

MAY 15 2014

## MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Addendum to Revised Vertical Control Requirements for USACE Projects (Engineering Division Datum Policy Memo #2)

1. This document provides updates to the following:

a. CEMVN-ED-S, memo, dated 1 December 2008, SUBJECT: Revised Vertical Control Requirements for USACE Projects (Engineering Division Datum Policy Memo #2).

b. The purpose of this memo is to provide updates to Engineering Division Datum Policy Memo #2 (Encl) based on recent changes by the National Geodetic Survey (NGS), publishing a new geoid model and a new NAVD88 epoch (2009.55).

2. Background on Geoid and Change in the Required Project Datum for the New Orleans to Venice (NOV) and Non-Federal Levee Incorporation into NOV (NF):

a. NGS is committed to defining and maintaining the National Spatial Reference System, and providing updated elevations on benchmarks for the nation. NGS periodically re-observes survey control monuments in Southern Louisiana and publishes new NAVD88 elevations (referred to as a Height Modernization Project). These updated elevations are published to represent the most current and most accurately defined benchmark elevations above or below the NAVD88 datum. Each update is designated with an epoch (or time stamp) of NAVD88.

b. NGS also periodically publishes new geoid models in order to improve the accuracy of GPS-derived elevations. These new geoid models are incorporated into each Height Modernization Project, and the resulting NAVD88 elevations are determined relative to this most current geoid model.

c. As referenced in the Engineering Division Datum Policy Memo #2, (Encl), Paragraph 1.a; the datum/epoch that was current when initiating design efforts for the "existing hurricane protection projects" was NAVD88 (2004.65). This datum/epoch was published using the geoid model that was current at that time (GEOID03).

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d. NGS published a new geoid model in July 2012 (GEOID12A), and the results of a new Height Modernization Project in March 2013. The Height Modernization results were adjusted using GEOID12A, and were published as NAVD88 (2009.55).

e. The published changes in the NOV-NF project area are too significant to continue referencing the previously stated project datum/epoch of NAVD88 (2004.65). The elevations at project control points also changed in different magnitudes along the project area (from +0.16 feet to -1.05 feet), making attempts to adjust newly collected data back to the project datum/epoch impossible. Therefore, the project datum/epoch for NOV-NF is changed to NAVD88 (2009.55).

3. Updates to Engineering Division Datum Policy Memo #2 to incorporate this change:

a. Reference 2.d shall reflect the memo being dated 23 March 2009, which superseded the 1 December 2008 memo which was originally referenced.

b. See enclosure, first sentence shall read **"The region's vertical control network is periodically readjusted to develop current elevations (e.g. NAVD88 (2003), NAVD88 (2004.65), NAVD88 (2006.81), NAVD88 (2009.55)) in response to subsidence, and to incorporate changes in the geoid model."**

c. See enclosure, Paragraph 1.a shall no longer reference New Orleans to Venice as one of the projects referencing NAVD88 (2004.65).

d. See enclosure, Paragraph 1.a, last sentence shall be updated to read **"Elevations shall be periodically collected and assessed to monitor actual subsidence versus estimated subsidence, as well as to document changes in elevations due to other factors (i.e. new geoid model)"**.

e. See enclosure, Paragraph 1.g shall be added as follows: **"New Orleans to Venice (NOV) and Non-Federal Levee Incorporation into NOV Hurricane and Storm Damage Risk Reduction System Project shall use NAVD88 (2009.55) as the project datum and epoch. Elevations shall be periodically collected and assessed to monitor actual subsidence versus estimated subsidence, as well as**

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**subsidence, as well as to document changes in elevations due to other factors  
(i.e. new geoid model)".**

4. These changes are effective immediately. An updated (Encl) 1 is enclosed with  
above referenced changed incorporated.

5. Questions regarding the required vertical control requirements may be addressed to  
the District Datum Coordinator, Design Services Branch, Mr. Joshua Hardy (x 1852).

