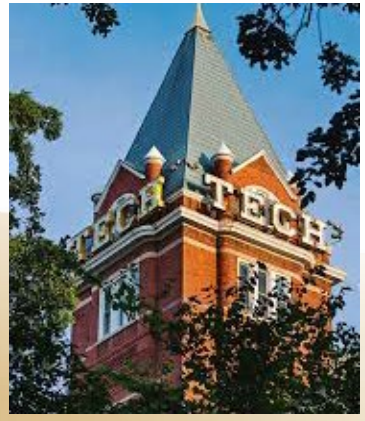
Samuel P. Clemence

Legends Award: November 2nd, 2023

Professor Samuel P. Clemence

- Born in 1939 in Knoxville, Tennessee
- Grew up in Atlanta Georgia
  (barefoot and happy)
- Georgia Tech 1962 BS in Civil Engineering
- Georgia Tech 1964 MS in Civil Engineering
- Geotechnical Advisor George F. Sowers



LEGENDS

U S Navy Career

- US Navy Civil Engineer Corps and attended Officer Candidate School 1963-64
- Mobile Construction Battalion Three

  1964 as Assistant Operations Officer

SEABEES

CONSTRUCTION BATTALIONS

SEABEES

"WE BUILD, WE FIGHT, CAN DO!"

U S Navy Career

- Deployed to Guam US Naval Base to repair Typhoon damage 1964
- Driving Steel Piles for Warehouse on Dock damage to pile heads driven in crystallized coral

U S Navy Career

- Member of Advanced Party Deployed to Da Nang, Vietnam April 1965
- Constructed Road to Marine Hawk Missile Battery Hill 327

U S Navy Career

- Officer in Charge Seabee Team 0306 deployed to Northeast Thailand 1965
- Constructed Earth Dam, Timber Bridge and 5 Km of Road-- USAID program (education on dangerous snakes in Thailand)

U S Navy Career

- Construction of Earth Dam with Concrete Spillway

- Elephant Crew to move logs for Timber Bridge

U S Navy Career

- 1966 Transferred to US Naval Base Rota, Spain

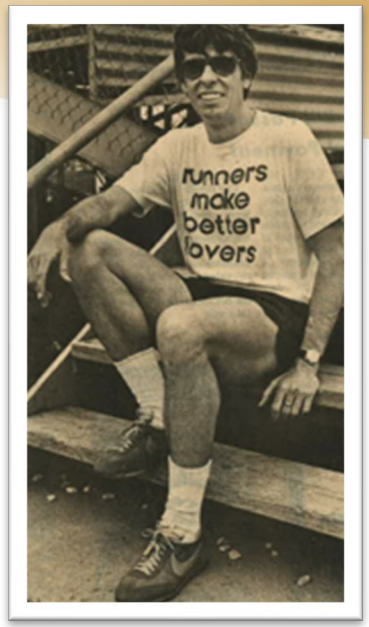
Responsible for dredging of Harbor for Nuclear Submarines and Runway Extension

- Met Lieutenant Carolyn Lipscomb

  US Navy Nurse Corps future wife!

☺

Continued Education



- Returned to Georgia Tech received Ph.D. 1973
- Assistant Professor University of Missouri Rolla 1973 to 1977 (Now MST)
- First MS student lived in a trailer—required by state law to be anchored for protection against tornadoes thesis topic:
- ‘”Dynamic Testing of Anchors in Sand”
- Began Research in Helical Foundations

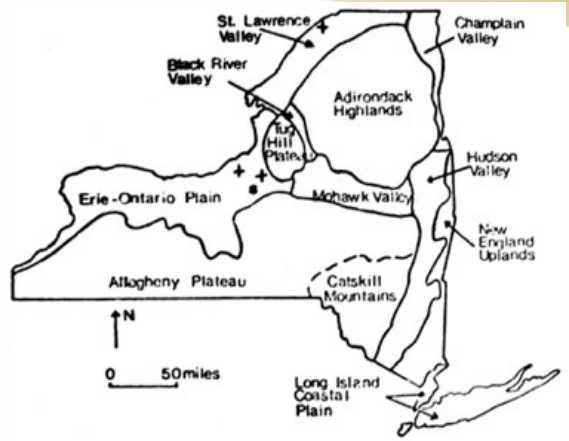
Research in Helical Foundations

- Appointed Associate Professor Dept of Civil/Environmental Engineering at Syracuse University 1977
- Research Project sponsored by Niagara Mohawk Power Corporation due to Transmission Tower Failure 1978 at :

