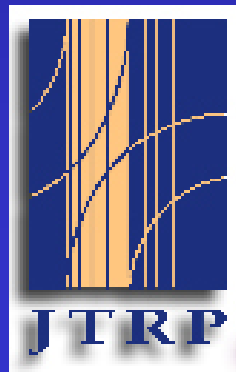


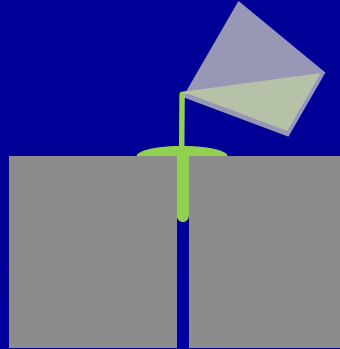
Evaluation of Bridge Deck Sealers

Robert J. Frosch, PhD, PE
Michael E. Kreger, PhD, PE

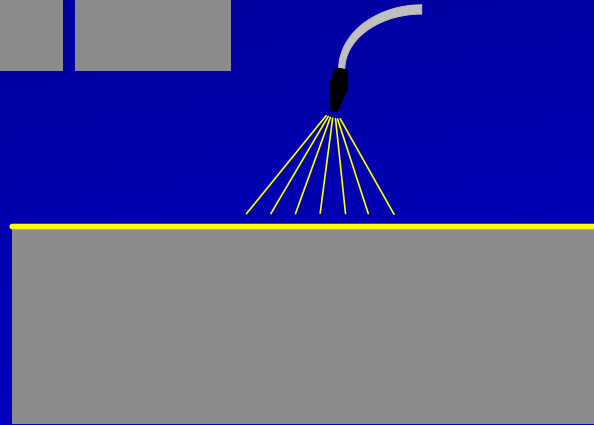


Sealing Methods

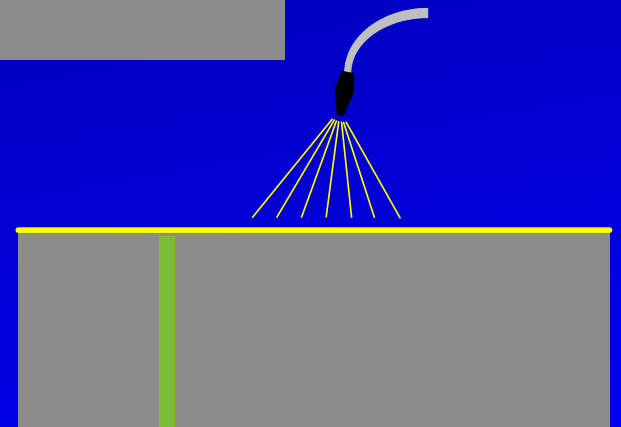
- Crack Sealing



- Deck Sealing



- Crack and Deck Sealing



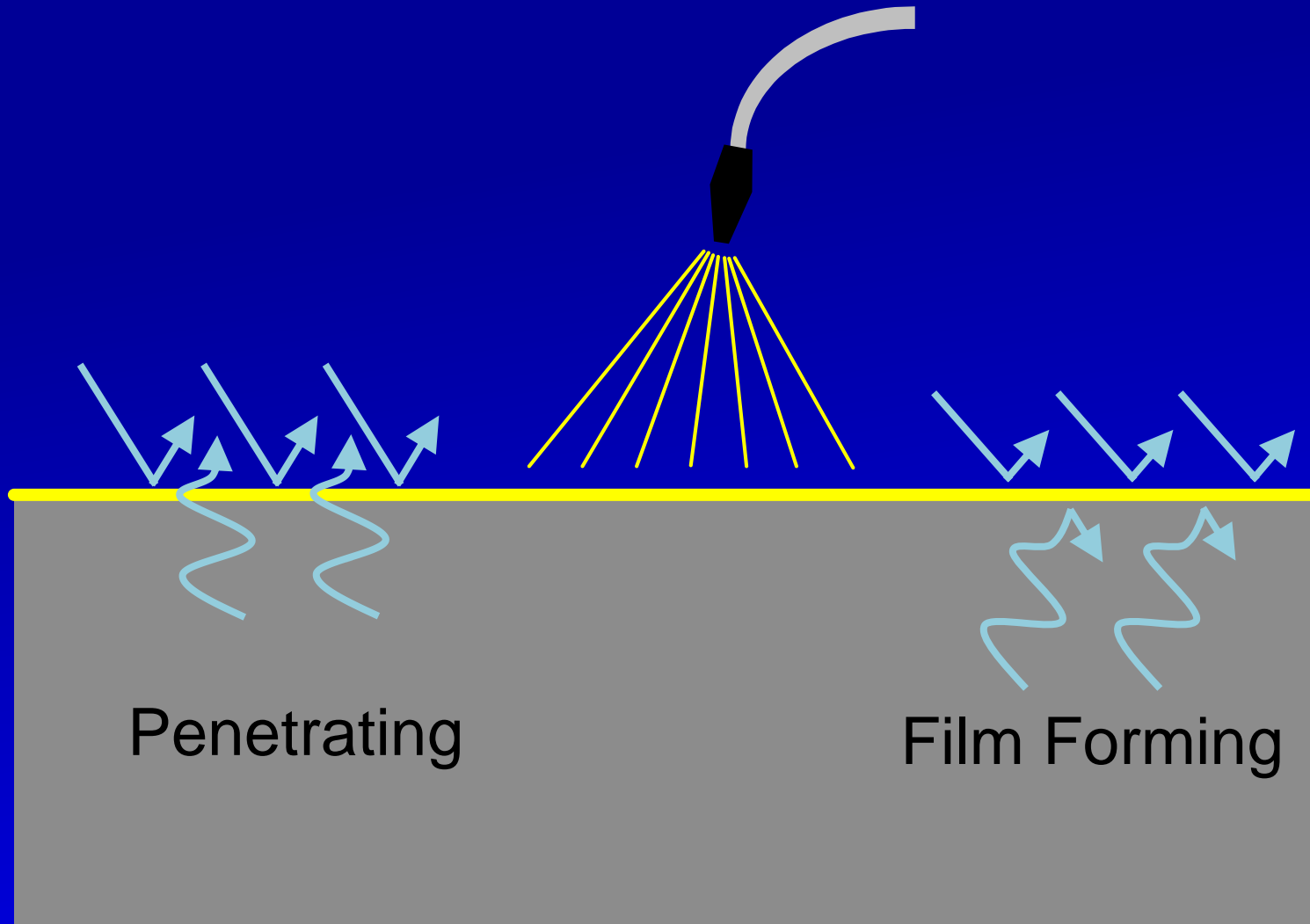
Crack Sealers

- Epoxy and methacrylate most popular
- Epoxy stronger, more durable
- Methacrylate less viscous
 - deeper penetration

Deck Sealers

- Flood coat of epoxy, methacrylate, linseed oil, silane, or siloxane
- Silane and siloxane best performing
- Solvent based and higher percent solids generally better

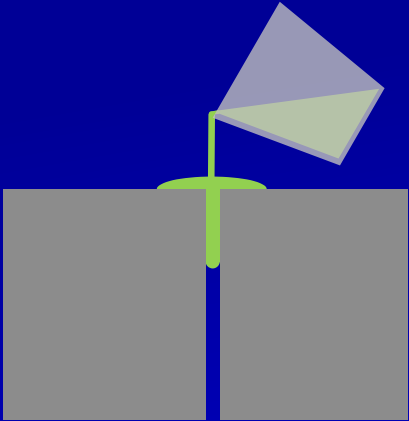
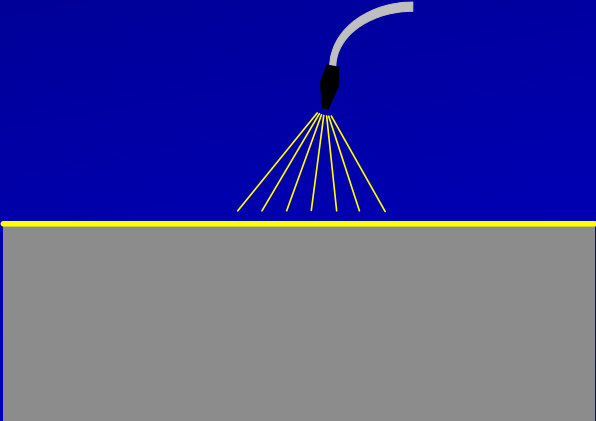
Deck Sealers



