Transportation News

A Resource for Military Transportation EngineersB Volume 20, December 2000

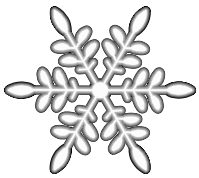
In This Issue

The Transportation Systems Center would like to wish all of you a safe and happy holiday season. May the New Year bring you...

...good health in your pursuit of happiness
...work that is satisfying and fun
...and many opportunities to make a difference!

We also dare to hope that your New Year is filled with...

...asphalt that never ruts
...concrete that never cracks (except at joints)
...joints that remain sealed
...subgrades that remain stable
...projects without changes
...and all the funding required to do the job right!



Eielson Gets a New Runway - Ahead of Schedule

by Ron Shafer, USACE, Alaska District

The project at Eielson Air Force Base, Alaska included 9,512 feet of a 75-foot wide Portland cement concrete (PCC) "keel" section and 37.5 feet of new asphalt concrete (AC) on each side of the keel section for a total width of 150 feet. The PCC keel is generally 14 inches thick with the edges of the keel section thickened to 18 inches. The asphalt concrete portion of the new runway is 4 inches thick. In addition, the existing 75-foot wide shoulders on each side of the runway were milled and overlaid with a 2" thick layer of new asphalt. Crack control joints in both the PCC and AC portions of the runway were placed at 20-foot intervals. The entire runway was grooved and new stripping applied. All of this was accomplished, from start to finish, in less than the contractually specified 135 days.

(Continued on page 5)

Existing pavement being milled at Eileson AFB

Criteria... Criteria. . . Criteria...

The articles on the next two pages, provided by Dan Boyer of theTransportation Systems Center, describe and explain some of the recent Transportation Systems Center. Contact Dan Boyer at (402) 221-7266, dan.j.boyer@usace.army.mil.

Changes to Corps' Guide Specification

Over the past 5 years, there have been many changes to the Corps' guide specifications. Sometimes no explanation comes with the changes and the designer sees only an updated guide. Changes to the guide specification format and numbering system appear to be the reason for most of the recent updates.

Recently the guide specifications were changed to the Construction Specification Institute (CSI) format. Then all of the numbers were changed to correspond to CSI's standard number system. The latest change by USACE's Huntsville Center was to change the submittal numbers and indicator for government approval "GA" to "G" with an additional indicator for Resident Engineer, Engineering Division or AE approval. These changes are part of a move toward the Unified Facility Criteria (UFC) that has been agreed upon the Army, Navy and Air Force. Conversion to the UFC system will ultimately renumber and reformat criteria documents. This will eventually help designers because the same numbers and format will be used for Army, Air Force and Navy.

Changes Wanted

There are a large number of guide specifications related to transportation available. The Transportation System Center does not receive adequate funding to keep all of these guides up-to-date. Therefore, it is very important for each district to share corrections or improvements that they have developed. TECHINFO provides a convenient means for electronic submission of comments at www.hnd.usace.army.mil/techinfo. Comments may also be submitted by traditional means using ENG Form 3078, "Recommended Changes to Engineering Documents". As another alternative, e-mail comments directly to the Transportation System Center.

To Drain or Not To Drain

Army pavement drainage criteria under went a major change in 1992 with the publication of Engineering Technical Letter (ETL) 1110-3-435, "Drainage Layers for Pavements". This criterion has since been incorporated into Engineering Instruction (EI) 02C020, "Subsurface Drainage for Pavements", dated 1995. The EI is available on TECHINFO (www.hnd.usace.army.mil/techinfo) or is installed with PCASESetup101f.exe, which can be downloaded from the PCASE web site at www.pcase.com.

The drainage criteria was written in a "one size fits all" philosophy, that new drainage criteria is applicable to all airfields and roadways pavements 8 inches or more in thickness (includes the surface, base and subbase). The reason for the magical 8 inches is that installing drainage layers with a separation layer in pavements less than 8 inches is not considered cost-effective or constructible. For light duty pavement designs for cars, with a minimum 6-inch PCC surface and a 4-inch base, it may not be cost effective to add a drainage layer, due to the surface strength far exceeding the wheel load stress.

The Corps requires a separation layer between the subgrade and the drainage layer to prevent mixing of material. The separation layer can be a 50 CBR subbase material. The higher quality subbase material is recommended to facilitate compaction of the permeable base.

Due to funding short falls, one of the first items evaluated for cost reduction is the pavement design, specifically the drainage criteria. Good drainage design can cost 10 to 15 percent higher than without drainage. However, eliminating subsurface drainage can reduce the pavement life and increase operation and maintenance costs for which funding is even more scarce than for new construction.

There are also ways to lessen the cost of providing subsurface drainage in a project without negating all the benefits. The Corps has designed road projects with the drainage layer daylighting into ditches, whereby eliminating the cost of the subdrain pipe. One way to accomplish this, is to stabilize the last meter of the drainage layer, where it daylights. Another way to reduce cost is to use Rapid Draining Material (RDM) which is normally less expensive than asphalt or cement stabilized Open-Graded Material (OGM). Take note, the Air Force requires stabilization of drainage layers under airfield pavement. Any deviation from this criterion would require a waiver. It is the district's responsibility to document any waivers to criteria in the project design analysis.

