protection board shall have 5% or less water absorption rate.

14.5.5 Approved Product/Manufacturer

IKO Protectoboard ..... IKO Industries Ltd.

Vibraflex MTO ..... W.R. Meadows of Canada Ltd.

14.6 Wick Drains

14.6.1 Typical Usage

14.6.1.1 The wick drain is placed on top of the waterproofing membrane along the bottom of the curb or barrier to wick water off of the bridge deck to either a seepage or deck drain.

14.6.2 Surface Preparation

14.6.2.1 The hot-applied rubberized asphalt shall be applied prior to the installation of the reinforcing sheet as per BC 1600-3.

14.6.3 Application

14.6.3.1 The wick drains shall be installed along the bottom of the concrete traffic barriers or curbs between seepage drains or drain boxes as identified on the Bridge Plans. The wick drains shall be extended a minimum of 200 mm into the seepage drains or drain boxes.

14.6.3.2 At abutments, the wick drains shall extend along the concrete traffic barriers or curbs from the rear face of the expansion joint dam to the nearest seepage drain or drain box.

14.6.3.3 Where it is necessary to splice the wick drain, top and bottom splices shall be laterally offset by a minimum of 300 mm.

14.6.3.4 The wick drain shall be placed directly on top of the hot applied rubberized asphalt membrane and shall be covered by protection board, as shown on the Bridge Plans.

14.6.4 Specifications

Property	**Test Method**	**Unit**	**Requirement**
Material	NA	NA	Non-Woven
Mass	ASTM D5261	g/m^2	≥ 110
Grab Tensile Strength	ASTM D 4632	N	≥ 600
Puncture Strength	ASTM D 4833	N	≥ 200
Trapezoidal Tear	ASTM D 4533	N	≥ 250
Filtration Opening Size (FOS)	CAN/CGSB 148.1, Method No. 10	µm	≥ 40
Permittivity	ASTM D 4491	s^{-1}	≥ 0.5

14.6.5 Approved Product/Manufacturer

Terrafix 360R.....Terrafix Geosynthetics Inc.

14.7 Modular Short Span Bridges

14.7.1 Typical Usage

14.7.1.1 Sealing longitudinal and transverse joints between adjacent precast prestressed concrete stringers with 18" wide strips of waterproofing membrane.

14.7.2 Application

14.7.2.1 The membrane shall be installed according to the manufacturer's specifications.

14.7.2.2 The membrane shall be depressed approximately 15 mm into the joints to provide slack for differential movement between the precast prestressed concrete stringers.

14.7.2.3 The transverse joints shall be sealed first, followed by the longitudinal joints.

14.7.3 Approved Product/Manufacturer

Tamco TW-60 ..... Tamco Building Products

CCW-711-90 Adhered Membrane System ..... Carlisle Coatings & Waterproofing Inc.

15 Foundation Coating

15.1 Foundation Coating

15.1.1 Typical Usage

15.1.1.1 Foundation coatings are used to control absorption and migration of moisture. Coating is used in multi-layers as a waterproofing membrane and can be applied at low temperatures. Ideal for foundation walls, footings, retaining walls, wing walls and abutments.

15.1.2 Surface Preparation

15.1.2.1 Surface must be sound, dry and free from grease, oil and loose or spalled material. Concrete surfaces must be free from honeycomb, fins, cracks, pits or other surface irregularities.

15.1.2.2 Irregular masonry surfaces should be cement parged to a smooth even finish.

15.1.2.3 Depending on coating used, a primer may need to be applied and cured prior to coating application.

15.1.3 Application

15.1.3.1 Two coats of foundation coating may be applied by brush or spray depending on manufacturers' recommendations.

15.1.3.2 Foundation coating shall be protected if exposed to backfill with a 6 mil polyethylene sheet.

15.1.3.3 Allow to dry thoroughly before commencing backfill.

15.1.4 Approved Product/Manufacturer

710-11 ..... Henry Company Canada

MC-Tar ..... Wasser

Tamoseal Foundation Coating ..... The Euclid Chemical Co.

MasterSeal 582 ..... BASF

16 Zinc Rich Paint

16.1 Primers

16.1.1 Typical Usage

16.1.1.1 Zinc Rich Primer is a zinc rich compound that protects steel and ferrous metals that are exposed to severe corrosive environments and provides long term galvanic protection against corrosion.

