



**INFRASTRUCTURE  
ENGINEERS, INC.**

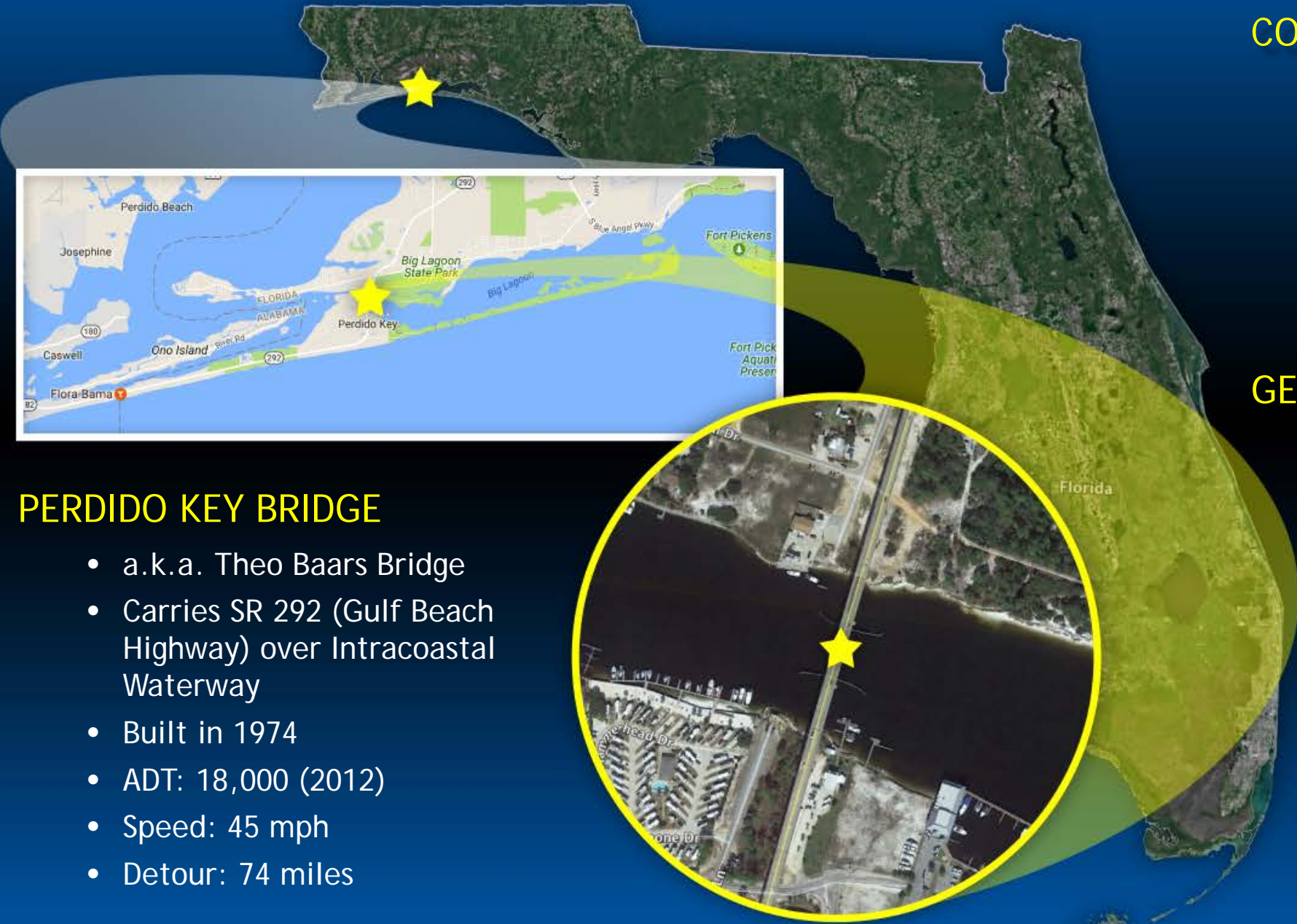
ingenuity & agility



# SR 292 @ PERDIDO KEY: CHALLENGES TO FIELD METALIZING OF STEEL SUPERSTRUCTURE



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## PERDIDO KEY BRIDGE

- a.k.a. Theo Baars Bridge
- Carries SR 292 (Gulf Beach Highway) over Intracoastal Waterway
- Built in 1974
- ADT: 18,000 (2012)
- Speed: 45 mph
- Detour: 74 miles

