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Nominations for the 2000 NOVA Awards

By Robert I. Carr[1]

Abstract: This paper presents summaries of the 27 NOVA Award Nominations received between September 15, 1998 and September 1999 for the 2000 NOVA Awards to be presented March 16, 2000 at the annual Innovation Celebration. Nominations include innovations in concrete, asphalt, foundation, retaining wall, insulation, highway, rehabilitation, light framing, pipe, scaffold, and bridge construction. Nominations also include innovations in architectural and engineering design, monitoring and testing, and worker recruiting, training, and safety.

INTRODUCTION

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Nominations are numbered in the order of the dates they were postmarked. Titles are hypertext links to the individual nominations, from which readers can obtain more detailed information. Nomination descriptions were edited by Robert I. Carr from original drafts of students in CEE 530 – Construction Professional Practice Seminar at the University of Michigan.

1 RAPID DEPLOYMENT BARGE AND DECK CRANE ARE TRANSPORTED WITHOUT DISASSEMBLY

The Rapid Deployment Barge is a new integrated barge/crane unit that can be transported overland as a single unit without disassembly. Compared to old models, it saves 75% of labor and 85% of cost because of lightweight, easily mounted, quick disconnect, shallow shore work, and self-launching and self-retrieving capability. Its high capacity, integrated hydraulic crane has a low center of gravity and 360 degrees of rotation. The barge has advanced US marine construction and maintenance capabilities by providing full integration of transportability (both overland and on water surface) with custom tooling adaptations that provide maximum flexibility for a wide range of multifaceted marine construction applications. Contact: James G. Collins; Trident Tech Services, Inc.; 1050 Broadway, Suite #7; Chesterton, Indiana 46304; (219) 929-9366; Fax 926-8446.

2 BURIED CONCRETE ARCH SYSTEM PROVIDES SOIL AND STRUCTURE INTERACTION

Con-Arch is an innovative cast-in-place buried arch construction methodology used in the construction of bridges, culverts, cut and cover tunnels, underpasses, and underground vaults and reservoirs. The Con-Arch system employs soil structure interaction and finite element analysis with improved wet mix shotcrete techniques to create a fast to install, cost effective, and aesthetically superior cast-in-place product. The arch structural sections work with surrounding soil to carry imposed loads. The rigid concrete arch provides the most structurally efficient section possible for a given amount of material. The Con-Arch system typically substitutes for reinforced box culvert conventional flat deck bridge construction and for precast concrete culvert and pipe sections. Contact: Randy Emerson; C. L. Ridgeway, LLC; 2450 W. Poppy Ave.; Tucson, Arizona 85705; (520) 202-1800; Fax 292-6974.

3 ASPHALT TRANSFER MACHINE FROM TRUCK TO PUP-TRAILERS PROVIDES MANEUVERABILITY

The Asphalt Transfer Machine uses a hopper and conveyer belt system to move asphalt from a pup trailer to an empty truck for paving. It allows pup-trailers to haul asphalt material to projects where available space does not allow pup-trailers to maneuver into the asphalt paver. The Asphalt Transfer Machine replaces the need to send strictly single trucks to the project and into the paver. Using pups speeds up paving time and the quantity that can be paved in one day, allowing companies to do more work during the paving season. Both jobs on which the transfer has been used went much more quickly and efficiently because of the quantity of asphalt moved by the transfer and pups. Contact: John I. Lundstrum; Shamrock Paving Co.; P.O. Box 19263; Spokane, Washington 99219; (509) 244-2800; Fax 244-2949.

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4 LOCK-UP DEVICE TRANSFERS FAST ACTING, SHORT DURATION LOADS BETWEEN SUPPORTS

The Colebrand Lock-up Device (LUD) provides a temporary rigid link between the deck of a bridge and its supporting abutments and piers. Under fast acting and short duration forces, such as seismic, braking, or collision, the load is transferred to and shared among the supports. But under low acting movements, such as thermal, shrinkage, or creep, the LUD no longer acts as rigid and moves with the deck. This technology can be used not only in new structures but also as an important alternative in strengthening existing bridge substructures, especially in seismic retrofitting. Contact: Alan Bromage; Colebrand Advanced Engineering; 18-20 Warwick St.; Regent St.; London, United Kingdom; +44 171 439 1000; Fax +44 171 432 0171 or 2401 Pennsylvania Ave. N.W.; Suite 604; Washington, DC 20037; (202) 496-1654; Fax 496-1656.

