



## Nominations for the 2002 NOVA Awards

By Robert I. Carr<sup>1</sup>

**Abstract:** This paper presents summaries of the 27 NOVA Award Nominations received between September 15, 2000 and October 2001 for the 2002 NOVA Awards to be presented April 25, 2002 by the Construction Innovation Forum (CIF) at its annual NOVA Awards Banquet. Nominations include innovations in concrete, steel, foundation, utility, highway, rehabilitation, masonry, asphalt, composites, light framing, piping, bridge, scaffolding, demolition, underground, and temporary construction. Nominations also include innovations in engineering design; automated measuring and positioning; internet applications; information systems; equipment; environmental and seismic control; remote sensing and mapping; and worker recruiting and safety.

### INTRODUCTION

This paper presents summaries of the 27 NOVA Award Nominations received between September 15, 2000 and October 2001 for the 2002 NOVA Awards to be presented April 25, 2002 by the Construction Innovation Forum (CIF) at its annual NOVA Awards Banquet. Nominations include innovations in concrete, steel, foundation, utility, highway, rehabilitation, masonry, asphalt, composites, light framing, piping, bridge, scaffolding, demolition, underground, and temporary construction. Nominations also include innovations in engineering design; automated measuring and positioning; internet applications; information systems; equipment; environmental and seismic control; remote sensing and mapping; and worker recruiting and safety.

Nominations are numbered in the order they were postmarked. Readers can access the individual nominations to obtain more detailed information at [www.CIF.org](http://www.CIF.org). Robert I. Carr wrote these nomination descriptions from original drafts of students in CEE 530 – Construction Professional Practice Seminar at the University of Michigan.

### 1 FUSED PLASTIC PIPE JOINT JACKET EXTENDS PIPE COATING ACROSS FIELD JOINTS

The Tapecoat Fusion Weld is an innovative way of matching the robustness of two and three layer extruded polyethylene (PE) and polypropylene (PP) pipe coatings on field joints. This matching is made by fusing the plastic jacket to the plastic coating on the pipe using a conductive wire mesh electro-clamp. After removal of the electro-clamp there is an almost indestructible plastic-armored pipe joint coating, and the corrosion protection coating is untouched and mechanically protected. The Fusion-Weld replaces tapes and shrink sleeves that do not have good bonding with thermoplastic materials. This system was patented in May of 2000 and has been used on projects in Indonesia, Malaysia, and the USA. Contact: Kip Bennett; Tapecoat Company; P.O. Box 631 Evanston, IL 60204-0631; 800-758-6041 / 847-866-8500; Fax 800-332-8273 / 847-866-8596; [kpbenett@aol.com](mailto:kpbenett@aol.com); [www.tapecoat.com](http://www.tapecoat.com).

### 2 MULTI-SPAN SUSPENDED BRIDGE PLATFORM FOR WORKING BELOW BRIDGE DECKS

The Safespan multi-span bridge platform system allows contractors to access the entire bridge underside during renovation projects. Conventional renovation and rehabilitation projects involve small work platforms supporting 4-5 workers that are repositioned along the bridge span as needed during the course of the project. Safespan is cable suspended and uses corrugated flooring panels locked down to the underlying cables and fastened with a proprietary cable-to-deck system. It is safe, stable, strong, faster to deploy than traditional platforms and can accommodate a large number of workers. Using this structural access system can result in higher productivity and significant labor cost savings for contractors up to 50 percent. NOVA Award Finalist. Contact: Lambros Apostolopoulos; Safespan Platform Systems, Inc.; 252 Fillmore Avenue; Tonawanda, NY 14150-2408; 716-694-1100; Fax 716-694-1188; [info@safespan.com](mailto:info@safespan.com); [www.safespan.com](http://www.safespan.com).

