



SEBPP Annual Meeting 2016

Hydro-Demolition in North Carolina

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Hydro-Demolition in North Carolina

During hydro-demolition, bridge concrete deck surface is pulverized using high pressure water (17,000 psi) in a controlled manner, removing existing concrete surface down to a prescribed depth.

Hydro-demolition allows bridge resurfacing without bridge replacement, saving NCDOT and NC taxpayers millions of dollars.

Hydro-demolition uses:

- Concrete deck preparation for Latex Modified Concrete (LMC) overlays.
- Demolition of concrete deck to access deck reinforcing.



Determine LMC Need

- Visual inspection
- Sounding/ chain drag
- Chloride content testing
- Infrared surveys
- Issues with existing AWS



Hydro-Demo Depth

- Minimum LMC depth 1¼" = typical minimum plan depth of hydro-demo
- Adjust depth as necessary
 - Chloride depths
 - Adding to grade to restore or add cover
 - Adding grade to lessen changes in approach roadway (AWS)



Concrete Deck Removal

- Initial removal by milling
 - cheaper
 - milling also gives the hydro-demo a surface that is easier for the high pressure water to “grab” and remove
- Current NCDOT specifications require milling to within ½” of planned depth (Considering revising this to ¼”)
- Final removal by hydro-demo
 - hydro-demo costs more
 - better surface preparation
 - better surface profile for bond of LMC
 - no micro-cracking in concrete substrate



Hydro-Demo Deck Removal

- Calibrate hydro-demo robot to depth in a “good” area of the deck
 - ❑ adjustable by ¼” increments
- Hydro-demo is “self-proofing”
 - ❑ unsound concrete areas are removed deeper
 - ❑ harder sound areas can cause issues
- Class II Surface Preparation
 - ❑ patch areas
 - ❑ approximately ½ deck thickness, ¾” below top steel
 - ❑ normal hydro-demo processes that go to this depth are not considered Class II
- Class III Surface Preparation
 - ❑ full depth
 - ❑ under deck containment required



Deck Preparation

- Hydro-demo
- Vacuum of hydro-demo debris
- Some areas of hand work
 - ❑ Pneumatic hammers weighing a nominal 35 lb or less
 - ❑ Pneumatic hammer chisel-type bits that do not exceed the diameter of the shaft in width
- Power washing of deck
 - ❑ 7500 psi
- Flooding or soaking of deck prior to LMC placement
- Cover to protect from debris and contamination during LMC placement



Environmental Considerations

- Depending on the size of the bridge, thousands of gallons of wastewater can be generated. 50,000 gallons for typical bridge in North Carolina.
- Hydro-demolition run-off water (HRW) considered “industrial process wastewater” by NCDWQ. No discharge allowed to ground surface or surface waters without permit. 100% containment and collection of the HRW.
- Plug or seal bridge drains, drop inlets, curbs, cracks, seams, and other features prior to start of work. Foam sealant, rubber seals, bridge drain plugs, and plastic sheeting have been used.
- Effective removal of HRW by vacuum as close to hydro-demo machine as possible, with back-up pump. Multiple pumps can be used, if necessary
- If pH exceeds 12.5, HRW considered to be a hazardous material. Generally, pH is less than 12; can be lowered by adding muriatic acid.
- HRW must be handled and disposed of in accordance with local, state, and federal regulations. NCDOT includes environmental guidelines in pre-bid packages for contractors.
- The guidelines include pH control plan and disposal plan, as well as sampling guidelines and environmental compliance statements.



Environmental Considerations

To simplify, HRW can be disposed of in the following ways:

- Slurry
 - to permitted WWTP or programmatic land application on NCDOT ROW or private land
- Separated liquids
 - to WWTP
- Solids
 - to permitted landfill
 - programmatic land application on NCDOT ROW or private land
 - permitted beneficial reuse as soil fortification or structural fill

This is not a one-size-fits-all. Each bridge must be handled on a case-by-case basis. Many factors (bridge size, location, and project type; treatment facilities capacities, capabilities, and proximity; location for land application; etc.) must be evaluated to determine best method to handle HRW.

