

**Hydro-Technologies, Inc.
& Modified Concrete Suppliers, LLC**
present

**Maintaining and Preserving Bridge Decks using Fast
Track Hydrodemolition Surface Preparation and Latex
Modified Concrete Overlays**

INDOT Hydro-Demolition and LMC Presentation

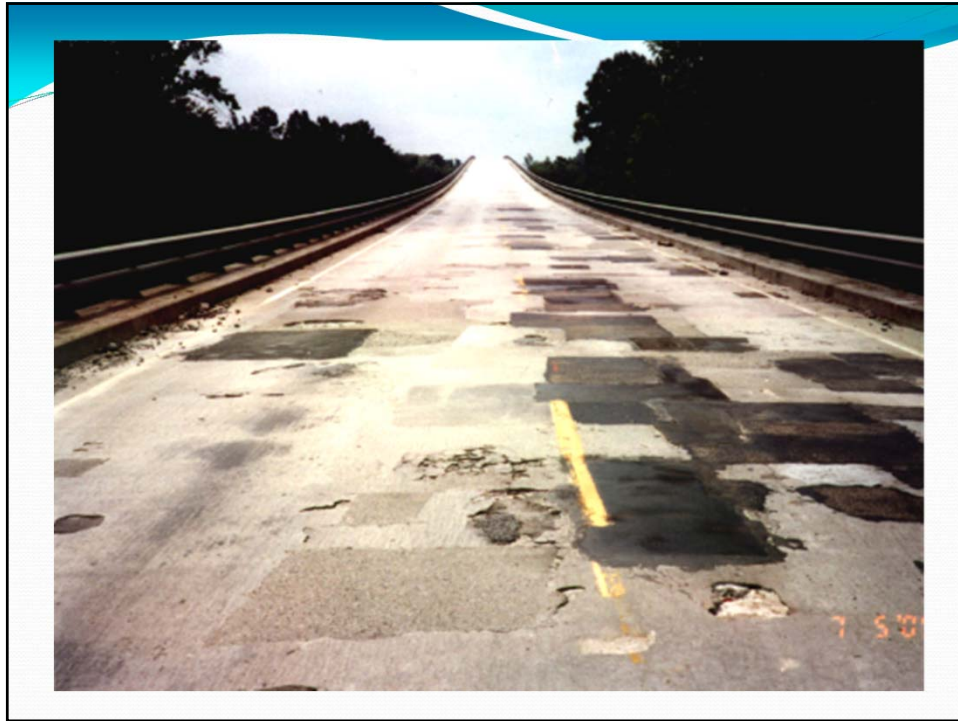
INDOT Central Office

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and
Dennis Kuchler







Bridge Deck Preservation

- It is very cost effective to attain a minimum of 75 years of service life from a bridge deck.
- By placing Latex Modified Concrete Overlays on Hydrodemolition prepared bridge deck surfaces before decks becomes structurally deficient, 75 years of service life or more can be achieved.
- The use of **Fast Track Hydrodemolition and Latex Modified Concrete Overlays** will provide an owner with an economical, long lasting and very fast bridge deck preservation method.

Bridge Deck Preservation Strategies

- ***75 Year Bridge Decks***
 - Year 1 – Construct New Bridge Deck
 - Year 25 – Place LMC O/L #1 – Hydrodemolition
 - Year 50 – Place LMC O/L #2 – Hydrodemolition
 - Year 75 – Replace Bridge Deck (Third O/L ? = 100 years)

Hydrodemolition & LMC Use in the United States

North Carolina 2012 – 41 Projects = 279,881 sy

Pennsylvania = 850,000 sy in last 6 years

Ohio – over 1,000,000 sy of concrete overlays since 2000

WV, VA, TX, NY, MT, MA, MD, LA, IN, AK, MI, KY + others

Fast Track / Total Surface Hydrodemolition Bridge Deck Surface Preparation



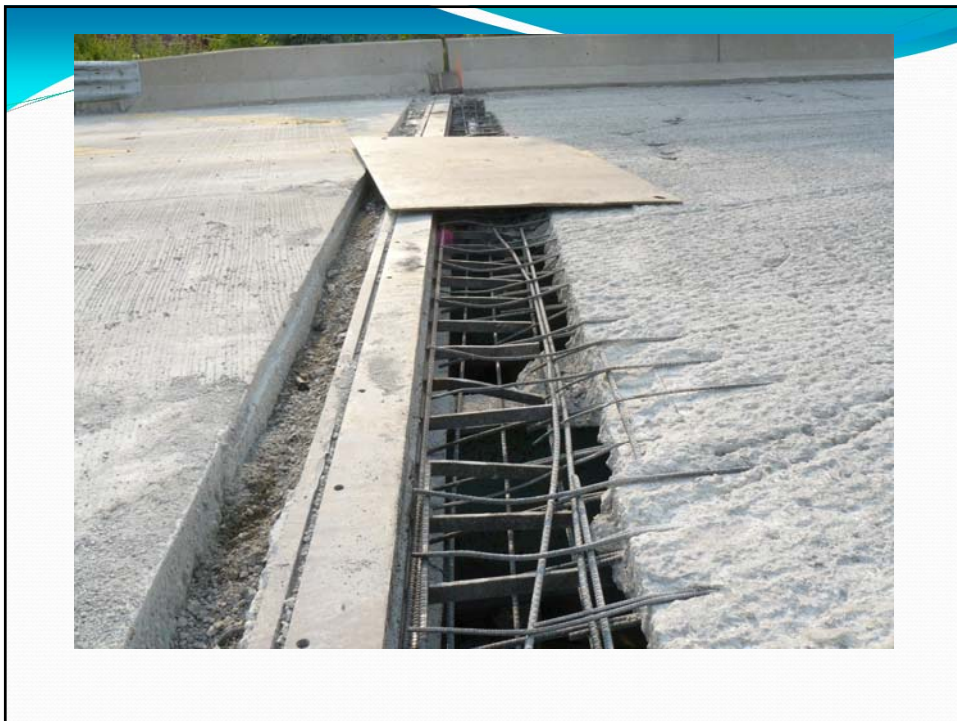
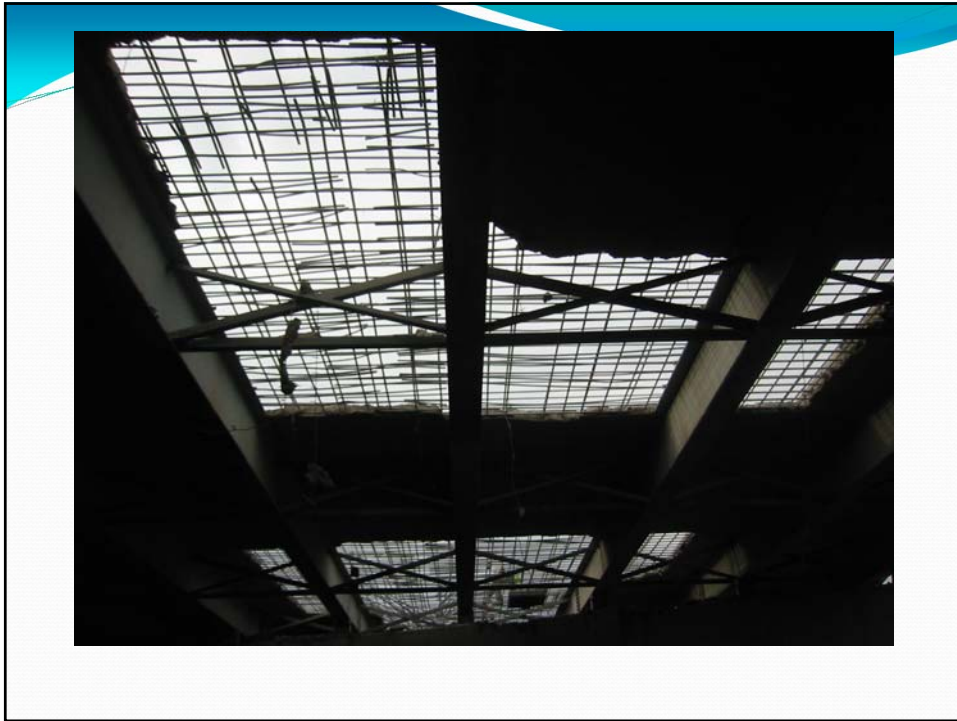
Hydrodemolition Definition

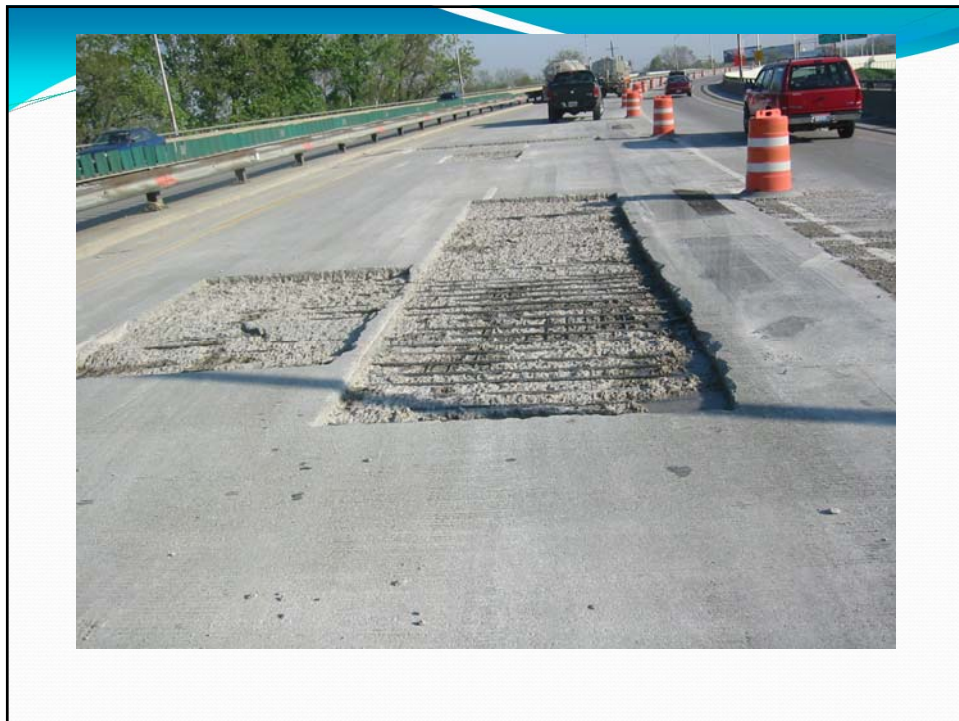
- Hydrodemolition is a mechanical process by which deteriorated concrete is selectively removed utilizing a high pressure water jet.
- By rapid erosion with the high pressure water, the cement matrix and fine aggregates between the course aggregate is essentially washed away.
- By properly calibrating the hydrodemolition robot movements, concrete of uniform strength can be removed to a specified depth + unsound deteriorated concrete with one pass of the robot = Selective Removal.