### 3 E-LIBRARY OF CONSTRUCTION OSH: OCCUPATIONAL SAFETY AND HEALTH ON INTERNET

The Electronic Library of Construction Occupational Safety and Health, eLCOSH, is a web-based clearinghouse at [www.elcosh.org](http://www.elcosh.org) for top-quality information about prevention of construction work-related injuries, illnesses, and deaths that makes it readily available to site owners, supervisors, and workers. As of August 2001, more than 450 documents were posted or linked from a wide range of sources. The eLCOSH home page offers information in English and Spanish classi-

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The CIF and the author do not endorse the innovations, they do not represent that the innovations perform as described, and they neither accept nor reject claims made in the Nominations or the descriptions contained herein. The CIF prohibits use of these descriptions or references to these descriptions, or any part thereof, in any way that implies endorsement or acceptance of performance or claims.

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fied into these main sections: Hazard, Trade, Job Site, Other, and Training; annotated links to 40 other sites on construction safety and health; a “What’s New” listing of new postings/links; and a listing of national conferences on construction safety and health. For most documents, information is provided to facilitate follow-up with an author and/or organization. Contact: Richard Niemeier; NIOSH – MSC14; 4676 Columbia Parkway; Cincinnati, OH 45226; 513-533-8388; Fax 513-533-8588; [www.elcosh.org](http://www.elcosh.org).

#### **4 ECONOMICAL BRIDGE REHABILITATION USING COMPOSITES**

A 60-year-old truss bridge was rehabilitated using lightweight fiber reinforced polymer (FRP) composites to replace a heavy concrete deck and numerous asphalt overlays. This reduced dead load by 80% and almost doubled live load carrying capacity of the bridge, HS12 to HS23, which removed a 14-ton weight restriction. The \$876,000 rehabilitation cost was much less than a complete bridge replacement costing \$2.34M. This also dramatically reduced project development time and construction duration. Innovations included precast haunches floor beams to reach proper elevation, installing bridge deck equal to existing thickness of deck and overlays, replacing deck with discrete deck panels, and field splices transferring forces between panels. Contact: Scott Hemphill; Hardcore Composites; 618 Lambsons Lane; New Castle, DE 19720; 302-442-5929; Fax 302-442-5901; [www.hardcorecomposites.com](http://www.hardcorecomposites.com); [scott.hemphill@hardcorecomposites.com](mailto:scott.hemphill@hardcorecomposites.com).

#### **5 FIXED ANTI-ICING SPRAY SYSTEM REPLACES DE-ICING SALT WITH ANTI-ICING LIQUID**

This system replaces de-icing salt on the landmark Brooklyn Bridge with anti-icing liquid (such as potassium acetate). Non-corrosive anti-icer is sprayed on the roadway surface prior to freezing and precipitation, preventing the formation of ice and facilitating the plowing of accumulated snow. Eliminating salt is expected to at least double the life of bridge paint and reduce the rate of steel corrosion drastically. Anti-icer application by spraying is economical, because it permits the amount of material to be optimized, depending on atmospheric conditions. The system is designed for user safety. Tests were conducted until the spraying was adjusted to deliver material to the roadway surface without discomfort to motorists. Contact: Brandon Ward; Division of Bridges; New York City DOT; 2 Rector Street; New York, NY 10006; 212-788-1700; Fax 212-788-2027.

#### **6 UP-DOWN CONSTRUCTION FOR SIMULTANEOUS SUBSTRUCTURE AND SUPERSTRUCTURE CONSTRUCTION**

Up-Down construction combines the advantage of underground space with simultaneous construction of the project's substructure and superstructure, which is especially important in congested urban environments. It evolved from the Milan method for subway construction. In the US this method was first performed by Haley & Aldrich, Inc., which has successfully completed seven projects. Up-Down construction is innovative because it requires no radical changes in construction techniques but rather a creative sequencing of techniques that have already been proven. This method provides a secure, low-risk excavation support system that becomes attractive for deeper excavations to shorten construction schedules to reduce costs. Contact: David Schoenwolf; Haley & Aldrich, Inc.; 7921 Jones Branch Dr., Suite 550; McLean, VA 22102; 703-356-8490; Fax 703-356-9445; [www.HaleyAldrich.com](http://www.HaleyAldrich.com).

