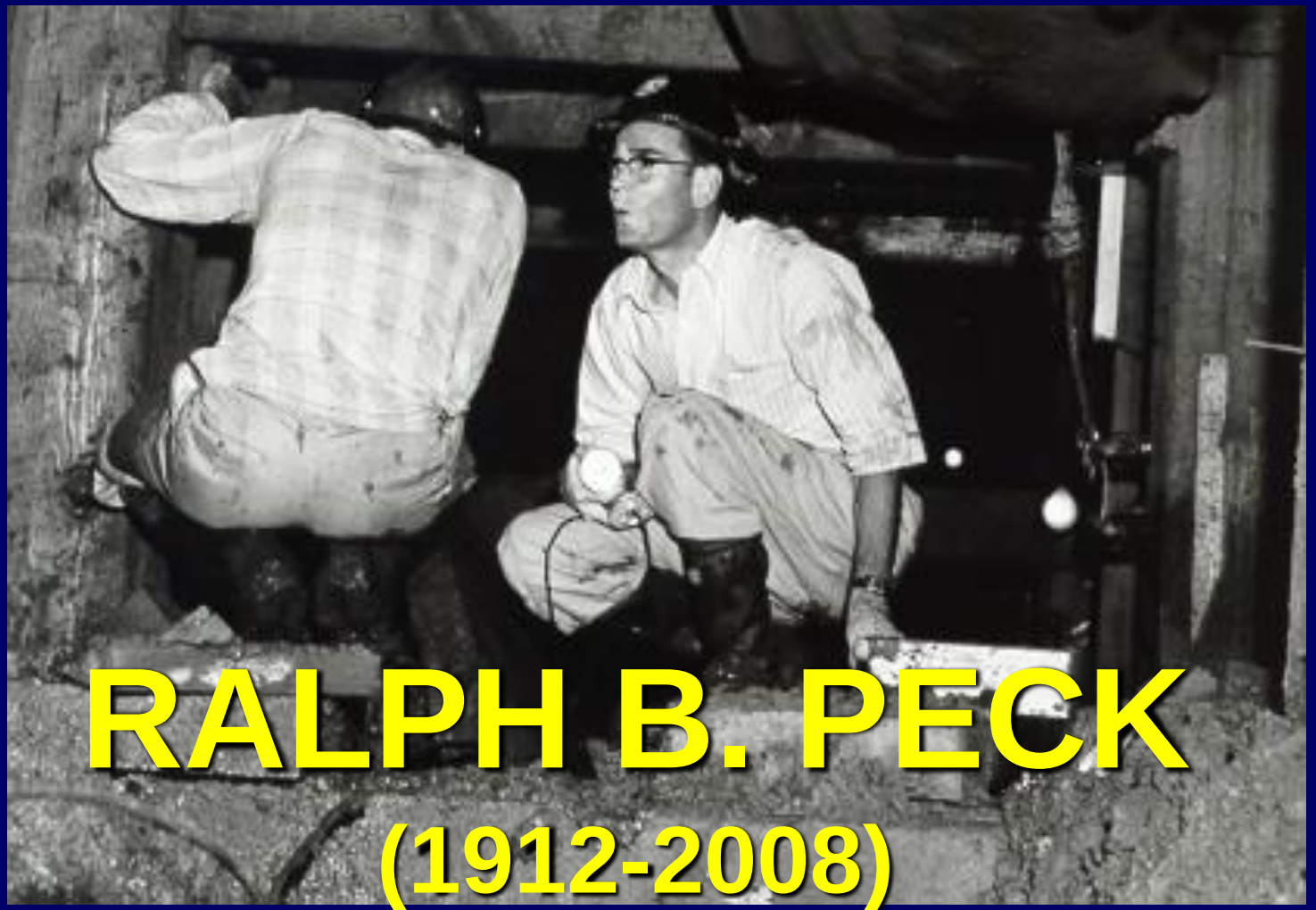


RALPH B. PECK
(1912-2008)

Photographic Essay of an Amazing Career

ASCE GeoInstitute Annual Meeting Heroes Celebration
Denver, Colorado August 2000
by J. David Rogers

PECK'S

FORMATIVE YEARS

1912 - 1930

A DETERMINED YOUNG MAN

Ralph Peck (third from left) about the time he decided to become a civil engineer (1924). His 6th Grade teacher, Miss Knight, asked her students to write an essay on what they aspired to do upon reaching adulthood. She told Ralph he'd have to take mathematics more seriously if he intended to become an engineer.

In his father's footsteps

Orwin and Ralph Peck in the back yard of their Denver home, circa 1933. Orwin Peck was a graduate of Dakota Wesleyan (B.A., 1904), who went on to engineering school at the University of Wisconsin, graduating in late 1907 with a B.S. in general engineering.

Orwin worked for a number of railroads before settling in with the Denver & Rio Grande Western in Denver, as a Bridge Engineer in 1921. He served as a consultant on the Royal Gorge suspension bridge, completed in 1929 then the world's highest span. Orwin was promoted to Engineer of Structures in 1939, and remained with the Rio Grande for the balance of his career, retiring in 1956.

The Peck home at 825 Garfield Street in Denver

It was here that Ralph spent most of his formative years. An only child, he lived with his parents and maternal Grandmother Huyck. The small family enjoyed singing hymns together in the evenings, and Ralph inherited his father's knack for playing the piano by ear, but not his father's deep bass singing voice. Years later, Karl Terzaghi visited the senior Pecks when he came to Denver.

HONING MATH AND MUSIC SKILLS

Still determined to become a civil engineer like his father, Ralph (at left) completed a challenging course in algebra taught by Miss Willins in the 7th Grade, and received his first set of glasses (1925-26).

Ralph began playing the piano in the 5th Grade, playing duets with his father. He continued playing in the symphony orchestra through high school.

SOCIAL LIFE CENTERED ON CHRISTIAN YOUTH GROUPS

Ralph (second from right) met Marjorie Truby (second from left) at their Christian Endeavor Group in the Capitol Heights Presbyterian Church in Denver, when both were in Jr. High School.
Marjorie was two years younger than Ralph.

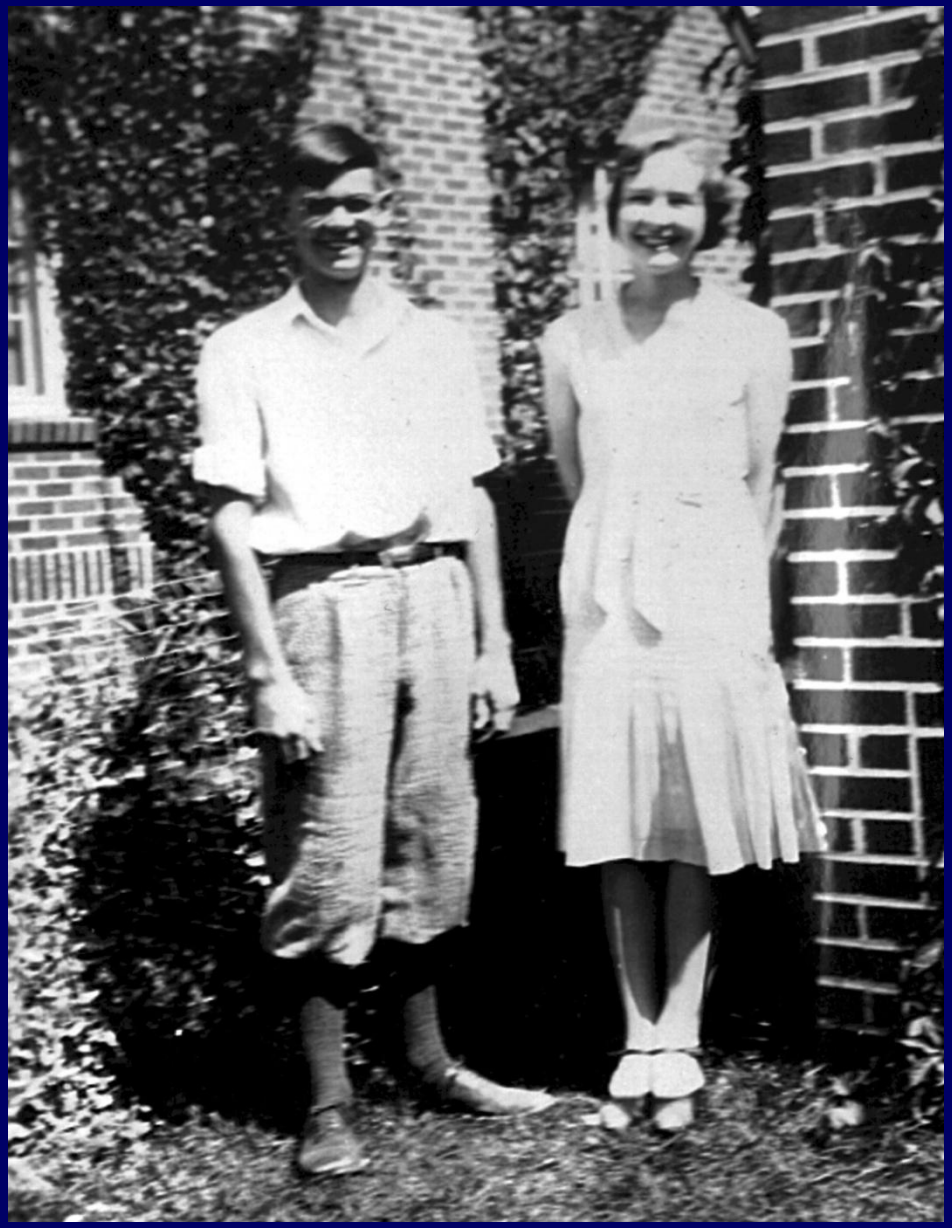
WORKING WITH SOILS ON A SIGNAL GANG

Ralph's first exposure to "soils" was as the junior member of a Denver & Rio Grande Railroad signal gang, performing trackside work during the summer following high school (1930). The job paid 55 cents per hour, just 20 cents an hour less than he would make seven years later at American Bridge, with a doctorate in structural engineering. Most of his work involved the use of a shovel, which made college look pretty good by the end of the summer. Ralph thinks that was his father's intent…

COLLEGE DAYS

Rensselaer Polytechnic Institute

September 1930 - June 1937



Off to RPI

On September 5, 1930 Ralph and Marjorie said their good-byes as he departed for college. He was 18 and Marjorie 16 at the time.

Turning down scholarships to the University of Colorado and the Colorado School of Mines, Ralph enrolled at Rensselaer Polytechnic Institute in Troy, New York because his father knew that many of the country's finest bridge engineers had attended RPI. At that time RPI's student body was all male.

LEARNING THE BASICS OF CIVIL ENGINEERING

Peck learning the finer points of route surveying at the end of his first year of RPI's mandatory 12 weeks of Surveying Camp, split into two 6-week summer sessions. The traverse pictured here was performed by Ralph near Poultney, Vermont during the summer of 1932.

As through the ages, student interest peaked whenever members of the opposite sex happened to be spied through their transits in the general area…..

HOME FOR THE HOLIDAYS

It took Ralph 2-1/2 days on various trains to travel to and from Rensselaer in upstate New York to Denver. He was afforded the privilege of a train pass because of his father's position with the Rio Grande Railroad, but he could not ride on the limited, so spent considerable time sitting on sidings, waiting for higher priority trains to pass.

SOLO TRAVELS

The thrill of his young life was a week long solo trip he made on the Rio Grande lines, just before leaving for college. Many of the narrow gage lines he traveled during that August 1930 trip were subsequently abandoned during the depression years that followed.

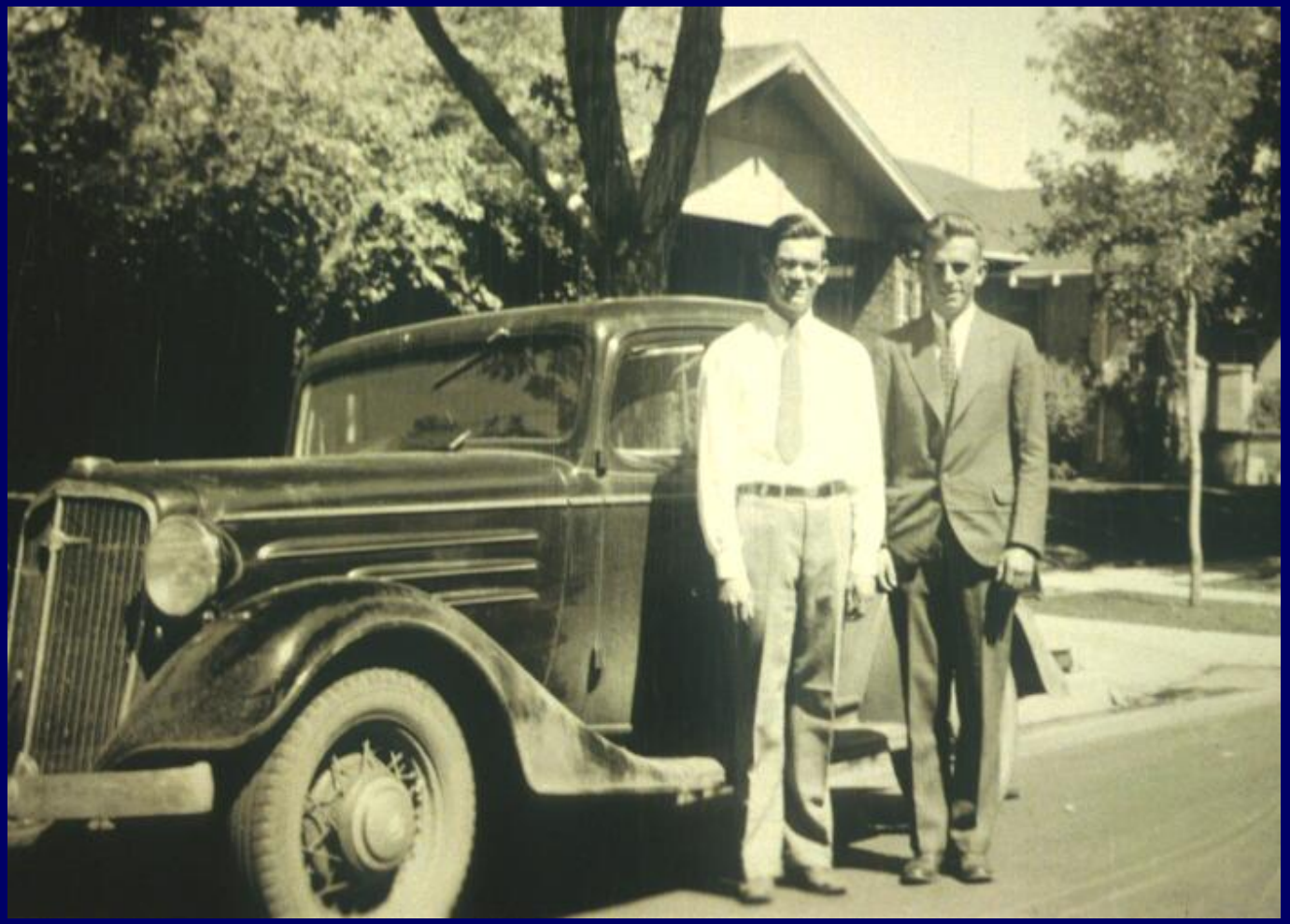
BUSY SUMMERS DURING COLLEGE 1930-37

Ralph's summer vacations from RPI were filled with surveying camps and report assignments. This shows the Peck family on a brief vacation tour near Shaffer's Crossing in the Colorado Rockies, in 1931, between Ralph's freshman and sophomore years. For his summer term report Ralph described Cheesman Dam and the Denver Water Department. Pictured above (left to right) are: Ralph, his mother Ethel, cousin Mary, and father Orwin.

GRADUATION DAY

Ralph and his roommate of 3 years at RPI, Al Widmer, graduated together in June 1934.

Ralph received his degree in civil engineering while Widmer got his in electrical engineering.



HOME FROM COLLEGE

Ralph's arrival home on June 24, 1934, after graduating from RPI. Ralph (at left) with fellow RPI classmate Chuck Bradley, who received this 1934 Chevrolet as a graduation present. He dropped Ralph off in Denver, on his way back to Boise, Idaho.

PONDERING HIS FUTURE

On family holiday in the summer of 1934, following graduation from RPI. The highlight of the summer was the opportunity to court Marjorie, who was two years younger and still attending Denver University.

