

Concrete Deck Overlays

Polymer Concrete is a composite material formed by combining aggregate with a polymer (monomer)

Thin Polymer Overlay
(Epoxy) 584.50010018
2 coats up to 3/8" thick

Polymer Concrete Overlay
(Polyester/Epoxy) 584.40000005
~ $\geq 3/4$ " thick

Polyester Polymer Concrete (PPC) characteristics



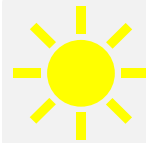
2-hr cure, 2-4 hr traffic return



Seals the bridge from Chloride and moisture intrusion



Provides a skid resistance wearing surface for the duration of overlay; service life 25-30 yrs



Can be applied at day or night



Easy repair

General Application Information

- Components: HMWM primer, Polyester Resin Binder, Aggregate & Sand.
- Minimum thickness is $\frac{3}{4}$ "; 1" typical application.
- HMWM healer/sealer seal cracks and develops chemical bond.
- Can be placed in variable thickness up to 12" in a single lift-multiple layers.
- Workmanship is important, troweling & finishing.
- Broadcast abrasive finish sand to treat bleeding and give the surface an initial traction/friction.
- PPC can be used to repair the deck after milling & removal of unsound concrete.
- Can be used as a joint header

Special Specification 584.40000005

- ▶ Currently we have approved 3 suppliers of PCO.
- ▶ PIN approved.
- ▶ First Placement in NY state is in 2006.
- ▶ More than 1.5 million ft² placed in NYS.
- ▶ There is an EI under review to make it a standard specification.

Basis of Acceptance

- ▶ Materials delivery in acceptable containers & all labels bearing manufacturer's name.
- ▶ System Provider certifications and written instructions submitted by the Contractor to the Engineer thirty (30) days prior to overlay placement:
 - Materials
 - Experience
 - Technical Representative
- ▶ Approval by the Materials Bureau based on conformance with the Material requirements above.
- ▶ Trial application to demonstrate the ability to place the overlay.

Surface Preparation & Conditions

Automatic steel shot blasting unit with a vacuum.

- You need to get to clean & sound concrete

Moisture content of the substrate $\leq 5.0\%$.

- Moisture Meter
- ASTM D4263- Plastic sheet method for 2 hrs

Pull/Adhesion test after 24 hrs of placement
ASTM C1583:

- Minimum 250 psi or concrete failure
- 2 successful tests to accept

Substrate Temperature
Between 40-100 °F

- Cure time is dependent on ambient and substrate temperatures.

Prep and Adhesion test



Construction techniques:

Maintain elevation and grade for a smoother finish.

Broadcast sand to refusal.

No glassy spot is left behind.

Texturing of the surface.

Mixing & Placement Methods

Vibratory Screed



Slip-form paving machine



Manual Mixing & Placement of PPC

Vibratory Screed Placement



Automated
Placement

Auto. Truck &
Slip form paver



Tining Eliminated



Tining is no longer accepted for texturing the PPC



Texturing



558.02 - Longitudinal Saw-Cut Grooving



Grinding with Slurry Removal (557.60010004)

Ideal Finished/Textured Surface

Grooved



Ground & Grooved



Monitoring the Placement



Construction Issues



- ▶ Insufficient broadcast sand resulting in glassy areas, resin-rich areas.
- ▶ Loss of sand to snowplows and traffic (Wheel Paths).
- ▶ Cracks developed after placement
- ▶ Adjustment of resin % in the mixture for thicker applications.



Loss of surface sand



Glassy Areas



Repair

- ▶ Diamond grinding to remove the resin-rich layer and expose the friction aggregate.
- ▶ Combination of diamond grinding and saw-cut grooving,
- ▶ Applying resin and sand to the surface, however you may be back where you started.
- ▶ Remove and replace spalled & delaminated areas.

Treating Non-Working Cracks



Applying HMWM to treat crack on the overlay.

Diamond Grinding



Determined at the Design Stage





**PPC DIAMOND
GRINDING/GROOVING
SLURRY DISPOSAL**

SOLIDS AND LIQUIDS ANALYTICAL

- Butanone
- Xylene
- Styrene
- Toluene
- Benzene

*Qualifies Solids as Non-Hazardous Solid Waste and Liquids as Petroleum Affected (No ROW or Residential/Commercial Property Disposal)

DISPOSAL CRITERIA

SOLIDS

Solidified slurry waste dried by either air or absorbent additive and passing a paint filter test may be disposed of as non-hazardous solid waste

LIQUIDS

Excess Liquid meeting minimum solids percentage (<3%) may be handled as a non-hazardous petroleum-affected liquid waste



Region 9 PPC VACUUM TRUCK WASHOUT

REGION 9
WASHOUT/DRIED
RESIDUE
POWDER



REGION 9 OPEN
LINED HOLDING
DUMPSTER



REGION 1
VACUUM
TRUCK
WASHOUT (AIR
DRIED)



REGION 1 FRAC TANK HOLDING DEVICE



SPECIALTY TANK TRUCK FOR EXCESS LIQUID TRANSPORT



107-10 MANAGING SUPPLUS MATERIAL AND WASTE

G. Non-Hazardous Industrial Waste.

6. Polyester Polymer Concrete (PPC) Slurry. Slurry generated from diamond grinding and sawcut grooving operations associated with new or historic PPC overlay and joint header applications shall not be discharged within NYSDOT right-of-way or private/commercial property. The Contractor shall dispose of both dewatered (solidified) and excess liquid in accordance with all applicable NYSDEC non-hazardous solid and industrial waste regulations. Slurry may be temporarily stored within 10 mil polyethylene-lined containers or pits to facilitate separation of solids from liquids and to allow for air and/or absorbent-additive drying. Contractor shall consider solidified slurry waste that passes a paint filter test approved for disposal as non-hazardous solid waste and excess liquid waste meeting minimum solids percentage (less than 3 percent) for disposal as non-hazardous petroleum-affected liquid waste. The Contractor shall be responsible for temporary storage, onsite treatment, disposal facility waste characterization, transport and disposal of all generated PPC slurry waste.

Epoxy VS. Polyester Polymer Concrete Overlay

The difference is in the primer, resin components and broadcast top sand:

- ❖ Epoxy uses an epoxy resin and hardener VS.
- ❖ Bauxite top aggregate; requires 50 °F minimum .
- ❖ Polyester uses a polyester resin, an initiator and accelerator.
- ❖ silica-quartz aggregates, can applied as low as 40 °F.
- ❖ EPC uses the binder resin as the primer.
- ❖ PPC uses HM WM as the primer.
- ❖ EPC: No VOC

Epoxy Polymer Concrete Placement



Epoxy Polymer Concrete Placement



EPC Follow Up Field Performance Photos



QUESTIONS

