Fall 2010

THE CONNCRETE TIMES

The Connecticut Concrete Promotion Council (CCPC) of the Connecticut Ready Mixed Concrete Association
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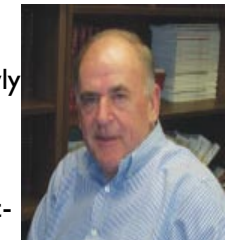
DIRECTOR'S MESSAGE



The 2010 construction window is slowly closing; major projects have been bid for future construction. Although the housing market remains stagnant, the foundation for the concrete marketplace is awaiting some positive signals. Along with some of our members (Builders Concrete, Enfield Transit/Mix, J. J. Mottes and L. Suzio Concrete) the Connecticut Concrete Promotion Council contributed to the building of facilities at Camp Courant Channel 3 Kid's Camp in Hebron. The contributions were recognized with a dinner reception at the facility and a framed painting by Camp Courant children. CCPC membership has demonstrated its generosity numerous times. The Habitat for Humanity, the Home Builders Association's and Camp Courant program are a few examples.

Pervious concrete has been CCPC's promotion focal point. The Green Capitol initiative at the State Capitol in Hartford is in its completion stage. Walks surrounding the Capitol have been replaced with pervious concrete. Another major project is a 90,000 sq.ft. pervious concrete parking facility at the world headquarters of Subway Sandwich in Milford. These projects are opportunities to educate designers and owners.

I want to thank our membership for their support and look forward to a growing and improved 2011.

All the best,

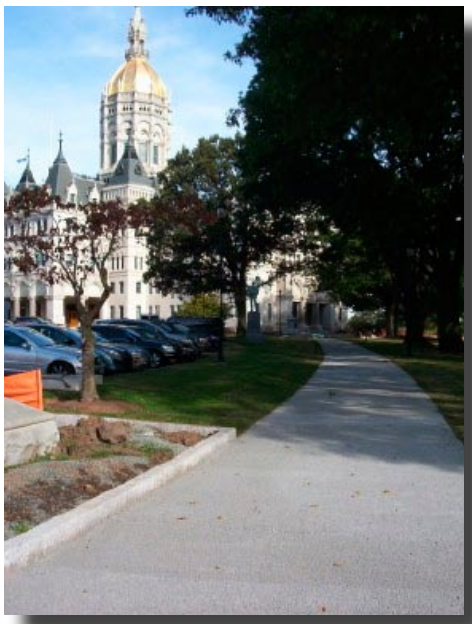
Jim Langlois

ON THE CONCRETE SCENE

PERVIOUS CONCRETE HELPS "GREEN" THE STATE CAPITOL

by Jim Langlois

On August 25, Governor M. Jodi Rell announced, "We want Connecticut's State Capitol to serve as a model for the benefits and the beauty of low impact development." The Governor noted, "These cost-effective ways of improving the grounds at the State Capitol will provide visitors with the opportunity to see how a green environment can be created."



Pervious concrete was installed in walkways, patio areas and sidewalks. This one million-dollar project aims to reduce stormwater runoff while demonstrating to cities, towns, developers and homeowners the value of "green" techniques. It incorporates "green roofs, rain gardens, rain harvesting and porous surfaces." The owner of the project is the State Capitol Building with oversight and funding from the U.S. Department of Environmental Protection (EPA) and the Connecticut Department of Environmental Protection (DEP). The Metropolitan District Commission

Continued on inside back cover

CCPC PROFESSIONAL MEMBERS

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FOR THE RECORD

AT THE CAPITOL

By Matthew Hallisey

Update on Low-Impact Development and EPA's Proposed Fly Ash Rule

The state Department of Environmental Protection has been evaluating Low-Impact Development (LID) principles for several months to incorporate them into Stormwater General Permits (SGPs). The evaluation process includes a series of consultant-facilitated meetings with stakeholders, including CCPC. LID presents an opportunity for future use of pervious concrete in construction.

The specific goals and objectives of the process are to: Establish LID and pollution prevention, performance goals, and criteria for best management practices (BMPs) common to SGP implementation; identify how the performance goals and criteria can be most effectively incorporated into the SGP to meet permit limits and conditions; and identify mechanisms for incorporating LID BMPs and pollution prevention practices into the SGP for priority attention.

