

# Get Ready, Set, Go!.... STOP!!!

## The Challenges with a Simple Rail Bridge Coating Project

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October 17 – 18, 2019  
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# Murphy's Law.....

- Die Tücke Der Dinge ("The perverseness of things")

**Murphy's Laws**

1. In any field of endeavor, anything that can go wrong, will go wrong.
2. Left to themselves, things always go from bad to worse.
3. If there is a possibility of several things going wrong, the one that will go wrong, is the one that will cause the most damage.
4. Nature always sides with the hidden flaw.
5. If everything seems to be going well, you have obviously overlooked something.

VIA 9GAG.COM

☘ ☘ ☘

**MURPHY'S LAW**

NOTHING IS AS EASY AS IT LOOKS  
EVERYTHING TAKES LONGER THAN YOU EXPECT  
IF ANYTHING CAN GO WRONG  
IT WILL GO WRONG  
...AND AT THE WORST POSSIBLE MOMENT.

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# The Project

- ***Polyurea*** specified for major Rail Bridge deck waterproofing
  - 2 steel decks, ~1,600 ft<sup>2</sup> each (150 m<sup>2</sup> each)
  - 2 concrete header decks, ~250 ft<sup>2</sup> each (24 m<sup>2</sup> each)
- Polyurea Specified at min average 120 mils (3 mm)
  - Applied over urethane based primer (8 - 10 mils, 200 – 250 μm)
- Abrasive Blast Steel (SSPC-SP 5 / NACE No. 1)
- Concrete Headers, SSPC-SP 13 / NACE No. 6, CSP 3 to 5
- Install pre-fabricated joint sections

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# The Project – Material & Timing

- ***Polyurea*** specified for major Rail Bridge deck waterproofing
  - 2 steel decks, ~1,600 ft<sup>2</sup> each (150 m<sup>2</sup> each)
  - 2 concrete header decks, ~250 ft<sup>2</sup> each (24 m<sup>2</sup> each)
- Polyurea Specified at min average 120 mils (3 mm)
  - Applied over urethane based primer (8 - 10 mils, 200 – 250 μm)
- Total of ~ **3,700 ft<sup>2</sup> (345 m<sup>2</sup>)**
- Material use: **318 gallon / 3 drum sets**
- Theoretical production spray time: **1,600 ft<sup>2</sup> / hour (145 m<sup>2</sup> / hour)**
  - Running 2 gals / min output (~ 4 liters / min)

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# Location of Rail Bridge Decks



“south-bound” deck location



Bridge replacement



“north-bound” deck location

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# The Challenges

- Work with the local DOT and their schedule
- Work with the Rail company, and their train schedules
- Work with the General Contractor
  - Schedules and work was very “fluid” .....
  - Weather delays
- Work with the Polyurea Contractor
  - Mobilization: Elgin – Fort Worth – North Dallas, Texas

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# First Mobilization

- First of August 2018
- One day preparing spray equipment for work
- Abrasive blasting for 2 days, < half deck done... Why????
  - Spec'ed SSPC-SP 5 ??? Weathering steel???? Adjusted to SSPC-SP 10
- Applied to “South-bound” bridge deck
  - Achieved min DFT requirements
  - Achieved min Adhesion requirements
- Application took 1.5 hours, done for this mobilization
  - Does not include waiting / standby time, that was all day (Murphy)....