#### **7 ICE BLAST CLEANS SURFACES WITH ICE FLAKES AND LEAVES LITTLE RESIDUE**

Ice blasting minimizes waste produced during industrial cleaning applications. Ice blasting is a simple, non-abrasive, cleaning process that uses ordinary tap water, compressed air, and electricity. The solid ice particles displace surface contaminants by imparting the energy from impact and from lateral deformation of ice particles. The ice melts after impact and flushes away the debris. This “scrub and flush” process makes ice blasting effective. Ice blasting does not generate the dust common with most abrasive media blasting operations nor the massive volumes of liquid waste associated with water blasting. It is used for precision cleaning and deburring, industrial cleaning and decontamination, lead and asbestos abatement, nuclear decontamination, and vessel maintenance. NOVA Award Finalist. Contact: Sam Visaisouk, Ph.D; Universal Ice Blast, Inc.; 533 6<sup>th</sup> Street South; Kirkland, WA 98033; 425-893-8424; Fax 425-893-9222; [visa@iceblast.net](mailto:visa@iceblast.net); [www.iceblast.net](http://www.iceblast.net).

#### **8 AUTOMATIC SELF-CLIMBING FORMWORK FOR CONSTRUCTING TALL CONCRETE STRUCTURES**

The Automatic Climbing System (ACS) is a hydraulically operated self-climbing formwork system for construction of tall concrete structures such as building core walls and bridge pylons. It improves productivity and safety, it is raised without the use of a crane, and it is connected to the structure at all times during climbing process. Platforms allow for safe, efficient work and high loads. The climbing sequence begins by stripping the formwork from previously cast lifts using carriages on the brackets or platform. Leading climbing shoes are then bolted to the anchors in the previous lifts. The hydraulic climbing mechanism raises the climbing rails or platform to the leading climbing shoe. Contact: Thomas A. Ameel, P.E.; PERI Formwork Systems, Inc.; 7272 Park Circle Drive, Suite 200; Hanover, MD 21076; 410-712-7225; Fax 410-712-7080; [T\\_Ameel@PERI-USA.com](mailto:T_Ameel@PERI-USA.com); [www.peri.de](http://www.peri.de)

#### **9 CONSTRUCTION CONGESTION COST (CO<sup>3</sup>) CALCULATES ROAD USER COST DURING CONSTRUCTION**

The Construction Congestion Cost System (CO<sup>3</sup>) is computer software that estimates impact of alternative road construction traffic maintenance contract provisions on congestion, road user cost, and construction cost, from which engineers produce realistic budgets and select practical contracting methods that balance construction cost and congestion delays with construction costs. It accounts for the impact of the road construction on road users by including user delay costs in project cost and time estimates. CO<sup>3</sup> is the first software that includes driver behavior due to congestion and speed decreases dur-

ing construction, such as when traffic backs up as lanes are closed and many drivers take alternative routes or cancel their trips. Contact: Robert I. Carr, Ph.D., P.E.; Department of Civil Engineering; University of Michigan; Ann Arbor, MI 48109-2125; 734-764-9420; Fax 734-764-4292; RICarr@umich.edu.

#### **10 CONVERT 3D CLOUD TO 3D SURFACE AUTOMATICALLY TO PRODUCE OPTIMIZED CAD MODEL**

Reality LINx is the software that automatically converts a "cloud of points" acquired from laser scans into a simplified 3D model. It automatically creates a simplified 3D model while optimizing the file size, which facilitates the use of the captured as-built data dramatically faster and more cost effectively, almost immediately after data acquisition. The benefit of this software is its ability to quickly superimpose new design and perform clash detection with existing plant structures. It facilitates the use of laser scanning when time or cost appear to prohibit the use of laser scanning technology. For construction projects, this has reduced the effort, costs, and schedule associated with creating a 3D as-built model from laser scanning by 40% to 50%. Contact: Dr. Mohsen Hashemi; INOVx Solutions; 9401 Jeronimo Road, Suite 102; Irvine, CA 92618; 949-699-4600; Fax 949-609-0898; www.inovx.com

