Elevated Water Tank Rehabilitation – Getting It Right When Things Go Wrong

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Ridgeview Elevated Tank Renovation

- 1.0 MG Hydropillar Tank.
- Coating system showed varying degrees of deterioration.
- Home to 5 Communication providers.
- High profile area.
Scope of Work

Methodology

- Pre-bid inspection *(General tank and tank coating condition)*
- Making recommendations
- Incorporating recommendations in specification
- Coating workshop *(What are the coating options)*
- Advertising for a qualified coating contractor
- Communication plan
- Work-in-process monitoring with a NACE International (formerly National Association of Corrosion Engineers) inspector
- One year anniversary inspection
Pre-Bid Inspection

Methodology
1. Dry Film Thickness measurements (Base line)
2. Adhesion Testing per ASTM-D3359-09
3. Percentage and types of coating breakdown

Type II Constant Pressure Probe

Method A “X Cut Tape Test”
Test Results

DRY FILM THICKNESS MEASUREMENTS RESULTS SUMMARY
RIDGEVIEW TANK
CARY, NORTH CAROLINA
JOB NO. 1587-11-018

TABLE I
DRY FILM THICKNESS MEASUREMENT RESULT
EXTERIOR AND INTERIOR DRY

<table>
<thead>
<tr>
<th>TEST AREA</th>
<th>NUMBER OF READINGS</th>
<th>MEASURED COATING THICKNESS (mils)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>LOW</td>
<td>HIGH</td>
<td>AVERAGE</td>
<td></td>
</tr>
<tr>
<td>EXTERIOR LOWER PEDESTAL</td>
<td>25</td>
<td>7.0</td>
<td>12.9</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>INTERIOR DRY</td>
<td>25</td>
<td>10.3</td>
<td>20.5</td>
<td>15.9</td>
<td></td>
</tr>
<tr>
<td>ROOF</td>
<td>25</td>
<td>6.4</td>
<td>19.9</td>
<td>13.1</td>
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</tr>
</tbody>
</table>
## ADHESION TEST RESULTS

### TABLE II

ADHESION CLASSIFICATION TESTING RESULTS

### EXTERIOR

<table>
<thead>
<tr>
<th>TEST NUMBER</th>
<th>EXTERIOR TEST AREA</th>
<th>INTERMEDIATE TO PRIMER</th>
<th>TOPCOAT TO INTERMEDIATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ROOF CENTER</td>
<td>5A</td>
<td>0A</td>
</tr>
<tr>
<td>2</td>
<td>ROOF KNUCKLE</td>
<td>5A</td>
<td>0A</td>
</tr>
<tr>
<td>3</td>
<td>LOWER PEDESTAL</td>
<td>5A</td>
<td>4A</td>
</tr>
<tr>
<td>4</td>
<td>UPPER PEDESTAL</td>
<td>5A</td>
<td>4A</td>
</tr>
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</table>

### INTERIOR DRY

<table>
<thead>
<tr>
<th>TEST NUMBER</th>
<th>EXTERIOR TEST AREA</th>
<th>INTERMEDIATE TO PRIMER</th>
<th>TOPCOAT TO INTERMEDIATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LOWER PEDESTAL</td>
<td>5A</td>
<td>5A</td>
</tr>
<tr>
<td>2</td>
<td>UPPER PEDESTAL</td>
<td>5A</td>
<td>5A</td>
</tr>
<tr>
<td>3</td>
<td>ACCESS TUBE</td>
<td>5A</td>
<td>5A</td>
</tr>
</tbody>
</table>

### ADHESION TEST STANDARD

ASTM D-3359-97 “STANDARD TEST METHOD FOR MEASURING ADHESION BY TAPE TEST”

- 5A No peeling or removal.
- 4A Trace peeling or removal along incisions or at their intersection.
- 3A Jagged removal along incision up to 1/16 in. (1.6 mm) on either side.
- 2A Jagged removal along most of intersection up to 1/8 in. (3.2mm) on either side.
- 1A Removal from most of the area of the X under the tape.
- 0A Removal beyond the area of the X.
Adhesion Test

Pedestal Adhesion Test 4A

Roof Center Adhesion Test 0A

Roof Knuckle Adhesion Test 0A
Interior Dry and Wet

- Interior Dry Pedestal
- Interior Dry Access Tube
- Interior weir box
- Interior roof stiffener
- Interior roof stiffeners
## Recommendations

<table>
<thead>
<tr>
<th>Location</th>
<th>Coating Recommendation</th>
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| **Exterior** | ♦ The existing coating on the tank shell and fluted pedestal appears to be suitable for overcoat based on coating adhesion, coating thickness and quantified percent of coating breakdown. The roof topcoat was estimated to be 65% delaminated from the underlying coat. Due to the exposed epoxy and percentage of topcoat delamination on the roof, the roof is not a candidate for overcoating and it should be removed and a new coating system applied.  
♦ Recommendation for overcoating of the shell and fluted pedestal should consist of spot repair of areas with corrosion and two additional full coats.  
♦ Existing coating does not contain lead, but containment may be required during coating removal and coating application.  
♦ Work should be conducted within one year to extend the coating service life. |
| **Interior Dry** | ♦ The existing coating is suitable for coating spot repair based on measured coating adhesion, coating thickness and quantified percent of coating breakdown.  
♦ Recommend spot coating repair on areas exhibiting corrosion (overcoat not recommended at this time).  
♦ Existing coating does not contain lead. |
| **Interior Wet** | ♦ Concluded the existing coating is not suitable for coating repair based on percent of coating breakdown.  
♦ Recommend removal of coating system and application of a new coating system.  
♦ The interior coating was not tested for lead.  
♦ Work should be conducted within one year to avoid further corrosion and metal loss. |
Tank Rehab

Roof stiffeners being blasted

Roof and shell in finish coat

Roof and access tube in finish coat
Tank 1\textsuperscript{st} Year Anniversary
Communication Plan
Communication Plan

Goals:

- Provide surrounding community and traveling public with timely, accurate, and complete information about the project.
- Inform, manage expectation, and provide accurate information about the project.
- Communicate early and often about the project.
- Engage stakeholders, and respond to concerns and questions in a timely manner (within 2 business days).
Communication Plan

Implementation:

- Community Meeting 2 weeks prior to the start of project.
- Fact Sheets
  - Project Description
  - Schedule
  - Milestones
  - Key Contact Information
- Website/Social Media
Communication Carriers

5 private carriers plus Town’s AMR equipment
Containment System

- Consists of textile tarps raised along a cable system.
- Ventilation system to force a controlled air current.
- Lowered during the non-working hours.
Construction Mishaps

- Diesel Fuel Spill
  - Asphalt repair
  - Stormwater system clean-up
  - Soil contamination
Construction Mishaps

Containment System vs. Thunderstorm
Construction Mishaps

Vehicle Accident
Acknowledgements

Jamie Revels, PE, Utilities Director, Town of Cary
Sam Tingler, Chief of Utility Sys. Mgmt., Town of Cary
Ken Schuster, PE, Project Manager, Retired