A recent stakeholder meeting was held in October. DEP plans to complete the process and make recommendations by December 15, 2010.

On the federal rule making front, CRMCA and CCPC wrote recently to the U.S. Environmental Protection Agency to oppose classifying fly ash as hazardous waste in a proposed rule regulating the disposal of coal combustion residuals generated from the combustion of coal at electric utilities and by independent power producers.

CRMCA and CCPC argued that regulating fly ash as hazardous waste would have a significant adverse impact on the ready mix concrete industry, eliminating its availability would result in cost increases that could render concrete non-competitive, its use in concrete is safe, and the rule would be counterproductive because fly ash that was once used in a beneficial way would end up in landfills. The organizations requested that the agency instead reduce the amount of fly ash wasted and ensure that it is managed properly.

EPA had planned to have the rule in place this year. However, in response to numerous requests for an extension of the comment period, the agency extended the deadline for submitting written comments on the proposed rule to November 19, 2010.

STRATEGIES FOR SUCCESS

Schedule, registration forms, and information available at CCPC office.

ACI FIELD TECH CERTIFICATION
CCIA Offices and Tilcon
Jan. 13, 15, 20 and 22, 2011

WORLD of CONCRETE
Las Vegas Convention Center, Las Vegas, NV
Jan. 17-21, 2011

ACI FIELD TECH CERTIFICATION
CCIA Offices and Tilcon
Mar. 3, 5, 10 and 12, 2011

NRMCA CON-AGG EXPO
Convention Center, Las Vegas, NV
Mar. 22-26, 2011

ACI FLATWORK FINISHERS CERTIFICATION
CCIA Offices
Mar. 31 and Apr. 2, 2011

ACI FIELD TECH CERTIFICATION
CCIA Offices and Tilcon
May 5 and 7, 2011

ACI FIELD TECH CERTIFICATION
CCIA Offices and Tilcon
Sept. 8, 10, 15 and 17, 2011

ACI FIELD TECH CERTIFICATION
CCIA Offices and Tilcon
Oct. 27, 29 and Nov. 3 and 5, 2011

SETTING NEW SITES

NRMCA-REGIONAL PROMOTION

from Douglas O'Neill, LEED® AP
National Resource Director, National Ready Mixed Concrete Association

Human Nature, Not EPA, Will Exclude Fly Ash in Concrete

Sustainability is a topic that the building industry has firmly embraced, from new methods of construction to product suppliers offering more sustainable building materials. The ready mixed concrete industry has recognized for many years the environmental benefits of concrete and slowly the message is being heard. Examples of where ready mixed concrete fits in with sustainability can be found in areas like reducing the urban heat island effect by using light colored pavements, managing stormwater runoff with pervious concrete or by the fact that concrete and it's ingredients for the most part are harvested and produced locally thus reducing the transportation costs of getting the material to the job site. One of the most well known environmental features of the use of ready mixed concrete is that our industry has figured out a way to use other industries industrial by-products, like fly-ash, silica fume and slag, in our mixes to actually enhance the qualities and performance of concrete. What a great success story! Materials that would otherwise be headed to our already cramped landfill systems are being put to good use by the concrete industry which ultimately helps reduce the amount of CO_2 released into our atmosphere.

Recently the US Environmental Protection Agency (EPA) has been reviewing the possibility of classifying coal combustion by-products (including fly ash) as a hazardous waste, perhaps in part due to the Tennessee Valley Authority's (TVA's) ash spill several years ago in Tennessee that sent 5.4 million cubic yards of coal ash sludge into the Emory River and onto surrounding areas. This proposed ruling will likely exempt from the hazardous waste designation any " beneficial use" of fly ash such as in concrete. Despite the fact that no final rule has been approved, the "hazardous" label appears to have already effected some in the design community who are now prohibiting the use of fly ash because of the potential future "hazardous" designation. NRMCA is collecting examples of these changes to specification for specific projects and presenting them to EPA at the end of the public hearing period in mid-November to demonstrate that as a result of the proposed rule, less fly ash will be used in the future.

