TRANSLETTER

Volume 26 第二十六期

INTERNATIONAL CHINESE TRANSPORTATION PROFESSIONALS ASSOCIATION

July 2004 二零零四年七月

交通運輸通訊

ANNUAL MEETING

ICTPA-NE ANNUAL MEETING 2004

Please mark down **September 25, 2004 (Sat)** on your calendar for this year's Annual Meeting. The ICTPA-NE Annual Meeting will be held at the **Sheraton Hotel in Flushing**. A technical session will kick off this special day at 2:00 pm, and as usual, the event will culminate with the annual dinner banquet. It is an important day for the Northeastern Chapter, and we all look forward to seeing everyone there.

This year's Technical Program will have a broad range of views covering national, state and local transportation perspectives. Ms. Eva Lerner Lam will provide us with an update on transportation security at the national level; Mr. Kurt Aufschneider (NJDOT) and Mr. Philip Eng (NYSDOT) will present us with the state of our transportation systems at the state level for New Jersey and New York, Ms. Alice Cheng (NYCEDC) will give us an insight on intermodal planning from the viewpoint of New York City Economic Development Corporation; and finally, Mr. Babu Veeregowda with Eng-Wong, Taub & Associate will brief us on the latest developments with the ongoing Flushing Transportation Study in Flushing, Queen.

More details and registration will be announced in the near future. So stay tuned.

Membership Updates

NEW MEMBER

Please join us to express our warmest welcome to our new member:

Full members

Susan LIM

CHANGE OF PERSONAL PARTICULARS

In preparing the upcoming annual meeting, we are updating member's information to be included in the year book. To keep our database current, please let us know if you have recently changed any of your personal particulars. You can simply return the form enclosed at the

back of this newsletter to Leo Tsang.

Since last year, we have been delivering our newsletters through email. It is therefore, very important for us to keep your most updated email address in our database. If you have changed your email address or have come across members who did not receive our latest newsletters, kindly notify Leo at ictpa_ne@yahoo.com with the updated information or use the form attached at the back of this newsletter.

MEMBERSHIP

You do not have to be a transportation or traffic professional to become a member of ICTPA/US Northeastern Chapter. Any person engaged or interesting in transportation, including students enrolled in a graduated or undergraduate school of recognized standing, pursuing a course of study in a transportation related field is welcomed. Our chapter brochure and application form can be downloaded from the following website: http://www.ictpaweb.org/templates/usne_index.dwt.

Announcement

CAAPS ANNUAL MEETING 2004

美東華人學術聯誼會第二十九屆年會將於今年八月十四日在 Sheraton LaGuardia East Hotel, Flushing, New York 隆重舉行。今年年會主題是 "立足美國、關懷社區、融入主流社會"。年會將包括專題演講、分組討論、晚宴及餘興節目等等。分組討論共有七個議題: 奈米科技、生物醫學、財經投資、國際關係 –台中美關係現況與展望、網路科技、海外僑教、和在美心理調適。目前各組分組討論徵文已經開始，截止日期為七月三十一日，有興趣之學者與專業人士請電 516-482-7266 或電子郵件至 CAAPS2004@yahoo.com 與該會聯絡。*(details please refer to the flyer attached to this newsletter)*

(The Chinese American Academic and Professional Society (CAAPS), established in 1975, is a registered 501(C)(3) non-for-profit and nonpolitical organization The purposes of CAAPS are:

A. To promote fellowship and cooperation in scholarly and professional activities, and

to encourage and support educational undertakings conducive to the interests, concerns and well-being or its membership;

B. To encourage and facilitate the exchange, enhancement, and application of the skills and expertise of its membership in the interest of advancing scientific knowledge, social and human values; and

C. To encourage and promote cultural understanding and communications among Chinese Americans in general, and with other ethnic groups in America and Chinese Communities elsewhere.)

There will be a transportation panel session at 3:15 pm. Current transportation issues and needs in Downtown Flushing will be assessed during the session. Future possible improvements to improve Downtown Flushing will also be discussed *(details please refer to the flyer attached to this newsletter)*

Activities Updates

REPORT ON JULY BOARD MEETING AND MEMBERS GATHERING

On Saturday of July 17, 2004 the NE Chapter held a Board Meeting and general members gathering at the home of our Chapter President Peter Lai. Peter's home is located in Plainsboro Township New Jersey just 5 minutes outside Princeton and is about an hour drive from Downtown Manhattan New York City. The gathering was very successful with a turnout of about 70 people including family members and friends. The weather was very cooperative with sunshine in most part of the day as everyone stayed outdoor most of the time. The gathering started around 3 pm and continued still 9:30 pm with a BBQ and karaoke session in between.

