February 2012
Volume 19 • Number 1

Interlocking CONCRETE PAVEMENT MAGAZINE

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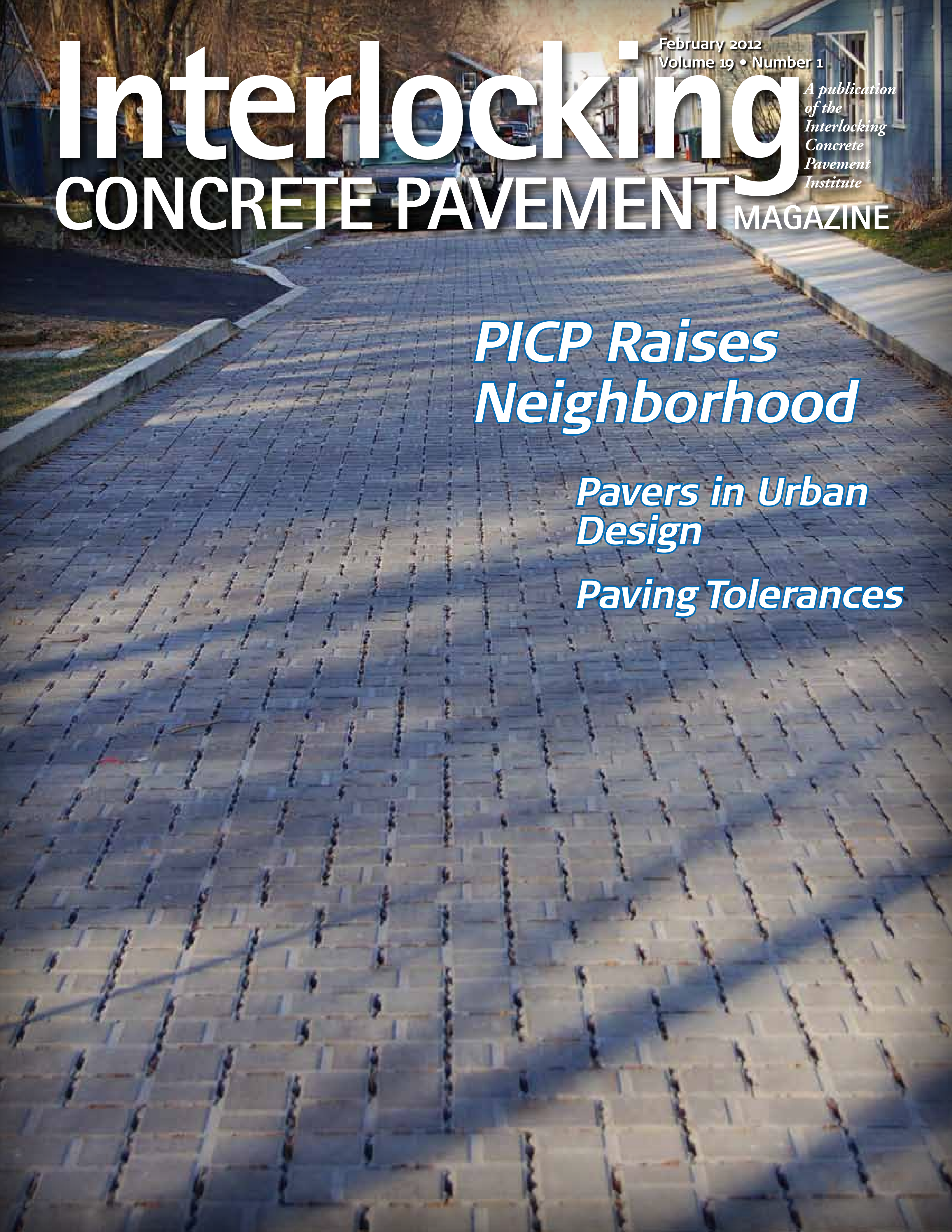

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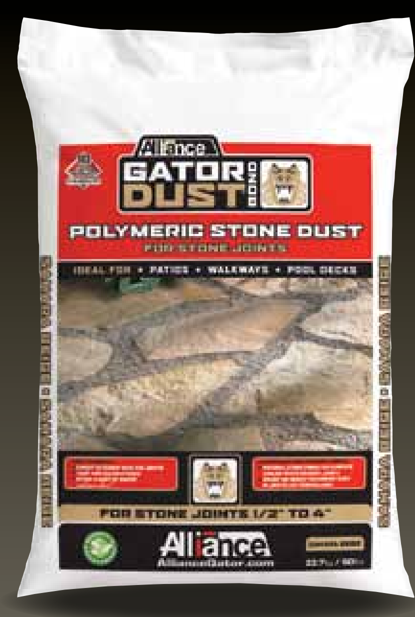

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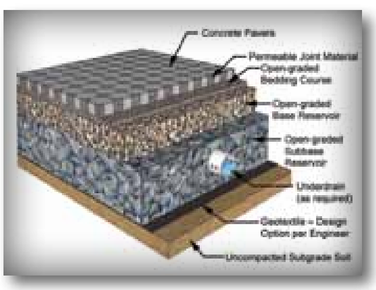

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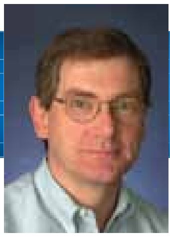

From the Editor

David R. Smith

The Last Teenage Year

Do you remember when you turned 19 years old? High school was behind you and bigger challenges lay ahead. Some of them were involved finding work and eventually a career. For others, 19 meant heading off to college. In either case, the world and life's options ahead often became clearer, or maybe more confusing because there were so many of them. The last teenage year represents moving onto greater responsibilities and potentials, and yes, a year closer to the legal drinking age.

This magazine turns 19 this year and the Interlocking Concrete Pavement Institute (ICPI) turns 20 next year. Those who look after the future of the magazine within ICPI are searching out new options and possibilities in design, content, and a possible greater online presence, especially for contractors. In the next year or so, we anticipate this publication evolving into a greater role in providing more technical and design ideas to architects, engineers and landscape architects. We will still continue to provide stories on unique projects that solved specific problems while lifting the look and feel of places. We covet your ideas and feedback, and we will publish your unique projects with emphasis on who designed them, why and how.

This issue provides all of these. The cover story describes how a small and struggling community used permeable pavement to transform a street visually, functionally and environmentally. As a favorite topic, urban design possibilities with segmental paving unfolds with a story that borrows concepts from a recent national streets conference.