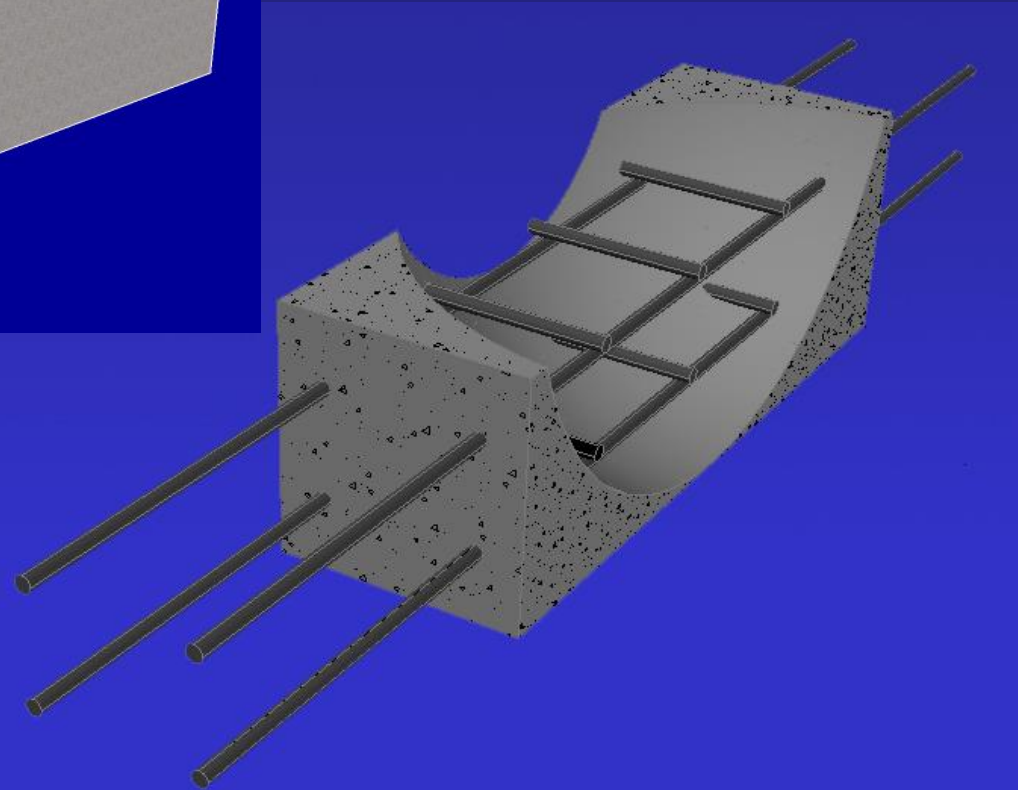
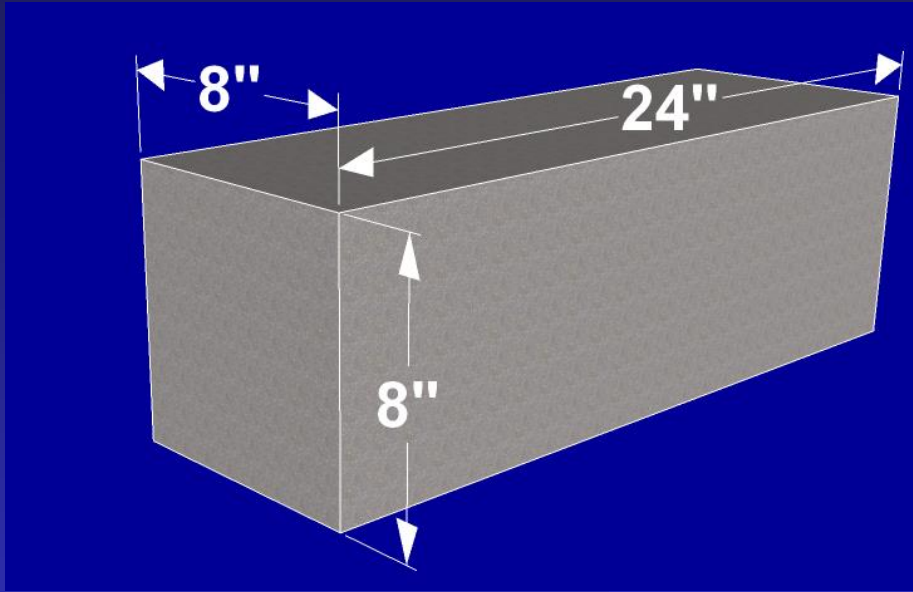
Objective

- Evaluate effectiveness
 - products
 - application/reapplication
- Extend bridge deck service life

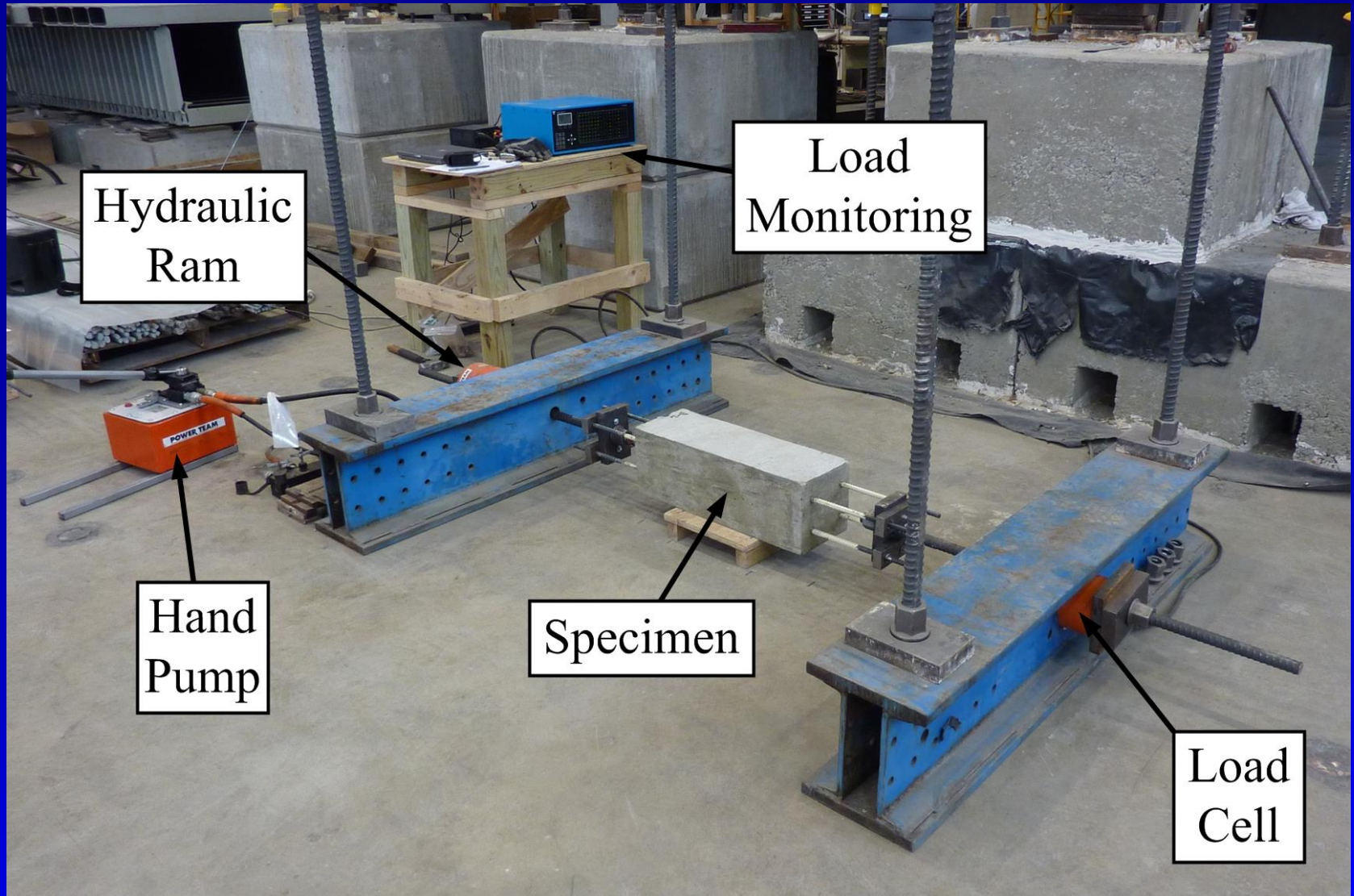
Products

| Crack Sealers | Deck Sealers |
|---|---|
|  A diagram showing a grey concrete block with a vertical crack. A green liquid is being poured from a grey funnel into the crack, filling it. The liquid is shown both inside the crack and on the surface above it. |  A diagram showing a grey concrete block with a yellow horizontal line on its top surface. A grey spray nozzle is positioned above the surface, spraying a yellow liquid in a fan shape onto the concrete. |
| Sikadur 55 SLV (epoxy) | Hydrozo Silane 40 VOC (silane, solvent) |
| Dural 335 (epoxy) | Enviroseal 40 (silane, H ₂ O) |
| Degadeck Crack Sealer Plus (methacrylate) | Linseed Oil |