What's worth mentioning is that NE Chapter was very grateful to have several guests from our ICTPA chapter in Washington DC joined us. Bing Huang, Mike Hough and Eric Ho arrived along with their families after a long drive from DC. Their presence undoubtedly provided additional excitements to our gathering especially with Mike also celebrating his birthday the same day. They also joined our Board meeting and provided an update on the status of the upcoming ICTPA Annual Meeting in January 2005 in Washington DC.

All key topics of the Board Meeting were focused on the upcoming NE Chapter Annual Meeting scheduled in September 25,

2004. Vice President Wen-min Pan also Chairperson of the 2004 Annual Meeting Committee, quickly reviewed and updated her "Do-List" and effectively assigned new works and monitored old processes. The meeting lasted over 2 hours before everybody allowed to join the BBQ. Later that evening, we also had a very productive discussion with Bing Huang and Eric Ho on how ICTPA can help to develop a joint conference with NACOTA with our annual meeting in January 2005. Despite all the business discussions that went on, it was indeed an enjoyable gathering as everyone got the opportunity to see old friends and meet new ones.

TECHNICAL TOUR 2004: Port Newark Container Terminal

By Xiao-pei XU.

On a sunny Friday afternoon, June 25, 2004, the International Chinese Transportation Professional Associates U.S. Northeastern Chapter organized an annual technical tour to Port Newark Container Terminal (PNCT) in Newark NJ, a most advanced container terminal on the East Coast.

About 50 members and friends from New York and New Jersey attended the tour. The President of PNCT, Mr. Don Hamm and his management team provided a PowerPoint presentation and a tour of the facility in which the terminal operations was presented

The Port Newark Container Terminal LLC (PNCT) operates a 176-acre container terminal in Port Newark, New Jersey. It has a 4,500 lineal feet of deep-water wharf, 4 new Post-Panamax cranes, 54 straddle carriers and cargo handling machinery. The terminal is capable of handling one million containers (measured in 20 ft. equivalent units). One of the most amazing operation system components is the state-of-the-art terminal gate complex with the Optical Character Recognition gate technology. This most advanced terminal management system provides faster processing, greater data accuracy and more efficient terminal operation. It dramatically reduces the gate turn-time from manual 40 minutes to 5 minutes.

To most of us engaged in the transportation engineering field, the tour was very informative and educational. It provided us with the first-hand experience on the advances of container terminal operations knowing that modern marine transportation operations help greatly in freight movement and reducing traffic congestion. We really appreciated the tour with special thanks to Mr. Robert LaMura and Mr. Del Bobish for hosting this wonderful event.

A SUCCESSFUL TRANSPORTATION CONFERENCE HELD IN THE INTERMODAL TRANSPORTATION HUB: WUHAN, CHINA

By Rachel Rong-fang LIU, NJIT

The 4th International Conference of Chinese Transportation Professionals (ICCTP-2004) was successfully held in Wuhan, China June 15-19th, 2004. This conference was co-hosted by the North America Chinese Overseas Transportation Association (NACOTA) and Wuhan University of Technology. Continuing the success of these previous conferences, the 4th ICCTP conference has attracted more than 100 attendees, among whom are nearly 30 international transportation experts from North America, Japan, and Europe.

In addition to the familiar technical presentation sessions, this conference also had special sessions featuring more than a dozen experts from overseas and China making extended presentations on various subjects, such as highway safety, transportation development strategies, freight movement, and ITS. The panel sessions, held on the cruise ship, were a great stimulator and facilitator for attendees from different areas and with various research interests to exchange ideas and discuss transportation problems.

Another highlight of the conference is the site visit to the Three Gorges Dam and the extended discussions and exchanges on the cruise ship along the Yangtze River. Most of the conference attendees boarded the cruise ship on the 3rd day of the conference and toured the "Five-Stage Ship Lock", Shen Nong Creek, Wu Gorge, Qutong Gorge, and Three Gorges Dam.

