Real World Considerations & Project Highlights

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Real World Considerations & Project Highlights: Outline

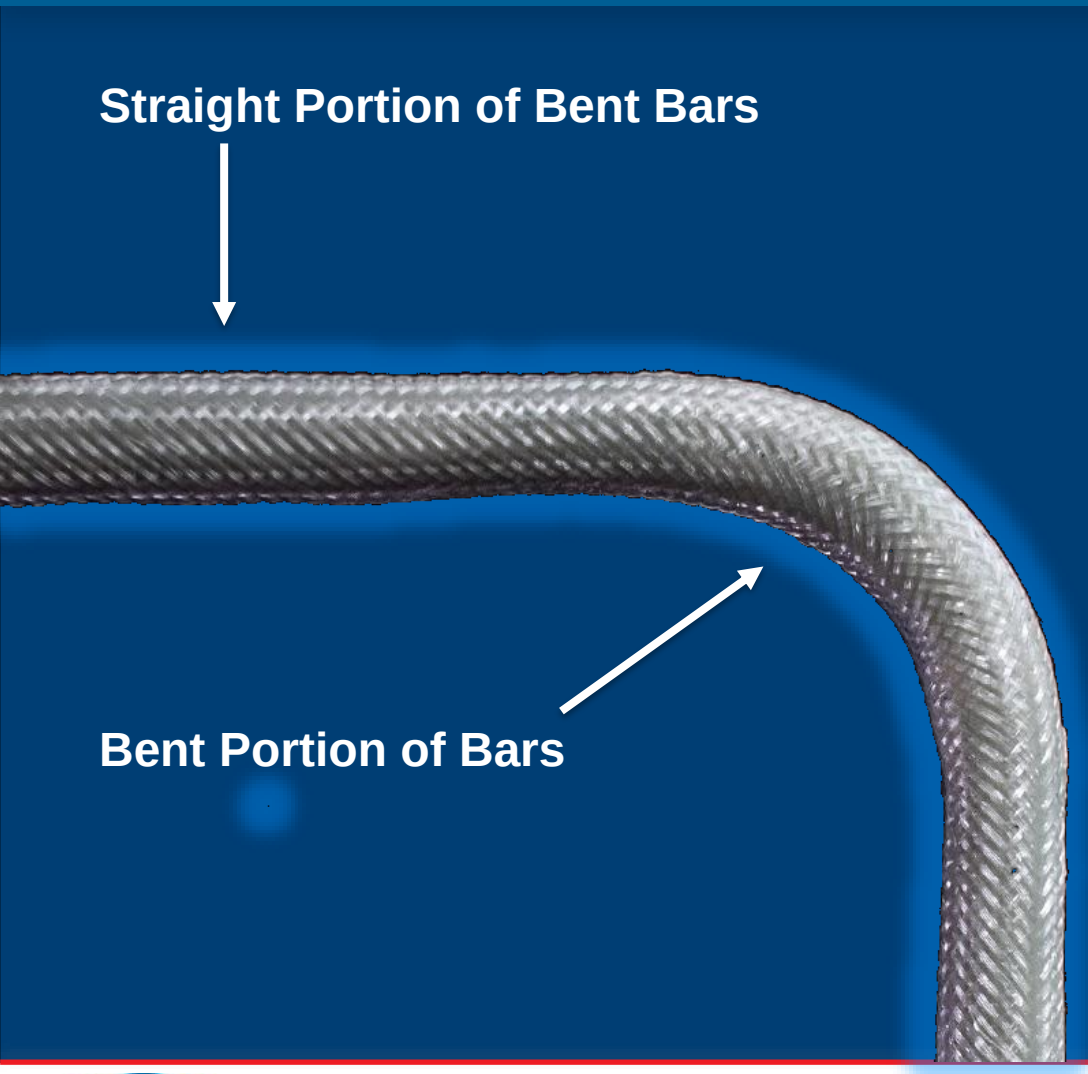
- GFRP from the Contractor's Perspective
- Constructability & Best Practices
- Value Engineering Process
- Project Highlight

Real World Considerations & Project Highlights: Outline

Constructability & Best Practices (Cutting & Bending)

- Field Bending is not possible with GFRP Rebar.
- Field Forming of large radius curves is possible with GFRP Rebar.
- Cut GFRP with Diamond Blade (DO NOT Shear GFRP Rebar!).

Constructability & Best Practices (Bent Bars)



- Bent Bars must be pre-formed in the factory according to the project's plans.
- **KEY CONSIDERATION**: Performance varies from manufacturer to manufacturer; this affects how you will **Design & Specify**.
- QC/QA currently qualifies Bent Bars at bent and straight portions.

Constructability & Best Practices (Tying & Installation)

- Steel ties and supports are acceptable unless otherwise specified by the plans.
- Non-ferrous rebar ties & supports available.
- GFRP Rebar is typically 25% the weight of steel, so floating may occur in high-slump concrete or during concrete vibration. Rebar ties/fasteners must be used in areas of concern.

