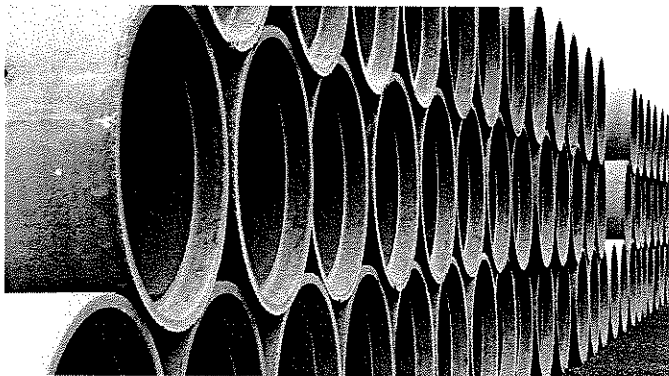
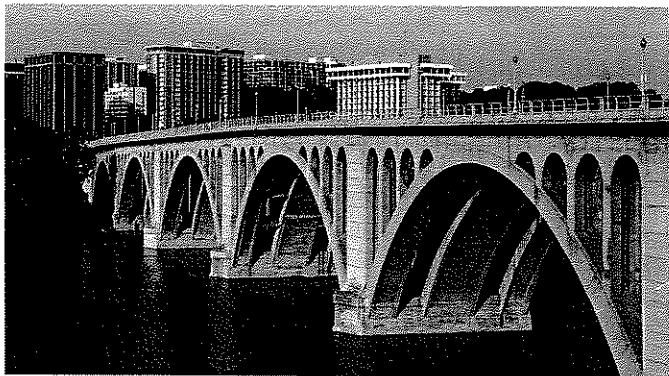
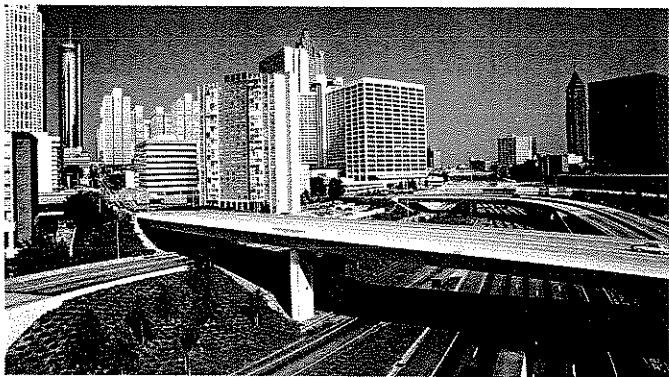


Drainage Infrastructure

High Performance Concrete



How can we improve the cost-effectiveness and durability of the nation's drainage infrastructure? The answer is simple. Demand high performance concrete and require the same performance specifications for drainage structures that most transportation structures now have in place.

FACT: As a result of the Federal Highway Administration's groundbreaking work on infrastructure material, use of high performance concrete has become common in the construction of the nation's transportation structures.

FACT: In many states, more than 85 percent of all new transportation structures are now made from high performance concrete.

FACT: Drainage facilities are exposed to the same abrasion, corrosion and erosion as transportation structures.

FACT: Drainage structures are not yet required to meet the same performance specifications and service life standards as found in high performance concrete transportation structures.

FACT: Existing drainage structures can be renewed to meet a higher performance specification and service life standard.

FACT: *High performance concrete IS the solution.*



Clean Water Resources
Products, Solutions and Private Funding
for Clean Water Infrastructure Renewal

Why High Performance Concrete?

Since 1990, the Federal Highway Administration and a large number of State Departments of Transportation have been actively involved in promoting the use of high performance concrete (HPC) as the infrastructure material of choice for use in the construction of the nation's roadways and bridges. Surveys undertaken by the FHWA's HPC Technology Delivery Team have shown that state DOT's would like to pursue increased performance in the areas of durability, service life, maintenance and corrosion resistance – all of which are areas that high performance concrete is now addressing.

