Lightweight, High-Performance Structural Panels—Innovation Description

Cornerstone Research Group 2014 NOVA Award Nomination

Advantic Lightweight, High-Performance Structural Panels

Precast concrete, redefined.

What happens when a highly recognized government and commercial research firm identifies an opportunity to disrupt the conventional construction materials paradigm? Leveraging over a decade of experience in the design, formulation, and production of structural polymer syntactic foams for demanding industry applications, CRG's engineers and scientists have introduced a polymer material system that exceeds nearly all performance capabilities and product forms of precast concrete.

At its fundamental core, Advantic syntactic is a high-performance polymer matrix with embedded hollow microspheres that provides a lightweight, high-strength alternative to precast concrete. CRG advanced materials engineers have augmented the performance to provide customers with tailorable products that can be interchanged seamlessly with many precast concrete applications while providing significant performance advantages.

The benefits of Advantic are many. Base formulations demonstrate a respectable 4,000 psi compressive strength at 35 pcf (compared to 110-150 pcf for concrete), while other formulations have been developed with up to 20,000 psi compressive strength at slightly higher density (50 - 60 pcf). Compared to conventional precast concrete, the substructure required to support the material is significantly reduced and in some cases eliminated. Given their polymeric nature, Advantic panels will never corrode, even when exposed to saltwater. Installation is rapid, simple, and requires lower capacity construction equipment for material handling. Panels in the field can be modified with conventional tools. Custom formulation enables the ability to meet any requisite fire code. Panels are designed to eliminate radio frequency (RF) attenuation, meaning that signal degradation is essentially zero across Advantic barriers and walls. The capability for embedded electronic systems, including lights and sensors, make Advantic the perfect protective material for intelligent building systems. Advantic has been demonstrated as a proficient thermal and acoustic barrier. Custom formulations already developed and delivered demonstrate electrically insulative and blast mitigative properties.

New York City Transit Saves $1 billion with Advantic

Nearly five years ago Thomas Lamb, Chief of Innovation and Technology in the Office of Strategic Innovation and Technology for New York City Transit, approached CRG with a problem: NYCT was at risk of needing a $1 billion upgrade in their communications infrastructure due to RF degradation imposed by the construction of new precast concrete panel closures within the over 800 miles of subways in New York. Did CRG have any material solutions that could meet this electromechanical problem while meeting requirements for fire exposure and cost efficiency?

CRG delivered on all fronts. Advantic syntactic panels were prototyped and delivered for RF and fire testing. After successful demonstration of material performance, CRG value-engineered the installation and connection details to reduce panel installation time from six hours to less than one hour with much reduced labor and equipment requirements. This six-fold decrease in installation time minimizes track downtime for the Transit Authority while reducing the installation cost to the contractor. Ultimately, the combination of advanced materials and value engineering met project performance requirements and afforded significant economic benefits to all parties.

In March of 2014, over 400 Advantic panels were delivered to NYCT's Contractor (EE Cruz) for installation. The Contractor planned to install 80 panels during the first weekend on track shutdown (midnight Friday through 5 am on Monday morning). Approximately 225 panels were installed in less than 48 hours greatly improving upon everyone's expectations. Nearly 1,000 additional panels have been approved with anticipated delivery by mid-summer 2014. CRG's Advantic material continues to be specified in ongoing projects throughout the NYCT system. From a letter of support by Tom Lamb,

> *"CRG has achieved that Idea-to-Innovation process with their Advantic syntactic foam material fashioned into panels here in New York. NOVA should also have a special medal for those who have successfully commercialized innovative materials and products in the highly risk-averse Public Sector!"*

In the spirit of its entrepreneurial business model, CRG recognized that Advantic technology offered a disruptive value proposition to the construction industry and promptly captured intellectual property and spun off a new company, Advantic, LLC. Today, Advantic LLC is actively engaged with owners, architects, engineers, and contractors by providing value-engineered alternatives to precast concrete in many forms and seamlessly integrated into the market by reputable, respected professional engineers. More information is available at Advanticllc.com.