Purdue Macrocells



Specimen Cracking

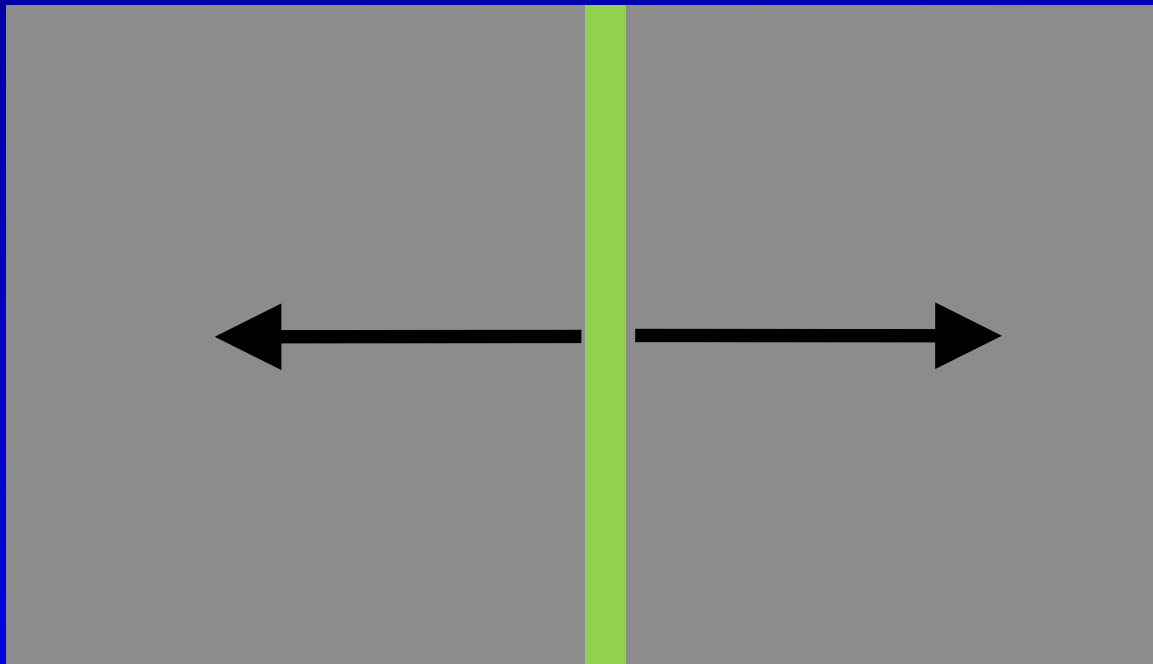


Crack Sealer Application



Service Load Stress

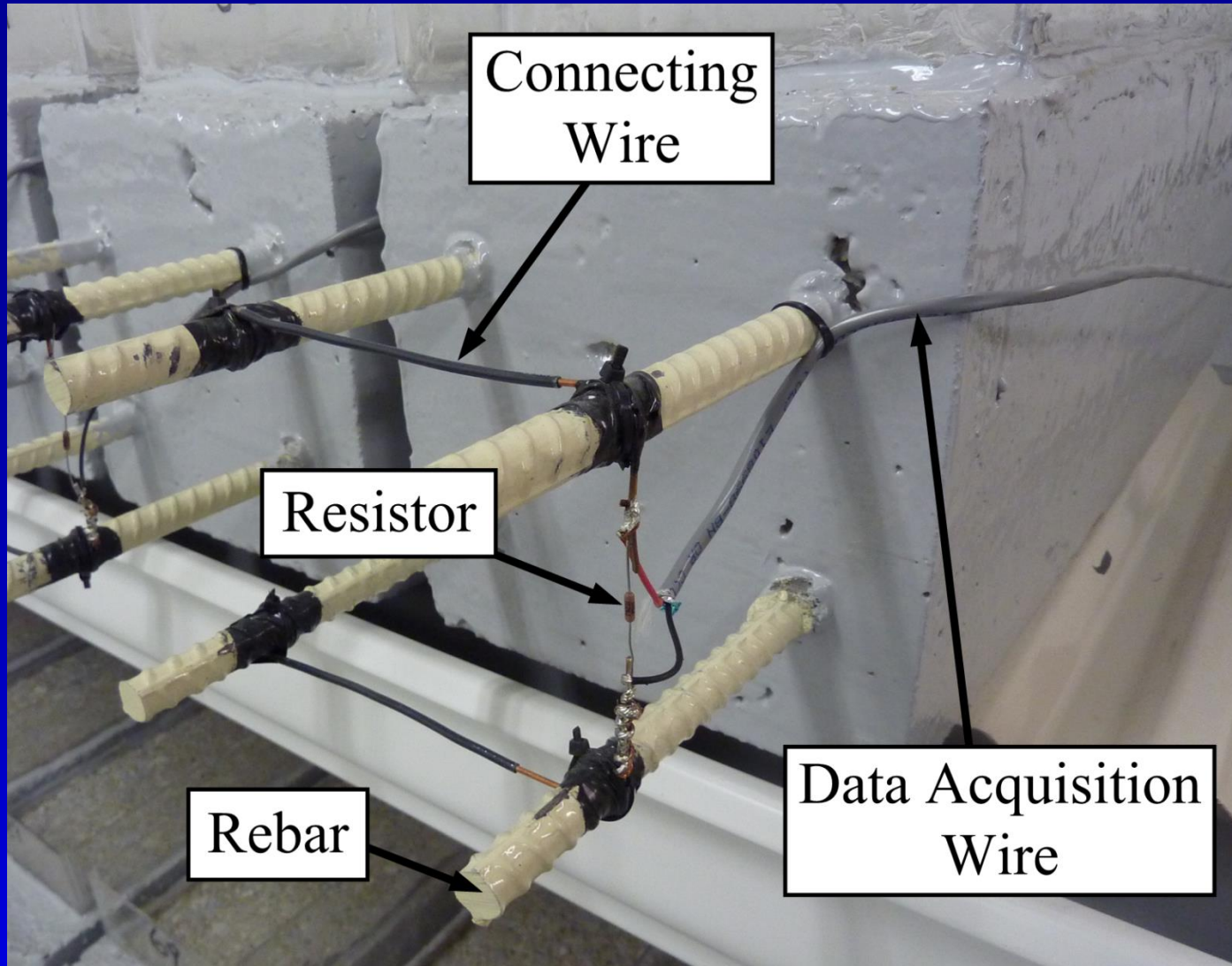
- Simulate stress in deck caused by traffic
- Restress specimens to $\sim 2/3 f_y = 40$ ksi



Restressing



Testing



Sealant Combinations



Uncracked

Deck
Sealer



Cracked

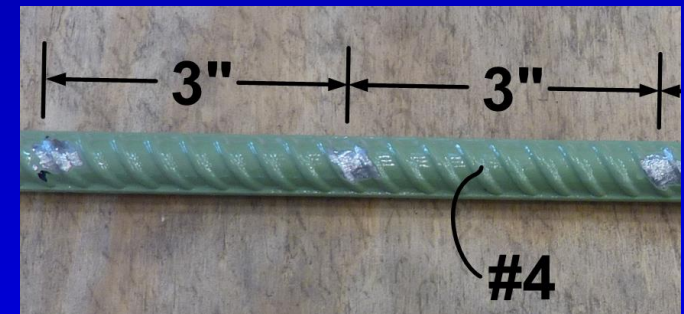
Crack
Sealer
Only

Crack
and
Deck
Sealer

Deck
Sealer
Only

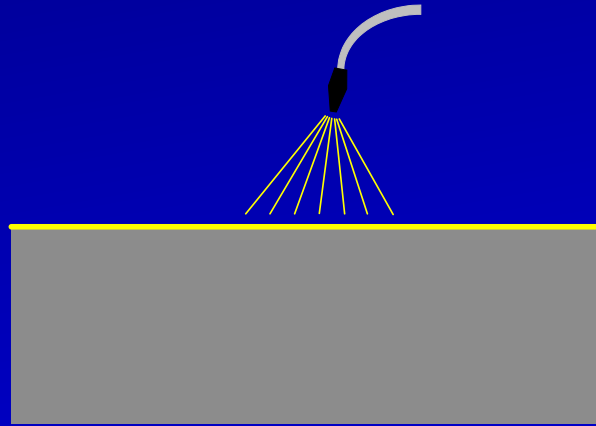
Additional Test Variables

- Surface Preparation
 - Before applying sealer, as per manufacturer's recommendations
- Resealing Intervals
 - “traffic wear” both pre- and post-application
- Epoxy-Coated Reinforcement
 - 2% induced damage
- Surface Tining