FIRST DESIGN SUFFERS A FOUNDATION FAILURE

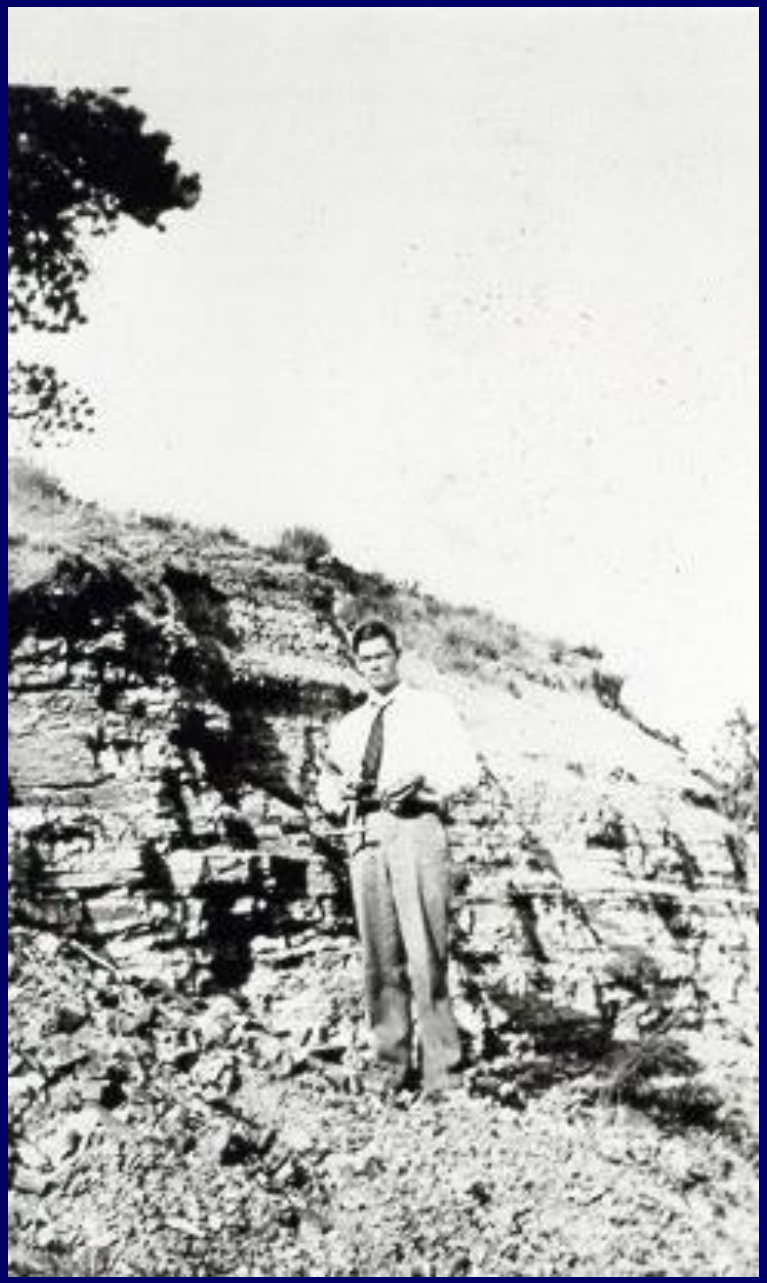
During Christmas break of his senior year (December 1933) Ralph designed his first bridge, a 60 feet long girder for the Rio Grande Railroad over the Animas River near Aztec, New Mexico. The bridge was washed out a few years later by bed scour during a flash flood!

ONTO GRADUATE SCHOOL

Henry Kruse of Yonkers, NY and Ralph Peck of Denver, CO.

Unable to land jobs during the depression, Ralph Peck and Bert Ingells accepted the two fellowships available for graduate study at RPI; becoming off-campus roommates, while sharing both their doctoral research and dissertation at RPI between 1934-37. Their thesis was titled: "Stiffness of Suspension Bridges." World renown bridge engineer D. B. Steinman reviewed their work.

Their Doctor of Civil Engineering degrees were among the earliest awarded by RPI.



FIRST GEOLOGY FIELD TRIP - 1935

Peck's first geology field trip was taken as part of a historical geology course he took at RPI during his first year of graduate school.

As one can appreciate from the style of clothing, this was an organized affair, involving the New York and Pennsylvania State geological societies.

Ralph received a guided tour of limestone caves from Miss Winifred Goldring of the New York State Museum on Natural History, whose illustrations still grace many a college text .

ENGAGED

Marjorie Truby and Ralph Peck at Fall River Pass in the Colorado Rockies.

A chaperoned family vacation with mom and dad; just after Marjorie's graduation from Denver University in June 1936. They had already known one another for more than a decade.

Ralph and Marjorie were both accomplished pianists. Ralph served as President and played the piano for the Young Peoples Christian Union in Troy, NY, the center of his collegiate social life. Ralph preferred to play by ear, mostly performing duos and hymns, while Marjorie preferred sheet music.

A MEMORABLE DAY
June 14, 1937

Doctorate awarded in the morning, marriage in the afternoon, honeymoon in the evening

Ralph and Marjorie on their wedding day, Saturday June 14, 1937. They were married at the home of Ralph's minister at the Second Presbyterian Church of Troy, Rev. Dr. Frederick W. Evans. They honeymooned at his structures professor's cottage by a nearby lake.

A TIME OF TRANSITION
1937-38

MARRIAGE: Saturday June 14, 1937, in Troy, New York

FIRST JOB: American Bridge Co. in Ambridge, PA
began Wednesday June 18, 1937 and paid 75 cents per hour

LAID-OFF FROM FIRST JOB: March 1938 (7 months later)

CAREER CHANGE: Informed by Professor L. E. Grinter that he could have a teaching job at Armour Institute in Chicago if he could learn something about "soil mechanics and foundation engineering."

MORE POST GRADUATE STUDY: Enrolls midway through spring term in Arthur Casagrande's program at Harvard University (April, 1938). Manages to impress Casagrande with his drafting and structural detailing skills, becoming a lab assistant at Harvard and a field observer for Casagrande's consultations in Boston.

NEWLYWEDS

Ralph and Marjorie, soon after their marriage. It was a rough year, making only 75 cents an hour at American Bridge Co., near Pittsburgh. The couple's first major expenditure was $25 for a piano with a cracked sounding board. Ralph bolted the broken board and they moved into a two room second floor apartment, where there was room for the piano.

Through his father's influence, Ralph managed to enroll in a 6-week detailing course taught by American Bridge, but was laid off 7 months later because no new orders for bridges had been received. Although teaching was an option, he found no openings for structural engineers. Based on a promise that colleges needed instructors in soil mechanics, he borrowed $5000 from his father-in-law and enrolled at Harvard University. Terzaghi arrived at Harvard 7 months later.

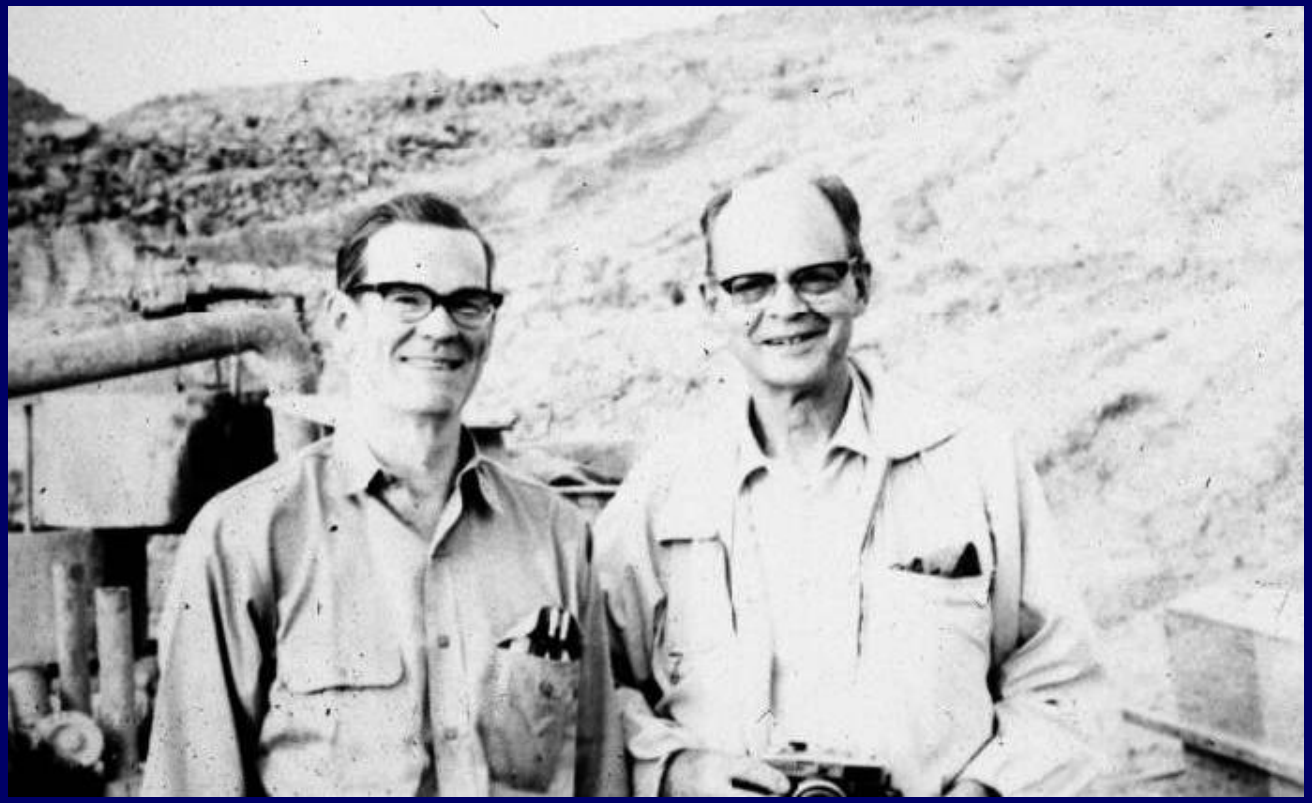
MEMORABLE MENTORS

Arthur Casagrande
Karl Terzaghi

Al Cummings

Ray Knapp

Ralph Burke



WHAT A DIFFERENCE 48 HOURS MIGHT HAVE MADE

Ralph Peck (left) and Arthur Casagrade (right) may never have met, were it not for a late letter. In April 1938 Peck turned down his "dream job" with the prestigious bridge designers Waddell & Hardesty of New York City, because their offer letter arrived two days after he had written to Casagrande, promising to enroll immediately at Harvard (despite Casagrande's desire that he wait until the following fall to begin).

DR. TERZAGHI

Karl Terzaghi strikes a typical pose during one of his lecture tours at the University of Illinois, in the late 1920s. At that time he usually signed his name "Dr. Terzaghi," and smoked 5 cent cigars, almost nonstop.

Terzaghi admired the Illinois program because they had developed a tradition of performing practical problem-solving research, with faculty members actively engaged in consulting.

However, Terzaghi had little respect for university bureaucracy, warning Peck to: "avoid committees, becoming a dean or university administrator, for fear he would become "altogether useless to the profession of civil engineering"

Al Cummings (1894-1955)

Another of Peck's early mentors was Al Cummings, who worked for the Raymond Concrete Pile Co. for 40 years.

A self taught geotechnical engineer and pioneer in pile foundations, he played a key role in enabling Karl Terzaghi's return to the United States in November 1938, by suggesting consulting work to support him. His first lead (in December 1938) was the Chicago Subway project, for which Raymond provided the rigs and drillers, crucial to the work at hand.

When he passed away in 1955, his extensive technical library was bequeathed to Ralph Peck.

Soil experts find ours good— Dr. M. J. Hvorslev (left), research expert for American Society of Civil Engineers, and Dr. Arthur Casagrande (right), co-founder of new science of soil mechanics, study sample of soft clay taken from Chicago subway, and assure R. S. Knapp and Dr. R. B. Peck that local underground project is "outstanding." (TIMES Photo)

MASTER MANAGER RAY KNAPP

Juul Hvorslev, Ray Knapp, Peck and Arthur Casagrande in Chicago, 1940. Peck's immediate supervisor for the City was Ray Knapp, a combat veteran of the First World War and Army Reserve officer. Peck would later state: "I learned as much from Ray Knapp as I did from Terzaghi, not about soil mechanics, but about how a geotechnical engineer can go about doing some good in an organization. Ray Knapp served as the consummate interface between job site and management, facilitating whatever needed doing to accomplish the tasks at hand."

RALPH BURKE - ANOTHER MEMORABLE MENTOR

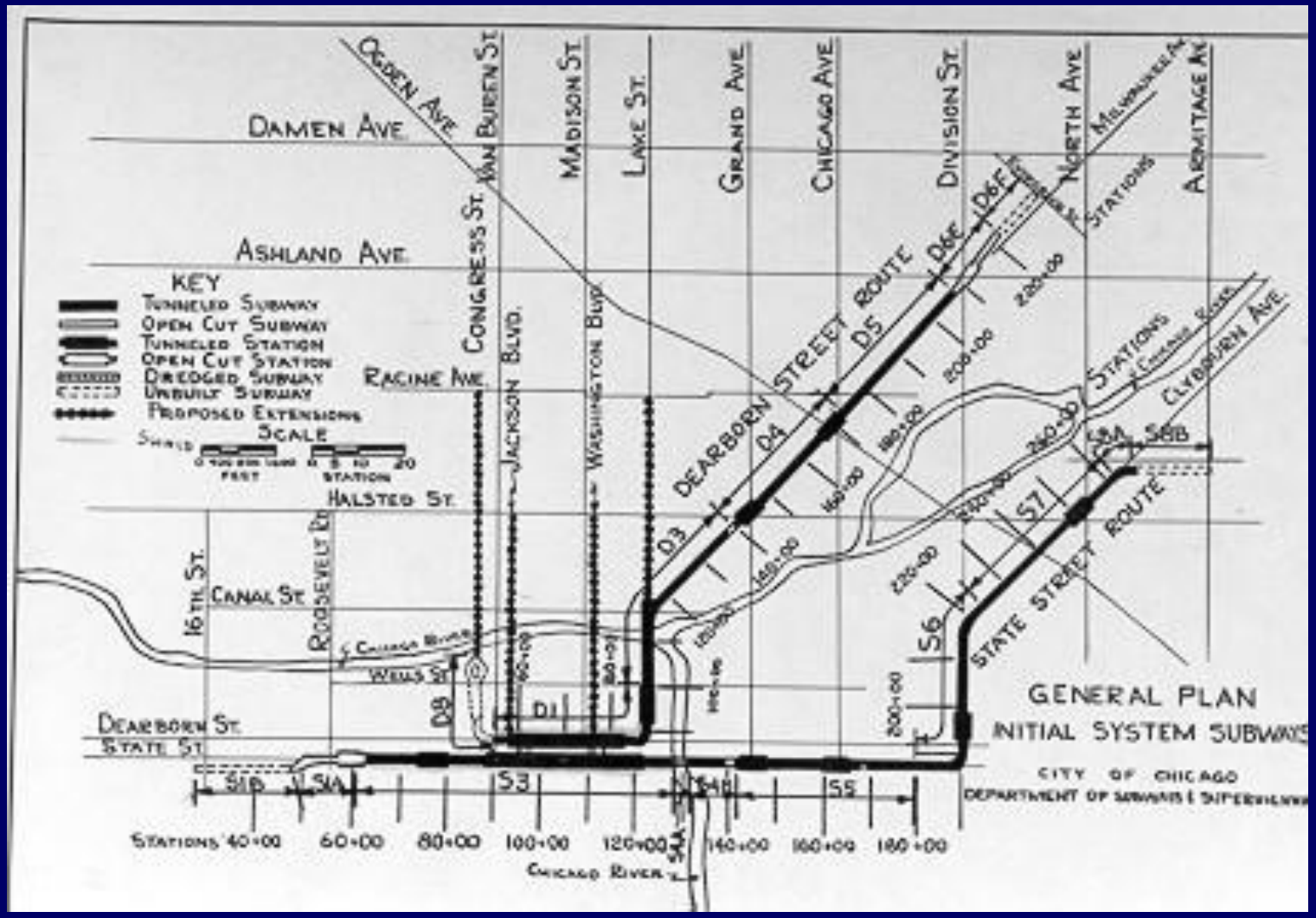
Another man who shaped Peck's career was Ralph Burke (shown above with Peck), chief engineer of many notable Chicago projects, including: the Subway (pictured here in 1951), Grant Park Garage, Meigs Field, and O'Hare Airport. When he opened up his own consulting firm in 1951, he tried to induce Peck to come work for him. Peck drew upon Burke for professional advice in many of his consultations.