#### **11 INTERNET-BASED DOCUMENT CONTROL SYSTEM STORES AND MANAGES PROJECT DOCUMENTS**

Documentum is an internet-based document control system that stores, files, retrieves, and prints computer-based documents. Detroit Edison has successfully introduced this system for a multi-year program to reduce nitrogen oxide emissions at its power plants. It eliminates many problems of previous paper or e-mail based systems: multiple filing systems, excessive paper duplication, and shipping time for documents. The computer-based documents can consist of any type of computer file: letters, graphic documents, photographs, video clips, databases, etc. It also permits any project participant at any location to enter documents into the system and to view and print any project documents under a variety of document security measures. Contact: Whitney Tidmarsh; Documentum; 6801 Koll Center Parkway; Pleasanton, CA 94566; 925-600-6981; Fax 925-600-6580; www.documentum.com

#### **12 NAWIC K-12 CONSTRUCTION EDUCATION PROGRAMS PROMOTE CONSTRUCTION CAREERS**

The NAWIC Education Foundation K-12 programs are three basic programs to introduce and encourage school age children and young adults of either gender to consider a career in the construction industry in either a degreed program or the skilled trades. The three programs are the Block Kids Building Program for elementary school students, the Building Design Program for middle school students, and the CAD/Design/Drafting Competition for senior high students. These programs give children and young adults an insight into construction work and related fields by carrying out small creative exercises in groups or individual efforts that include challenges in math, science, and design. Contact: Tanya Cople; NAWIC Education Foundation; 1750 Norwood Dr., Suite 107; Hurst, TX 76054-3639; 817-282-8321; Fax 817-282-8430; nef@airmail.net; www.nawic.org

#### **13 RECYCLED PLASTIC COMPOSITE CROSSTIES REPLACE WOOD RAILROAD TIES**

U.S. railroads replace about 15 million wood crossties each year, and increasing wheel loads accelerate this deterioration. Earlier problems using fiber reinforced ties have been overcome by using either of two innovative techniques: (1) chopped glass fibers recovered from scrap fiber-reinforced polymer composites and (2) recycled waste polystyrene. These develop elastic moduli exceeding 250,000 psi. The recycled plastic composite crossties have been field tested to investigate performance parameters, rail fasteners, and lateral track stability. They have been subjected to over 500M gross tons of traffic at heavy wheel loading with no failures or signs of degradation or wear. The ties are used both in mainline and transit tracks across the U.S. Contact: Richard G. Lampo; U.S. Army ERDC-CERL; P.O. Box 9005; Champaign, IL 61826-9005; 217-373-6765; Fax 217-373-6732; r-lampo@cecer.army.mil; www.cecer.army.mil

#### **14- REINFORCED CONCRETE TIED-ARCH TRUSS 327' CLEAR SPAN ROOF OF NEW ORLEANS ARENA**

Rising steel prices and long-lead times led structural engineers to apply proven bridge technology to the New Orleans Arena roof in a completely new way, employing a reinforced-concrete, tied-arch bridge concept to create a clear-span roof of 327 feet over a modern arena. The roof system uses a combination of traditional structural steel elements with site-cast concrete top chords. This saved the owner considerable time and money and avoided delays by minimizing steel tonnage by taking advantage of concrete being six to eight times more economical than structural steel sections when carrying compression loads. This is the first time the concept has been applied to an arena roof. NOVA Award Finalist Contact: Lawrence G. Griffis, P.E.; Walter P. Moore; 3131 Eastside; Houston, TX 77098; 713-630-7300; Fax 713-630-7386; lgriffis@walterpmoore.com; www.walterpmoore.com.

