HAWAIIAN CONNECTIONS

NEWSLETTER OF THE HAWAII LOCAL TECHNICAL ASSISTANCE PROGRAM

VOLUME 1, NO.4 WINTER 1999

IN THIS ISSUE

Please Pass this on to other interested parties in your office.

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FHWA 1999 Region 9 County Engineers Conference

by Henry M. Hirata, Director of Public Works, San Joaquin County, California

On October 20th through 22nd, 1999, delegates from States within Region 9, which includes Arizona, California, Hawaii and Nevada, attended the 1999 Federal Highway Administration (FHWA) Region 9 County Engineers Conference in Laughlin, Nevada.

Leon Witman, Director of the FHWA Western Resource Center, opened the Conference with an update on restructuring activities currently occurring within the FHWA organization. Although there may be changes regarding the County Road Advisor program, Mr. Witman expressed his desire to see conferences like the Region 9 County Engineers Conference continue.

The next session was assembled by the Arizona Technology Transfer Center, who put together a panel of engineers from private firms to conduct a presentation on State standards for floodplain management which are being used in Arizona. Following, a presentation describing geologic impacts on the engineering design of U.S. 93 was given.

On behalf of CEAC, Donald LaBelle, Director of Public Works from Alameda County, led a panel discussion on impact fees and extraction practices in California and Nevada. Then, as part of the Conference's management presentation, Dr. Larry Bienati spoke on attracting and retaining new employees in the new millennium. The ensuing session, presented by Bill Cox of the Navajo County Department of Public Works, who represents agencies with low volume roads, provided attendees with an update on low volume road issues transpiring at the national level.

The FHWA demonstration portion of the Conference was conducted by employees of the FHWA Western Resource Center and Caltrans, who jointly shared their knowledge on abating erosion. Next, a session on regulatory impacts affecting County engineers was presented by representatives from the U.S. Army Corps of Engineers, legal field and Arizona Division of Emergency Management. Their topics included updates on permits and processing of claims.

The last session consisted of manufacturing groups who shared information regarding new construction products on the market, such as dust control and pavement fibers.

Comments received on this year's Conference were favorable and plans for the 2000 Region 9 Conference are being formulated - details will follow at a later date.

In preparation for the 2000 Conference, CEAC members are encouraged to begin considering ideas for sessions to be held at the next Conference, which is scheduled for October 18th through 20th, 2000, in Laughlin, Nevada.

John Parker: Tech Taxi driver sports his high-tech vehicle. See page 3.

Walter Lum's Rules of Thumb

Storm Drainage of Small Areas (1-2 Acres)

When it comes to sizing inlets and drainage pipes for small areas, a dozen engineers will most likely come up with a dozen different answers using the same rational formula, because of the difficulty of choosing the right rainfall, time of concentration, seepage and run-off conditions.

Drainage of small areas is usually done more by practice that works rather than by theory. Many design firms have their own standard practice or rules of thumb but these rules are usually not readily available to others.

The inserted table should put you in the ball-park of drainage systems that can be expected on a small job site.

> "Drainage of small areas is usually done more by practice that works rather than theory."

Roof Drainage: 1 sq. in. per 100 sq. ft.

For the design of gutters and downspouts for roofs, a common rule of thumb is to provide 1 square inch of gutter or downspout for every 100 square feet of area to be drained. The minimum size is 3 inches in diameter. This works out to a cross-sectional area of 3 square feet of gutter or pipe for every acre to be drained.

The minimum slope is usually specified as 1/8 inch per foot or 1 percent.

Site Drains, 1- 2 Acres: 1 sq. ft. per

Inlet Sizes. A city block is usually about 1 to 2 acres in size and a common practice is to have a catch-basin for each block. A curb side inlet is expected to handle a flow about 4 inches high by 10 feet in length or an inlet of about 480 square inches. This amounts to 1 square inch of inlet per hundred square feet of area to be drained or 3 square feet per acre.

Pipe Sizes. The minimum size pipe allowed by the City and County of Honolulu for any catch basin is 18 inches in diameter or a pipe 1.76 square feet in cross-section. If catch basins were spaced to serve 1 to 2 acres, then a reasonable rule of thumb would be to provide 1 square foot of pipe or drainage ditch per acre to be drained.