Human nature being what it is, if the EPA does rule fly ash a hazardous material, what homeowner or school board would possibly approve the use of fly ash in their concrete? Even if they were made aware of the special "beneficial use" designation, why would they take the chance and why would the design teams even bother with fly ash given the possibility of future legal action due to the hazardous implication. Ultimately human nature will exclude the use of fly ash in concrete which will negate any positive effects the EPA hopes to gain by classifying fly ash as hazardous. Costs will go up and fly ash usage in beneficial applications will go down.

Impact of Project Specifications on Sustainable Development

By Colin Lobo, Senior Vice President, Engineering, NRMCA

The ready mixed concrete industry has been proactive in recognizing the challenges and opportunities resulting with the trend toward sustainable development in construction. NRMCA Sustainability Initiatives, endorsed by the membership, establish goals for reducing the overall environmental footprint of concrete materials and production and establish strategies and credits for achieving these goals. Specifically, the goals include minimizing energy use, reducing CO_2 footprint of concrete, reducing potable water use, reducing waste and increasing the use of recycled content. Other initiatives supported by the NRMCA membership include the Green-Star certification for concrete production facilities and the Sustainable Plant Guidelines that will document continuous improvement toward sustainable concrete production.

Aspects of project specifications, however, restrict the industry toward achieving its sustainable goals. Some of these are based on code requirements. Some are based on prescriptive limits invoked for an intended performance attribute. It is generally accepted that project specifications that minimize prescriptions or that incorporate performance-based requirements allow knowledgeable concrete suppliers to optimize concrete mixtures for performance required in its plastic and hardened states. The NRMCA P2P Initiative has been working to evolve specifications to performance-based requirements. Some of the typical specification requirements that impact sustainable construction identified by the committee are briefly discussed in this article.

The general concepts are that specifications should permit the use of regionally available materials that minimize transportation, avoiding restrictions on material ingredients beyond those in reference material specifications, permit the ability to increase the recycled content in concrete mixtures and minimize waste incurring disposal management and cost, minimize the carbon footprint of concrete mixtures, and incorporate aspects that maximize the environmental (life cycle assessment) and service life performance of concrete as a construction material.

Restriction on ingredient materials

Specifications place restrictions on the source and type of ingredient materials that can be used in concrete. These restrictions may force the use of materials unfamiliar to the producer, require a greater over-design, cause incompatibility with other materials and require material to be transported longer distance. In most cases, concrete mixtures can be optimized with available materials to meet the needs of a project. Prohibiting acceptable products inhibits the concrete producer from optimizing concrete mixtures. These restrictions do not support sustainable development and can adversely impact performance of concrete.

Cement Type and source: Specifications often restrict a type (e.g. ASTM Type II) of cement or restrict use to certain sources. These are appropriate only if there is a code requirement or specific reason for durability or other property.

Cement Specification: Specifications often restrict the use of cements conforming to ASTM C150. Blended cements conforming to ASTM C595 and performance cements conforming to ASTM C1157 are optimized for performance by cement manufacturers and often have a lower carbon footprint per unit of product.

Low alkali cement: Specifications often require the use of a low alkali cement to minimize the occurrence of deleterious expansive cracking due to alkali silica reactions. Manufacturing low alkali cements increases the use of natural resources and energy and increases the generation of cement kiln dust (CKD) as a waste byproduct. Mitigation of alkali silica reactions with locally available potentially reactive aggregates can be accomplished and documented by tests using supplementary cementitious materials and admixtures.

Type and characteristics of SCMs: Specifications often prohibit the use of some types of supplementary cementitious materials or impose restrictions over and above those in the material specifications – such as on alkali content, loss on ignition or grade of slag cement. These will prevent the use of locally available materials that likely have good past performance and will require materials to be imported.

Type and brand of admixtures: Most specifications include a list of specific admixture brands and suppliers. There are situations where specifying a specific brand is appropriate for performance or historical reasons. Concrete producers have experience with use of certain products and forcing the use of a new product will impact the ability of the concrete producer to provide concrete mixtures of consistent quality and performance.

Type and source of aggregate: Specifications may restrict the aggregate type and require the use of a specific source – crushed vs. gravel, mineralogy, specific supplier or source, etc.

Characteristics of aggregates: Specifications often place restrictions on the characteristics of aggregates, such as grading, specific gravity,

particle shape and size. In some areas, local aggregate supplies may not comply with all requirements of referenced specifications, such as ASTM C33, but have a good history of use.

