George R. Herrmann, Ph.D., P.E., P.H., CFM, SIT

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Full Name: George V Rudolph Herrmann
Date of Birth: August 10, 1957
Place of Birth: Del Rio, Texas, USA
Citizenship: United States of America

Contact Information

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Formal Education

Doctor of Philosophy
Major: Civil Engineering.
Texas Tech University Graduate School September, 2008–December, 2013

Admitted for the Doctoral studies program at Texas Tech beginning in the fall of 2008, with the intent of a second career in research, academia, and consulting upon retirement from TxDOT. Interest in arid/semi-arid land hydrology, fluvial geomorphology, bedload sediment transport, and interaction of ground and surface water in arid streams. Doctoral studies began with Special Studies classes titled "Emerging Topics in Statistical Hydrology." Along with the instructor and one other student, extensively studied the application of copulas to bivariate stochastic processes, Markov chains and processes, and other probabilistic structures. Completed Doctoral studies December, 2013, overall graduate GPA 3.914/4.0.

Graduate Certificate
Major: Geographical Information Systems Technology (GIS)
Texas Tech University Graduate School September, 2012–December, 2013

As part of coursework in the Doctoral program, took an introductory course in Geographical Information Systems (GIS) and 12 additional hours in GIS coursework. The GIS faculty at Texas Tech introduced a Graduate Certificate program in GIS Technology in the 2012–2013 academic year; used remaining coursework hours to obtain that certificate. Coursework included Spatial Analysis, Global Positioning System (GPS) Field mapping, Geodatabase design, and Internet Mapping. Recipient of the first Graduate Certificate in GIS Technology awarded by Texas Tech University.

Master of Science
Major: Civil Engineering.

Texas Tech University Graduate School September, 2001–December, 2002

As an employee of the Texas Department of Transportation (TxDOT), was allowed to return to Texas Tech in the fall of 2001 to pursue a Masters degree in Civil Engineering. As hydraulic and hydrologic engineering had remained an area of personal interest, these were the focus of graduate study. Achieved a GPA in Master's studies of 3.9/4.0. Thesis entitled *Unit Hydrographs and Watershed Scale*. Earned Master of Science degree in December of 2002. Took all available graduate courses in water resources engineering.

Bachelor of Science
Major: Civil Engineering
Texas Tech University January, 1982–May, 1988

Undergraduate studies in Civil Engineering, specialized in water resource engineering. Took all available classes that focused on the behavior of water in natural and man-made settings.

Major: Geology
Texas Tech University August, 1976–May, 1978

Studied Geology for two academic years before suspending education for other pursuits.

Professional Experience

Texas Department of Transportation, West Regional Support Center
Assistant Regional Director for Project Delivery
July 2009–July 2012

Selected to fill a newly created position in a newly created office, pursuant to a large-scale reorganization of TxDOT. Oversaw and coordinated functions supporting the design and delivery of transportation projects over seven west Texas districts. Significant increase in duties and responsibilities, covering all aspects of transportation engineering and right-of-way. Retired from this position at the end of June, 2012.

Texas Department of Transportation, San Angelo District Office
District Advanced Project Development Engineer
April, 1998–September, 2001 and January, 2003–June, 2009.

Shifted from the position of District Design Enginer to the position to District Advanced Project Development Engineer. Continued to serve as Technical Advisory Panel (TAP) chair for hydraulic issues. Temporarily left the district position in 2001-2002 to attend graduate school under the TxDOT Masters Program, then returned after completing a masters degree. Applied for the Masters Program in order to advance knowledge in the area of water resources.

District Design Engineer
September, 1997–March, 1998

Transferred to the San Angelo District as the District Design Engineer, and served in that capacity for several months. During that time, became involved in the management of TxDOT research in Hydrology and Hydraulics by beginning my service as the chair of the TAP for that subject matter.

Texas Department of Transportation, Pampa Area Office, Amarillo District
Assistant/Associate Area Engineer
April 1994–August, 1997

Attained licensure as a Professional Engineer in 1994. At that time was promoted to Assistant Area Engineer. Continued to work and progress in responsibilities. Particular interest in hydrology and hydraulics was further heightened by growing realization of the inadequacy of methods available.