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# First Mobilization



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# First Mobilization



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# Second Mobilization

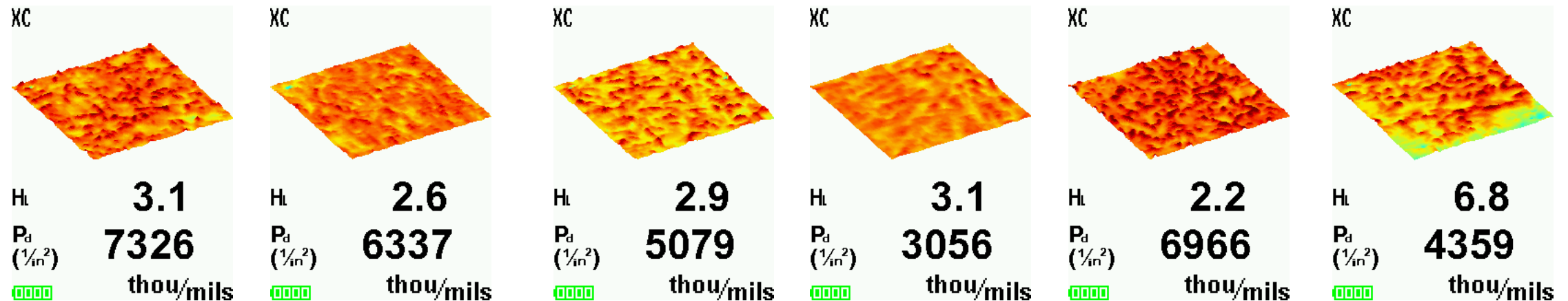
- End of August 2018
- Abrasive blasting went very well this time.....
  - Adjusted to SSPC-SP 10
  - Achieved min surface profile, and cleanliness
- Applied to “North-bound” bridge deck and concrete headers
  - Achieved min DFT requirements
- Application took 2.5 hours, done for this mobilization
  - Does not include waiting / standby time, that was all day (Murphy)....

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# Surface Profile Measurements

- **ASTM D 4417 / SSPC-PA 17 / NACE RP 0287-2016**
- DeFelsko PosiTector ADV Body, s/n 731896 / PosiTector RTR-P, s/n 247342, Testex Press-O-Film HT X-course



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# Second Mobilization - Completed Log Files

**Primeaux Associates LLC**  
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 Polyurea@flash.net

**Quality Control Daily Report Log**

Date: 21-22 Aug 2018 Qualified Applicator: Mobile Enterprises Inc  
 Project Description: US 75 Rail Bridge Coating  
- North bound side deck, and two concrete deck  
headers - bridge header  
Continuation of 7-8 August log Report

**I. Environmental Conditions:** ASTM E 337  
 Temperature ADV of DPM ADV of W 173/196  
 DPM W 295/404

Time of Day	Temp °F	Relative Humidity	Wind Velocity	Substrate Temp, °F	Substrate Moisture	Dew Point
8/21 1:45 am	95°F	34%		90°F	4%	65°F Binding
8/21 10:30 am	90°F	34%		96°F		69°F Spray Comm
11:30 am	93°F	45%		106°F		69°F 1:30 Si.
8/22 1:45 pm	97°F	34%		109°F		65°F

Finish @ 2:40 PM

Description of general weather conditions: Sunny, light wind

**II. Substrate Preparation:**

Substrate: \* Weathering Steel \* Square Footage: Bridge #2 - East side/4th bound  
 Equipment: 12/10 Blast bench Air Pressure: \_\_\_\_\_  
 Surface Preparation Standard: min SSPC-SP10  
 Surface Profile: 2.3-6.6 - Profiled ADV 8/1 731596 /RTR-P 3/1 249342  
 General Comments: Removed all old film tapes and 3-D output of profile  
ASTM D 4419 SSPC-PA10 DABE RPO201-102 - Reference  
Blast profile expanded based upon size & type of grit - 16/40  
and type of steel  
- 2 concrete decks also spray - bridge header

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**III. Primer Application:**

Primer System: Bridge Preservation - MultiPrime - Fast  
 Lot / Batch number: N/A  
 Application Technique: rolled - added some acetone  
 Amount Used: not reported  
 General Comments: N. Bound deck primed 21st Aug. Both concrete  
deck areas primed morning 22nd Aug.  
- Good!