Contractor must submit his plan for handling the HRW prior to starting work.



Traffic Management Plan

- Contractor usually responsible, but traffic management plan must be reviewed in preconstruction meeting
- Detour preferred
 - safer
 - leaves more room for HRW staging/collection
- If traffic is not detoured
 - maintain maximum area for HRW staging
 - prevent flow of HRW into travel lanes
 - maintain maximum distance from HRW sheet flow and cars as hydrocarbons from car exhaust may be contaminating HRW













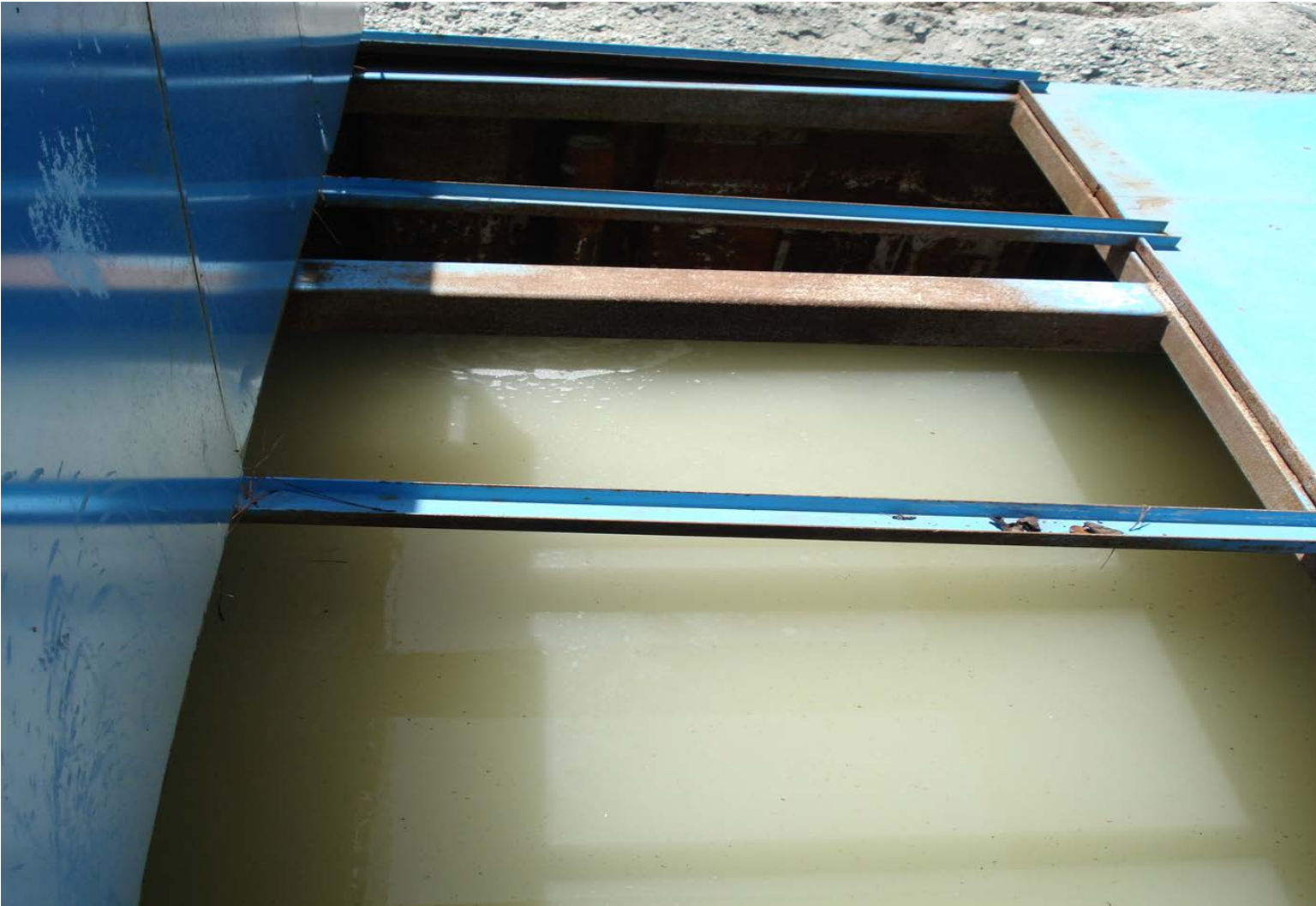


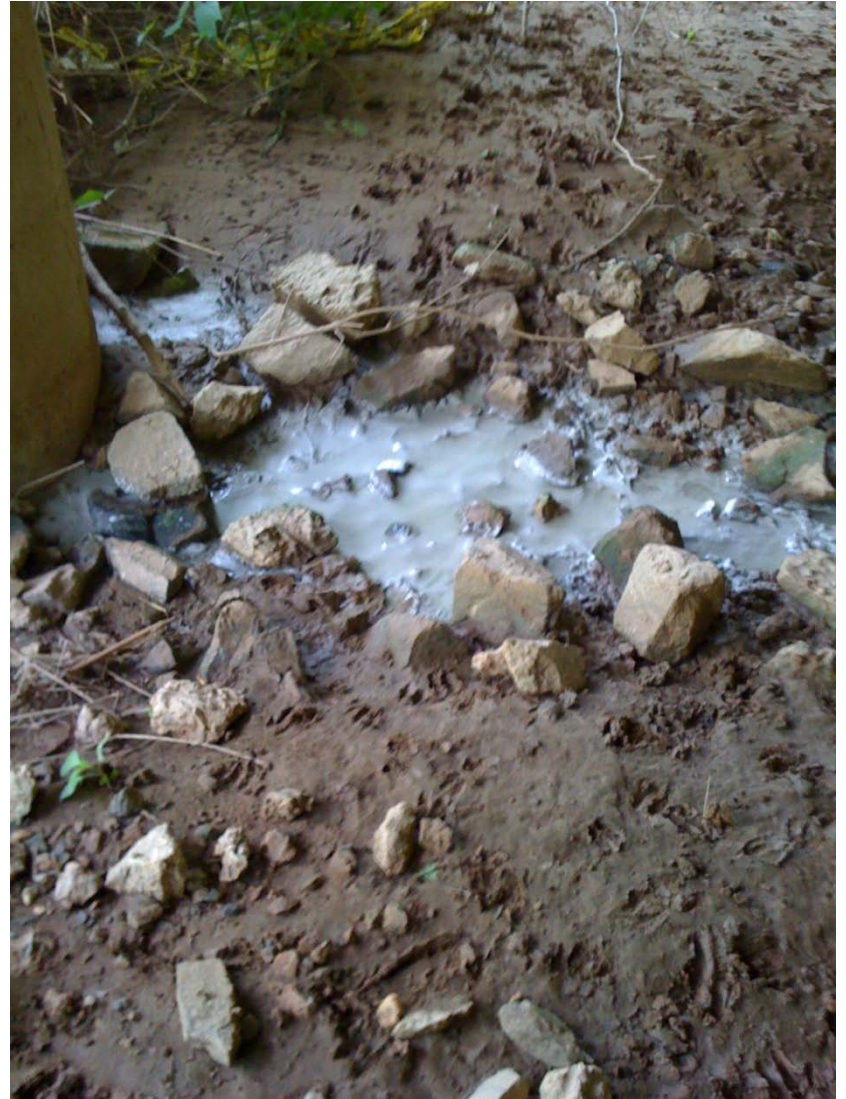




