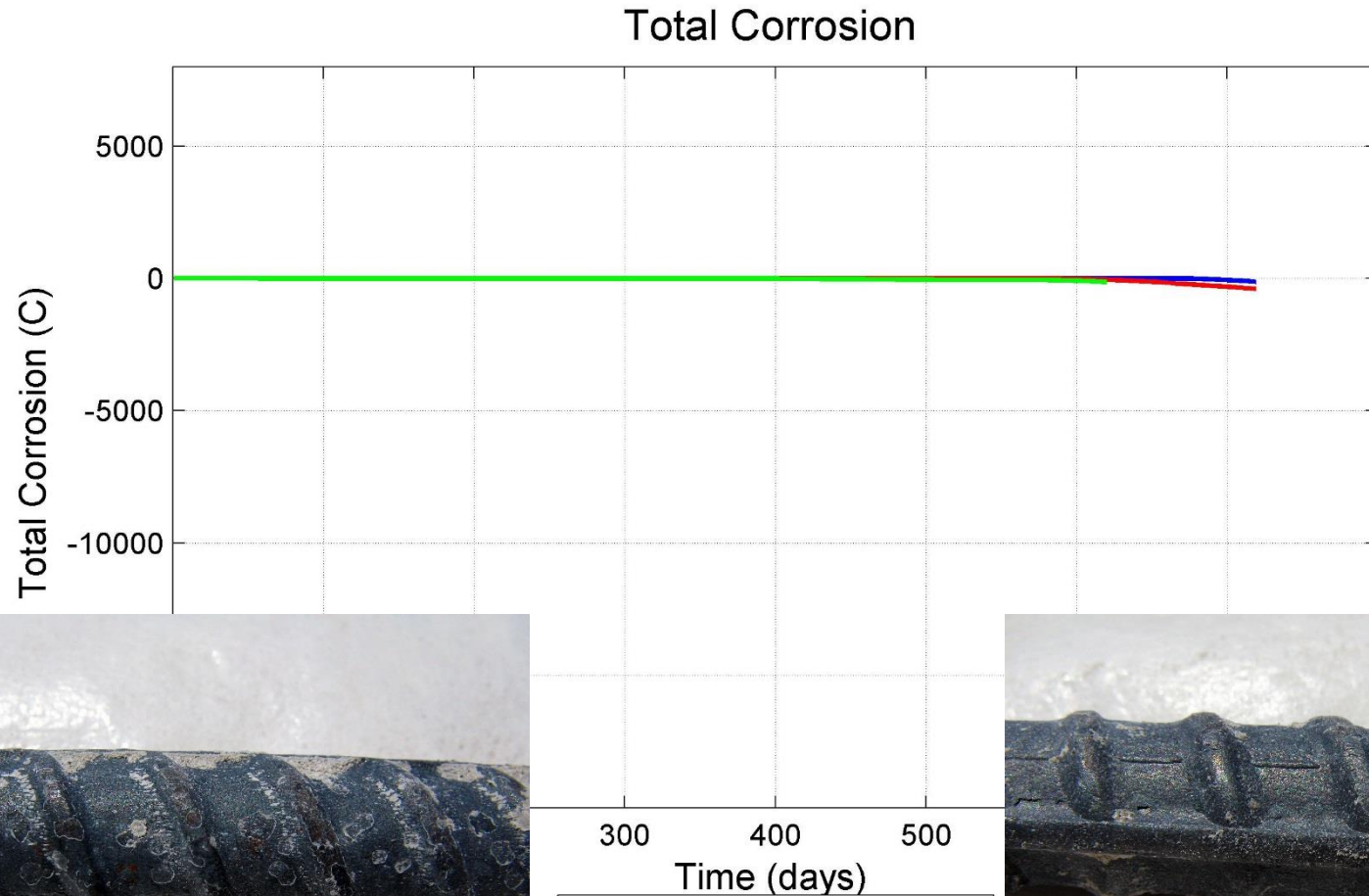


Uncracked Specimens

Evaluate Deck Sealers

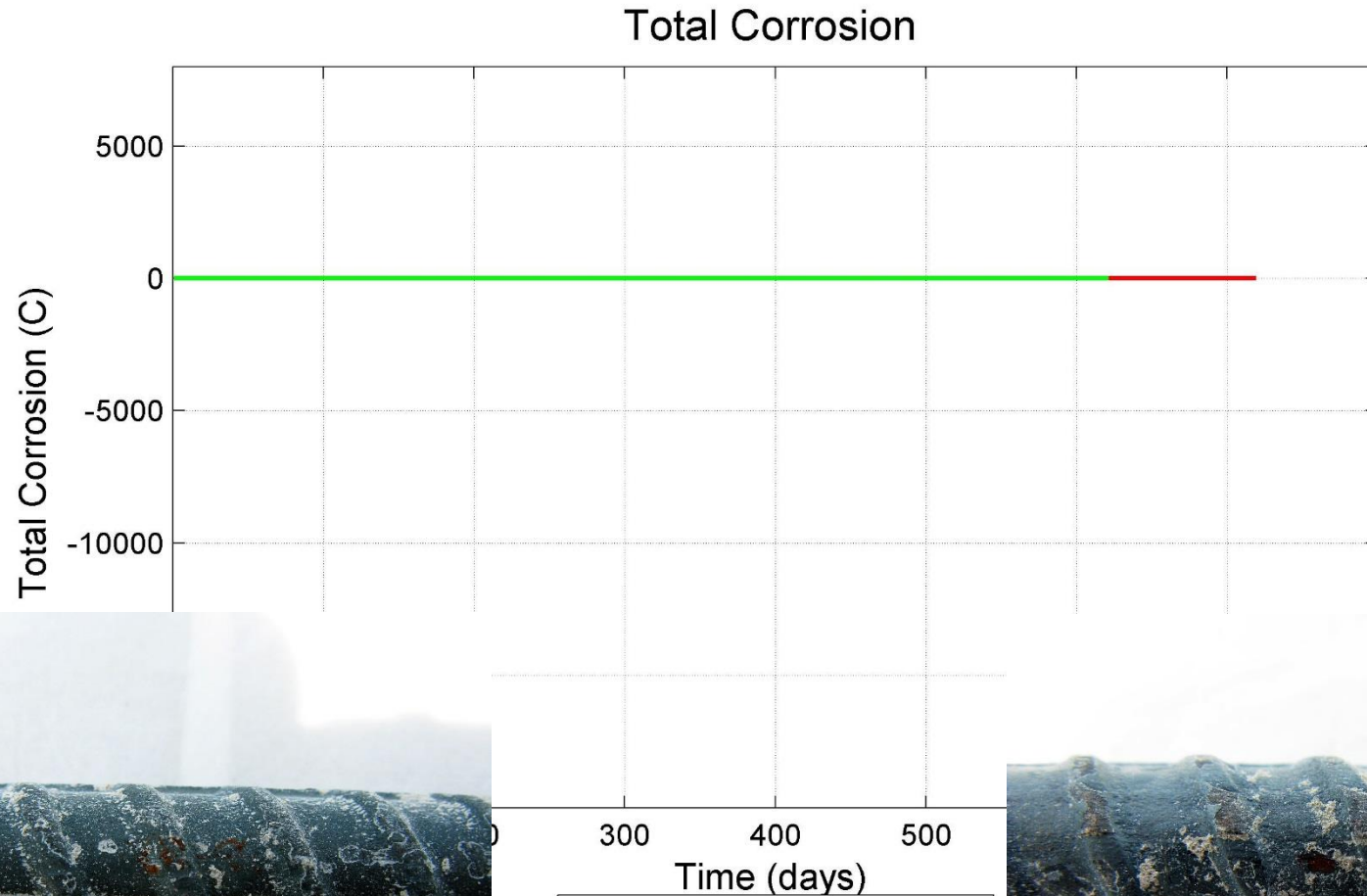


Control



- G23 Specimen1 (#90)
- G23 Specimen2 (#91)
- ★ G23 Specimen3 (#92)

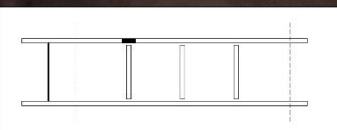
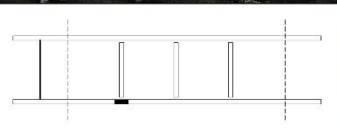
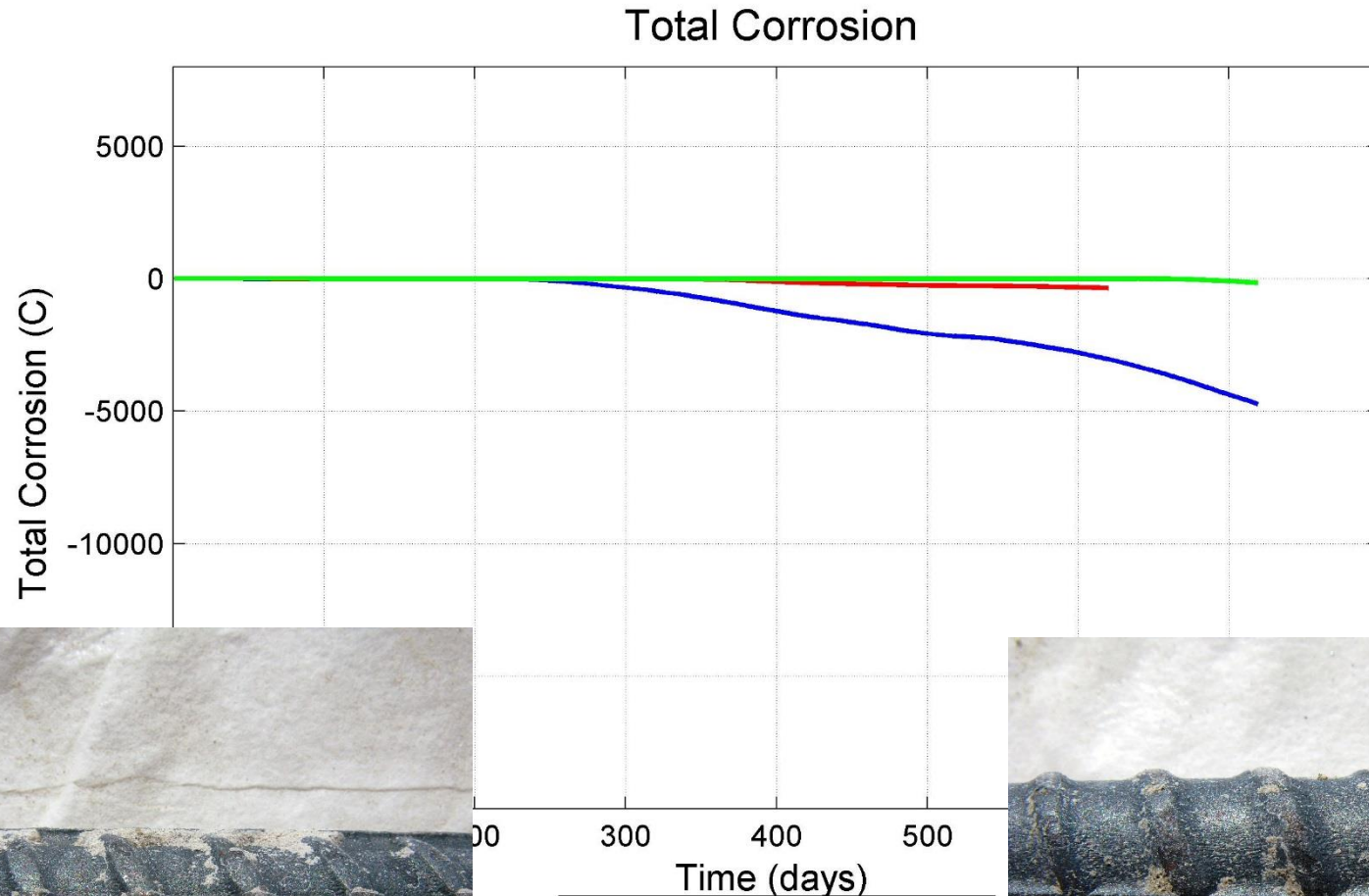
Silane



