Transportation News

A Resource for Military Transportation Engineersj

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On the Move…

Due to the rehabilitation of the Zorinsky Building, home of the Transportation Systems Center for the past 4 years, the Transportation Systems Center has re-relocated to it's previous home at the Missouri River Region office in Omaha, Nebraska. The move is complete and we are all snuggled in to our "new" abode. After rehabilitation of the Zorinsky Building, in 3 years, we will move back. Our new/old/temporary address is 12565 West Center Road Omaha, NE 68144-3869. Phone and fax numbers have remained the same as well as e-mail addresses.

The Transportation Sytems Center Team at new location. Shown in top box: B.J. Skar and Dan Boyer. Shown in lower box, left to right: Gainard Mattke, Justin Watters, Terry Sherman, Betty Carmody, John Gregory, Mary Adolf and Kordon Kiel.

Military Construction Management Policy for Airfield Pavement Projects

In an effort for districts to better serve customers with quality airfield pavements HQ USACE sent out a Memorandum, CECW-E, 02 Feb 2001, "Military Construction Management Policy for Airfield Pavement Projects". The policy requires paving workshops prior to construction, better technical support during construction and selection of more qualified contractors for critical airfield construction projects.

The policy was established due to USACE-managed Air Force projects that experienced unacceptable airfield pavement quality. The primary reasons cited by the Air Force were lack of full time qualified USACE quality assurance personnel and the selection of contractors ill-staffed or equipped to accomplish major airfield pavement projects.

Districts are strongly encouraged to use selected Corps district experts, TSMCX staff, Corps laboratory personnel and TSMCX Indefinite Delivery Type (IDT) Contracts to supplement their in-house expertise and capabilities in providing required QA inspection and testing for airfield paving projects. For information regarding the use of TSMCX IDT Contracts for airfield construction management, contact Dan Boyer (402) 221-7266 or e-mail dan.j.boyer@usace.army.mil.

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Military Construction Management Policy for Airfield Pavement Projects (Cont'd)

On-site Airfield Paving Workshops are required for all airfield pavement projects with a current working estimate (CWE) over $5,000,000. Workshops for projects with a CWE less than $5,000,000 will be provided only when requested by the district or the customer. Workshops are typically one day for hot-mix asphalt paving and two days for PCC slipform paving. For workshop costs and to schedule a workshop, contact Terry Sherman, (402) 221-7260 or e-mail terry.w.sherman@usace.army.mil.

A copy of the memorandum can be viewed on the Transportation Systems Center homepage at www.tsmcx.com.

Did You Get the Message?

A message on the update of the PCASE Airfield Design Program (ADP) was sent out to registered members in the PCASE e-mail group. If you have registered on the PCASE web site you are in the e-mail group. If you didn't get the message you can download the updated ADP at www.pcase.com. Be sure to register so you can be notified of future upgrades and announcements.

PCASE2.0 Ready for Alpha Testing

The PCASE2.0 is ready for review at www.pcase.com. Download the new desktop and see what you think. If you have any comments send them to us, we'd love to hear from you. Send comments to support@pcase.com. If you have questions on the software and would like to talk to us contact Mary Adolf, Transportation Systems Center, (402) 221-7265 or Robert Walker, ERDC, (603) 634-2145.

Change in the Base Course Specification

In the past, the "Aggregate and/or Graded-Crushed Aggregate Base Course" Specification (CEGS 02722) allowed 0 to 10 percent to pass the #200 sieve. This is being reduced to 0 to 8 percent. The change has been sent to Huntsville and should be included in the next release of revised CEGS's. In the meantime, if you are designing a project you may want to consider incorporating the new change. Feel free to contact the Transportation Systems Center for guidance.

Why the change? According to Dr. Ray Rollings, ERDC, at 100% modified density; crushed stone bases with 10% fines have about the same permeability as the core of an earth dam. Hence, under dynamic loads, pore pressure develops and strength drops. The 0 to 10% values were based on 1940's and 1950's work. More recent research indicates that maximum density occurs at about 15% fines and maximum strength below 10%. Other agencies (i.e. ASTM and FAA) have pushed their limits for base course down to 8% and the Corps is following suit.

For more information contact Kordon Kiel, Transportation Systems Center, (601) 634-7268 or Dr. Ray Rollings, ERDC, (603) 646-4821.