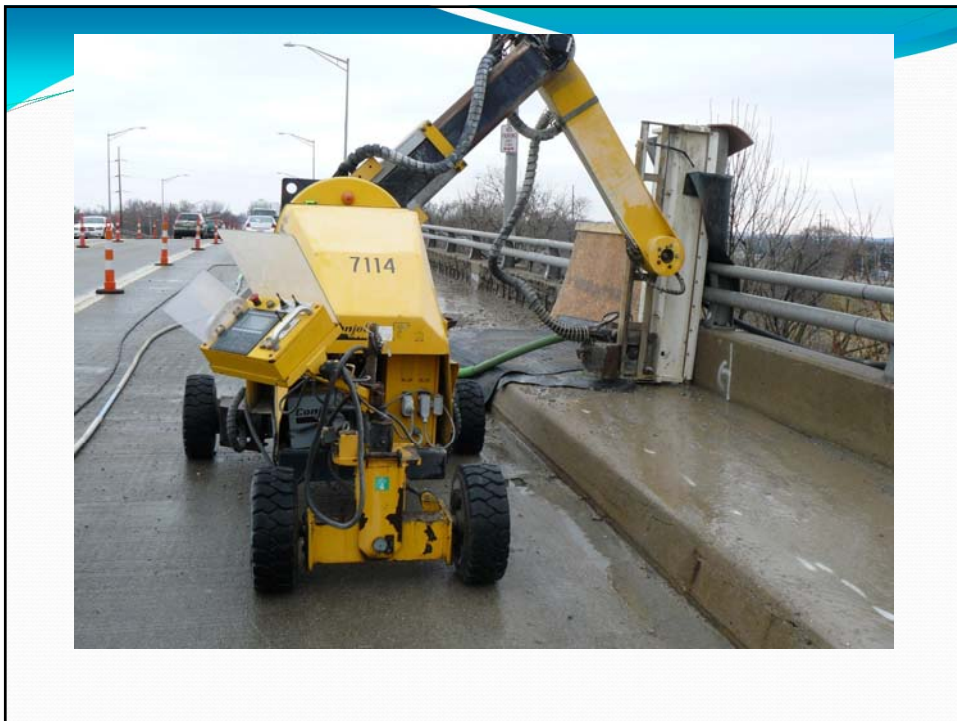
Hydrodemolition Applications

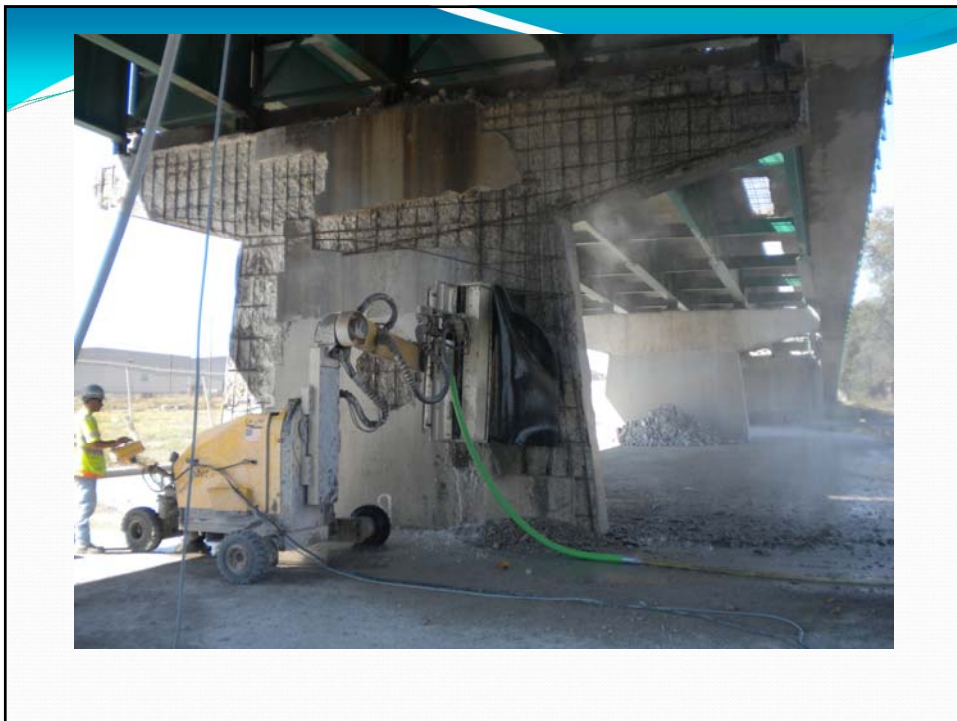
- Surface preparation of the total area of bridge decks prior to placement of overlays.
- Surface preparation for patches in bridge decks.
- Full Depth Removals
- Slotting
- Selective portions of structures removed – bridges, shipping piers, factory's, parking garages, nuclear power plants, tunnels.