Research in Helical Foundations

- "The Uplift and Bearing Capacity of Helix Anchors in Soil"
- Full Scale Field Tests in Sand, Silt and Clay

  (Note hardworking Graduate Students)
- High Voltage sign kept Vandals Away!



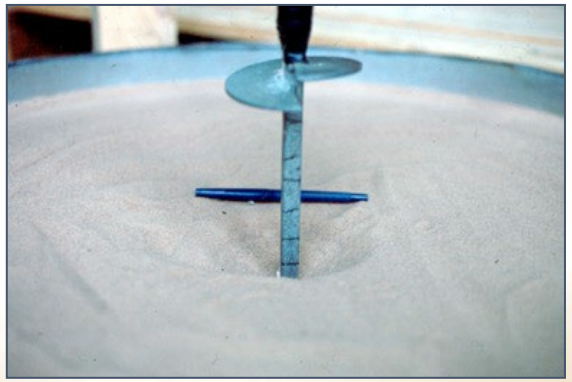
Research in Helical Foundations

- Large Scale Laboratory Tests on Soils Obtained from Field Test Site

Tests in Clay-

note failure surface

Tests in Sand

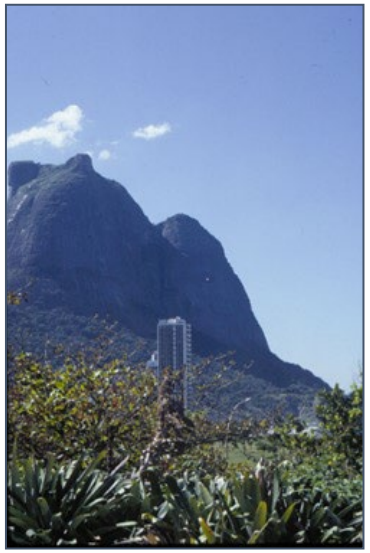


Research in Helical Foundations

- Funded Research projects and work with Engineers at AB Chance resulted in several publications of note:
- Book “Uplift Behavior of Anchor Foundations in Soils” Editor, S. P. Clemence ,ASCE, New York, NY, October 1985,ISBN 0-87262-496-X
- R.M. Hoyt and S.P. Clemence, "Uplift Capacity of Helical Anchors in Soil," Twelfth International Conference on Soil Mechanics and Foundation Engineering, Rio de Janeiro, Brazil, Vol. I, 1989, pp. 243-246.

Research in Helical Foundations

- Uplift Capacity of Helical Anchors in Soil (Hoyt & Clemence 1989,Rio de Janeiro, Brazil)



Analyzed (91) load tests at (24) different test sites

- Sand, silt, and clay soils represented
- Calculated capacity ratio (Q_{act}/Q_{calc})
- Three different load capacity models
  - Cylindrical shear
  - Individual bearing
  - Torque correlation

Torque correlation method yields more consistent results than either of the other two methods and is best suited for on-site production control and termination criteria

Research in Helical Foundations

The Torque Required to Install a Helical Foundation or Anchor is Empirically and Theoretically Related to Ultimate Capacity

- $Q_{ult} = K_t T$
  - Where:
    - Q_{ult} = Ultimate Capacity [lb (kN)]
    - K_t = Empirical Torque Factor [ft-1 (m-1)]
      - Default Value = 10 (33) for 1.5” & 1.75” Square Shaft
      - Default Value = 8 (26) for 3” Round Shaft
      - Default Value = 7 (23) for 3.5” Round Shaft
    - T = Final Installation Torque [ft-lb (kN-m)]

