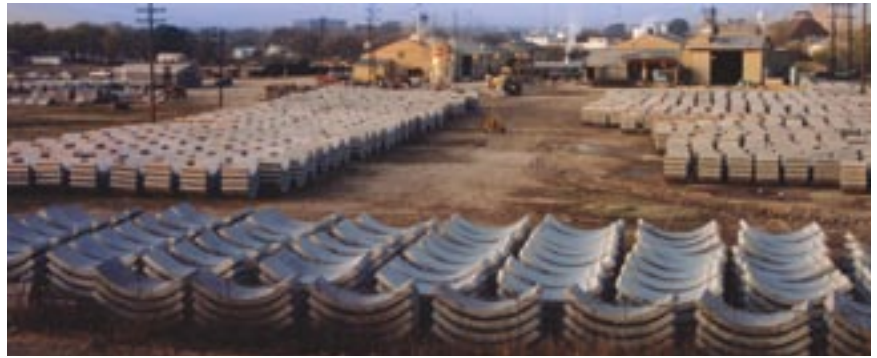




Ivy Knows Tunnels

Today, engineers know that there are three basic steps to building a stable tunnel: excavation, support and lining. When it comes to the lining, Ivy Steel & Wire knows the tunnel business.

Whether your tunnel project uses precast concrete segments or shot-crete linings, Ivy knows how to efficiently handle most applications. We understand that no two tunnel projects are exactly alike and that various conditions require a diverse arsenal of reinforcing capabilities. Since 1953, Ivy has delivered the broadest range of high quality welded wire reinforcement (WWR) products to meet industry design specifications as well as the latest product knowledge and expertise to help simplify concrete construction projects.

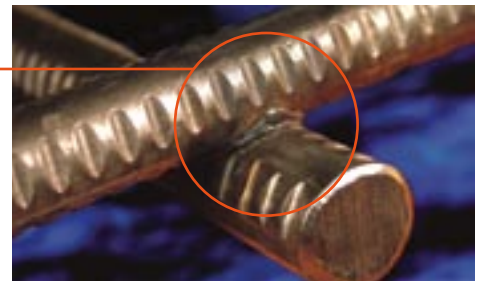


Tunnels

Achieve structural strength and versatility with WWR



Machine Resistance Welding – Pressure and heat fuse the intersecting wires into a homogeneous section and fix all wires in their proper position.



Structural WWR provides an economical alternative to tied-in-place rebar. Increasingly, engineers are replacing rebar with the stronger and more versatile WWR. Why?

Quicker Installation: The welded grid pattern reduces labor by eliminating the need to tie individual rebar together.

Faster Inspections: Wires are precisely machine spaced and welded when sheets are manufactured so field inspections are quick and easy.

Eliminates Oversteeling: WWR is custom manufactured to your design specifications, providing the exact steel area required – no waste.

WHY WELDED WIRE REINFORCEMENT?

A common misconception among architects and structural engineers is that WWR is what you buy at a hardware store – small, flimsy wire fabric. While WWR does come in these smaller formats, those are not the construction-grade materials used in structural applications. Ivy manufactures WWR sheets with wire diameters up to 3/4" (equivalent in diameter to a #6 rebar).

Initially used for fencing, WWR is now commonly used as concrete reinforcement throughout the construction industry because of its high product strength and inherent labor saving properties.

WWR's strength results from the cold-working

process of wire manufacturing and its welded intersections. Per ASTM A497/497M Standard Specifications, and depending on building code permissions, welded deformed wire reinforcement can have a yield strength of up to 80 ksi, compared with hot-rolled rebar's yield strength of 60 ksi, independent of size.

The 1995 edition of ACI 318, for the first time, permitted the use of 80 ksi yield strength wire and WWR in shear reinforcement applications. This opened the door for designers and contractors to utilize high strength WWR sheets and cages that use less steel and require less placing time and labor, lending further economy in these construction applications.