The Chicago Subway

- In January 1939 Ralph Peck departed Harvard for Chicago, to serve as Karl Terzaghi's "eyes and ears" on that landmark project

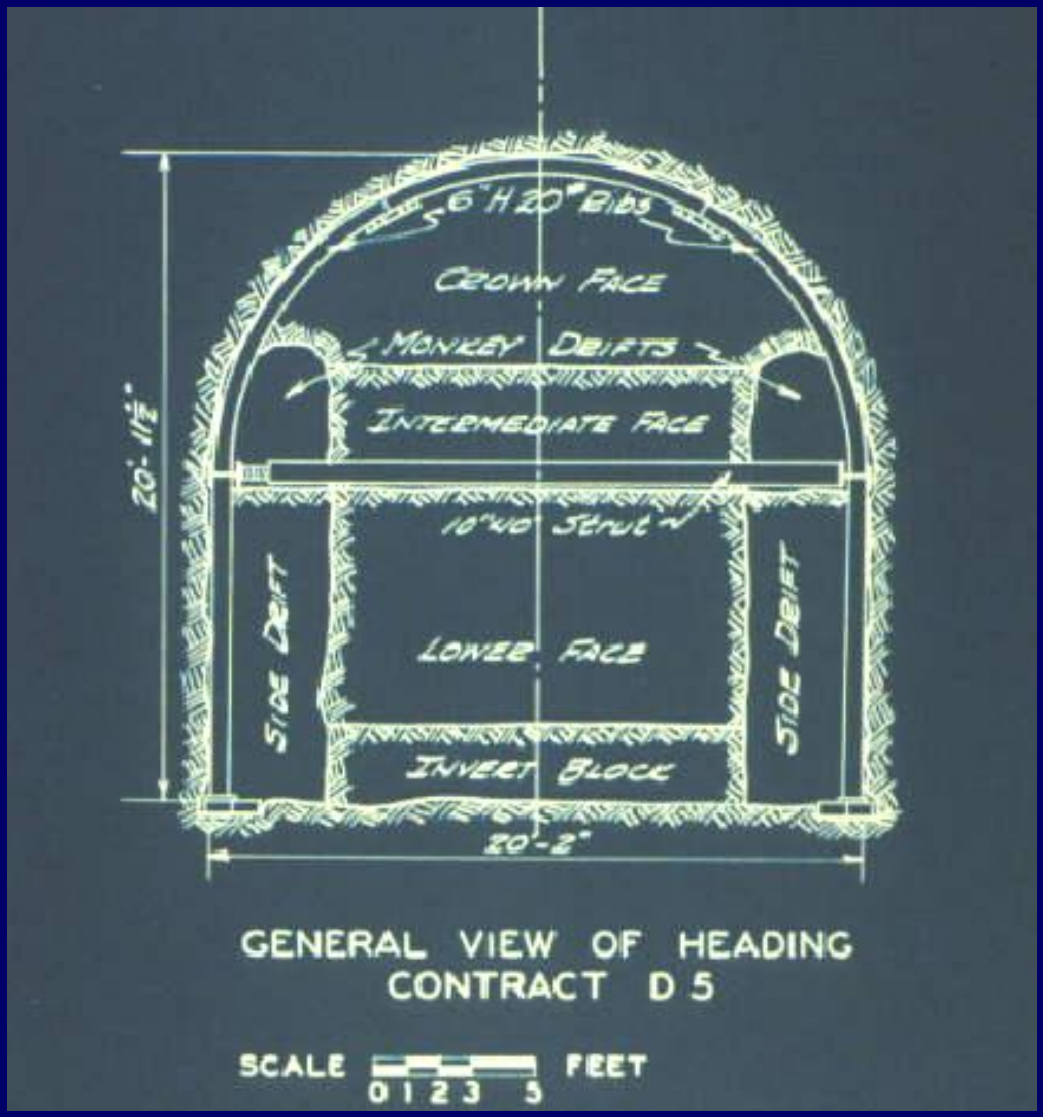
- Peck thought that he was selected for the position because, unlike his classmates, he was not enrolled at Harvard for a post-graduate degree.

- Terzaghi was a determined task master, requiring constant recording of of a variety of measurements, inked figures and daily typed reports. Terzaghi would visit Chicago for an entire week, about once every 4 to 6 weeks. During these visits he would discuss Peck's findings and provide guidance on what to do next.



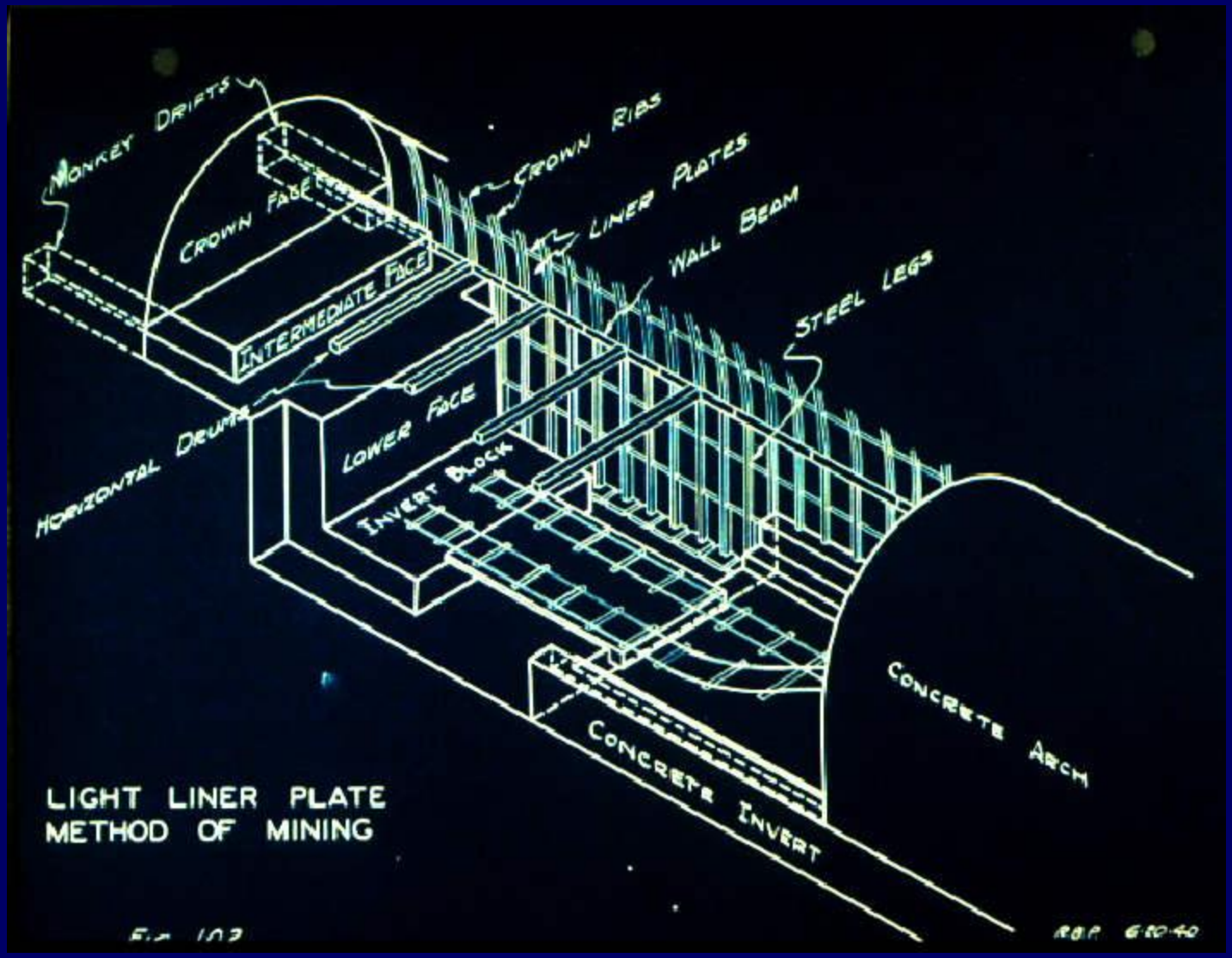
THE CHICAGO SUBWAY PROJECT January 1939 - May 1942

Map of the Chicago Subway project. When Peck arrived on January 14, 1939, the first segment was being excavated along the State Street Route at far right.



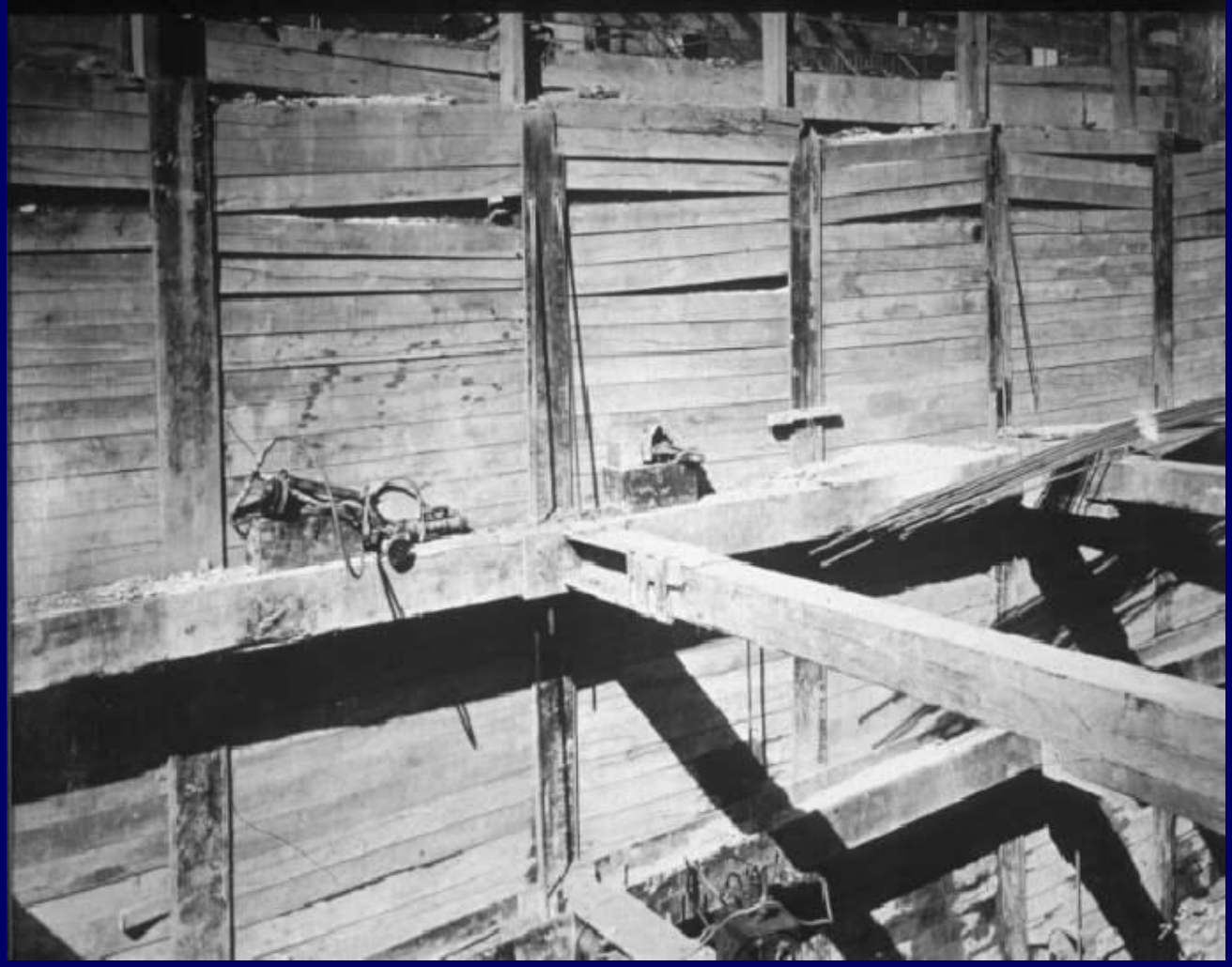
THE CHICAGO SUBWAY

Typical ink on vellum sketch of excavation sequences on one portion of the Chicago Subway project, drawn by Ralph Peck



THE CHICAGO SUBWAY

Sketch showing sequence of excavation and placement of steel liner plates, traced by Ralph Peck in June 1940

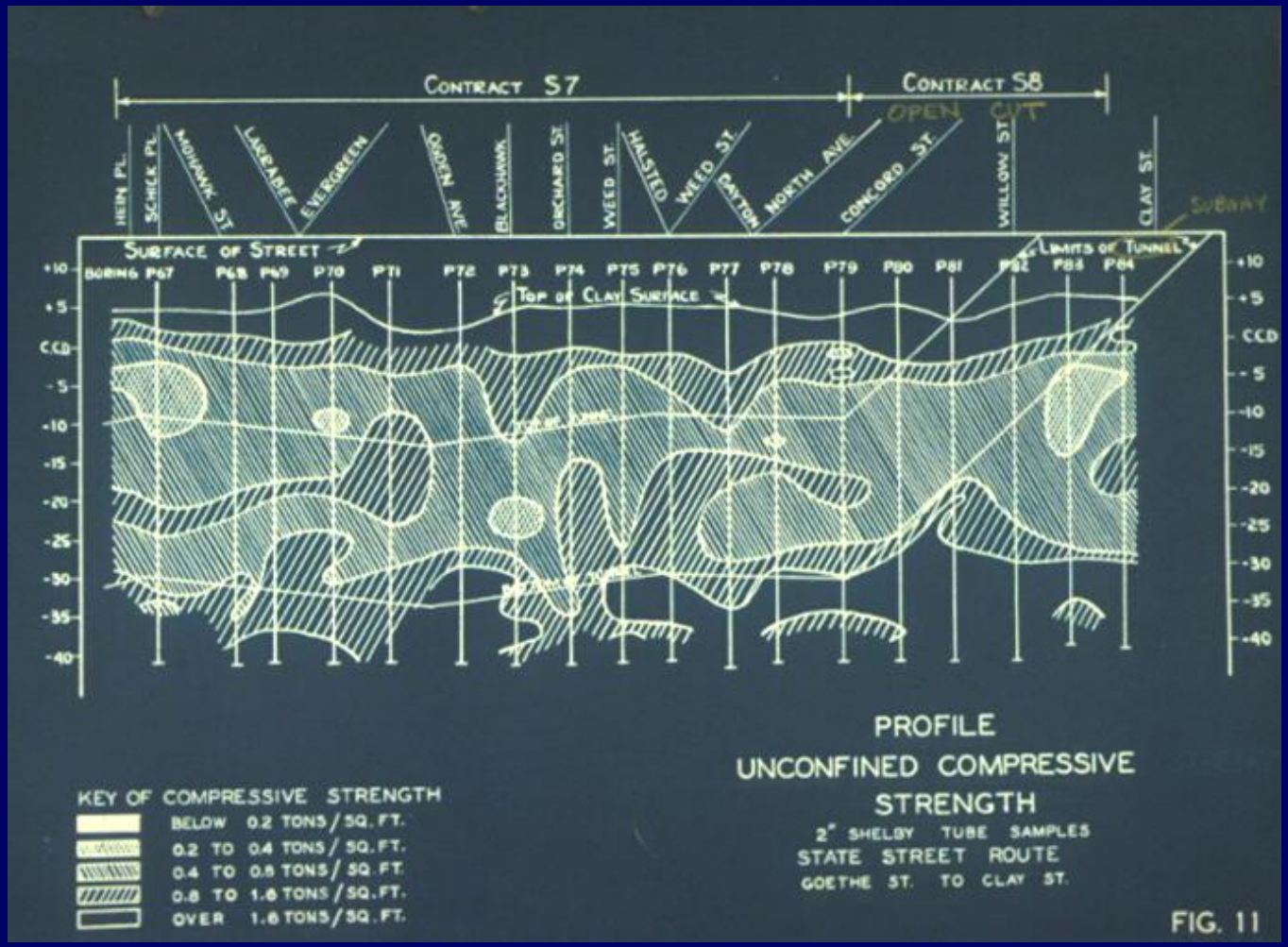


BRACED EXCAVATIONS

Close up view of steel H-piles, timber struts, steel walers and timber lagging used to support an open cut of the Chicago Subway, late 1939 - early 1940. Terzaghi wanted Peck to measure strut loads, to see if clays adhered to the wedge theory of lateral soil pressure for sands he had proposed after studying the Berlin Subway collapse in 1936.