Clarification on Drainage Layers

The article "To Drain or Not to Drain", Volume 20 of *Transportation News*, gives many benefits of a good drainage layer. An added argument in favor of a drainage layer and clarification, according to Bill Grogan, ERDC, is that although you do not get a reduction in thickness because of the use of a drainage layer, you also do not usually get an increase in thickness.

A misinterpretation by designers is to use the "standard" design and then add the drainage layer and separation layer to increase the overall thickness by four to eight inches. The "additional" thickness is not necessary. The drainage layer material substitutes for equivalent strength base course material 1 for 1 and the separation layer can substitute for subbase material. The strength of the drainage layer material is a function of the percent crushed faces.

For more information contact Bill Grogan, ERDC, (601) 634-2226.

Have You Considered "Sustainability"?

The Corps requires AE contractors to consider "sustainability" (new buzzword) in all designs. What is it you might ask?

Paper No. 00-1116, "Role of the Motor-Vehicle Industry in a Sustainable Transportation System", Transportation Research Record 1702, gives a good definition. "A sustainable transportation system is one in which fuel consumption, vehicle emissions, safety, congestion, and access to social and economic opportunity are of such levels that they can be sustained into the indefinite future without compromising the ability of future generations to meet their own transportation needs."

New Pavement Design Manual

by Dick Grau, ERDC

The new manual UFC 3-260-02, "Pavement Design for Airfields" should be available in a new format on 31 March 2001. The purpose of the manual is to establish general concepts and criteria for the design of airfield pavements for the U.S. Army, Navy, Air Force, and Marine Corps.

In an effort to reduce the number of manuals that exist in the DoD system and combine similar information into a single document this manual combines and updates information that was included in: TM 5 818-2/AFM 88-6, Chap 4; TM 5-822-2/AFM 88-7, Chap 5; TM 5-822-13/AFJMAN 32-1018; TM 5-822-5/AFM 88-7, Chap 1; TM 5-824-1/AFM 88-6, Chap 1; TM 5-825-2/AFM 88-6, Chap 2/DM 21.3; TM 5-825-2-1/AFM 88-6, Chap 2, Sec A; TM 5-825-3/AFM 88-6, Chap 3; and TM 5-825-3-1/AFM 88-6, Chap 3, Sec A.

This document prescribes procedures for determining the thickness, material, and density requirements for airfield pavements in nonfrost and frost areas. It includes criteria for the California Bearing Ratio (CBR) procedure and elastic layered analysis for flexible pavements and the Westergaard analysis and elastic layered analysis for rigid pavements. The elastic layered analysis for rigid pavements covers plain concrete, reinforced concrete, and concrete overlay pavements.

The new format for this manual is the Unified Facilities Criteria (UFC) system, which provides planning, design, construction, operations and maintenance criteria, and applies to all service commands having military construction responsibilities. UFC will be used for all service projects and work for other customers where appropriate.

UFC are living documents and will be periodically reviewed, updated, and made available to users as part of the Services' responsibility for providing technical criteria for military construction. Headquarters, United States Army Corps of Engineers (HQUSACE), Naval Facilities Engineering Command (NAVFAC), and Air Force Civil Engineering Support Agency (AFCESA) are responsible for administration of the UFC system. Technical content of UFC is the responsibility of the preparing tri-service committee.

UFC are effective upon issuance, and are distributed only in electronic media from the following sources:

- USACE TECHINFO Internet site www.hnd.usace.army.mil/techinfo/index.htm
- NAVFAC Criteria Office Internet site criteria.navfac.navy.mil/criteria
- Construction Criteria Base (CCB) system maintained by the National Institute of Building Sciences at Internet site www.nibs.org

For more information contact Dick Grau, ERDC, (601) 634-2494 or B.J. Skar, Transportation Systems Center, (402) 221-7262.

New Airfield Concern

The Unmanned Aerial Vehicle (UAV) is making its way into the airfield scene and causing concern for operations. The UAV System is a remotely operated aircraft that delivers battlefield information to their units. The Army's Shadow 200 is capable of flight at a maximum height of 15,000 feet (4,600 meters). The UAV is capable of automatically navigating and flying to 100 waypoints selected by an operator.