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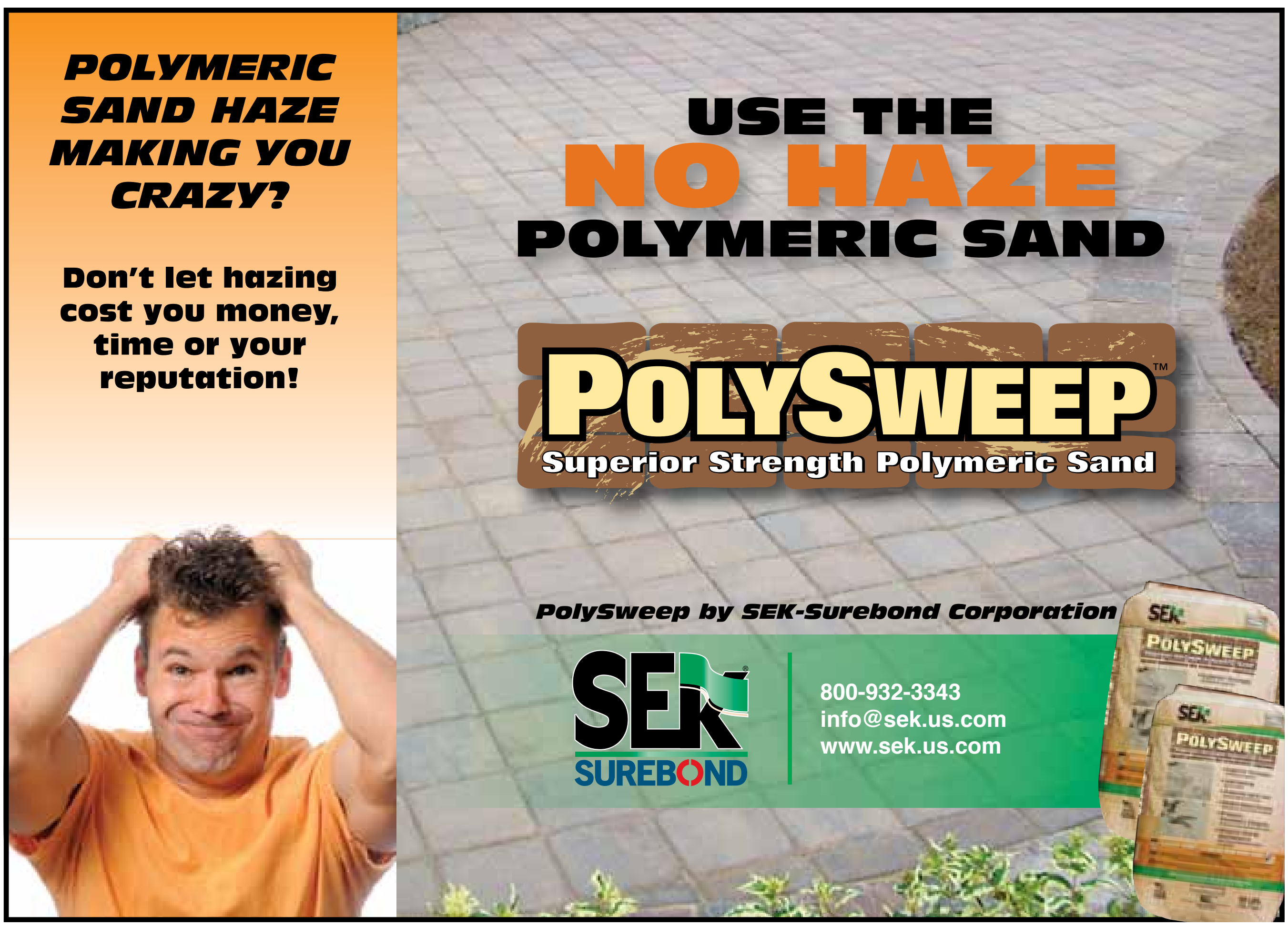

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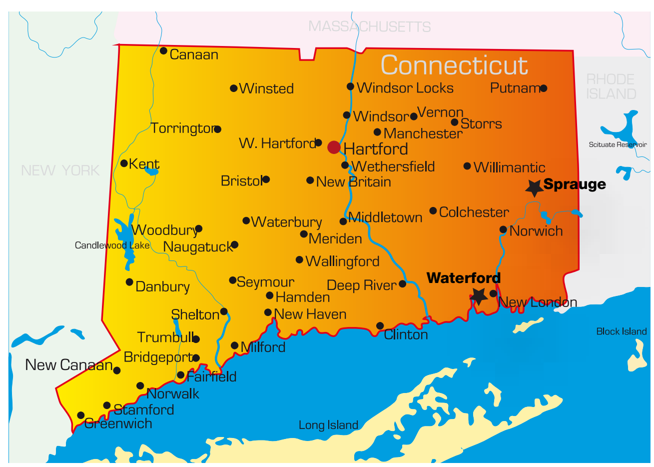
A Modest Street Receives a Higher Calling

Permeable interlocking concrete pavement brings new life to Upper High Street in the Town of Sprague, Connecticut

When renewing Upper High Street, an old mill road in the Town of Sprague, Connecticut (pop. 3,000), the town turned to permeable interlocking concrete pavement (PICP) (see location map). According to First Selectman Cathy Osten, the street "hadn't been touched in 40 years." There was local flooding, flooded basements, no storm sewers and open drainage that created uneven pavement with erosion. With ten houses along the narrow road, there was limited working space for construction and little underground space for storm sewers. CLA Engineers, Inc. from Norwich, Connecticut, functions as the Town Engineer for Sprague. When the Town asked if PICP could resolve problems on Upper High Street, CLA investigated the question further and developed a proposal to construct a 17,500 sf (1,700 m²) PICP road with an underdrain to allow for some stormwater infiltration filtering through the pavement and underdrain outflow.

Inspiration for CLA Engineers came from the town of Waterford, Connecticut, about 25 miles (40 km) south that has a 15,000 sf (1,500 m²) PICP road and residential driveways in the Glen Brook Green subdivision (see map). This



project was built in 2003 using low impact development principles with runoff monitored and compared to that from nearby conventionally developed residential areas and impervious pavements. The story was covered in the August 2004 issue and was one of several case studies published in a brochure by the Interlocking Concrete Pavement Institute (ICPI) (see inset). The positive environmental