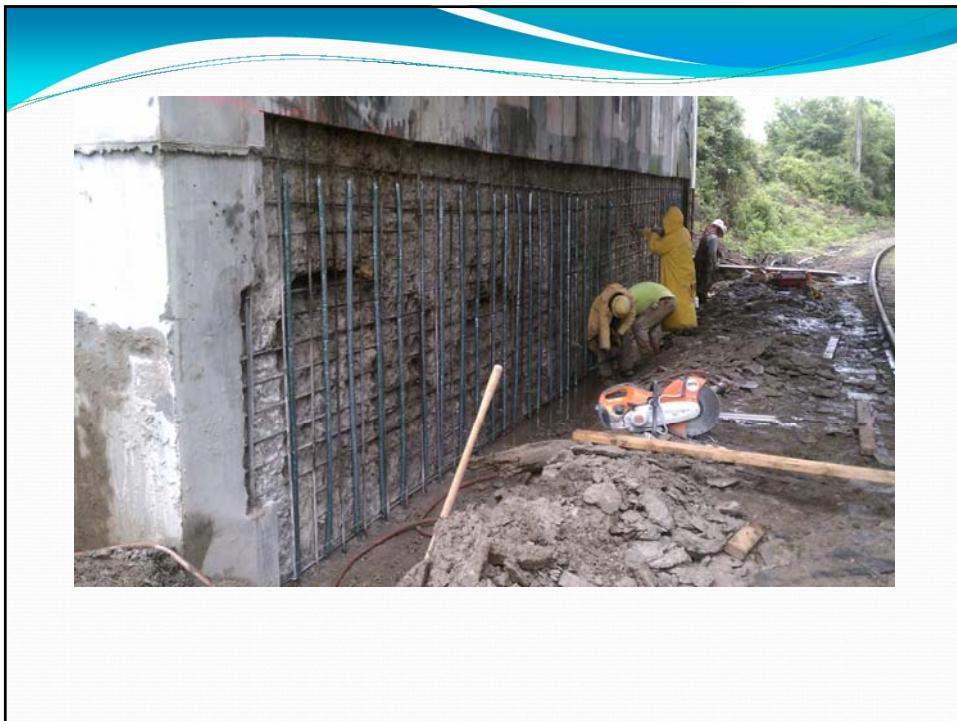


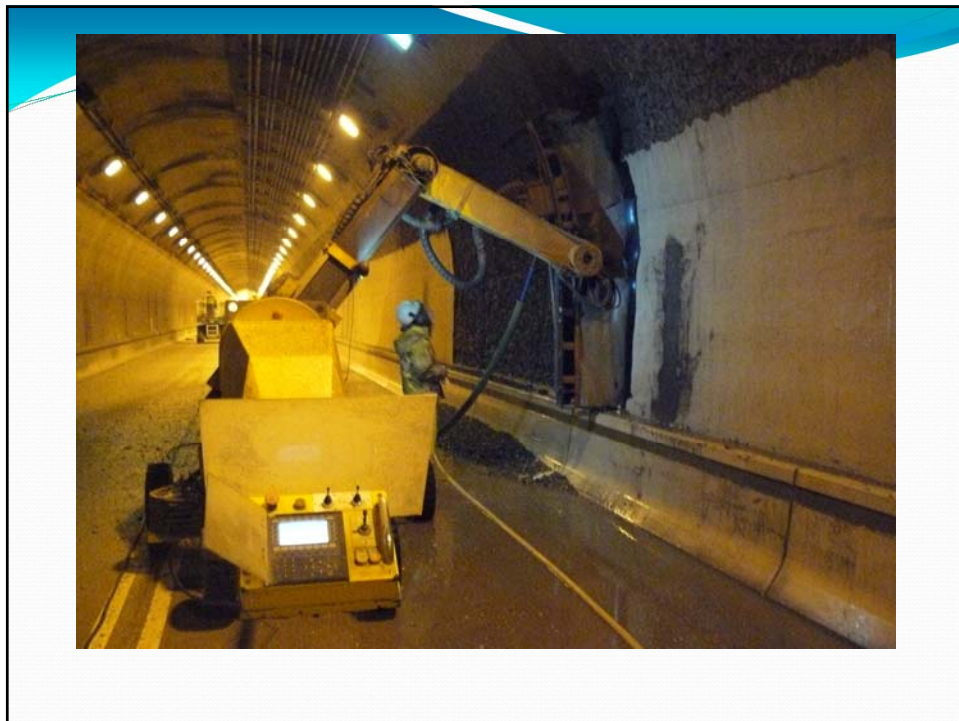








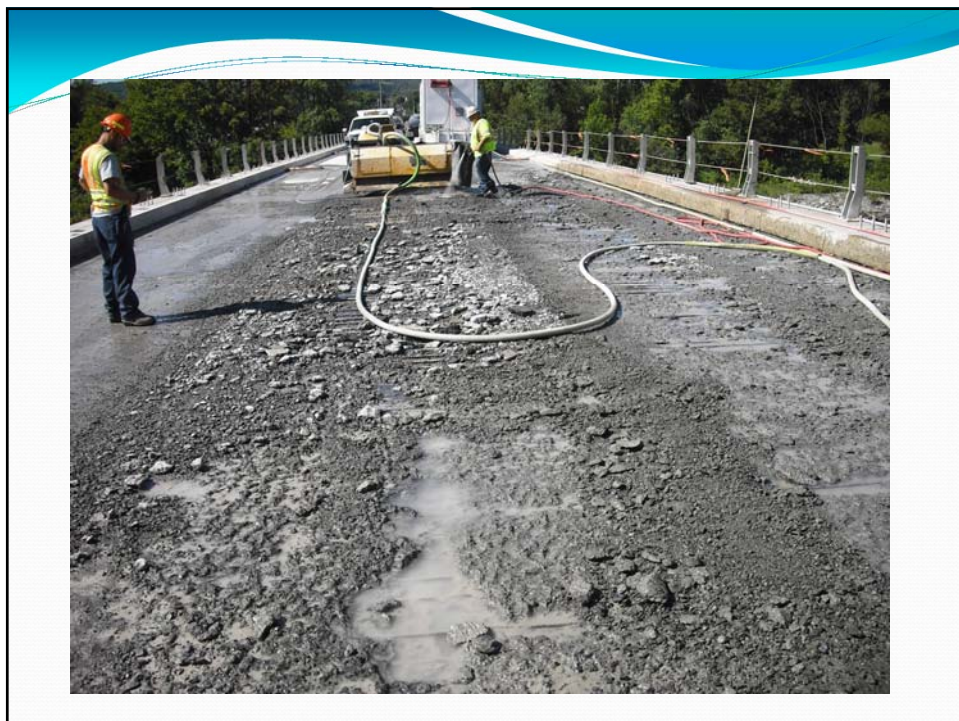


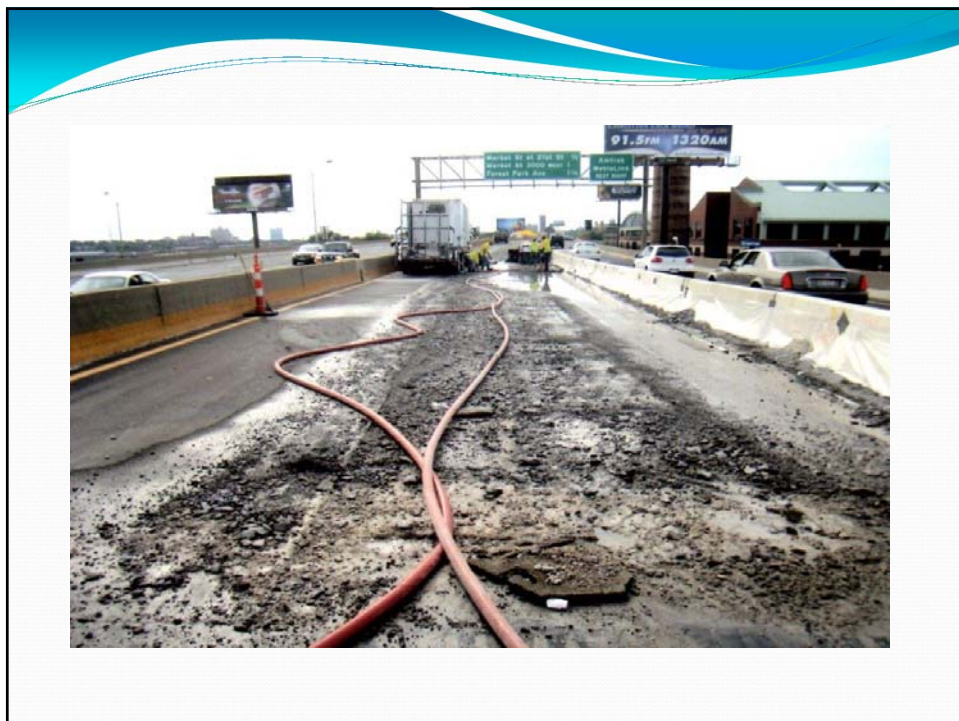


Fast Track Hydrodemolition Surface

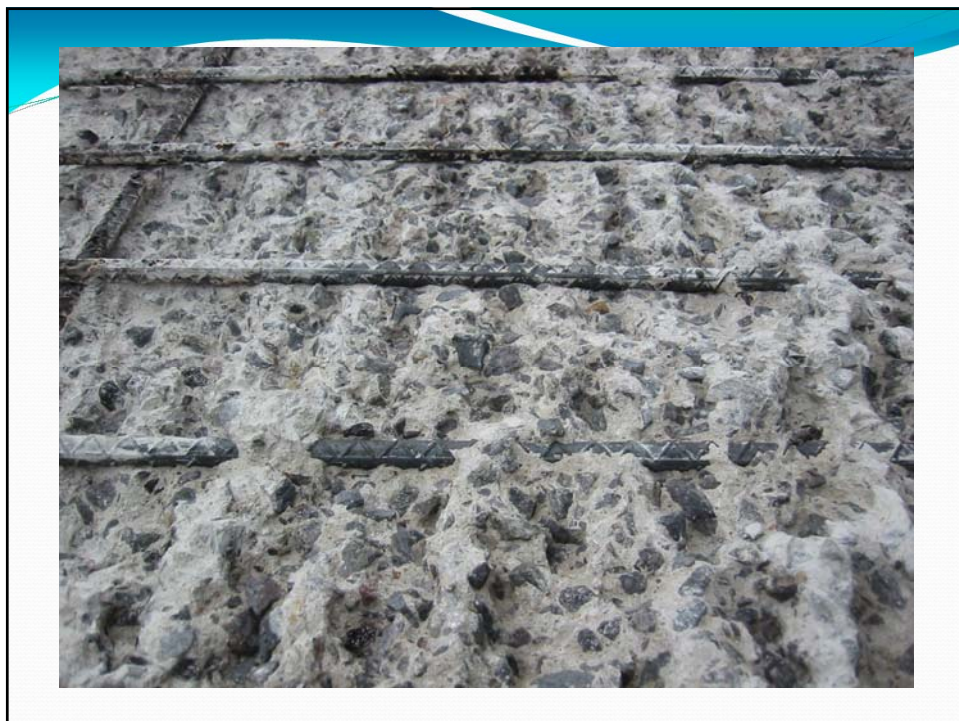
- Fast way to prepare a bridge deck surface for a concrete overlay.
- Selectively removes deteriorated concrete at variable depths.
- Highly rough and bondable surface.
- Reduces Chloride Ion concentrations in the deck.
- With proper milling, only sound concrete remains.
- Has 300% to 400% more bondable area than surface milling alone.
- Stone is not cut – aggregates are protruding.
- Exposes and cleans reinforcing steel. Will not damage or dislodge reinforcing steel.

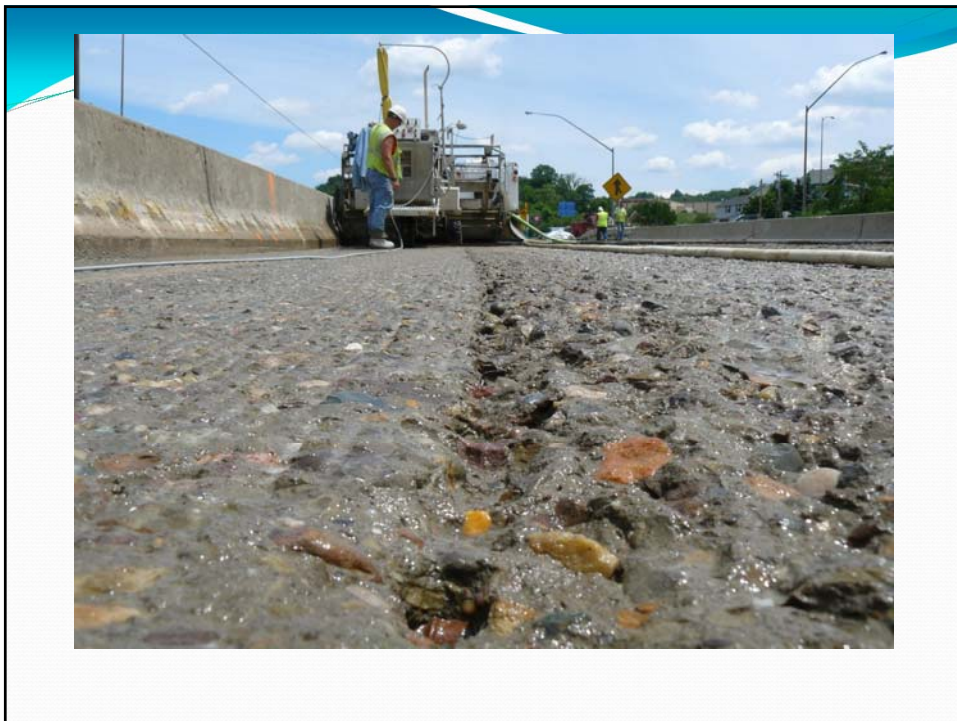


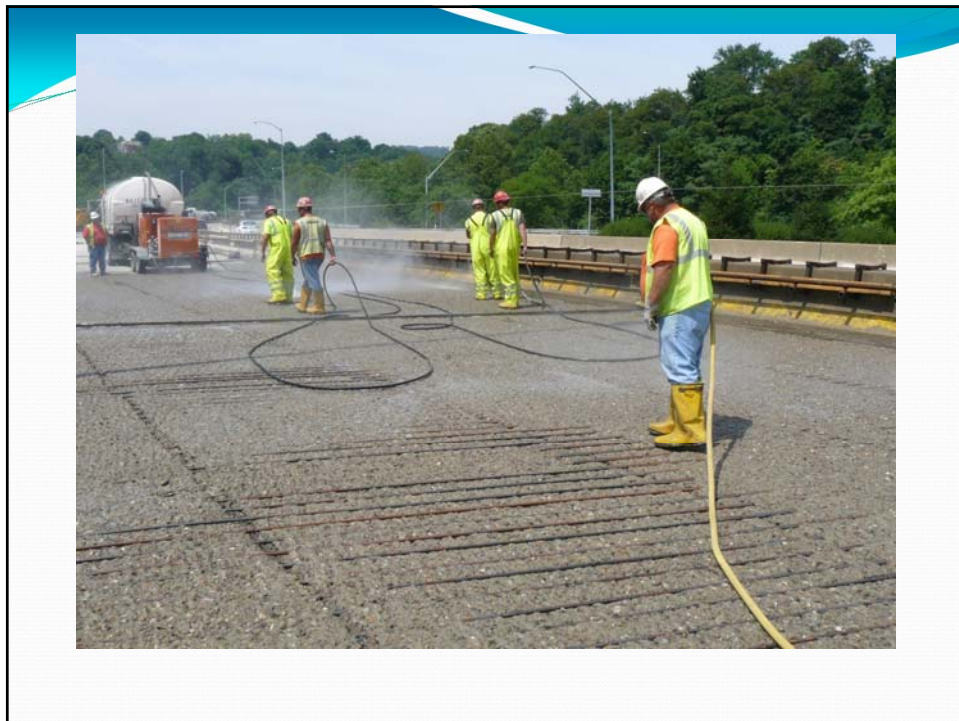
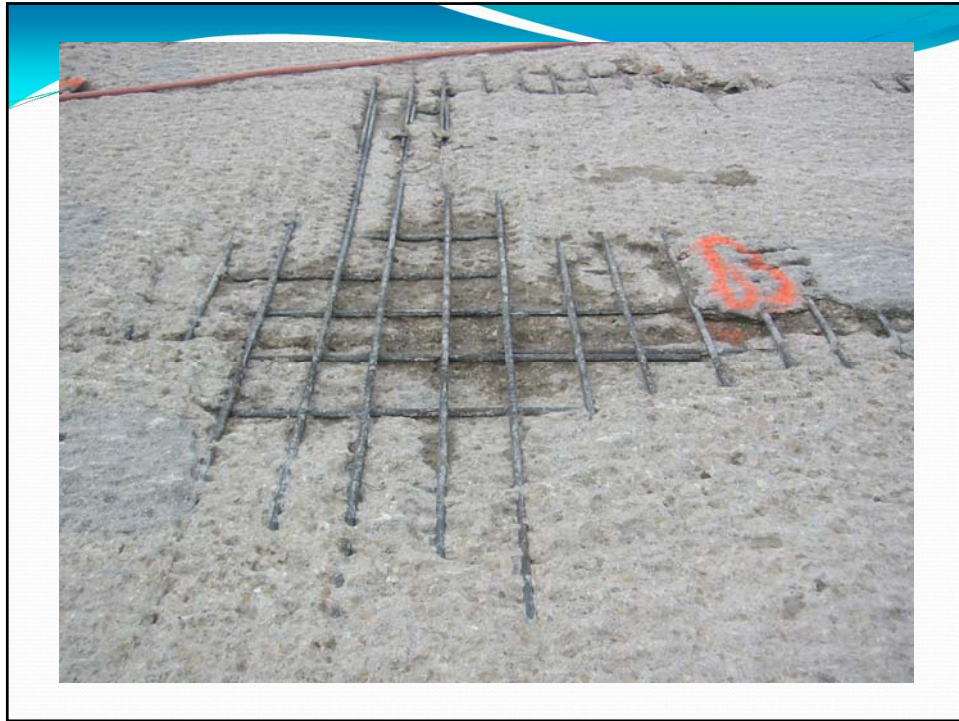