Braced open cut on Contract S-1A of the Chicago Subway

This view shows the transition between the elevated and below ground sections of the State Street line, towards its north end, near the intersection with Clybourn Ave. In July 1940



GRAPHICAL REPRESENTATIONS OF GEOTECHNICAL DATA

Typical strip section assembled from borings taken along the State Street route of the Chicago Subway, with Raymond's dill rigs. This view shows the unconfined compressive strength from recovered samples. This data was assembled by the soil laboratory personnel under Peck's supervision.

OBSERVATIONAL METHOD BORN OF NECESSITY

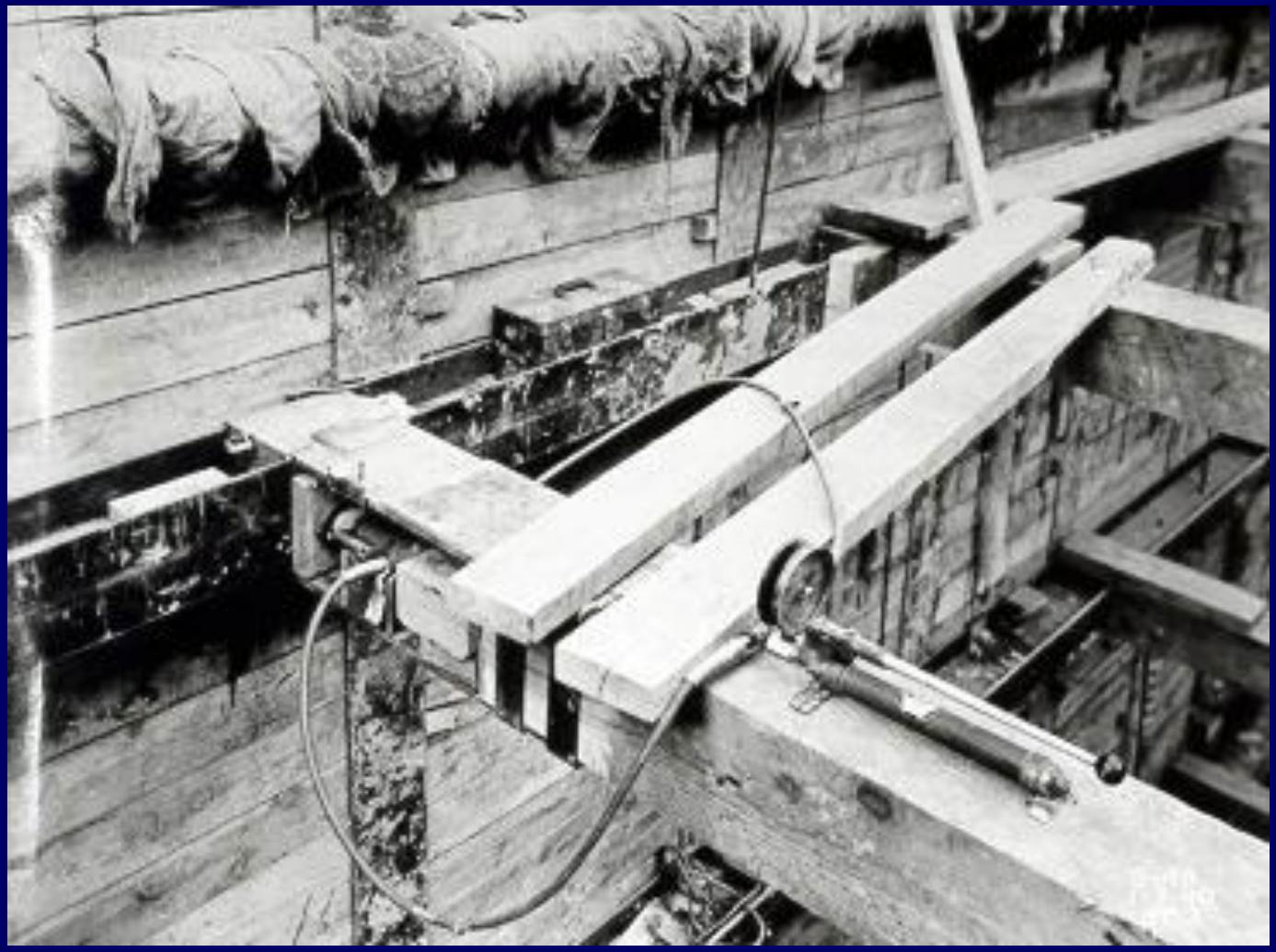
Three level bench excavation in soft glacial clay for the Chicago Subway, in May 1939. When he arrived in January 1939, there was no soils lab or test equipment.

The principal concern of the city and its merchants was the settlement of streets and businesses caused by the subway excavations. Peck's group surveyed spearheads pushed into the tunnel face to measure relaxation, and compared these data to that being recorded on survey pins placed along the streets above.

DEEP BRACED EXCAVATIONS IN CHICAGO

The deepest braced excavation for the Chicago Subway system was at a station near the crossing beneath the Chicago River, shown here in February 1940.

Peck's group measured strut loads with mechanical strain gages, providing the first such readings made in cohesive materials. This work confirmed Terzaghi's wedge theory of [lateral] soil pressure, which evolved from his study of the collapse of bulkhead walls against sands on the Berlin Subway project in 1936.



MEASURING STRUT LOADS

In 1940 Peck began measuring loads on timber struts, using hydraulic jacks, as shown here.

THREE ARTICLES

- As the Chicago Subway project progressed, it generated a great deal of interest. Terzaghi and Peck collaborated to prepare summary reports for the City, out of which three landmark articles evolved.
- In October 1941 ASCE sponsored a session on soil mechanics in Chicago. Terzaghi applied his name to an article on the liner plate tunnels, while Peck's was affixed to a companion article describing "equivalent pressure distribution" on open cuts.
- These were then published in the June 1942 ASCE Proceedings and, later, in the 1943 Transactions (with discussions). Terzaghi's second article on the shield tunnels was later published by the Boston Society of Civil Engineers

EARTH-PRESSURE MEASUREMENTS IN OPEN CUTS, CHICAGO (ILL.) SUBWAY

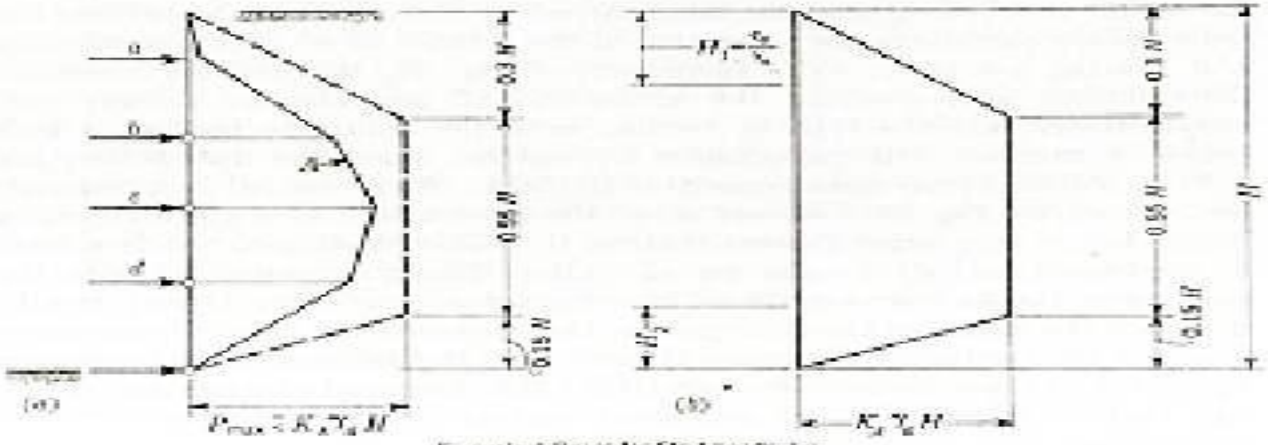
BY RALPH B. PECK,[1] JUN. AM. SOC. C. E.

SYNOPSIS

Systematic field observations on open-cut portions of the Chicago subway provided a constant check on the loads carried by the bracing as well as the soil movements associated with the excavations. Results of the measurements are given in this paper, together with a comparison of the measured earth pressures with generally accepted theories. It was found that the magnitude of the total lateral pressure was in satisfactory agreement with either the plane or general wedge theories for purely cohesive soils, having no effective internal friction, but that the distribution of the pressure was non-hydrostatic. Measured movements of the sheeting were found to be in accordance with those theoretically necessary for non-hydrostatic distribution. Simple rules are given which are believed to be applicable to the design of bracing for similar cuts in plastic clay deposits.

Title page of Peck's Norman Medal-winning article on earth pressure measurements in open cuts, which appeared in the June 1942 ASCE Proceedings and the 1943 Transactions.

importance is the statistical investigation of the variation in strut loads actually measured, in order to determine the maximum loads that may be expected under ordinary construction procedures. A useful method of investigation is by means of an equivalent beam, as demonstrated by Professor Terzaghi[13] in analyzing the results of measurements on the Berlin subway. The method is shown in Fig. 35. The vertical members of the sheeting are



Equivalent Beam for Strut Loads: (a) from Tests, and (b) for Design

FIG. 35

assumed to be hinged at each strut except the uppermost one, and a hinge is assumed to exist at the bottom of the cut. The abscissas of the pressure diagram "A" represent the intensity of horizontal pressure required to produce the measured strut loads. A study of such diagrams for all of the measured

Trapezoidal-shaped equivalent pressure diagrams for retained excavations in clay, which appeared in Peck's award wining article. The trapezoidal shape was a dramatic departure from the Rankine earth pressure theory, introduced in 1857, which predicted a triangular pressure distribution.

Ralph Peck's 1944 Norman Medal

This was awarded for the first journal article (other than a discussion) he ever published with ASCE, titled "Earth Pressure Measurements in Open Cuts, Chicago (Ill.) Subway", contained in the 1943 ASCE Transactions. Back in 1938, ASCE had declined to publish his article with Bert Ingalls summarizing their doctoral research at Rensselaer Polytechnic Institute. Peck was stunned by the awarding of such prestigious recognition to someone of his age. The Collingwood Prize was reserved for recognition of contributions by junior members of ASCE, such as himself.

YOUNGEST TO HAVE EVER RECEIVED BY HIMSELF

The back side of Ralph Peck's 1944 Norman Medal from ASCE. At that time there were only a few ASCE awards: the Norman and Croes Medals for at-large contributions, and the Collingwood Prize for junior members. Terzaghi's four Norman Medals remain a Society record, while Peck (age 31) was the youngest person to have ever received the Norman Medal alone.

PASSED OVER FOR AN IMPORTANT POSITION - MARCH 1942

Peck with Bill Turnbull, Chief of the Soils and Foundations Division of the Corps of Engineers Waterways Experiment Station during the Second World War. In March 1942, Peck was one of three finalists who were considered for this position, which was given to Turnbull. The division's work on airfield pavements during the war proved crucial, but Peck feels he would not have been well suited to the administrative duties required of the position.

31 YEARS LATER

Peck receiving the Civilian Service Medal from the Department of the Army in 1973, in recognition of his contributions as a consultant to the Corps of Engineers between 1954-1972.

ANOTHER CROSSROADS - MAY 1942

The Chicago Subway project was shut down in May 1942 because of a steel shortage necessitated by America's entry into the Second World War, in December 1941.

During the subway project, Peck had been lecturing on soil mechanics at Armour Institute, and less frequently at the University of Illinois, about 90 miles south of Chicago.

In May 1942 Peck was offered a position at Illinois to teach soil mechanics. When Peck asked Terzaghi for his advice, he sternly replied that Peck needed "more experience" before he could fashion himself a teacher of foundation engineering. So, Peck declined the offer.

LANDING POSITION AT THE UNIVERSITY OF ILLINOIS

Republic Steel's Cleveland, Ohio Ore Yard in 1942. One of the consulting jobs where Peck's acquired the experience Terzaghi had recommended. Again, Terzaghi guided the work and Peck supervised the observations. After this incident, Terzaghi told Peck he could accept the faculty position offered by the University of Illinois 7 months earlier. Prof. Huntington accommodated the belated acceptance, and scrounged the funds to pay Peck at 7/8 salary the first year (1943).

PROFESSOR OF FOUNDATION ENGINEERING

Peck joined the faculty of the civil engineering department at the University of Illinois in December 1942, where he was given the necessary support to build a model geotechnical engineering program during the expansion that followed the Second World War.

SOIL MECHANICS in ENGINEERING PRACTICE

Ralph Peck, as he appeared at age 36, when the First Edition of Soil Mechanics in Engineering Practice was published. (1948). He joined the faculty at Illinois in December 1942, gaining tenure in 1945 with a substantial raise, to $5000 per year.

On the day Pearl Harbor was bombed (Sunday December 7, 1941), he was busy working on the manuscript of the new textbook, more than 6 years prior to the book's completion.

SOIL MECHANICS IN ENGINEERING PRACTICE

- Terzaghi and Peck began working on this text during the Chicago Subway job, 7 years before it appeared in 1948.
- Terzaghi invented the term “Standard Penetration Test” to describe the method of correlating blow counts with soil properties, using the drive sampler developed by Charley Gow in Boston in the early 1900s.
- The text immediately became a classic, and Ralph Peck found himself in greater notoriety and demand than ever before.

Peck with Karl Terzaghi in Peck's office in the Talbot Laboratory at the University of Illinois, circa 1958. These visits were occasioned by their continuing work on the second edition of Soil Mechanics in Engineering Practice, released in 1967, 3-1/2 years after Terzaghi's passed away.

SOIL MECHANICS in ENGINEERING PRACTICE, 3rd Edition

Authors Reza Mesri and Ralph Peck in front of a sketch of Karl Terzaghi, commissioned by Soil Test, Inc. and distributed soon after Terzaghi passed away on October 25, 1963. The 3rd Edition of the classic text was released in 1996.

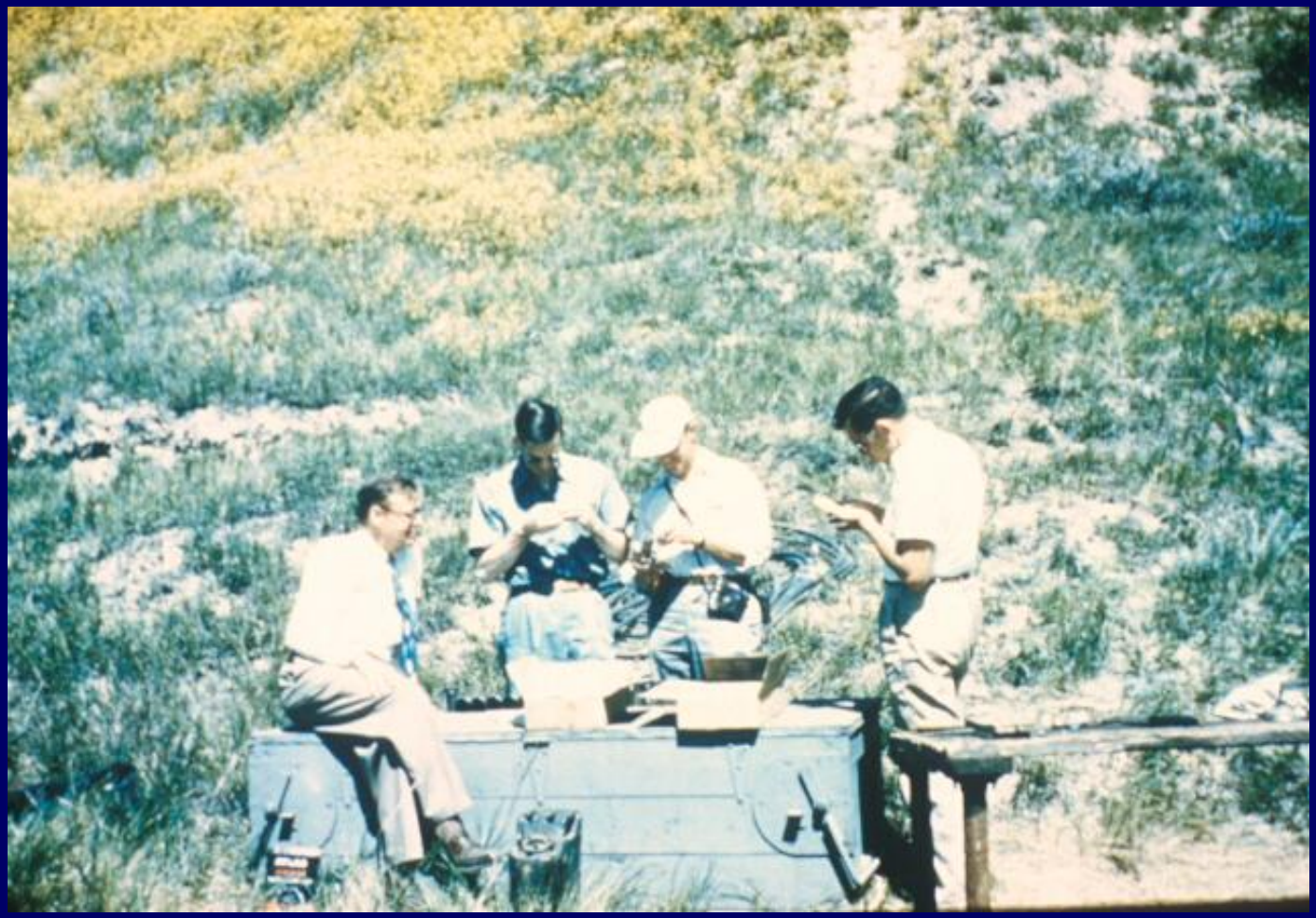
A LASTING LEGACY

Portrait of Peck in 1996, at age 84, for the Third Edition of Soil Mechanics in Engineering Practice, by Terzaghi, Peck and Mesri, published by John Wiley.

