

Not many people realize that concrete is the most abundant man-made product on earth. Each year, 2.5 billion tons of new cement is produced and used as a key ingredient to make concrete. However, no one seems to know that for every ton of cement produced, a ton of CO<sub>2</sub> is generated. This makes concrete a big contributor to CO<sub>2</sub> emissions but, more importantly, a big opportunity for CO<sub>2</sub> reduction. If we can improve the CO<sub>2</sub> emissions in the production of concrete the implications for air quality and global warming are clear. If we can produce concrete that lowers its CO<sub>2</sub> impact, we can make a bold and measurable step forward in reducing global warming. If we can create a more durable, high performance concrete, we can reduce the long-term costs of infrastructure replacement and increase safety. If we can do these those things, we've got a remarkable product that will revolutionize the construction industry.

**High Performance Concrete.**

# 2X Green

**Twice as Durable. Infinitely Greener.**



## ■ We can. We do.

2X Green creates green infrastructure, by design. Our 2X Green product cuts the CO<sub>2</sub> signature for concrete. It's more durable, too. In fact, it has twice the durability and service life of ordinary concrete. Using our cost-effective 2X Green product will lower the carbon impact and increase the value of your construction.

2X Green is a high performance concrete that was created to focus on two key areas: durability and CO<sub>2</sub> reduction. It's a truly green concrete that uses industry byproducts to produce a stronger, more durable, concrete that has a lifespan of up to 100 years. 2X Green produces less carbon dioxide than traditional concrete. And, because it's more durable and requires less maintenance, it is also cost-effective.



**(800) 915-9160**

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## Green. Durable. Smart.

Smart engineers, architects, developers, construction companies, cities, and planners are demanding more durable concretes. Federal Highway Administration (FHWA) surveys show that state and local officials are insisting on better performance, as well. Ordinary products just can't meet these new standards. Transportation officials want durability, extended service life, corrosion resistance and reduced maintenance. Water managers want to revitalize old systems and

ensure that new infrastructure protects water quality and reduces costs, losses, leaks, overflows, inefficiency and system failure.

The EPA says that by using waste by-products in cement mixes, concrete structures can reduce green house gases by more than 50 percent. FHWA research showed that the blend of waste byproducts with Portland cement produces a more durable product. 2X Green's custom blends produce durability while reducing greenhouse gasses.

## Selected Performance Characteristics for HPC

Performance Characteristic	Standard Test Method	FHWA HPC Performance Grade <sup>A</sup>		
		1	2	3
<b>Freeze-Thaw Durability</b> (x=relative dynamic modulus of elasticity after 300 cycles)	AASHTO T 161 ASTM C 666 Proc. A	$60\% \leq x \leq 80\%$	$80\% \leq x$	
<b>Chloride Permeability</b> (x=coulombs)	AASHTO T 277 ASTM C 1202	$2000 < x \leq 3000$	$800 < x \leq 2000$	$x \leq 800$
<b>Strength</b> (x=compressive strength, ksi)	AASHTO T 22 ASTM C 39	$6 \leq x < 8$ ksi	$8 \leq x < 10$ ksi	$10 \leq x < 14$ ksi
<b>Elasticity</b> (x=modulus of elasticity, GPa)	ASTM C 469	$24 \leq x < 40$ GPa	$40 \leq x < 50$ GPa	$x \geq 50$ GPa
<b>Shrinkage</b> (x=microstrain)	AASHTO T 160 ASTM C 157	$800 > x \geq 600$	$600 > x \geq 400$	$400 > x$

**Source:** CWR for Duracoat; U.S. Federal Highway Administration (FHWA) for Grades 1, 2 and 3

**Notes:** A – Per FHWA, a given HPC mix design is specified by a grade for each desired performance characteristic. For example, a concrete may perform at Grade 3 in strength and elasticity, Grade 2 in shrinkage and scaling resistance, and Grade 2 in all other categories.

## Green. Durable. Custom.

If the outcome were simply about blending waste byproducts with cement, anyone could do it. The benefit of 2X Green is that we can customize our blend to meet your performance specifications. This is true whether you want to use our product for precast drainage

or bridge construction. Asset owners can specify the performance standards for their project with the assurance that they will get the desired consistent performance.

## Green. Durable. Results.

Our technical team includes some of the most respected cement and concrete experts in North America. Collectively, our team has authored hundreds of technical papers and numerous books on high performance concrete and its applications. They are Fellows with the American Concrete Institute and other professional and research organizations. We've coupled our experts with some of the largest and most experienced cement and precast firms in the world to produce a line of high performance concrete products. These products work for new construction or the renewal of drainage pipes, catch basins, manholes, inlets and culverts.

For example, our Duracoat™ product offers an efficient, cost-effective solution that makes old systems more efficient, and in the process, helps protect water and air quality...all for less money.

Duracoat™ is the strongest and most durable concrete liner on the market today. It is an ultra-high performance concrete (UHPC) that is a fiber-reinforced pre-blended concrete mix. It's composed of highly specific cement, silica fume, silica flour and silica sand.

Reduced CO2. Improved performance. Green concrete. 2X Green.

Individually and collectively, our products including 2X Green, Duracoat™ and Lifespan® provide management solutions for water and transportation infrastructure. For every ton of cement produced, a ton of CO2 is generated. Each year, 2.5 billion tons of cement is produced. Let us optimize your concrete to improve your product and your environmental contribution.

