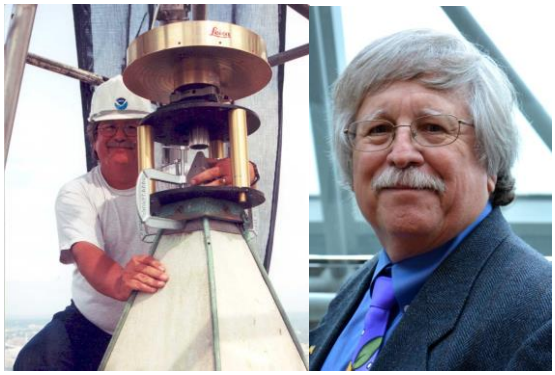
David Doyle
Base 9 Geodetic Consulting Services
12503 Two Farm Dr.
Silver Spring, MD. 20904
e-mail: base9geodesy@gmail.com
(c) 301-704-9578



Employment

01/2013 to Present
Base 9 Geodetic Consulting Services
12503 Two Farm Dr.
Silver Spring, MD. 20904

Providing technical consulting services to International, Federal, state and local government and private sector enterprises responsible for the development and implementation of geodetic control reference fames. These services include; drafting technical proposals for the design of national and local geometric and vertical geodetic control networks including both passive marks and GNSS Continuously Operating Reference Stations (CORS) and workshops and seminars detailing the practical fundamentals of geodetic science and geodetic surveying practice.

03/2000 to 12/2012
National Geodetic Survey
1315 East-West Highway
Silver Spring, MD. 20910
Position: Chief Geodetic Surveyor

I served in the position of the National Geodetic Survey's (NGS), Chief Geodetic Surveyor in the Spatial Reference System Division. In this position I have been one of the primary sources of

geodetic technical support to all of the NGS Divisions as well as National Ocean Services offices of Coast Survey (Nautical Charting) and Center for Operational Oceanographic Products and Services (Tides and water levels) and numerous other Federal agencies including; the U.S. Army Corps of Engineers, National Park Service, International Boundary Commission, Federal Emergency Management Agency, Fish and Wildlife Service, Bureau of Land Management, Federal Aviation Administration and U.S. Geological Survey, on many aspects of theoretical and practical geodesy. These topics include contemporary and historic horizontal and vertical geodetic datums, datum transformations, map projections and grid coordinate systems, improvements and uses of national, regional and global geoid models, geodetic surveying operations including GPS, leveling and triangulation. I am usually considered the "go-to" person for many of the most difficult and obscure questions and problems relating to data elements of the National Spatial Reference System (NSRS), use of NSRS in the determination and description of local, state, and international boundaries, practical applications by the land surveying, engineering, and geographic information system user communities. In this position, I have developed workshops and seminars for detailing elements of NSRS and cooperative programs with CO-OPS and have presented 215 seminars detailing the development of geodetic datums, datum transformation and network design at surveying, mapping and GIS conferences to more than 9,500 users of high accuracy spatial data in the United States and 4 countries.

Some of my major accomplishments during this period included:

Project manager of a 2-year effort (1999-2001) funded by the U.S. Agency for International Development (USAID) to restore and modernize the spatial reference infrastructure of El Salvador, Guatemala, Honduras and Nicaragua due to the major damage inflicted on those countries by Hurricane Mitch. This program required the installation of Global Positioning System (GPS) Continuously Operating Reference Stations (CORS), design and observation of networks of high accuracy GPS passive control networks, integration of geodetic programs with others U.S. and non-governmental organization relief and restoration efforts, coordination with national government surveying and mapping institutions, solving extreme logistical and communications problems, development of bilingual (English and Spanish) reports, program documentation, project specifications and operational agreements.

Development and implementation of the foundation for the Puerto Rico Vertical Datum of 2002 (PRVD02), and the U.S. Virgin Islands Vertical Datum of 2009 (VIVD09), American Samoa Vertical Datum of 2002 (ASVD 02), Guam Vertical Datum of 2004 (GUVD 04) and the Northern Marianas Vertical Datum of 2003 (NMVD 03). I have also been one of the primary geodetic technical advisors for the modernization of geodetic spatial reference systems to the governments of Benin, British Virgin Islands, Cayman Islands, Ethiopia, Iraq, Jamaica, Mongolia, South Korea and Suriname. These efforts included the development of systems of CORS, integration of tidal datum observation systems, absolute and relative gravity observations systems, and observations of densified GPS passive survey networks, development of outreach and education materials for local surveyors and GIS professionals, height systems modernization and geoid modeling.

