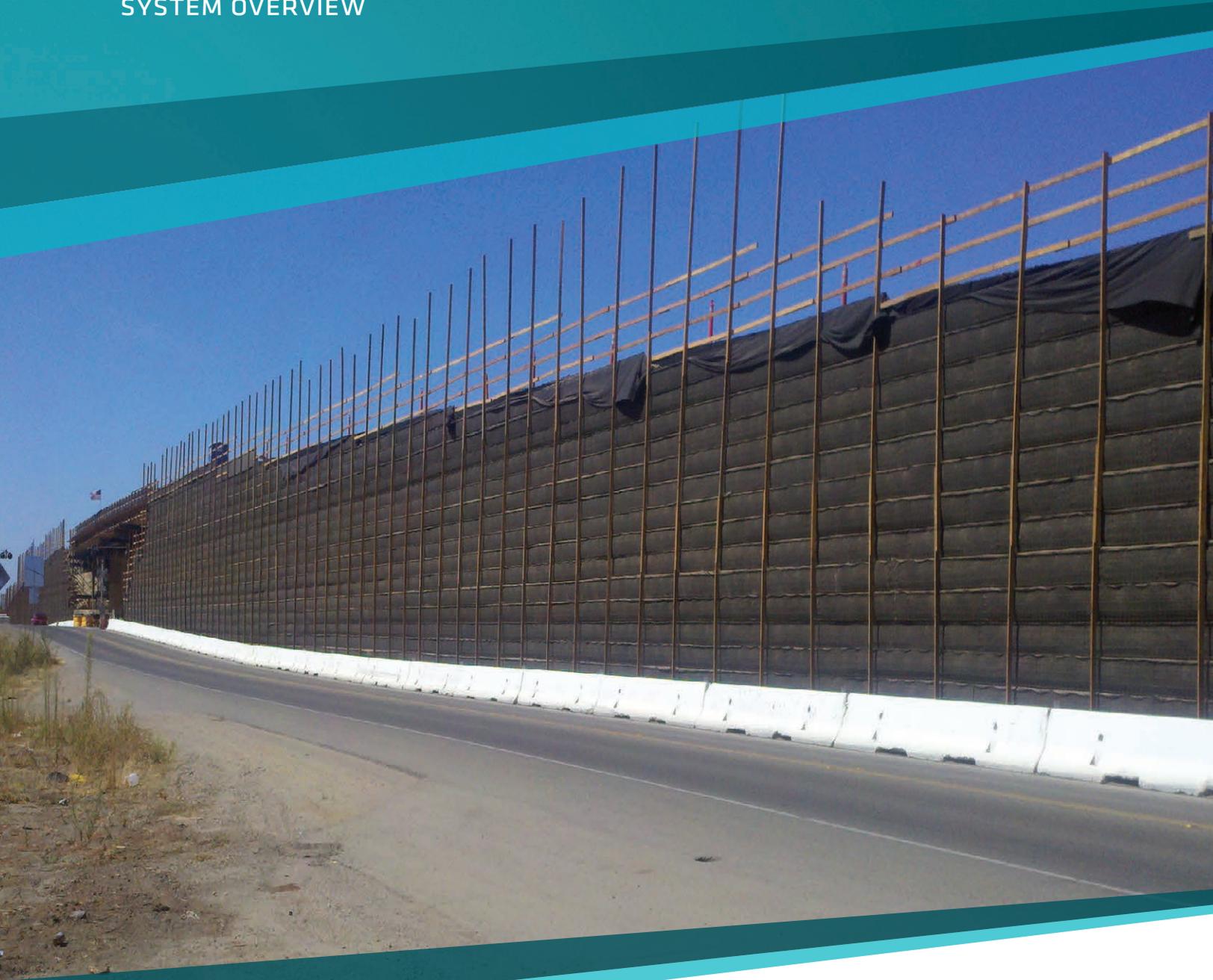


# TENSAR® TEMPORARY RETAINING WALL SYSTEM

SYSTEM OVERVIEW



With lower cost materials, reduced labor and the use of lightweight installation equipment, a Tensar® Temporary Wall is the economical alternative.