Hydrodemolition Equipment

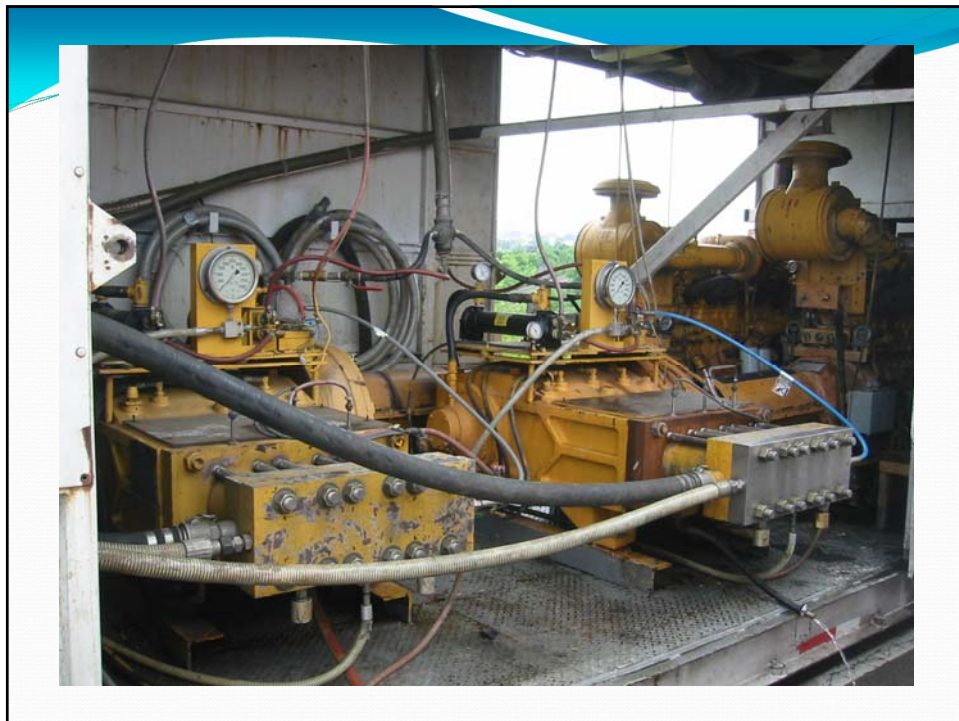
- Consists of Pump & Power Unit, Hydrodemolition Robot and Vacuum Truck.
- Can be readily mobilized to any project.
- Set up time is quick and relatively easy.

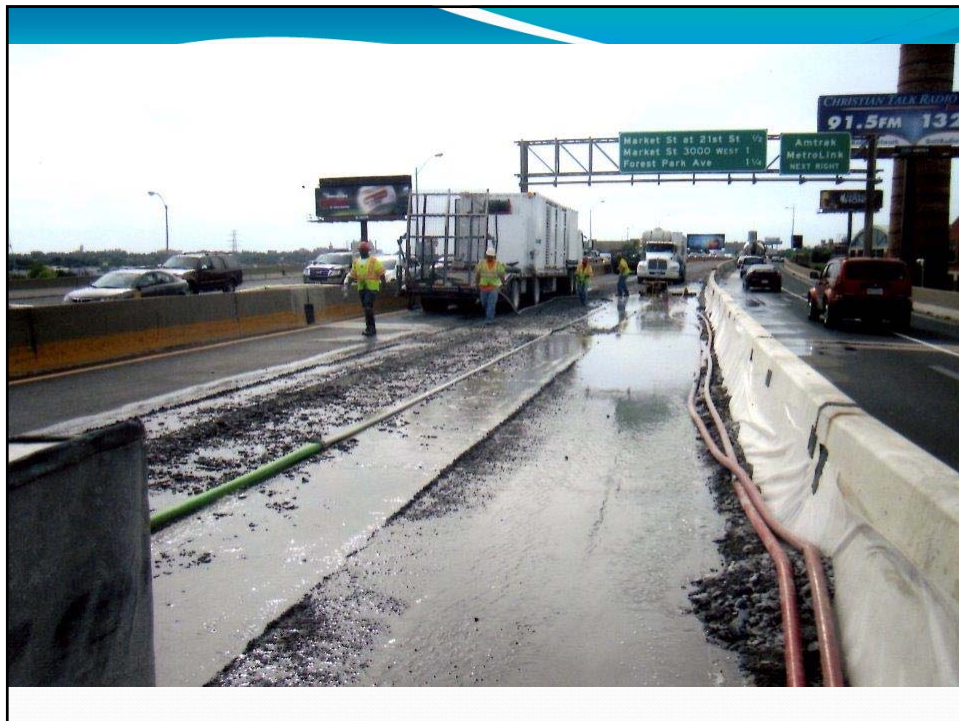
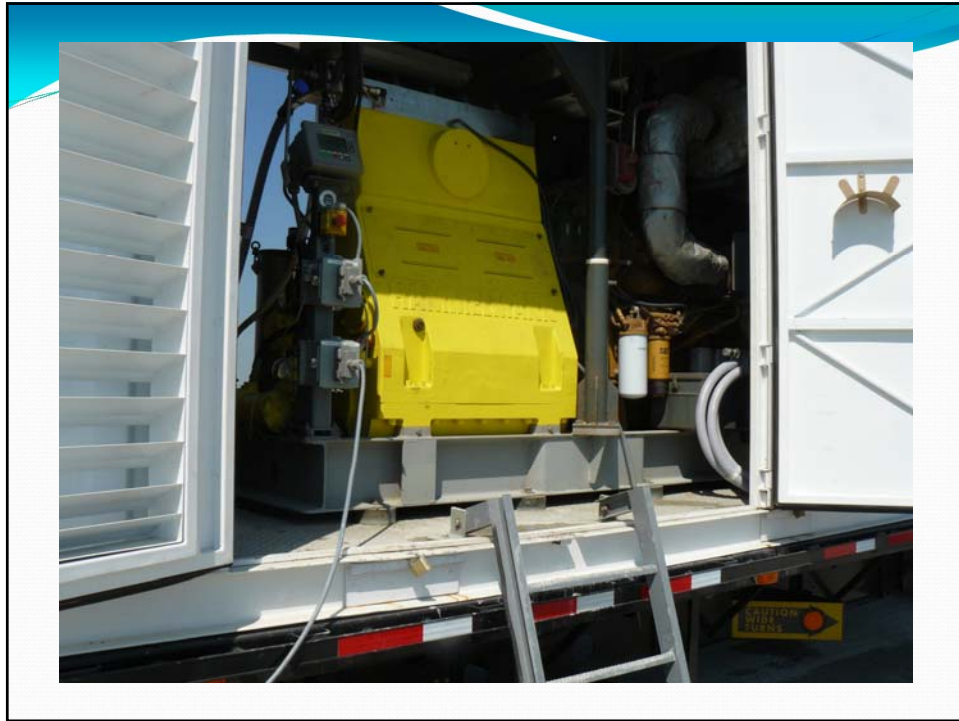
Hydrodemolition Pump Unit

- Receives water intake from either tankers, hydrant or directly from stream or lake.
- Filters and pressurizes water.
- Supplies water at 15,000 psi and 55 ga/min to the Hydrodemolition Robot.









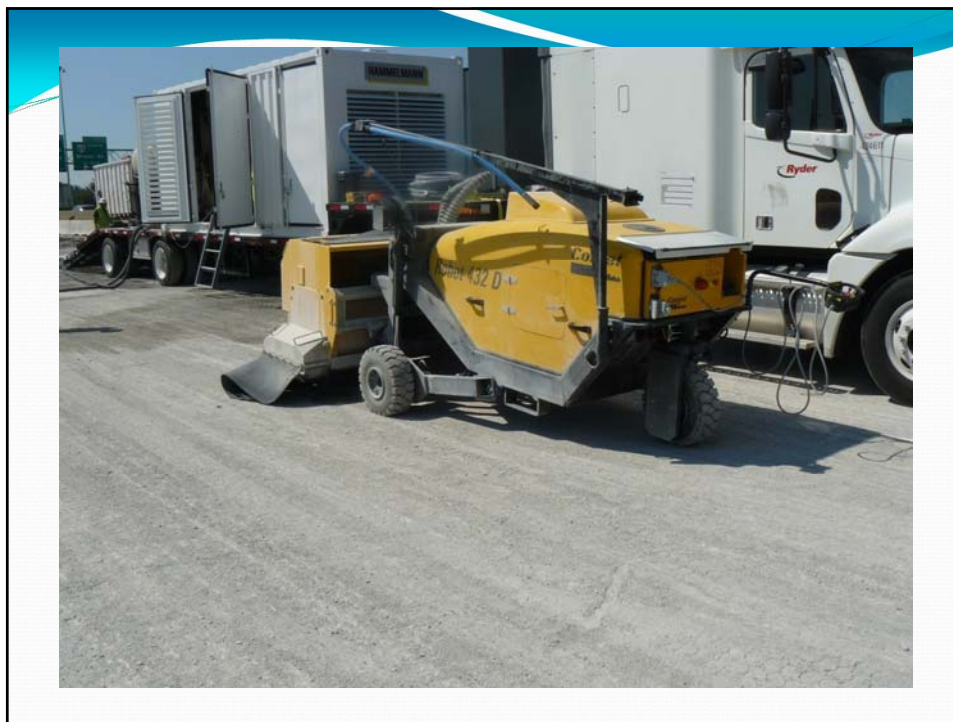
Hydrodemolition Robot

- Computerized and Self-Propelled.
- Water from the power unit exits through a ¼” jet nozzle.
- Controls allow operator to control the removal depth of the concrete by adjusting the step of the machine and the glide of the water jet.