The Army, Navy, and Air Force recently met at Ft. Huachuca to begin developing criteria for facility requirements (i.e. runway, taxiways, hangars, etc.) for the new aircraft. Dimensional requirements will be easily established and combined with current aircraft criteria, however, establishing the location of the facilities will be more difficult because of operational and air space conflicts with standard manned aircraft. Meeting participants observed operations for the Army's Shadow and Hunter, Navy's Pioneer and Air Force's Predator. Currently at Ft. Huachuca, the UAV and manned aircraft use separate facilities and air space for operations. For more information contact B.J. Skar, Transportation Systems Center, (402) 221-7262.

What's Wrong with these Pictures?

Read on to find the correct answer...

Improvement Project to Include ILS Guide Slope

Part of the Airport Improvements Project at Forney AAF, Fort Leonard Wood, Missouri, includes a new Instrument Landing System (ILS) Glide Slope. This is to allow precision approaches to be conducted on the runway. At Forney AAF the ILS Glide Slope site is very difficult and not suitable for the conventional "image-antenna" type. The initial project plan was to use an "end-fire" type Glide Slope. After initial fieldwork was done on 29 January 2001 the draft conclusion was a "capture-effect" type ILS Glide slope would perform adequately and cost less to construct and maintain. An ILS specialty consultant, Richard H. McFarland, Ph.D., P.E. performed the site evaluation for the Kansas City District Corps of Engineers.

For more information contact John Gregory, Transportation Systems Center, (402) 221-7267.

Lighting the Way for the TSMCX

John Gregory lights the way for the Transportation Systems Center as the resident expert in airfield lighting, marking and NAVAIDS. He does a re**mark**able job.

John Gregory and his family

Mr. Gregory received a bachelor's degree in electrical engineering and a master's in structural engineering from the University of Nebraska. He has used both degrees in his 25-year career with the Corps in technical, project management and program management positions.

For the past 10 years John has been helping TSMCX customer's by reviewing design projects, updating criteria, consulting and also reviewing criteria waiver requests related to lighting, marking and NAVAIDS. John also manages the airfield indefinite delivery A-E contracts that serve all Corps districts and laboratories. He serves as a NATO standards delegate and coordinates the U.S. Army participation in international criteria standardization with NATO and ASCC. What John likes best about being part of the TSMCX team is "helping people to improve airfield safety and effectiveness through better facilities and participating in the solution of interesting and unique airfield problems in service to the Nation."

Outside of the office John enjoys, home and auto projects which is a good thing because with his wife Anne, they have 4 children driving now: Elizabeth (age 23), Sara (age 20), Rachel (17), and William (15). John also enjoys watching football and hockey and going fishing and hunting. John's leave schedule always lets coworkers know; the hunting season has opened!

Services Uniting

The current construction guide specifications of the Army Corps of Engineers, the Naval Facilities Engineering Command, and the Air Force Civil Engineer Support Agency united and converted to the Unified Facilities Guide Specifications (UFGS) 25 March 01. This action is in accordance with House Conference Report 105-247 requiring unified design guidance for the Tri-Services.

Notice was displayed at www.hnd.usace.army.mil/techinfo/gspec.htm.

PCC Guide Specification Going Tri-Service

The Portland Cement Concrete Pavements for Airfields and Other Heavy Duty Pavements guide specification, CEGS 02753, is undergoing major revisions. The end result of the update will be a single Tri-Service specification. The goal is to complete the tri-service specification in FY01 and have a single DOD/FAA industry specification completed in FY02.

The preliminary draft of the specification is due 30 April 01. If you have recommendations you would like considered for the revised guide contact a member of the update team. Members of the team include Terry Sherman, Transportation Systems Center, (402) 221-7260; Gene Gutierrez, Albuquerque District, (505) 342-3485; John Hess, Sacramento District, (916) 557-7625; John Hawkins, Omaha District, (402) 221-4323; Greg Hughes, HQUSACE, (703) 428-7130; Jim Greene, HQ AFCESA, (850) 283-6334; Vince Donnally, NAVFAC, (757) 322-4204; Greg Cline, NFESC, (805) 982-3655; and Jack Scott, FAA, (425) 227-2622.