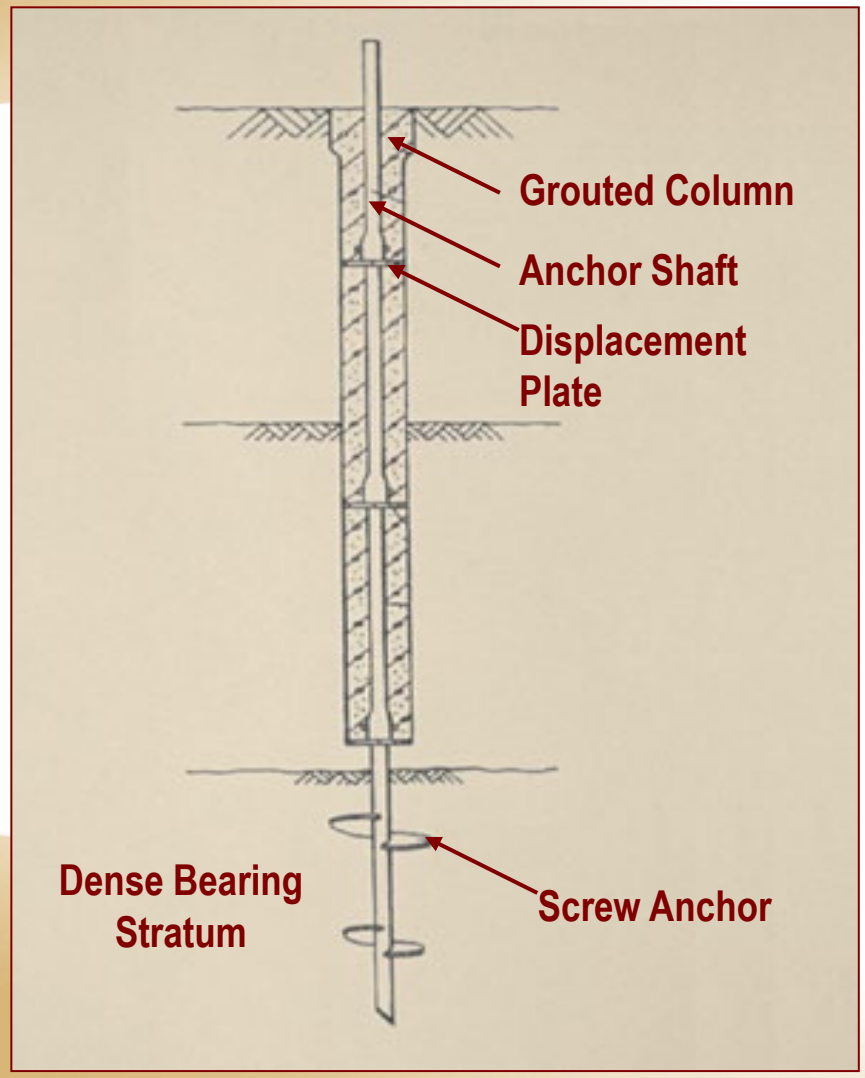
Research in Helical Foundations

- Construction of natural gas pipeline in frozen Muskeg in northern Canada in midwinter
- 5000-pound concrete weights used for buoyancy control - to keep pipeline from floating up when swamp thaws out!

Research in Helical Foundations

- Anchoring for pipelines using helical anchors
- The anchors are placed below the frost line into more stable, unfrozen soil that holds the pipeline in place throughout the year.

Research in Helical Foundations



HELICAL PULLDOWN piles involves the combination of helical anchors or piles and grouting. It was developed and patented by a Canadian engineer in Vancouver, BC.

The result is a helical pile with a grouted shaft that can withstand compressive as well as tensile loads.

Compressive capacities of over 100,000 pounds have been documented.

Research in Helical Foundations

- Image of exhumed Helical Pulldown pile shaft

Research in Helical Foundations

APPLICATIONs FOR HELICAL FOUNDATION SYSTEMS

- Commercial Foundations
- Earth Retentions Systems
- Excavation Shoring
- Underpinning
- Electrical Transmission Systems
- Solar Arrays & Wind Turbines
- Residential Foundations
- Earthquake Resistant Foundations
- EV Charging Stations
- Highway Sign Foundations

And Many More!