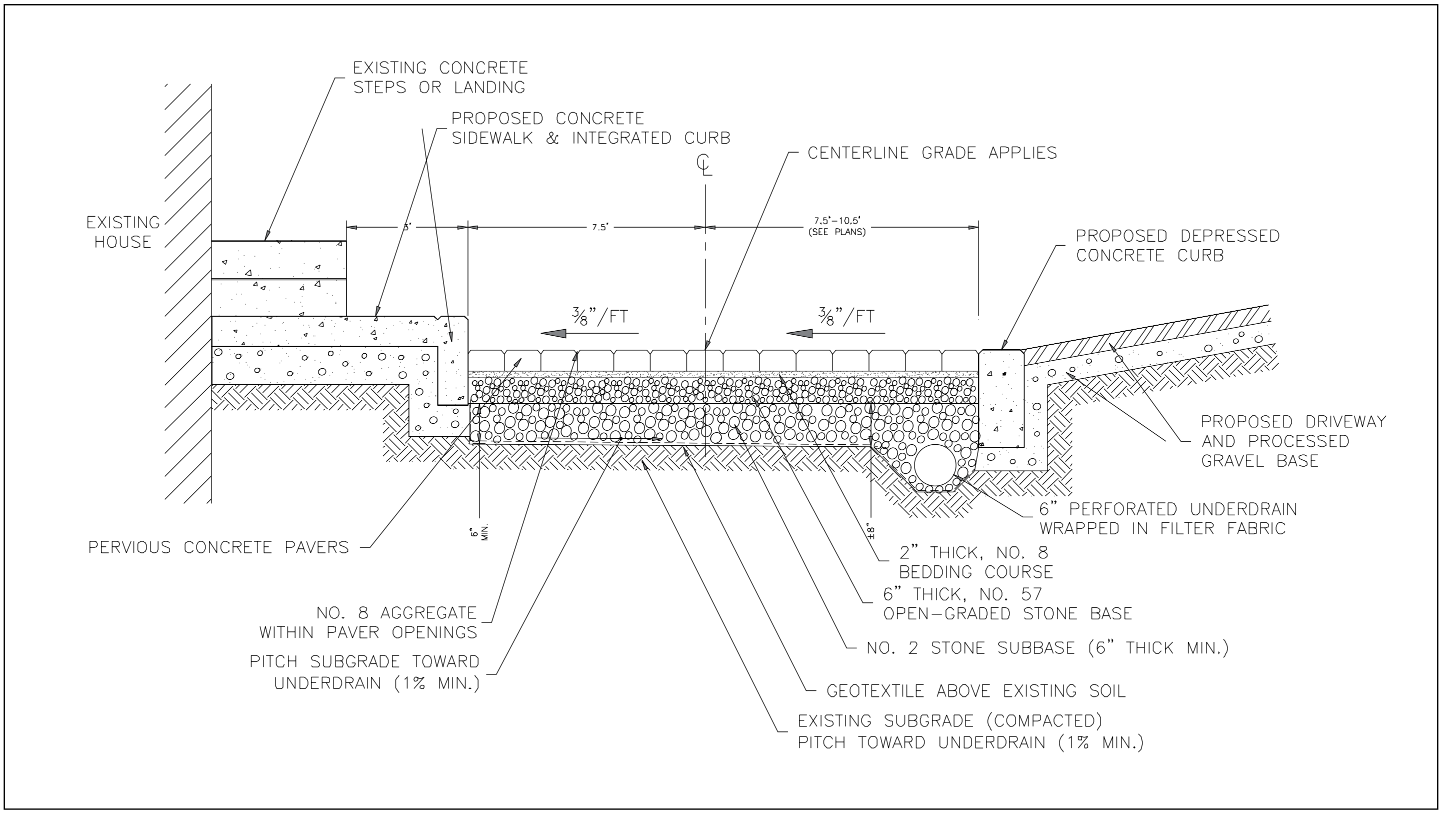
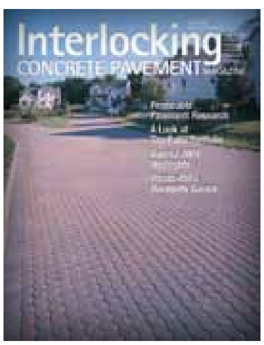


Figure 1. PICP cross section for Upper High Street in Sprague, CT



Located in Waterford, one of the first PICP projects in Connecticut was featured in the August 2004 issue of this magazine and this project inspired High Street's renewal in Sprague.

impacts of PICP in the subdivision can be found in a report issued by the University of Connecticut at http://jordancove.uconn.edu/jordan_cove/publications/final_report.pdf.

Ms. Osten obtained federal Community Development Block Grant funding and with some town funds was able to design and build the Upper High Street project for $540,000. Besides the permeable pavement, the project included constructing a sidewalk next to the houses and segmental concrete retaining walls to contain residential yards further up the street. In addition, an old water line was replaced.

The Upper High Street pavement structure in the Figure 1 cross section shows $3\frac{1}{8}$ in. (80 mm) thick pavers over a 2 in. (50 mm) thick bedding of ASTM No. 8 stone. The paver joints are filled with the No. 8 stone as well. The pavers and bedding layer rests on a 6 in. (150 mm) thick base of ASTM No. 57 (see Figure 2) and an 8 in. (200 mm) thick ASTM No. 2 stone subbase. The base and subbase layers were compacted with a 10 ton (10 T) roller. The soil was compacted with a roller for grading only.

Project Engineer Kyle Haubert, P.E. with CLA Engineers said that the silty sand soil subgrade infiltrates some of the water and the underdrain is designed to handle overflows. About half of the roofs on homes along the road drain into

Continued on p. 8

Figure 2. This view illustrates the installed ASTM No. 2 stone under the No. 57 layer with a drain pipe along one side of the road.

the pavement as well as most driveways. The PICP surface is pitched to meet the curb elevation next to the sidewalk. However, the soil subgrade under the PICP is almost flat to allow for infiltration.

Figure 3 shows the laying pattern for the pavers which were machine installed about a square yard (square meter) at a time. The pavers are placed on the 2 in. (50 mm) thick layer of ASTM No. 8 stone. The joints are filled and the pavers are compacted. The finished surface is shown in Figure 4 with edge pavers cut to fit against the curbs. The average longitudinal slope of the PICP surface is about 3.5%.

Ms. Osten noted that maintenance will include periodic vacuuming and snow will be removed with snow plows like any other town street. While deicing salts will be applied as needed, sand will not be used to reduce the risk of surface clogging. She said the project exceeded her expectations and that the system delivers more than what was promised. She visited the site during heavy rainstorms and especially during hurricane Irene that damaged many cities and towns along the eastern U.S. last August. To her surprise the pavement had no puddles and was taking in the massive rainstorm. She is so pleased with the performance that she is seeking additional funding to use PICP on up to six more streets. ❖

Figure 3. Now the norm for PICP installation, machine assisted paver placement accelerates installation time compared to manual methods. The pavers were installed by an ICPI member.

Figure 4. The finished surface shown here comes as a result of filling the paver joints with No. 8 stone, sweeping, then compacting the paver surface.

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Unpacking Urban Streets

The urban street provides a wealth of place-making opportunities for enhancing neighborhood and downtown character, safety and utility. Classics on the subject are from Jane Jacobs, Alan Jacobs, William Whyte, Donald Appleyard, and Hans Monderman. Many more have unpacked the street environment, what it is and should be, through writings and practice.

> ***Charrette:*** A method of organizing thoughts from experts and users on a particular topic into structured ideas and concepts. The method involves flexible, brainstorming-like process that is unrestricted and conducive to creativity through generating a myriad of design scenarios.