The Corps criteria does not permit any structural benefit from the addition of a good drainage system, but if good drainage is incorporated a designer could look at reducing existing conservatism built into the District's standard practices. For example, instead of rounding up to the nearest inch the designer could round to the nearest ½-inch.

Don't forget about maintenance. Design drainage systems that are easy to maintain by considering constructability, future cleaning and rodent protection. It is not uncommon to discover pipes that have been crushed in the construction process. Some states have even implemented a QC camera inspection program after construction is complete. (Continued on next page)

changes in pavement-related criteria. Feedback on any problems caused by criteria changes would be appreciated by the

To Drain or Not To Drain (Cont'd)

For more information on subsurface drainage systems (outside of Corps procedures) the FHWA offers a very detailed method of assessing the need for drainage layers based on an objective ranking of design details, traffic, soil type and climate. However, designers are cautioned on mixing criteria from different agencies. Each agency uses a holistic system of pavement design based on a balanced approach, with drainage being only one of many factors. The following are excellent references for additional information: "Considerations for Providing Subsurface Drainage in Jointed Concrete Pavement", Transportation Research Record 1709, Paper No. 00-0994; and "America's Pavements: World's Longest Bathtubs", by Harry R. Cedergren, *Civil Engineering* Magazine, September 1994.

Drainage Layer Guide Specification Being Revised

The Corps of Engineers Guide Specification, CEGS 02714, "Drainage Layer", is currently being revised. Planned changes are as follows and should be incorporated by time of publication of this newsletter.

In paragraph 3.2, *Test Sections*, of the revised guide specification, the density testing requirements on Open Graded Material (OGM) will be eliminated because it is very difficult to obtain consistent and accurate density readings on OGM material. Without an accurate test method for the OGM, the responsibility for determining the number of compaction passes is now going to be left to the experience of the designer. For OGM stabilized with cement or asphalt, the designer should witness the test section construction and visually inspect the aggregate sampling to determine if any degradation is occurring. For OGM stabilized with choke stone, the designer should analyze sieve test results to detect any degradation. If no construction equipment will be operated on the OGM the contractor may elect not to use choke stone for stabilization. If the contractor elects not to use the choke stone a material transfer device may be required in order to use pavement-laying equipment.

For Rapid Drainage Material (RDM) the density testing has been retained to determine the number of required passes for adequate compaction.

Tack and Prime Coat Guide Specification Modified

The Corps of Engineers Guide Specification, CEGS 02748, "Bituminous Tack and Prime Coats for Bituminous Pavements" has been modified to incorporate ETL 1110-3-497, "Prime Coats for Asphalt Pavements". The ETL permits the contractor to determine if a prime coat is needed to protect the base when a bituminous surface course will be placed within seven days. Because of the economics, the contractor will normally elect not to use a prime coat. The seven-day time limitation should provide some incentive for the surfacing to be completed in a timely manner. It is not critical that the surfacing be placed in exactly seven days, but time extensions should be granted only on a project by project basis after award.

Resin Modified Pavement Guide Specification Updated

The use of Resin Modified Pavement (RMP) is increasing throughout DOD. RMP is an open-graded asphalt pavement with the open pores filled with a resin grout. The pavement is fuel resistant and has surface characteristics of Portland Cement Concrete pavement. The Corps of Engineers Guide Specification,CEGS 02746, "Resin Modified Pavement Surfacing Material", was updated to include the mix design procedure which will permit the contractor to develop the job mix formula for the open-graded asphalt layer and the slurry grout.

Airfield Sign Criteria

Signs and markers provide important guidance and control for the safe and efficient surface movement of aircraft on an airfield. Proper signing provides information on location, direction, destination, mandatory holding positions, important boundaries, and other information. Additionally, runway distance markers provide to the pilot the remaining distance on a runway for landing and take-off operations. This is from the new criteria, AFMAN(I) 32-1187/ TM 5-811-5, "Design Standards for Visual Air Navigation Facilities", Chapter 9, *Standards for Airfield Signs and Markers*.

This new criteria will be officially released early 2001 and will replace the sign criteria contained in TM 5-811-5, "Army Aviation Lighting", paragraph 6-3.*a.* (4) and AFMAN 32-1076, "Design Standards for Visual Air Navigation Facilities", 1 December 1997, paragraph 5.6, *Taxiway Guidance Signs*.

For more information contact John Gregory, Transportation Systems Center, (402) 221-7267 or Larry Strother, HQ AFCESA/CESM, 850-283-6354, DSN 523-6354.

Criteria Available on the Internet

Army Regulation 420-72

The revised Army Regulation 420-72, "Transportation Infrastructure and Dams," is now available at www.hqda.army.mil/acsimweb/fd/policy/ar420_72/index.htm. The regulation describes the Director of Public Work's administrative policies, procedures, and responsibilities for paved roads, airfields, other surfaced areas, culverts and other appurtenances, railroad tracks, bridges, and dams.