5 WASTE REDUCTION/RECYCLING MODEL SPECIFICATION FOR CONSTRUCTION AND DEMOLITION

WasteSpec is a 114-page manual that provides architects and engineers with model specifications and background information on waste reduction, reuse, and recycling during construction and demolition. The model specifications are tailored to all sixteen divisions of the Construction Specifications Institute (CSI) format. The manual also includes background information on alternatives for handling construction and demolition waste, information specifically designed for bidders on how to estimate recyclable waste, a sample waste management plan, a checklist of 135 materials and items typically contained in demolished buildings, and sources of further information. Contact: Judy Kincaid; Triangle J Council of Governments; P. O. Box 12276; Research Triangle Park, North Carolina 27709; (919) 558-9343; Fax 549-9390

6 MOBILE PARAPET BARRIER FOR UNGUARDED EDGES PROVIDES PORTABLE GUARDRAIL

The Mobile Parapet Barrier is a portable guardrail device that satisfies OSHA guardrail requirements. It eliminates the need for protective parapet walls or worker fall protection equipment. Workers use it to service light fixtures and cameras mounted at the roof edge and to inspect, repair, and maintain roof drains, cant strips, and cap flashings. The Barrier is easily moved from one work task to another on its four caster wheels. Aluminum wheel plates placed under the casters prevent roof damage when the Barrier is stationary on tar and gravel roofs. It folds into a compact and balanced shape for transport. Both side panels have 100 pounds of counterweight to prevent overturning. It weighs 140 pounds without counterweights. Contact: Arthur M. Schlachter, P.E.; Worldwide Facilities Group; General Motors Corp.; 485 W. Milwaukee Ave.; Detroit, Michigan 48202; MC: 482-303-003; (313) 556-2562; Fax 974-8784.

7 FOUNDATION RETROFIT FOR TURBINE / GENERATOR IN OPERATING POWER PLANT

$1,330,000 and 2 months of labor were saved demolishing a 710 ton, 30 x 75 x 8 ft concrete pedestal on the 3rd floor of a power plant by uniquely using wire sawing, epoxy anchors, and specialized rigging. The concrete was first cut apart in the largest practical pieces. Wire sawing required careful placement and accurate tapering of cuts so each piece could remain in place until all cuts were made and then be disassembled and loaded into the rail car in one handling. It was the first use of epoxy set anchors for lifting massive concrete pieces. The rail car was fitted with special structural steel framework to fit the different sizes and shapes of concrete pieces. Contact: Earl J. Pember, Jr.; DTE Energy; 2000 Second Ave.; Detroit, Michigan 48226; (313) 235-5075; Fax 235-5126.

8 FRICTION PENDULUM SEISMIC ISOLATION BEARINGS FOR BUILDINGS, BRIDGES, INDUSTRIAL FACILITIES

With spherical Friction Pendulum seismic isolation bearings at each support point, a structure sways with a gentle pendulum motion during earthquake ground shaking. This allows the ground to shake without damaging the structure. Friction Pendulum seismic isolation provides structures with higher level of seismic protection than conventional structural strength and ductility design. Friction Pendulum bearings are simple in design but with versatile properties and a wide range of applications. They are less expensive to install than elastomeric bearings. Friction Pendulum bearings have been used in some of the world's largest seismically isolated buildings, bridges, and industrial tanks. They are also effective and economical for small buildings and chemical tanks. Contact: Dr. Victor Zayas; Earthquake Protection Systems, Inc.; 2801 Giant Hwy., Bldg. A; Richmond, California 94806; (510) 232-5993; Fax 232-6577.