## TENSAR® TEMPORARY WALL

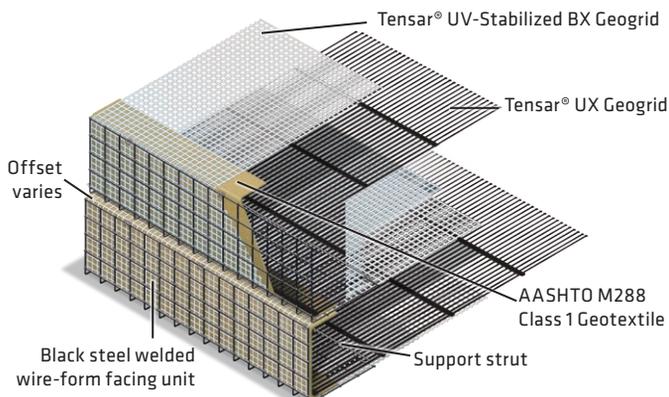
Temporary walls are a necessity for many types of staged construction, but the conventional means for installing them are expensive, requiring heavy lifting and pile-driving equipment. Structures such as soldier piles and lagging walls or sheet piling typically require toe penetration equal to or greater than the wall height, and they may also need secondary bracing or deadmen to retain the fill safely. These walls demand the use of expensive equipment and labor, resulting in significantly increased project costs.

Fortunately, there is a proven technology that allows you to build temporary walls without the challenges and expense of traditional techniques. The Tensar Temporary Retaining Wall System uses an inexpensive wire-form facing system along with Tensar® Geogrids to reinforce the fill. As a result, Tensar Temporary Walls can simplify planning and allow for quicker construction for bridge improvement, road widening, surcharge load cell, phased or staged projects and more. And Tensar Temporary Walls are both durable and flexible; they may be left in place or easily removed as needed.

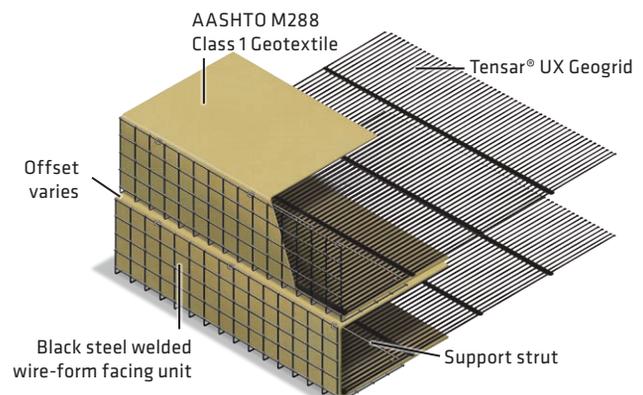
### Tensar Temporary Wall System Components

Component	Function
<b>Tensar® Uniaxial (UX) Geogrids</b>	Primary reinforcement that internally reinforces soil structure and fill materials.
<b>Tensar® UV-Stabilized Biaxial (BX) Geogrids</b>	Secondary reinforcement that provides surficial stability to the wall structure.
<b>Black Steel Welded Wire-Forms</b>	Wire-form baskets that provide temporary facial stability during placement and compaction of fill material, and simplify facing alignment. Dimensions: 18 in. tall x 18 in. deep x 10 in. long.
<b>Black Wire Struts</b>	Struts attach to the Temporary Wall System's basket tail and help stiffen the facing element to maintain alignment.
<b>Geotextiles</b>	Fabric provides a barrier to confine the backfill material.

### Temporary Welded Wire-Form - with UV-Stabilized BX Geogrid and Fabric



### Temporary Welded Wire-Form - with Fabric



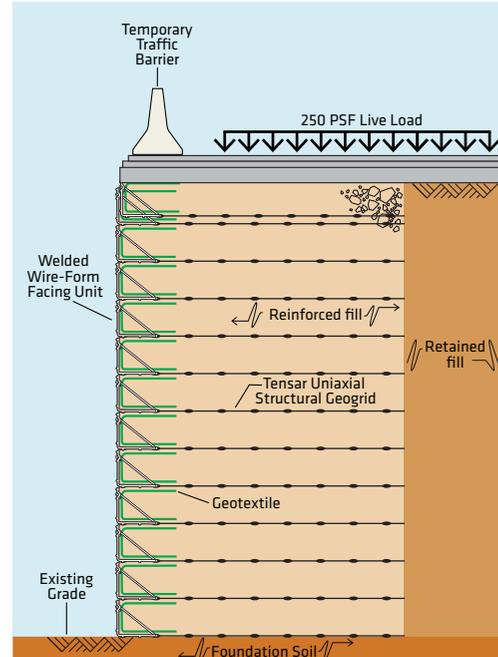
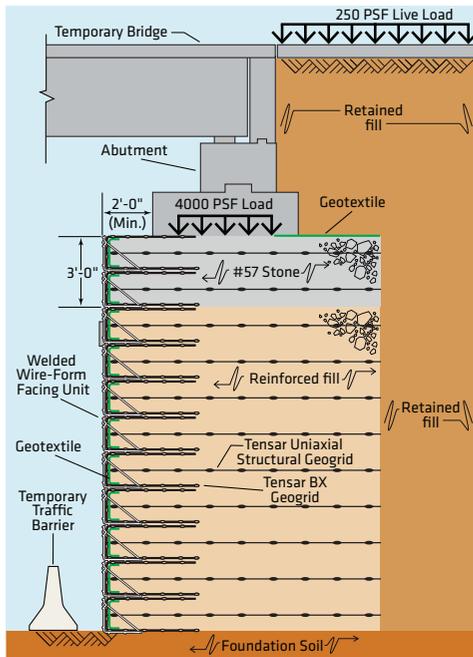


