WIRE REINFORCEMENT INSTITUTE®

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Technical Blog

The WWR Detailer's Role

When the design professional elects to specify WWR as a Pre-Approved Equal to reinforcing bars (See Effectively Specifying Welded Wire Reinforcement for more information), the manufacturer's WWR detailer plays a more substantial role in the process of defining and detailing the final WWR configurations to suit the engineer's prescriptive requirements.

A descriptive example of the basic mechanics of the Pre-Approved Equal process is presented below.

1. The design professional specifies ASTM A615 Grade 60 #5 reinforcing bars spaced at 12" on center as vertical reinforcement and #4 @ 12" on center as horizontal reinforcement in a structural wall application.

2. The contract drawings for this particular project contain Pre-Approved Equal language consisting of the following:

    a. A statement indicating that WWR substitution of rebar is permitted in multiple structural applications, including structural wall reinforcement

    b. A requirement that WWR substituted for reinforcing bars be positioned and terminated within the structural element as originally-detailed for rebar, i.e., maintain same clear cover, hooked end geometry (as applicable), and lap splicing

    c. A requirement that WWR substituted for reinforcing bars not be spaced in excess of the spacing defined for the originally-detailed rebar.

    d. A requirement that the substitution WWR wires not have diameters larger than the originally-detailed reinforcing bars they are replacing.

    e. A requirement that WWR substituted for reinforcing bars exhibit a yield strength not less than the yield strength specified for the originally-detailed rebar.

    f. A requirement that WWR substituted for reinforcing bars exhibit nominal unit tensile strength equivalent to or greater than originally-detailed rebar, i.e., $[A_s f_y]_{WWR} \geq [A_s f_y]_{rebar}$

3. In assessing the project-specific rebar details and annotations in conjunction with the permissive Pre-Approved Equal language, the WWR detailer generates a strength-equivalent WWR solution that consists of D15.5 wires spaced at 8" on center vertical and , as this is well-suited for the manufacturer's production capabilities and the readily available ASTM A1064 80 ksi wire material being regularly produced.

4. As part of the WWR shop and placement drawings submitted for contractor review and subsequent design professional review, the WWR detailer provides an accompanying conversion calculation confirming for the designer the required WWR equivalence (see image below). This set of calculation verifies for the design professional that the defined Pre-Approval conditions are being met and eliminates any uncertainty regarding the ultimately selected WWR solution.

Welded Wire Reinforcement – Project Conversion Summary

Project: XYZ Building	**To: The Project General Contractor**
Date: XXXX-XX-XX	
By: WWR Company Technical Director	**Structural EOR: The Project Structural Engineering Firm**

Application: Structural Foundation Wall
Designation: SW-1
Description: Structural foundation wall along Gridline 1, between Gridlines A and H.

Conversion:
Originally-specified reinforcing bars:
#5 @ 12" OC vertical, ASTM A615 Grade 60
#4 @ 12" OC horizontal, ASTM A615 Grade 60
Nominal Unit Tensile Strength

$$Vertical: \quad A_s f_y = \frac{0.310\ in^2}{12"} \times 12" \times 60\ ksi = 18.6\ kip\ per\ foot \leftarrow originally\ specified$$

$$Horizontal: \quad A_s f_y = \frac{0.200\ in^2}{12"} \times 12" \times 60\ ksi = 12.0\ kip\ per\ foot \leftarrow originally\ specified$$

WWR substitution:
D15.5 @ 8" OC vertical, ASTM A1064 Grade 60
D15.5 @ 12" OC horizontal, ASTM A1064 Grade 60
Equivalent Nominal Unit Tensile Strength

$$Vertical: \quad A_s f_y = \frac{0.155\ in^2}{8"} \times 12" \times 80\ ksi = 18.6\ kip\ per\ foot \leftarrow substitution\ OK\ (\geq\ 18.6\ for\ rebar)$$

$$Horizontal: \quad A_s f_y = \frac{0.155\ in^2}{12"} \times 12" \times 80\ ksi = 12.4\ kip\ per\ foot \leftarrow substitution\ OK\ (\geq\ 12.0\ for\ rebar)$$

Notes:

1. WWR material is 80 ksi yield strength conforming to ASTM A1064.
2. All bend geometry and lap splice lengths noted on the structural contract drawings for originally-detailed rebar shall be maintained for the substitution WWR presented here.
3. Refer to the shop and placement drawings for WWR mat geometry, quantity, and layout.

In the end, the WWR detailer is tasked with ensuring that all attributes of the WWR substitutions pursued by the contractor on a particular project are transparently communicated to and illustrated for the design and construction team members. WRI member organizations, by maintaining highly-qualified staffs of licensed design professionals and technicians, are well equipped to carry out this work.

For more information on WWR specification methodology, refer to the WRI Manual of Standard Practice and the WRI Welded Wire Reinforcement Design and Detailing Guide, both found at www.wirereinforcementinstitute.org.