9 REMOTE PILE DRIVING FORCE/VELOCITY ANALYZER

The PAL-R analyzer monitors pile installation from a remote location. It records and processes force and velocity signals from sensors installed on the pile and transmits them to an engineer, who need not be on site for testing. The equipment and sensors can be installed on site by the installation crew or a technician. The data is then sent back to the main office via a cell phone connection, where an engineer can analyze this and other projects at the same time from the office. The two main advantages are cost savings and a speedy analysis after the data is received. Contact: Garland Likins; Pile Dynamics, Inc.; 4535 Renaissance Parkway; Cleveland, Ohio 44128; (216) 831-6131; Fax 831-0916.

10 FIRE RESISTANT INSULATION COMPOSITION FOR HIGH TEMPERATURES

FireComp is a fire resistant, high temperature insulation that can be applied very easily on virtually any kind of material of any shape and size by simple spraying, trowelling, or hand forming. This produces a lightweight solid with astonishing insulation properties. Moreover, it is capable of resisting direct flame up to 6000º F without melting, flaming, or emitting harmful fumes. FireComp is being tested by Boeing to replace their prime insulation materials, and it is already their first back-up. FireComp has the potential to become the premier fire-stop in the industry. Contact: Randolph C. Farrar; FireComp, Inc.; 1217 Gloria St.; Jackson, Missouri 63755; (573) 243-8411; Fax 241-8411; Email firecomp77@hotmail.com.

11 ROTATING PIERHEAD FOR ELEVATED HIGHWAYS DOES NOT INTERFERE WITH TRAFFIC

This is a non-friction rotating device for very heavy loads (500 tons) that is placed between a pier and its pierhead. The device consists of two steel discs with pressurized oil in between. It allows an elevated toll road to be built above an existing, fully operating road without interrupting traffic. The pier is first built in the median between opposing lanes of the road. The pierhead is then cast on top of the pier and the device, above and parallel with the existing road. After the pierhead concrete has gained strength, the pierhead while supported by the device is rotated 180º to its final position perpendicular to the existing road. This technology has been applied to pierheads of 450 and 540 tons. Contact: Dr. Ir. Tjokorda Raka Sukawati; JL. Galuh II / 7; Jakarta 11210 Indonesia; 62 21 7207167; Fax 62 21 7268021.

12 SUPPLIER COST REDUCTION PROGRAM TO PROVIDE GREATER VALUE FOR SAME/LESS MONEY

DaimlerChrysler created and uses the SCORE program (Supplier COst Reduction Effort) to make the company more efficient and cost effective. SCORE was originally developed for suppliers and vendors. It is now applied to DaimlerChrysler construction contractors, making them business partners with DaimlerChrysler and rewarding their efforts to be more efficient, innovative, and cost effective. DaimlerChrysler expects them to be creative in finding ways of reducing costs, eliminating waste, and continuously improving. Target savings are 5%. As an incentive, SCORE accounts for 15% of a supplier's and vendor's overall DaimlerChrysler grade and weighs heavily in DaimlerChrysler's decision to increase the level of business with it. Contact: James P. O'Connor; DaimlerChrysler Corp.; 800 Chrysler Dr CIMS 484-06-10; Auburn Hills, Michigan 48326-2757.

13 MILITARY TANK PROOF LOAD TESTING DETERMINES CAPACITY OF BRIDGES

This method uses M-60 or M-1 tanks as proof load to verify the load carrying capacity of bridges. Analytical evaluations tend to underestimate a bridge's carrying capacity, and proof loading may save a bridge that is deemed unsound by analytical methods, thus saving the replacement cost of the bridge. Each tank weighs about 60 tons and has a track length of about 5 meters. Sensors are placed on the bridge structure and readings are taken as the tank moves across the bridge. Military tanks have an advantage over proof loading bridges with concrete blocks, because a tank is self-propelled, and a crane is not required to move the load. Contact: Dr. Andrzej S. Nowak; Dept. of Civil Engineering; 2370 G. G. Brown; University of Michigan; Ann Arbor, Michigan 48109-2125; (734) 764-9299; Fax 764-4292; Email nowak@umich.edu.