## CONDITION

- Deck: 6 Satisfactory
- Superstructure: 6 Satisfactory
- Substructure: 7 Good
- SR: 85.2
- HI: 71.95
- HS-20 Operating RF = 2.13 (LFR)

## GEOMETRY

- Two lanes (two way)
  - 11.5' travel lanes
  - 5' wide shoulders
- Main Spans
  - 135' -195' -135' continuous spans
  - Four steel plate girders
- Approach spans
  - 16 simply supported prestressed concrete spans

# SR 292 @ PERDIDO KEY - CHALLENGES TO FIELD METALIZING OF STEEL SUPERSTRUCTURE



- Connects mainland with Perdido Key
- Only route on and off the key
- Public pressure to keep route open

## FIELD METALIZING CONSIDERATIONS

- Future capacity demands
- Existing structure in good condition
  - bridge deck and steel members to be coated
- Existing coating is in poor condition
- Harsh salt environment (coastal)
- Projected high future maintenance costs
- High traffic demands
- Access difficulty
- High fixed costs
  - traffic control and mobilization





## SCOPE OF WORK

- Metalize superstructure steel components in Spans 9 to 11
- Paint bearing assemblies at Piers 9 to 12

## SCOPE OF WORK

- Remove, clean, paint, and reinstall intermediate cross frames



## SCOPE OF WORK

- Remove existing bottom diagonal bracing throughout

*Removal made  
the metalizing easier  
in these areas.*



## DESIGN CONSIDERATIONS

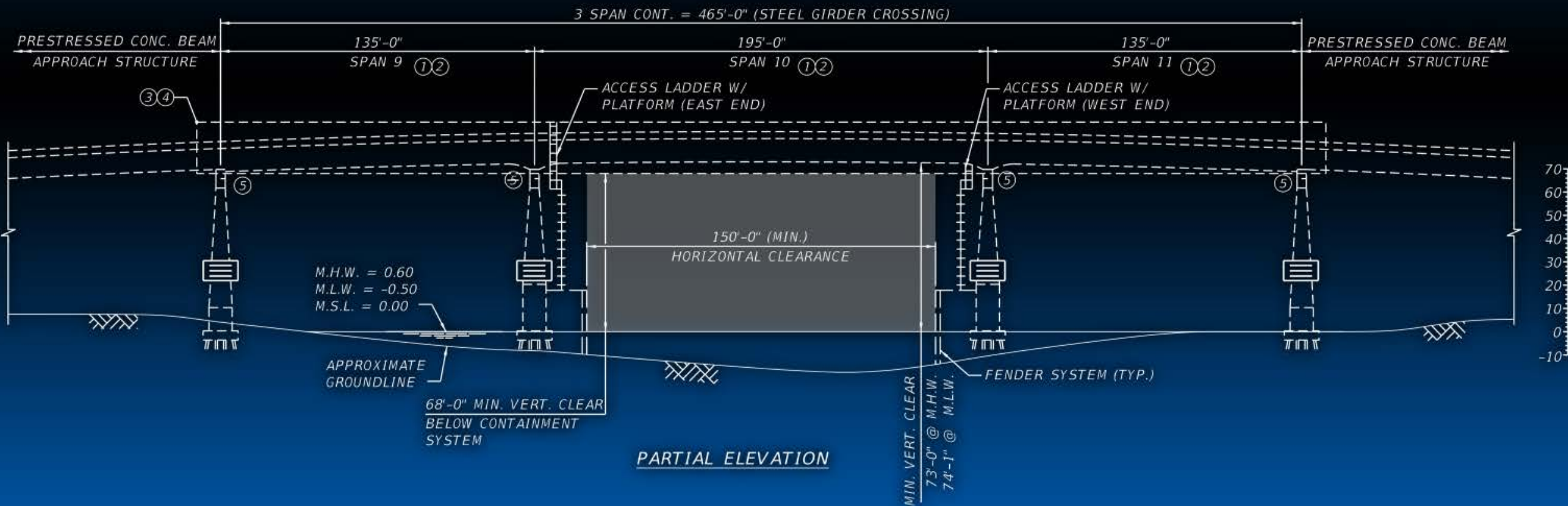
- No lane or shoulder closures allowed





## DESIGN CONSIDERATIONS

- All work from the channel - maintain 68 feet minimum vertical clearance
- Barge placement - clear channel to allow marine traffic passage