### GARDEN STATE PARKWAY P200.201 – WALL TOWNSHIP, NEW JERSEY

Installation: January-September 2013  
 Quantity: 90,000 sq ft of face  
 Max. Height: 25 ft  
 Owner/Developer: New Jersey Turnpike Authority

### I-40/I-440 DESIGN BUILD – RALEIGH, NORTH CAROLINA

Installation: January 2014  
 Quantity: 7,360 sq ft of face  
 Max. Height: 27 ft  
 Owner/Developer: North Carolina DOT



Northeast Remsco worked with Tensar and Kennedy Companies to design and supply the temporary walls for their project. Temporary walls were indicated in the contract documents but Northeast Remsco opted to use the Tensar® Temporary Wall System to act as piers for the temporary bridge structure at multiple bridge overpasses as well. These temporary piers supported a 4,000 psf surcharge load and were designed and installed as four-sided boxes.

Granite Construction Company contacted Tensar to explore the idea of creating a temporary structure to bridge over an existing highway. The temporary bridge structure would enable the contractor to have access between a concrete batch plant and the construction site, eliminating the need for construction vehicles to enter the highway. Tensar designed temporary walls to support the temporary bridge abutment as well as wing walls for the project with heights upwards of 27 ft.



## TENSAR® GEOGRIDS

Tensor's Grade Separation Solutions owe their long-term performance and durability to high strength Tensor® Uniaxial (UX) Geogrids. Due to their stiff interlocking capabilities, these geogrids stand the test of time, performing better than other commercially available geosynthetics. For more information please visit [www.tensarcorp.com](http://www.tensarcorp.com).

# Temporary Retaining Wall System Design

**Please Note:** The following information is provided for general illustration purposes only and does not constitute engineering advice. The below simplified chart does not consider specific loading conditions (e.g. crane loads, bridge loads, etc...), foundation conditions, global stability concerns, seismic concerns, drainage and other variable construction parameters. It is recommended for preliminary estimating purposes only. Final designs should be executed only by a qualified professional engineer providing sealed drawings, calculations and detailed installation requirements.

## USING THE CHARTS

The generalized design charts address two different design scenarios with wall elevations ranging from 6 ft (1.8 m) to 15 ft (4.5 m). The design scenarios alter the backfill soil type. Understanding these different scenarios is important for selecting the most appropriate solution for your specific design.

- ▶ **Soil Types** – The two backfill soil types are a sand material (32°) and a silty sand or clayey sand (28°) that meet a minimum gradation and plasticity recommendation provided by NCMA or AASHTO
- ▶ **Loading Conditions** – A horizontal surface at the top of the wall with a uniform surcharge of 250 psf

Once the most appropriate design has been selected, the charts will provide the suggested geogrid type, and embedment length with geogrid spacing set at 18 in. All lengths listed are measured from the wall face to the last transverse bar\* on the Tensor® Geogrid and are uniform throughout the given elevation of the wall.

## TENSARSOIL-PRO™ SOFTWARE IS COMPATIBLE WITH ALL MAJOR DESIGN METHODOLOGIES

TensorSoil-PRO Software offers versatile technology that enables you to design grade separation solutions in accordance with all major industry-standard protocols including:

- ▶ National Concrete Masonry Association – (NCMA) 1997
- ▶ Federal Highway Administration – National Highway Institute (FHWA NHI 043) 2001 (AASHTO ASD) 2002
- ▶ American Association of State Highway and Transportation Officials – Load and Resistance Factor Design (AASHTO LRFD) 2010

TensorSoil-PRO Software includes information on all Tensor wall and slope systems. Fully interactive, it allows you to input and easily alter wall/slope geometry, geogrid grade or layout, surcharge load and/or soil characteristics – all on a single screen image – to determine stability data and material costs instantaneously. With each change, results are updated in real time. Once internal and external stability parameters have been determined, design data can be exported to TensorSlope™ Software, our slope stability application, for comprehensive, compound and global stability analyses.

**The design charts assume that the walls are constructed in accordance with the Tensor Temporary Retaining Wall System standard specifications. Other requirements and limitations based on actual site conditions may also apply.**

\*The transverse bar is the solid section of the Tensor® UX Geogrid, approximately 3/4 in. wide, located parallel to the face of the retaining wall and in a repeat pattern at a 6 in. to 20 in. spacing (depending upon the type of UX Geogrid being evaluated).