14 UNPAVED ROAD STABILIZATION AND DUST SUPPRESSANT IS ENVIRONMENTALLY FRIENDLY

Roadbind America began operations in January of 1997 and produces and markets its environmentally friendly unpaved road stabilizers and dust suppressant throughout the USA and South America. Products are derived from the pulping process of timber, to which proprietary agricultural products are added. The products reduce unpaved road maintenance costs up to 95%, and they also provide a safer and healthier environment by eliminating hazardous fugitive dust. Benefits include costing 10% of paving costs, increasing load bearing ration up to 150%, and preventing costly destructive wind and water erosion. Roadbind products are used by Federal, State, County, and Municipal levels and on sugar cane plantations, citrus groves, farms, and private industry. Contact: Joseph S. Kroll; Roadbind America, Inc.; 1201 US Highway 1, Suite 215; North Palm Beach, Florida 33408; (561) 624-7060; (888) 488-4273; Fax 624-2341

15 GALVANIC EMBEDDED ANODE FOR REINFORCING STEEL PROTECTS CONCRETE PATCHES

Galvashield XP anodes consist of a galvanic zinc core surrounded by an active cementitious matrix. The palm-sized anode is incorporated into concrete patch repairs by connecting it to reinforcing steel. The zinc core corrodes preferentially to the surrounding rebar, thereby protecting the rebar from corrosion. Its use also reduces the effect of "ring anode" corrosion in concrete patchwork. Galvashield XP changes concrete patch repair from a temporary, short-term fix to a repair with a much longer service life. It also eliminates the need for expensive and less effective rebar coatings, corrosion inhibitors, and repair materials with specialized components. Anodes are designed to provide effective protection for 10 to 20 years. Contact: David Whitmore, P. Eng.; Vector Construction Group; 474 Dovercourt Dr.; Winnipeg, Manitoba R3Y 1G4 Canada; (204) 489-6300; Fax 489-6033.

16 STEEL CURVE GUIDES SUPPORT STEEL OR WOOD STUDS FOR CURVED WALLS

Flex-C Track is used to frame curved-structural frames. Its new technology allows builders to create high quality curved walls, columns, arches, and even "S" curves easily with lower labor cost. Contractors report labor savings up to 80% compared with labor intensive methods. Flex-C Track is made of pivotal galvanized steel sections with a sliding strap on each of two legs. It is easily shaped by hand without special or unusual tools to form a curved U-shaped channel that is attached to the floor and ceiling. Steel or wood studs are inserted into the channel and covered with gypsum wallboard, wood, or other architect specified product. It is widely used on commercial construction in the United States. Contact: Franklin L. Wheeler; Flex-Ability Concepts; P. O. Box 7145; Edmond, Oklahoma 73083; (405) 302-0611; Fax 302-0645.

17 RETAINING WALL OF SEMI-RIGID PRECAST CONCRETE FACING ELEMENTS

Kal-SR is a semi-rigid wall system for soil retention and stabilization that combines advantages of a traditional gravity wall's rigidity with a crib wall's flexibility. Kal-SR wall facing elements comprise the kernel of the entire system. The elements' spatial structure provides wall strength and stability and allows interconnection of subsequently stacked layers by concrete poured into voids at the interfaces. Remaining voids can be filled with soil, which saves concrete. Kal-SR retaining walls fit a variety of heights, site conditions, and soil properties to provide high safety factors against instability and

very high safety factors for earthquakes. More than 700,000 sq. ft. have been constructed in Israel since its development in 1996. Contact: Suheil Khamis; Kal-SR, Ltd.; POB 88; Zippori Industrial District; 17910 Zippori; Israel; +972 6 6563251; Fax +972 6 6460392

18 CONNECTION ACCESSORIES FOR PRECAST CONCRETE IN HIGH-RISE BUILDINGS

Grouted Connection Tube, Swift Lift Cover, Spandrel to Column Connector Sleeve and Closure Cap, and Double Tee Stem Blockout are four products used in high-rise precast concrete structures since the early 90's. GCT provides strong connections, quick installation, and less time and labor between connections of precast products. SLC saves time during Swift Lift Anchor installation and resists freeze/thaw cycles and UV rays on covers and caps. SCCSCC is less labor intensive and greatly improves through-bolted connections between exterior spandrels and precast columns. DTSB is quickly and easily installed in precast double tee forms to provide openings for electrical and other utility lines to pass through. Contact: Kevin Iddings; High Concrete Accessories; 125 Denver Road; Denver, Pennsylvania 17517; (717) 336-9397 or (800) 508-2583; Fax 336-9301.

