



Leo Casagrande

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1903–1990

By Anton Tedesko and Ralph B. Peck

Leo Casagrande, a person of great warmth and personal charm, was an experienced civil engineer with a solid theoretical foundation; he excelled in what is now known as geotechnical engineering. He combined high technical ability with good judgment and, in proper balance, scientific rigor with an awareness of the needs of practical engineering and construction.

Leo was born September 17, 1903, in Haidenschaft, near Trieste, a cultural center in the German-speaking part of the old Austrian empire, which was torn apart by World War I. He died at Winchester, Massachusetts, on October 25, 1990, after many years as a consultant and a professor at Harvard University.

His father, Angelus Casagrande, served as a cavalry officer in the Austrian army during the war and was taken prisoner in Russia, which repatriated prisoners only years after hostilities had ended. He returned from Russia in 1922 but died shortly thereafter. In his father's absence, Leo; his mother, Anna; elder brother, Arthur; and younger sister, Alix, moved from their home to remain in Austria because the province in which they lived had become a part of Italy.

Leo attended high school in Austria, and in 1918 the Casagrandes moved to Vienna and lived for a while with the family of Leo's uncle. Later, they rented a modest apartment there, a couple of miles from the center of town.

Leo, as well as his brother, Arthur, twelve months his senior, were students at the Institute of Technology in Vienna, where they had outstanding teachers, Friedrich Hartmann (bridges) and Rudolf Saliger (reinforced concrete) among them. They attended five and a half years of engineering courses, their educations being nearly identical.

Vienna during these postwar years attracted outstanding, stimulating people in the fields of sciences, arts, music, literature, and drama. It had become a center of great cultural and intellectual activity. The young Casagrandes were exposed to, and influenced by, the cultural climate that contributed to their well-rounded education. Old-world manners and courtesy came naturally to Leo (and he knew how to dance a Viennese waltz). Men like Leo who lived in Vienna during that period felt a continuing nostalgia for those Vienna days; he grew up as an Austrian, not as a German.

While Arthur went to the United States soon after his graduation and became an assistant to Professor Karl Terzaghi (the founder of soil mechanics) at the Massachusetts Institute of Technology (MIT), Leo started his career as a structural engineer in Augsburg, Bavaria. After two and a half years, in 1930, he too decided to go to the United States, where he became a research assistant at MIT.

In 1931 Terzaghi accepted the offer of the Institute of Technology in Vienna to become its first professor in the new field of soil mechanics, and Leo returned to Vienna in 1932 to become his assistant at the Institute. Part of a small seminal group surrounding Terzaghi in those early years, Leo acquired a great deal of new knowledge and received an engineering doctorate.

In 1933 he accepted a teaching assignment at the Technological University of Berlin, where he took charge of organizing a soil mechanics institute.

In 1934 he was asked to head the Soil Mechanics Division of the Office of the Inspector General for the German Highways, which had the principal assignment of building the German Autobahn, the first true superhighway system. For more than ten years he had most challenging assignments, solving many problems in foundation and earthworks engineering and in soil

stabilization. He developed the principles and practice of electro-osmotic dewatering and stabilization of soils and used it extensively. He rapidly became recognized as one of the most knowledgeable soil mechanics engineers in Europe, experienced in research and in common sense practical applications.

While acting as a guide and interpreter for a British delegation of Members of Parliament on an excursion-inspection of Autobahn bridges, Leo met the attractive Carla Maria Busch, a free-lance photographer assigned to document the visit. He and Carla Maria were married in 1937.

In 1940 and for several years thereafter he was a lecturer in soil mechanics at the Institute of Technology in Braunschweig, which gave him the title of professor. He lived and worked in Berlin during the devastating war. Carla Maria, their three sons, and one daughter stayed with him for most of that time, but during the last year Carla and the children lived with her mother in the north.

Immediately after the end of World War II, Allied teams of engineers and scientists went to Europe to seek out and examine recent innovations used in Germany and to search for outstanding men who could be induced to work in the United States or Great Britain, which offered them attractive opportunities in their field. Among outstanding men thus recruited were Wernher von Braun and Wilhelm Flügge. The Russians were engaged in a similar quest. Leo and his family fortunately left Berlin just before the Russians arrived; the British reached him first. He was invited by the British government to join the Building Research Station at Watford. He worked there from 1946 to 1950 and was joined there by his family in 1947. His fourth son was born in England.

In his employment as head of the Soil Mechanics Division of the German highway system, Leo pioneered in several aspects of soil mechanics in addition to electro-osmosis. He also wrote technical papers on such diverse subjects as soil sampling, removal of peat by blasting as a means of stabilization, the significance of drainage, and settlement of bridges and other structures. His application of electro-osmosis to stabilize excavation slopes in extra-sensitive clays in Norway was a remarkable

success. This achievement came to the attention of the British and most likely led to his assignment to the Building Research Station, then the leading organization developing the still relatively new field of soil mechanics in the United Kingdom. The station's initial interest was in Leo's expertise in electro-osmosis, about which very little was known outside Germany. Consequently, his first assignments were to summarize the relevant principles and practical applications. His report, *The Application of Electro-Osmosis to Practical Problems in Foundations and Earthworks* published by the station in 1947, was widely circulated and quickly brought recognition to both Leo and the subject among geotechnical engineers throughout the English-speaking world.

Leo's brother Arthur, in the meantime, had built the soil mechanics program in the graduate school at Harvard into a preeminent position in the United States. He succeeded in bringing Leo and his family to the United States in 1950 and added him to Harvard's illustrious group. In 1956 Leo became professor of the practice of soil mechanics and foundation engineering. In addition to performing his academic duties, he became increasingly active as a consultant, in later years practicing with Arthur and his son, Dirk, as Casagrande Consultants in Arlington, Massachusetts. He was elected to membership in the National Academy of Engineering in 1974.

His consulting activities included a wide variety of major projects: foundations for conventional and nuclear power plants and for commercial and industrial buildings, dams for hydroelectric developments, tailings dams, and numerous slope-stabilization assignments. Electro-osmosis continued to be significant in his practice, including investigations regarding its suitability for such diverse applications as stabilization of the collapsed weathered volcanic soil in the Wilson Tunnel in Honolulu, stabilization of the sensitive soils of the Turnagain slide area after the 1964 Good Friday Earthquake in Anchorage, and an eminently practical scheme for arresting the tilt of the Leaning Tower of Pisa.

His students found him to be a superb teacher, at once scientific and practical, who required thoughtful solutions encompassing the broad as well as the specialized picture.

He devoted most of his time to his work, but he also took great pleasure in his family. Having lost the guidance of his father at an early age and all his material possessions in World War II, he highly valued personal relationships and was unusually close to his wife and children. To the extent possible, he shared with them the development of a farm in New Hampshire, which he and the family enhanced by planting thousands of pine seedlings and painstakingly pruning them as they grew. He also characteristically used his expertise to create successfully a pond on the property, even though local agricultural advisers were of the opinion it would not hold water.

He was a gentle, kind man with a deep, somewhat wry sense of humor, a gentleman of the old school, whose contributions to engineering were notable but were unsung except by others.