**IV. Polyurea System Application:**

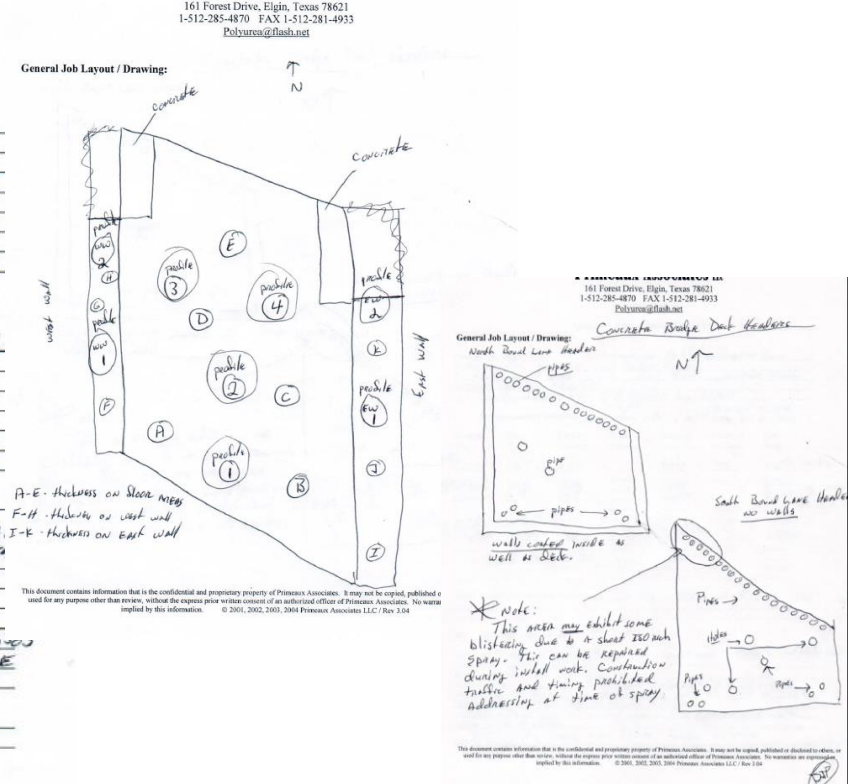
System Used: BDM Bridge Deck Membrane ISO 54041.2  
RES 54041.3  
 Lot / Batch Number: ISO-040518-04/512/08 RES-050118-3B VF1539 Orange 5/12/08  
 Application Equipment Used: GRACE H-XP3 TJS/TE  
 Spray Gun: GILACO/GlasCoast P2  
 Mixing Chamber: O2 Spray Tip: O2 insert  
 Processing Temperature: Primary: ISO: 160°F Resin: 160°F Hose: 160°F  
 Spray: 2700 / 2400 ISO: 1600 / 1400 RES: \_\_\_\_\_  
 Processing Pressure: Static: \_\_\_\_\_  
 Application Thickness: Method Used: ASTM D 7091, Type 2

Value (mils / mm)	Approximate Location
<u>115-135</u>	<u>random, not to spec - PA I-E thickness on east wall</u>
<u>120 + 140</u>	<u>Floor Area - 5 spots</u>
<u>120 + to 135</u>	<u>East Wall - 3 spots</u>
	<u>West Wall - 3 spots</u>
	<u>DEFALGO Positioning ADV 731596 / 6000 PRIME</u>
	<u>used 98.62 ml shim to assist</u>

**Adhesion Testing:** Method Used: Not Tested  
 Adhesion Test Unit: \_\_\_\_\_ Adhesive: \_\_\_\_\_

Value (psi / Mpa)	Failure Mode / Comments

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# Second Mobilization



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# Third Mobilization

- First of October 2018
- To Install the “South-bound” bridge section
- Spent all day waiting for original bridge section to be cut out
  - Of course, said would have it out by time ready to spray install joints
  - We were READY!
  - Spray was only to be ~ 50 ft<sup>2</sup> (4.6 m<sup>2</sup>)
- Finally told would be 2 more days, mobilization  **canceled!**

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# Fourth Mobilization

- Mid November 2018
- Installed the “South-bound” side bridge section
- Modified “joint area installation” by hand
  - Spray polyurea application not “available”
  - Approved changed to spec by Rail company and supplier
- South-bound section completed, train traffic resumed

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# Fifth Mobilization

- Mid January 2019
- To Install the “North-bound” side Bridge section
- Arrived by noon, bridge section not in place till 8:00 pm
  - Hurry up and wait.....
- And then Murphy’s visit...
  - Whip hose plugged on ISO-side, no spare whip...
  - Removed whip, re-arranged electrical and air
  - Spray gun not working.....
  - All fixed, now ready to spray the  $\sim 50 \text{ ft}^2$  ( $4.6 \text{ m}^2$ ).....

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# Fifth Mobilization



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# The Pre-Fab Joints did not Fit!!!