New Railroad Manual

The new Technical Instructions (TI) 850-02, "Railroad Design and Rehabilitation", is available on the Internet at www.hnd.usace.army.mil/techinfo. The new TI replaces the existing TM 5-850-2 with expanded chapters and examples of track inspection reports in the appendix. The TI is to be used on all new railroad design and rehabilitation projects. If you have any questions or find any errors in the TI contact Dan Boyer, Transportation Systems Center, (402) 221-7266, dan.j.boyer@usace.army.mil.

Navy Hosts Tri-Service Workshop

The Navy hosted a Tri-Service Pavement Workshop 11 – 12 October 2000 at Port Hueneme, California. The Tri-Service workshop included 26 representatives from the Navy, Air Force and Army Corps of Engineers. The purpose of the workshop was for the exchange of new ideas, new problems and new solutions with the focus on airfield pavements. In particular, Tri-Service criteria, high volume fly ash concrete, heat resistant pavements, and void detection were addressed. For more information contact Javier Malvar, NFESC, (805) 982-1447, malvarlj@nfesc.navy.mil.

Design-Build Contracts on the Rise

Design-Build is the fastest growing method of project delivery in the country, according to the Design-Build Institute of America. The number of design-build projects increased from 15% in 1990 to 35% in 1999.

Traditionally, with the design-bid-build process, projects start with the owner contracting with a professional to design a project. Upon completion of the design, bids are solicited from contractors and the owner then enters a new separate contract with contractor to construct the project. In the design-build process, the owner has a single contract for both the design and construction.

Advantages of design-build contracts:

- Provides single-point responsibility. If the owner has a problem, they only need to call the design-builder. No more "finger pointing" between the designer and contractor; when a problem arises.
- Constructed within the owner's budget.
- Fewer change orders during construction.
- Shortened project delivery time. Design-builder can sometimes start construction and order long-lead time items before the final design is completed.

Precautions of design-build contracts:

- Owner cannot rely on the designer to act as a representative during construction.
- Mediocre designs because the design-builder more concerned with cost and constructability. Concern is less now as contractors are becoming more experienced and more designers are entering the design-build field.

According to a memorandum from Major General R.L. Van Antwerp, Assistant Chief of Staff for Installation Manatement, dated 10 July 2000, "Project Delivery Using Design-Build", the Navy and Air Force use this procurement method for almost 50% of their respective MILCON programs. The Army currently uses the design-build process to a much lesser extent. But because of the Army's under-funded planning and design account DAIM has requested that 25% of FY 02 MCA projects be design-build. The goal is to have is to eventually have 50% of the projects design-build.

The Transportation Systems Center would like to track transportation-related design-build projects and develop a database of lessons learned. If you have any on-going design-build projects please call Terry Sherman, (402) 221-7260, or send lessons learned to terry.w.sherman@usace.army.mil.

Alkali-Silica Reactivity Mitigation Workshop 2000

The first-ever Alkali-Silica Reactivity (ASR) Mitigation Workshop 2000 was held 28-29 November 2000 at the Corps' Albuquerque District. ASR causes concrete to deteriorate and has been a major problem at some Army and Air Force Installations. The Workshop included presentations on ASR, a panel discussion and a site visit to view ASR at Kirtland AFB, New Mexico. The PowerPoint presentations will be made available on the Transportation Systems Center's website at www.tsmcx.com. ASR mitigation requirements will be added to CEGS 02753, "Concrete Pavements for Airfields and Other Heavy-Duty Pavements" and the concrete pavement standard practice manual. Kudos to Gene Gutierrez, Alburquerque District, for putting together an excellent workshop!

Eielson Gets a New Runway - Ahead of Schedule (Cont'd)

The Alaska District Corps of Engineers awarded the project to Wilder Construction for $12,448,000.00. The method of procurement utilized the source selection procedure in which a firm fixed price construction contract is awarded to the bidder who submits a proposal determined to be the best value and is most advantageous to the government with price and other factors considered.

The project kicked off on May 1, 2000 with demolition of the existing runway. The existing runway consisted of various layers of asphalt concrete accumulated since the early 1940's. Some areas of the runway had as much as 15 inches of AC with an average thickness of approximately 12 inches. The waste AC on the runway combined with the millings from the shoulders resulted in a total of 62,000 cubic yards of waste asphalt concrete. Eielson AFB had miles of gravel roads, which experienced severe dust problems during summer months. The base civil engineer requested that the waste asphalt be processed into one inch minus material, mixed with CSS-1 emulsion and placed on the gravel roads throughout the base.