Design, management and analysis of a comprehensive First-Order geodetic leveling and GPS campaign for region of the Washington Mall including the White House, U.S. Capitol and the Washington Monument during 2012. This survey was designed to detect any possible subsidence/settlement of the many significant monuments, memorials and other Federal buildings that may have been caused by the 5.8 magnitude earthquake of August 23, 2011 centered near Mineral, Virginia. This program now provides the foundation for future monitoring activities that are an essential part of the preservation and maintenance programs of the U.S. National Park Service.

Act in the position of senior geodetic advisor to the NGS/Federal Aviation Administration's interaction with the International Civil Aviation Organization (ICAO) in support of the design and implementation of global satellite navigation systems and integration of national geodetic datum programs with airport surveying operations. This has involved representing NGS/FAA at several international working symposiums on issues related to airport survey design and specifications, development of global geodetic height systems and datum transformation applications.

10/1991 to 03/2000
National Geodetic Survey
1315 East-West Highway
Silver Spring, MD. 20910
Position: Senior Geodesist

Served in the position of Senior Technical Assistant to the Chief of the NGS Observation and Analysis Division, involving continuous interfacing with all levels of management throughout NGS. Duties include the development and implementation of technical standards and specifications for the High Accuracy Reference Network (HARN) campaigns, and the training of geodesists and surveyors from Federal, State and local agencies and the private sector to support the HARN densification. I was assigned the position of program manager for the readjustment of the NAD 1983 that require the development of an observation and adjustment strategy in cooperation with International, Federal, State and local surveying and mapping organizations, the identification of personnel and software required to adjust and analyze the network solution, and the development of educational outreach programs for the surveying, mapping and Geographic Information System communities. I also provided technical support on geodesy to the Federal Aviation Administration (FAA), the International Civil Aviation Organization (ICAO) and the Radio Technical Commission on Aeronautics (RTCA) to support the eventual implementation of GPS air navigation performance standards, and the design and integrity of flight management systems.

Provided the technical leadership of an NGS team providing assistance for the modernization of the geodetic infrastructure of Romania during 1992-1995. This program included performing an assessment of the condition of Romanian geodetic survey practices and equipment, acquiring contemporary geodetic technology including computers and GPS equipment, development of a GPS network and training plan for GPS data collection, analysis and network adjustment for the Romanian National Office of Geodesy, conducting training workshops on GPS vector

processing, 3-dimensional network adjustments and datum transformations. The culmination of this program was a four-day Eastern European Geodesy conference in Bucharest, Romania in June, 1995 where I was the senior NGS representative with responsibility for the technical program coordination and financial support for all conference activities.

I designed and managed a Caribbean-wide high accuracy GPS campaign of 19 countries to support GPS air navigation requested by FAA and ICAO. This required substantial coordination between NGS, FAA and the Civil Air Authorities and national surveying and mapping organizations of all 19 countries. This program required an especially resourceful approach to identify and organize the individual national surveying offices, frequently dealing with very high ministerial levels, and often hindered by cultural and language differences and considerable effort was required to coordinate the interactions with six different airlines providing inter-island transportation. During this time, I also developed and conducted 92 seminars detailing elements of Fundamentals of Geodesy, NSRS, HARN, State Plane Coordinates and Datum Transformations.