Constructability & Best Practices (Concrete Cover)

Authoritative guidance on Concrete Cover available through **ACI 440.5** (Table 3.1) & **AASHTO LRFD-GFRP** (Table 6.6.2.4-1).

Table 6.6.2.4-1—Concrete Cover Requirements for GFRP Reinforcing Bars

Description	Specified Cover
Slabs Top and bottom reinforcement for No. 10 GFRP reinforcing bars and smaller	1.0 or 1.5 bar diameters
Beams, formed Stirrups	1.5 in.
Principal reinforcement	2.0 in.

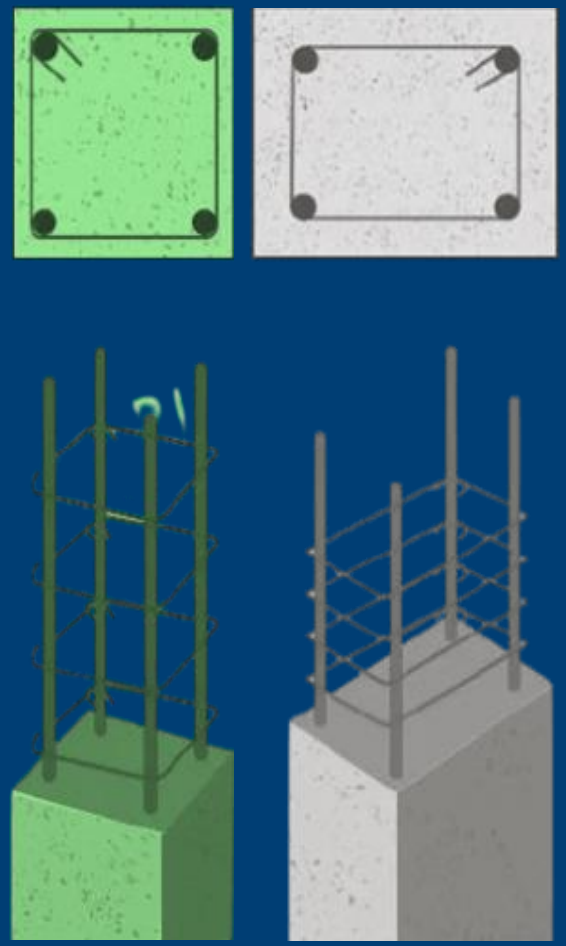


Table 3.1—Concrete cover requirements for FRP reinforcement

	Specified cover, in.
Slabs and joists	
Top and bottom bars	
No. 10 bars and smaller	3/4
Formed concrete surfaces exposed to earth and for bottoms bearing on work mat, or slabs supporting earth cover	
No. 5 bars and smaller	1-1/2
No. 6 through 10 bars	2
Beams, formed	
Stirrups, spirals, and ties	1-1/2
Primary reinforcement	2
Exposed to earth	
Stirrups and ties	2
Primary reinforcement	2-1/2
Walls	
No. 10 bars and smaller	3/4
Formed concrete surfaces exposed to earth or in contact with ground	2
Footings and base slabs	
At formed surfaces and bottoms bearing on concrete work mat	2
At unformed surfaces and bottoms in contact with earth	3
Top of footings	Same as slabs
Over top of piles	2

Value Engineering Process

COMMUNICATION & PLANNING

- Know Contractor's timeline.
- Know the project's submittal/approval process.

STRUCTURAL DRAWINGS

- Acquire structural drawings, project plans, loading info, any additional data.

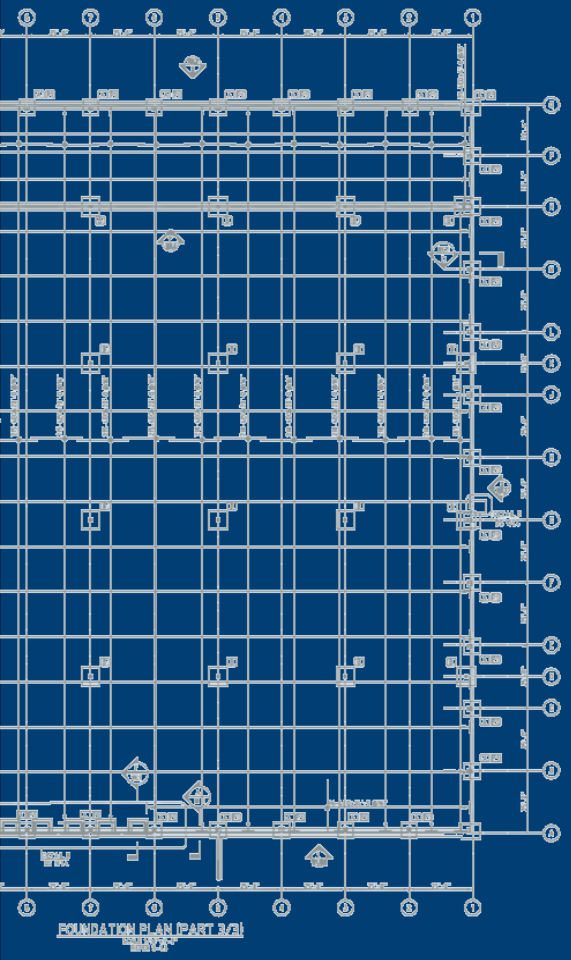
RED LINE MARKS & ESTIMATION

- Other deliverables could include Stamps, Placing Docs, Updated CAD Drawings, Estimation.