Encl  
as

  
MARK R. HOAGUE, P.E.  
Chief, Engineering Division

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SUBJECT: Revised Vertical Control Requirements for USACE Projects (Engineering Division Datum Policy Memo #2)

1. This document supersedes the following:

a. CEMVN-ED, memo, dated 11 April 2002, SUBJECT: Vertical Control and Permanent Benchmarks.

b. CEMVN-ED, memo, dated 20 December 2002, SUBJECT: Vertical Datum Policy.

2. References:

a. CECW-CE, memo, dated 04 December 2006, SUBJECT: Implementation of Findings from the Interagency Performance Evaluation Task Force (IPET) for Evaluating Vertical Datums and Subsidence/Sea Level Rise Impacts on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects.

b. CECW-CE, Engineer Circular, 1110-2-6065, dated 01 July 2007, SUBJECT: Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects.

c. CEMVN-ED-S, memo, dated 3 October 2008, SUBJECT: Assignment of District Datum Coordinator Role and Authority (District Datum Policy Memo #1).

d. CEMVN-ED-S, memo, dated 1 December 2008, SUBJECT: Requirement for Use of Benchmarks for USACE Projects (Engineering Division Datum Policy Memo #3).

3. The purpose of this memorandum is to update the vertical control requirements for USACE projects in order to implement the lessons learned from the IPET report and the resulting directive for project evaluations of vertical datums (Reference 2b).

4. The region's vertical control is periodically readjusted to develop current elevations based on updated datums and epochs (e.g. NAVD88 (2003), NAVD88 (2004.65), NAVD88 (2006.81)) in response to subsidence. Enclosure 1 indicates the appropriate project datum / epoch to use based on project type and location.

5. Design and construction documents must document the estimated rate of subsidence, project benchmarks, seasonal variation of local mean sea level, unit of measure, datum, and gaging

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stations used for determination of tidal/hydraulic datum for use in future reevaluations of the vertical datum to be conducted at each scheduled periodic inspection.

6. All design and construction documents shall be certified and signed by the District's Datum Coordinator (DDC) for compliance to this policy and References 2a, 2b and 2d.

7. All surveying activities within the District boundaries shall be coordinated through the DDC. All contracted design work utilizing independent survey collection or independent gaging shall provide a Survey Plan, to be approved by the DDC, prior to data collection. All surveying activities within the District boundaries shall be performed in accordance with the published USACE MVN Minimum Surveying Guidelines which can be found at <http://www.mvn.usace.army.mil/ed/edss/surveyingguidelines.asp>. All collected or obtained survey deliverables shall be routed to Survey Section within 5 working days for quality assurance, database incorporation, and archival in EGIS and the District's archival system (e.g. ProjectWise).

8. Subsequent periodic reevaluations of project reference elevations and related datums shall be included as an integral component of the Periodic Inspection Program, Quality Assurance Program, Dam Safety Program, or Levee Safety Program, as appropriate. The frequency of these reevaluations is a function of estimated magnitude of geophysical changes that could impact flood protection or navigation grades. See enclosure 1 for more details.

9. All spatial data shall be collected relative to the latest datum/epoch with direct geodetic ties to project control such that the elevations can be converted back to the project design datum and epoch. This will provide current elevations to validate the estimated subsidence rate utilized during design. The direct tie to the existing project vertical control will provide the conversion factor for conversion back to the design datum.

10. These policies are effective immediately.

11. Questions regarding the required vertical control requirements may be addressed to the DDC, Design Services Branch, Mr. Josh Hardy (x1852).

Encl

  
WALTER O. BAUMY, P.E.  
Chief, Engineering Division

DISTRIBUTION:  
Chief, CECW-CE  
Commander, Mississippi Valley Division  
Director, Task Force Hope

(CONT)

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Datum Policy Memo #2)

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**Enclosure 1: (to CEMVN-ED-S, memo, dated 1 December 2008, SUBJECT:  
Revised Vertical Control Requirements for USACE Projects  
(Engineering Division Datum Policy Memo #2))**

**Vertical Control Requirements for USACE Projects  
(Revised 12 May 2014)**

The region's vertical control network is periodically readjusted to develop current elevations (e.g. NAVD88 (2003), NAVD88 (2004.65), NAVD88 (2006.81), NAVD88 (2009.55)) in response to subsidence, and to incorporate changes in the geoid model. This process affects projects whose construction spans many years and therefore spans several vertical control adjustments. If each phase of construction were to use the latest adjusted elevations, projects would have segments using varying reference surfaces causing an uneven design grades. Regional subsidence and its effect on the design grades of USACE projects necessitates consideration of the vertical control as it relates to project design, construction, inspection, and maintenance.