#### **15 RESTORATIVE IONIZED AIR WASH CLEANS SMOKE/SOOT FROM STRUCTURES AND CONTENTS**

In addition to obvious visible contaminants, microscopic carbon based bi-products of combustion can cause discoloration by blocking light reflection to the human eye or by altering surface texture to affect light reflection. These foreign materials also continue to contaminate indoor environments as an odor. Air washing is dry washing with a controlled flow of filtered, ionized air. Carbon particulate is ionized, altering its static properties, and lifted away from the surface, by a laminar flow of purified air. While airborne, the contaminant is drawn into a specially designed negative air extraction system and trapped in a series of high efficiency filters which can include HEPA and activated charcoal. Contact: Marshall Oliver; Cromwell Restoration, Ltd.; 2625 Skeena Street; Vancouver, BC; Canada V5M 4T1; 888-432-1123; 604-432-1123; Fax 604-432-2451; marshall@cromwell.ca; www.cromwell.ca.

**16 ALL-IN-ONE STREET TRENCH-MILLING MACHINE COMBINES CUTTING AND REMOVAL OPERATIONS**

The Street Trencher combines many street cutting and removal operations, including operating diamond tipped saws, hydraulic hammers, and large backhoes, into one machine. An enclosed drum on its front has carbide teeth that saw-cut both sides of a trench and grinds up the roadway in between in one pass with a minimum of noise, dust, and vibration. It will mill a trench in a roadway at speeds between 100 to 900 feet per hour depending on roadway material density. The Street Trencher lowers pavement impact and vibration, which minimizes the risk of damage to nearby utilities. The precision of the saw-cut and reduced vibrations may reduce or eliminate cutbacks to produce additional restoration savings. Contact: Brian Schonberg; Street Industries, LLC; 303 Sunnyside Blvd.; Plainview, NY 11803; 868-STREET-1; 516-349-8200; Fax 516-349-8275; brians@streetindustries.com; www.streetindustries.com

**17 INTERLOCKING MORTARLESS BRICK SIDING USES TONGUE AND GROOVE CONCRETE UNITS**

Novabrik is a patented mortarless brick siding system of high strength concrete tongue and groove units that interlock and overlap to create a strong, water resistant brick veneer. Units are screwed to the wall so they can be used on wood, steel, and concrete structures. Ease of installation is Novabrik's major advantage. In commercial and residential construction it can be installed 35% faster than conventional masonry with less skilled workers. Novabrik can also replace other siding systems on existing buildings without modifying the building structure or foundation. It eliminates mortar and its unique interlocking system eliminates joint variations and height limitations while creating a true rain screen. NOVA Award Finalist. Contact: Simon Gauthier; Novabrik International, Inc.; 8138 Metropolitan East; Montreal, Quebec; Canada H1K 1A1; 514-355-2922; sgauthier@novabrikcanada.com; www.novabrik.com.

**18 GROUND PENETRATING IMAGING RADAR (GPIR) MAPS SHALLOW SUBSURFACE AND INFRASTRUCTURE**

GPIR maps the shallow subsurface. Applications include mapping buried utilities; inspecting the subsurface before construction; comparing "as-builts" to construction plans; inspecting bridge decks and roadbeds; environmental monitoring and assessment; near-surface geological assessment; and "non-invasive" archeology. It incorporates a complete system for underground imaging: (1) an array of antennas to make underground mapping by radar feasible on a large scale; (2) advanced signal processing to convert radar echoes into 3D underground images; (3) precise positioning of the images relative to ground features by monitoring sensors with a survey geodimeter (laser theodolite); (4) advanced image processing to extract and display underground features in 3D and archive results in CAD or GIS. NOVA Award Finalist. Contact: Michael Oristaglio; Witten Technologies, Inc.; 295 Huntington Ave, Suite 203; Boston, MA 02115; 617-236-0019; Fax 617-236-0032; www.wittentech.com.