- Uncle Murphy's last visit of the project....
- Design drawings did not match to placed bridge section
- Fabricate some special plates, wait on welders.....
- Dallas Cowboys playoff game on.....
- Lot's of tension.....
- But, got it done, covered and ballast, rails set and train traffic resumed....

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# Fifth Mobilization



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# But The Results!

## Protective Solutions Span Railway Overpass

By Stephanie Marie Chizik

Plano, Texas, a city just north of Dallas (USA), is home to many businesses, including Frito-Lay, Dr. Pepper/Snapple Group, and Cinemark movie theaters. Transportation in the city of ~286,000 includes air and ground, moving people and goods all over the world.

This movement of goods is helped by the Kansas City Southern (KCS) Railway (Kansas City, Missouri, USA), which owns and operates rails over the United States and Mexico, including a freight section in Plano over Interstate 75 that carries goods. Without a sound platform for the rail to cross, those goods could be disrupted.

To update the overpass, the Texas Department of Transportation chose to replace two spans on either side of a center span. The east and west spans, which total 2,925 ft<sup>2</sup> (272 m<sup>2</sup>), were prepped and painted individually, enabling the rail to



A crew from Mobile Enterprises Inc. was surprised to see weathered steel on two new spans for a rail overpass project in Plano, Texas. Sandblasting to prepare took much longer than expected. Photo courtesy of Mobile Enterprises, Inc.

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INFRASTRUCTURE INSIGHTS

stay online for as much time as possible. First, the east span was to be removed, moved to the side to be worked on, and then replaced. Second, the west span would be worked on in a similar fashion. All of the repairs were to be done by a crew from Mobile Enterprises Inc. (MEI) (Fort Worth, Texas, USA), but they had only four days to work on each span!

### Surprising Substrate

In any coating job, the first step is to prepare the surface. This part was anything but normal, though.

The 10- to 14-person MEI team was in or a big surprise. When the crew members arrived on site, they saw that the substrate was actually weathered steel, which takes a significantly longer time to blast. "It is a very, very time consuming and difficult task," says Derek Scheiblich, VP of Field Operations for MEI. "It took about four to five times longer than I had anticipated because we did not know it was weathered steel prior to bidding it," Scheiblich says.

Not only did the project require more time, it also required more materials. The crew up top blasted Black Beauty coal slag Seven Fields, Pennsylvania, USA with a free-bag pot from Clemco (Washington, Missouri, USA) and a 185 compressor, but he crew members down below had to keep the material coming. "If it was regular steel, it wouldn't have been an issue, but we had guys going in flatbed trucks just to pick up pallets of blasting grit. Three pallets at a time weight-wise was what we could carry on them," Scheiblich explains.

Despite MEI's objection, the coating manufacturer instructed the crew to blast the steel to achieve NACE No. 2/SSPC-SP 10, "Near-White Metal Blast Cleaning." The blasters wore blast hoods with supplied air, while the crew members feeding the pot below wore respirators.

"It was a major challenge," says Scheiblich. "We had very limited operational area and then of course we had to sandblast the entire steel deck and the side walls."

Access to the site was limited, which meant the MEI crew had just enough room to squeeze their truck into the dirt median between the road and freeway. But the top of the general contractor (GC)-supplied containment was open, which meant that there was still risk for



To hold the blast, the crew immediately applied a thin layer of Bridge Preservation's Multi-Use Primer FAST using squeegees and rollers. Photo courtesy of Mobile Enterprises, Inc.

overspray escaping. Scheiblich had the crew cover their truck and trailer during that stage of the job, but he later learned that they must have forgotten to protect the windshield. Back in the shop days after the polyurea was applied, he hopped in the truck to move it, turned the wipers on, and was surprised by a not-so-nice noise. "I got out there and saw all these orange dots," he said. Luckily, the polyurea overspray came off easily with a razor blade.

### Around the Clock

As each piece of steel was prepped, the crew came in quickly to apply the primer to hold the blast. "I think they went 20 something hours. The priming didn't take any time at all, it was the sandblasting. That was like around the clock, different guys going nonstop and picking up more black grit," he said. The coating manufacturer's rep even got in on the action to help speed up the process. On days when it rained, they delayed work.