The First (1948) and Second Editions (1967) were translated and published in 17 languages, more than any other geotechnical engineering text of the 20th Century.

PRACTICAL, PROBLEM SOLVING RESEARCH

Having been reared “in the trenches and tunnels” of geotechnical engineering on the Chicago Subway, Peck’s research efforts focused on the application of evolving soil mechanics theorems to solve civil engineering problems.

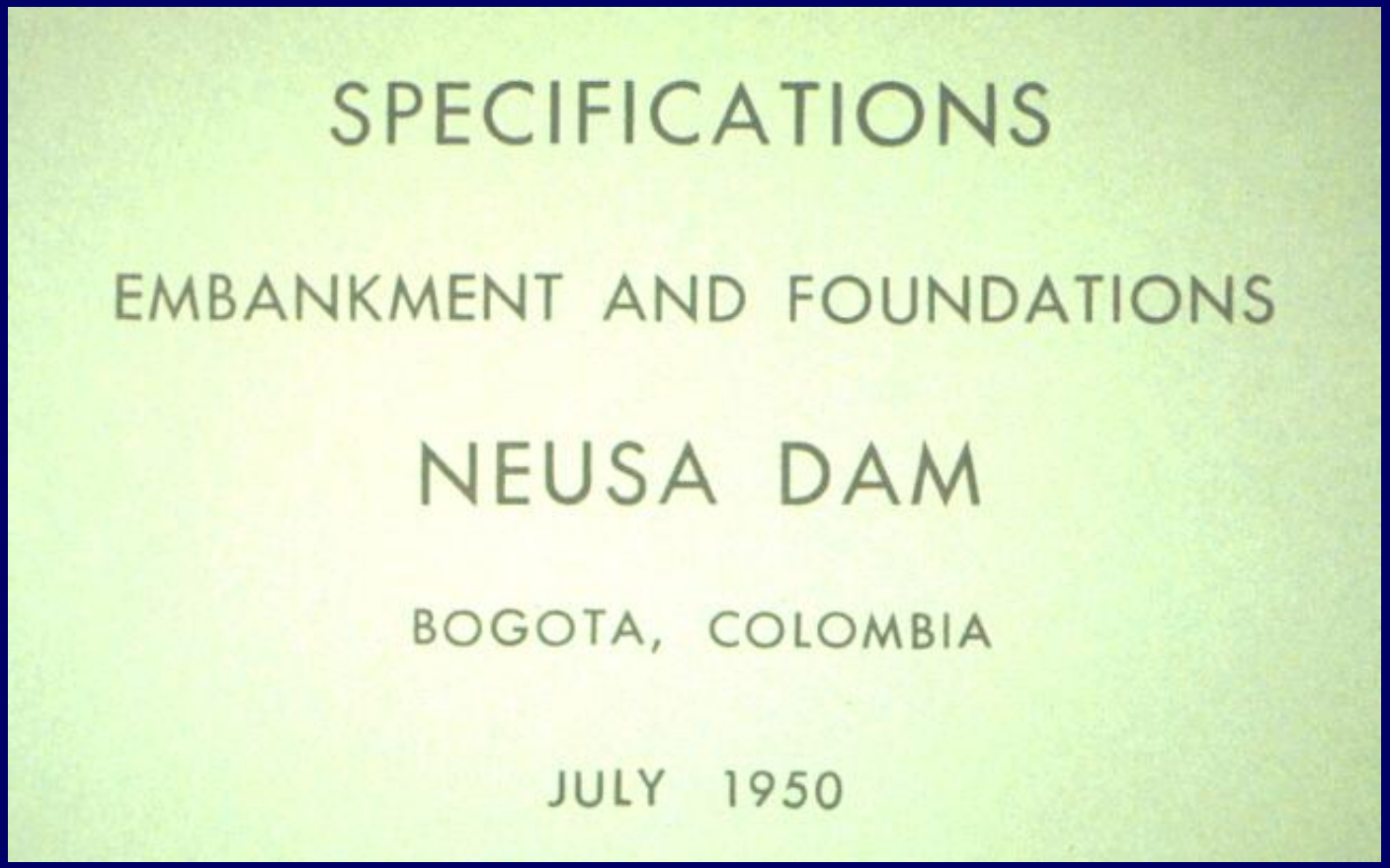


IN THE FIELD - BISMARCK BRIDGE LANDSLIDE

(Left to right: Rockwell Smith, Ralph Peck, Herb Ireland, and Frank Bryant looking at samples of the Fort Union shale at the Bismarck Bridge landslide, circa 1951. The assimilation of Don Deere into the Illinois faculty in 1955 was a key factor in establishing the balanced program sought by Peck to instruct students in the many-faceted aspects of "geotechnics".

REVISITING THE SITE OF HIS FATHER'S WORK

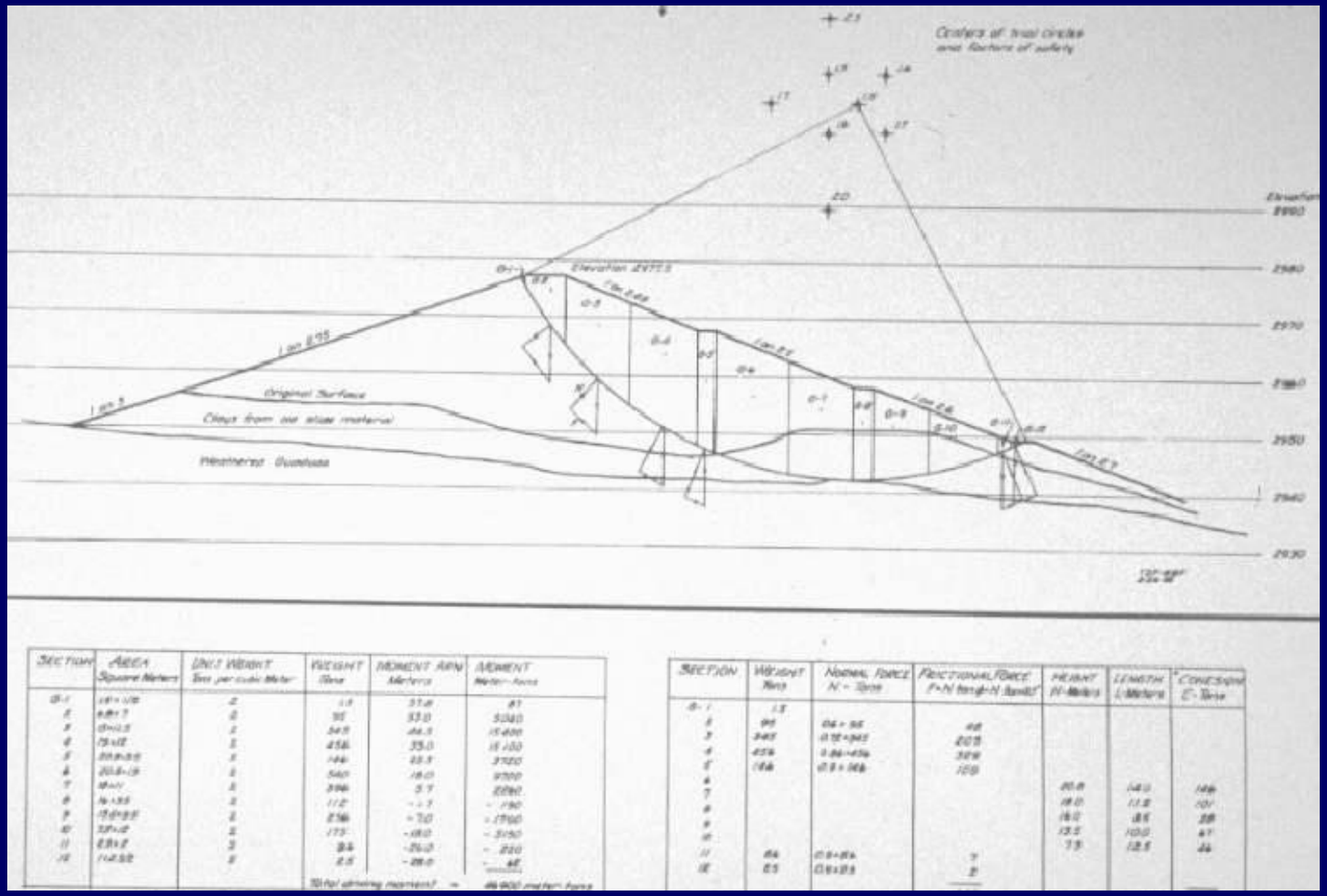
Remedial mass grading to alleviate movement of the large landslide impinging on the eastern abutment of the Bismarck Bridge (1951). Ralph's father, Orwin Peck, had designed the tail span at left center for the Northern Pacific Railroad in 1909.



PECK'S FIRST OVERSEAS JOB

Peck's first international consultation and dam design was the 120-feet high Neusa Dam near Bogota, Columbia in January 1950, with his mentor Al Cummings of the Raymond Concrete Pile Co. When Peck went to obtain his first passport, he had to prove he was actually a U.S. citizen, because he had been born in Winnipeg, Canada.

The proposed site for Neusa Dam as it appeared in early 1950, when Peck and Al Cummings arrived. They designed an embankment dam comprised of halloysitic clay, utilizing as much judgement as data. On the return leg through New York City, Peck was instructed to dictate the entire report to Al's secretary.



FIRST SLOPE STABILITY ANALYSES

Peck's first slope stability analyses on an earth dam were performed for Neusa Dam in 1950, and presented in his consulting report for the Raymond Concrete Pile Co.

Downstream face and spillway of Neusa Dam as it neared completion in 1951. It was constructed with a core of compacted soft shale because the intended borrow pits proved to consist of troublesome halloysitic clay. Renown clay mineralogist Professor Ralph Grim at Urbana helped Peck identify the clay.

ANOTHER TEXTBOOK ON FOUNDATION ENGINEERING

The textbook "Foundation Engineering" was released through publisher John Wiley in 1953. It was immediately adopted by more than 50 different universities. A second edition appeared in 1974, which remained the classic text on this subject well into the 1980s.

Authors of the text Foundation Engineering (1953, 1974)

Left to right, Ralph Peck, Tom Thornburn, and Walt Hanson. Still a well-thumbed classic, it emphasized the practical aspects of foundation design.

Peck, Walt Hanson, and Reza Mesri in a Soil Laboratory in the basement of the Newmark Civil Engineering Laboratory at the University of Illinois, in 1997. Like Peck, Walt Hanson was a structural engineer by training, who learned soils and foundations as a post-graduate interest. He was the first successor to whom Peck entrusted the undergraduate foundation design course.

SYMBIOTIC PARTNERSHIP

Ralph Peck (44) and Karl Terzaghi (73) walk through an exploratory trench excavated along Lake Maracaibo, Venezuela, in 1956.

This consultation for Creole Petroleum involved the settlement beneath Lake Maracaibo, due to petroleum withdrawal.

Terzaghi's earlier work (1949-54) on petroleum-induced subsidence of the Wilmington oil field adjoining the Los Angeles-Long Beach Harbor had proven optimistic because of the difficulty of assessing the compressibility of Tertiary-age sedimentary "rock".

EVOLVING JUDGEMENT - EVEN WITH THE OLD MASTER

Ralph Peck and Karl Terzaghi in trench excavated alongside Lake Maracaibo, Venezuela, circa 1956. The Wilmington oil field consultations had underlined the import of proper geologic characterization of underlying materials, even so-called "bedrock", which could behave like unconsolidated soil.

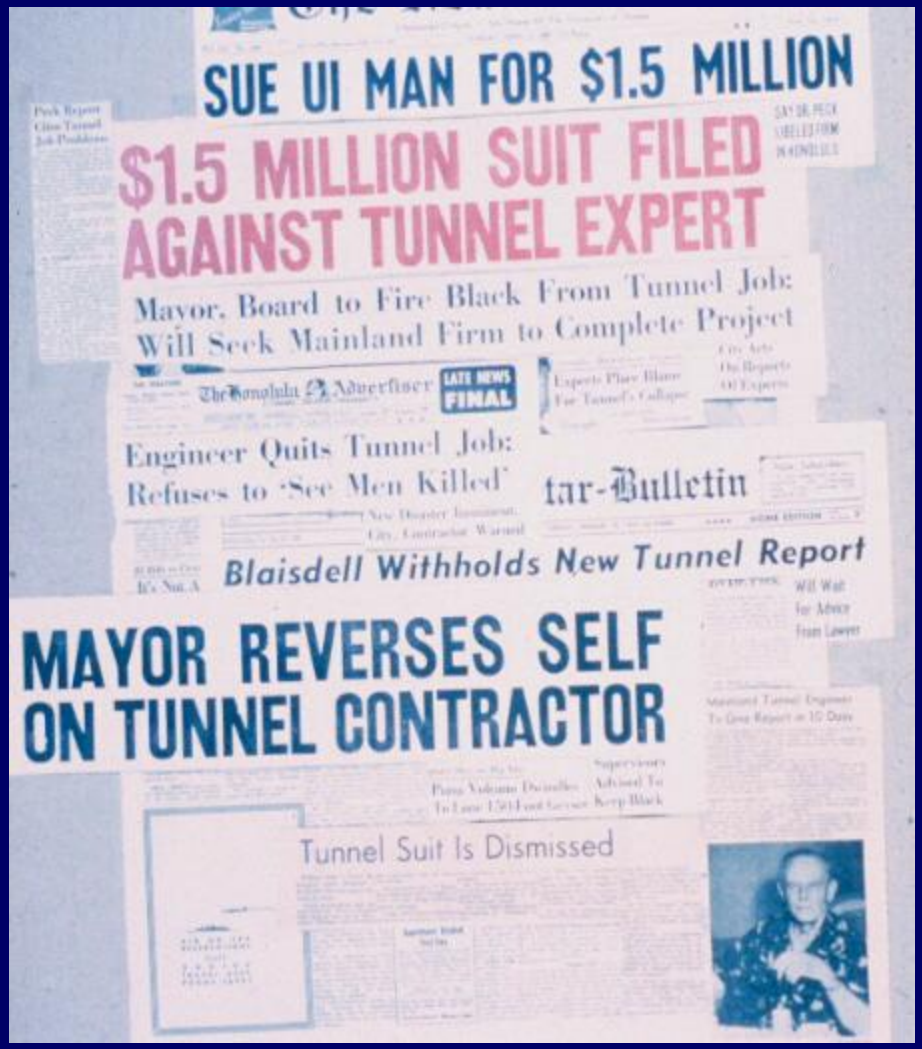
TERZAGHI and HIS EVER PRESENT CIGARS

Ralph Peck and Karl Terzaghi aboard a boat on Lake Maracaibo. Peck once recalled a miserable day spent driving Terzaghi from Purdue back to Urbana, during a severe winter storm. Terzaghi chain smoked cheap cigars with the car windows shut. But, Peck never complained. Years after his passing, Peck apologized to Ruth Terzaghi for the "many times he felt he had let "the bear" down; but she rebuffed his apologies, telling him Karl had the greatest respect for his abilities, patience and years of faithful support.

THE WILSON TUNNELS CONSULTATION 1954-58

On July 10, 1954 five workers were killed by a cave-in 700 feet from the south portal of the first Wilson Tunnel, on the island of Oahu in Hawaii.