Four people from the Greater New York Region attended this

conference, made presentations, and served as session moderators or hosted panel sessions. As show in the attached picture, they are Guoan Chiao, Zhongguo Chiang, Jerry Zheng, and Rongfang (Rachel) Liu.

For more information about NACOTA and other related events, please visit: http://www.nacota.org/htdocs/index.htm

Technical Corner

NONDESTRUCTIVE EVALUATION OF MULTI-LAYER CONCRETE SLAB STRUCTURES USING SPECTRAL ANALYSIS OF SURFACE WAVES METHOD

By Feng-Bao LIN and Young S. CHO.

Abstract: This article presents a modified experimental SASW method for nondestructive evaluation of the cement mortar compressive strength in in-place single-layer mortar slabs with a rather finite thickness. The tests were conducted on 3' x 3' x 4" (91.44 x 91.44 x 10.16 cm) cement mortar slab specimens using steel balls as the impact source to generate surface waves at various frequencies. The boundary reflection effects were removed in this study by collecting only the wave forms before the time when the reflected compressive waves reach the receivers. The correlation between the surface wave velocity and the compressive strength was obtained by conducting the SASW tests at different ages of the slab specimens. The results can be applied to the quality control of early age concrete during the construction phase. Because of the limitation on the article length, only a part of the study is presented.

Introduction

During the construction stage and/or the lifecycle of concrete slabs, the integrity of concrete needs to be evaluated. A visual inspection provides only information about what have happened on the surface. To control quality of new constructions or to assess deterioration of existing structures, destructive methods are usually used, in which sampling for laboratory tests could be difficult and could in some cases be more harmful than beneficial due to the damage caused by the sample collection. Thus, nondestructive testing methods are preferable as long as they can provide reliable information. There are various types of nondestructive testing methods, such as ultrasonic based methods, resonant frequency methods, magnetic/electrical methods, short-pulse radar methods, infrared thermographic techniques, acoustic emission methods, and stress wave methods. Some of these methods have been used to determine the structural properties and conditions of concrete structures with different levels of success [1].

Stress wave methods, which are particularly suitable for reinforced concrete structures, include the pulse-echo, impact-echo, impulse-response, and spectral analysis of surface wave (SASW) techniques. The SASW method was originally developed and used for the assessment of elastic properties of pavements and soil layers in geotechnical engineering [2, 3], and later was applied to thin concrete slabs [4]. This method has the following advantages: (1) It requires measurement and access to only one side of the object to be tested. (2) When an impact is used to create a source wave, the majority of energy generated from the impact is imparted in the form of surface waves while the remainder goes into body waves. (3) The damping due to geometrical spreading for surface waves (cylindrical) is smaller than for body waves (spherical wavefront). (4) A stiffness profile (e.g., Young's modulus or shear modulus) can be obtained without knowing the layer thicknesses.
The SASW method deals mainly with the estimation of the phase velocities of surface waves as a function of the frequency. Ideally the method requires the presence of a thick layer of material whose thickness is approximately more than two times the wave length. The surface wave velocities can then be evaluated using the interpretation methods developed by Bay and Stokoe [4]. In thin slabs, however, the reflected body waves can arrive nearly simultaneously with the surface waves at the receiving device. In this case, the interpretation technique has to be improved to eliminate the effects of the reflections from the member boundaries.

This paper presents nondestructive assessment of single-layer mortar slabs using the SASW method. The theory of surface wave propagation, the current development of SASW method, experimental setup, interpretation procedure, reduction of boundary reflections, and a modified SASW technique are described. The correlation between early age mortar compressive strength and surface wave velocity using the SASW method is also presented.

SASW Method

There are two kinds of surface waves, Rayleigh waves and Love waves. Rayleigh waves propagate along the surface of a uniform half space medium, decay exponentially with depth, and diminish in amplitude with travel distance due to cylindrical spreading of energy. Love waves exist only if a low-velocity surface layer overlies a medium of higher velocity, and are generated as the result of multiple reflections between the top and the bottom of the low-velocity layer. The Rayleigh-type surface waves are the focus of this study because most of the stress wave energy due to an impact at a point propagates as Rayleigh waves. Layered systems have dispersive characteristics for Rayleigh waves. Rayleigh waves with different wavelengths will penetrate to different depths at different speeds. The depth to which a certain Rayleigh wave will penetrate is approximately equal to its wavelength [4]. Rayleigh wave velocity is related to the material properties of the layer through which it propagates. The velocity of Rayleigh wave is a function of the elastic modulus, Poisson's ratio, and density, and is approximately the nine tenths of the shear wave velocity. The particle motion is elliptical as a result of longitudinal and transverse vibrations. The Rayleigh wave velocity is also a function of the wavelength and frequency. The plot of Rayleigh wave velocity versus wavelength is called a dispersion curve (see Figure 1).