Placement of the base course at Eielson AFB

The existing base course was determined to be frost susceptible and was removed to a depth of 11 inches beneath the new AC and to a depth of 5 inches beneath the new PCC. The subgrade was prepared by excavating and mixing the subgrade in-place with a caterpillar road reclaimer (or similar equipment) to a depth of six inches and recompacted to 100% maximum density. The intent of the subgrade preparation was to "heal" existing thermal cracks in the subgrade and mitigate reflective cracking. Geotextile fabric was placed on the recompacted subgrade in the areas to receive new AC. The intent of the fabric was to prevent the finer particles in the base coarse from migrating into the subgrade through thermal cracks. New graded crushed aggregate base course was placed, compacted to 100% of maximum density and proof rolled prior to placement of the new airfield pavements.

Originally the PCC keel section was to be placed using steel forms, however, during partnering sessions initiated prior to construction, the contractor proposed slip form paving as a value-engineering alternative. Slip form paving had not been previously used by the Alaska District Corps of Engineers and was greeted with some skepticism, primarily due to concerns with edge slump. The Transportation Systems Center was consulted and, partly because of the paving contractor's (Walt's Concrete Co.) excellent past performance, ultimately recommended approval of the value engineering proposal.

PCC keel section after 1st day of paving

First lane of the 37.5' of AC being placed on each side of the keel section

The project was completed ahead of schedule with very minimal modifications to the contract. The runway was turned back over to the Air Force on September 7, 2000 (nearly a week early) and reopened to traffic on 13 September. The project was designed by the Alaska District Corps of Engineers utilizing the Airfield Design Program (APD) created by PCASE (Pavement-Transportation Computer Assisted Structural Engineering). The contract was administered by the Northern Area Eielson Resident Office and was a test site for the payment adjustment software PAYAD, also created by PCASE. The Airfield and Pavements Branch of the U.S. Army Engineering Research & Development Center and the Transportation Systems Center provided on-site technical assistance to the Eielson Resident office.

For more information contact Ron Shafer, USACE, Alaska District, (907) 753-2693, ronald.a.shafer@poa02.usace.army.mil.

From the Message Board

Question: Could you provide some references regarding the theories and practices for construction quality control/assurance of airport concrete pavements, particularly for high early strength concrete pavements (for runways and taxiways).

Reply from Terry Sherman, (402) 221-7260: The Corps of Engineers Guide Specification, CEGS 02753, "Concrete Pavement For Airfields And Other Heavy-Duty Pavements" provides information on construction quality control for concrete airfield pavements. The guide specification is available on the TECHINFO web site at www.hnd.usace.army.mil/techinfo. Another source is Engineer Technical Letter, ETL 1110-3-488, "Design and Construction Management Practices For Concrete Pavements", which is available at www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-488/. The FAA also has information available in "FAA Construction Manual for Airport Pavements" available at www.nw.faa.gov/airports/Standards/PAVEMAN.PDF and also in their P-501 Specification, "Portland Cement Concrete Pavement" available at www.faa.gov/arp/5370p501.pdf.

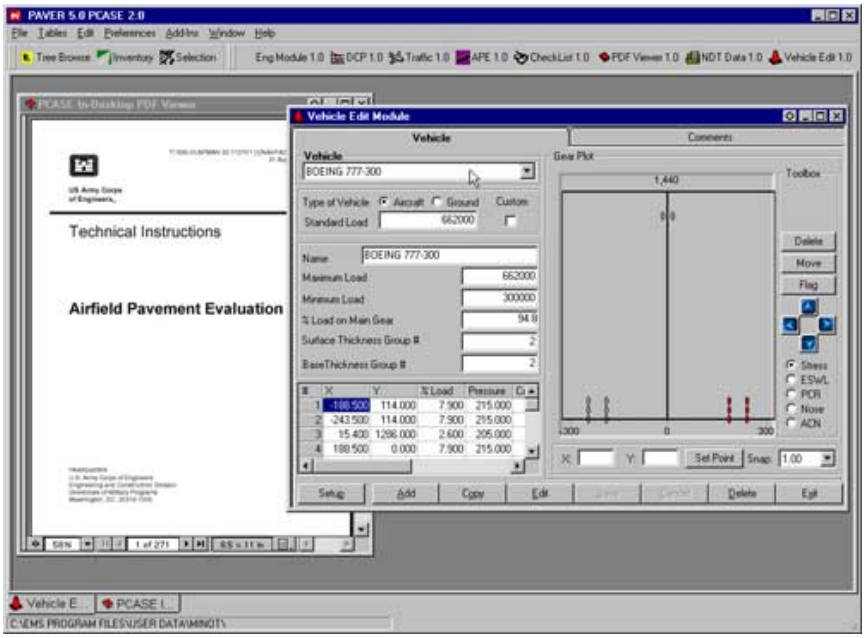
Concrete Guide Spec Being Updated

The Corps of Engineers Guide Specification CEGS 02753, "Concrete Pavements for Airfields and Other Heavy-Duty Pavements" is currently being updated. The update of this guide specification is the number 1 priority in the FY01 transportation–related Criteria Document Update Program (CDUP). If you have comments or concerns with the current guide specification please submit them to terry.w.sherma@usace.army.mil for consideration in the updated version. Future goals include developing a single tri-service guide specification in FY02 and a DOD/FAA guide specification in FY03.