10/1985 to 09/1991
National Geodetic Survey
11400 Rockville Pike
Rockville, MD. 20852
Position: Senior Geodesist

Primary duties included program management of the Airport Datum Monumentation (ADAM) and subsequent Area Navigation Approach (ANA) programs, the first nation-wide effort to perform GPS surveys in support of FAA operations. This included the initiation of the installation of Primary and Secondary Airport Stations (PACS/SACS). Management of this program included coordination of the activities of NGS Horizontal, Vertical, Gravity and Space Geodesy, and Operations Branches to perform reconnaissance, mark setting, GPS data collection and processing and final network adjustment of airports to the National Spatial Reference System. This position also required that I act as liaison with the NOS Aeronautical Charting Division, FAA and numerous state aeronautical authorities to develop program requirements, track performance standards and reduce duplication of efforts with other programs. This required the preparation of briefings and reports to detail the progress of the program, the evaluation of the performance of field crews and office personnel, and the preparation of long-range performance plans. I also worked closely with FAA, EuroControl, ICAO and RTCA on the development of international standards and specifications for the integration of GPS into global air navigation programs by co-authoring the combined FAA and EuroControl WGS 84 adoption protocol.

I also assisted in coordinating NGS's NAD 83 datums transformation activities, including organizing and presenting briefings to the Canadian Geodetic Survey, numerous Federal, State and local governmental surveying and mapping agencies as well as private sector users of geodetic data. As part of this effort I authored and presented papers to the American Congress on Surveying and Mapping (ACSM) detailing NGS activities in datum transformations, GPS and horizontal control network development, and the use of geodetic data in GIS. As part of this

effort, I developed and conducted 17 seminars detailing elements of Network Adjustments, GIS, State Plane Coordinates and datum transformations

08/1984 to 09/1985
National Geodetic Survey
11400 Rockville Pike
Rockville, MD. 20852
Position: Supervisory Geodesist

General Responsibilities:

Supervised 5 professional employees (geodesists) in the performance of high-precision geodetic network adjustments, datum transformations, use of NGS geodetic data products and services, design of multi-purpose land information systems, geodetic computer software, global positioning system observations, data analysis and adjustment and computation of State Plane and Universal Transverse Mercator grid coordinate systems.

This required the review and analysis of work completed by each geodesists, assessing progress of Horizontal Network Branch programs, evaluating professional performance of each employee, establishing and documenting policies concerning horizontal control for the Branch Chief, representing the Branch in planning operational meetings concerning development of NSRS and investigating activities researched by outside sources in the development of GPS, GIS and geodetic network design and assessing this activities on current NGS policies, program, policies and services.

07/1982 to 08/1984
National Geodetic Survey
11400 Rockville Pike
Rockville, MD 20852
Position: Geodesist

General Responsibilities:

Reviewed corrections to geodetic data made by other employees involved in network analysis for the readjustment of the North American Datum and served as primary source for the Horizontal Network Branch for users of geodetic control data outside of NGS. This required resolving numerous problems involving data integrity, knowledge of field observations procedures, conversion and transformations of coordinate system. I also provide technical advice on the proper use of geodetic instrumentation, development of field observation programs and network design.

05/1978 to 07/1982
National Geodetic Survey
11400 Rockville Pike
Rockville, MD 20852
Position: Geodesist

General Responsibilities:

Trained other geodesists in performing analysis of field observations, drafted and presented technical specifications for horizontal control surveys, resolved geodetic data problems by identifying and removing blunders in horizontal measurements, contributed to the development and maintenance of NGS geodetic computer programs used to index, validate and store observed field data. This position also required the adjustments of both horizontal and vertical geodetic mark maintenance data including the analysis of all raw data, proper reductions of observations for meteorological and geometric conditions.

08/1972 to 05/1978
National Geodetic Survey
11400 Rockville Pike
Rockville, MD 20852
Position: Geodetic Technician

Responded to both written and telephone requests for horizontal and vertical geodetic control information from government and private surveying and mapping organizations. Assisted in the preparation of horizontal control data sheets for final publication, including completed review of positional, descriptive and recovery text information. Performed preliminary processing and quality control review of NGS Mark Maintenance data, including reductions of electronic distance and invar tape base measurements, astronomic azimuths and eccentric station reductions. Through rotational field assignments, I worked with several NGS Mark Maintenance field engineers and NGS triangulation field units conducting observations in support of network densification. During these assignments, I was also trained in NGS methods of horizontal direction observations, azimuth observations, precise taping, electronic distance measurements, mark setting and construction of Bilby steel observation towers.