Heisey et al. in 1982 studied the feasibility of using transient signals to construct dispersion curves using the SASW method [5]. Nazarian and Stokoe in 1984 and 1987 [2, 3] developed the experimental and theoretical aspects of the SASW method applied to the geotechnical and pavement engineering fields. Sanchez-Salinero et al. [6] studied analytically the most feasible source-receiver configuration. They concluded that a desirable distance between the source and the first receiver is equal to the distance between the two adjacent receivers. Sheu et al. recommended that, for the set-up suggested by Sanchez-Salinero et al. [6], wavelengths greater than three times the distance between the receivers should not be considered [7]. Gucunski and Woods conducted an analytical study to quantify some of the problems associated with soft and hard layers [8]. Bowen in 1992 evaluated cracked and repaired beams and columns using the SASW method [9]. Aouad studied the relationship between the properties of paving materials and temperature using the SASW method [10]. To make the SASW method practical, two simplifying assumptions have been made. First, it is assumed that a stack of horizontal layers can approximate the structure of a pavement and that the material properties of each layer are constant. Second, it is assumed that the effect of body waves is ignored and only the plane Rayleigh waves are involved [3]. The validity of these assumptions was evaluated by Sanchez-Salinero in an analytical study [6] and by Rix et al. in an experimental study [11]. Their results show that ignoring the effect of body waves is quite justified as long as the source-receiver geometry relative to the wavelength is kept within certain limits. The wavelengths exceeding the depth of the layer being tested are not desirable because they do not produce reliable results.

Experimental Setup

The main purpose of this study is to correlate the surface wave velocity with the mortar compressive strength using the SASW method. For comparison and verification purposes, three different testing methods, SASW, resonant frequency, and cylinder test, were used to measure the mortar strength. Two 3000 psi (210 kgf/cm^2) and one 2000 psi (140 kgf/cm^2) cement mortar slab specimens were prepared. Mortar slabs were chosen for this initial study because mortar is more homogeneous than concrete. The size of each specimen is 3' x 3' x 4" (91.44 x 91.44 x 10.16 cm). The forms were stripped two days after casting and the specimens were moved into the lab environment for curing with a temperature controlled at 75 °F. Mix proportions for cement, fine aggregate, and water are 1: 2.25: 0.5 by weight for the 3000 psi (210 kgf/cm^2) slabs, and 1: 3.25: 0.6 for the 2000 psi (140 kgf/cm^2) slab. Type I Portland cement was used. Instrumentation used in the SASW method consists of an impact source, two receivers, and a recording device as shown in Figure 2.

Evaluation of Modified SASW Technique

In this experimental study, each of the three slab specimens was tested at 9 positions evenly spaced and 6" (15.24 cm) minimum away from the boundaries of the slab as shown in Figure 3. Each position in the same specimen having the same compressive strength should produce a similar result. Measurements were conducted on the 3rd, 6th, 10th, 16th, 20th, and

31st days after casting the mortar slabs. Sixteen signal samples were collected at each test for averaging. The phase spectra and coherence functions were obtained from the tests and then used to construct the dispersion curves. To obtain the phase spectra and coherence functions, the recorded signals were first processed to remove the portions of the signals that include reflections from the slab boundaries. These signals were then transformed from the time domain to the frequency domain using the Fast Fourier Transform. After taking averages of the 16 signals, they were further processed based on the procedure stated in the section of Signal Processing to obtain the cross power spectra and coherence functions. These cross power spectra show acceptable phase differences so that the corresponding dispersion curves can be plotted.