PCASE 2.0

By Robert Walker, ERDC

PCASE users can look forward to a new version of PCASE to be released for initial testing in January 2001. The new 2.0 release of PCASE is the first major release in almost a year (1.01 was released in February), but it promises to be worth the wait. The new version has multiple enhancements over the previous version and introduces a complete redesign of the user interface. No more individual programs, all programs will run together under one "desktop" window and each application will be represented by a toolbar button. This new format promotes data sharing allowing the programs to share layer and traffic information. In addition to a new look, PCASE 2.0 has added several new capabilities.



The figure above shows two of the major additions to the PCASE software. On the right side there is the new "Vehicle Edit Module". This tool allows users to create custom vehicles for use in the design and evaluation tools. On the left side there is the "PDF Viewer". This tool shows the actual evaluation or design manual inside the desktop window and allows the user to press "F1" for help in a software component and have the manual go to the right page for assistance. In addition to these tools, several other components are being added. For more information contact Robert Walker, ERDC, (601) 634-2145.

Navy to Host PCASE Workshops

Upon completion of the new desktop system the Navy will be sponsoring three PCASE regional workshops at their pavement design engineering field divisions (Atlantic Division, Southern Division, and Southwest Division).

The PCASE workshops will provide "hands-on" instruction of the software and cover design and evaluation of airfields and roads. The proponent of the workshops, Vince Donnally, NAVFAC, requested that participants in the Navy workshops use the software in advance for the purpose of having more beneficial participation. If space is available, invitations will be extended to the Army and Air Force Activities in the geographic region. Dates and locations of the workshops will be advertised on the PCASE web site at www.pcase.com.

Send in Your Wish List

With the development of the new PCASE desktop system, traffic will be handled a little differently. In the past there was one program to calculate airfield pavement thickness (ADP) and another program to calculate roadway pavement thicknesses (ROADS). Each program handled traffic differently. In ADP the user selected aircraft and input the number of passes. In ROADS the user entered the number of vehicles in a general category. With the advent of the new desktop system there will be one traffic inventory that will include both aircraft and vehicles and the user will be able to select specific vehicles and input passes, as we do with airfield design. We are currently in the process of developing the vehicle database. We feel we have a pretty good inventory of aircraft but would like your input on the vehicles. Below is a list of specific vehicles that we have been requested to add to the inventory. If you have a vehicle on your "wish list" that is not shown below please e-mail your request to mary.j.adolf@usace.army.mil.

Armored Resupply Vehicle (RSV)
Bradley (M113)
Bradley (OSV) OPFOR Surrogate Vehicle
Bradley BMP-2
Heavy Equipment Transporter (HET) with 5-axle trailer (M1070/1000 Semi-trailer) with and without M1 tank payload
HEMTT with variable weight 37,000 lb to 150,000lbs
HMMWV
K-Loaders
M078 Truck (2.5 ton)
M1074 truck with M1075 Palletized Load System (PLS)
M860 Semi-trailer with M983 HEMTT tractor
Multiple Rocket Launch System (MRLS)
New Howitzer (SPH)
New M1 Tanks (72 tons)
Oshkosh M11/P11 Fire Trucks
P&H Superstacker
P-15 Crash/Rescue vehicle
R-11 Fuel Servicing Tank Truck
Rough Terrain Container Handler (RTCH) - Cat 998B
XM2001/Z33888 HOWITZER
XM2002/Z20650 Carrier Ammunition (Tracked)

NATO Working Group Meets

A subgroup of NATO, the Airfield Services Working Group (ASWG), met at Tyndall AFB, Florida in October 2000 to discuss development of new NATO Standards for reporting pavement strength, condition and frictional characteristics and also the possibility of developing a standard method for designing pavements. Representatives from Austria, Belgium, Canada, Czech Republic, Denmark, France, NATO HQ, Netherlands, Slovenia, United Kingdom and the United States were in attendance.

In general, there was considerable agreement from the Nations represented. One item of particular interest was a proposal to establish standard NATO aircraft traffic based on the NATO mission at the particular airfield. This would establish the level of funding the member nation would obtain from NATO. Results of this subgroup meeting will be presented at the next NATO meeting in April of 2001 with recommendations that the Subgroup continue their efforts.

Meet the TSMCX

Need help with the design or construction of railroads or roadways? Mr. Dan Boyer of the Transportation Systems Center team is the man to call on. If he doesn't know the answer (although he most likely does) he'll "track" down an answer for you. He's very persistent and dedicated to satisfying customer needs.

Dan began his illustrious Corps career in 1974 after graduating with a Civil Engineering degree from the South Dakota State University. Before joining the TSMCX team in 1990 he worked at the Omaha District for 12 years in design, 2 years in project management, and 2 years in construction and also one year at the Northwestern Division. While working in the Design Branch, Dan received a Master's Degree in Transportation from the University of Nebraska. He has had the privilege to work on a number of major projects like the Air Force Air Launched Cruse Missile (ALCM), Peace Keeper Missile (MX), B-2 Aircraft Deployment, and the National Dam Safety program.