## MODIFICATIONS TO FDOT SPECIFICATIONS SECTIONS 560 AND 561 TO ADDRESS METALIZING

- Removal of pack rust
- SSPC SP5/NACE1 white metal blast cleaning
- Anchor profile 3.0 - 5.5 mils
  - five test areas per 100 square feet
- Multiple passes of 85/15 wire to achieve 8 - 12 mils
- Apply coat of 100% solids epoxy penetrating sealer



MODIFICATIONS TO FDOT  
SPECIFICATIONS  
SECTIONS 560 AND 561 TO ADDRESS  
METALIZING

- Apply caulking to faying surfaces
- Apply aliphatic urethane to all surfaces
- Apply aliphatic clear coat to all surfaces






## MATERIAL, EQUIPMENT, AND APPLICATOR QUALIFICATIONS

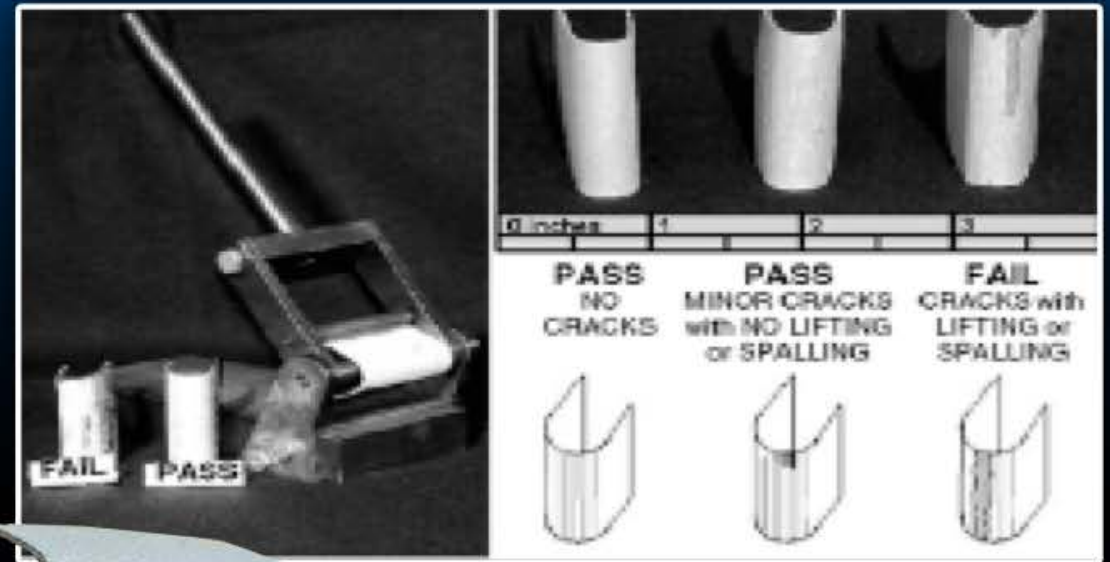
- 85/15 wire per ASTM B 833
- Electric arc equipment manufacturer on site to verify suitability of application

## CONTRACTOR QUALIFICATIONS

- Three years metalizing experience
  - Documentation of thermal spray projects
  - Superintendent
    - three years certified experience
  - Thermal spray applicator
    - one year certified experience
  - Adhesion test and bend test per NACE12/AWS C2.23/SSPC-CS23
- 