Last July, another substantial unpacking occurred at the University of California in Berkeley called Re: Streets. The event attracted over 100 professionals from across the U.S. and Canada, including urban designers, architects, planners, landscape architects, transportation engineers, ecologists and mobility experts (Figure 1). Re: Streets centered on a design charrette facilitated by MIG, Inc., a Pacific states-based, multidisciplinary design firm (www.migcom.com) that specializes in street environments.

The Re: Streets website (www.restreets.org) recounts the event: The charrette was structured to push participants' thinking and creativity beyond the current best practices. Working groups were aided by professional facilitators to critique and build design concepts and solutions. The charrette utilized information from real streets in major American cities as examples so participants could create prototype designs for the different topics and settings.

Figure 1. About 100 street design professionals attended Re: Streets including representatives from the Interlocking Concrete Pavement Institute and from member paver producers in California.

"Paved streets occupy as much as 30 percent of our urban areas yet at best they merely convey traffic—and at worst they are a cause of blight and crime," says urban planner Daniel Iacofano with MIG, Inc. "Instead, streets can and should be a part of the social fabric, contributing to community building and improving quality of life." The street designs rethink the future of America's streets and roadways, expand their value far beyond paved strips through cities. An online interactive eBook of detailed design solutions will be available in 2012. Results of the design charrette are on www.restreets.org.

The design charrettes were organized around eight work groups that defined, designed and advanced major functional and place-making roles for streets. The roles with corresponding design metaphors (suggested by the writer):

- Commerce—The street as shopping place
- Events—The street as stage and auditorium
- Green infrastructure—The street as attenuator of pollution and climate extremes
- Image and identity—The street as neighborhood entrance expressing/reinforcing context, personality and character
- Mobility and access—The street as shared space for all transportation modes and movement
- Play and recreation—The street as playground and recreation room
- Social gathering—The street as living/dining room
- Urban agriculture—The street as garden and local food source
- Wayfinding—The street as compass and a navigation tool

From a slightly different perspective, the richness in these roles and metaphors is that they require contribution by the pavement in order to be fully successful. Unlike silent conventional asphalt and concrete, segmental paving has contributed much in many municipal, street, sidewalk and park environments, whether residential or commercial. The following provides examples that demonstrate these design roles and metaphors. Some are drawn from projects in past issues of this magazine.

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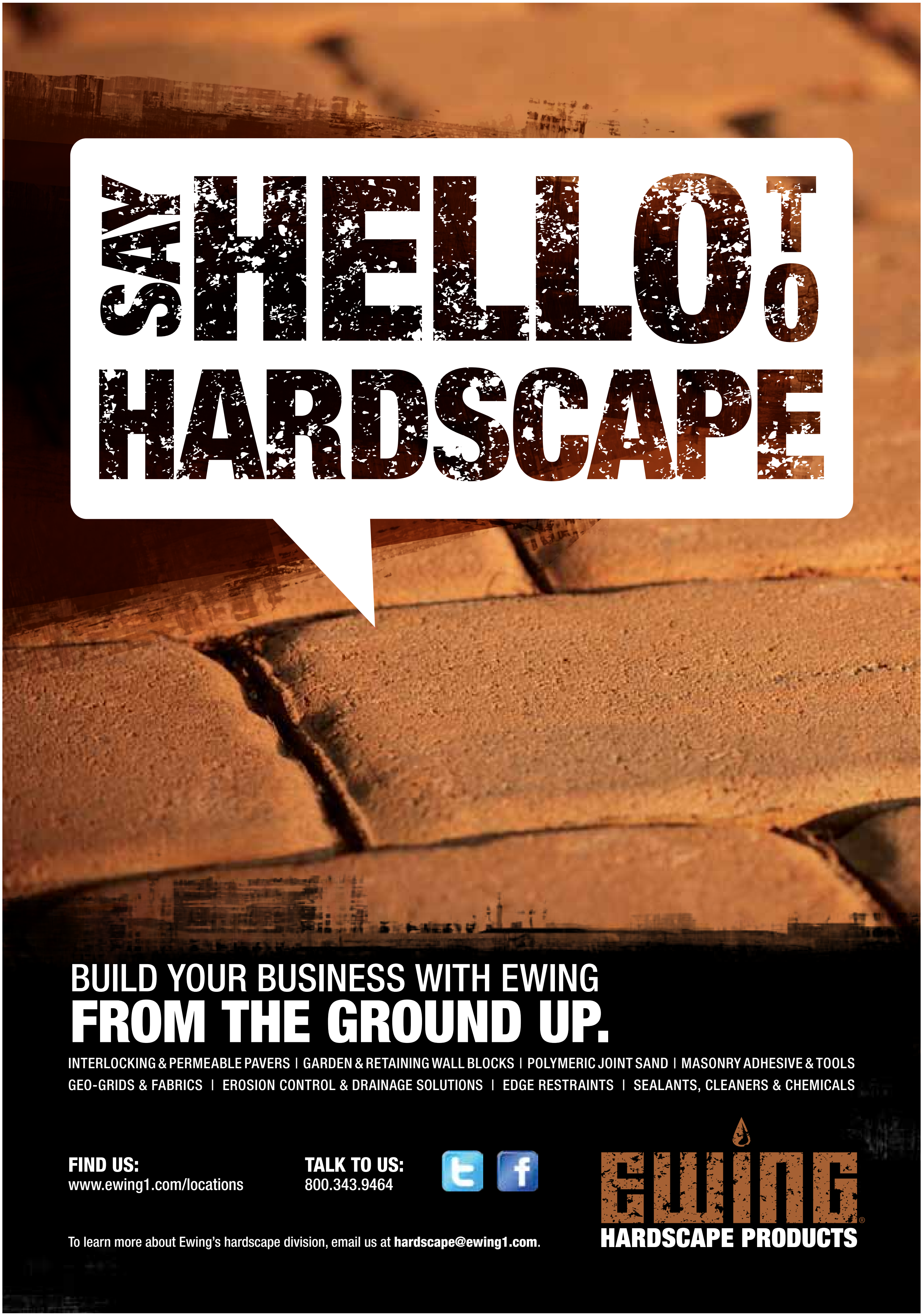
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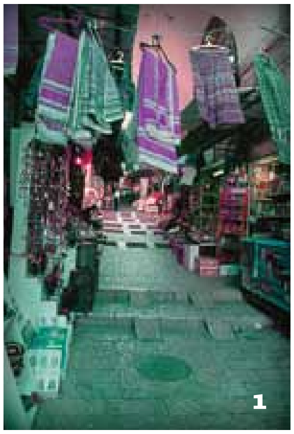

Commerce: The street as shopping place

Since the start of history, the street is the public platform for buying and selling as shown in this 1996 picture of an ancient street in the Arab Quarter of Old Jerusalem (1). The most vibrant modern streets have ground floor retail shops, cafes, and restaurants and little or no passive ground floor uses such as hotels, banks and office buildings (other than entrance doors). Since the early 1970s, concrete pavers have visually integrated countless shopping districts and neighborhood business districts such as sidewalks in Milford, Michigan (2). Concrete pavers have also supported street shopping spaces such as the 7th Street farmers market in Washington, DC. The street pavers take urban traffic during weekdays as well as guide drivers into parking spaces using different colored units. The street is closed and a farmer's market appears just about every weekend of the year. The exterior market spreads over the street and it supports the one inside the adjacent historic brick building in the background (3).