Dan has been married to Laurie, an Interior Designer, for 26 years. They have a son currently studying Electrical Engineering at UNL and a daughter in Physical Therapy at St. Ambrose University, Iowa. He enjoys skiing in the Colorado Rocky Mountains and stays active with softball, volleyball, water skiing and golf. What he likes best about being a member of the TSMCX team is the privilege of working with so many different districts and DPWs. Each office has unique experiences that can be passed on to help other engineers within DOD.

Dan Boyer, Transportation Systems Center Team Member

From the Labs...

Researcher Receives Hammer Award

Charles J. Korhonen, a research civil engineer, with the U.S. Army Engineer Research and Development Center's Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire, has received the Hammer Award for his role as the Team Leader of the Low-Temperature Repair Team for Sequoyah Nuclear Power Plant.

Vice President Al Gore created the Hammer Award to recognize Government teams who show innovation either by (1) putting customers first, (2) empowering employees, (3) cutting red tape, or (4) achieving results American citizens care about. The Hammer is symbolic of "hammering away at building a better government" – one that works better and costs less.

The Tennessee Valley Authority (TVA) was faced with a dilemma at their Sequoyah Nuclear Power Plant located near Chattanooga, Tennessee. The concrete floors in its ice-storage rooms had heaved upward because of frost action and needed to be repaired. The dilemma was that the work had to be done under tight time constraints of a nuclear refueling outage and at –8°C, the operating temperature of the ice-storage rooms, but that was not possible, as ordinary concrete cannot cure under those conditions. Shutdown of the ice-storage rooms in the nuclear plant was not acceptable, since each day of shutting down the plant represented a potential of $1 million in lost revenue and loss of service to their customers.

Sequoyah Nuclear Power Plant

Korhonen, in a joint effort with the Tennessee Valley Authority (TVA), S&ME Singleton Labs, and a private material and concrete construction consultant, developed a lightweight portland cement concrete mixture that allowed repairs without shutting down the nuclear plant or disrupting service. This new concrete mix was placed, consolidated, finished and cured at below-freezing temperatures without thermal protection. Ordinary concrete would not have survived.

Korhonen states, "This technology, for placing concrete at sub-freezing temperatures, could extend the concrete construction season by several months in much of North America. Currently, the U.S. construction industry spends about $1 billion dollars per year to provide heated enclosures for placing concrete at below-freezing outdoor temperatures. Approximately $800 million of that cost is in heat from non-renewable fossil fuels much of which could be saved by adopting this new low-temperature concrete technology." For more information contact Charles Korhonen,ERDC-CRREL, (603) 646-4438.

Troops Work with Engineers in Aftermath of Hurricane Mitch

During late October-early November 1998, Hurricane Mitch deposited very high cumulative amounts of rainfall on the extremely mountainous country of Honduras, Central America. People, property, and transportation infrastructure were washed away by Mitch's torrents. Uncountable numbers of highway river and stream crossings were washed out. Highways that did not close due to direct landslides were closed due to drainage infrastructure integrity loss or pipe washouts. This created many discontinuities in the transportation system and made ground travel very uncertain.

An engineering team made up of specialists from ERDC and other Corps Districts responded to Mobile District's call for assistance. Together with the U.S. Military troops (Army, Navy, Air Force, and Marines) of Joint Task Force Bravo the engineering team worked to investigate low-water river and stream ground-traffic crossing problems, develop engineering solutions and designs, and construct temporary low-water crossings (see Photos). For more information contact George Regan, ERDC, (601) 634-2728.

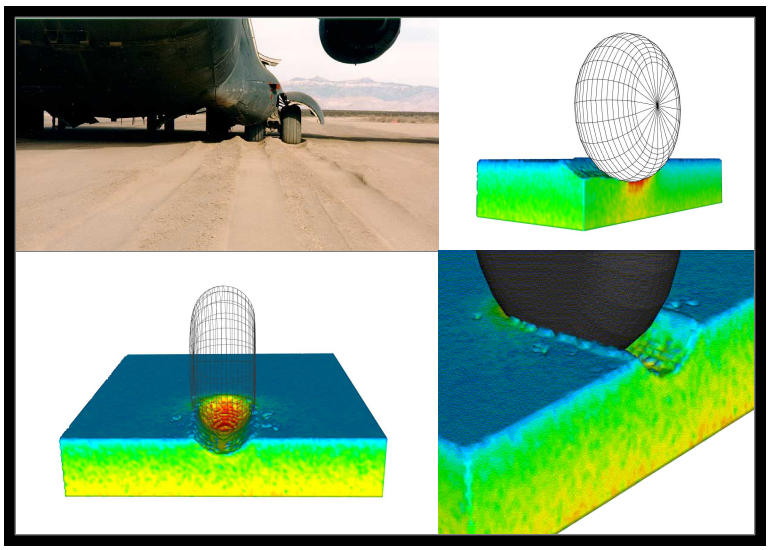
Numerical Modeling Efforts

To improve the design of road and airfield pavements a major research initiative using numerical modeling methods is being conducted at the Airfields and Pavements Branch (APB), Geotechnical and Structures Laboratory, Engineering Research and Development Center (ERDC). The principal modeling methods include the finite element method (FEM) and the discrete element method (DEM). The research is for applying these methods to rigid and flexible pavement design and to the predict the performance of unsurfaced pavements.