16.1.1.2 Zinc Rich Primer is used for the recoating and touch-up of damaged galvanized surfaces.

16.1.1.3 After curing, Zinc Rich Primer may be coated with conventional primers and finishes.

16.1.2 Surface Preparation

16.1.2.1 The surface must be free of oil, moisture, rust, paint before applying. The zinc must have contact with the bare metal surface to provide an electrically conductive (galvanic) film. Solvent cleaning (SSPC-SP1) is usually sufficient for new steel surfaces.

16.1.3 Application

16.1.3.1 The primer may be applied by brush, roller or spray depending on manufacturers' recommendations.

16.1.4 Approved Product/Manufacturer

Clearco Zinc Rich Primer ..... Clearco Products Co., Inc.

Comex ZR-10 Zinc Rich Epoxy Primer .....Comex Group

Coraflon ADS Zinc Rich Epoxy Primer ..... PPG Industries, Inc.

Chem-O-Z .....Jones Blair

SigmaZinc 102 HS ..... PPG Protective and Marine Coatings

SigmaZinc 109 HS ..... PPG Protective and Marine Coatings

16.2 Zinc Rich Paint

16.2.1 Typical Usage

16.2.1.1 Zinc rich paint is to be used to touch up areas damaged during shipping, welding, or handling hot dipped galvanized bridge components.

16.2.1.2 Zinc rich paint is not to be used in lieu of hot dipped galvanizing.

16.2.2 Application

16.2.2.1 Zinc rich paint can be applied by spray, brush or roller.

16.2.2.2 Apply one coat of 3 mils dry film thickness.

16.2.3 Surface Preparation

16.2.3.1 Surfaces should be free from moisture, oil, grease, dirt, mill scale, rust, corrosion products, oxides, paint, and foreign matter.

16.2.3.2 Remove all dirt, mill scale, rust, corrosion products, oxides, paint, and foreign matter by "Power Tool Cleaning".

16.2.3.3 Remove all oil, grease and flux by solvent cleaning.

16.2.4 Specifications

16.2.4.1 Zinc rich paint must contain a minimum of 92% content in dry film.

16.2.5 Approved Product/Manufacturer

WL740 Zinc-Rich Galvanizing Compound..... Sprayon Products

Galvax Cold Galvanizer..... Alvin Products, Inc.

Zinga .....Zinga-USA

ZRC Cold Galvanizing Compound .....ZRC Worldwide

17 Anti-Graffiti Paint Systems

17.1 Paint Systems

17.1.1 Typical Usage

17.1.1.1 Anti-graffiti paint systems are specially modified for use in applications requiring anti-graffiti, non-stick and high surface slip characteristics. They can be used to ease removal of graffiti on buildings, allow simplicity of cleaning equipment, or provide a high slip (low coefficient of friction) surface for dry bulk material container surfaces.

17.1.2 Application

17.1.2.1 Follow manufacturer's recommendations for applying the anti-graffiti paint.

17.1.3 Surface Preparation

17.1.3.1 All surfaces must be sound, dry, clean and free of oil, dirt, grease, wax, mildew, loose or flaking paint and other surface contaminants.

17.1.3.2 Remove old paint, coatings, mill scale and rust by sandblasting. If sandblasting is not practical, clean surfaces with power tools, hand scraping and wire brushing.

17.1.4 Approved Product/Manufacturer

SEI Graffiti Proofer Anti-Stick ..... SEI Chemical

Sherwin-Williams Anti-Graffiti Coating ..... Sherwin-Williams

18 Subsurface Drainage

18.1 Geodrains

18.1.1 Typical Usage

18.1.1.1 Geodrains are designed for use in high-flow, high-compressive-strength, vertical drainage applications where single sided subsurface drainage is needed. An example of this is behind abutment walls.

18.1.2 Application

18.1.2.1 Geodrain panels may be installed in a variety of construction applications. They may be installed against retaining walls, foundation walls (both waterproofed and non-waterproofed), lagging systems and buttress/landfills.

18.1.2.2 Geodrain panels can be cut with a utility knife or scissors.

18.1.2.3 Slurries, shotcrete or concrete may be placed directly onto either side of the panels.

18.1.2.4 Native soils or backfill can be used over Geodrains.

18.1.2.5 Refer to manufacturers recommendations for minimum overlap of panels.

18.1.2.6 Refer to manufacturers recommendations for properly adhering panels.

18.1.3 Approved Product/Manufacturer

CCW Miradrain 6000 .....Carlisle Coatings and Waterproofing

CCW Miradrain 9000 .....Carlisle Coatings and Waterproofing

DrainStar Z-Drain .....Tremco Barrier Solutions