Events: The street as a stage and auditorium

Streets, sidewalks and plazas often become stages for performances. They can be a one-man show like the chalk graphics on this concrete paving slab plaza in Ülm, Germany or for concerts chock full of people 4). Streets and sometimes sidewalks are a stage for a protest (5). Whatever the message, people typically find comfortable places out of the sun or at least away from its glare and protected from wind.

Image and identity: The street as neighborhood entrance expressing/reinforcing context, personality and character

Moving from the back door to the front door, the street has every opportunity to contribute to first impressions with concrete pavers. Hess Street in Hamilton, Ontario is the front entrance to an entertainment district (6). Downtown Miami, Florida, comes alive with bold colors and patterns suggesting Latin American energy and a party attitude (7). A meticulously restored historic neighborhood in Dayton, Ohio called the Oregon District used concrete pavers on one of the few streets that didn't have the old clay brick type (8). Whether a historic district or modest modern neighborhood, the street contributes to the vibe of the place.

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Unpacking Urban Streets *Continued from p. 13*

Green infrastructure: The street as attenuator of pollution and climate extremes

With significant reduction of runoff and pollutants, permeable interlocking concrete pavement (PICP) offers cost savings from reducing or eliminating detention ponds and drainage pipes. Exemplars include Main Street in Warrenville, Illinois, (9) which eliminated surface flooding and flooded basements; residential streets in Charles City, Iowa, (10) that precluded costly expansive upsizing of existing storm sewer pipes; and an older Portland, Oregon neighborhood where PICP reduced overflows from combined sanitary and storm sewers during rainstorms (11). Its traffic calming characteristics can increase pedestrian safety.

9


10


11


After
13
Before
12

Alleys are neighborhood back doors: the place to park cars and trash cans, receive trash pick-up service, take shortcuts, and hide unattractive overhead power lines. Starting with the Chicago Green Alleys program, the lowly urban alley has been elevated to playing a significant role in reducing runoff peak flows and combined sewer overflows. Now institutionalized by the Chicago Department of Transportation, the CDOT is systematically converting a portion of their 1,900 mile (3,000 km) alley system each year. Memorialized in Chicago's *Green Alleys Handbook* cities such as Los Angeles, Washington, DC, Philadelphia, Boston and Richmond, Virginia (12 and 13) have built or are planning green alleys in downtown or residential neighborhoods.

Play and recreation: The street as playground and recreation room

Popular in the early 1980s, the Dutch 'woonerf' or living street reversed the roles of pedestrians and drivers, i.e., created obstacles to intimidate drivers while increasing pedestrian and especially child safety. The notion was born from dense Dutch row housing with no side yards, and limited front/back yards. The woonerf especially came from moms who wanted keep their kids safe from passing cars, and within earshot rather than allowing them to leave for the local park. The Dutch use of precast concrete curbs and concrete pavers enabled them to rearrange the street and create mini-playgrounds. The Dutch approach was a bit radical for other cultures (including ours), but their ideas found many expressions across many countries and contributed design techniques for traffic calming (14).


14

Mobility and access: The street as shared space for all transportation modes and movement

Degrees of sharing by transportation modes of course vary with the neighborhood. Major thoroughfares used to moving only cars and then parsed into shared spaces for public transit, bicycles and greater pedestrian space can be fraught with tough tradeoffs. Some crowded downtowns toss all these modes together, create some rules for competing and let users figure out specifics on moving through that space. Others, like the Dutch, are masters at organized space allocation that differentiates pedestrian, bicycle and vehicle paths with pavers, lines and curbs (15 and 16).


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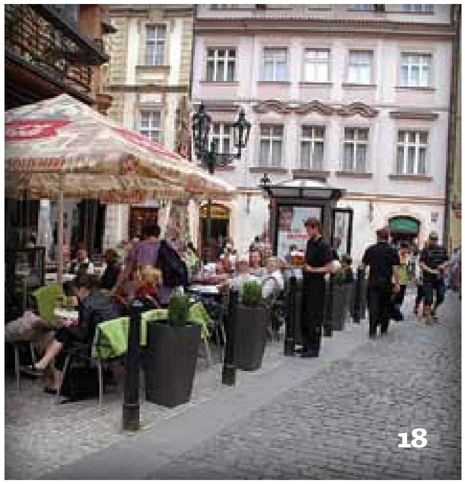
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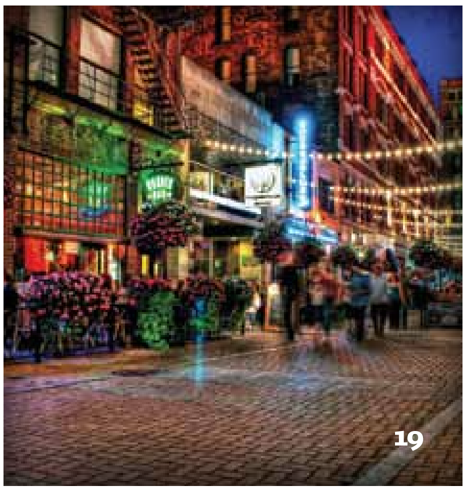
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Social gathering: The street as a living/dining room

Cafés and restaurants always require some consideration to creating a small outdoor dining room separated from moving traffic. A few tables line this Dutch street, (17) or the entire restaurant can move outside as this café did in Prague, Czech Republic (18). Such places can coexist with the street as long as there is a clear line between the dining room and moving traffic. East Fourth Street in Cleveland, Ohio, is touted as a premiere downtown living destination (19). As a linear living and dining room, the place invites you in to stay awhile. The seating areas are defined by fences and plants. Sometime the living or dining room can be close to water (20).

Urban agriculture: The street as garden and local food

Leftover spaces in urban areas, street medians, and large traffic islands present opportunities to plant food gardens. Sometimes there's sufficient space to feed those living on the adjacent street. There isn't a big opportunity for the hard surfaces of segmental pavement to contribute other than providing a path through or around such gardens. In the most urban places, roof gardens can be laced with segmental paving such as that on the roofs of the Olympic Village in Vancouver, British Columbia (21). While segmental pavement doesn't grow food, it enables rapid deployment of a farmer's market. It stays for awhile and moves on like the one in Kingston, Ontario (22).


21


22

Wayfinding: The street as compass and a navigation tool

Besides street signs, many things along a street or sidewalk tell us where to go. For example, this sidewalk leads the visually impaired around the subway entrance (23). The modular nature of segmental paving enables lines and arrows to be an integral part of the pavement, thereby saving re-painting costs (24). By changing color, texture or elevation, segmental concrete paving visually defines or reinforce edges and boundaries and help keep drivers and pedestrians in safe places (25).