1. All project design grades shall incorporate the estimated amount of subsidence/sea level rise for the project's lifecycle, 50 years in most cases. With this estimated subsidence and sea level rise factored into design grades, the use of the design's reference elevation throughout project lifecycles will not affect the intended design grade/protection level. Accordingly the following actions are required:
  - a. Existing hurricane protection projects (Lake Pontchartrain and Vicinity, Grand Isle and Vicinity, Larose to Golden Meadow, West Bank and Vicinity, Morganza to the Gulf, and Morgan City and Vicinity) shall use the project datum, elevation, and epoch at the time of initiating design efforts (i.e. NAVD88 (2004.65)). Elevations shall be periodically collected and assessed to monitor actual subsidence versus estimated subsidence, as well as to document changes in elevations due to other factors (i.e. new geoid model).
  - b. New hurricane protection projects authorized after the date of this policy memo shall use the latest available datum, elevation, and epoch for design and construction (e.g. NAVD88 (2006.81) or newer).
  - c. Flood control protection projects shall use the datum, elevation, and epoch consistent with the compatible flow line, where required (e.g. NAVD88 (2004.65) or newer).
  - d. Coastal navigation projects design and maintenance shall be referenced to the latest available Mean Lower Low Water (MLLW) elevations published by the National Oceanic and Atmospheric Administration (e.g. MLLW 2002-2006).

- e. Mississippi River and Atchafalaya River, LA (excluding Bayous Chene, Boeuf, and Black) navigation projects design and maintenance shall be referenced to the latest approved Low Water Reference Plane (currently Mississippi River LWRP – 2007 and Atchafalaya River LWRP - 2000).
  - f. All other existing projects not referenced in above paragraphs shall use the project datum, elevation, and epoch at the time of initiating design efforts (i.e. NAVD88 (2004.65)). All other new projects authorized after the date of this policy memo not referenced in above paragraphs shall use the latest available datum, elevation, and epoch for design and construction (e.g. NAVD88 (2006.81) or newer).
  - g. New Orleans to Venice (NOV) and Non-Federal Levee Incorporation into NOV (NFL) Hurricane and Storm Damage Risk Reduction System Projects shall use NAVD88 (2009.55) as the project datum and epoch. Elevations shall be periodically collected and assessed to monitor actual subsidence versus estimated subsidence, as well as to document changes in elevations due to other factors (i.e. new geoid model).
2. Consideration for subsidence extends to the District's stream gaging program, since gages are also subsiding thereby causing higher water level readings. All automatic gages, including data collection platform (DCP) gages, shall be inspected yearly and gage offsets to the latest available adjustment will be calculated. These offsets will be used to adjust raw gage readings to the desired datum and epoch, as needed, and shall be maintained in a database by Hydraulics and Hydrologic Branch. All staff gages shall document the current elevation upon inspection, and updated gage offset values will be calculated. High water staff gages on the Mississippi River shall be inspected annually. Other high water staff gages shall be inspected every three years. Hydraulics and Hydrologic Branch shall coordinate with USGS, NOAA, the State of Louisiana and other gage operators to facilitate discussions, exchange information, and improve awareness of datums.
3. Subsequent periodic reevaluations of project reference elevations and related datums shall be included as an integral component of the Periodic Inspection Program, Quality Assurance Program, Dam Safety Program, or Levee Safety Program, as appropriate. The frequency of these reevaluations is a function of estimated magnitude of geophysical changes that could impact flood protection or navigation grades. For project design water levels a reevaluation shall be performed by H&H Branch every 10 years or after a major flood or storm event. Any uncertainties in protection levels that are identified during the inspection will also need to be incorporated into any applicable risk/reliability models developed for the project (Ref: EM 1110-2-1619, Risk Based Analysis for Flood Damage Reduction Studies). Details on these periodic reevaluations will be provided in subsequent guidance.