DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF:

CEMVN-ED

26 October 2000

MEMORANDUM FOR Chief, Engineering Division, Mississippi Valley Division, P. O. Box 80, Vicksburg, MS 39181-0080

SUBJECT: CEMVN-ED Policy Letter of 1985 - NGS Benchmarks

1. Reference subject policy letter, and endorsements thereto, copy attached.

2. The New Orleans District has been abiding by the policy outlined in the referenced letter since its approval by the Division Office. In the 15 years since adopting this policy, the NGS has no longer performed the surveying of our reference benchmarks to publish new epochs and, most assuredly, we have witnessed continued subsidence. Until recently there has been very little alternative for maintaining accurate vertical control.

3. This district has recently hired an expert cartographer and geographer (Mr. Clifford Mugnier) to assist us on this issue. He has presented us with a proposal to implement and operate GPS Continuously Operating Reference Stations (CORS), which will measure gravity and accommodate subsidence, (See Attached, "GPS Leveling In The Gulf Coast Region"). This system will need to be validated with absolute gravity observations. We intend to implement this proposal and to cooperate with state and other federal agencies in South LA in establishing a network of CORS located at sites of mutual benefit. This vertical control network will provide the means for maintaining accurate vertical control.

4. It is becoming increasingly untenable to maintain the existing policy. We are proposing to use the NAVD88 for future work on all projects (Federal Register extract attached). All of our partners are using this datum for their work, and the existing policy is causing great confusion. We propose to abandon the 1985 policy and request your oncurrence. We intend to evaluate the impacts of this on a project-by-project basis, and will take appropriate mitigation actions.

Encls

Robert J Fowler, P.E.
for Gerard S. Satterlee, P.E.
Chief, Engineering Division

CF:
CEMVN-CD
CEMVN-OD
CEMVN-DE

GPS LEVELING IN THE GULF COAST REGION

The Height Modernization Program of the National Geodetic Survey (NGS) is made possible by the development of "GEOID99," the mathematical model of the equipotential gravity field of the United States. GPS Leveling is a procedure that utilizes this concept, but requires independent validation and observation of benchmark velocities in regions of crustal motion. The ability to independently observe and measure subsidence with changes in Absolute Gravity is a new technology applicable to the Gulf Coast Region. GPS Continuously Operating Reference Stations (CORS) do record the variation in their own three-dimensional coordinates. However only the independent measurement of changes in Absolute Gravity allow the validation of the vertical component of CORS sites in a subsidence-prone region for short-term use. It is thought that 4 to 5 years of CORS site operation in a subsidence area will provide some validation of vertical movement of the CORS site itself, but short-term variations of subsidence rates can be masked by noise. The independent determination of changes in elevation by observing changes in the absolute gravity at the same point provide that physical certainty.

For an area of crustal motion, GPS Leveling must be accomplished by GPS observation of benchmarks for 30 minutes on one day, (say in the morning), and for 30 minutes the following day, in the afternoon. The two observation periods separated by a day insure that the GPS constellation above the observer's local horizon will be substantially different and free of geometric bias in a simultaneous post-processed solution. The maximum distance from a mobile observer using a dual-frequency geodetic survey-grade GPS receiver to a CORS site is 50 statute miles. The accuracy achieved with proper post-processing is **two centimeters vertical**. This represents the state of the art if each CORS site is validated with the observation of Absolute Gravity every year at each CORS site.

The data collected at each CORS site must be edited and adjusted on a daily basis and submitted electronically to the National Geodetic Survey. Acceptance and publication of the observed data from each CORS site by NGS constitutes the establishment of the national infrastructure of geodetic control with today's technology. LSU will provide the daily data processing support, the continuous observation of Absolute Gravity at LSU and on a rotating basis at all CORS sites, and the establishment of fiducial benchmarks. Fiducial benchmarks will be established and periodically re-observed at strategic locations throughout the NOD with GPS Leveling procedures and observation of Absolute Gravity with outdoor portable instruments.