Research in Helical Foundations

- Professional Contributions:

Editor, “Uplift Behavior of Anchor Foundations in Soil”, American Society of Civil Engineers

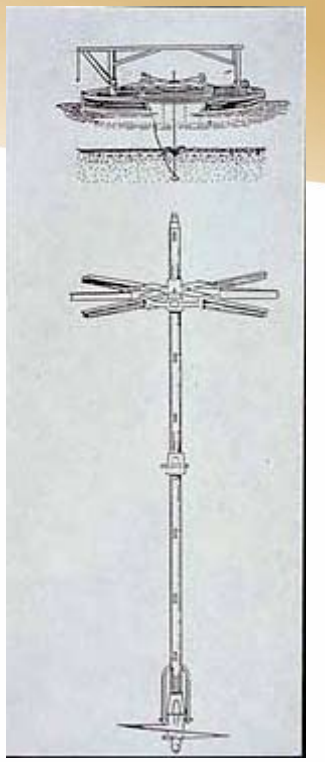
Published over (60) technical papers – (20) papers on Helical Systems

Presented over (30) Seminars/Short Courses on Helical Foundation Systems

Charter member and first Chair of DFI Committee Helical Piles and Tiebacks 2001-2004

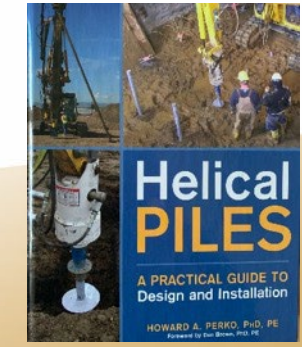
Brief History of Helical Foundations

- 1836 Alexander Mitchell installs screw anchors for lighthouse foundation in England
- 1860-90 more than (100) screw pile foundations installed for lighthouses along the US east coast
- Early 1900's screw piles used for bridge, jetties and building foundations - cast iron to steel
- 1950's after WWII - great advances in high - capacity hydraulic torque installation equipment
- Extensive use of helical foundations in Electric Transmission Infrastructure in US



Brief History of Helical Foundations

- 1970 - 90 Extensive research in Anchor capacity and relationship to installation torque.
- 2001 - DFI Committee on Helical Piles and Tiebacks Committee takes leadership for gaining acceptance of helical foundations by the International Building Codes (IBC).
- 2009 *"Helical Piles A Practical Guide to Design and Installation"* by Dr. Howard A. Perko published by John Wiley and Sons.



Brief History of Helical Foundations

- 2011 International Society for Helical Foundations founded by Dr. Alan Lutenegger
- 2015 DFI sponsors Research Projects on the Seismic Resistance of Helical Foundations conducted by Dr. Amy Cerato

Brief History of Helical Anchors

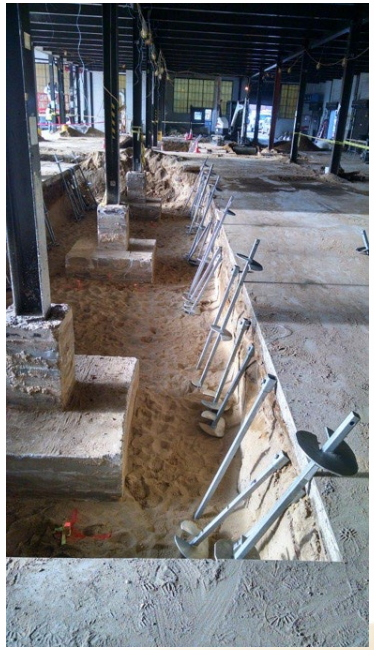
HelicalPileWorld.com eNews August 2023

by Bill Bonekemper

- "Since this author began working in the helical pile industry in 2001, the industry has undergone an absolutely explosive amount of growth…"
- (25) helical pile U.S. manufacturers in the U.S., an increase of (8) since 2015 and (16) now in Canada
- The combined total of (41) helical pile manufacturers is four times the number of companies that were manufacturing and selling helical piles in 2001 - **a 400% increase in (22) years!**

Brief History of Helical Anchors

- The Future is Bright for Helical Foundations!