**19 TALKING AERIAL WORK PLATFORM USES BOTH VISUAL AND AUDIBLE OPERATING INSTRUCTIONS**

The Workforce Odyssey 34 Aerial Work Platform is a unique telescopic lift used to perform overhead maintenance functions in buildings up to 40'. This is the only lift on the market with audible operating instructions for quick and precise setup in addition to visual guides. An LED display installed on the base also gives operating instructions visually. Other unique features are its extremely stable mast design and the way in which its outriggers are mounted towards the top of the mast sections. Features include wireless controls at the platform, a laser locator for correct positioning, non-floor-marking wheels on its base, and a closer-to-the-wall positioned outrigger. Contact: Bob Yoder; Bil-Jax / Workforce; 125 Taylor Parkway; Archbold, OH 43502; 419-445-8915; 800-537-0540; Fax 419-445-0367; bobyoder@biljax.com; www.biljax.com.

**20 3D POSITIONING FOR SITE LAYOUT GIVES POSITION/ELEVATION WITH ONE TOOL, ONE OPERATOR**

With Trimble's LaserStation 3D contractors can perform layout and positioning tasks with only one tool and one person, which helps reduce errors, improve efficiency, streamline labor, and save money. LaserStation 3D does the same type of work with greater efficiency and in less time than such existing instruments as lasers, theodolites, auto-levels, single slope lasers, dual slope lasers, and the common tape measure. It measures parallel and perpendicular distances and angle as well as such traditional laser functions as level and single or dual slopes. Such applications as anchor bolt layout, formwork, and footer placements can be carried out simply with only one-person operation. Keyword: equipment. Contact: Jonathan Jackson; Trimble; 5475 Kellenburger Road; Dayton, OH 45424-1099; 937-233-8921; Fax 937-233-9441; www.trimble.com.

**21 GPS AUTOMATIC MACHINE CONTROL SYSTEM IMPROVEMENTS FOR DOZERS AND SCRAPERS**

The SiteVision GPS Machine Control System improves accuracy, efficiency, and overall project productivity on the job site. By placing the site design in the cab and using precise GPS technology, the GPS system allows machine operators to accurately perform earthmoving operations for highway and road construction, residential and commercial subdivisions, and other land development projects. Two recent enhancements include the SiteVision Auto option, and a single-antenna version for scrapers. The automatic controls option connects the GPS system to machine hydraulics to control exact blade elevation and cross-slope. The scraper single-antenna option combines real-time positioning and design information in the cab for operators to access exact grade information without relying on surveyors and grade checkers. Contact: Mark Nichols; Trimble; 5475 Kellenburger Road; Dayton, OH 45424-1099; Phone 937-233-8921; Fax 937-233-9441; www.trimble.com.

**22 TRANSPARENT MASONRY GROUT CLEAN-OUT HELPS ELIMINATE UNFILLED/HONEYCOMB CELLS**

The Smart Masonry Clean-Out system replaces old methods of fastening clean-out covers to a concrete masonry wall in preparation for grouting. A clear transparent window allows visual monitoring of grout flow, which virtually eliminates unfilled or honeycomb cells by allowing identification and correction of any blockage in the cells during the pour. This saves time and money, eliminates costly blow-outs that require chiseling and grinding (costly punch out), causes no damage to the face of the block, can be installed and removed in seconds, and is corrosion resistant. The transparent window attaches to the masonry wall by a patented T-Bolt and Nut. Both the transparent window and nut are re-usable. Contact: Randy Jensen; 7667 West Sample Road, # 418; Coral Springs, FL 33065; 954-341-5809.

**23 SHEET METAL PERIMETER FOUNDATION SPANS FROM FOOTING TO FLOOR ON IRREGULAR SITES**

Anchorpanel is a crawl-space perimeter foundation system of corrugated galvanized steel structural panels that are attached around the perimeter of a house and cast into a continuous concrete footing at grade. Panels are initially hung onto any type of pre-situated guide, such as a staked-board, a supported floor system, or an in-place home (either new or retrofit). The footing concrete “locks in” continuous concrete-anchorage deformation along the panel bottoms. This produces a permanent perimeter foundation that supports two-story loads and wind, seismic, or flood forces. There is no concrete forming, stripping, and cleaning; no concrete block work; no wall framing and sheathing; no fitting of framing to an uneven concrete footing. Contact: Michael Butler; Fast Track Foundation Systems; 31078 Turner Rd.; Fort Bragg, CA 95437; 800-789-9694. Fax 707-961-1895. MButler@fasttrackfoundations.com. www.fasttrackfoundations.com.