Corps Helps with Project at Masirah Island, Oman

The project to repair the main runway and taxiway for use by the Air Force Air Combat Command at Masirah Island AFB is unique in that Air Force Red Horse Squadrons came to the Corps of Engineers, Transatlantic Programs Center (TAC) for help with the design. Normally Red Horse units do their own engineering work but the scope of the project was beyond their in-house capabilities. TAC has prior experience working in Oman. A program totaling approximately $300 million was completed during the 1980s, providing upgraded and new construction at four Oman airfields, including Masirah Island. The facilities are available for use by U.S. Forces with the permission of the Sultan of Oman. The project to repair the runway and taxiway included developing a set of plans and material supply specifications. In addition to the pavement repairs, significant interior drainage problems needed to be corrected.

This project took partnering amongst the Corps to get the job done. The workload in TAC's pavement design department was too great at the time to perform the work so TAC partnered with the Omaha District. TAC performed the electrical and project management, Omaha District performed the civil and geotechnical design, the Transportation Systems Center and ERDC provided technical support and oversight. During the design process Red Horse members helped guide the designers in the quality and detail of the design products needed.

Congress has just approved funding authorization for Red Horse construction effort. The Red Horse is hoping to stockpile materials in April/May 2001 to avoid the monsoon season, which makes for difficult barge delivery due to the high winds. Construction will start at the beginning of FY02.

For more information contact Keith Evers, TAC, (540) 665-3646.

The Keiko Report

Did you every wonder what happened to Keiko the Whale, you know, the whale the Air Force and PCASE software helped to save. In Volume 16 of *Transportation News*, December 1998, a story was published about Keiko, the killer whale. In summary, after years of hard life in a movie career a foundation to save the whale asked the Air Force to use their C-17 to transport the ailing whale back to his homeland. The Air Force's Air Mobility Command used the PCASE software to determine that the aircraft could safely land on the runway on Vestmannaeyjar Island. In September 1998 Keiko was transported back to Iceland and has been in therapy ever since in an attempt to reintroduce him to his native habitat.

The latest report says that Keiko is "healthy" and adapting well to his Iceland waters. Plans are under way to reintroduce the orca back into the wild this summer. His personal Veterinarian reports that Keiko is very healthy, shows no signs of any health related problems and is continuing to adapt well to his ocean environment.

Aircraft Pass Defined

It appears there is confusion as to the definition of an "aircraft pass". Many of the technical manuals contain definitions but each are a little different. In general, TM 5-825-2 defines an aircraft pass as "the passage of an aircraft on a pavement". Duh, that's a no brainer! Let's break it down for the different facilities. The best and most current definition of passes for a runway is in the new Pavement Evaluation Manual, TI 826-01 (which hasn't been published yet but can be obtained from the PCASE homepage under Documents at www.pcase.com). Passes are defined as the number of aircraft movements across an imaginary transverse line placed within 152 meters (500 feet) of the end of the runway. Since touch-and-go aircraft operations will not pass this line, they will not be counted. For taxiways and aprons passes are considered to be the number of aircraft movements that traffic the taxiway or apron or better yet, the number of aircraft movements across a line on the primary taxiway that connects the runway and the parking apron. One definition all manuals agreed on is for the single-runway airfields. For these airfields the pass levels for the runway, taxiway, and apron should be the same.

Still confused? Call the Transportation Systems Center and will try to clarify it further.

Sources: TM 5-826-1/AFM 88-24, Airfield Pavement Evaluation Concepts, paragraph 8.c.; TI 826-01/ AFMAN 32-1121V1, Pavement Evaluation, Chapter 2, paragraph 5.c.(3); TM 5-825-2/AFJMAN 32-1014,Flexible Pavement Design for Airfields, paragraph 9-4; and TM 5-825-3/AFM 88-6, Chap. 3, Rigid Pavements for Airfields, paragraph 1-6.

Cooperation Between Federal Agencies

The Federal Railroad Administration (FRA) in cooperation with the Corps of Engineers is upgrading the TRACK computer program, which will benefit both agencies. TRACK is a computer program for the design and evaluation of railroad track developed by USACE CERL for PCASE. Don Plotkin, previously of CERL and currently employed by FRA, oversaw the development of the original TRACK program and will be in charge of the upgrade.