Hydrodemolition Vacall Unit

- Cleans and washes bridge deck surface.
- Removes all hydrodemolition debris and slurry.



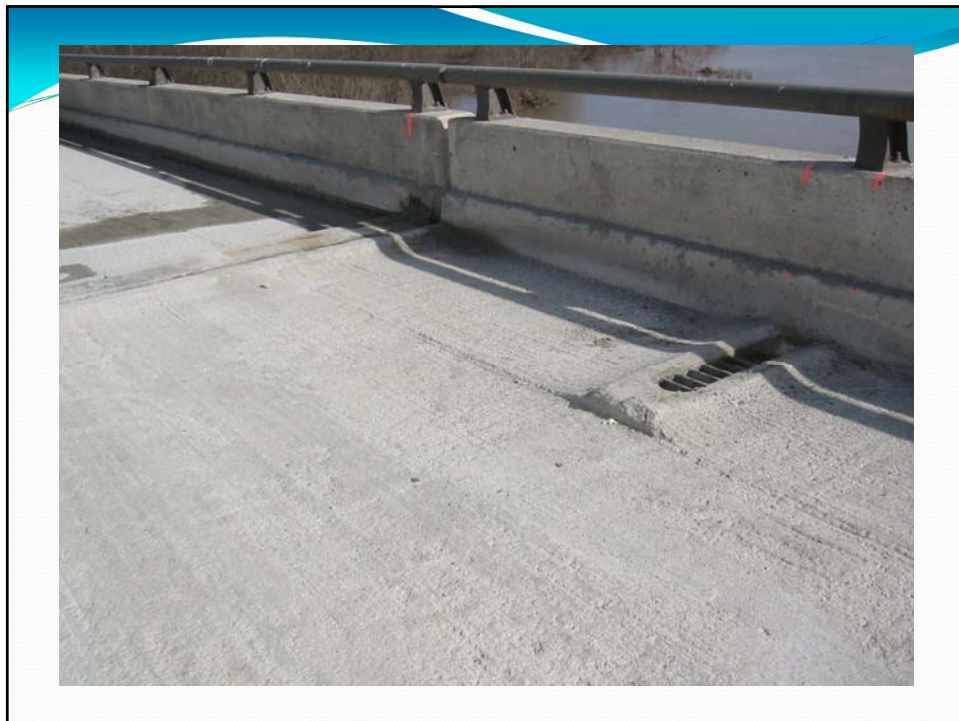
The Fast Track Hydrodemolition/Modified Concrete Bridge Overlay Method

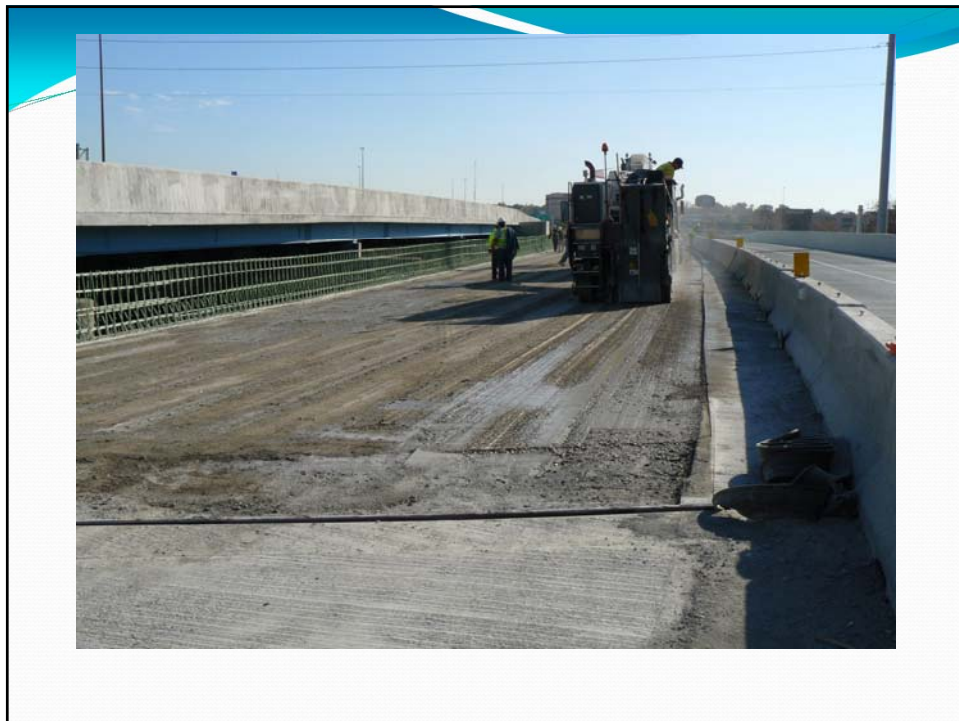
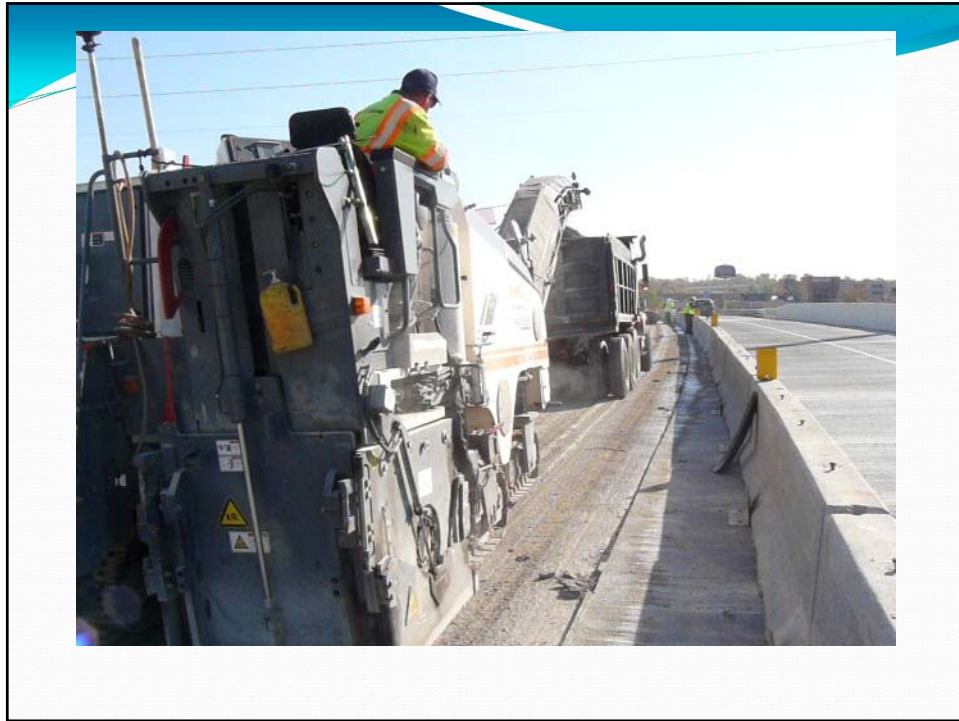
- Fastest and most cost effective way to overlay a bridge deck.
- A minimum of 25 years of service life will be attained by the overlay if surface is properly prepared and overlay is properly placed.
- Consists of 4 steps

The Fast Track Hydrodemolition/Modified Concrete Bridge Overlay Method

- Step 1 – Mechanical Milling of the Existing Bridge Deck Surface to a Specified Depth or to the Top Matt of Reinforcing Steel.
- Mill for depth – Cost Effective
- Mill to top mat of reinforcing steel.





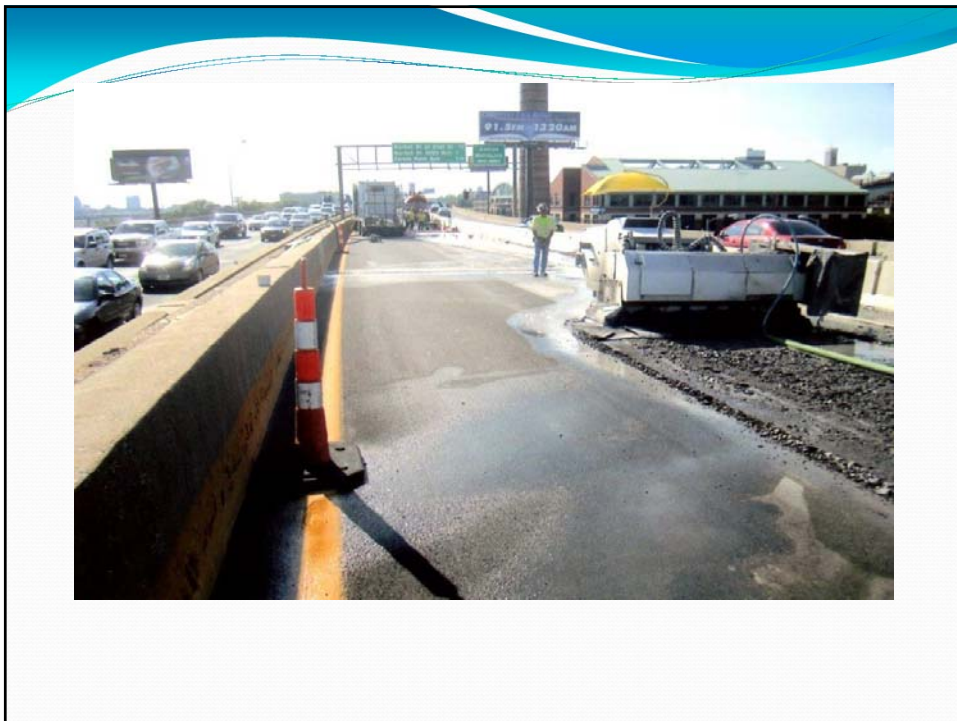
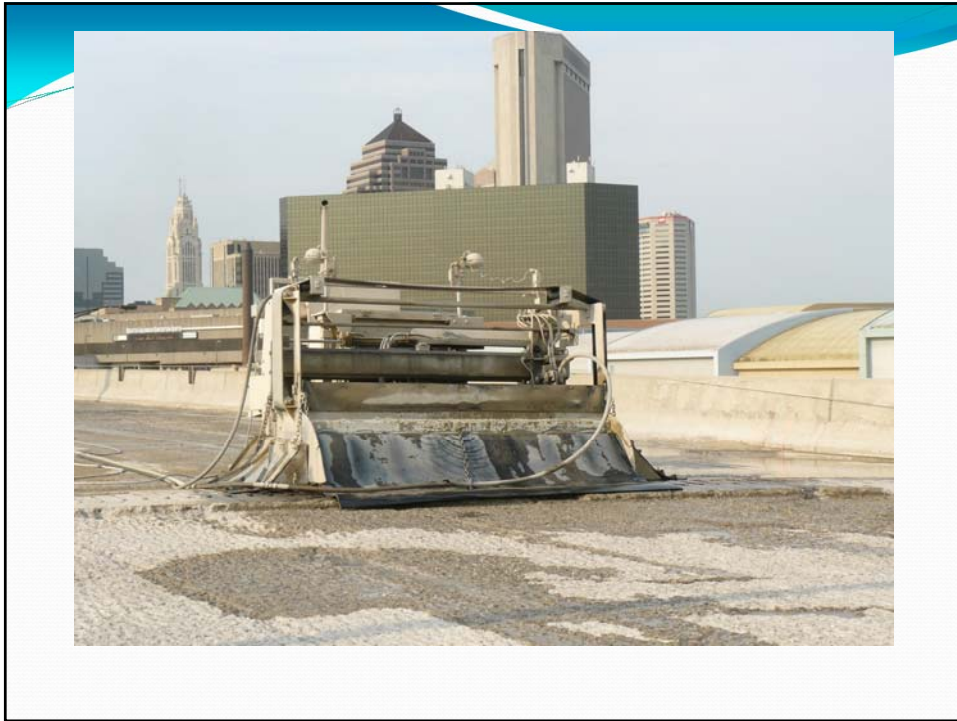




The Fast Track Hydrodemolition/Modified Concrete Bridge Overlay Method

- Step 2 – Perform Total Surface Hydrodemolition.
- Hydro to get the bad concrete out below the milling line and to provide a highly bondable surface.
- Do not hydro for depth – not cost effective.