Engineering Assistant II/III/IV
August 1988– March 1994

After earning BS degree in Civil Engineering, entered the employment of the agency now known as TxDOT (known at that time as the State Department of Highways and Public Transportation). For the first several years, was in a functional classification reserved for those with an engineering degree, but not yet licensed as Professional Engineer. Gained experience in all phases of highway engineering including all aspects of roadway design and construction management, field and office surveying for engineering and right-of-way acquisition/boundary purposes, and management of physical facilities (right-of-way). Retained a specific interest in hydrology and hydraulic structures.

Summary of TxDOT Technical Experience

During 24 years of service with TxDOT, designed and oversaw the construction of a large number of culverts of varying sizes, shapes, and materials; detention ponds with outlet works; energy dissipaters; both small and large bridges; storm sewers; and drainage channels. Performed a large number of bridge hydrologic and hydraulic analyses during the evaluation of in-service bridges in Texas for scour vulnerability.

Familiar and experienced in all of the common methods of hydrologic estimation including techniques such as:

- the rational formula,
- various unit hydrograph methods,
- statistical methods such as log-Pearson curve fitting by the techniques of Bulletin 17B,
- graphical estimation by plotting position formulae,
- regression methods,
- manipulation of raw data and managing outliers within data sets,
- a number of probability distributions of varying numbers of parameters,
- distribution characteristics such as skew and kurtosis,
- modern techniques such as L-moment analysis and maximum likelihood,

- advantages of robust techniques like those mentione as compared to the traditional product moment techniques,
- standard tools of the profession, such as step-backwater and other computer programs, as well as
- developing advanced techniques to solve or provide insight into unique problems.

In addition to experience in water resources, I have extensive experience and training in other areas. I held the titles of District Bridge Engineer, District Pavement Engineer, and District Hydraulic Engineer for several years in the San Angelo District.

Technical Training

I have had training courses and experience in all aspects of transportation engineering. Specific to water resources, I have attended training courses in the following subjects:

- Basic and advanced hydrology (multiple courses)
- Storm sewer design
- Culvert design
- Bridge opening analysis
- Scour analysis
- Step-backwater computer analysis (WSPRO and HEC-RAS)
- Stream Stability and Restoration (Craig Fischenich, PhD., USACE)
- Fluvial Geomorphology (David Rosgen, PhD., Wildland Hydrology)

Awards and Certifications

- Commandants List, Infantry Officers Basic Course class 5-87
- Honorable Discharge, US Army Reserve, 1Lt. (Infantry)
- Professional Engineer, licensed in Texas, license No. 79293, 1994
- Certified Floodplain Manager, certification No. 0313-01N, 2001
- Registered Professional Hydrologist, American Institute of Hydrology, certification No. 1679 (surface water hydrology)
- Associated General Contractors of Texas Construction Award for 1997
- TxDOT Research Management Committee 3 (RMC3) Project Director of the Year award, 2005
- Surveyor in Training, Texas Board of Land Surveying. Knowledge and experience in land surveying required for this credential has been of great value in all of my professional endeavors. Continued experience would allow me to progress toward a professional land surveying credential, but the opportunity to gain such experience is unlikely to present itself.

Research Involvement

Chair of Technical Advisory Panel for Hydraulics and Hydrology research from 1997 to 2008. During this time, TxDOT funded an extensive series of hydrologically-oriented projects with the intent of substantially improving the quality and quantity of tools available to highway engineers in Texas for hydrologic simulation and estimation. This program has been very successful and is ongoing. Personally managed that effort from beginning until 2008. Project Director on several TxDOT-funded research projects including (but not limited to) the following subject matter:

- Hydraulics of large culverts (extended to examine safety pipe runners).
- Regional unit hydrographs for Texas (extended to include loss models).
- Hydrologic methods and watershed scale.
- Subdivision of watersheds for modeling purposes.
- PRESS-Minimized Statewide Regression Equations.
- Project Advisor on all hydraulic and hydrologic projects from 1997 to 2008.
- Standing Committee Member, Transportation Research Board (TRB) of the National Academy of Science. Committee AFB60- Hydraulics, Hydrology, and Water Quality. First appointed 2005, reappointed 2008 and 2011.
- Project Oversight Committee Member- National Cooperative Highway Research Program (NCHRP) Project 15-36, "Estimating Joint Probabilities of Design Coincident Flows at Stream Confluences".