19 APPRENTICE MARKETING VIDEOS FOR CONTRACTORS AND CRAFTS

The National Erectors Association and the National Maintenance Agreements Policy Committee produced two videos. "The Best Kept Secret" promotes the skills and expertise of union contractors. It consists of leading owners from utility, steel, automotive, and aerospace companies who speak first-hand on why their companies used union contractors to perform their industrial construction and maintenance programs. It received the 20th Annual Telly Award. "The Best Kept Secret – Earn While You Learn" describes union apprenticeship programs as a career path for young people. It was filmed in actual apprenticeship schools with real apprentices and instructors. Contact: National Maintenance Agreements Policy Committee; 1501 Lee Highway; Suite 202; Arlington, Virginia 22209; (703) 524-3336; Fax 534-3364.

20 UNITED STATES COURTHOUSE IN BOSTON FEATURES METAL-GLASS CONOID

The new federal courthouse in Boston, Massachusetts houses the First Circuit District Court of Appeals for the District of Massachusetts. The building's innovative design shapes a critical moment in Boston's urban fabric within the context of a grand public building. Through its materials and thoughtful site strategies, the building addresses the open public nature of a courthouse as well as its formality. Brick facades on the city side help blend the building into this context, and a conoid shaped glass wall that is both technically complex and aesthetically beautiful communicates openness on the harbor side. Much of the site is public space with paths, arcades, benches, and shade trees for people to use and enjoy. Contact: Henry N. Cobb; Pei Cobb Freed & Partners; 600 Madison Ave.; New York, New York 10022; (212) 751-3122; Fax 872-5443.

21 AUTOMATED DUCT DESIGN MEETS ROUND INDUSTRIAL DUCT CONSTRUCTION STANDARDS (RIDCS)

This program automates the RIDCS for designers of industrial ventilation and air pollution control systems. It automates the calculations that define suitable construction details for industrial duct, which eliminates hand calculations based on tables of predesigned duct. The program is innovative because it is the first of its kind. Its flexibility and database permit users to select duct from a wide variety of metals, including various grades and alloys of carbon steel, stainless steel, and aluminum. This software generates specific details based on specific requirements and has no limitations on its selections. Contact: Dennis Bradshaw; Sheet Metal and Air Conditioning Contractors' National Association; 4201 Lafayette Center Dr.; Chantilly, Virginia 20151; (703) 803-2980; Fax 803-3732.

22 PIPE LASER HAS REVOLUTIONIZED GRAVITY FLOW PIPE INSTALLATION

The pipe laser provides an accurate and efficient way to align and install pipe. Contractors can install two to three times more pipe per day with more accurate line and grade. Safety is increased, because fewer people have to go down into the trenches, which reduces the risks in underground work. The increased accuracy of the pipe laser also reduces gravity flow sewer pipe system warping and cracking, which reduces contamination and infection of surrounding soils. Many product improvements have been made since the first pipe laser was introduced by Spectra-Physics in the 1960's, and 99.9% of pipe crews now use pipe lasers. Contact: Karl Ramström; Spectra Precision; 5475 Kellenburger Rd.; Dayton, Ohio 45424; (937) 233-8921; Fax 233-9441.

23 ROTATING LASER FOR INTERIOR/GENERAL CONSTRUCTION IS NOW IN STANDARD USE

The rotating laser was invented for machine control in 1968 and then expanded into construction and site preparation. Additional inventions included the LaserLevel and subsequent creation of the self-leveling rotating laser in 1975. This technology is now the standard for general construction and interior laser products worldwide. The innovation in LaserLevel was removal of the need for one person at the instrument and one at the rod. LaserLevel requires only one person at the rod. Hand signal communication is eliminated, and accuracy and productivity are greatly increased. What began as the LaserLevel is now a full line of products to meet the need and price range of every contractor, from do-it-yourselfers to large, heavy highway construction companies. Contact: Karl Ramström; Spectra Precision; 5475 Kellenburger Rd.; Dayton, Ohio 45424; (937) 233-8921; Fax 233-9441.