Traffic Abrasion

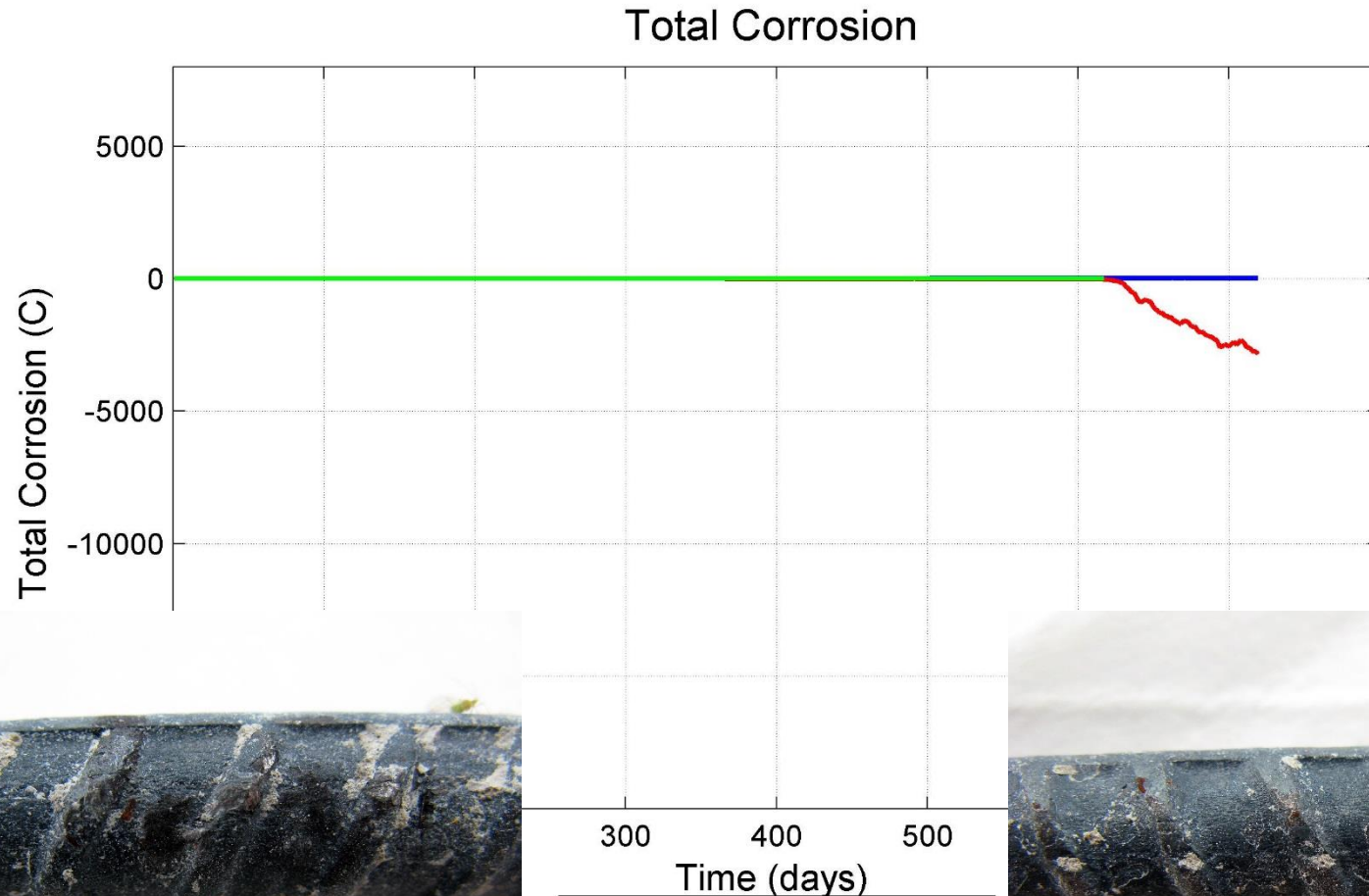


Control - Sandblasted



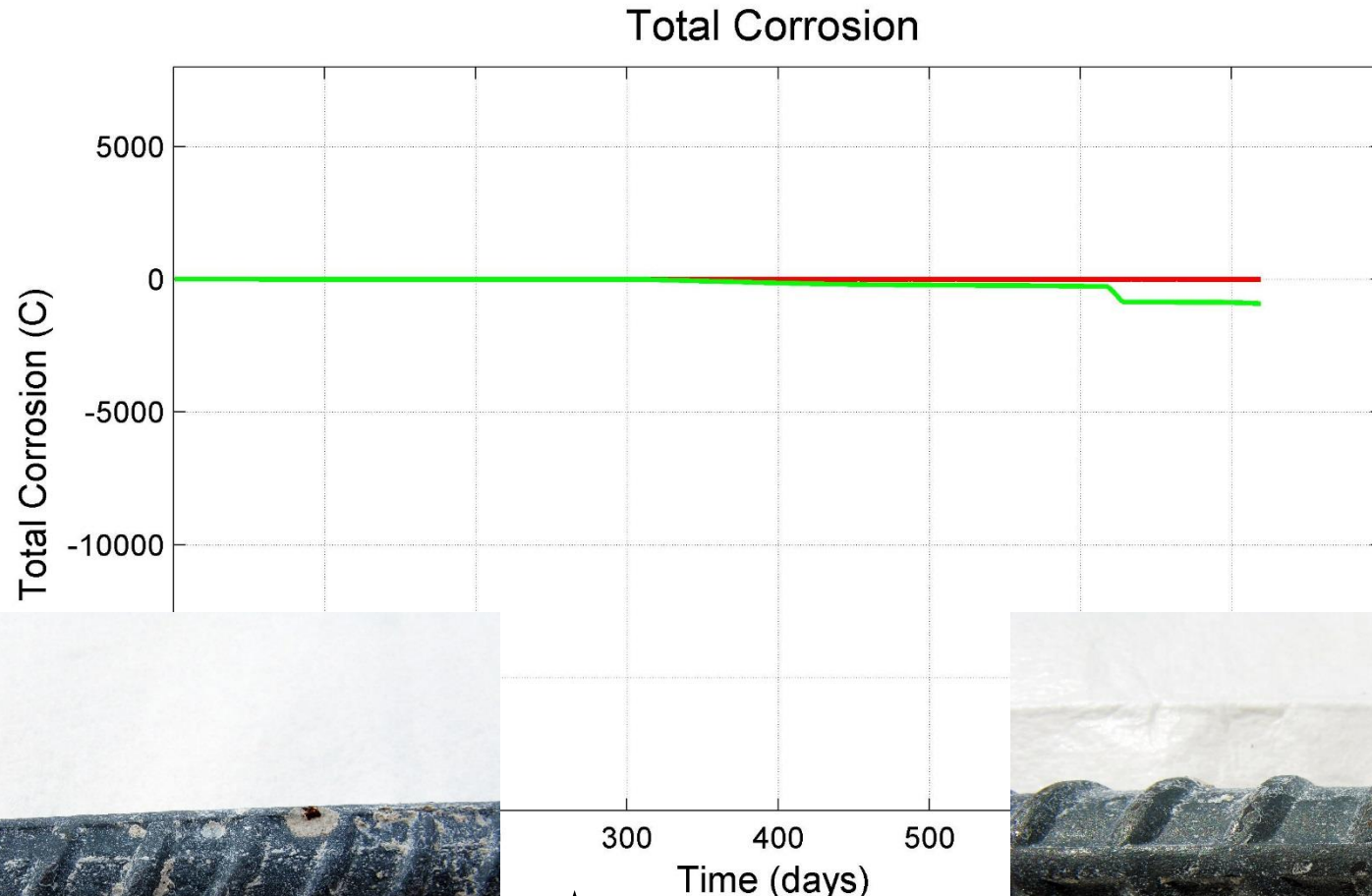
- G30 Specimen1 (#69)
- ★ — G30 Specimen2 (#70)
- G30 Specimen3 (#71)

Silane: Sandblast then apply



- G24 Specimen1 (#72)
- G24 Specimen2 (#73)
- ★ G24 Specimen3 (#74)

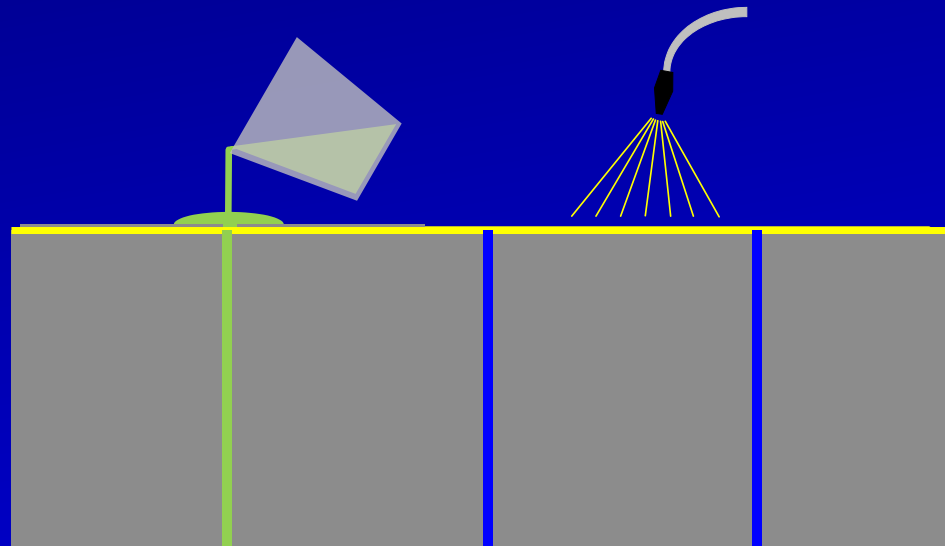
Silane – Apply then sandblast



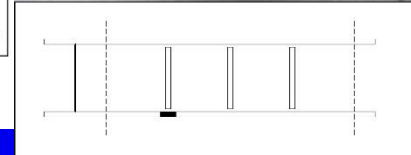
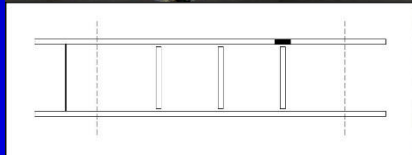
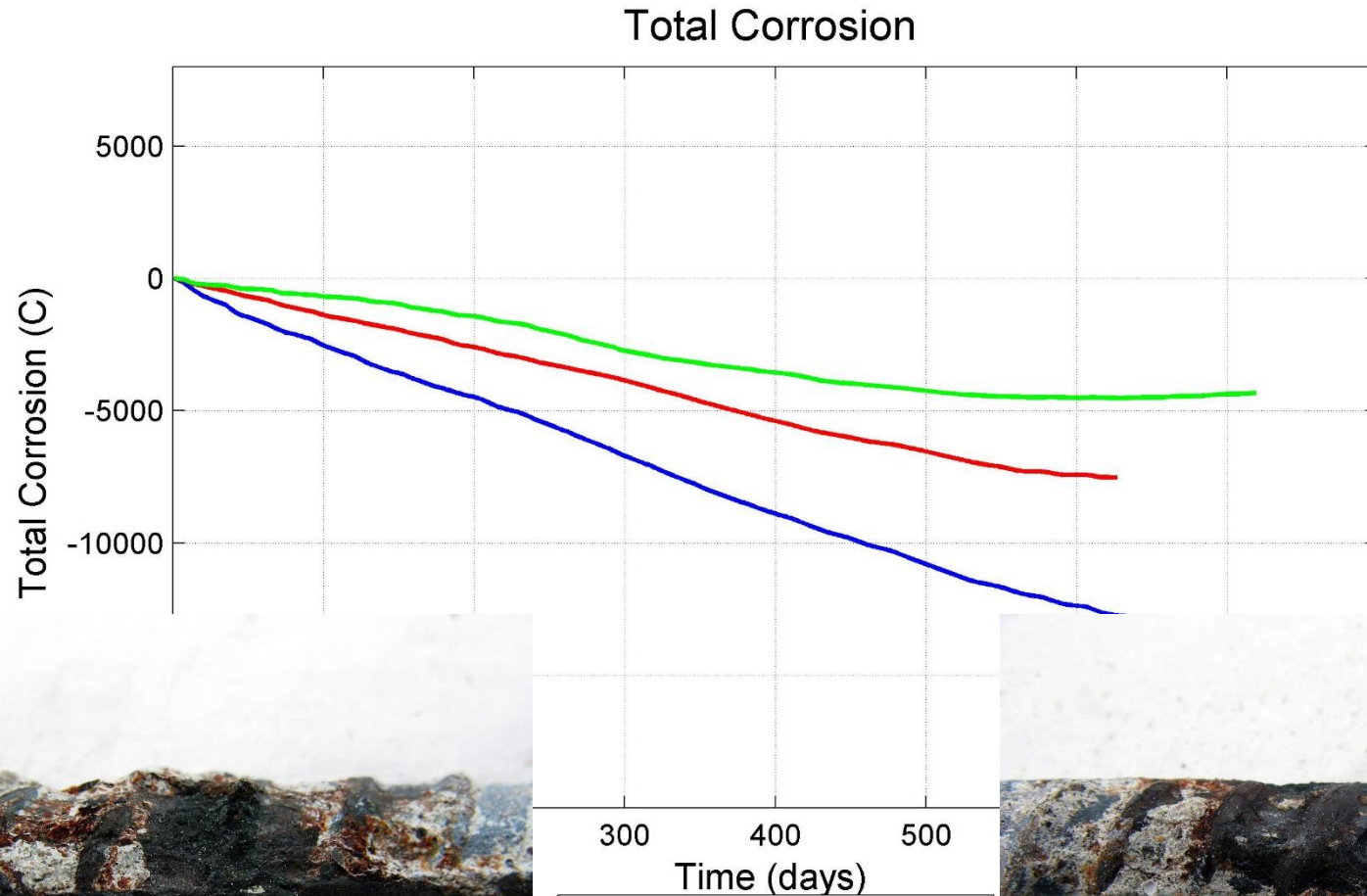
- ★ G28 Specimen1 (#84)
- G28 Specimen2 (#85)
- G28 Specimen3 (#86)