Yard Drainage < ½ Acre, 2 sq. ft. per Acre

For the drainage of house lots, one can note actual pipe sizes and drainage ditches in residential lots that vary from 3 inches to as much as 24 inches. A more reasonable approach would be to use something in-between a roof drain and a site drain or 2 square feet per acre to be drained.

Parking lots with drainage areas of ½ acre of less would fall in this category.

Drainage of Small Areas, 1-2 Acres

	Inlets		Pipe Sizes	
	$in^2/100\ ft^2$	ft^2/Acre	$in^2/100\ ft^2$	ft^2/Acre
Roof Drains & Down-Spouts	1	3	1	3
Yard Drans < .5 Acre	1	3	2/3	2
Site Drains 1-2 Acres	1	3	1/3	1

Minimum slope:1/8 inch per foot or 1%.

A Better Mousetrap

John Parker, Tech Taxi

In December 1996, the Traffic Control Center of the Honolulu Department of Transportation and the College of Engineering at the University of Hawaii launched a web site that displays "near-real-time" traffic pictures from 68 cameras located in Honolulu. The web address is www.eng.hawaii.edu/Trafficam.

Last month, John Parker, a Honolulu taxi driver devised an ingenious way to take advantage of the web site and to improve his efficiency and productivity.

As he describes it, "Aloha State Cab #10 (The Taxi) is Hawaii's first public transportation vehicle to utilize HONOLULU'S TRAFFIC CAMERA SYSTEM. All 68 traffic cameras in Honolulu are viewable from the dashboard of The Taxi. This is possible by using an on-board cellular internet computer to access the web site. No more guessing what the traffic is like on the road ahead. Now you can see it. Is the H-1 freeway clear all the way to the airport? The Taxi knows."

And he adds, "the reaction of my customers is disbelief. No other city that I know of has anything like it. When I pick up a passenger in Waikiki going to the airport, by the time I get to Ala Wai and McCully, I can know whether to take the freeway or an alternate route."

Above: Parker uses Laptop computer to determine traffic conditions.

Left: Parker shows LTAP Director C.S. Papacostas his high-tech instrumentation.

Photos by Randall C. Wong

Other Mousetraps?

Have you or one of your co-workers built a better mousetrap recently? a modified gadget? an improved way to do a job? Please let us know about it. The best entries will be featured in a future issue of Hawaiian Connections.

Your Name and Phone Number: _____

Inventor's name and phone: _____

Invention: _____

Please fax this form to 956-8851.

Ultra-Thin Whitetopping

The following article was prepared by FHWA and the LTAP Clearinghouse .
— Lisa Pogue, Director of Technology Transfer
LTAP Clearinghouse, American Public Works Association

Ultra-Thin Whitetopping

Got ruts in your city's intersections or washboarding in your country's roads? If so, Ultra-Thin Whitetopping (UTW) can be a candidate for resurfacing deteriorating asphalt pavements.

UTW is a relatively new technique that involves placing a thin (50 to 100 millimeters) concrete overlay to restore asphalt concrete pavements which have cracked and/or rutted. UTW is one of the candidates for rehabilitation of any area where rutting, washboarding and shoving of asphalt is a problem.

"UTW is a relatively new technique that involves placing a thin (50 to 100 millimeters) concrete overlay to restore asphalt concrete pavements which have cracked and/or rutted."

The technique was developed specifically for low-volume roads, parking areas and light duty airports. In UTW the concrete overlay is thinner than conventional whitetopping and forms a bond with the underlying asphalt, which creates a composite action. Short joint spacing significantly improves the overlay's performance.

The first experimental application of UTW was constructed on an access road in Louisville, Kentucky in 1991. Since then over 170 UTW projects have been constructed across the United States.

The advantages of UTW include:

- ❖less time to construct and repairs last much longer.
- ❖a durable, wearing surface.
- ❖is cost competitive.
- ❖surfaces reflect light; thus street lighting can be reduced.
- ❖a cooler surface with environmental benefits.

UTW construction

The four steps to constructing UTW include:

- ❖Prepare the surface so that it will bond the two layers. This is most often done by milling and cleaning or blasting it with water or abrasive material.
- ❖Place, finish and cure concrete overlay using conventional techniques. The concrete mix is matched to the project's traffic conditions and requirements for opening the road to traffic. Many projects include synthetic fibers used to increase post-crack integrity of the panels. Proper curing is critical. Because the overlay is thin, it can lose water rapidly due to evaporation. Curing compound is applied at twice the normal rate.
- ❖Cut saw joints as early as possible to control cracking.
- ❖Open to traffic.