FRA is interested in upgrading TRACK for it is potentially beneficial to the commercial short line industry. Commercial short line industry has 25% of the total track mileage in the United States. The program was originally developed by the military for the military. The upgrades to the program will include changes to be useful to the short line industry but will also enhance the program which will be beneficial to the military. FRA is sponsoring all changes.

The revised TRACK program will be sent back to the Corps for use and distributed on the PCASE website. All PCASE programs are free domain and available at www.pcase.com.

Get the Latest CEGS Updates

If you haven't been to TECHINFO lately to get the latest Corps of Engineers Guide Specifications (CEGS) you may want to do so by visiting www.hnd.usace.army.mil/techinfo. The following pavement-related CEGS's have been updated since 15 December 2000.

CEGS 02390	Mooring and Grounding Points for Aircraft
CEGS 02761	Fuel-Resistant Sealing
CEGS 02786	Asphalt Slurry Seal
CEGS 02787	Bituminous Rejuvenation

Government Civil Engineer of the Year 2000 Goes to Navy Engineer

Congratulations to Mr. Vincent R. Donnally for being awarded the American Society of Civil Engineers' (ASCE) Government Civil Engineer of the Year 2000. Vince received the award on February 23 from the ASCE's Norfolk, Virginia Branch. He was selected for his outstanding leadership, expertise and service. This prestigious award is given annually to exceptional public servants that are deeply involved in the community and in industry.

Vince Donnally, NAVFAC, displays his Civil Engineer of the Year Award

Mr. Donnally is the Naval Facilities Engineering Command Design Criteria Manager for aircraft and aviation facilities and considered the navy's expert on aircraft hangar design, airfield geometric design, pavement, and jet engine test cells. He has served as the Navy representative on the PCASE committee since 1995 and has helped organize the 1996 and 2000 Tri-service Transportation Systems Workshops.

Mr. Donnally spent most of his career as a practicing structural designer for the Atlantic Division Naval Facilities Command. He also worked in Public Works Engineering at the Norfolk Naval Shipyard, and began his career with the Corps of Engineers, Baltimore District in 1973 after received a Bachelor of Science degree from Virginia Polytechnic Institute and State University, Blacksburg, Virginia. In 1979 he received a Master's Degree in Civil Engineering from Old Dominion University.

Vince has been happily married to his wife, Lillian for 25 years. They have three daughters: Kristin, Megan, and Lauren.

Kudos to you Vince! A well deserved honor.

www.internet.addresses

Facilities Engineering Transportation Infrastructure and Dams
www.hqda.army.mil/acsimweb/fd/policy/ar420_72/index.htm
Site is the web-enabled manual AR420-72, "Facilities Engineering Transportation Infrastructure and Dams". This regulation prescribes the Army administrative policies, procedures, and responsibilities for the Director of Public Works (DPW) to plan, program, and perform maintenance, repair, minor construction, quality assurance, and control of paved roads, airfields, other surfaced areas, culverts and other appurtenances, railroad tracks, bridges, and dams.

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What's Wrong with This Picture?

If you guessed that it is clay contaminants in the asphalt pavement – you are correct. The pavement at this airfield was suffering from a unique failure mode resulting from numerous, small clay contaminants in the asphalt concrete material. If left in place, this type of contamination would undoubtedly lead to accelerated pavement deterioration. In addition, this pavement posed a serious foreign object damage (FOD) potential for all jet aircraft using the apron.

The amount of contamination spots varied from about ten spots per square yard to one every few square yards, but all pavement areas contained some amount of visible spots of clayey contaminants. The clay was easily identified by the tan to reddish brown coloration. These spots were easily dug out of the pavement surface with a small pocketknife. In spots where the clay had been exposed to the environment, occasional rainfall had caused the clay to dissolve and left small open pits (averaging ½- to ¾-in diameter) in the pavement surface.

In an attempt to correct the problem, the contractor tried to remove the clay contaminants visible on the surface and apply a surface treatment. In essence, the contractor's suggested solution involved thousands of tiny pothole patches! However, this did not address the fact that there were other clay particles just beneath the pavement surface that would eventually degrade. The only feasible solution was to remove the pavement surfacing and replace it with asphalt concrete of the proper quality.

For more information on this project or clay contamination contact Gary Anderton, ERDC, (601) 634-2955.