The Fast Track Hydrodemolition/Modified Concrete Bridge Overlay Method

- Step 3 – Final Cleaning of the Bridge Deck Surface and Minor Hand Chipping in Areas Inaccessible to The Hydrodemolition Equipment.
- Clean closely behind the hydro robot.
- Do not leave loose debris or slurry on the bridge deck surface.



The Fast Track Hydrodemolition/Modified Concrete Bridge Overlay Method

- Step 4 – Placement of Modified Concrete Overlay.
- Place during optimum weather conditions.
- Surface must be extremely clean and in a damp condition.

Latex Modified Concrete Characteristics

- LMC was specifically designed (1960's) for use as a thin bonded concrete bridge deck material. It's quality has withstood the test of time.
- A LMC Overlay is a structural bridge deck repair that will extend the service life of a bridge deck for over 25 years when placed on a hydrodemolition prepared concrete surface.
- LMC is very adhesive and develops great bond strengths to the existing deck.
- LMC shields the underlying deck because it is very impervious.
- LMC has greater flexural strength than conventional concrete.
- LMC is very wear resistant and improves the skid resistance on bridge decks
- LMC has a very low water/cement ratio. This characteristic prevents shrinkage cracking from occurring in the overlay.

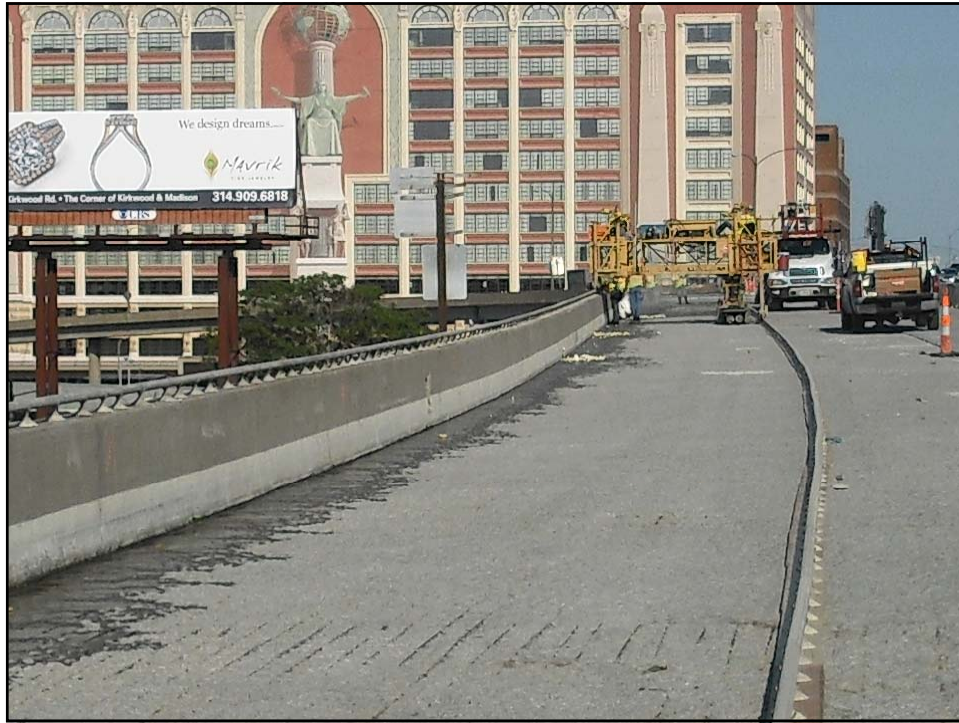
Latex Concrete Mix Design

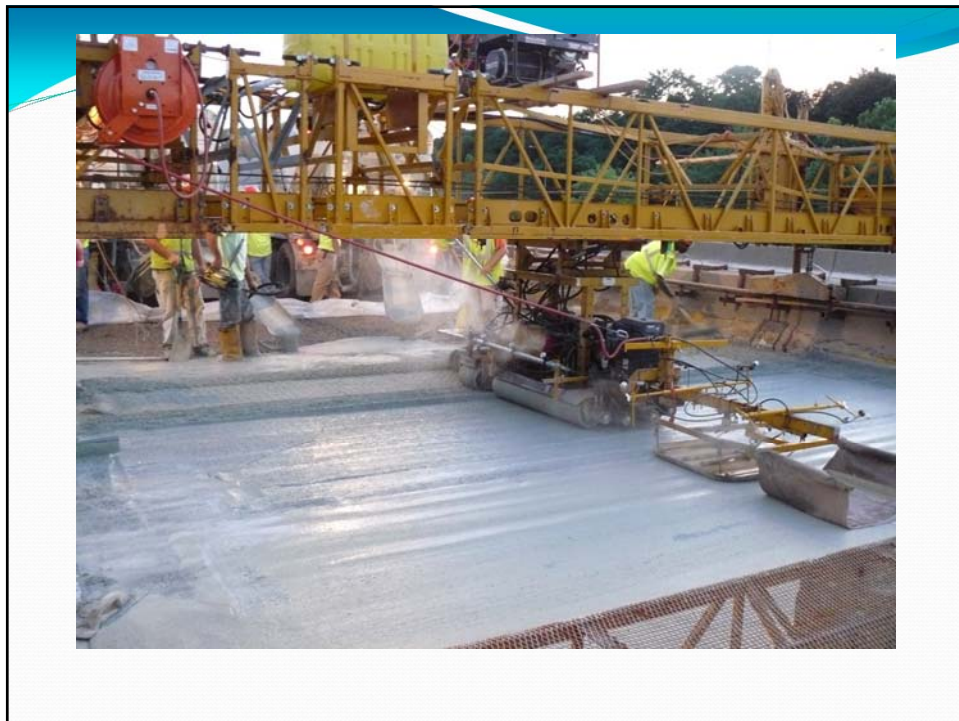
- Fine Aggregate (Sand) - 1575 - 1855 lbs/cy
- Course Aggregate (# 8's) - 1106 - 1386 lbs/cy
- Cement (7 bags) - 658 lbs/cy
- Latex Emulsion - 24.5 gal/cy
- Water - 17.5 gal/cy
- Maximum Air - 7 %
- Slump - 4 to 6 in