Predicting the performance of rigid pavement systems is a complex problem characterized by 3D geometry and nonlinear material behavior, which can be dealt with efficiently with modern FEM codes. Additionally, the behavior of joints between adjacent slabs can be directly accounted for using the FEM. Research is currently being conducted to predict for the damage accumulated from repeated loading.

In another application, FEM is being used to predict the response of the granular materials of a flexible pavement system; in particular the permanent deformation caused by repeated loadings of military aircraft. As follow-on to this study, the basic model has been modified to include viscous time/temperature dependent behavior for asphaltic concrete. Laboratory calibration and verification tests are currently underway on dense-graded mixes.

The DEM shows continued promise as a research tool due to the ability of modern supercomputers to solve bigger problems faster. As with soil, which deforms both as a solid and in a fluid-like manner and can not be reliably modeled with FEM, the DEM overcomes the mathematical complexity by treating the soil as an assemblage of discrete particles. The DEM used in this research is designed to interact with FEM representation of vehicle components, creating a powerful analysis tool. The DEM was applied to the simulation of a C-17 tire moving through a bed of granular soil. The study showed that rut depth and forces on the landing gear could be computed. The figure below shows how well the graphical depiction of the analysis compares to photographs of ruts made by C-17 tires. For more information contact Donald Smith, ERDC, (601) 634-2918.



TeleEngineering Operations

TeleEngineering is simply "distance" or "reach back" engineering. When a complex problem is encountered in the field, soldiers can quickly send information via advanced communications links to the TeleEngineering Operations Center (TEOC). Once the request for information has been submitted to the TEOC, the Center can tap the technical expertise of the Corps research laboratories, Centers of Expertise, Districts and Divisions, other DOD and non-DOD agencies, private industry and academia to provide an expedient answer to the problem.

TeleEngineering is not a new concept, but the U.S. Army Engineer Research and Development Center (ERDC) is conducting this technology demonstration to help put the process in doctrine thus eliminating the ad hoc nature of warfighter support. TeleEngineering can tap expertise in a broad spectrum of Army operations areas.

Realizing the increasing importance of TeleEngineering steps are being taken to improve its operations. Investigative and reconnaissance equipment packages are being developed to help the deployed engineer forces provide the best decisions. The packages range from simple field devices that help gather data on soil strength to highly sophisticated developmental tools such as the Urban Robot, that is being developed for urban reconnaissance. More recently, TeleEngineering Operations is leveraging the significant contributions that the PCASE program has provided to the transportation community. This leveraging helps expedite products to the field and opens up a new costumer base to PCASE. For more information contact Larry Lynch, ERDC, (601) 634-4274, Larry.N.Lynch@erdc.usace.army.mil.

Transportation Proponents at HQ Make a Move

Headquarters of the U.S. Army Corps of Engineers moved from the Casimir Pulaski Building to the third floor of the General Accounting Office (GAO) Building in August. According to HQ, the move gives them less expensive space to meet its long-term needs. But not everyone moved there! Greg Hughes, Mike Dean and Dave Bohl (formerly of Military Programs), HQ transportation-related proponents, moved to the Humphreys Engineer Center at Fort Belvoir.

In addition to the moves, HQ also restructured. The trio is now part of the Site Development Team, Water Resources Branch, Engineering and Construction Division, Civil Works Directorate, HQUSACE. Quite a title, but their duties haven't changed.

You can contact Greg, Mike and Dave at the following:

CECW-EW
Kingman Building, Room 321
7701 Telegraph Road
Alexandria, VA 22315

Greg Hughes, (703) 428-7130
Mike Dean, (703) 428-7175
Dave Bohl, (703) 428-7121

Whenever you meet someone new, you have one to four minutes in which to make a positive first impression. There are four main things to think about - your physical appearance, your voice quality, the topics you talk about, and how well you listen. It is also important to give a confident handshake, keeping direct eye contact.

Source: Fred Pryor Seminar, "How to Become a Great Communicator"

Obstruction Marker Product "Appears" one of the Best on the Market

Obstruction markers are used near airfields to warn aviators of power lines in their flight path. In the search for a reliable obstruction marker the Dervaux night warning light "appears" to be one of the best products currently available. The Dervaux warning light consists of a neon tube, with one end connected to the line conductor and the other to a separate conductor. The existence of a potential difference between the main conductor and the separate one lights the tube, which – as it works in a pure neon atmosphere – provides a red light, with a luminous brilliancy upper to 10 Candela. Bonneville Power Administration, electrical testing and computer modeling, indicated that the Dervaux night warning lights will perform acceptably on all BPA 500-kV, 345-kV and 230-kV single circuit configurations.