Cracked Specimens

Evaluate Crack & Deck Sealers

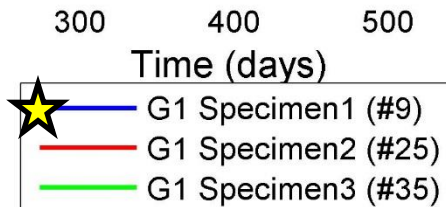
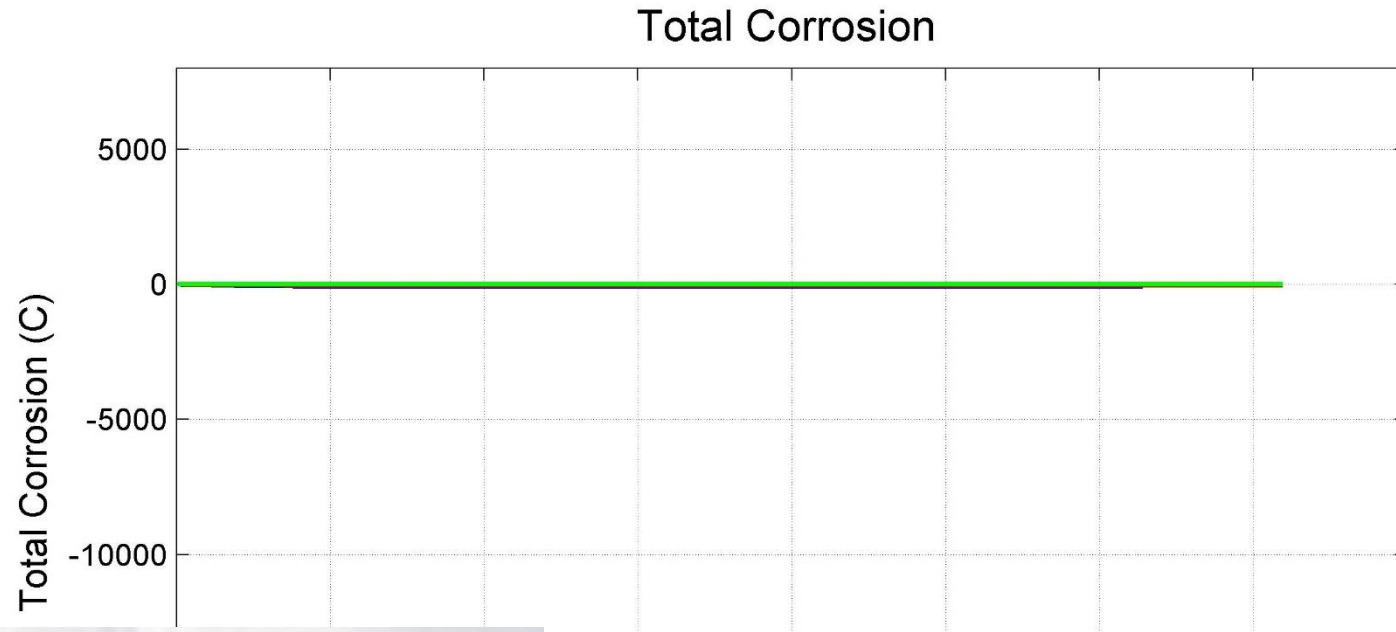


Control – No repair

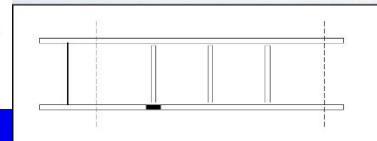
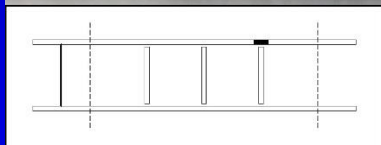
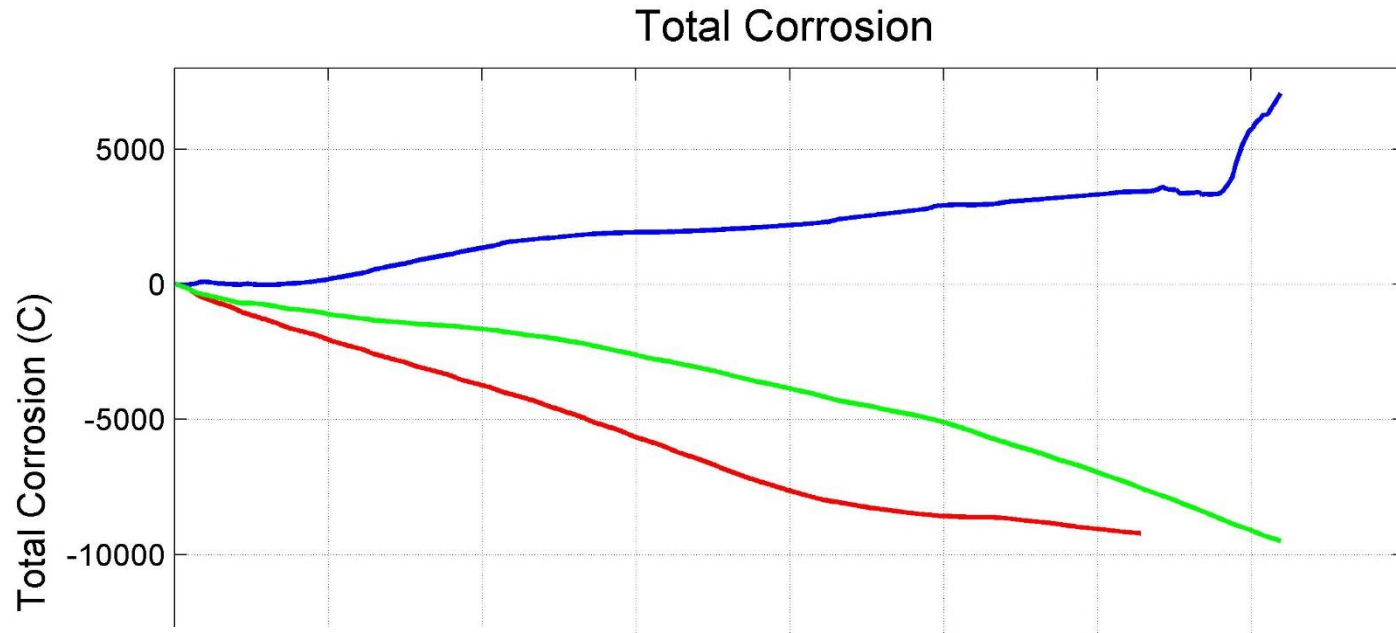


- G11 Specimen1 (#22)
- ★ G11 Specimen2 (#44)
- G11 Specimen3 (#48)