** Cement = Type 1, Type 3 or Rapid Set

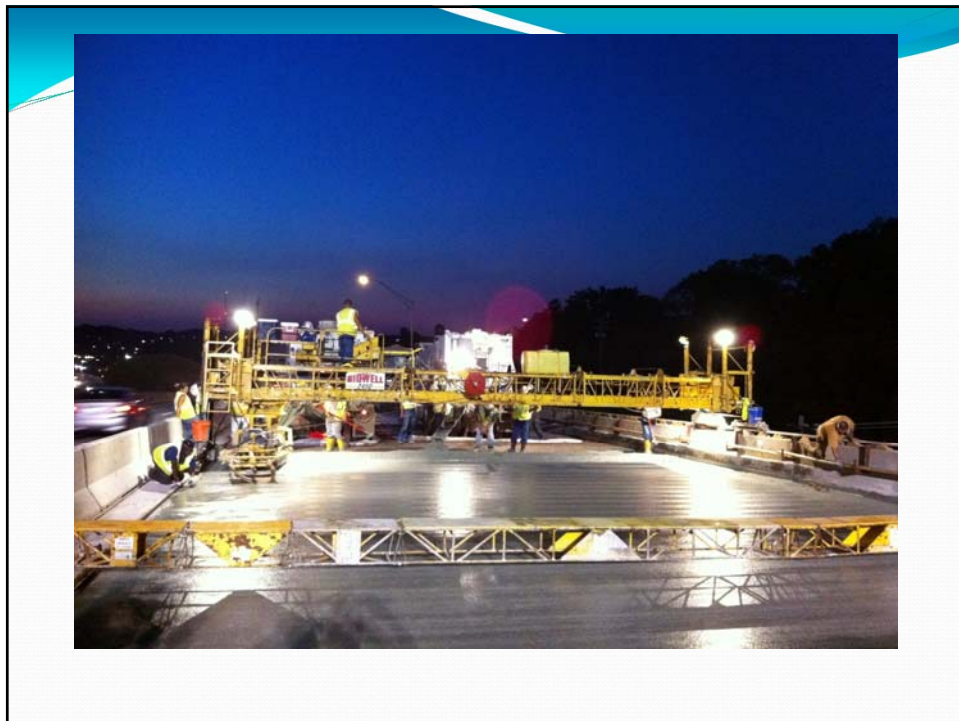
Latex Emulsion

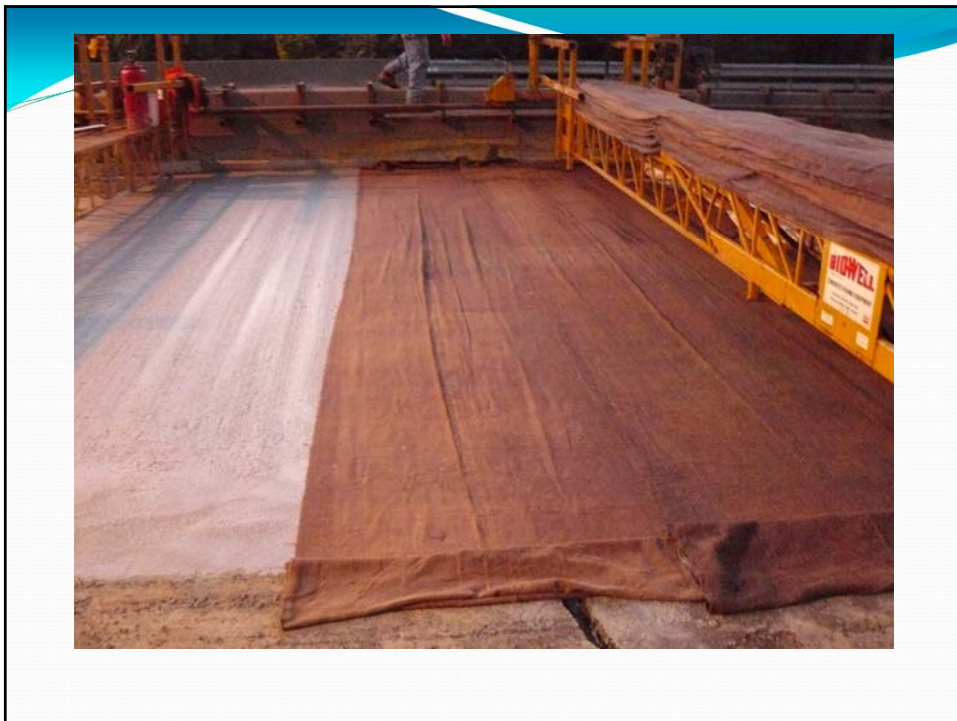
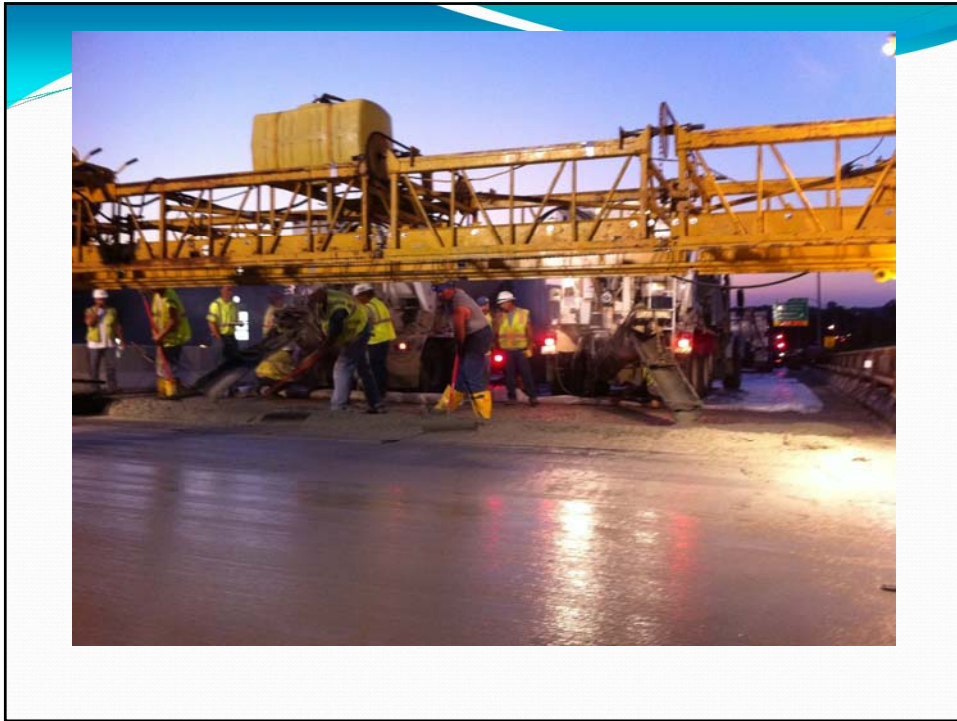
- Suspension of tiny (.2 micron diam.) styrene-butadiene polymer particles in water, typically about 50% polymer solids.
- Styrene-butadiene polymers are known for their hydrophobicity or excellent water resistance.
- Polymer particles coalesce or fuse together when in intimate contact to form a highly waterproof polymer film.
- Essentially waterproofs concrete.

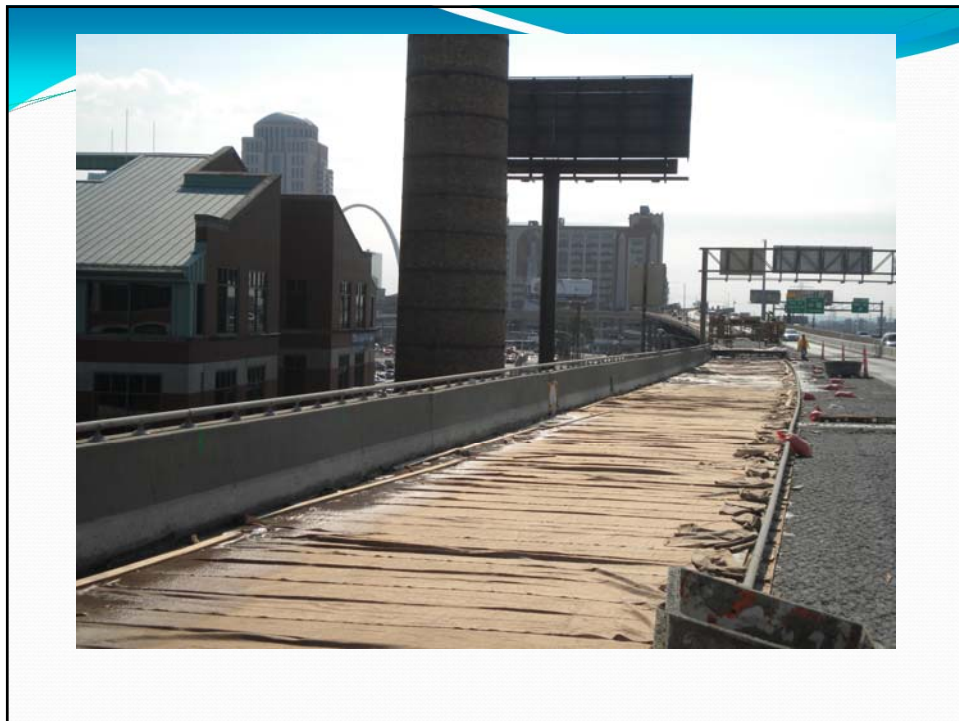


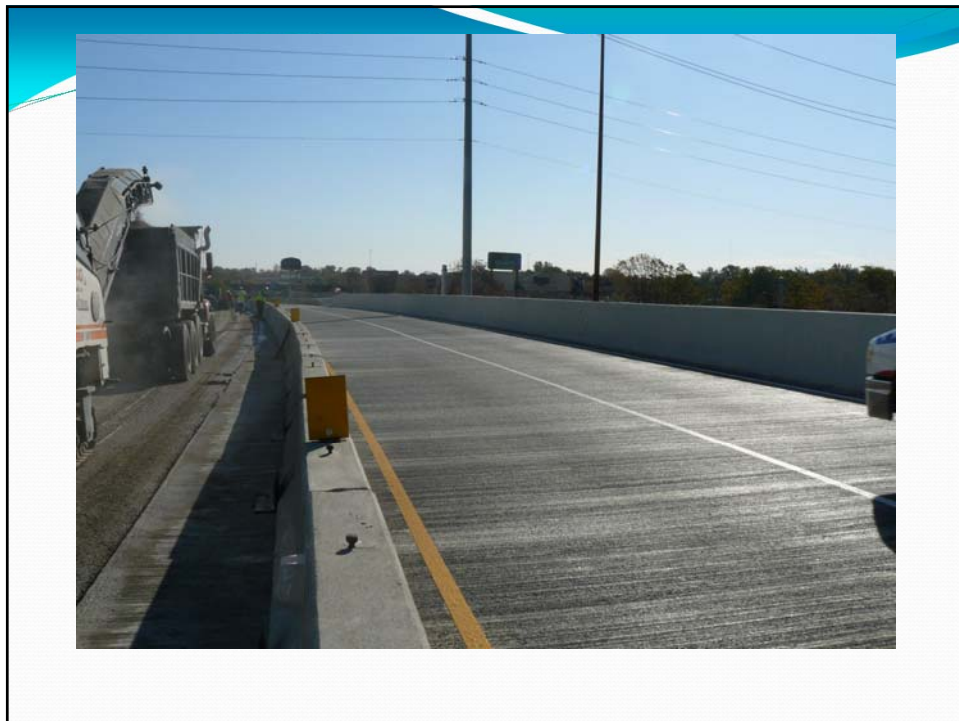
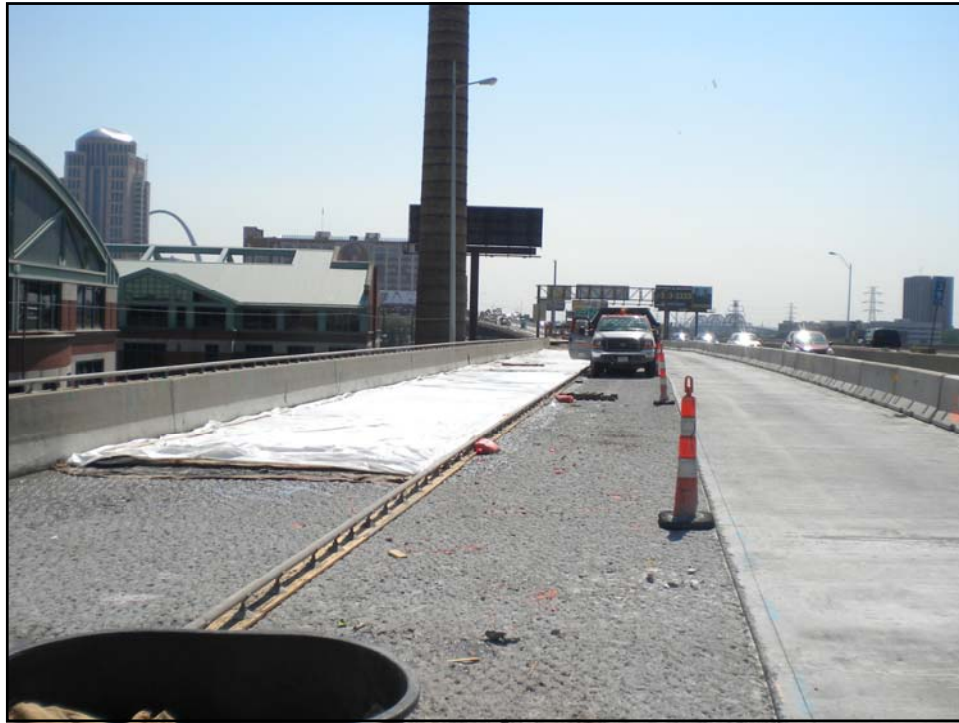