The compact dispersion curves for the 3000 psi (210 kgf/cm^2) and 2000 psi (140 kgf/cm^2) specimens were plotted by compressing 100 data points from a dispersion curve into a data point and were obtained after a masking process which eliminates unnecessary portions of the cross power spectra that show no phase difference in the phase diagram. These compact dispersion curves were obtained at different mortar ages. A typical dispersion curve for the 3000 psi (210 kgf/cm^2) specimens is shown in Figure 1 which presents the data points, the best-fit curve, and the average surface wave velocity. The dispersion curve shows the trend of a horizontal line except some differences in surface wave velocity which may have been caused by a differential curing induced by the varying moisture contents in the slab sections due to air dry after casting the mortar. The surface wave velocity was used to correlate with the compressive mortar strengths. Figure 4(a) and 5(a) show a gradual increase in the surface wave velocity from the 3rd day to the 31st day after casting the mortar. The increase in the surface wave velocity reasonably agrees with the increase in the mortar strength obtained from the resonant frequency and the cylinder test methods as shown in Figures 4(b) and 5(b). Figure 6 shows the combined correlation between the surface wave velocity and the mortar compressive strength after combining the test results of the 2000 psi (140 kgf/cm^2) and 3000 psi (210 kgf/cm^2) cement mortar slabs. The relationship between the cement mortar strength and the surface wave velocity was then obtained from the following best fit equation:

$$f_c = 0.51\,V_R - 990 \qquad (1)$$

where f_c is the mortar compressive strength in psi and V_R is the surface wave velocity in ft/sec.

Conclusions

The SASW method was originally developed only for multi-layer media in an infinite half space. This paper presents a modified SASW technique which can be applied to cement mortar slabs of finite thickness. The problems associated with the boundary reflection effects encountered in the finite thickness slabs are removed in this study using only the signals before the time when the reflected compression waves reach the near receiver from the source. It appears that, through this modification, the coherence function and the phase spectrum obtained from the experiments are clear and legible for generating accurate dispersion curves. The correlation between the surface wave velocity and the compressive strength of cement mortar in finite thickness slabs is also developed in the current study. With further refinements of the research, these initial test results can be the basis for the quality control of early age concrete and the integrity analysis of concrete slab

constructions.

References

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3. Nazarian, S., Yuan, D. and Baker, M. R., "Rapid Determination of Pavement Moduli with Spectral-Analysis-of-Surface-Waves Method", Transportation Research Report, 1243-1, The Center for Geotechnical and High Way Materials Research, The University of Texas at El Paso, 1995.
4. Bay, J. A. and Stokoe, II, K. H., "Field Determination of Stiffness and Integrity of PCC Members Using the SASW Method", Proceedings of Nondestructive Evaluation of Civil Structures and Materials Conference, University of Colorado at Boulder, 1990, pp.71- 86.
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6. Sanchez-Salinero, I., "Analitical Investigation of Seismic Methods Used for Engineering Applications," Ph.D. Thesis, The University of Texas at Austin, 1987.
7. Sheu, J. C., "Application and Limitations of the Spectral-Analysis-of-Surface-Waves Method", Ph.D. Thesis, Department of Civil Engineering, The University of Texas at Austin, 1987.
8. Gucunski, M., "Generation of Low Frequency Rayleigh Waves for the Spectral-Analysis of-Surface-Waves Method", Ph.D. Thesis, Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, 1991.
9. Bowen, B. R. And Stokoe II, K. H., "Evaluation of Cracked and Repaired Beams and Columns Using Surface Stress Waves," Proceedings of the Tenth World Conference on Earthquake Engineering, Madrid, Spain, 1992.
10. Aouad, M. F., "Evaluation of Flexible Pavements and Sub grades using the Spectral-Analysis-of-Surface-Waves (SASW) Method", Ph.D. Thesis, the University of Texas at Austin, 1993, pp. 15.
11. Rix, G. J., "Experimental Study of Factors Affecting the Spectral-Analysis-of-Surface-Waves Method", Ph.D. Thesis, Department of Civil Engineering, The University of Texas at Austin, 1988.