What's new in UTW?

The Federal Highway Administration (FHWA) and the American Concrete Pavement Association (ACPA) launched a joint research effort to evaluate critical design factors affecting the performance of UTW.

ACPA, in cooperation with the Virginia Ready Mix Concrete Advisory Council and ACPA's Northeast Chapter, will arrange for the design of the concrete mixes and for the construction of the UTW pavement sections. FHWA will test the material properties for all pavement layers, test the pavements with Turner Fairbank Highway Research Centers (TFHRC) Accelerated Loading Facility (ALF), and provide the data for a cooperative evaluation of the design method by ACPA and FHWA. For more information on the UTW project go to the TFHRC Web site at http://www.tfhrc.gov.

Additional resources

http://www.pavement.com.

http://www.irmca.com/utw/index.html.

http://www.trmca.org/index.htm.

http://restructure.fhwa.dot.gov/ptp/Whitetop/whitetop.htm.

Rockfall Hazard Rating System (RHRS)

By Herbert Chu, Geotechnical Engineer, Hawaii DOT

Highways constructed in mountainous terrains will usually have steep slopes adjacent to the pavements. Rockfall potential is inherent in areas with rock slopes adjacent to the highways. Hawaii Department of Transportation (HDOT) is committed to provide a safe highway system to the public. Therefore, HDOT is implementing projects to develop a systematic way to rate the rock slopes, to set rockfall project priorities and to allocate limited repair funds.

On Oahu, a contract is currently being negotiated for the project "Rockfall Protection at Various Locations on Oahu" to develop a Rockfall Protection Management Program which shall include a database management program with an island-wide inventory and rockfall hazards ratings of all rock slopes/cut slopes along the entire State highway system and streets under the jurisdiction of HDOT. On Maui, a project "Hana Highway Rockfall Mitigation Plan" is also being implemented to rate rockfall hazards along the Hana Highway Route 360 between Milepost 4.0 and Milepost 30.0. Both of these two projects will perform rockfall hazard rating following guidance and recommendations presented in FHWA Publication No. FHWA SA-93-057, November 1993, Rockfall Hazard Rating System (RHRS).

In RHRS, preliminary rating based on field observation and historical rockfall data will be performed to classify the existing slopes into class "A" for high rockfall potential, class "B" for moderate rockfall potential and class "C" for low rockfall potential. Following preliminary rating, detailed rating using numerical values to evaluate risk factors in different categories causing rockfall potential will be performed for all class "A" slopes, and sometimes all class "B" slopes depending on the total number of "A" and "B" slopes. The categories causing rockfall potential are:

- ❖Slope Height
- ❖Ditch Effectiveness
- ❖Average Vehicle Risk
- ❖Percent of Decision Sight Distance
- ❖Roadway Width Including Paved Shoulders
- ❖Geologic Character
- ❖Volume of Rockfall/Block Size
- ❖Climate and Presence of Water on Slope
- ❖Rockfall History

Preliminary rockfall mitigation measure recommendations and cost estimates will be included in the detailed rating. Common rockfall mitigation measures include Scaling, Slope Screening, Catch Fences, Excavation, Artificial Reinforcement, Shotcrete, Barrier Systems and Drainage Improvements. Detailed discussion of rockfall mitigation measures are presented in FHWA Publication No. SA-93-085, Rockfall Hazard Mitigation Methods, dated March 1994. It is believed that the RHRS will become a valuable tool to prioritize rockfall protection projects given the limited resources available.

Above: Rock Slope along Hana Highway, M.P. 11.4 +/-, Maui.

Left:Rock Slope along Kalanianaole Highway by Makapuu, Oahu.

Highlights of the 1999 FHWA Region 9 County Engineers Conference

Editor's Note: Hawaii LTAP offered support to the representatives of the four Counties to attend this annual conference. Three of the Counties accepted the invitation and attended along with our Program Manager Juli Kobayashi. The three County representatives agreed to share their experience with you.

Randall K. Fujiki, City and County of Honolulu

Many thanks to the Local Technical Assistance Program for inviting the City and County of Honolulu to participate in the FHWA Conference.

The conference was very beneficial to the City and County of Honolulu through its formal programs, informal discussion, opportunities with other counties and the Federal highways staff.