Feeble Thoughts

Dr. Ray Rollings, ERDC, shares some of what he terms "Feeble Thoughts"...

A well-built pavement that is poorly designed will outlast a well-designed pavement that is poorly built.

Good concrete needs no surface sealer for most applications. Applying a sealer to bad concrete only makes it less bad; it never makes bad concrete good.

We presume that we can cover up inherent deficiencies in materials or construction with chemical admixtures or by applying a "surface sealer".

Plastic fibers are only useful to prevent plastic shrinkage cracking - you are supposed to be preventing that by proper curing, why pay for the fibers?

Good engineering and good construction have their basis in a thorough mastery of the fundamentals.

There is no substitute for good, conscientious people on the construction crew working for a knowledgeable superintendent who is honest and fair.

It takes supreme courage to ask the hard questions when everyone else has already jumped ahead to the answer.

The computer cannot do engineering but it can sure give the uninformed the impression of good engineering.

Long-Time Corps of Engineers Geotechnical and Pavement Experts Move North

By Dr. Ray Rollings

Last October the Doctors Ray and Marian Rollings moved from the Corps of Engineers Waterways Experiment Station (WES) in Vicksburg, Mississippi to the Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, New Hampshire. Those of you attending the Transportation Systems 2000 Workshop will remember this unusual husband and wife team presented a number of papers ranging from recent advances in compaction technology to case studies of field failures to pavement problems under the B-1. Whether at WES or CRREL, they remain part of the Corps-wide research laboratory organization (ERDC) and are available for consultation and assistance as always. Despite moving to the Cold Regions lab, Ray has already made two trips to the desert, and Marian gets on-the-job-training on her pavement deicing study just driving to work. They reportedly are getting into the swing of things with both downhill and cross-country skiing and building a house in the teeth of the New England winter. What do people think when these two say they are from New Hampshire with their decidedly Southern accents!

The Rollings may be reached at (603) 646-4821, rrollings@crrel.usace.army.mil for Ray and (603) 646-4822, mrollings@crrel.usace.army.mil for Marian.

Proof-Rolling: Still A Viable Concept Or An Antiquated Practice?

By Drs. Raymond Rollings and Marian Rollings

Since the 1950s we have required proof-rolling of the surface of the subbase and each lift of the base course of certain (not all) critical portions of flexible airfield pavements subjected to heavy bomber and cargo aircraft traffic. Proof-rolling consisted of 30 coverages of a proof roller with 30,000 lb wheel loads and 150 psi tire pressure. Proof-rolling is done after the subbase and base course have been compacted to 100 percent modified (CE-55) density. This proof-rolling requirement evolved to meet the challenging requirements of the B-47 and B-52 when they were introduced in the 1950s. Some have considered that this requirement was an anachronism of another more primitive age that was outdated with the widespread use of vibratory compaction equipment in the 1960s. When the 150 psi tire for the most commonly available proof–roller ceased to be commercially available a few years ago, this provided an opportunity to reevaluate our proof-rolling requirements.

Let's begin with a clear understanding of why we proof-roll. It accomplishes two very specific objectives:

- It identifies soft spots in the underlying materials. These areas can then be repaired before placing the expensive surfacing.
- It increases the compacted density of the subbase and base course layers to levels above 100 percent of the laboratory value. Studies conducted in the 1950s found that the large new military aircraft with high tire pressure and large wheel loads were compacting these materials to levels above 100 percent in the field. Proof rolling attempts to provide this extra densification prior to paving.

In 1996 the Air Force sponsored field tests that examined the effect of compacting to 100 percent modified laboratory density and then not proof-rolling, proof-rolling at 100 psi, proof-rolling at 125 psi, and proof-rolling at 150 psi. When exposed to simulated aircraft traffic, proof-rolled sections had less densification than the one without proof-rolling. There was relatively little difference between the 125 and 150 psi tire pressure proof-roller effects, so the Air Force decided that the 125 psi pressure could be accepted in lieu of the 150 psi tires which were becoming increasingly difficult to obtain.

These tests established that proof-rolling remains a viable concept and that substitution of the 125 psi tire for the 150 psi is a pragmatic compromise to adjust to market realities. Interestingly, we are not unique in requiring proof-rolling of airfields and airports. The Australians actually proof-roll with an even bigger "super compactor," one of which was used at the new Hong Kong airport.