Today, WWR is commonly replacing rebar in projects that call for sizes #3 to #6 – delivering superior reinforcement properties and lowering overall costs. Even when #7 and larger rebar is specified, WWR products, utilizing reduced wire spacing, can be substituted.

Additionally, WWR can significantly reduce placement time and labor costs. A small crew can quickly and accurately place preassembled sheets and cages, which may range from 1 to 17 feet wide and up to 60-plus feet long. Inspection of WWR is simpler and faster primarily because wire spacing is held to tight tolerances and bent or rolled shapes are uniform and precise throughout the entire WWR sheet.



Reduces Cost: Compared to grade 60 rebar, WWR's greater strength often reduces the amount of steel required, in some cases by as much as 25%.

No wire company has more experience custom manufacturing WWR products for tunneling projects than Ivy Steel & Wire. For more than 50 years, Ivy's state of the art manufacturing plants have been simplifying concrete construction by producing precisely the right WWR product for each project.

Engineering expertise delivers customized WWR solutions

Ivy engineers have decades of experience on some of the most complex tunnel projects, and they know how to keep budgets and timelines on track as they exceed safety and quality requirements. Using your engineering design drawings,



they can quickly recommend the right WWR to meet your project goals.

Because Ivy custom-manufactures every WWR sheet, they can meet the most stringent building code requirements while satisfying your budgetary parameters. You can count on Ivy to provide:

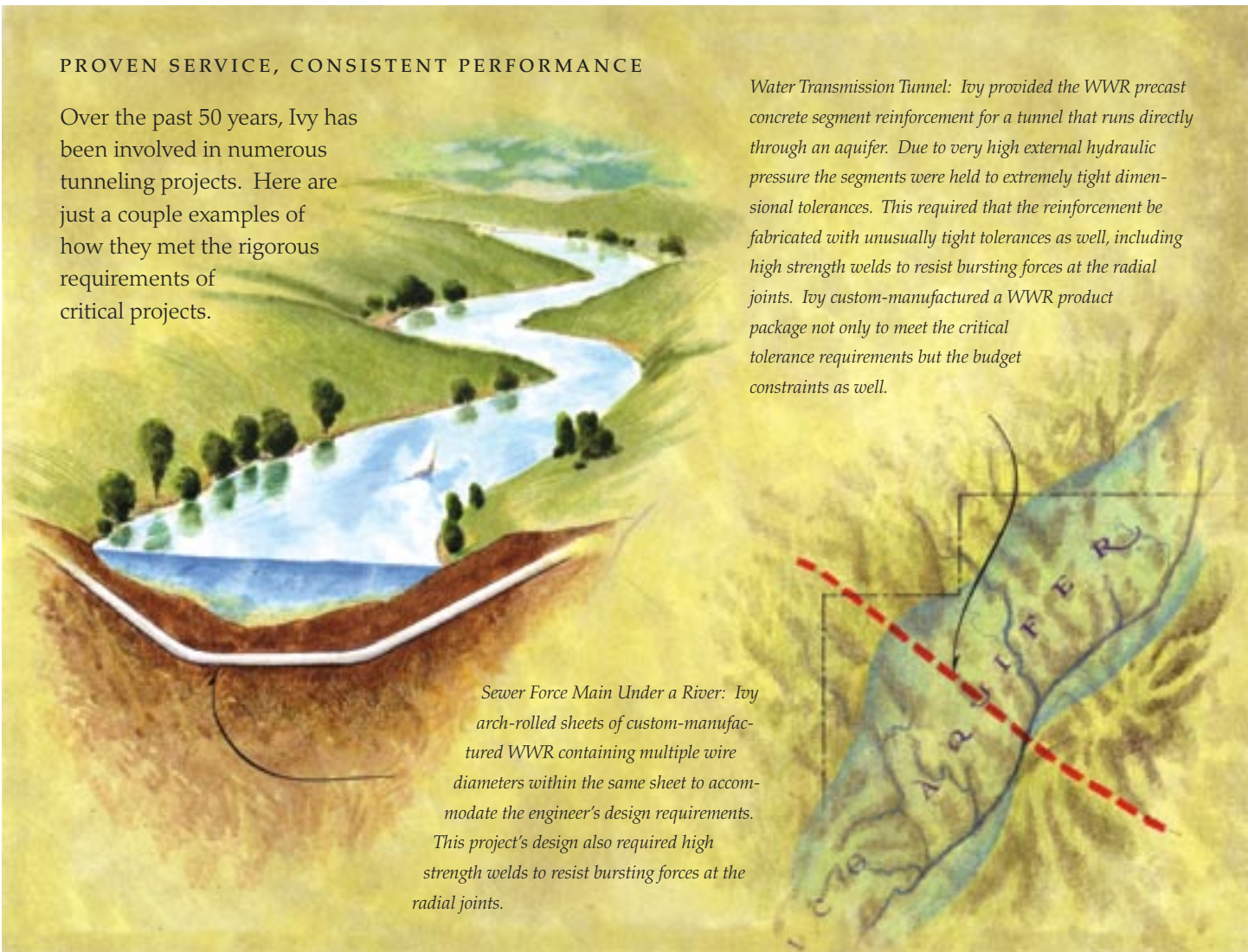
- Structural design conversions that incorporate the latest in WWR design efficiencies with just the right steel area, and wires spaced to avoid inserts and bolt pockets
- Precise fabrication of the parallelogram and key-shaped sheets that provide the structural locking geometry unique to certain precast tunnel segments
- Fractional wire spacing capability in both directions enabling almost limitless positioning options
- Custom bent and arch-rolled WWR sheets delivered directly to your job-site
- Custom WWR designs that integrate varying wire diameters, wire lengths and wire spacing all on the same sheet
- Rigorous quality assurance procedures to assure reinforcement is delivered as ordered. With eight plants strategically located across the United States, you can count on Ivy for a reliable supply of WWR product being convenient and in close proximity to your tunnel project.