Use of potable water: ASTM C1602 addresses the quality of water that can be used to produce concrete and includes provisions to permit the use of non-potable water with proper testing and evaluation. Specifications that require the use of potable water detract from the development and use of sound environmental management practice and negate the associated capital investment for best environmental management practices at concrete production facilities.

Recycled materials and aggregates: There are applications for concrete that can accommodate the use of recycled aggregates or other materials with minimal impact to concrete quality. Crushed returned concrete can be used as a portion of the aggregate in structural fills and footing applications, for example, and conserves virgin material resources. The use of recycled material can contribute to credits in green construction rating systems. The use of crushed concrete as aggregate is recognized in industry standards. Judicious use of these materials conserves natural resources and landfill space with minimal impact to required performance.

Requirements on concrete mixtures

Some limitations on concrete mixtures in project specifications impact the ability to optimize the mixtures for placement, can result in significant overdesign or adversely impact other properties. In most cases these requirements will detract from sustainable concrete mixtures.

Minimum cement content: Many specifications impose minimum cement contents for different classes of concrete. These limits impact meeting environmental goals with questionable benefits to quality, performance and durability.

Quantity of SCM: Specifications place maximum limits on the quantity of supplementary cementitious materials. This prevents optimizing concrete mixtures for performance and durability. The only code restriction on the quantity of SCM is for exterior concrete subject to application of deicing chemicals.

Increasingly, projects seeking green construction credits impose prescriptive requirements on concrete mixtures, such as a minimum replacement for cement or minimum recycled content. These requirements can often impact the performance of fresh and hardened concrete properties, such as setting characteristics, ability to place and finish and rate of development of in-place properties. In the long run this may impact the quality of construction or the service life of the structure.

Max w/cm when not required: The code requires the use of a maximum w/cm for durability and assigns a minimum specified strength that is in alignment with the required w/cm. Many specifications invoke limits on w/cm for elements not subject to severe service exposure conditions. This includes all interior concrete. Imposing a low w/cm limit likely increases the cement content of concrete mixtures and affects the ability to place and finish concrete.

Inconsistent specified strength to design: Concrete members in a structure are often designed for different strength levels – requirements for foundations may differ from beams and columns; slabs may have different requirements. Specifications may, however, specify the same class for all concrete on a project. This can cause problems during placing and finishing some members. There are considerable cost savings and environmental benefits if the concrete is specified as required for the different structural members on a project. When a higher strength is specified, the designer should use that to advantage when designing the structure and minimize section size when applicable.

Air content: Most specifications require a constant air content requirement regardless of aggregate size and often increase it, assuming this will improve freeze-thaw durability. Air content requirements for concrete vary by aggregate size. In many exterior vertical members that will not be critically saturated and have a high strength and for interior concrete, air entrained concrete may not be required. Air content reduces strength and additional cement is required to offset this strength decrease. This can result in increased propensity for thermal and shrinkage cracking.

Restriction on changes to mixtures: Ingredient materials vary as do environmental conditions at the project. Real time adjustments are necessary to concrete batches to accommodate these variations and to ensure consistent concrete characteristics. Several specifications prohibit such minor changes to concrete unless a submittal, often with supporting test data, is provided to the engineer of record. It is recognized that the engineer of record should be notified for major revisions to mixtures, but this prohibition can cause considerable variation to concrete performance.

Use of test record for submittals: Specifications often indicate that the concrete mixture should be designed to produce an average strength at a fixed value greater than the specified strength. This essentially prohibits the use of a past test record that allows for a statistically based average strength level that can be lower than that set by the specification. This benefits concrete producers that have good control to optimize concrete mixtures to a lower strength level and thereby conserve materials.

Reliable testing

Test results are used to establish the average strength for concrete mixtures. Improper testing contributes a significant component of the variability of test results that will increase the required average strength for future projects. When concrete producers are aware of improper testing, they protect themselves by increasing the cementitious materials in concrete mixtures. Owners should select testing agencies based on quality of work, conformance to ASTM C1077 and having certified personnel performing testing.