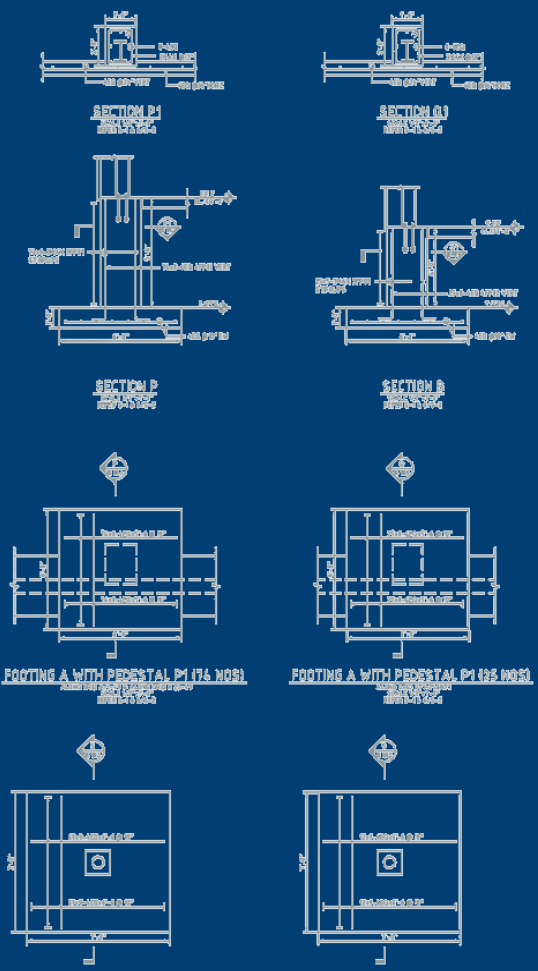
START TO FINISH SUPPORT

- Provide support & education: Contractor, EOR, Local Building Officials, Structure Owners.

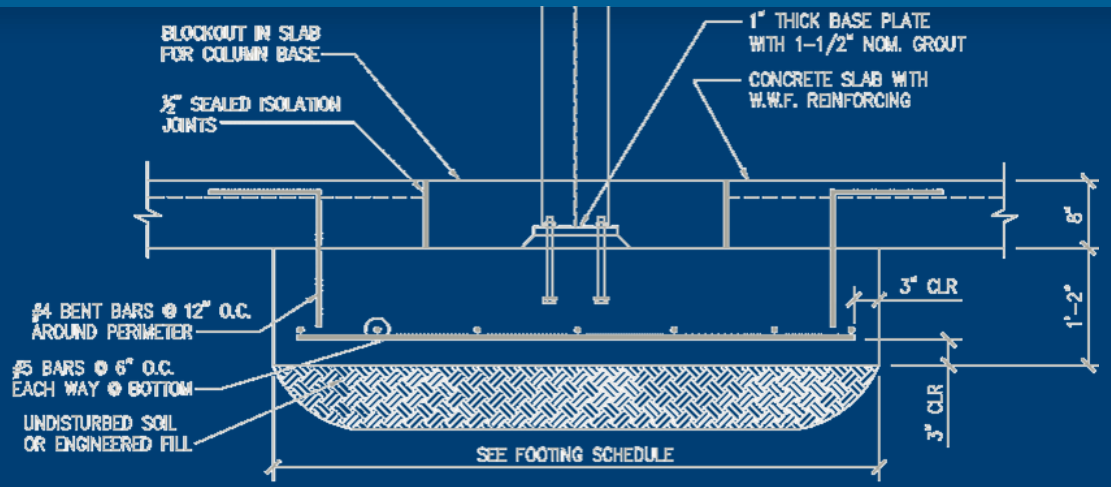
Project Highlight: Commercial Warehouse



- 300,000 sqft Commercial Warehouse.
- Steel-RC design utilized rebar sizes #3, #4, #5, & #6.
- Value Engineering was driven by the Contractor, who promoted the idea to the EOR and Owner.
- Lunch & Learn with EOR.
- VE provided a High Modulus GFRP-RC design.



Project Highlight: Commercial Warehouse (cont.)



- All steel rebar was replaced by a single sized AC454-approved bar (ESR-4664) meeting High Modulus criteria.
- **11,127 lbs** of GFRP rebar (pickup truck & trailer) replaced **79,194 lbs** of steel rebar (two truckloads).
- Contractor saved **19%** compared to steel package.

Thank you

For the most up-to-date information please visit the American Concrete Institute at:
www.concrete.org