07/1970 to 08/1972
Long and Rinker Surveying and Engineering
Fairfax, VA.
Position: Instrument Man

Major duties included complete responsibility for performing boundary, topographic and engineering surveys, photo-mapping programs and construction stake-out in a timely, accurate and efficient manner. This included performing all field observations such as: traverse, leveling, solar-azimuth observations and plane-table surveys. In addition, I was responsible for the

completion of final survey adjustment computations, drafting, survey equipment and vehicle maintenance and supervision of field party personnel for overall quality control. This position often required the supervision of 3 to 6 field personnel, daily review of equipment maintenance and record analysis and interactions with property owners, construction engineers and county inspection officials.

07/1967 to 06/1970
U.S. Army
U.S. Army Basic Training Center, Ft. Benning Georgia. (7/67 – 9/67)
U.S. Army Engineer School, Ft. Belvoir, VA. Topographic Surveyor 82D20 (9/67 – 12/67)
U.S. Army 656th Topographic Engineers, Schwetzingen, Germany (1/68 – 7/70)
Final rank E-4 (Specialist Fourth Class)

During this time, I served in the position of a Topographic Surveyor (82D20) and performed all duties associated with extension of geodetic horizontal and vertical control in support of various military objectives in Europe, including: topographic mapping, artillery and missile fire control, unexploded ordnance location and removal and engineering applications. These observations involved triangulation, traverse and trilateration, electronic and precise taped base measurements, 3-wire leveling and astronomic positioning and azimuth observations. Position required reduction and adjustments of all observations, preparation of survey monument description and recovery data, instrument maintenance and adjustment. Major projects included rapid deployment and establishment of horizontal and vertical control in support of artillery fire control during the Soviet Union intrusion of Czechoslovakia in 1968, development of mapping control in support of NATO operations in Norway in 1969 and support of the Army Mapping Mission in Ethiopia in 1969.

Publications

Title	Date	Source
Why Doesn't My Centimeter Match Your Centimeter	May-15	GPS World Magazine
A New Datum; Rational to replace NAD 83	Aug-13	Professional Surveyor Magazine
Definition and Densification of the Puerto Rico Vertical Datum of 2002	Jul-12	ACSM - Surveying and Land Information System (SsLIS)
Virgin Island Vertical Datum of 2009	Jun-11	ACSM - Surveying and Land Information System (SsLIS)
Development of Comprehensive Geodetic Vertical Datums for Pacific	Mar-09	ACSM - Surveying and Land Information System (SsLIS)
The Future Role of Geodetic Datums in Control Surveying in the US	Apr-06	ACSM - Surveying and Land Information System (SsLIS)
Computing State Plane Coordinates with the NGS Toolkit	Jan-05	Professional Surveyor Magazine
Washington Monument GPS Project	Jan-00	Professional Surveyor Magazine
High Accuracy Reference Network for Illinois	Aug-98	Illinois Professional Land Surveyors Association
High Accuracy Reference Network for Indiana	May-98	Indiana Society of Professional Land Surveyors
High Accuracy Reference Network for Kansas	Jan-98	Kansas Society of Land Surveyors
High Accuracy Reference Network for Arkansas	Oct-97	Arkansas Society of Professional Surveyors
High Accuracy Reference Network for Iowa	Aug-97	Society of Land Surveyors of Iowa

