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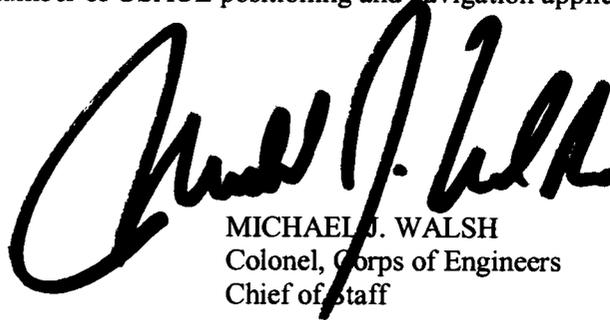
**Engineering and Design**  
**NAVSTAR GLOBAL POSITIONING SYSTEM SURVEYING**

**1. Purpose.** This manual provides technical specifications and procedural guidance for surveying and mapping with the NAVSTAR Global Positioning System (GPS). It is intended for use by engineering, planning, operations, real estate, and construction personnel performing georeferenced feature mapping or accurate control surveys for civil works and military construction projects. Procedural and quality control standards are defined to establish Corps-wide uniformity in the use of GPS by hired-labor personnel, construction contractors, and Architect-Engineer (A-E) contractors.

**2. Applicability.** This manual applies to all USACE commands having responsibility for the planning, engineering and design, operation, maintenance, construction, and related real estate and regulatory functions of civil works, military construction, and environmental restoration projects. It applies to GPS survey performance by both hired-labor forces and contracted survey forces. It is also applicable to surveys performed or procured by local interest groups under various cooperative or cost-sharing agreements.

**3. Discussion.** GPS surveying is a process by which highly accurate, three-dimensional point positions are determined from signals received from satellites. GPS-derived positions may be used to provide the primary reference control monument locations for engineering and construction projects, from which detailed site plan topographic mapping, boundary demarcation, and construction alignment work may be performed using conventional surveying instruments and procedures. GPS surveying also has application in the precise positioning of marine floating plant and photogrammetric mapping aircraft, and in monitoring structural deformations of locks and dams. GPS control surveying techniques are also used for the rapid, real-time geospatial feature mapping of wetlands, facilities, utilities, and related geographical information system (GIS) products. USACE commands first began using GPS in 1983, primarily for establishing precise positions on fixed monuments to control navigation and military construction projects. In the early 1990s, commands began using dynamic GPS for real-time control of hydrographic survey vessels and dredges, and real-time topographic mapping. In the later 1990s, GPS applications expanded to precise airborne positioning for photogrammetric mapping and Light Detection and Ranging (LIDAR) terrain modeling applications. Simply operated hand-held GPS receivers using wide-area augmentation networks will now provide accurate, real-time geospatial coordinate and feature data for an expanding and unlimited number of USACE positioning and navigation applications.

FOR THE COMMANDER:



MICHAEL J. WALSH  
Colonel, Corps of Engineers  
Chief of Staff

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