PROVEN SERVICE, CONSISTENT PERFORMANCE

Over the past 50 years, Ivy has been involved in numerous tunneling projects. Here are just a couple examples of how they met the rigorous requirements of critical projects.

Water Transmission Tunnel: Ivy provided the WWR precast concrete segment reinforcement for a tunnel that runs directly through an aquifer. Due to very high external hydraulic pressure the segments were held to extremely tight dimensional tolerances. This required that the reinforcement be fabricated with unusually tight tolerances as well, including high strength welds to resist bursting forces at the radial joints. Ivy custom-manufactured a WWR product package not only to meet the critical tolerance requirements but the budget constraints as well.



Sewer Force Main Under a River: Ivy arch-rolled sheets of custom-manufactured WWR containing multiple wire diameters within the same sheet to accommodate the engineer's design requirements. This project's design also required high strength welds to resist bursting forces at the radial joints.

Affiliations expand capabilities

Meadow Burke, Ivy's sister division, manufactures and markets inserts, spacers, supports and precast lifting devices that help to complete your reinforcement package. Meadow Burke is an industry leader in the manufacture, distribution and support of concrete construction accessories. Meadow Burke creates and offers hundreds of products to help you get the job done quickly, competently and with maximum profit. Architects, engineers and contractors across North America trust Meadow Burke as their preferred supplier for concrete construction products. For more information about Meadow Burke please visit www.meadowburke.com.



About Ivy Steel & Wire

Ivy Steel & Wire is a division of MMI Products, Inc. and began operations in Jacksonville, Florida in 1953. Now one of the largest producers of steel wire and welded wire reinforcements in North America, Ivy Steel & Wire operates from eight plants delivering a large variety of products throughout the continent and abroad.

Wire and welded wire reinforcement produced in all of Ivy's plants meet or exceed all applicable industry and governmental standards, and more importantly, consistently exceed our customers' expectations.

For more information on how Ivy Steel & Wire can add strength, versatility and reliability to your tunneling projects call 800.876.0080 or visit www.ivysteel.com.



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