Conclusion

Requirements in project specifications need to be in concert with the goals for sustainable concrete construction. Some examples where these do not work hand-in-hand are illustrated. The evolution toward performance specifications that address the needs of the contractor for placing concrete and the design professional for the structural and serviceability requirements of the structure needs to occur. Specifications should permit the appropriate flexibility for conserving resources and facilitating innovation. Concrete construction needs to be competitive with other building materials in the current environment that emphasizes on green and sustainable construction. ■

This article is an excerpt from a document on specifications and sustainability under development by the NRMCA P2P Steering Committee. For more information, contact Dr. Lobo at clobo@nrmca.org.

The Pervious Concrete signage (courtesy of CCPC) (right) and the State of Connecticut signage (below) shown are designated to be placed throughout the grounds at the State Capitol.

In addition, on-going tours by the League of Women Voters will provide visitors with informative handouts describing the pervious concrete "green" installation. All of this will give emphasis and exposure to the benefits of low impact development of pervious concrete.

Pervious Concrete

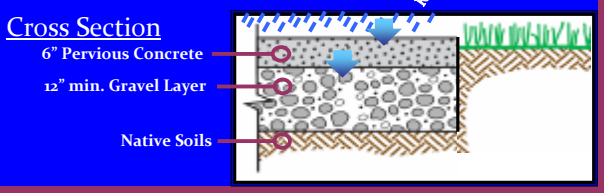
This Concrete is Full of Holes

The new concrete pavement in this area is pervious, allowing water to drain through it. The sand and other fine particles usually mixed into concrete were left out so that small holes, called "voids", remain in the concrete. Rain and melting snow drain through these voids down into a layer of gravel then into the ground.

Why is it Better Than Traditional Pavements?

On traditional impervious pavements, rainwater runs off the pavement, empties into storm sewers, and ends up in creeks. Pervious concrete allows that rainwater to drain directly below. This slows the flow of water, reducing the flooding of sewers and creeks, and recharges the groundwater on site as nature intended. The rainwater is also cleansed through the filtration process of the pavement layers. Another benefit of pervious concrete is that it reduces or eliminates standing water and ice on the pavement, making it safer for all who use it.

Cross Section



Sign courtesy of: The Connecticut Concrete Promotion Council

Jim Langlois | p: 860-529-6855 | www.ctconstruction.org

Above and right: View of Walkway from East Portico to Parking Lot.

Right: Statue at East Portico with Special Pervious Placement.

Above: View of Walkway and Steps from West Portico

Continued from front page

(MDC) was responsible for the construction management of the project and final engineering design was completed by Camp, Dresser, McKee (CDM). Laydon Industries,LLC, was the pervious concrete placement contractor and Tilcon Connecticut Inc. supplied the pervious concrete for the project.

Placement of pervious concrete began on August 26th and was completed on November 5th. Approximately 21,000 square feet of impervious materials in the walkways and sidewalks was replaced with pervious concrete. The walks will be an integral portion of the walking tours of the State Capitol and informational handouts and signage will explain the function of pervious concrete and its application regarding stormwater runoff.

The Connecticut Concrete Promotion Council held workshops for the MDC during 2010 in order to better familiarize the MDC engineers of the nuances of pervious concrete. CCPC will hold informational meetings with the State Capitol representatives to discuss maintenance and winter weather treatment of the pervious. MDC Chief Executive Officer Charles Sheehan stated, "We believe the Green Capitols project will demonstrate alternatives to traditional pipes and catch basins for the management of storm water. Adoption of green alternatives will result in the diversion of this water from our sewer system."

Above: Testing Porosity of Pervious One Day After Placement

The CCPC is very grateful for the opportunity to discuss the value of pervious concrete and its importance in future "green" projects as a remedy to stormwater runoff. This project is one of the most visible pervious concrete construction projects undertaken in the United States.

Above: Pervious Concrete (detail)

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Your CONNCRETE TIMES CONNECTION

IN THIS ISSUE

EXPANDED ISSUE:

Pervious Concrete Helps "Green" The State Capitol

Update on Low-Impact Development and EPA's Proposed Fly Ash Rule

Human Nature, Not EPA, Will Exclude Fly Ash in Concrete

Impact of Project Specifications on Sustainable Development

Strategies for Success

Newsletter Concept and Design:
Ann Beaudin and Andrea L. Beaudin

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To become a member of a growing professional trade organization, contact Jim Langlois at CCPC 860.529.6855