Sikadur 55SLV



Hydrozo Silane 40VOC

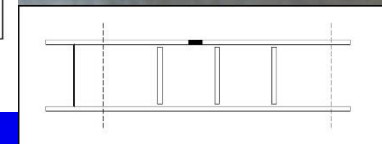
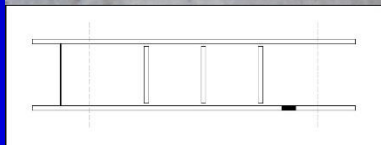
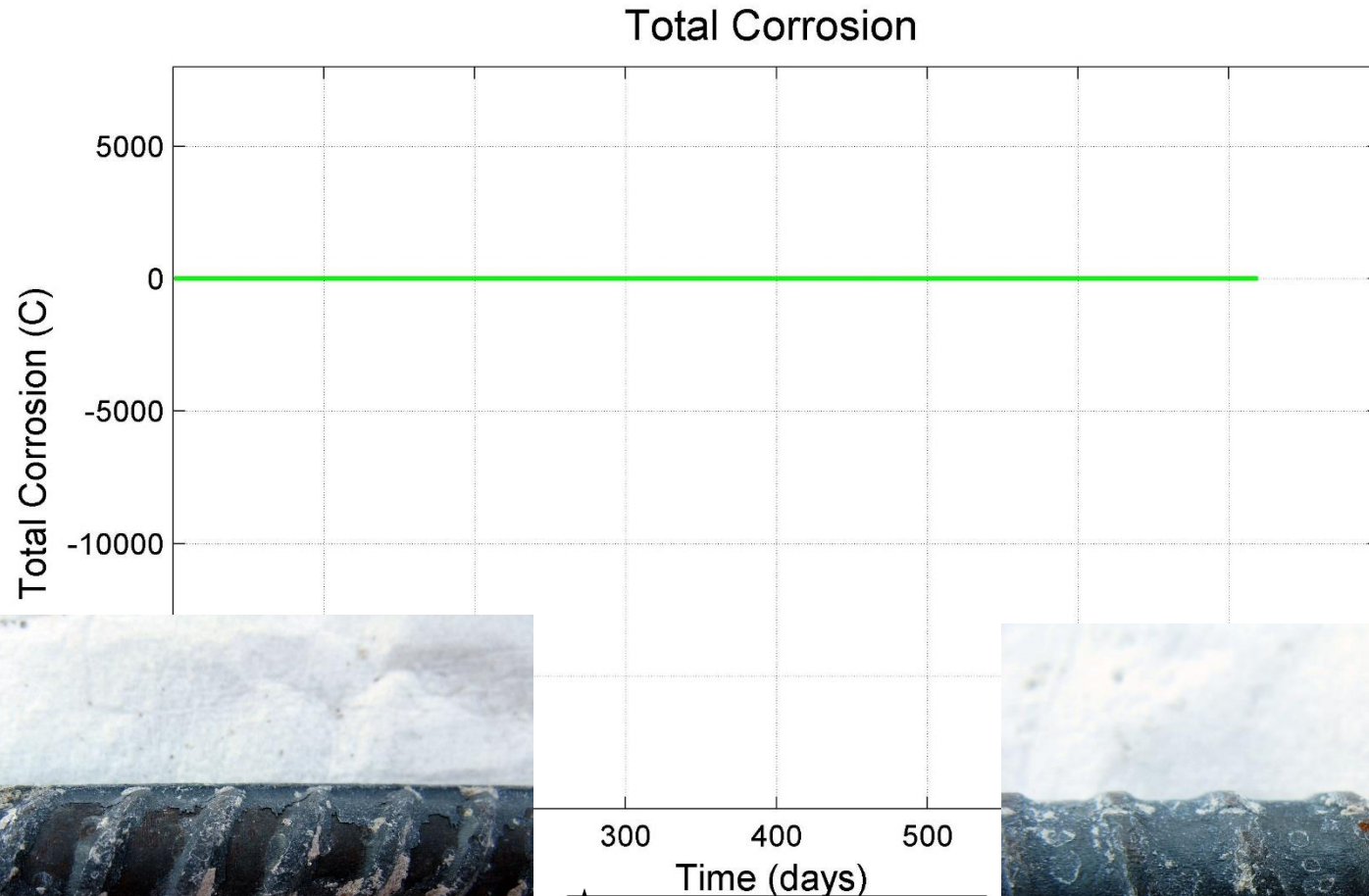


300 400 500

Time (days)

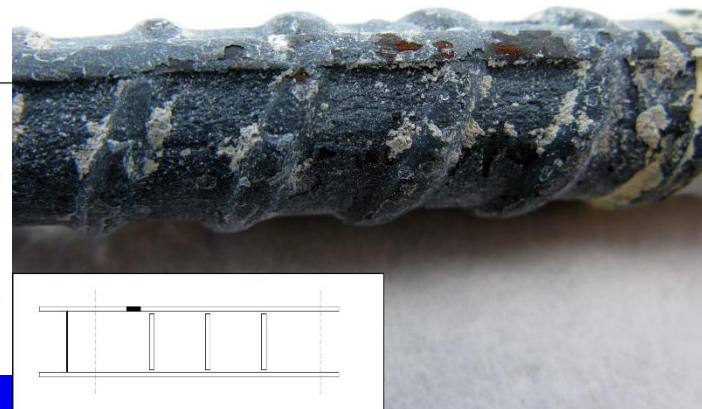
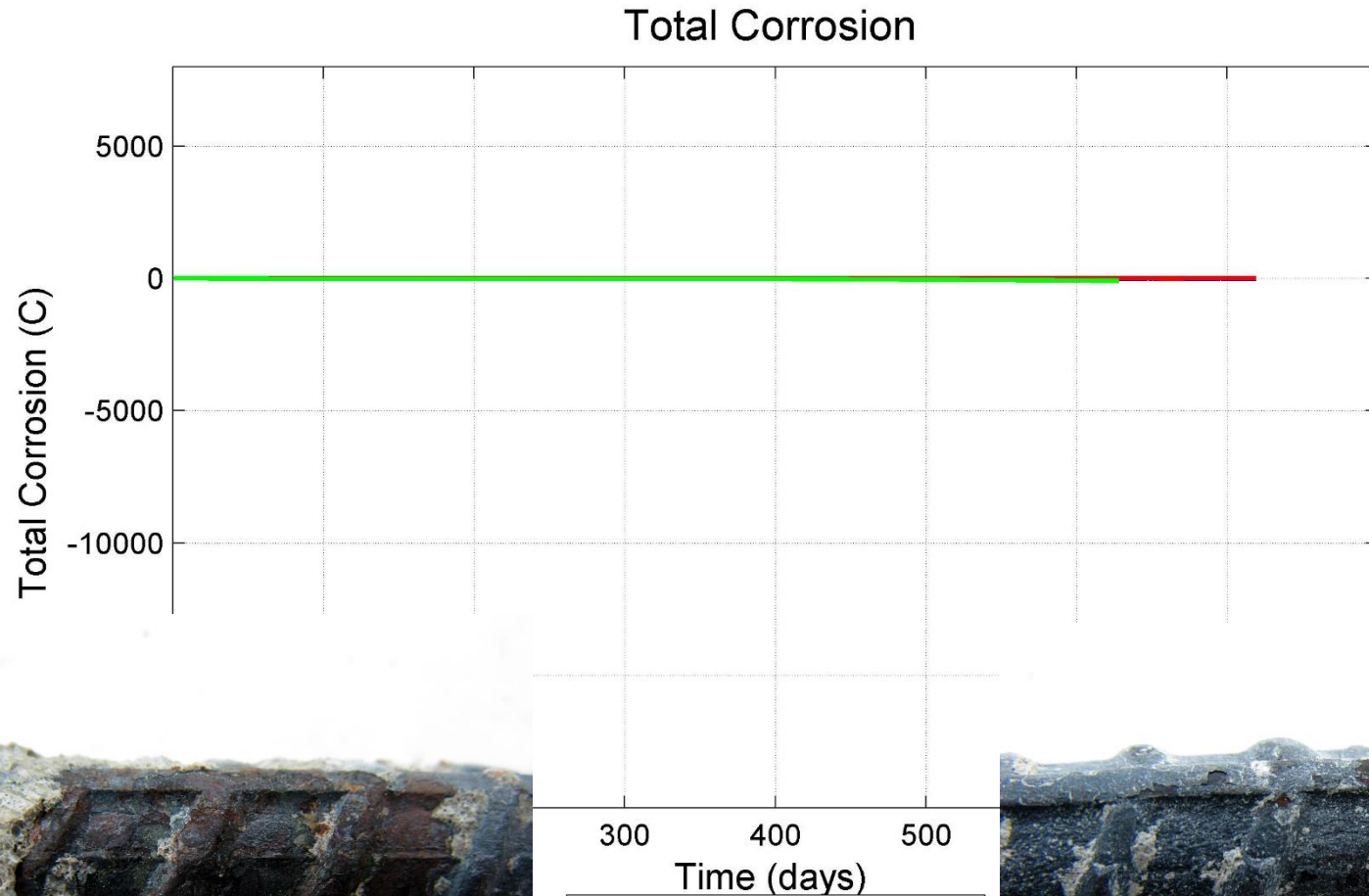
- G2 Specimen1 (#3)
- ★ — G2 Specimen2 (#19)
- G2 Specimen3 (#23)

Sikadur and Silane



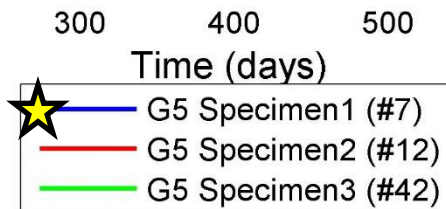
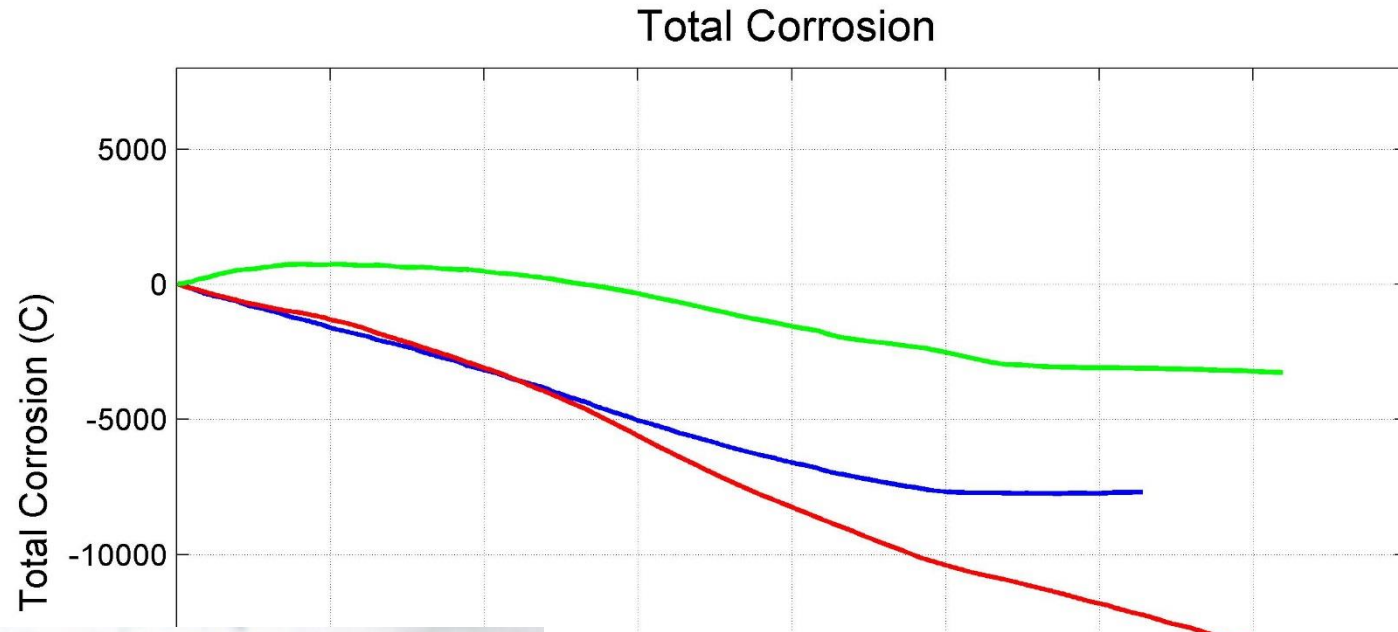
- ★ G3 Specimen1 (#10)
- G3 Specimen2 (#11)
- G3 Specimen3 (#15)