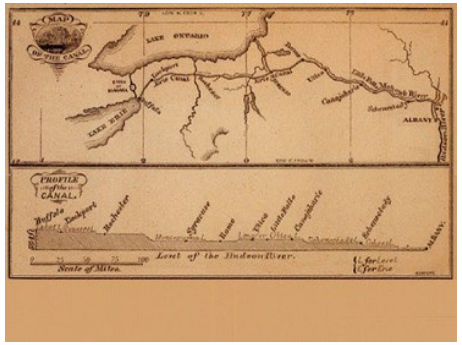


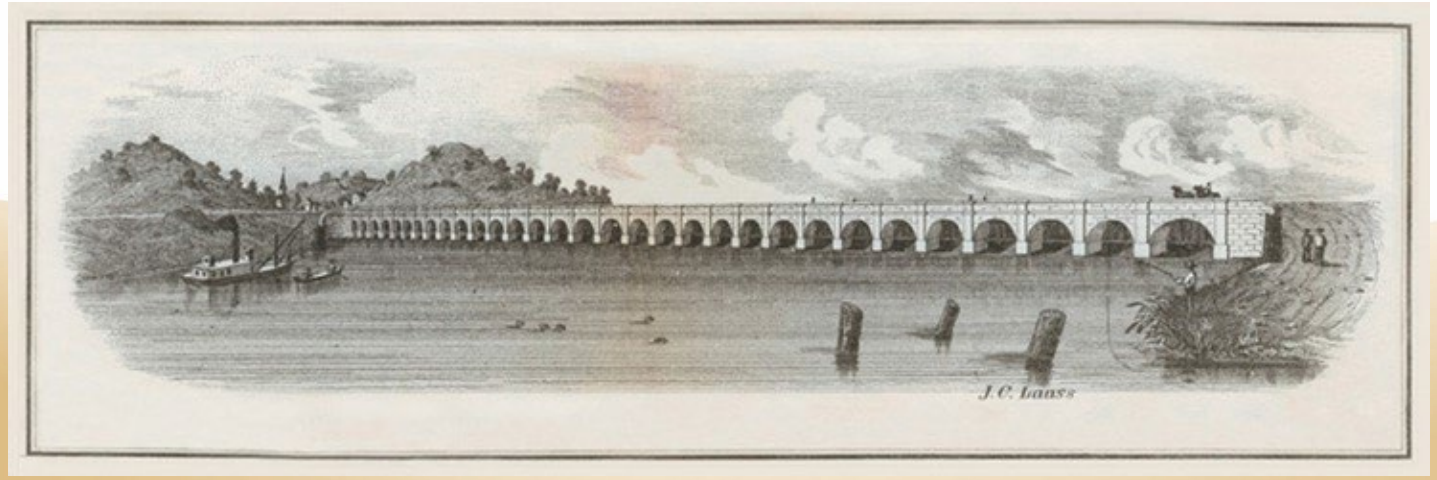
Career in Education

- Professor Clemence's area of specialization is Geotechnical Engineering/Soil Mechanics and Foundation Engineering. Taught undergraduate courses in basic soil properties, foundation design, and soil testing
- Developed graduate courses in advanced soil testing, soil stabilization, rock mechanics, and advanced foundation design

Career in Education

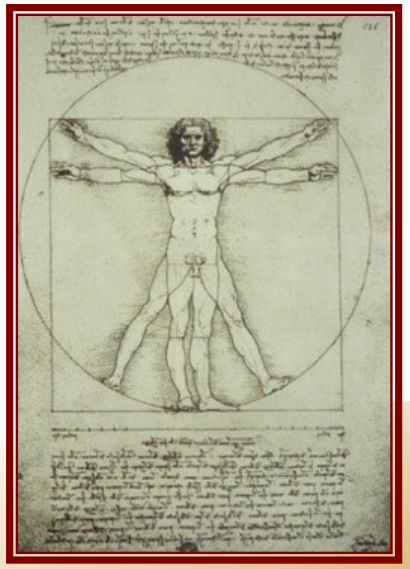
- Developed multi-media lecture on “The History of Engineering” and the “The Erie Canal: Engineering and History”.





Career in Education

- Developed an interdisciplinary course entitled “Leonardo da Vinci: Artist and Engineer-taught with Fine Arts professor and includes a spring break trip to Italy and France.