High Accuracy Reference Network for North Dakota	Aug-97	North Dakota Society of Professional Land Surveyors
High Accuracy Reference Network for South Dakota	May-97	South Dakota Society of Professional Land Surveyors
High Accuracy Reference Network for Ohio	Nov-96	Professional Land Surveyors of Ohio
High Accuracy Reference Network for Nebraska	Aug-96	Professional Surveyors Association of Nebraska
High Accuracy Reference Network for West Virginia	Aug-96	West Virginia Association of Land Surveyors
High Accuracy Reference Network for Utah	Dec-95	Utah Council of Land Surveyors
High Accuracy Reference Network for Michigan	Oct-95	Michigan Society of Professional Surveyors
High Accuracy Reference Network for Nevada	Jun-95	Nevada Society of Professional Surveyors
High Accuracy Reference Network for Oklahoma	Jun-95	Oklahoma Society of Professional Surveyors
New Coordinate Adjustment for Mississippi	Jan-95	Mississippi Association of Land Surveyors
Development of the National Spatial Reference System	Aug-94	American Congress on Surveying and Mapping
Where Freedom Stands (GPS Survey of the U.S. Capital)	Jan-94	Professional Surveyor Magazine
New Coordinate Adjustment for Arizona	Oct-93	Arizona Professional Land Surveyors Society
New Coordinate Adjustment for Alabama	Aug-93	Alabama Society of Professional Land Surveyors
New Coordinate Adjustment for Louisiana	Aug-93	Louisiana Society of Land Surveyors
New Coordinate Adjustment for Colorado	Apr-93	Colorado Society of Professional Land Surveyors
New Coordinate Adjustment for Maryland and Delaware	Apr-92	Maryland Society of Surveyors
High Accuracy Reference Networks: Development, Adjustment and Transformation	Feb-92	American Congress on Surveying and Mapping
Cadastral Surveys in a GIS/LIS	Nov-91	American Congress on Surveying and Mapping
GPS Surveys and the Horizontal Network	Aug-91	American Congress on Surveying and Mapping
GPS Resurvey of the D.C. Boundary Stones	Jun-90	American Congress on Surveying and Mapping
Datum Transformations from NAD 27 to NAD 83	Apr-87	American Congress on Surveying and Mapping

Seminars and Workshops

Since 198, I have conducted more than 500 seminars and webinars for international, national, state and regional surveying, mapping and GIS conferences, detailing the fundamentals of geodesy including: geodetic field measurements, horizontal and vertical datum definitions and implementation, coordinate systems, GPS-Derived Heights, State Plane Coordinates, relationships of vertical and tidal datums, datum transformations, project planning and network adjustments.

Professional Association Affiliation

Arkansas Society of Professional Surveyors (Lifetime Honorary Member)
American Association for Geodetic Surveying (President 1999-2000)
District of Columbia Association of Land Surveyors (Charter and Life Member)
Ferris State University, Survey Chapter (Lifetime Honorary Member)
Florida Surveying and Mapping Society (Lifetime Honorary Member)
Geographic and Land Information Society (Charter Member)
International Federation of Surveyors, U.S. Delegation Chair for Commission 5 (Positioning and Measurement) 2004-2012
Illinois Professional Land Surveyors Association (Lifetime Honorary Member)

Maryland Society of Surveyors
National Society of Professional Surveyors
Puerto Rico Professional College of Engineers and Land Surveyors (Lifetime Honorary Member)
Virginia Association of Surveyors (Lifetime Honorary Member)

Awards

2021 – Maryland Society of Surveyors – Russell E. Lowman Award for Education
2019 – Maryland Society of Surveyors – Lifetime Service Award
2018 – Joseph Dracup Lifetime Achievement Award – American Association for Geodetic Surveying
2013 – Florida Surveying and Mapping Society – Scientific Research of the Year Award
2013 – Maryland Board for Professional Land Surveyors – Lifetime Service Award
2013 – National Society of Professional Surveyors Lifetime Achievement Award
2011 – Towson University Maryland, GIS Conference - Outstanding GIS Service Award
2010 – National Society of Professional Surveyors Board of Governors Meritorious Service Award
2009 – New Jersey Society of Professional Land Surveyors - Lifetime Service Award
2008 – Maryland Society of Surveyors - Surveyor of the Year Award
2008 – Virginia Association of Surveyors - Lifetime Service Award
2006 – Professional Surveyor Magazine – One of the 25 Most Influential People in Surveying in the United States
2002 – Department of Commerce Bronze Medal for Superior Service – Redefinition of the geodetic reference frame for American Samoa
1996 – Department of Commerce Bronze Medal for Superior Service – Caribbean GPS International Airport Survey Program
1995 – American Society of Military Engineers, KARO Award – Modernization of the geodetic reference frame for Romania
1995 - American Congress on Surveying and Mapping - Fellow Member

Education

09/70 – 12/1979 – George Washington University, Washington D.C. major in Geodetic and Cartographic Sciences (no degree)
09-12/1967 – U.S. Army Topographic Survey School (82D20), Ft. Belvoir, VA
06/1967 – Marshall High School, Falls Church, VA