The crew used Bridge Preservation's (Kansas City, Kansas, USA) Multi-Use Primer FAST, which was applied to an average of 400 ft<sup>2</sup> (37 m<sup>2</sup>) per gal (4 L). It was ribboned out, squeegeed and backrolled on the deck, and rolled up the side walls. Because it was applied so thinly, the crew couldn't use wet film thickness gauges to

confirm thickness. "Usually, we're in 100 to maybe 125 ft<sup>2</sup> [9 to 12 m<sup>2</sup>] per gal so they're comfortable with that, and that's normal. But 400 ft<sup>2</sup>, I think they'd measure it off just to make sure they were really close to that ballpark because you're not supposed to put it on thicker than that," Scheiblich says. "Thicker is not better."

Wearing full-face respirators with tear-off lenses, gloves, and rags to help avoid any overspray in their hair, the crew members covered the primer with polyurea. That came in a "nice lovely orange," according to Scheiblich. Welding a Graco pump and 300-ft (91 m) hose, the crew spray applied Bridge Preservation's Bridge Deck Membrane to an average of 120 mils (3,048 µm). The MEI crew coordinated with the GC and others that the area was to be kept clear, especially during this step. "That area was ours; we established that ahead of time," Scheiblich says.

Because rock and tracks were to be installed on top of the polyurea, something needed to protect the coatings. On this project, that protection was 1/2-in (1 cm) asphaltic board. At 104 lb (47 kg) a piece, each 4-ft by 8-ft (1 m by 2 m) board was laid down from a pallet on a SkyTrak unit (Cedar Grove, Wisconsin, USA). They also ran the boards up the walls, using adhesive so they wouldn't fall before the ballast was installed.



The Bridge Deck Membrane, protective polyurea was applied to an average of 120 mils (3,048 µm). Photo courtesy of Mobile Enterprises, Inc.



The polyurea needed to be protected before rocks and rail were installed on top. The crew used 1/2-in (1 cm) asphaltic board on the vertical and horizontal surfaces. Photo courtesy of Mobile Enterprises, Inc.

As someone who used to work in the field, Scheiblich is open to ideas from his on-site crew members. Not all solutions

can be used on every job, especially if they have to be completed to spec, but he's open to any idea to make the project

more efficient. "Somebody could be driving down the road and they're thinking about it, and boom they're the next Einstein," he says.

### Solutions Spanned

When the east span was completed, it had to be jacked up and put in place. "The first one went south," Scheiblich says succinctly of that span. The new section fit to the center piece but not to the approach, which meant that the GC needed to complete a lot of unexpected work to make it fit. According to Scheiblich, it was about 6 in (15 cm) off.

MEI helped by creating a makeshift joint using a sheet membrane while the GC decided what the long-term solution would be. That enabled the GC to "get the ballast put back in, the track put back in and opened, and then go back to the drawing board to figure out what they were going to do to get that thing jacked back up and set in the proper place," Scheiblich says.

Several weeks later, a plan was devised. The GC jacked the span back up, enabling MEI to go in and install the Bridge Preservation's Articulus Bridge Deck Expansion Joints that had originally been specified.

"They had experienced all these problems on the first span," Scheiblich explains. "They were ready for them on the second span, so that went smoother."

The teamwork, dedication, and flexibility of MEI helped to keep this project on task. "When you kind of look at it from afar, it seems really simple, well, there's not much to this; you sand blast it, you prime it, and you coat it," Scheiblich explains. But in reality, that sandblasting threw "something in the gears; it just ground everything to a halt there for a while and extended the length of the project and hours we had to work," he continues.

The crew kept the project moving forward. "They're an outstanding bunch of guys, and we've been working together for a pretty good while," Scheiblich says. Some of the more seasoned crew members have worked at MEI for 25 to 30 years, and Scheiblich says even the newer guys are go-getters. "They really get out there, they got it done," he says. "They're just an excellent bunch of guys." ||

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# Conclusion

- Be aware, even with proper specification, **The Best Laid Plans:**
  - the futility of making detailed plans when the ability to fully or even partially execute them is uncertain.....
- Quality Contracting company adapted to a fluid situation.....
  - “Endeavor to persevere”
    - Chief Dan George (Lone Waite), The Outlaw Josey Wales
  - Experience, dedicated crew
- Spraying was the easy part....

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Thank You!

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