Involvement in research projects has been a tremendously rewarding and enlightening experience. Ultimately, that experience is what prompted application for the TxDOT Masters program and attend graduate school for advanced education. Aspire to be extraordinarily well qualified and rounded in the water resource engineering field considering that practice in a state DOT, rather than university faculty or work for a specialized consulting firm. Close work with the research program has benefitted the transportation field.

Authorship

- Herrmann, George R.,
  Conceptual, Algorithmic, and Statistical Exploration of Relations
  Between Runoff Generation, Stream Geomorphology, and
  Watershed Topography in West Texas
  Doctoral Dissertation, Texas Tech Univ., 2013.
- Asquith, William H, George R. Herrmann, and Theodore G. Cleveland
  Generalized Additive Regression Models of Discharge and
  Mean Velocity associated with Direct-Runoff Conditions in Texas:
  The Utility of the U.S. Geological Survey Discharge Measurement Database
  American Society of Civil Engineers, Journal of Hydrologic Engineering, volume 18, no. 10, October, 2013, pp 1331–1348.

- Herrmann, George R. and Theodore G. Cleveland
  Moving Substrate in an Ephemeral Stream: Case Study in Bridge Survival
  Transportation Research Record, Journal of the Transportation Research Board, no.220, Bridge Engineering Vol. 2
  (proceedings of the 7th International Bridge Engineering Conference 2010, San Antonio, Texas)

- Herrmann, George R. and Theodore G. Cleveland
  Consideration of Fundamental Loss Components, Rational Coefficients,
  and Arid Climate
  Proceedings, AIH/AHS HydroSymposium 2009, American Institute of Hydrology.

- Herrmann, George R. and Theodore G. Cleveland
  Generation of Simulated Monthly Rainfall Accumulations and Associated
  Monthly Evaporation Depths For Use in the Management of Small Reservoirs,
  and Water Harvesting For Central Texas,
  Proceedings, AIH/AHS HydroSymposium, Scottsdale, AZ, 2009,
  Arizona Hydrological Society, American Institute of Hydrology.

- Herrmann, George R.
  Unit Hydrographs and Watershed Scale
  Masters Thesis, Texas Tech Univ., 2002.

- Numerous engineering reports.

- White papers for internal training use in specific topics including:
  - Accuracy, Precision, and Significant Figures
  - Plotting Positions
  - Exploratory Data Analysis
  - Regression Equations
  - Statistical Analysis
  - Statistical Methods and Regulated Basins
  - Dimensional Consistency and the Rational Method
  - Rational Coefficients
  - Step-Backwater Modeling
  - Regional Geology of the Edwards Plateau
  - Several research problem statements that were ultimately funded for research

Speaking Engagements

- Federal Highway Administration (FHWA) National Hydraulic Engineers Conference 2004, Asheville, NC. Topic: TxDOT Research in hydrology.

- TxDOT San Angelo District Staff Engineers Meeting, San Angelo TX (2004) Continuing education requirements for Texas Professional Engineers.

- TxDOT/ Texas Transportation Institute annual transportation "Short Course" 2006, Texas TAMU University. Topic- improved hydrologic estimation techniques.