Captions of Figures

Figure 1: Compact dispersion curve for 3000 psi (210 kgf/cm²) mortar slab at the age of 16 days, with 3" (7.62 cm) receiver spacing

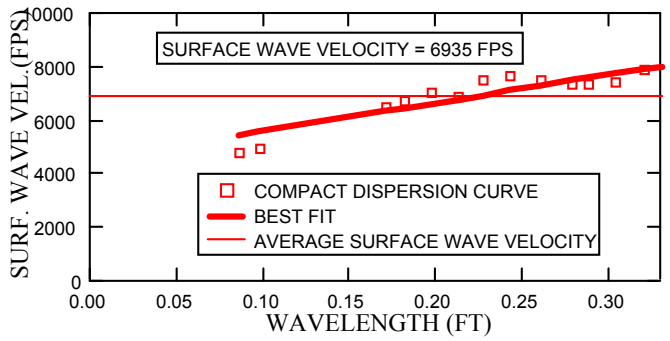


Figure 2: Experimental set-up for SASW method

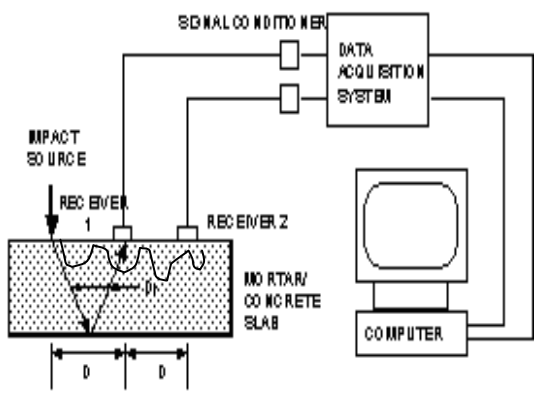


Figure 3: Testing position in the slab

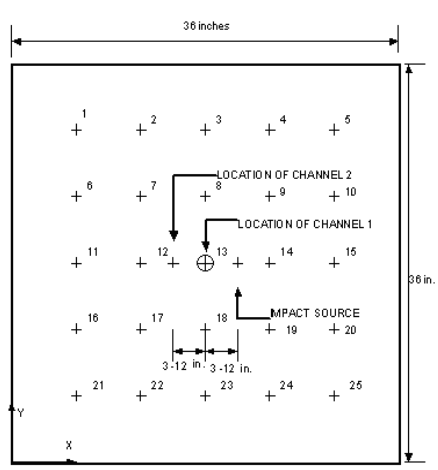
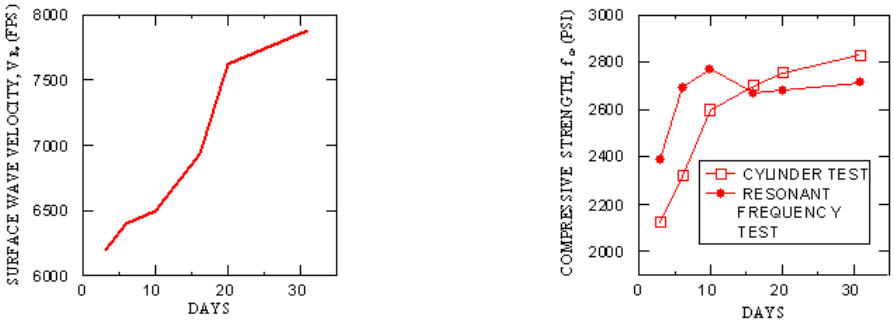
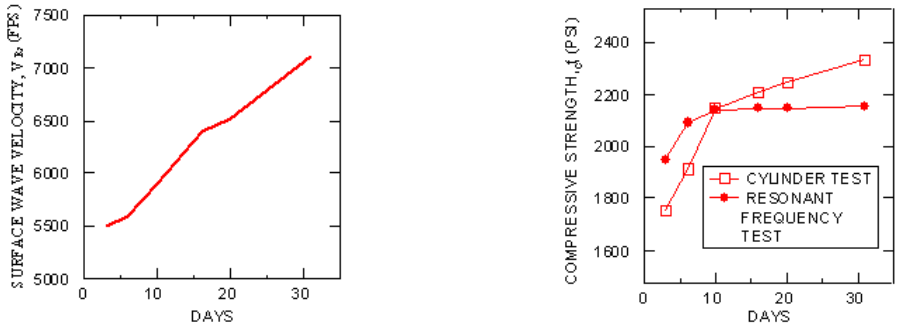


Figure 4: Surface wave velocity and compressive strength at different ages of the 3000 psi (210 kg/cm²) specimens