23


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In conclusion, the eight roles and design metaphors for streets provide a convenient filter through which to enhance important public places. There are many other design elements—lighting, furniture, signals, signage, building facades/entrances, building setback and materials, trees and planters, and more—that work together to fulfill these roles. Pavement is a leading player because all users come in contact with it via feet or tires, and segmental concrete paving fulfills these roles superbly. ❖

Construction Tolerances for ICP and PICP

There are similarities and yet substantial differences in the materials and methods used to construct interlocking concrete pavement (ICP) and permeable interlocking concrete pavement (PICP). Figures 1 and 2 illustrate cross sections of each ICP and PICP systems. PICP is absent of fines in the joints, bedding, base/subbase materials so runoff can enter. On the other hand, sand and fines in the joints, bedding and base, makes ICP essentially an impermeable system that keeps water from entering. For the installation contractor, the table below provides a comparison of construction tolerances, materials and methods.

References after the table provide further reading and resources. Referenced standards from AASHTO, ASCE, ASTM and CSA can be obtained from these organizations for a charge. ICPI Tech Specs are available at www.icpi.org at no charge. Software programs, student manuals and the recently updated manual on PICP can be purchased from www.icpi.org.

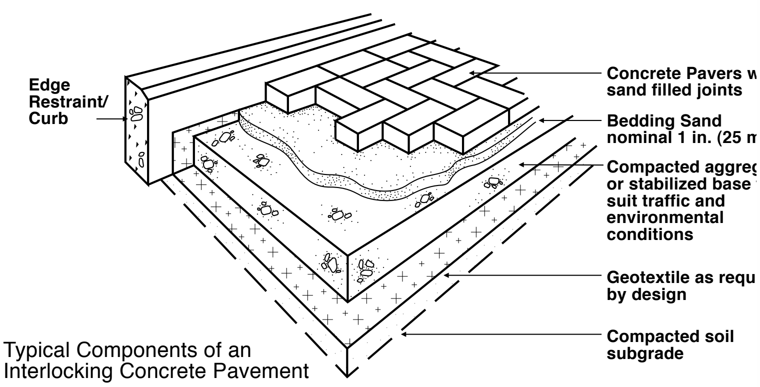

Figure 1. Schematic cross section of interlocking concrete pavement (ICP)

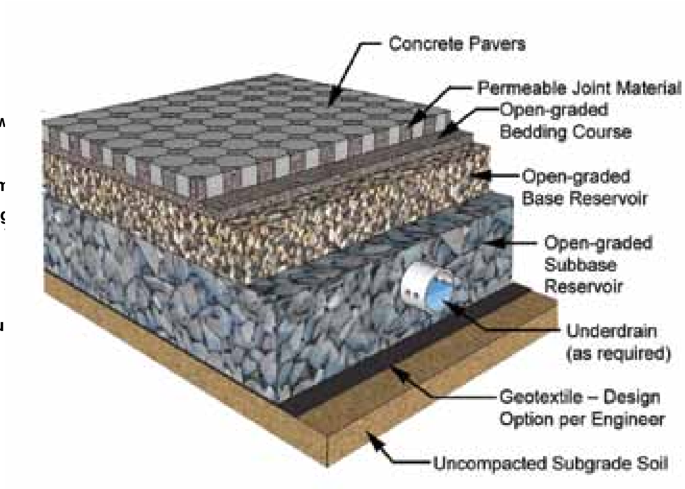

Figure 2. Cross section of permeable interlocking concrete pavement (PICP)

Table 1. Comparison of ICP and PICP Construction Tolerances

Attribute	ICP	PICP
Paver joint width	1/16 in. (2 mm) to 3/16 in. (5 mm)	3/16 in. (5 mm) to ½ in. (13 mm)
Paver pattern	Vehicular: Herringbone	Same
Paver surface	Maximum ±3/8 in. (10 mm) over 10 ft (3 m) (non-cumulative)	Same
Lippage at catch basins/ drains/ curbs	Non-ADA: 1/8 to 3/8 in. (3 to 10 mm) ADA: 1/8 to 1/4 in. (3 to 6 mm)	Same
Lippage between individual pavers	Maximum 1/8 in. (3 mm)	Same
Paver aspect ratio (length/ thickness)	Maximum 4:1 for pedestrian & residential driveways Maximum 3:1 for street/parking lots	Same
Joint fill depth maximum	1/2 in. (13 mm) from surface of chamfered pavers or 1/4 in. (6 mm) from surface of non-chamfered pavers	Same
Variation in bond (joint) lines	Maximum ±1/2 in. (13 mm) over 50 ft. (16 m)	Same
Surface slope	Minimum 2%; maximum 18%	Minimum 0.5%; maximum 12%
Cut pavers	No less than 1/3 of a whole paver in areas subject to tire traffic; no less than 3/8 in. (10 mm) wide for all other areas	Same
Minimum paver thickness	Pedestrian & residential driveways: 2 3/8 in. (60 mm) vehicular areas: 3 1/8 in. (80 mm)	Same
Bedding layer gradation & thickness	ASTM C33 or CSA A23.1 FA1 sand, 1 in. (25 mm) thick	ASTM D448 No. 8 stone, 2 in. (50 mm) thick
Bedding layer screeded surface tolerance	± 3/8 in. (10 mm) over 10 ft (3 m)	Same
Jointing material gradation	Sand: ASTM C144 or C33; CSA A23.1 FA1 or CSA A179	ASTM D448 No. 8, 89, or 9 stone
Base materials	Crushed stone conforming to ASTM D2940 or local agency specs for asphalt pavements	Crushed stone conforming to ASTM D448 No. 57 gradation
Compacted base surface variation (non-cumulative)	Maximum ± 3/8 in. (10 mm) over 10 ft (3 m)	Maximum ± 1 in. (25 mm) over 10 ft (3 m)
Compacted subbase surface variation (non-cumulative)	Maximum ± 1/2 in. (13 mm) over 10 ft (3 m)	Maximum ± 21/2 in. (65 mm) over 10 ft (3 m)
Compaction requirements	Minimum 95% standard Proctor density per ASTM D696 (Modified density per ASTM D1557 may be required for heavy traffic applications)	Two vibratory passes & two static passes with no visible movement using a 10 t (10 T) vibratory roller; may use 13,500 lbf (60 kN) plate compactor
Minimum base thickness (For well drained soils – See structural design references as thickness can increase thickness in colder climates, weak soils, & under higher vehicular loads).	Pedestrian: 4 in. (100 mm) Residential driveways: 6 in. (150 mm) Vehicular: Parking lot/residential street: 8 in. (200 mm)	Pedestrian: ASTM D448 No. 57 stone base: 6 in. (150 mm) Residential driveways: 8 in. (200 mm) Vehicular: ASTM D448 No. 57 stone base: 4 in. (100 mm) ASTM D448 No. 2, 3, or 4 stone subbase: 6 in. (150 mm)
Base thickness variation	Maximum +3/4 to -1/2 in. (+20 mm to -13 mm)	Same
Geotextiles	Per AASHTO M-288; recommended over clay & silt soils	Applied vertically between excavated soil & stone base/subbase; horizontal use over subgrade per design engineer; AASHTO M-288 for drainage & separation
Surface infiltration	No minimums	Minimum 100 in./hr (254 mm/hr) for new PICP; minimum 10 in./ hr (25.4 mm/hr) for in-service PICP using ASTM C1701