**24 SLOTTED WEB STEEL BEAM-TO-COLUMN CONNECTION REPLACES MOMENT CONNECTIONS**

The slotted web connection improves on the popular but fundamentally flawed pre-Northridge earthquake field welded-field bolted beam-to-column moment frame connection. Long longitudinal slots are cut to separate beam flanges from the beam web in the region of the connection, and the beam web is welded to the column flange. These changes dramatically change the force, stress, and strain distributions to make the connection kinematic so connection force distributions are statically determinate, eliminate lateral-torsional beam buckling, eliminate seismic shear in the beam flanges, and develop biaxial rather than triaxial stress and strain in the connection region. The connection is cost effective for both new and retrofit construction. Contact: Seismic Structural Design Associates, Inc.; 28570 Marguerite Parkway, Suite 211; Mission Viejo, CA 92692; 949-365-1330; Fax 949-365-1335; webmaster@ssda.net; www.ssda.net.

**25 CONCRETE PULVERIZER WITH RIPPER INTEGRATED WITH JAWS TO MANIPULATE RUBBLE**

The NYE “Digital” Concrete Pulverizer is a service attachment that mounts in place of a bucket on excavators of all sizes. The tool was designed to process concrete of all forms. It has a digital pulverizer that features opposing replaceable jaws and a multi-position ripper on its front side. The digit is used to rip, pry, manipulate, sort, and position product. With the integrated ripper the machine operator can efficiently stand on edge horizontally placed concrete and pulverize from top to bottom, which saves time and operating cost. The pulverizing process yields a product suitable for a variety of uses including roadbeds, soil stabilization, shoreline protection, and ocean wave management. Contact: Scott A. Guimond; National Attachments, Inc.; 80 Dow Road; Gorham, ME 04038; 800-839-9981; 207-839-9999; Fax 207-839-6816; natlat-tach@aol.com; www.nationalattachments.com.

**26 ELECTRO-OSMOTIC PULSE CONTROLS GROUNDWATER INTRUSION IN CONCRETE STRUCTURES**

The Electro-Osmotic Pulse (EOP) system prevents or reverses groundwater intrusion into a building. It is based on the concept that an electrically charged liquid moves under the influence of an external electrical field. A pulsing DC voltage is applied between opposing electrodes in a concrete wall/floor slab and the surrounding earth to produce an electric field in the wall/floor that moves water from the dry side toward the wet side. One innovation is a new patented electronic conducting ceramic-coated anode material that does not change shape over time. Another innovation is a patented asymmetric dual polarity pulse waveform that prevents the concrete from becoming too dry and losing structural integrity. NOVA Award Finalist. Contact: Vincent F. Hock; U.S. Army ERDC-CERL; P.O. Box 9005; Champaign, IL 61826-9005; 217-373-6753; Fax 217-373-6732; v-hock@cecer.army.mil; www.cecer.army.mil/eop.

**27 SMALL BUILDING BASE ISOLATOR PROTECTS HOMES AND SMALL BUILDINGS FROM EARTHQUAKES**

The Ever-Level Foundation System (ELF) mitigates small building damage and danger associated with earthquakes by reducing forces induced on buildings by as much as 50%. It consists of a ball and socket and an elastomeric bearing pad similar to, but smaller than, those made for bridges and large buildings. It is innovative because it does not depend on a large mass and friction plates such as the isolators used for large structures. It is superior to other foundation systems for use on compressive or expansive soils such as adobe and clay, because it is a pier-based foundation that can be re-leveled any time after construction to accommodate soil movement and shifting. Contact: Harold L. Stiles; Ever-Level Foundation Systems, Inc.; 75 Plum Tree Lane, Suite 9, San Rafael, CA 94901-2843; Fax 415-256-9400/415-453-3300; www.ever-level.com.