I found the formal programs valuable for our County, especially the following sessions:

FHWA Update
Leon Witzman (Director, FHWA Western Resource Center) was excellent on his review of the reorganization of the Regions and Districts. Review of FHWA resources available to our County and opportunities to question and dialogue with FHWA representatives.

Presentations on Arizona State Standards Flood Management Programs
- Stormwater retention and detention standards.
- Comparisons with standards of other counties

Employee/staff management presentation
Excellent programs for attracting and retaining quality employees.

Bridge Scour Programs by FHWA
Excellent opportunities to use available FHWA funds for evaluations and repairs. Honolulu is presently establishing programs on bridge scour with FHWA funds.

This conference also provided excellent opportunities to work and meet with important county engineers, FHWA and consultants/vendors. The following people were important connections made at the conference:

- ❖Henry Hirata, Director of Public Works, San Joaquin County, California
- ❖Renee Hoekstra, RH & Associates, working on developing value engineering workshop in Honolulu
- ❖Arlo Waddoups, FHWA Western Resource Center
- ❖John Klemunes, FHWA Western Resource Center
- ❖Jiro Sumada, Deputy Director of Public Works, County of Hawaii
- ❖Ken Kitabayashi, Chief, Engineering Division, County of Kauai

I strongly recommend the continued attendance to this conference by all Hawaii counties. It is important for administration and senior staff of our engineering departments to meet with FHWA and other county engineers. This type of conference allows our sometimes isolated operations to review the type of work, technology, and operations that are being done on the mainland. It is also important to see how other counties are working with FHWA and their respective State programs.

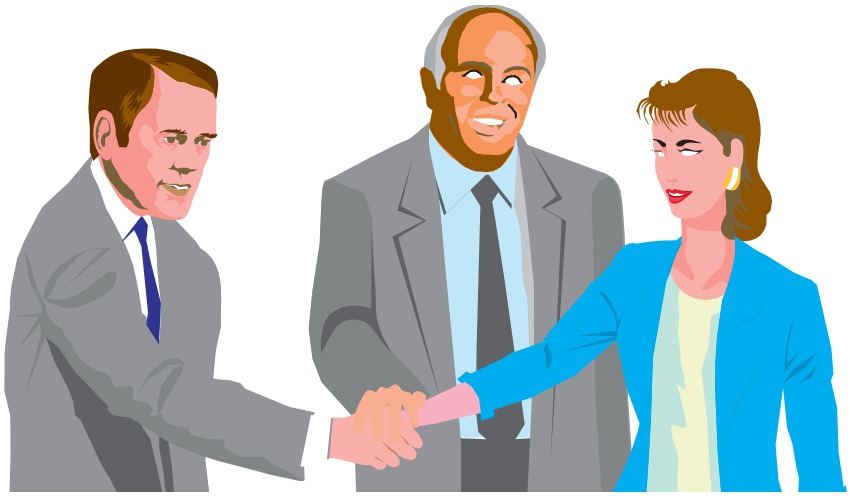
Jiro Sumada, County of Hawaii

The material discussed during the conference was very applicable to the challenges we face in Hawaii County. More importantly, I found the interaction with the other County Engineers during and between sessions extremely valuable. Solutions to many of the same problems we're trying to solve have already been implemented in the mainland. I've sent letters to some of the conference participants to follow up on information that may help our Department effectively address various issues and concerns. In addition, we are also considering inviting the Heavy Equipment Operator Trainer from the Arizona LTAP program to the Big Island to conduct a heavy equipment training program for our operators and to establish a local program.

Based on my attendance at this year's conference, I have directed our Highway Maintenance Division to include in their budget for two representatives to attend next year's conference so we can continue to interact and network with these same County Engineers. During these fiscally constrained times, we feel it is especially important to look for new and creative ways to operate more efficiently. If we can benefit from the lessons learned by our mainland counterparts, the trip will be well worth the travel investment.

Ken Kitabayashi, County of Kauai

Thank you LTAP for giving us the opportunity to attend the County Engineer's Conference. We met and interacted with representatives of construction product companies who gave us useful information on products which included among others dust and erosion control, signs and markings, pavement repair and sealers and high density polyethylene pipes. We also met County and Consulting Engineers, and Manufacturers Representative who gave presentation on topics such as Arizona's Floodplain and Floodway Criteria, and Storm Water Detention/Retention Standard, Geology encountered in constructing U.S. 93, road Impact Fees, Low Volume Road Design, Bridge Abutment Scour, Erosion Control Used by California, Improving Road Smoothness and New Construction Products.