Dural 335

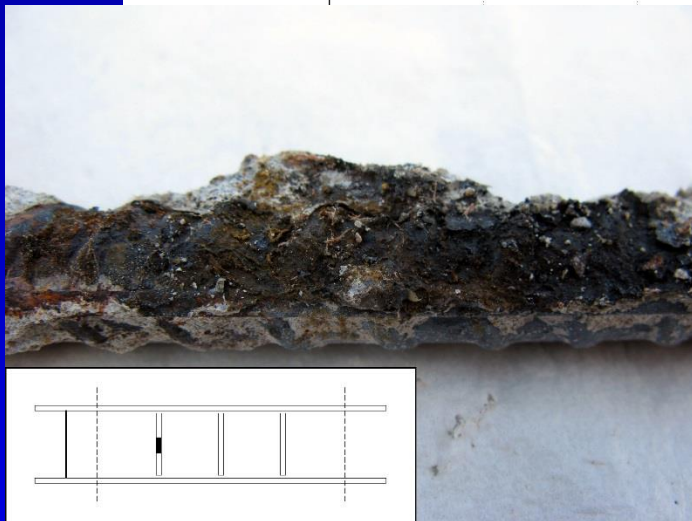
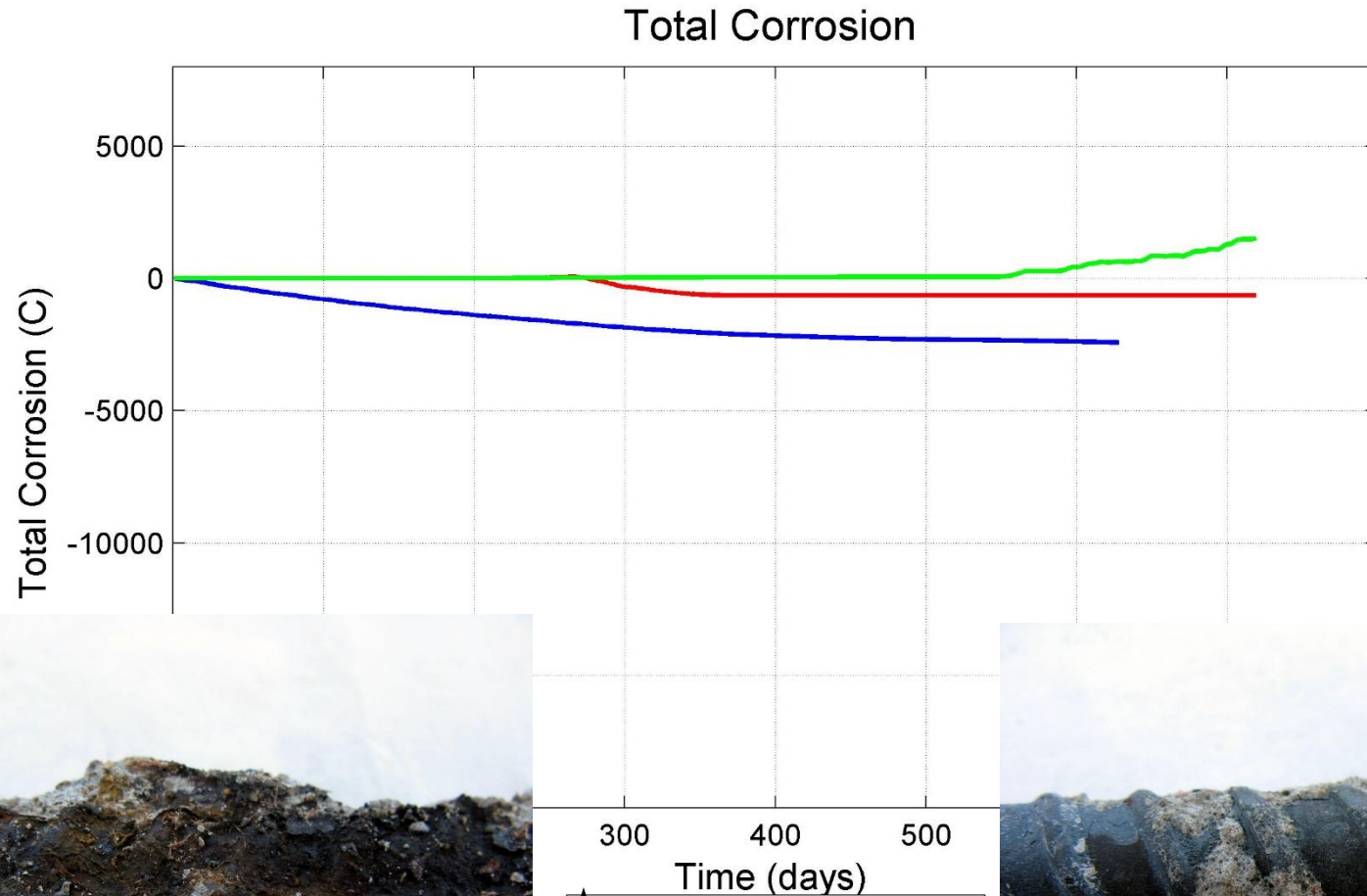


- G4 Specimen1 (#13)
- G4 Specimen2 (#18)
- G4 Specimen3 (#36)

Enviroseal 40

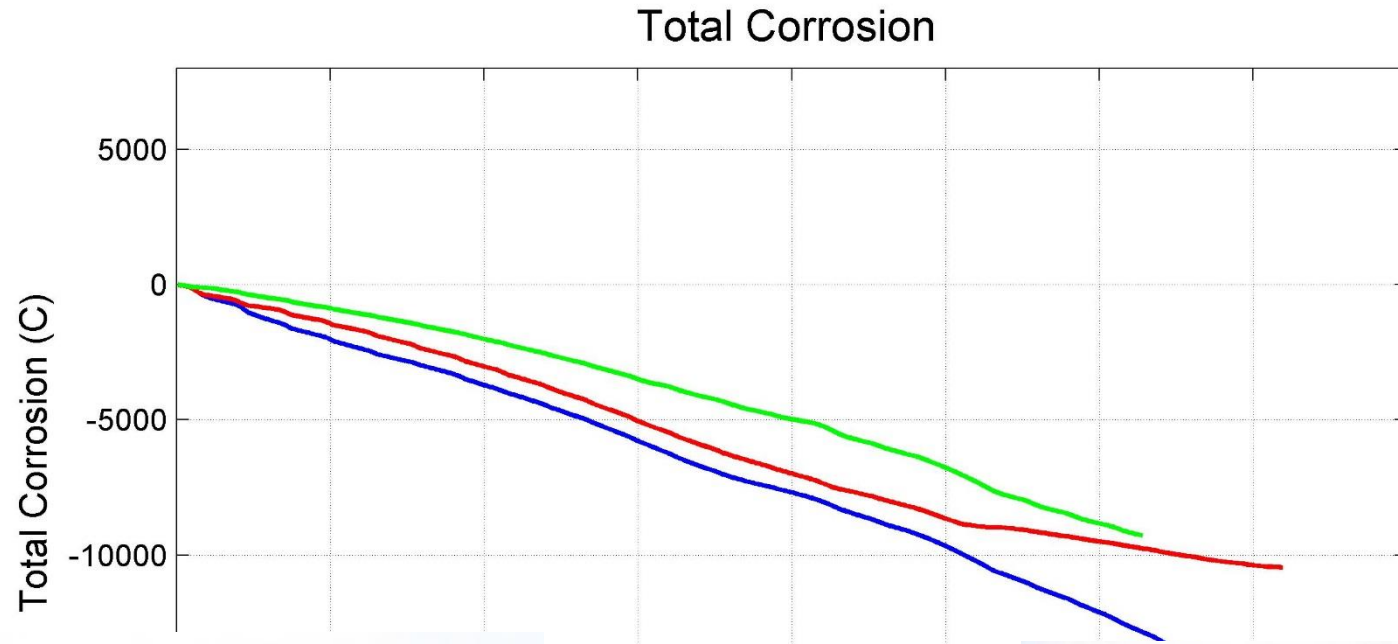


Dural and Enviroseal



- ★ G6 Specimen1 (#14)
- G6 Specimen2 (#16)
- G6 Specimen3 (#49)

Linseed Oil



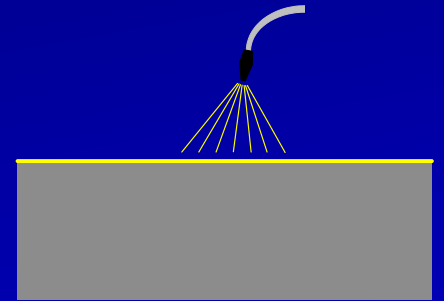
300 400 500
Time (days)

- G7 Specimen1 (#46)
- G7 Specimen2 (#47)
- G7 Specimen3 (#51)



Preliminary Findings: Deck sealing

- Silane products dried fastest
- Metered sprayer needed
 - uniform deck sealer application
- Evidence of effectiveness
- Effective after abrasion
- Extended exposure needed



Preliminary Findings: Crack sealing

- Several stripings necessary
- Crack filling
 - Epoxy – large crack widths
 - Methacrylates – small crack widths
- Bond strength - Sikadur 55 SLV
- Epoxy and methacrylate both effective
- Deck sealers ineffective
- Potential incompatibility between sealers