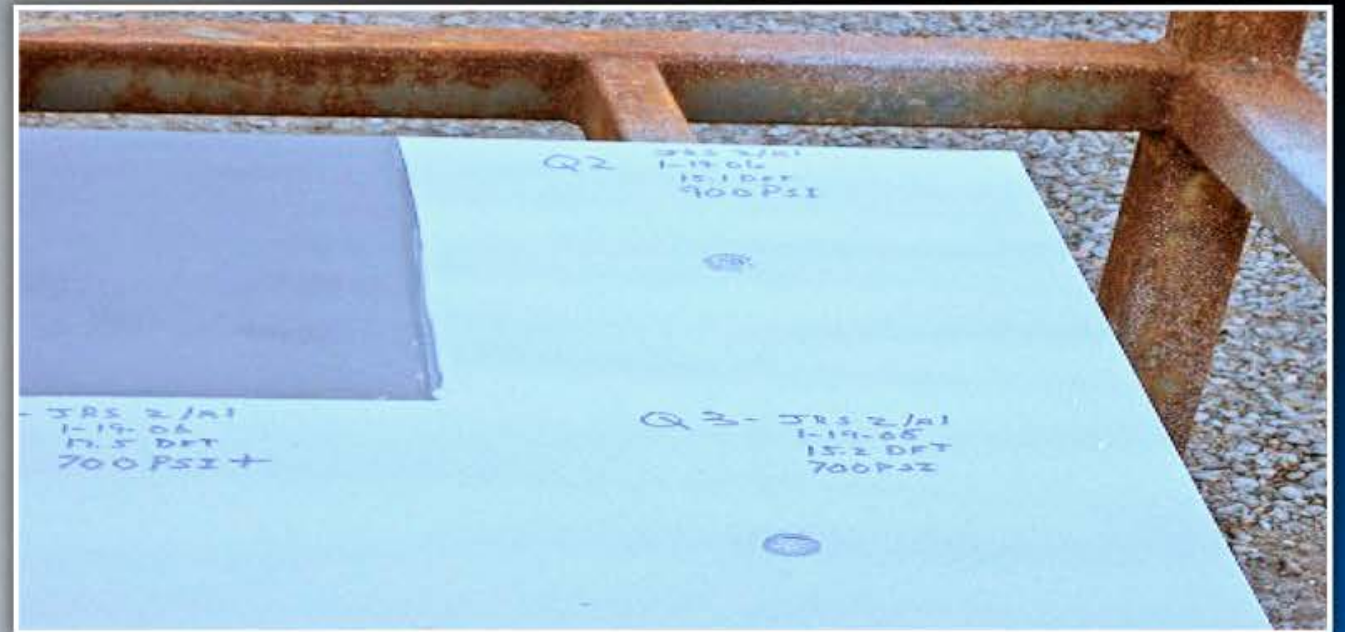
## APPLICATOR QUALIFICATIONS

- Nine bend test three position
- Pass/Fail criteria



## APPLICATOR ADHESION TESTING

- 6x6 plate - Job Reference Standard per CS 23 standard
  - used to evaluate appearance and texture of the metalizing
- 3 tests
- 750 psi minimum per ASTM D 4541 tensile adhesion testing



## QUALITY ASSURANCE AND QUALITY CONTROL

- QC Specialist
  - responsible for total application and testing of metalizing
  - two years metalizing experience
  - five years in corrosion control coatings on steel structures
- QC Supervisor
  - NACE 3 or SSPC BC12
  - two years metalizing experience
  - five years in corrosion control coatings on steel structures
- QC Inspectors
  - NACE 1 or SSPC BC11





## QC HOLD POINTS

- Ambient conditions
- Pressure wash entire structure before surface preparation
- Pre-cleaning welds to remove spatter and sharp edges
- SSPC SP1 Solvent Cleaning to remove oil or grease
- Surface preparation
  - SP5 metalizing
  - SP10 bearings
  - soluble salts
- Metalizing application
  - dry film thickness
  - texture
  - adhesion testing



## QC HOLD POINTS

- Sealer application
  - no DFT only theoretical 1.5 mils
  - time between metalizing and sealing
- Coatings mixing
- Coatings applications
  - defects, DFT, recoat windows
- 90% inspections
  - before clear coat