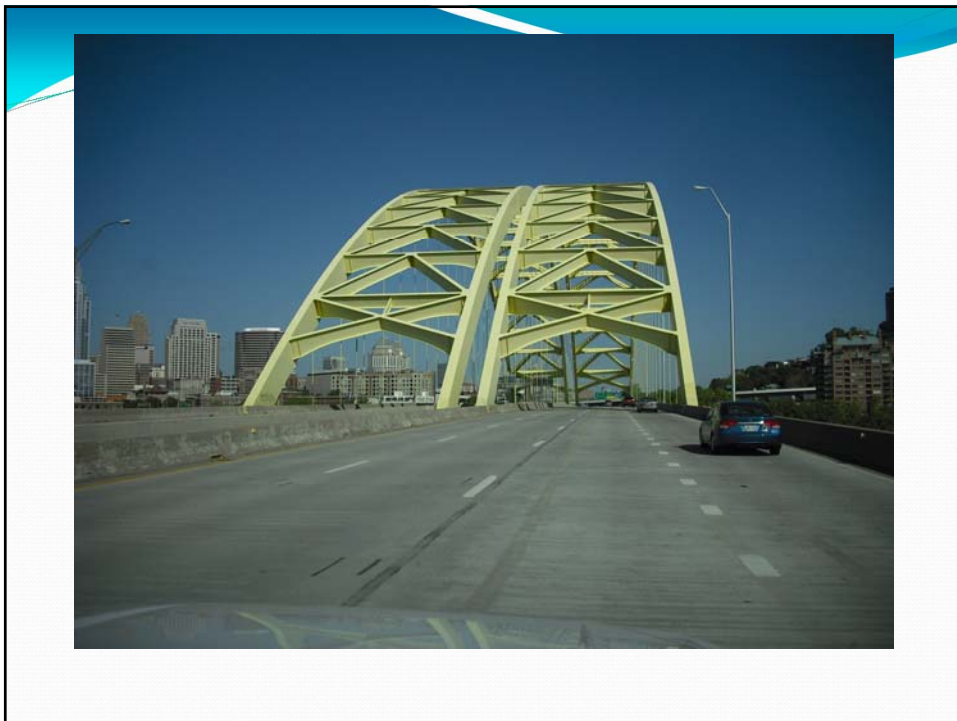
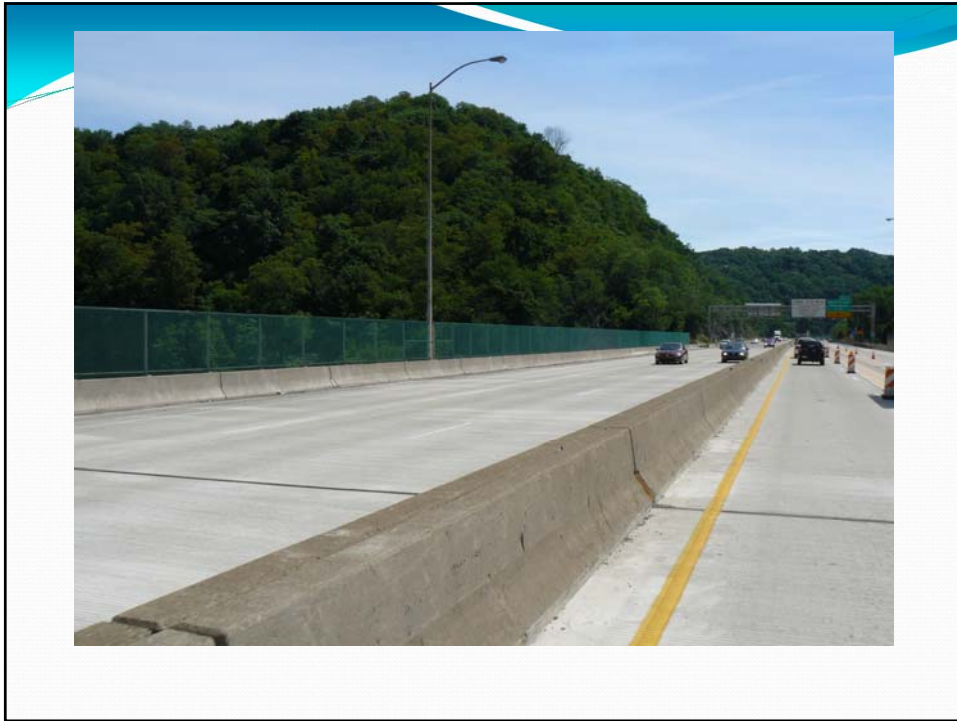


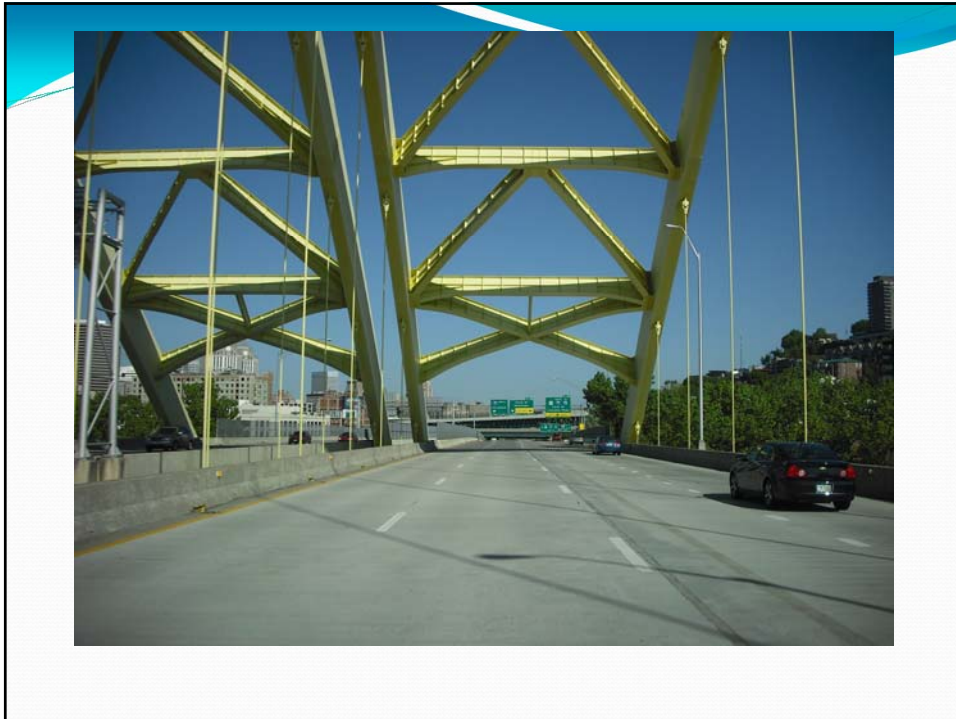










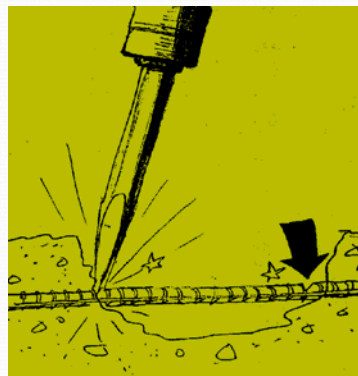


Fast Track Hydrodemolition Advantages

- **Speed** - A fast, productive and economical way to prepare a bridge deck for a Modified Concrete Overlay.
- **Quality** - Selectively removes delaminated concrete and avoids the unnecessary removal of sound concrete.
- **Removes** chloride contaminated concrete.
- **Will not damage** existing reinforcing steel. Actually cleans the steel.
- **Surface** has 300 % to 400 % more bondable area than a mechanical milled surface.
- **Cost Savings** - Long term service life and maintenance cost savings. Immediate traffic control and road user cost savings.
- **Construction** - Replaces jackhammers. Lower Noise Levels. No fugitive dust. No micro-cracking of deck concrete.



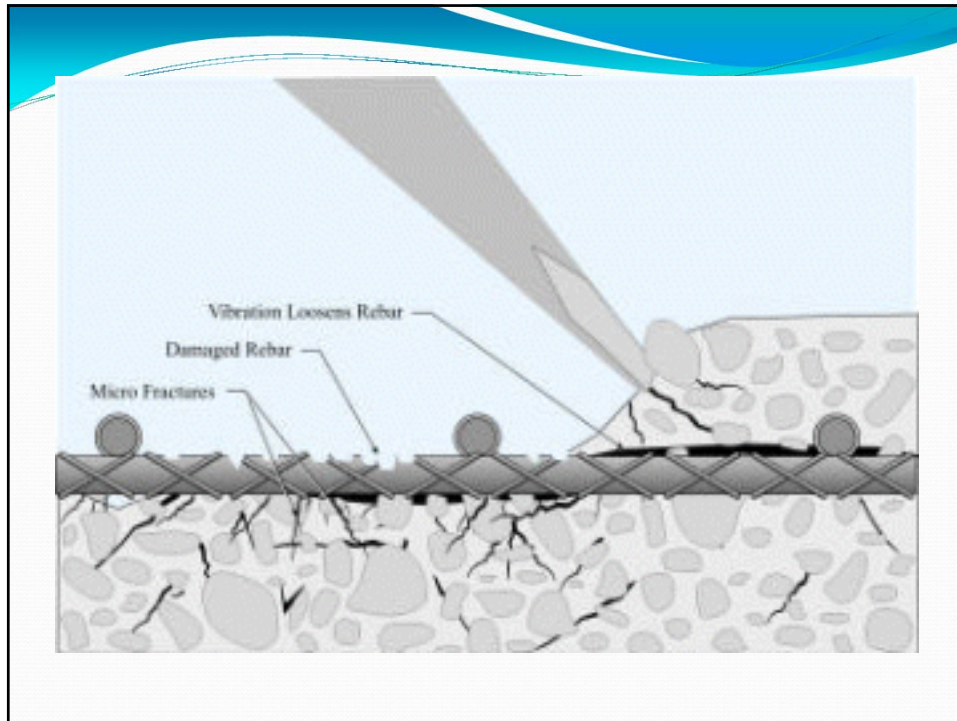
Jack hammer the method of yesterday



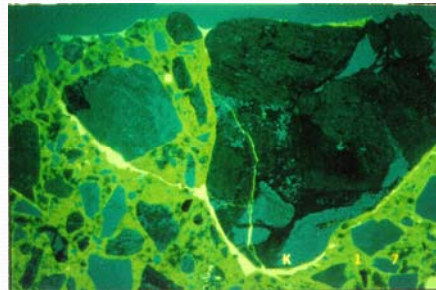
- Damage to rebars.
- Vibrations in the rebars cause long distance damage to the bond in the structure
- Causes new micro cracks.
- No selective removal.
- Labour intensive.
- Hand and arm vibrations
- Slow and noisy.

08/04/08

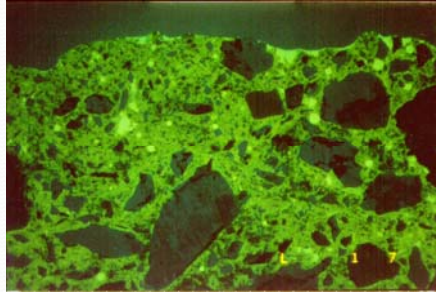
Conjet AB



Micro cracks and no bond is shown on a thin section after use of a jackhammer.



Thin section sample after using
Hydrodemolition showing no micro cracks



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Conjet AB

Questions / Contact Info

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- We offer technical presentations, field demonstrations (I-471 next month), simple plans and specification development and Professional Engineering Services