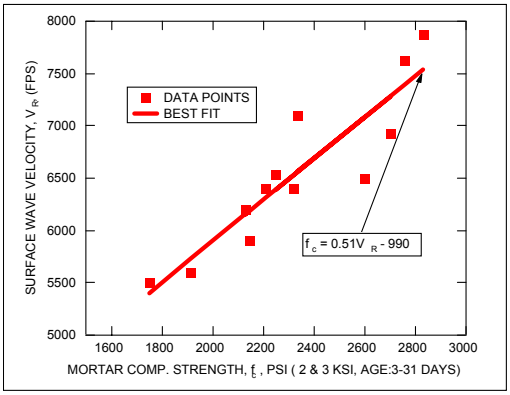
(a) (b)

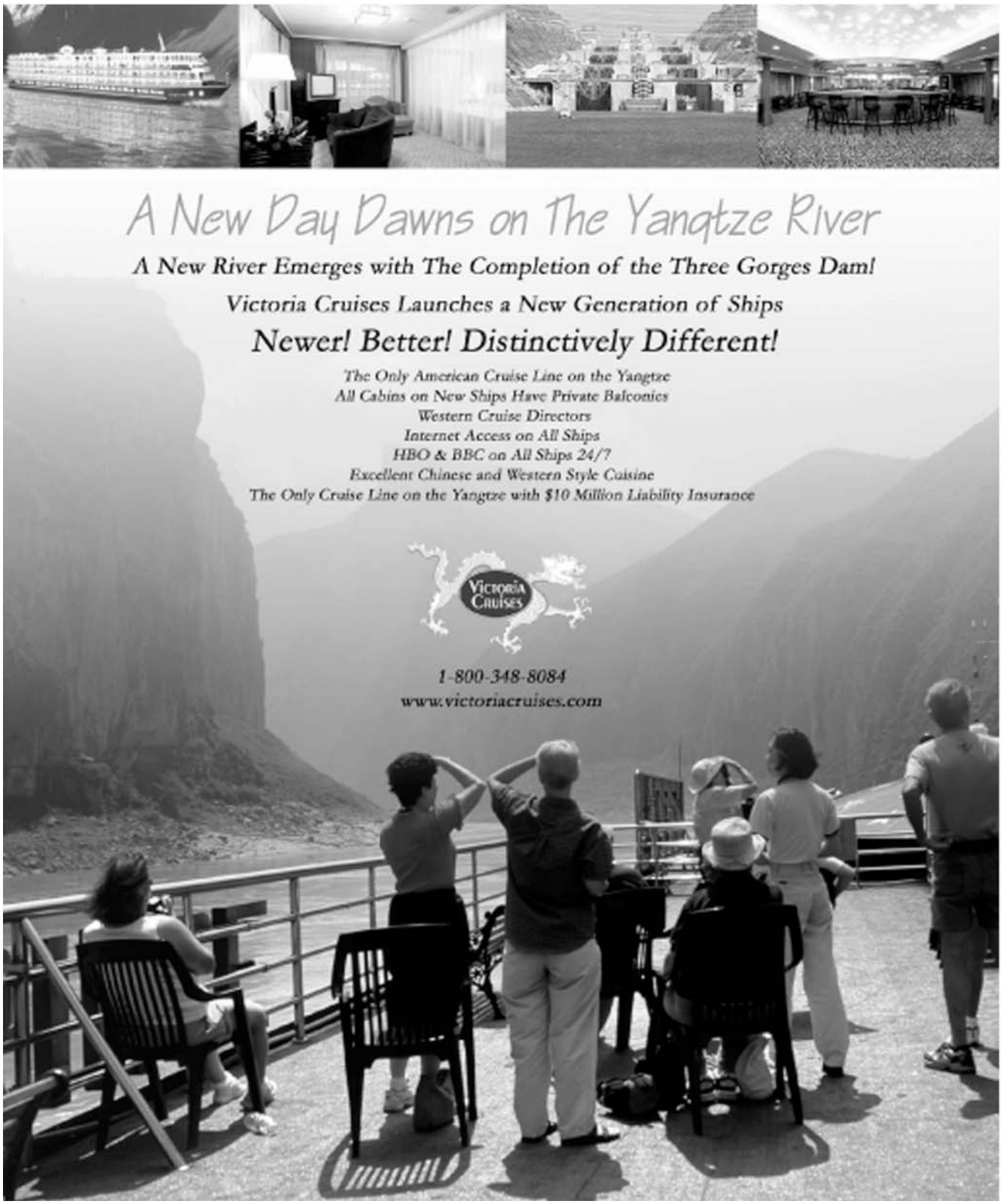
Figure 5: Surface wave velocity and compressive strength at different ages of the 2000 psi (140 kg/cm²) specimens