Awards

- Outstanding Teaching Award at the University of Missouri at Rolla, Rolla, Missouri, 1974-1975 and 1976-1977.
- Elected to Tau Beta Pi as an Eminent Engineer, 1977.
- Outstanding Teacher Award in the L.C. Smith College of Engineering, Syracuse University, 1988-1989.
- 1990 Syracuse University Scholar/Teacher of the Year
- Laura J. and L. Douglas Meredith Professor of Teaching Excellence, 1996
- Outstanding Educator Award from the St. Lawrence Section of the American Society for Engineering Education, 1998.
- Lifetime Achievement Award for furthering the goals of technology education in Central New York, Central New York Technology Club, 2000
- Life Member of the American Society of Civil Engineers, January 1,2004
- Chapter Honor Member by National Chi Epsilon Civil Engineering Honor Society October 12, 2008.
- Outstanding Civil Engineer ASCE Syracuse Section 2014

Career in Education

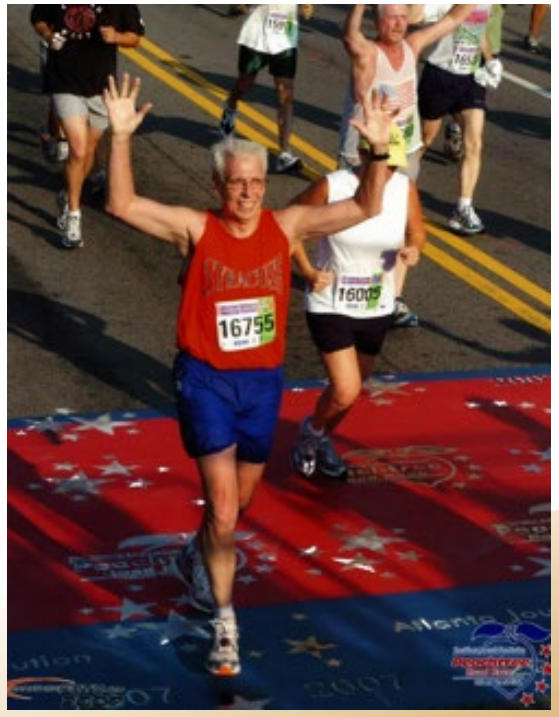
- Founding faculty DCC SU Internship Program DSIP in Dubai UAE sponsored by Abdallah Yabroudi SU Alumni. The program has sponsored (120) US and Middle Eastern engineering students in a six-week internship in Construction Management and Planning.

Awards

- Sam and Carolyn Received Syracuse University Chancellor's Medal in 2017

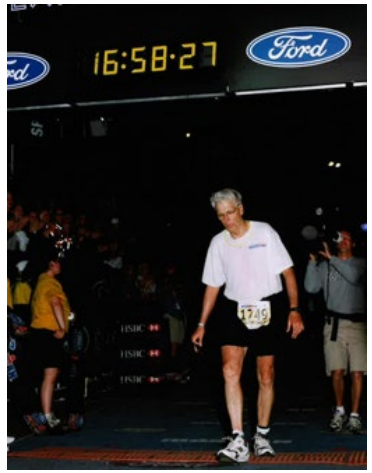
Leisure Time Activities

- Completed a total of (10) Marathons in St. Louis, MO, Columbia, MO, Montreal, Quebec, Canada, Burlington, VT and New York City.



Leisure Time Activities

- Completed (45) triathlons in ten years.
- Completed Ironman Triathlon Lake Placid, June 2005 **at age 65**



Leisure Time Activities

- Completed the Hellespont and Dardanelles Swim in Canakkale Turkey, August 2015 **at age 76**

After Retirement

- Retired from Faculty in 2014
- Served as Interim Dean Hendricks Chapel 2015 to 2017

- Served as Interim University Ombuds 2018 to 2020

Family

- Wife Carolyn, son Daniel, daughter Samantha and grandson Patrick (majoring in Electrical Engineering!)

IN CONCLUSION

You may not always succeed at first . . .

Freshman Bridge Design Test

. . .but keep trying and keep humble!


LEGENDS