ASTM Releases Standard Practice for Surveying the Condition of Interlocking Concrete Roads and Parking Lots

The American Society for Testing and Materials (ASTM) International has approved a new standard practice for rating the condition of interlocking concrete pavements. ASTM E2840-11 *Standard Practice for Pavement Condition Index Surveys for Interlocking Concrete Roads and Parking Lots* provides guidance on conducting visual surveys to assess roads and parking lots surfaced with interlocking concrete pavers.

The rating method known as the Pavement Condition Index or PCI method in ASTM E2840 evolved from assessing the condition of asphalt and concrete pavements by the U.S. Army Construction Engineering Research Laboratory in the 1970s for the U.S. Air Force. Procedures were soon adopted by the other military branches, by the American Public Works Association for roads, and by the Federal Aviation Administration for airport pavements.

Procedures for collecting data and calculating a PCI were updated in 1998 when ASTM published D5340 *Standard Test Method for Airport Pavement Condition Index Surveys* and D6433 *Standard Test Method for Roads and Parking Lots Pavement Condition Index Surveys* for asphalt and concrete pavements in 1999. ASTM E2840 is an adaptation of the PCI method to interlocking concrete pavements based on surveying the condition of dozens of paver roads and parking lots, as well as reviewing international literature on segmental pavement condition rating systems.

Proposed by the Interlocking Concrete Pavement Institute (ICPI) to ASTM Subcommittee E17.42 on Pavement Management and Data Needs, ASTM E2840 provides municipalities and private project owners specific guidance on when maintenance is required by surveying interlocking concrete pavement and applying a severity rating for a range of conditions or surface distresses. A composite PCI between 0 (very poor) and 100 (new condition) suggests when maintenance or rehabilitation might be required. The condition index also enables users to compare results to that from conventional asphalt and concrete.

In 1999, the General Accounting Standards Board (GASB) issued guidelines on generally accepted accounting practices for cities and states. GASB views long-term or long-lasting public assets as those that are non-moveable which includes pavements. GASB recommends that such municipal assets be surveyed and inventoried to determine their value as well as develop maintenance and replacement schedules with forecasts for maintenance expenses.

ASTM E2840 enables cities to manage interlocking concrete pavements and compare performance to conventional asphalt and concrete.

One reason for developing asset management systems for public infrastructure components like streets is its requirement for governments seeking favorable bond ratings so they can participate in the $3 trillion municipal bond market.

In order to know when to maintain street assets, many cities have developed pavement management systems, typically computerized databases with formulas to estimate anticipated maintenance costs. The databases can provide a means to compare performance among pavements. ASTM E2840 provides a familiar structure for inventorying and assessing the condition of interlocking concrete pavements for the purposes of asset management. ASTM E2840 includes a list of interlocking concrete pavement distress types divided into three levels of severity: low, medium and high.

Photographs gathered through many site visits across North America and Europe are included to assist pavement engineers and technicians in applying the distress guide in the field. There are photographs of distresses at each distress severity level for eleven conditions. These distresses include rutting, cracked pavers, joint sand loss and others. The methodology considers the interaction of several distresses on the Pavement Condition Index rating. Interactive effects of several distresses are characterized using "deduct curves" that reduce the numerical PCI rating. Furthermore, the PCI can be used to compare performance of conventional asphalt and concrete pavements.

ASTM E2840 can be used by municipalities to manage interlocking concrete pavements by identifying when maintenance might be required. As with all ASTM standards, the standard practice can be purchased and downloaded from www.astm.org. The price is $40 (ASTM members $35).

PCI Software Available from ICPI

In addition, ICPI offers companion software to assist field data collection and analysis. Called Pavement Condition Index Software, the Excel-based program allows for fast calculation of a PCIs and follows the structure of ASTM E2840. The software is available from www.icpi.org on a CD for $20 (ICPI members $10) plus shipping and handling.

ASTM Clarifies Test Methods in C936 and C1645

ASTM C936 *Standard Specifications for Solid Concrete Interlocking Paving Units* requires freeze-thaw durability testing in tap water or a saline solution, depending on anticipated exposure. The test method is C1645 *Standard Test Method for Freeze-thaw and De-icing Salt Durability of Solid Concrete Interlocking Paving Units*. This method submerges three pavers in water and places them through freeze-thaw cycles. Material lost as a result of the freeze-thaw testing is measured in grams and compared to the surface area expressed in square meters. After 28 freeze-thaw cycles, if no more than 200 g/m^2 is lost, the pavers pass the test. If over 200 g/m^2 is lost, the test proceeds to 49 cycles. If no more than 500 g/m^2 is lost, the pavers pass the test. C936 and C1645 now clarify that the mass lost measured at 28 or 49 cycles is the average of that lost from the three test specimens. This was not stated in previous versions of these standards.

C936 also requires sampling and testing pavers for dimensional tolerances, compressive strength, absorption per ASTM C 140 *Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units* and abrasion durability testing per ASTM C418 *Standard Test Method for Abrasion Resistance of Concrete by Sandblasting*. The standard now requires sampling a minimum of three pavers each for compressive strength and absorption. Three test specimens are also sampled for freeze-thaw testing and two for abrasion durability testing. In order to conserve test specimens, dimensional tolerances can be determined from either the compressive strength or absorption specimens prior to testing. This saves sampling an additional three pavers just for measuring dimensional tolerances.

CSA Standards Re-approved

Last fall, Canadian Standards Association Technical Committee on precast concrete paving slabs and precast concrete pavers reapproved CSA A231.1 *Precast Concrete Paving Slabs* and CSA A231.2 *Precast Concrete Pavers*. The

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ICPI Rolls Out Advanced Residential Paver Technician Course

ICPI rolled out a new Residential Paver Technician course for owners of paver installation companies and foreman involved in residential paver installations. The course content comes from some of the industry's top contractor instructors, and it builds on the knowledge introduced in the Concrete Paver Installer course. While not a prerequisite, participants in the Residential Paver Technician course are strongly urged to have previously taken the basic course. The new advanced course includes classroom training and an exam. Upon successful completion of the exam, a participant receives a Record of Completion. A Residential Paver Technician designation can be added to the Concrete Paver Installer Certification if the participant also meets the minimum installation experience requirement. See www.icpi.org/InstallerDesignations for more details.