The Military needs obstruction markers that will perform at high voltages for long-term (20 years or more). It has not yet been demonstrated that the Dervaux lights can perform at higher voltages for long-term (20 years), because the higher voltages have not been used for long-term. There has been, however, a recent use in which a higher voltage (500 kV) has been performing satisfactorily for 8 years. For more information, contact John Gregory, Transportation Systems Center, (402) 221-7267.

Emergency Relief for Federally Owned (ERFO) Roads

The ERFO Roads Program funds repair to Army installation roads or bridges seriously damaged due to natural disasters or catastrophic failures. Serious damage is heavy, major, or unusual damage to a road that severely impacts the safety, capacity, or usefulness of the road or results in road closures. Examples of natural disasters include floods, hurricanes, earthquakes, tornadoes, tidal waves, severe storms, or landslides. An example of a catastrophic failure is a road destroyed or wiped out as a result of a landslide.

Military installation roads are considered to be public lands highways and, therefore, eligible for ERFO funding. This is based on the facts that these roads are owned by the Department of Defense (DOD) and maintained by the installations, and the majority is open to public travel. The Military Traffic Management Command Transportation Engineering Agency (MTMC-TEA) established DOD's eligibility for the ERFO program in May 1988 with FHWA.

The ERFO program provides emergency relief funds from the Highway Trust Fund. The Federal share under the ERFO program is 100% of total costs. The combined damages for an individual disaster for all Federal agencies must exceed $500,000 unless serious damage beyond the scope of normal heavy maintenance or routine emergency repair can be demonstrated. If the combined damage does not meet the threshold, the Federal agencies are expected to fund the repair costs using emergency or routine procedures. Catastrophic failures resulting in damage less than $500,000 are not normally eligible for ERFO funding. For more information contact Larry Black, HQDA, (703) 428-6173, Larry.Black@hqda.army.mil or check out the ERFO web site at www.hqda.army.mil/acsimweb/fd/policy/pdffiles/ManTech2.pdf.

www.internet.addresses

Long Term Pavement Performance (LTPP) Research Reports
http://tfhrc.gov/pavement/ltpp/reports.htm
LTPP was established as part of the Strategic Highway Research Program (SHRP) and is now managed by the Federal Highway Administration (FHWA). LTPP's goal is to help make decisions that will lead to better performing and more cost-effective pavements. Site gives a list of published LTPP reports. Abstracts of each report can be viewed by clicking on the report title.

Pavement Engineering On-line
http://www.mincad.com.au/engineering/pavenet
Site gives pavement engineering news and information. Includes the Pavenet Bookshop, Jobs Board, Calendar, and News (information and links to many pavement-related topics).

Careful, It Could Happen to You

A KC-135 aircraft was being pressurized at ground level. The outflow valves that are used to regulate the pressure of the aircraft were capped off during a 5-year overhaul and never opened back up. The post-investigation revealed that a civilian depot technician who, "had always done it that way," was using a homemade gauge, and no procedure.

The technician's gauge didn't even have a max "peg" for the needle and so it was no surprise he missed it when the needle went around the gauge the first time. As the technician continued to pressurize the aircraft, and as the needle was on its second trip around the gauge the aircraft went "boom" - the rear hatch was blown over 70 yards away, behind a blast fence!

Moral of the Photo: just because you've "always done it that way", doesn't make it the "right" way. Always be sure to use trained people, with the right tools, and that they are following detailed procedures.

Calendar of Events

Transportation Research Board Annual Meeting
Washington, DC
7 – 11January 2001
(202) 334-2934,
www.nationalacademies.org/trb/

Geosynthetics Conference 2001
Portland, Oregon
12 - 14 February 2001
POC: Danette Fettig or Janet Schneider, (651) 225-6959, fax (978) 945-2654 or (651) 631-9334, jmschneider@ifai.com

Asphalt Conference & Expo
Atlanta, Georgia
11 – 14 March 2001
POC: Wendy Cantwell, (816) 246-7711, fax (816) 254-7446

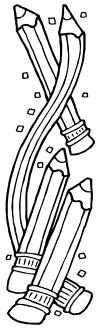
American Concrete Institute (ACI) Convention
Philadelphia, Pennsylvania
25 - 30 March 2001
POC: Conventions and Meetings, ACI, P.O. Box 9094, Farmington Hills, MI 48333-9094, (248) 848-3795.

World of Concrete
Las Vegas, Nevada
27 February – 2 March 2001
(800) 837-0870

5th Int'l Conference on Managing Pavements
Seattle, Washington
11 - 14 August 2001
www.engr.washington.edu/~uw-epp/pavements/info.html

National Association of Women in Construction
Anchorage, Alaska
26 – 29 August 2001
(817) 877-5551

7th Intl Conference on Concrete Pavements
Orlando, Florida
9 - 13 September 2001
POC: Shiraz Tayabji, (410) 997-0400, fax (410) 997-8480, stayabji@ctlgroup.com



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Transportation News

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