(a) (b)

Figure 6: Correlation between surface wave velocity and mortar compressive strength for the 2000 psi (140 kg/cm²) and 3000 psi (210 kg/cm²) specimens from ages of 3 days to 31 days

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(Please return to Leo TSANG, c/o Parsons Brinckerhoff, 506 Carnegie Center, Princeton NJ 08540)

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ICTPA-USNE
506 Carnegie Center
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USA
Attn: Mr. Peter LAI
Parsons Brinckerhoff

美東華人學術聯誼會 2004 年會

CAAPS 2004 第二十九屆年會

主題：立足美國、關懷社區、融入主流社會
Establish, Grow, and Merge
into the Main Stream in America

地點：法拉盛喜來登大飯店
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時間：八月十四日(星期六)

詢問及購票(晚宴$65)請洽:
516-482-7266 , 917-536-1996
或 **CAAPS2004@yahoo.com**

歡迎台北市長

馬英九

蒞臨

並發表專題演講

12:30—1:00 註冊報到

1:00—3:00 分組研討會(研討會不收門票，歡迎各界人士參加)

前瞻科技 主持人：郭子師（紐約州石溪大學教授）
主講人：朱鵬年、汪東平、鄧 斌、鍾 毅

網路科技 主持人：李振華（聖若望大學及美國聯邦商船軍校教授）
主講人：王學亮、張 儀、Ali Tamory、廖約翰

財經投資 主持人：廖國隆（聖若望大學教授）
主講人：楊漢群、朱邱華美、巫本添

在美心理調適 主持人：林昱廷（紐約州執照社工及心理治療師）
~美國華裔兒童青少年常見的心理問題
主講人：金曉春、陸曉春

生物醫學 主持人：李衡鈞 西奈山醫學院教授
~Live Well, Age Well
主講人：林有直

3:15—5:15 分組研討會

紐約市政 主持人：鄭向元（紐約市都市計劃局交通處主任規劃師）
~法拉盛交通問題
主講人：劉醇逸、陳作舟、Babu Veeregowda

兩岸關係 主持人：楊力宇（新澤西州西東大學教授）
~台灣情勢與兩岸關係
主講人：王涵萬、童惠珍、朱林驥

6:00—11:30 晚宴

董事長李衡鈞及會長林豐堡致詞
駐紐約台北經濟文化辦事處夏立言大使致詞
專題演講：**台北市長馬英九**
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CHINESE AMERICAN ACADEMIC AND PROFESSIONAL SOCIETY

2004 Annual Conference

Transportation Issues and Needs in Downtown Flushing

TRANSPORTATION PANEL SESSION

3:15pm to 5:15pm

August 14, 2004

Sheraton LaGuardia East Hotel

Downtown Flushing is a major transportation hub that has become congested. The Main Street terminal of the IRT No. 7 line has the largest patronage of any station outside of Manhattan. Each day 50,000 passengers transfer to the subway from 12 of the 19 bus lines serving Downtown Flushing, make this the single largest intermodal location in the system. As one of the largest retail areas and with the fastest growing commercial sub-center, this area exhibits intense vehicular and pedestrian activity by a multitude of shoppers, workers, visitors, and commuters, etc.- and places heavy demands on its transportation system. Transportation solutions are needed not only to improve the existing conditions but also to provide the infrastructure essential to support future new developments.

This panel session will assess the current transportation issues and needs in Downtown Flushing and discuss possible improvements for the future.

Organizer and Chairperson	Jerry Cheng	Principal Transportation Planner, New York City Department of City Planning Former President, International Chinese Transportation Professionals Association
Panelists	John Liu	Councilman and Transportation Committee Chair, NYC City Council
	Wellington Chen	Senior Vice President, TDC Development Corporation Former Commissioner, NYC Board of Standards and Appeals
	Babu K. Veeregowda	Senior Associate/ Vice President, Eng-Wong, Taub & Associates
	Peter Ma	Deputy Queens Boro Engineer, NYC Department of Transportation

The panel discussion will start with a presentation ("Downtown Flushing Traffic Study") by Babu Veeregowda