The County of Kauai is replacing its Storm Drainage Standards dated February 1972. The Arizona Floodplain and Floodway Criteria and Detention/Retention Standard provides another perspective for handling the hydrology and hydraulic criteria for small and larger drainage basins. We are also interested in using the high-density polyethylene pipes due to lower cost, hydraulic efficiency, and easy installation. However, we are experiencing difficulty in installation due to pipe deflection and squashing. The conference enabled us to meet the manufacturer's representative who is scheduling a visit to Kauai and will be presenting a seminar for our engineers, inspectors and contractors on proper installation and backfilling operation.

We are enlightened with the construction products that were presented at the conference. Dust and erosion control products may conserve water especially when bared sites are at final grades and have long exposure. We are also very interested in new construction products provided by California Paving Fabric. We have requested more information on radar prediction, uratech, and glass grid. These products may help the county of Kauai to monitor and test asphalt and concrete pavement thickness and density, repair cracks and voids in asphalt and concrete pavement, and provide another pavement reinforcement product to prevent reflective cracking for road resurfacing project.

LTAP should continue Hawaii's participation in the County Engineer's Conference. The conference provides an opportunity for our engineers to meet other County and Consultant Engineers, and Manufacturer's Representatives and provides a forum for discussing engineering and construction issues that need to be handled in our work.

Hawaii DOT Research Report

Soil Loss Mitigation

by: Dr. Chittaranjan Ray, University of Hawaii

The climate and topography of Hawaii make the land very susceptible to soil erosion. Eroded soils wash off to the ocean along with soil nutrients. Eutrophication of coastal waters and reef damage are some of the major concerns. In addition, continual erosion reduces the productivity of the land. Currently, I am leading a project involving polyacrylmides (PAM) that can potentially mitigate soil loss.

PAM's are very long-chain organic molecules that can be engineered to have either slightly positive or negative charges. PAM functions as a soil stabilizer by binding soil particles together and by protecting already existing aggregates from slacking. Both cationic and anionic PAMs have already been tested on soils with differing chemical, physical and mineralogical properties. These tests include, soil stability under simulated rainfall, settling velocity, aggregate stability via wet sieving, and water infiltration rates. Current studies are also measuring nitrate and phosphate leaching from soils treated with PAM. For most mainland applications, the anionic PAMs are used because of their low aquatic toxicity.

PAM could potentially be used in Hawaii to stabilize steep road cuts and unpaved roads that lack protective cover, and as a flocculant to improve sediment settling and water clarity in settling ponds. PAM is already being used in many parts of the northwestern United States in furrow irrigation and as a settling agent for highway runoff detention basins.

Current results indicate that the PAM has good potential for reducing soil loss from many Hawaiian soils. It reduces surface runoff and promotes infiltration. The sediment flocculation potential appears to be quite high for nearly all soils, with potential for use in detention/retention basins.

This project was initiated with a grant from both the Hawaii Department of Transportation and the Hawaii Sea Grant College Program in the spring of 1998. Additional work will continue through the summer of 2000.

Above: Graduate Assistant Jim Teo collecting soil erosion runoff.

Related Info...

"Commercial use of polyacrylamide (PAM) in irrigation water began in 1995 and has been enormously successful and environmentally beneficial. Over 600, 000 acres were PAM-treated in the USA in 1997. The overseas market is much larger."

Source:

http://kimberly.ars.usda.gov/sojka/pamphlet.htm

Director's Note

by: C.S. Papacostas

The last quarter of 1999 was eventful as we extended our services beyond workshops, training sessions and technical assistance:

We offered support to representatives from the four counties to attend the annual meeting of the National Association of County Engineers. A summary of the meeting and the benefits gained by the three counties that took advantage of our offer are included in this issue (pages 1, 6 & 7). It is the executive committee's hope that the counties were sufficiently encouraged
by these benefits to consider sending staff to future meetings.

The first Traffic Safety Forum, sponsored by the Hawaii DOT using FHWA incentive funds, was a great success. It brought together national and local experts of all aspects of traffic safety, that is, engineering, education and enforcement. I served as the forum's engineering chair and Juli Kobayashi took responsibility for the logistical aspects of the forum. For her dedication and for going beyond the call of duty, she was presented with a special award. Congratulations Juli!