Before this consultation was concluded, Peck would be called off an airliner at Honolulu Airport and detained, have his wife learn of these embarrassing events through the headlines of their local newspaper on a Sunday morning, and find himself held hostage in a $3 million lawsuit brought on by an embattled contractor.



LARGEST LAWSUIT AGAINST AN AMERICAN ENGINEER

In April 1955 tunnel contractor E.E. Black sued Ralph Peck for $1.5 million over statements he made in a report to the City of Honolulu about the Wilson Tunnel collapse.

The claim later rose to $3 million, making it the largest legal action ever taken against an American civil engineer up until that time. Three years later the case was dismissed, with the City paying Peck's legal fees.

68 PAGES—HONOLULU, TERRITORY OF HAWAII, U. S. A., SATURDAY, APRIL 2, 1955—68 PAGES

Honolulu Star-Bulletin, Vol. 44, No. 79 ★★★★★ AIRPLANE DELIVERY ON ISLANDS OTHER THAN OAHU 15¢ PRICE ON OAHU 10¢

LEGISLATORS MEET TUNNEL EXPERTS — Tunnel authorities Dr. Ralph B. Peck and Dr. Leo Casagrande met with members of the Territorial Legislature yesterday to discuss Wilson Tunnel problems. Peck is wearing a dark print aloha shirt. Casagrande sits to his left. Soil on the table was used in a demonstration. (Story on Page 5.)—Star-Bulletin Photo.

Special Board Meet Set

E. E. Black Company Sues Peck for $1.5 Million

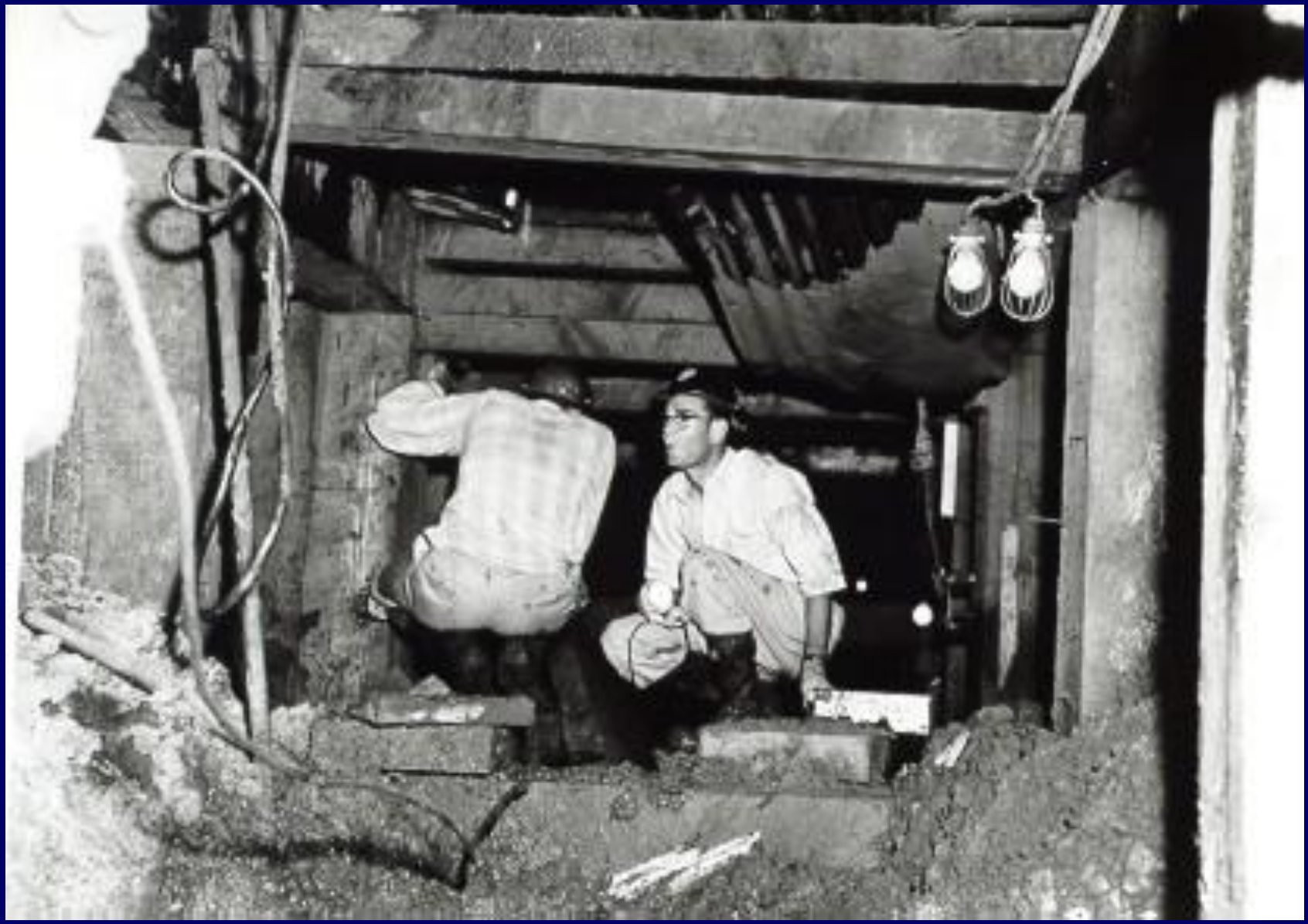
Ralph Peck is grilled by Honolulu engineers and politicians following his investigation of the first Wilson Tunnel bore on Oahu, on April Fool's Day, 1955. At this juncture, Peck had submitted his letter of resignation to the mayor, because the City had decided to retain the original contractor, contrary to his recommendation. Discharging the contractor was actually Terzaghi's recommendation, but Peck wrote the letter, so he was sued.

FEELING THE HEAT

Close-up of a serious Ralph Peck in April 1955, during his meeting with Honolulu officials. Leo Casagrande is sitting on Peck's left; he had been engaged at the request of Peck and Terzaghi to help devise schemes to dewater the failed tunnel's muck pile.

EXAMINING THE MUCK PILE on the WILSON TUNNELS

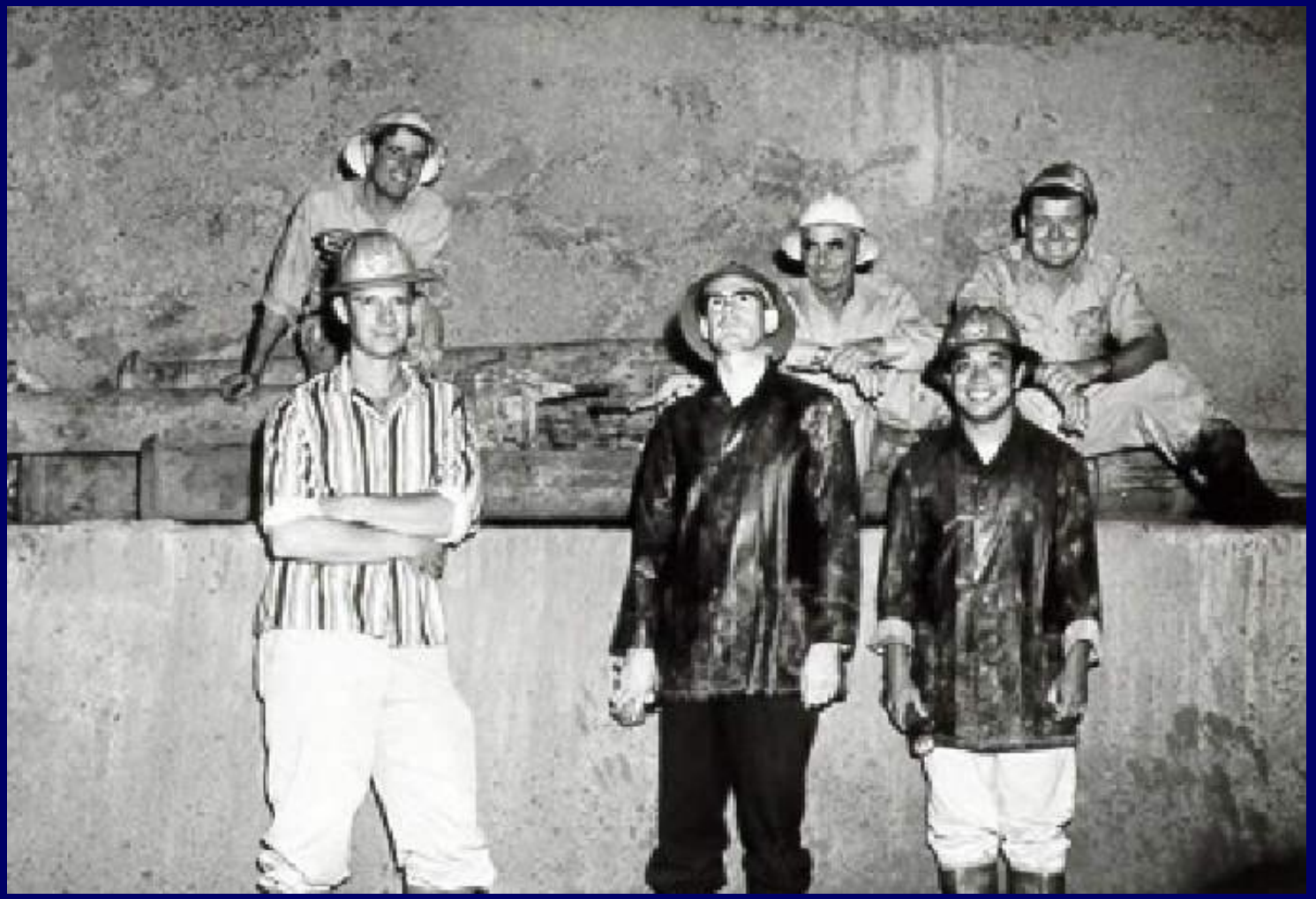
Consequent to his letter of resignation to the mayor, Peck was detained in Honolulu and personally named in a lawsuit. He found himself obliged to continue his consultations for another three years, until the litigation was settled. The tunnels were later named after Mayor Wilson.



Ralph Peck exploring the exploration drift through the Wilson Tunnel cave-in, summer 1955. Five workers died at this location in July 1954.

ALL IN A DAY'S WORK

Ralph Peck performing his own lab tests outside the first bore of the Wilson Tunnels, near Honolulu in the summer of 1955. Despite all his visits to the job, he never met contractor E.E. Black, who sued him for $3 million.



With the help of long-time mentor Ralph Burke back in Chicago, Peck (center) was able to develop a work plan for repairing the problematic first bore on the Wilson Tunnel. Burke advised him on how to defend the lawsuit and his engineering firm developed plans for excavation and permanent support of the second bore.

Peck (center) with Walter Lum (left), outside the Wilson Tunnels through Oahu's Pali Coast, circa 1956. This consultation presented many technical, political and legal challenges. Peck sought help from Terzaghi, Ralph Burke, Dick Loughney, Leo Casagrande, and a local Hawaiian attorney named Joseph V. Hodgson. Lum had been a graduate student in soil mechanics with Ralph Fadum at Purdue.

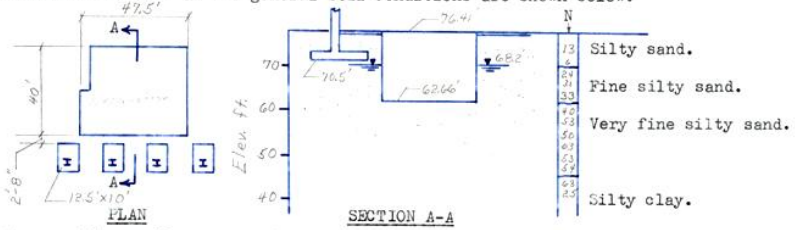
PROFESSOR OF FOUNDATION ENGINEERING

Ralph Peck's official portrait at the University of Illinois (1961).
Professor Peck rarely received research support from the Federal government; instead he solicited funds for solving problems that arose on specific projects. Much of his early support came from the American Railway Engineering Association, for whom he completed many challenging investigations. Later, most of his students received support while working on real-world problems associated with the design and construction of dams, tunnels, and highways.

No. 7. U.S. Navy Missile Launching Pad. 10' Elmo DiBiagio

Description of Project. This project deals with an excavation made in 1958 for the specific purpose of installing a training missile lauch pad inside the Gunners Mate Building at the Great Lakes Naval Training Station in Chicago.

Significant Problem. The exterior walls of the 237 by 241 ft Gunners Mate Building consist primarily of glass panels; the flat roof of the structure is supported entirely by roof trusses and columns located along the exterior building walls. These columns are supported by spread footings on sand at a depth of approximately five feet. The proposed excavation was to be made in the southeast corner of the building adjacent to two existing gun mounts and within 2 ft-8 in. of the line of spread footings that support the walls and roof columns. A plan and cross section of the excavation as well as the general soil conditions are shown below.



The specific problem was to devise a means of carrying out the excavation without damaging the building or disturbing the gun mounts. The major concern was to prevent settlements of the column footings and thereby avoid cracking of the exterior glass panels. Engineers at the Training Station estimated that footing settlements greater than 1/4 in. could not be tolerated.

Approach to the Problem. The Navy engineers had proposed a system consisting of steel sheeting embedded 16 ft below final excavation depth, timber braces in both directions at two levels and a well point installation between the footings and the sheeting. The cost of the project according to this scheme was $86,000.

Our Board of Consultants proposed two schemes for carrying out the excavation. The first of these utilized a well point dewatering system and a bracing system consisting of H-pile soldier beams, wooden lagging and three levels of struts. Soldier beams were selected instead of continuous sheeting because they would be easier to drive or jet and drive through the compact sand.

The second approach was based on the assumption that the well points could be eliminated and steel sheeting could be used to avoid loss of ground and subsequent settlement of the footings. This method required at least four feet of embedment of the sheeting below final grade in order to prevent a hydraulic heave of the bottom; dewatering was to be achieved by pumping from a sump in the center of the excavation. The major objection to this method was the uncertainty regarding the effects on the building of the shock and vibrations associated with driving the sheeting through the compact sand.

Solution. The procedure adopted for carrying out the excavation was as follows.

1. Vertical 8 in. soldier beams were driven on 5 ft centers around the periphery of the excavation. Jetting was required.
2. The soil beneath the four adjacent footings was stabilized to a depth of 18 ft by chemical injections around the periphery of each footing (Cost $12,000).
3. One line of well points was installed along the outer edge of the footings. This location was chosen because it would result in a more uniform drawdown and consequently more uniform settlements beneath the footings.
4. Top strut was positioned before excavation and installation of lagging began.

Evaluation. The excavation was successfully made without breaking any of the glass panels in the building; however it was noted that at the completion of construction the footings were 7/8 in. higher than they were prior to the start of construction. The battle was won but they lost the war because of poor field control.