Course Topics

- Basic installation review
- Overlays
- Raised and multi-level patios
- Fireplaces, grills, outdoor kitchens
- Pool decks
- Advanced business practices

Continuing Education

This program is approved for 13 CE credits of ICPI Installer Continuing Education.

Registration

$350 for 2-day course, including student manual and exam ($250 for ICPI members)

Visit www.icpi.org for course announcements. ❖


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ASTM Releases Standard Practice

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committee will be convening in 2012 to further refine test methods for two standards. CSA A231.1 has been in existence since 1972 and provides dimensional tolerances, flexural strength standards and test methods, and those for resistance deicing salts during freeze-thaw tests. The standard is written for paving slabs used in pedestrian applications. Developed in mid-1970s, CSA A231.2 also includes dimensional tolerances testing, test methods and criteria for compressive strength, and a rigorous freeze-thaw test method and criteria with pavers submerged in a saline solution.

Both product standards can be purchased and downloaded as one PDF from the Canadian Standards Association for Cdn$139 from http://shop.csa.ca/. ❖

The Last Teenage Year

Continued from p. 4

Technical and construction support centers on as-built tolerances because there is a continual need to align what appears in project specs with that which is humanly possible to build.

The past four years have been brutal for the construction industry. It still carries the highest unemployment rate among all sectors of the economy. The segmental paving industry has matured in the process, perhaps like one does moving from age 15 to 19. There is greater sense of answers to the questions: Who am I? Where am I going? Who am I going with? Answers are suggested in recent market position statement from ICPI: "To responsible, forward thinking communities, interlocking concrete pavements are the pavement system that provides the most sustainable solution and makes every environment more inviting." I think that nails it.

We see sparks of hope in residential, commercial, municipal and industrial paving that could be fanned into flames and be part of getting the economic engine running again. We hope the winds of political and economic uncertainty don't extinguish them. In spite of the damage done to our economic system and the years of repair ahead, it is reassuring that homeowners, architects, engineers, landscape architects and contractors continue to build with the finest pavement—the segmental concrete kind. ❖

Concrete Paver Industry Calendar of Events

March 1-3, 2012
The Precast Show
Orange County Convention Center
Orlando, Florida
theprecastshow.org

March 1-2, 2012
ICPI Residential Paver Technician Course
Shingle Creek Resort
Orlando, Florida
www.icpi.org/orlando

March 3-6, 2012
ICPI Annual Meeting
Shingle Creek Resort
Orlando, Florida
www.icpi.org

August 22-25, 2012
ICPI Summer Meeting
Grand Traverse Resort and Spa
Traverse City, Michigan
www.icpi.org

November 24-26, 2012
10th International Conference on Concrete Block Paving
Shanghai, China
www.2012iccbp.com

ICPI Webinars for Design Professionals, Contractors and Suppliers
For registration details or more information, visit www.icpi.org or call ICPI at 703-657-6900.

See www.icpi.org for a listing of 2012 ICPI installer courses.

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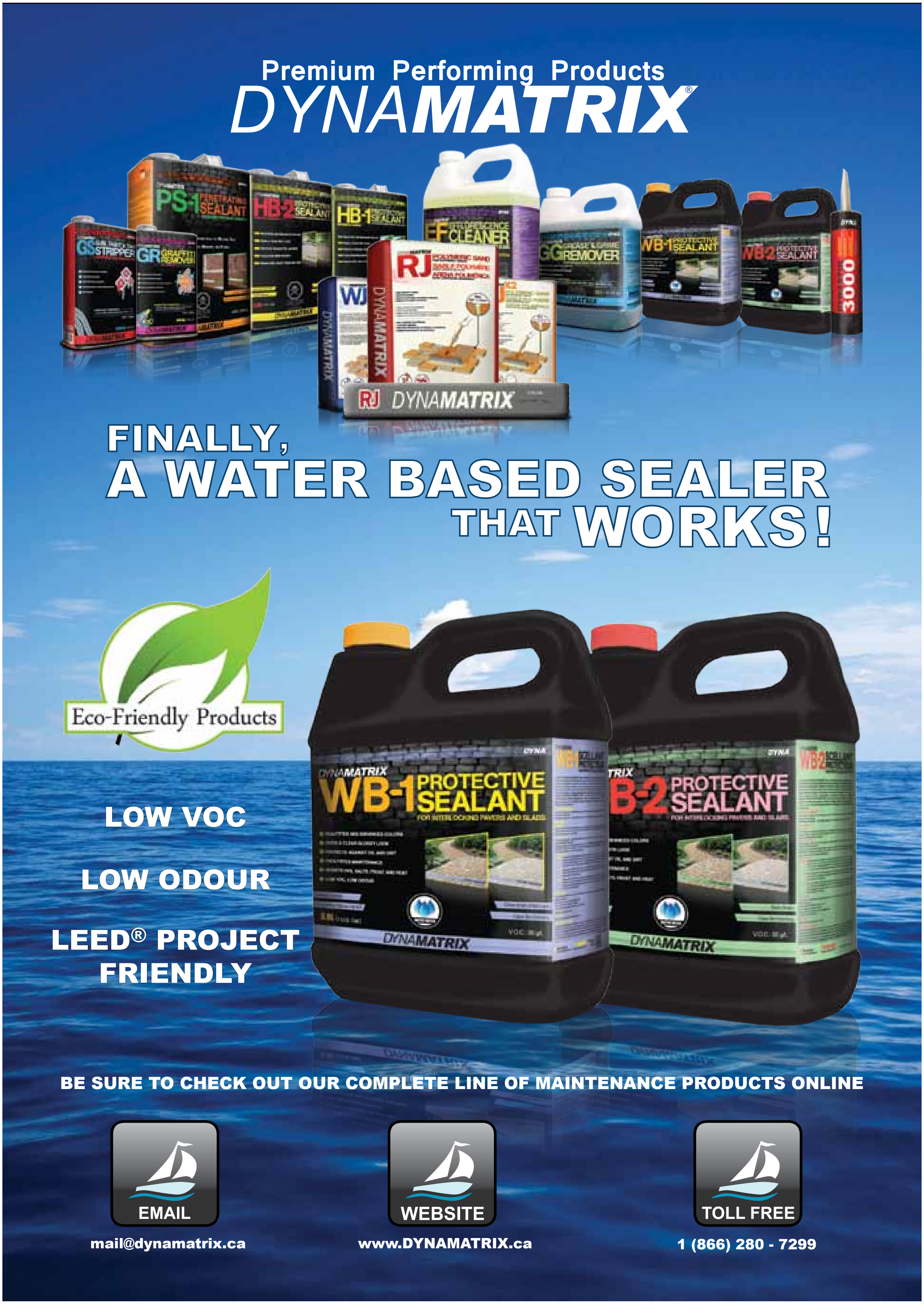
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