Our Advisory Committee met in December. The new Dean of Engineering at the University of Hawaii, Dr. W. F. Chen, expressed support for our program and encouraged increased interaction between the profession and the University. Increasing our response to local government needs was a major theme of the meeting.

We look forward to hearing from you.

Season's Greetings.

Program Manager's Note

by: Juli Kobayashi

Happy Holidays! As we look forward to the new millennium, we are grateful for all the wonderful things that happened over the past year. The Hawaii LTAP held over 13 workshops with more than 1150 participants. We sponsored 10 county personnel from the outer islands to attend workshops held on Oahu. The LTAP program has also held two advisory committee meetings to help guide the program to better serve the transportation community in the future.

In October, I had the pleasure of attending the Region 9 County Engineer's Conference in Laughlin, Nevada with Jiro Sumada (County of Hawaii), Randy Fujiki (City & County of Honolulu) and Ken Kitabayashi (County of Kauai). Besides having a wonderful time, we were able to make some valuable contacts with the other county engineer's from Region 9 (California, Nevada and Arizona), the Federal Highway Administration and the many different consultants/vendors.

During the last week in November, LTAP had the pleasure of assisting the Hawaii Department of Transportation hold its first Traffic Safety Forum. It was a huge success with more than 650 participants from such places as Australia, Canada, Samoa, the Northern Mariana Islands, the mainland and Hawaii.

We look forward to hearing from you as we plan for the year 2000. If you have suggestions on workshops or training sessions that would be of benefit to you and your organization, please contact the Hawaii LTAP office. We would also like to know which workshops that were held in the past were of some merit. Please fill in the questionnaire on page 11 and fax it back to us.

Have a safe and wonderful holiday season!

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University of Hawaii at Manoa

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Juli Kobayashi

Graduate Assistant:
Matt Nakamoto

Student Assistants:
Reid Ikemori
Joni Tanimoto

Hawaii LTAP's Library.

The Hawaii Local Technical Assistance Program Library is located in Holmes 207A at the University of Hawaii. The library houses many transportation-related technical reference materials. Informational and workshop videos may also be found in the library. Reference materials and videos are available to the public and may be borrowed or copied.

A database of all materials may be found on the web at:

Videos –

www.eng.hawaii.edu/~hltap/video.html

Publications –

www.eng.hawaii.edu/~tlib

For more information, please contact Juli Kobayashi at 956-9006.

Upcoming Workshops & Activities

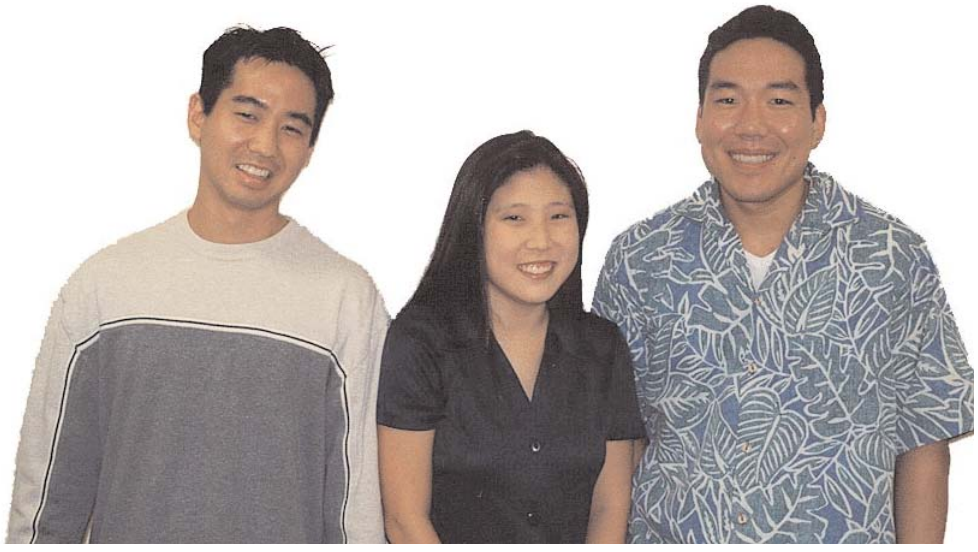
Workshop	Date	Place
Ground Improvement Methods - Demonstration Project 116	February 2-4, 2000	Oahu
Indirect Cost	February 8-11, 2000	Oahu
Load & Resistance Factor Design for Highway Bridge Substructures	February 28-29, 2000	Oahu
Work Zone Safety (Tentative)	May - June 2000	Oahu, Maui, Kauai, Hawaii

Staff News

We would like to congratulate our graduating staff members Beth Florendo and Marmelyn David! They have both received degrees in Civil Engineering. Beth has accepted a position at Dames & Moore in California. Marmelyn will be returning to Pompei. Thanks for all your hard work!