2003 FHWA Survey	VA	FL	TX	CA	NY	Average
High Durability	5	1	5	5	5	4.2
Longer Service Life	5	5	4	5	3	4.4
Minimum Maintenance	5	5	4	3	3	4.0
High Corrosion Resistance	5	1	4	3	5	3.6

Key: 5 = High Interest; 1 = Low Interest

The most recent survey by the FHWA shows that the adoption of high performance concrete has happened at a very rapid rate, with the use and specification increasing every year. In many states, more than 85 percent of all new transportation structures were constructed using high performance concrete.

Drainage Facilities

Every road and bridge in the country incorporates some type of drainage facility. And, that drainage system is exposed to the same elements as the road or bridge and is as susceptible to the same deterioration as the transportation structure.

FHWA's report "Culvert Pipe Liner Guide and Specifications" published in June 2005, said, "Drainage facilities, such as culverts, decay due to the processes of abrasion, corrosion, and erosion, shortening the anticipated service life of the facility. Many culverts have deteriorated and need repair or replacement."

Thus, it only makes sense to have the same performance specifications for construction of the drainage facilities that are connected to the transportation structures throughout the country. The use of high performance concrete in drainage facilities would improve durability, extend service life, minimize maintenance and reduce the effects of corrosion.

Performance Specifications

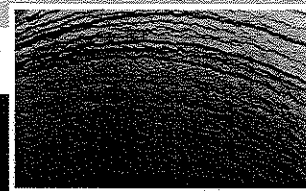
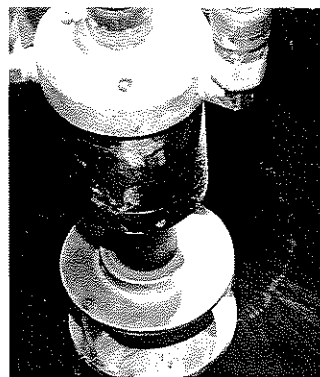
Concrete continues to be a great material for infrastructure. The development of new admixtures, minerals and aggregates has led to concretes that can provide a service life of 100 years.

Because today's drainage structures are manufactured in controlled environments at plants that are certified by the National Precast Concrete Association and others, asset owners can specify the performance standards they want with the assurance that they will get a consistent quality product. Asset owners can – *and should* – specify drainage structures made from high performance concrete that will meet or exceed the specifications they now have in place for transportation structures.

Is it *really possible* for drainage and transportation structures to be constructed to the same performance specifications?

Absolutely.

Finished, renewed drainage pipe >



< Duracoat™ being applied to a concrete drainage pipe.

Introducing CWR's

High Performance Concrete Product Solutions

Not only are high performance concrete drainage solutions *possible*....they are *now* in operation. CWR works with the largest and most experienced cement and precast firms in the world to deliver a line of high performance concrete product solutions for the construction of drainage pipes, catch basins, manholes, inlets and culverts. The renewal of drainage pipes using high performance concrete is currently underway in the U.S. Midwest.

Duracoat™ HPC Liner for Drainage Structures		
Material Properties at 28 days, unless otherwise indicated		
	ASTM	Result
Compressive Strength	C109/C109M-05	15,000 psi
Permeability	C1202	325 coulombs
Bond Strength	C882-99	2,800 psi (at 7 days)
Freeze/Thaw	C666	100% (no loss after 300 cycles)

We have the manufacturing and technical experts in place to produce high performance concrete products that will mirror the *performance standards* and *service life* adopted for today's transportation structures. The CWR HPC solutions *minimize maintenance* and provide greater *durability* against abrasion, *corrosion* and erosion. Additionally, these materials can be shotcrete as a liner to repair and renew existing pipe, catch basins, manholes, inlets and culverts to new performance specifications.

High performance concrete drainage solutions are *real*. And they're available *now* from **Clean Water Resources**. Together, we *can* address your priorities.



To learn more about the CWR High Performance Concrete Product Solutions, call or click.
 CWR Holdings, LLC • Fairfield, Connecticut
 203-659-1300 • www.CleanWaterResources.com