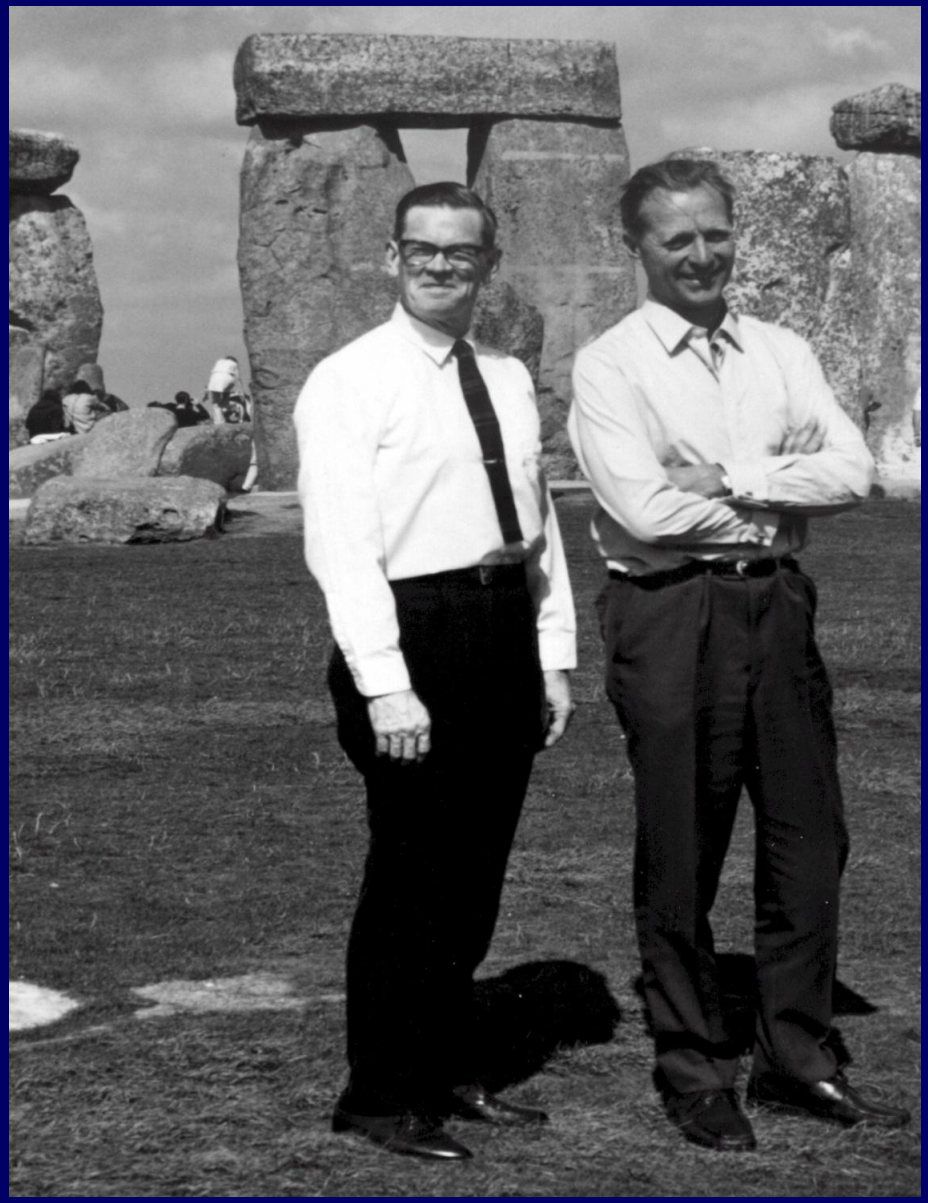
CE 484 GEOTECHNICAL CASE HISTORIES

A typical 1-page summary sheet prepared by students enrolled in Ralph Peck's Geotechnical Case Histories course (in this case, the student was NGI's Elmo DiBiagio).

Students would be presented information as though they were consultants engaged in providing services on a project. The briefing would include the type of information normally known at the beginning of a job. From that point on, the students were required to ask questions, in order to elicit additional information needed to make engineering assessments.

“JET SET” CONSULTATIONS - 1968

Ralph Peck at age 56, while aboard a boat investigating the Dead Sea dikes in Israel. He, Tom Leps, and Laurits Bjerrum were retained by Kaiser Engineers and Constructors to serve as experts in their construction claim against the Dead Sea Works. Edgar Kaiser flew the trio around the globe in his private aircraft and lavished them with expensive meals and attention. The case was eventually settled out of court.



Ralph Peck and Laurits Bjerrum at Stonehenge

This was taken during consultations for Kaiser on the Dead Sea dikes case, in 1968.

Bjerrum's staff fashioned a portable piezometer with a Bourdon gage to test the permeability of the core of the gravel dikes. They filled the piezometers with brine and recorded the outflow into the dike when the pressure of the system was increased. The results were so consistent that Bjerrum realized that the brine pressure was sufficient to induce hydraulic fracturing of the core, invalidating the test scheme.

PRESIDENT OF THE INTERNATIONAL SOCIETY of SOIL MECHANICS
Ralph and Marjorie Peck, Alec and Nancy Skempton, and Laurits and Gudrun Bjerrum at the 1969 ISSMFE meeting in Mexico City.

Approaching the close of an outstanding academic career

After 32 years of teaching, Ralph Peck quietly retired from the University of Illinois in June 1974, just shy of his 62nd birthday.

This is his last official faculty portrait, inscribed to Laurits Bjerrum during the period of his presidency of ISSMFE, between 1969-73.

PRIVILEGED COMPANY

Some of the speakers at the Purdue Conference on Soft Ground Engineering in 1973. Wayne Clough is standing next to Ralph Peck, behind Mike Duncan, Jim Gould, Bill Lambe, and Joe Ward

RECEIVING THE MOLES AWARD 1973

Another black tie gala - from another era

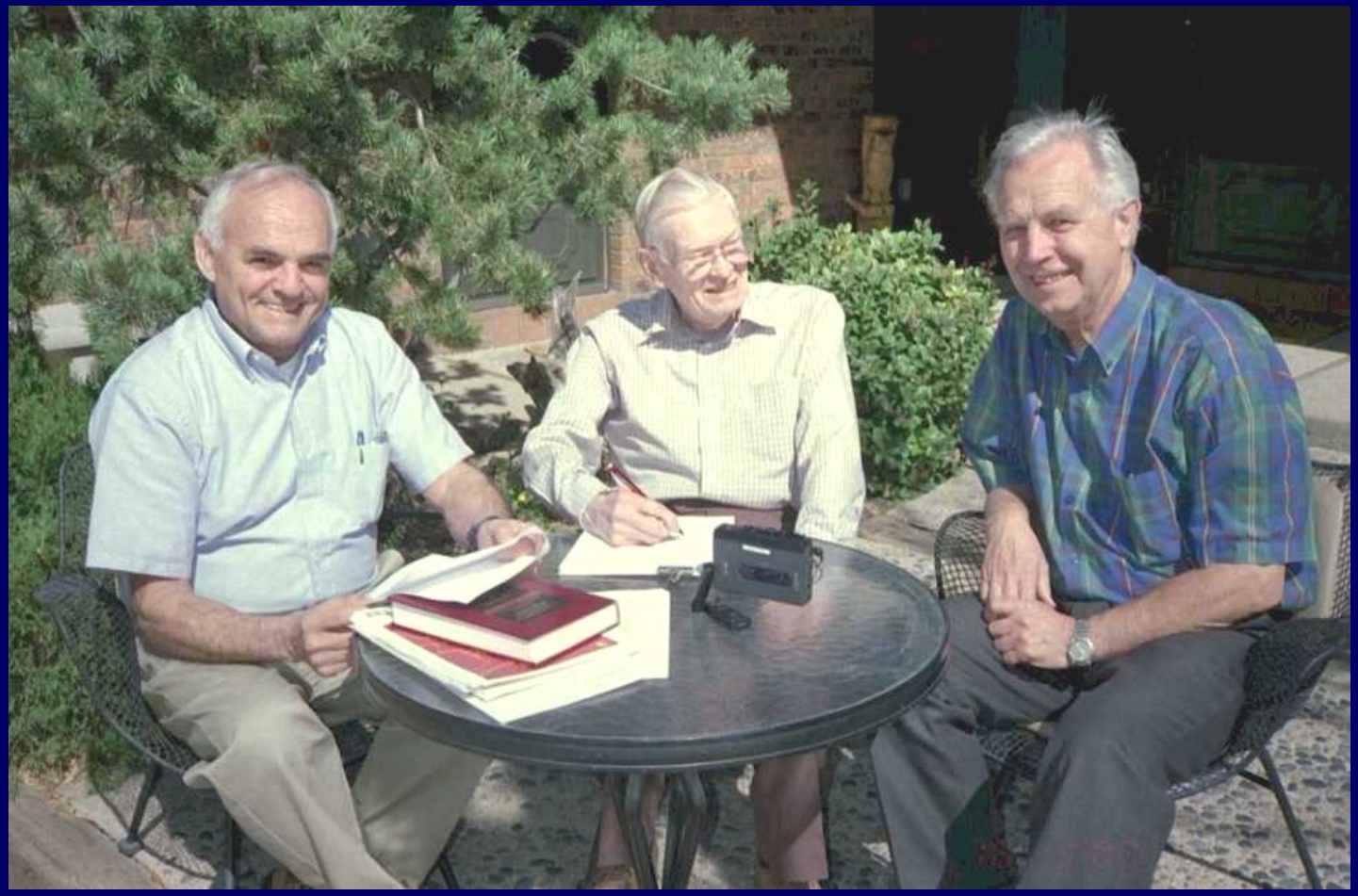
Ralph Peck at the annual dinner of The Moles, accepting their non-member Moles Award for 1973, for his many contributions to tunnel engineering and technology.

RETIREMENT, or FULL TIME CONSULTANCY? 1974 to present

Ralph Peck officially retired from the University of Illinois in June 1974. He and Marjorie worked on designing a dream home in Albuquerque, which was completed in 1975. While others of his age group pursued golf, Peck was actively pursued by clients all over the world, ever eager to obtain his opinions.

RETIREMENT - 1974 to 2008

Long before his 1974 retirement, Ralph and Marjorie were determined to return to the less humid climes of the American west, where they had both gown up. They chose Albuquerque over Denver, because Denver had become too large and the smog often obscured the mountains.



ENTERTAINING COLLEAGUES and PAST ASSOCIATES

Elmo DiBiagio, Ralph Peck and Kaare Flaate visiting on the patio of Peck's home in Albuquerque (1999), while interviewing Peck for NGI Pub. 207. During their retirement years in this home, Ralph and Marjorie's hospitality has been legendary.

ANOTHER BOARD OF CONSULTANTS

Few individuals have served on as many boards of reviewing consultants as Ralph Peck. This photo shows (left to right) Peck, Clarence Allen, and Evert Hoek at Dutchman's Ridge slide area, near Mica Dam in British Columbia

THE OBSERVATIONAL METHOD BEGINS HERE

Ralph (at left) leading exercises in The Observational Method, using stereo-capable human eyeballs.

MT. BAKER RIDGE TUNNEL BOARD OF CONSULTANTS

Pictured (from left) are Ralph Peck, Al Matthews, and Chuck Metcalf. This was one of Peck's most memorable consultations because it validated the concept of flexible tunnel linings, which he had investigated while making measurements on test sections of the Chicago Subway, more than 30 years earlier. Peck theorized that a tunnel lining should be flexible, so it could deform sufficiently to equalize soil pressure around the tunnel. The 85 feet diameter tunnel, which carries Interstate 90, was completed between 1973-1987.

There aren’t many photos of Ralph Peck frowning

This example was sent to Ralph after a board of consultants tour through the Mt. Baker Ridge Tunnel project in Seattle. It is prominently displayed in Peck’s home office in Albuquerque.

WHEN HE SPEAKS, PEOPLE LISTEN

Note: Red hard hats are reserved for very special visitors

RETURNING TO ILLINOIS

Since his retirement in 1974, Peck has consistently returned to the Illinois campus to provide lectures on a variety of topics, usually in each term of the academic year.

His topics vary from the latest consultations to the evolution of building foundations in Chicago, in the late 19th Century.

HONORING THE PROGRAM HE BUILT

Ralph Peck and Reza Mesri outside Newmark Civil Engineering Laboratory at the University of Illinois. Twice a year since his retirement in 1974, Peck returns to the Illinois campus to deliver a series of special lectures.

PASSING THE BATON TO A NEW GENERATION

Dr. Ralph B. Peck, Dr. Don Deere, Marawan Shahien, and Sunghoon Choi. Whenever Professors Peck or Deere are in the vicinity, people usually line up to have their photos taken with them.

LEAVING A LASTING LEGACY

Professors Ralph B. Peck and Gholamreza Mesri with Scott Olson, recent recipient of Peck Graduate Student Award at the University of Illinois

Fernando Moreu (structures student from Granada, Spain) and Dr. Ralph B. Peck - Fernando interviewed Ralph for an article in his university's daily newspaper.

Dr. Gholamreza Mesri, Dr. Ralph B. Peck, and Dr. Herbert Ireland in Dr. Mesri's office. Dr. Mesri presently holds the R. B. Peck Professorship in Geotechnical Engineering at the University of Illinois. Professor Ireland was one of Peck's early Ph.D. students at Illinois, completing his doctorate in 1956, then remaining on the faculty the balance of his career.

Peck assisting with Illinois' senior capstone design course

In the fall of 1999, the class project involved developing structural and foundation plans for selected buildings, e.g., the auditorium, of a secondary school in Illinois. The students answered Peck's questions concerning the project and potential for differential settlement and presented him with ideas for the design. On the last day of class the students were informed that the auditorium in the actual project experienced unacceptable differential settlement due to compressible soils underneath the thick fill material placed for the auditorium!

PROFESSIONAL RECOGNITION

How might a civil engineer follow up on winning the Norman Medal for their first published article?

What follows are examples of the diversity of recognition received by Peck over the years, beyond the Terzaghi and Rankine Lectures.


THE KARL TERZAGHI AWARD
of the
American Society of
Civil Engineers
is presented
to
Ralph B. Peck

1969 TERZAGHI AWARD

The Karl Terzaghi Award of the American Society of Civil Engineers awarded to Ralph Peck in 1969, in recognition of his career contributions to soil mechanics.

Although the citation makes specific reference to the text "Soil Mechanics in Engineering Practice", it omits any mention of "*Foundation Engineering*," by Peck, Hanson and Thornburn; which remained the benchmark text in foundation design well into the mid-1980s.

Face of Civilian Service Medal of the Army awarded to Ralph Peck for his many contributions to the Corps of Engineers between 1954-72

CITATION

"For noteworthy assistance to the Office, Chief of Engineers, as a consultant from July 1954 to December 1972. As an engineer, consultant, professor, author and authority in soil mechanics and foundation engineering, he contributed continuously and outstandingly to the advancement of knowledge and proficiency in the application of the principles of soil mechanics by the Corps. These efforts, and his sense of public responsibility enabled the Corps of Engineers to design and construct earthworks and pavements with a high degree of safety, economy, and reliability, and to accomplish its Civil Works mission in a more efficient manner."

FITING RECOGNITION

Peck receiving the 1974 National Medal of Science from President Gerald R. Ford at The White House on September 18, 1975

THE CITATION READ:

“For his development of the science and art of subsurface engineering, combining the contributions of the sciences of geology and soil mechanics with the practical art of foundation design.”

His father Orwin had passed away the previous year (1974) in Albuquerque, at age 92.

Face of Ralph Peck's National Medal of Science

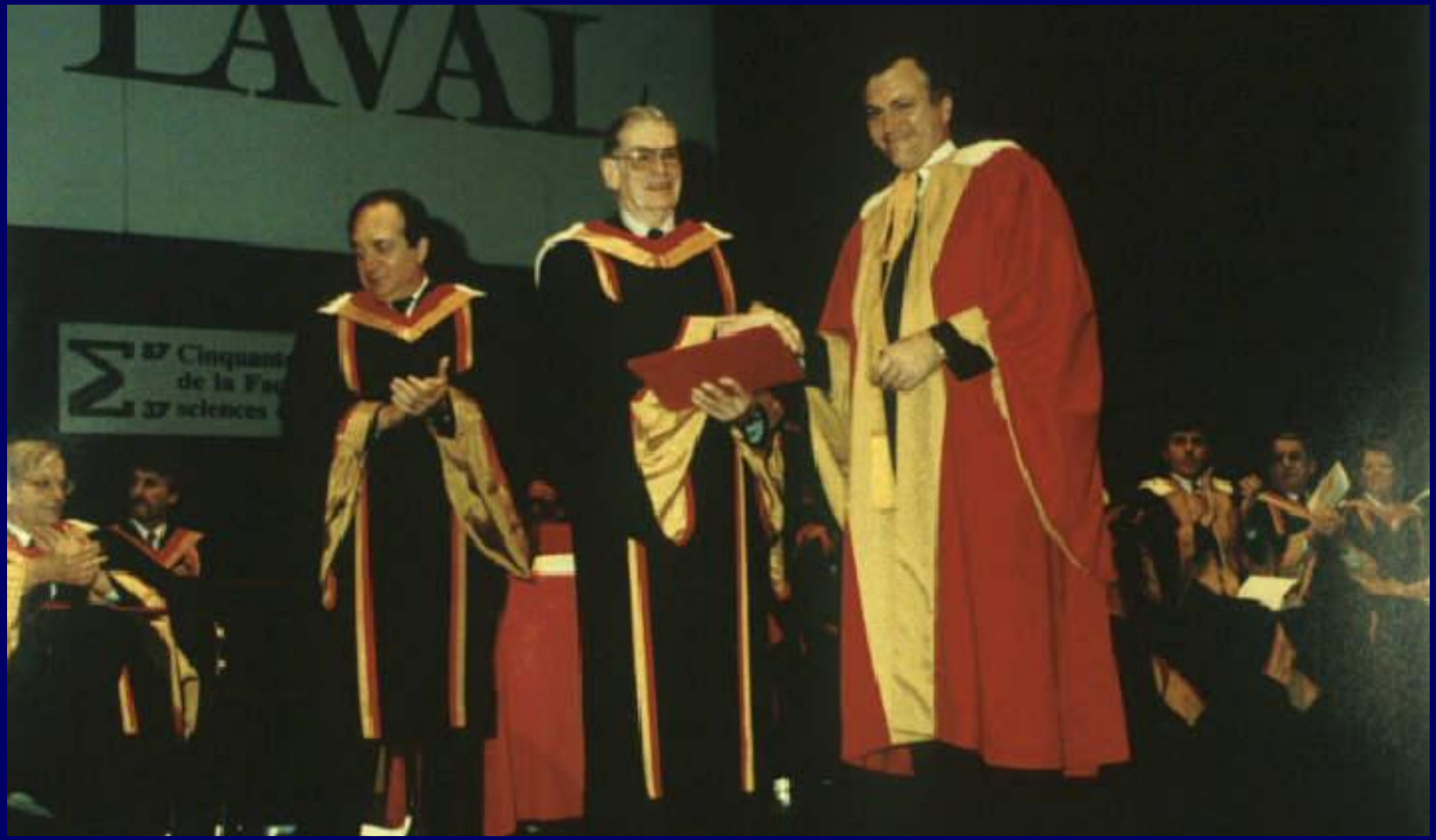
The nomination and awarding of the medal actually took place in 1974, but President Nixon refused to deliver the awards because he was opposed to Linus Pauling's selection, due to Pauling's outspoken opposition of his political policies. The medals were subsequently awarded in 1975, after Gerald Ford had succeeded Nixon as President.