## PRE-SURFACE CLEANING

- Weld spatter removed
- Sharp edges and flame cut edges prepared



*BEFORE*

*AFTER*



## SURFACE PREPARATION

- Anchor profile ASTM D 4417 Method C tape



- SSPC SP5 white metal blast

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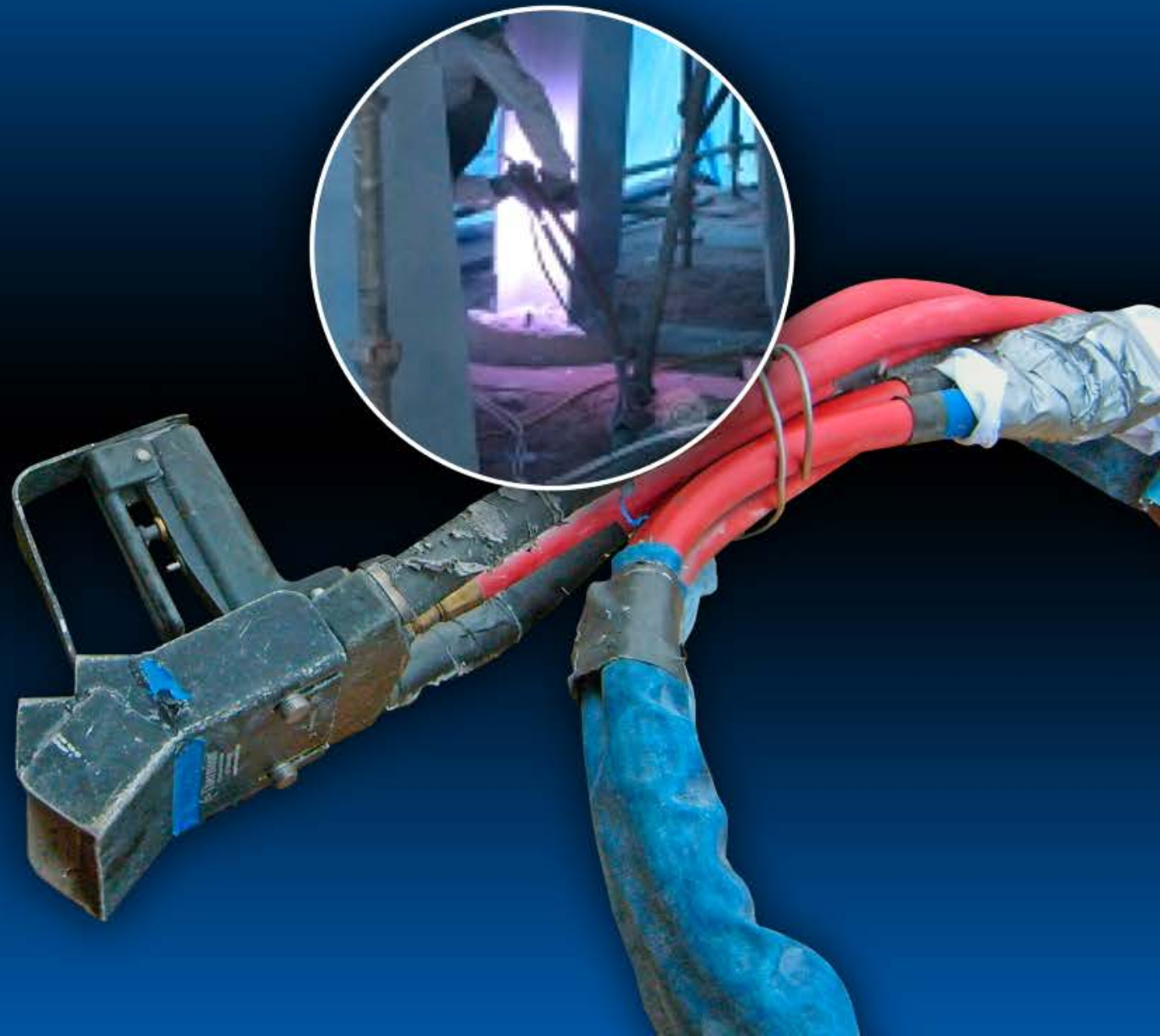


## METALIZING EQUIPMENT

- Metalizing application
- Equipment set

## APPLICATION REQUIREMENTS

- Metalizing technique
- Gun close to surface
- Multiple passes
- 8 - 12 mils



## ADHESION TESTING

- 750 PSI minimum
- One test every 100 square ft.



## CONSTRUCTION

- Numerous request for lane closure to secure containment
- All work from barges in the channel
- Contract Time: 180 days





## CONSTRUCTION

- Contractor submitted RFI to allow 72-hour window for sealing
- EOR recommended companion panels that would be monitored daily
  - any presence of oxidation or metalizing oxidation, contractor would remove and replace all at their expense
- Area and panel checked with 50X power magnification daily
  - no failures noted during process



## CONSTRUCTION

- Sealer applied and stripe coat of sealer applied
- Caulking and mastic for joints



## CONSTRUCTION

- Top coat and clear coat
- Applied clear coat to all surfaces for longevity



## CONSTRUCTION

- Repairs of pull test areas
- Re-blasted and metalized



## CONSTRUCTION

- Bearings
- SSPC SP10, zinc rich epoxy, epoxy, urethane, and clear coat



## CONSTRUCTION

- Bid comparison
  - bid range: \$1.82 million to 2.47 million
  - engineer's estimate: \$1.25 million
- Pay item - Coating Existing Structural Steel
  - bid range: \$3,961.90/ton to \$5,598.05/ton
  - FDOT pay item (12 month average): \$1,025.28/ton
- Service life
  - metalizing: 50 to 75 years with overcoat
  - polymeric coat system: 20 to 25 years
  - FDOT polymeric coating experience:  
as little as 12 years



