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
~ ≥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
Components: HMWM primer, Polyester Resin Binder, Aggregate & Sand.
Minimum thickness is ¾”; 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 ≤ 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 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
- 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
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 HMWM as the primer.
- EPC: No VOC
Epoxy Polymer Concrete Placement
Epoxy Polymer Concrete Placement
EPC Follow Up Field Performance Photos
QUESTIONS