Peck receiving the 1974 National Medal of Science from President Gerald R. Ford. He is the only geotechnical engineer ever accorded this honor.

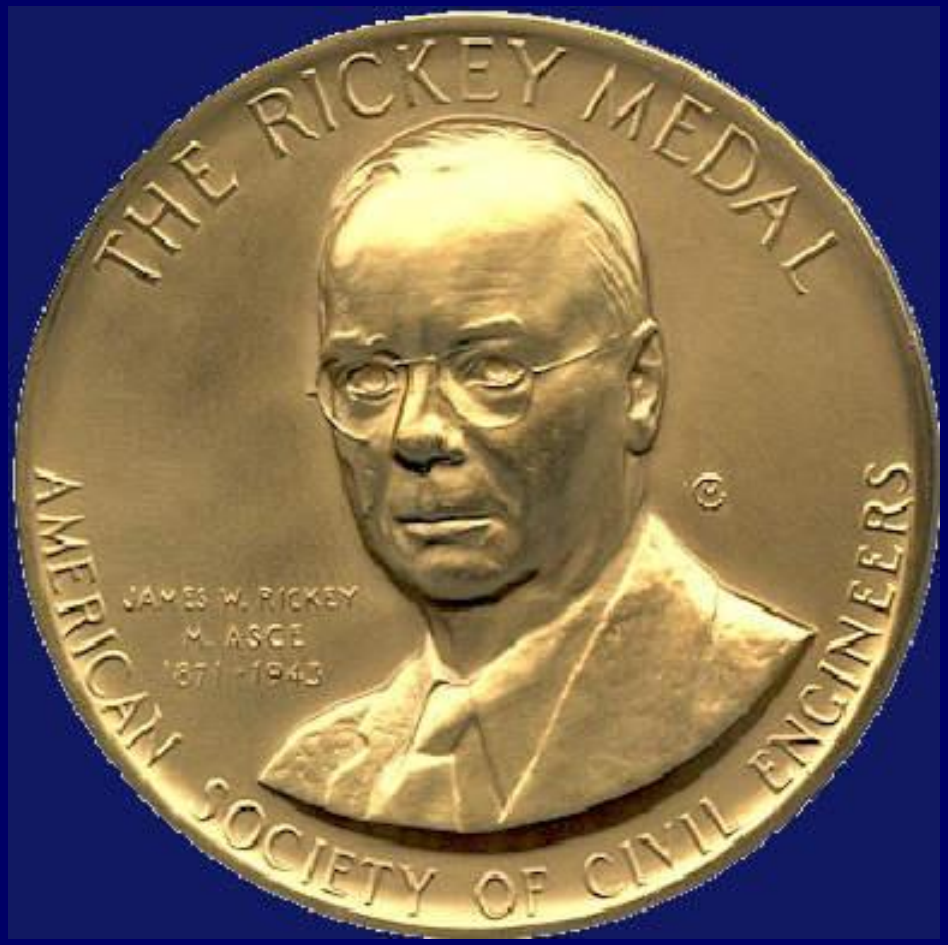
Ralph Peck's 1976 Washington Award from the Western Society of Engineers

The citation reads: "For notable contribution to the Public Welfare thru Engineering and Science conferred in 1976 for eminent international leadership and pioneering contributions to soil mechanics and foundation engineering practice, education and research, and distinguished service to mankind.

Ralph Peck's 1978 Distinguished Service Award from the University of Illinois

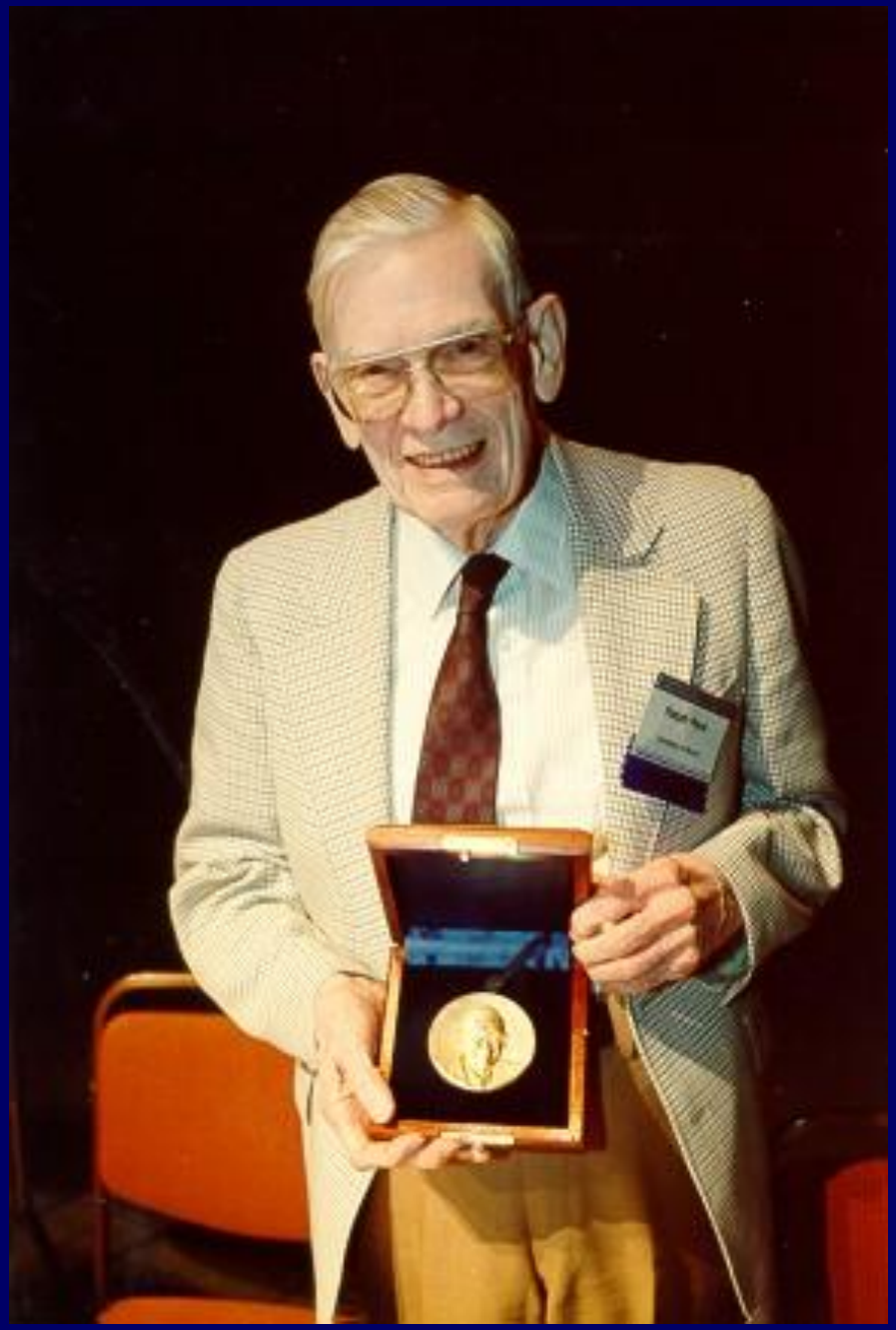


Ralph Peck receiving an honorary doctorate from Laval University at Quebec in 1987



Face side of Ralph Peck's 1988 Rickey Medal from ASCE

"For his valuable contributions to the field of hydroelectric engineering and for a long and distinguished career as a teacher and as a geotechnical consultant"



Professor Peck holding the new Ralph B. Peck Medal established by the American Society of Civil Engineers

THE PECK FAMILY

A few snapshots from the family album

SETTLED IN URBANA, ILLINOIS 1942-1974

The Peck Family preparing for the Christmas holidays, at Urbana in December 1947. The Second World War was over and the university was expanding at an unprecedented rate.

Pictured are (left to right) Marjorie and Ralph, with daughter Nancy and son Jim.

Nancy was born in Evergreen Park, Illinois during the Chicago Subway job, while Jim was born in Urbana.

A LEGACY OF STABILITY AND THE WORK ETHIC

Ralph and Marjorie (standing), with (left to right) Marjorie's parents Lester and Ethyl Truby, and Ralph's parents, Ethyl and Orwin K. Peck. In Urbana, circa 1960. After 35 years with the Rio Grande Railroad, Ralph's father retired in 1956. Ralph would complete 32 years with the University of Illinois in June 1974.

Ralph and Marjorie on their 50th Wedding Anniversary, June 14, 1986. Marjorie passed away in January 1996, following a protracted illness.

Nancy Peck Young and her husband Alan, noted New Mexico artists and Ralph's next-door neighbors in the Four Hills area of Albuquerque.

Allan and Nancy met at the University of Arizona in Tucson, where they majored in geology. Allan spent 10 years in the Navy as an intelligence officer before becoming a teacher, then joined Nancy as a professional artisan.

They moved to Albuquerque in 1975 to be near Ralph and Marjorie.

Ralph's son Dr. James L. Peck, his wife Laurie Scheck, and their daughter Maia. Jim is Executive Director of "The Culture and Civilization of China" project, which produces books on various aspects of Chinese culture. Laurie teaches creative writing at Princeton.

Ralph and his grandson, San Francisco chef Michael Young, with his wife Michelle, in 1999.

Ralph Peck speaking at the opening luncheon of the First ASCE GeoInstitute at Logan, Utah in August 1997. His memorable critique of the trend in academia towards funding esoteric research was widely publicized. Several generations earlier Karl Terzaghi had warned: "*If universities allow professors to teach foundation engineering who've never designed foundation themselves, we can't expect much from the graduates.*"

THE PECK LIBRARY

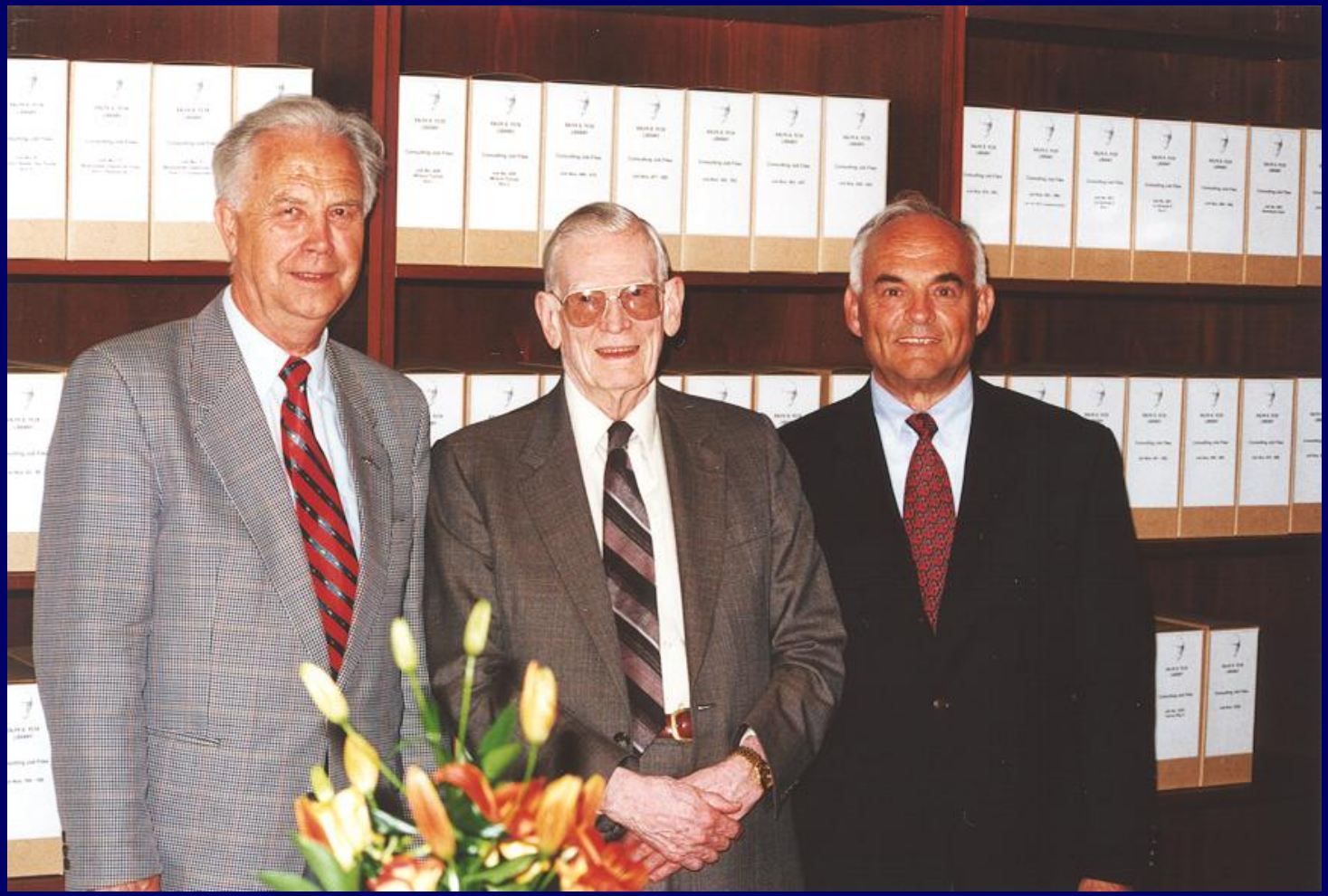
In May 2000 the Norwegian Geotechnical Institute established the Ralph Peck Library, as a companion to the Terzaghi Library.

The Terzaghi Library at NGI began in the fall of 1957, when Laurits Bjerrum had the good fortune of recognizing boxes of Terzaghi's old notes and diaries about to be discarded at the Technische Hochschule in Vienna, upon the retirement of Otto Frohlich, who had succeeded Terzaghi when he fled Austria in 1938.

A LEGENDARY FIGURE

Ralph Peck holding NGI Publication No. 207, entitled: "*Ralph B. Peck, Engineer, Educator, A Man of Judgment*", released in May 2000, during dedication of NGI's Peck Library.

NGI in Oslo: Home of the Peck and Terzaghi Library collections



Peck with Kaare Flaate and Elmo DiBiagio at the Norwegian Geotechnical Institute for dedication of the Peck Library in May 2000. Drs. Flaate and DiBiagio were both Ph.D. students of Peck's at the University of Illinois in the mid-1960s.

Ralph Peck and NGI Director Suzanne Lacasse in the Peck Library at NGI

Interior of the new Peck Library at NGI

Ralph Peck reviewing some of thousands of documents contained in the new Peck Library at NGI

Front row (left to right): Mrs. Laurits Bjerrum, Ralph's children James Peck and Nancy Peck Young, and Ralph at the dedication of the Peck Library at the Norwegian Geotechnical Institute in May 2000.

An autograph session at NGI during dedication of the Peck Library at NGI

THE SECRET TO LIFE IS ENJOYING YOUR WORK

At the age of 88, Ralph Peck was honored by the ASCE GeoInstitute in Denver for his lifetime of accomplishments. He remained vibrant and active, able to click off names, places and figures accumulated over a lifetime of stimulating work. He died in Albuquerque on February 18, 2008.