- Possible to manage coating projects from water access to permit flow of traffic to be uninterrupted
- Include design considerations to provide a coating that increases the life cycle of corrosion protection
- Construction issues are addressed with end goal in mind - aid in the completion of projects on time and with little interruption to the public and business interest



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Longitudinal  
Cables in  
Place



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Scaffolding  
Placement

PERDIDO  
KEY  
CONSTRUCTION

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Manlift on Barge

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Containment System

Blast Lines

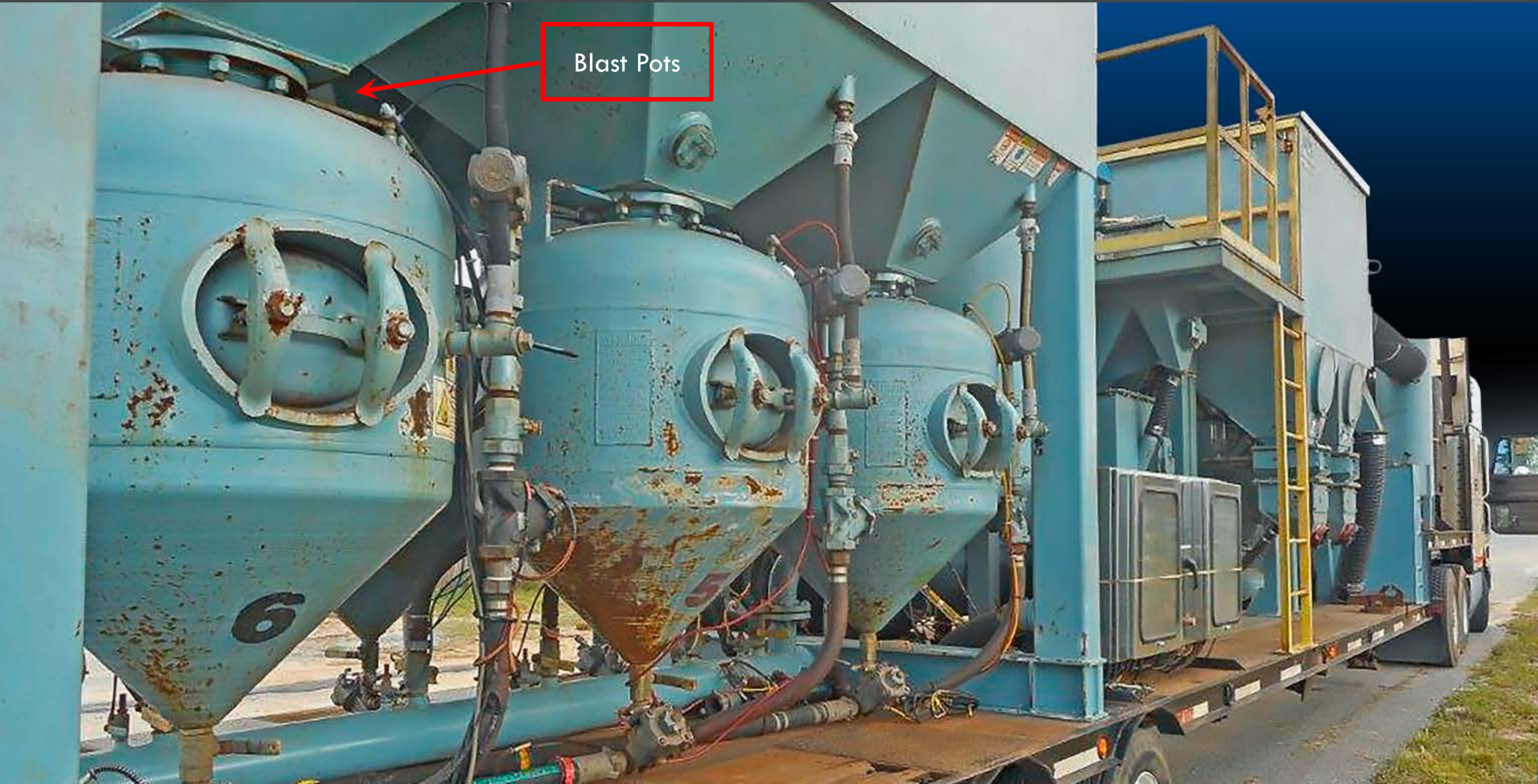
Vacuum Duct System

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Blast Pots &  
Vacuums

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Blast Pots

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Ground  
Protection

SR 292 @ PERDIDO KEY:  
CHALLENGES TO

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# QUESTIONS



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