	REINFORCED BACKFILL SOIL TYPE											
	Sand: $\phi=32^\circ$ ; $\gamma=120$ pcf; $c=0$						Silty Sand/Clayey Sand: $\phi=28^\circ$ ; $\gamma=120$ pcf; $c=0$					
Wall Height (H)	H=6 ft	H=7.5 ft	H=9 ft	H=10.5 ft	H=12 ft	H=15 ft	H=6 ft	H=7.5 ft	H=9 ft	H=10.5 ft	H=12 ft	H=15 ft
Geogrid Length (L)	L=6 ft	L=6 ft	L=7 ft	L=8 ft	L=8.5 ft	L=10.5 ft	L=6.5 ft	L=7.5 ft	L=8.5 ft	L=9.5 ft	L=11 ft	L=12.5 ft
Geogrid Type	UX1100	UX1100	UX1100	UX1100	UX1100	UX1400	UX1100	UX1100	UX1100	UX1100	UX1400	UX1500

For further information, please refer to the TensorSoil-PRO™ Software.



The photo to the left illustrates a CAT 777 weighing approximately 360,000 lbs that is supported by a Tensar Temporary Wall as it drives to the embankment site.

## SR-76 TEMPORARY BRIDGE - SAN DIEGO COUNTY, CALIFORNIA

Installation: May - June 2010

Quantity: 3,000 sq ft of face

Max Height: 20 ft

Owner/Developer: Caltrans

Design Engineer: Tensar International Corporation

General contractor: Flat Iron West, Inc.

**APPLICATION:** To improve traffic flow, the California Department of Transportation (Caltrans) funded projects to expand SR-76 from two lanes to four. One segment of this route required excavating 1.5 million cubic yards of material from cuts to fills. Temporary bridge abutments were required during the expansion in order to keep the project on schedule.

**THE CHALLENGE:** Most of the fill movement involved crossing SR-76 with large, off-road hauling equipment. The traffic volume on SR-76 and time restrictions made this approach impractical.

**THE SOLUTION:** In early 2010, Justin Allington, project manager with contractor Flatiron West, Inc., met with Tensar MSE Specialist Bob Miller and Tensar design engineer Jong Lee to discuss using the Tensar® Temporary Wall System for the bridge abutments.

Although the abutments would be temporary structures, they had to meet the latest AASHTO bridge design specifications. They also had to be capable of supporting half the design dead load of the bridge and half the live load of a fully loaded CAT 777 off-road truck with a gross weight of some 360,000 pounds.

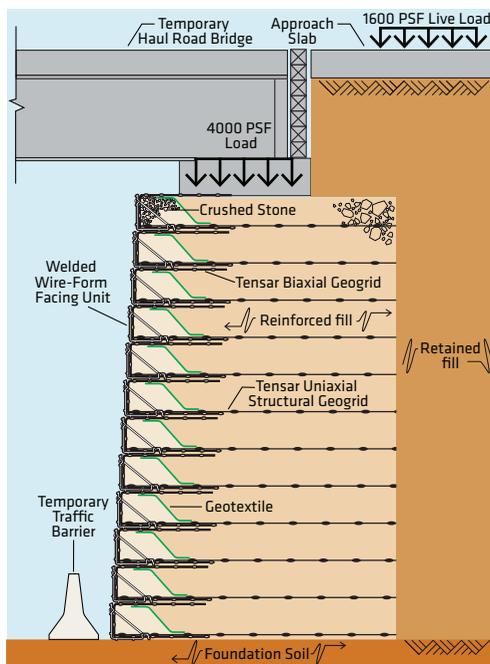
“The Tensar Temporary Wall System was the best option,” says Miller. “It enabled us to create true abutments with the ability to handle very large surcharge loads. That was a big advantage.”

“Caltrans was aware that the proposed temporary bridge would be required to support some very large and heavy haul vehicles,” says Quanyan Liao, Ph.D., P.E. of Caltrans.

After approval, Flatiron’s crew was soon able to construct the temporary bridge and their subcontractor began the essential work of moving the soil from the cuts located along the new alignment. During this phase of work, several fully loaded CAT 777 trucks made hundreds of trips over the bridge on their way to the embankment site.

## EXPERIENCE YOU CAN RELY ON

For innovative solutions to your engineering challenges, rely on the experience, resources and expertise that have set the industry standard for decades. For more information on the Tensar Temporary Retaining Wall System, call **800-TENSAR-1**, visit [www.tensarcorp.com](http://www.tensarcorp.com) or e-mail [info@tensarcorp.com](mailto:info@tensarcorp.com). We can provide you with system specifications, design details, conceptual designs, preliminary cost estimates and much more.



# Tensar®

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