CRG, Inc. Brad Doudican, Ph.D., P.E., and Robert Sullivan, P.E. March 2014

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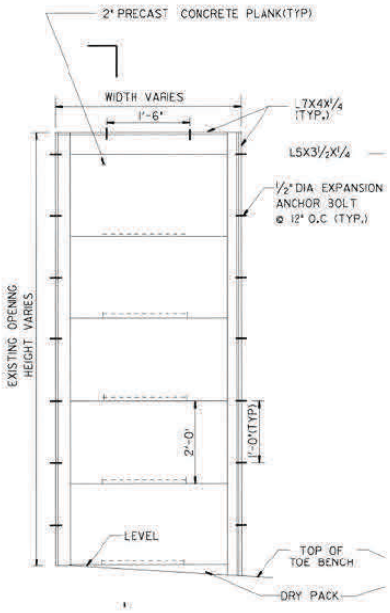
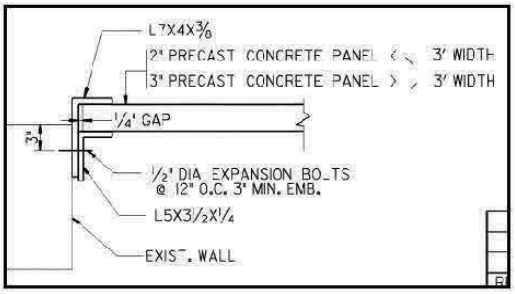
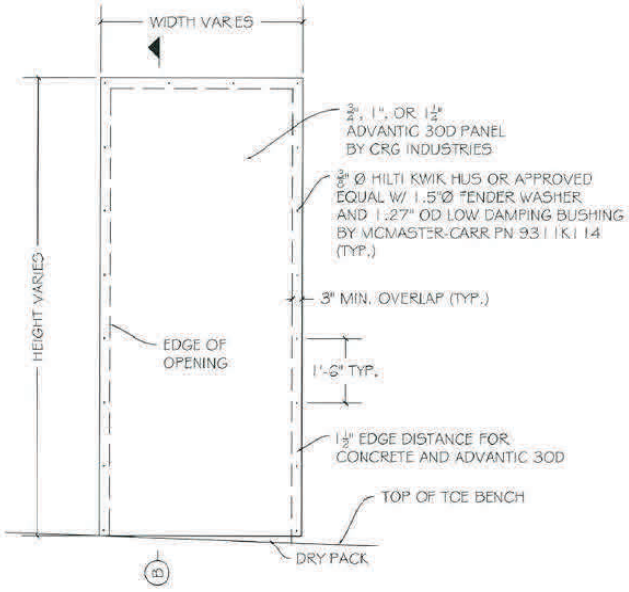
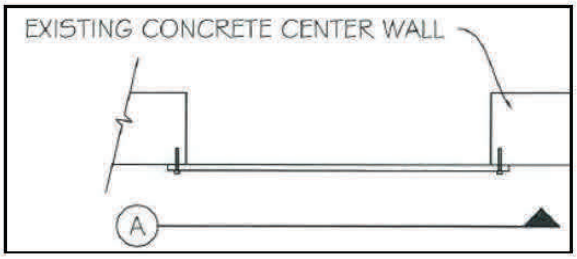




Precast Panel Detail





Advantic Panel Detail

Item	Precast Concrete (lb)	Advantic (lb)
Advantic	853	66
Steel	356	--
System Weight	**1209**	**66**

Advantic Offers:

- ✓ Fewer, lighter anchor bolts
- ✓ No steel angle support infrastructure
- ✓ One piece per opening
- ✓ Reduced installation time and cost
- ✓ RF permeability
- ✓ No corrosion
- ✓ Negligible moisture absorption

New York City Transit Subway Installation 2014

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