- TxDOT Maintenance Conference 2007, Waco, TX. Topic- improving sediment throughput of large culverts.
- TCEQ One-day training course "Floodplain Management 101", January 31, 2006. Topic, Introduction to Hydrology and Hydraulic Modeling.
- TxDOT Design Conference/District Hydraulic Engineers Meeting 2006, Corpus Christi, TX. Topic- Exploratory Data Analysis.
- TRB Committee AFB60-sponsored symposium 2007, Sanibel Island, FL. Topic- PRESS-minimized regression equations with surrogate variables as an alternative to regionalization.
- TxDOT Design Conference/District Hydraulic Engineers Meeting 2007, Corpus Christi, TX. Topic- Introduction to Unit Hydrograph Theory and Methods.
- Federal Highway Administration (FHWA) National Hydraulic Engineers Conference 2008, Portland, ME. Topic: Steepness of flood frequency curves in arid areas.
- TxDOT/ Texas Transportation Institute annual transportation "Short Course" 2008, Texas TAMU University. Topic- holistic approach to the evaluation of existing bridges for scour vulnerability.
- American Institute of Hydrology (AIH)/Arizona Hydrologic Society (AHS) Annual Conference 2009, Scottsdale, AZ. Presented two papers, co-authored with Theodore Cleveland, Ph.D. P.E.: "Consideration of Fundamental Loss Components, Rational Coefficients, and Arid Climate", and "Generation of Simulated Monthly Rainfall Accumulations and Associated Monthly Evaporation Depths For Use in the Management of Small Reservoirs and Water Harvesting For Central Texas".
- Transportation Research Board 7th International Bridge Engineering Conference 2010, San Antonio, Texas. Presented paper co-authored with Theodore Cleveland, Ph.D. P.E.: "Moving Substrate in an Ephemeral Stream: Case Study in Bridge Survival"
- TxDOT/ Texas Transportation Institute annual transportation "Short Course" 2011, Texas TAMU University. Topic- "Effects of Flooding on Structures".
- Team Member, team to update FHWA HEC-17 to address adaptation to climate change
- U. S. State Department Speaker Program Univeridad Catolica Boliviana Symposia on Water Resources Santa Cruz, Cochabamba, and Tarija, Bolivia, March–April 2016

Miscellaneous Contributions to the Engineering Profession

- Assisted in lobbying internally for the designation of a "District Hydraulic Engineer" title to be created in each TxDOT district (there are 25 districts). Holder of that title in the San Angelo District until transferred to the West Region Support Center.
- Assisted the TxDOT Bridge Division-Geotechnical Branch personnel in the development of a rapid and simple screening technique to assess in-service bridges for scour vulnerability. This resulted in the screening of nearly 1000 bridges in a period of a few months, assisting Texas in meeting a federal mandate. Continuing to assist in the development of further techniques for the assessment of bridges with unknown foundations for vulnerability to scour damage, in order to meet a subsequent federal mandate.

- Served as an advisor to several TxDOT engineers who have pursued advanced degrees through the TxDOT Masters Program, especially those who specialize in water resources. Served as the TxDOT Mentor for such a student. The honor of mentoring such students is usually reserved for District Engineers or Division Directors. Actively promote "lifelong learning" and the acquisition of advanced degrees by interested engineers.
- Actively promote the practice of hydraulic engineering at the highest level of quality possible by all of our engineers. Promote recognition of the magnitude of impact that the surface transportation network can have on parts of the hydrologic cycle.

Additional Competencies

- Engineering surveying and measurement,
- Survey geometry,
- Survey calculations,
- Mapping,
- Datums and coordinate systems,
- Map Projections,
- Coordinate transformations, and
- Photogrammetry.

Research Interests

- Arid land hydrology,
- Fluvial processes and fluvial geomorphology,
- Partial area contribution,
- Variable area contribution,
- Hydrologic modeling and estimation,
- Hydrologic risk estimation,
- Application of observation to hydrologic studies,
- Description of site characteristics, and
- Comparison of models to site characteristics.
- Roadway drainage
- Geospatial engineering,
- Applications of GIS in Civil Engineering and water resources,
- Statistical relationships in water resources and geospatial engineering,

- Paleoflood hydrology,
- Archeology and paleoenvironmental water resources

Intend to stay involved in the Water Resources Engineering field through consulting, research, teaching, training, and publication for the foreseeable future. Formal involvement in both research and consulting to this point has been as the agent of a sponsoring client; yet have taken the position that both are joint efforts and have contributed as much as possible toward the final goals of projects.

Recognized as a subject matter expert in hydrology throughout TxDOT and TxDOT consultants. Traditionally called upon to assist with many difficult problems. Thoroughly enjoy speaking, teaching, and training, and anticipate spending much time and effort in those endeavors as well.