Above: Graduating seniors Beth Florendo and Marmelyn David.

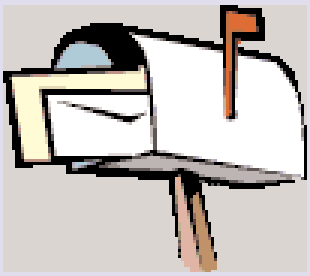
Below: Continuing Staff members (Engineering Students) Matt Nakamoto, Joni Tanimoto, and Reid Ikemori.



We Need Your Feedback

Member Info...

Would you like to remain on our LTAP mailing list? Yes___ No___
Would you like to receive LTAP workshop notices? Yes___ No___
Would you like to receive our quartely LTAP newsletter? Yes___ No___

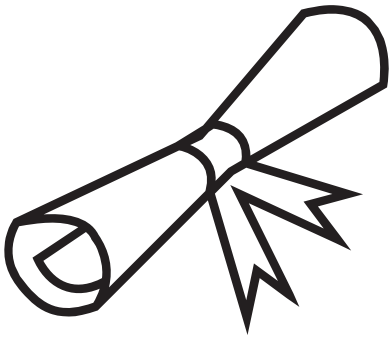


If you answered yes, please help us by filling in the following information:

Name:_____
Company/Organization:_____
Address:_____
City:_____ State:_____ Zip:_____

Workshops that work...

Vote for your favorite workshop of 1999!!!



Workshop_____

Reasons_____

Name (Optional)_____

Workshops of 1999

Workshop	Dates
Introduction to Highway Hydraulics	February 23 - 26, 1999
AASHTO Presentation of TRNS*PORT	April 15 - 16, 1999
Documenting NEPA and Transportation Decision Making	April 20 - 22, 1999
Life Cycle Cost Analysis in Pavement Design - DP 115	April 27 - 28, 1999
Achieving Smooth Asphalt Pavements (3 sessions)	May 18, 19, 20, 1999
Bridge Underwater Repair & Evaluation	June 9 - 10, 1999
Presenting Powerful Presentations	August 18 - 19, 1999
Hazardous Bridge Coatings: Design & Management of Maintenance & Removal	October 12 - 15, 1999
Introduction to Highway Hydraulics	October 19 - 22, 1999
Comprehensive American Disability Act Paratransit Eligibility Determination	October 26 - 28, 1999
Freeway Traffic Operations	October 26 - 28, 1999
HEC-RAS, River Analysis System	November 15 - 19, 1999
Hawaii Traffic Safety Forum	Nov. 29 - Dec. 3, 1999

Please fax this form to Juli Kobayashi at (808) 956-8851 or mail to:

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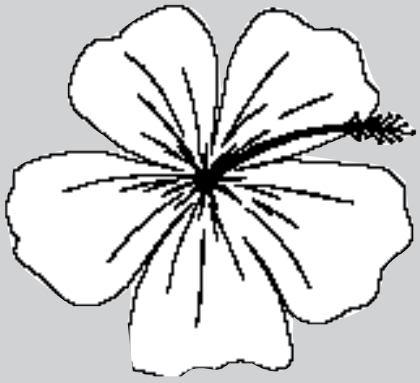

Hawaii LTAP is a cooperative program of the Department of Civil Engineering, University of Hawaii, the Hawaii Department of Trans-portation, Highway Division, State of Hawaii and the U.S. Department of Transportation Federal Highway Administration, Hawaii. The LTAP program is to provide technical assistance and training programs to local transporta-tion related agencies and companies in order to assist these organizations in providing cost-effective improvements for the nation's highways, roads and bridges. Our office is located at:

Hawaii Local Technical Assistance Program
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University of Hawaii at Manoa
2540 Dole Street - Holmes Hall 383
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Please contact:
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