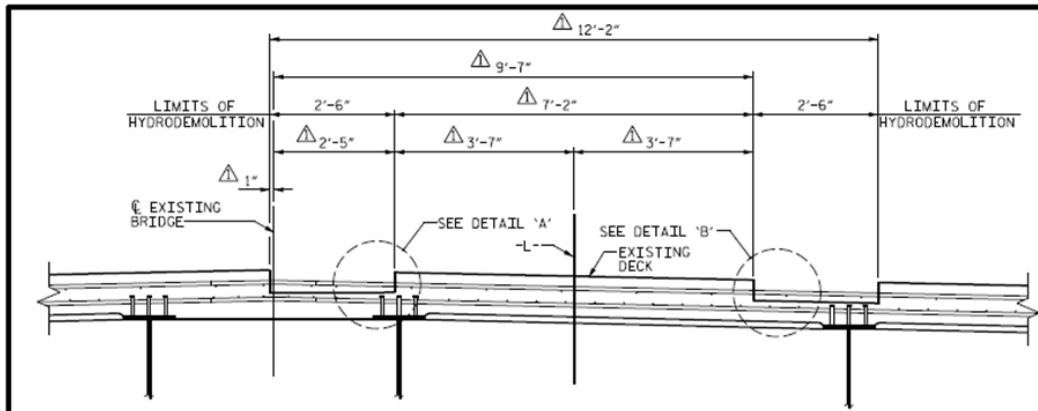




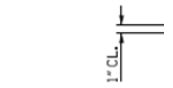
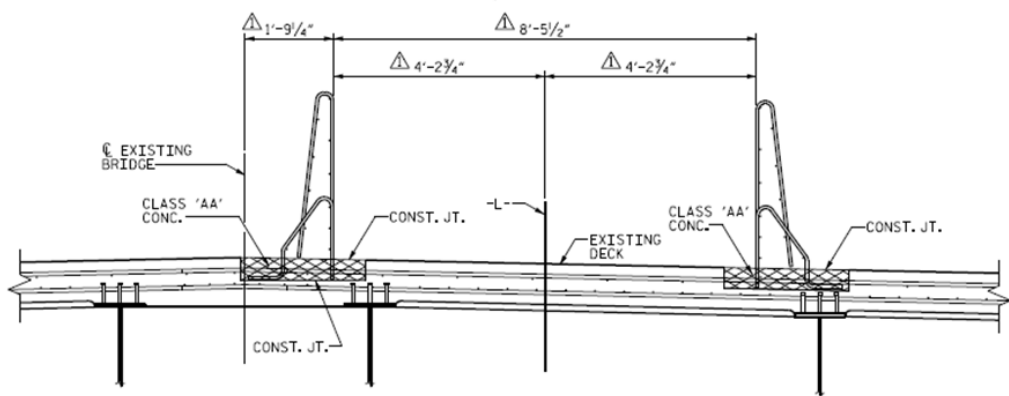


Hydro-demolition to Access Slab Top Reinforcing

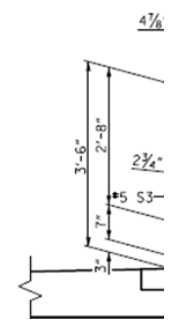
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CONCRETE TO BE TO 1" CLEARANCE EXISTING "B" B



#5 "B" BARS TIED TO EXISTING "A" BAR



Concluding Considerations

- Safety First
 - Traffic can create very dangerous conditions.
 - Hydro-demo often done at night to minimize traffic issues, but this increases dangers. Visibility on or under bridge can be difficult.
 - Operations are loud
 - Wear hearing protection
 - Communication can be difficult
 - Flying debris from hydro-demo robot
 - Wear safety glasses
 - Be alert and pay attention at all times
 - Stop work if problem arises
- Hydro-demo and LMC operations might take several days (nights) or several weeks or longer, depending on the size and condition of the bridge and other possible factors.
- If discharge to ground surface of surface waters occurs, contact NCDOT Division Environmental Officer and/or DWQ Regional Office within 24 hours of compliance violation. The violation will be issued to both NCDOT and the contractor.





QUESTIONS?