24 WASHINGTON MONUMENT SCAFFOLD OF ALUMINUM INCORPORATES 1° LEAN

The aluminum accesses scaffold on the Washington Monument incorporates many special innovations. A variable girt and brace system accommodates 1° of lean, and a unique system of variable and adjustable trusses accommodates tie re-

strictions. Mechanical anchors cannot be used, so "V" shaped corner brackets engage the monument. The system accommodates a personnel/material hoist within the structure at the 1 lean. A specially fabricated 65' free standing top of tapered 2D trusses and converging space frame trusses was fabricated with tubular main members to allow concentric loading of a 13 member, 5 direction, nodal connection 10' above the monument. The scaffold was also designed to accept decorative mesh false panels that maintain the beauty of the Monument during its renovation. Contact: Craig O'Callaghan; Universal Builders Supply, Inc.; 5720 Columbia Park Rd.; Cheverly, Maryland 20785; (301) 771-7171; Fax 772-5272.

25 STEEL-FREE CONCRETE FOR PRE-CAST AND CAST-IN-PLACE CONCRETE BRIDGE DECKS

Pre-Cast ArchPanel and Cast-in-Place steel-free bridge deck slabs eliminate reinforcing steel in concrete. The cast-in-place version is reinforced only with randomly distributed, chopped, polypropylene fibers. Top flanges of adjacent girders are joined at intervals by steel straps. The pre-cast ArchPanels use external steel straps to harness the arching action of the slab. Both uses have been thoroughly tested and primary failure has been punching failure. The steel-free deck slabs improve quality and durability by eliminating corrosion caused by de-icing salts. This slab is also less expensive in first cost and even less expensive in life cycle cost. Maintenance and repairs can be made without the normal disruption of traffic. Contact: Dr. Aftab A. Mufti, P.Eng.; Nova Scotia CAD/CAM Centre; Dalhousie University ; P. O. Box 1000; Halifax, Nova Scotia B3J 2X4; Canada; (902) 494-6035; Fax 422-8380; Email cad.cam@dal.ca.

26 SUPERVISORY TRAINING PROGRAM IS SPREADING THROUGHOUT CANADA

The SuperVision program was created to meet the need for additional supervisors in Alberta's rapidly growing construction market. Construction owners, contractors, and building trade unions worked together developing the framework of this training program, whose goal is to teach technical competence and leadership abilities to existing and potential construction supervisors. Since Better SuperVision was implemented in 1995, contractors have noted that jobs overseen by supervisors that have completed the program run smoother, with fewer problems. In the last four years 450 supervisors in Alberta have completed the program, and it has been licensed to joint labor and management groups in four other provinces. Contact: Ron Cherlet; Construction Labour Relations – Alberta; 10949 – 120 St.; Edmonton, Alberta T5H 3R2 Canada; (780) 451-5444; Fax 451-5447.

27 SPAN-BY-SPAN METHOD ON EVANS CRARY BRIDGE

A span-by-span scheme was developed for the Evans Crary Bridge as an value engineering proposal after contract award. This resulted in the longest span-by-span constructed bridge in the world. Span-by-span construction using an underslung erection truss provides faster construction and reduces materials, equipment and labor. The value engineering proposal also included a combination of simple span external post-tensioning tendons and internal continuity post-tensioning tendons; staged construction to allow one roadway to be built at a time; precast decks and steel girders for temporary widening and transition spans; and one month reduction in overall construction time, six months earlier completion and opening of traffic, and $300,000 in cost savings. Contact: R. Craig Finley, P.E.; Finley McNary Engineers, Inc.; 2865 Remington Green Circle; Tallahassee, Florida 32308; (850) 422-0000; Fax 422-3373 or Dave Hrynyk; PCL Constructors; 9900 West Sample Road; Suite 203; Coral Springs, Florida 33065; (954) 345-1725; Fax 341-4576 or George Denti, P.E.; Florida Department of Transportation; 3725 SE Ocean Blvd.; Suite 100; Stuart, Florida 34996; (561) 286-7790; Fax 286-6420.