For more information contact Ray Rollings, ERDC, (603) 646-4821or Marian Rollings, ERDC, (603) 646-4822.

Look well into yourself; there is a source of strength which will always spring up if you will always look there…"

…Marcus Aurelius

Expedient Road Construction Using Sand-Fiber Stabilization

by Rosa Santoni, ERDC

Road construction using sand-fiber stabilization technology involves mixing hair-like 5-cm-long (2-in.) polypropylene fibers into moist sand using a self-propelled rotary mixer. The sand-fiber layer is compacted with a smooth drum vibratory roller. A wearing surface is added by spraying a resin-modified emulsion (trade name Road Oyl) or emulsified asphalt onto the road surface. Military supply roads over-the-beach or across desert sands can be quickly constructed at remote sites using reduced equipment, manpower, and materials. Experiments conducted at Waterways Experiment Station (WES) indicate that roads constructed using this new technology will carry over 10,000 passes of heavy military supply traffic with very little or no maintenance required. Sand-fiber stabilization uses existing military construction equipment and requires no special construction skills.

Sand-fiber stabilization is applicable for a wide variety of sands and silty sands found around the world (SW, SP, SM, and some SM-SC types). Successful fibers tested to date include 5-cm long (2-in.) polypropylene fibers having either a monofilament, fibrillated, or tape structure. Cost of test quantities of fibers was approximately $3.00/kg ($1.40/lb). Fibers are delivered in 181 kg (400-lb) boxes each containing 20 bags of fibers 9.1 kg/bag (20 lb/bag). Road Oyl is a resin-modified emulsion that is non-water soluble and has a high bonding strength. It was developed specifically for use in pavement applications, dust control treatment, and erosion control. It contains selected fractions of natural tree resins combined with a strong bonding agent. It is petroleum-free and can be cold-applied. It is environmentally friendly and available for bulk shipments, 208 L (55-gallon) drums and 1041 L (275-gallon) palletized bulk container packaging. The Road Oyl used in WES experiments was purchased in 208 L (55-gallon) drums for $1.12 per L ($4.23 per gallon). The bulk price was approximately $0.47 per L ($1.79 per gallon) plus $1.24 per km ($2.00 per mile) per tanker-truck load. Emulsified asphalt can be substituted for Road Oyl.

The Road Oyl should be cold-applied without diluting with water. The Road Oyl (or emulsified asphalt) will penetrate approximately 1.25 – 2.54 cm (0.5 - 1.0 in.) into the sand-fiber layer and form a wearing surface. The road can be opened to truck traffic immediately. Minor sand blotting of the surface may be required until a firm-wearing surface is formed. The resulting surface will support over 10,000 passes of heavy military truck traffic with little or no maintenance required. Tracked vehicles will damage or destroy the road surface. A protective layer of sand should be applied over the road surface at points where tracked vehicles cross the road.

For more information contact Rosa L. Santoni, ERDC, (601) 634-3379 or e-mail santonr@wes.army.mil or Rosa.L.Santoni@erdc.usace.army.mil.

Calendar of Events

ASCE Airfield Pavement Specialty Conference
Chicago, Illinois
5 – 8 August 2001
www.asce.org

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

USACE Infrastructure Workshop
Reno, Nevada
14 16 August 2001
Robert DiAngelo, CECW, (703) 428-7263 or Al Sidhom, CESPD, (415) 977-8166

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

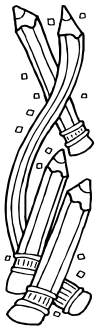
7th Intl Conference on Concrete Pavements
Orlando, Florida
9 - 13 September 2001
POC: Shiraz Tayabji, (410) 997-0400, fax (410) 997-8480, stayabji@ctlgroup.com

ACI Fall Convention
Dallas, Texas
28 October – 2 November 2001
www.aci-int.org

American Concrete Pavement Association Annual Convention
San Diego, California
27 November – 1 December 2001
http://www.pavement.com/calendar.html

Transportation Research Board
Washington D.C
13 – 17 January 2002
www.trb.org

3rd World Congress on Emulsions
Lyon, France
24 – 27 September 2002
www.cme-emulsion.com



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