

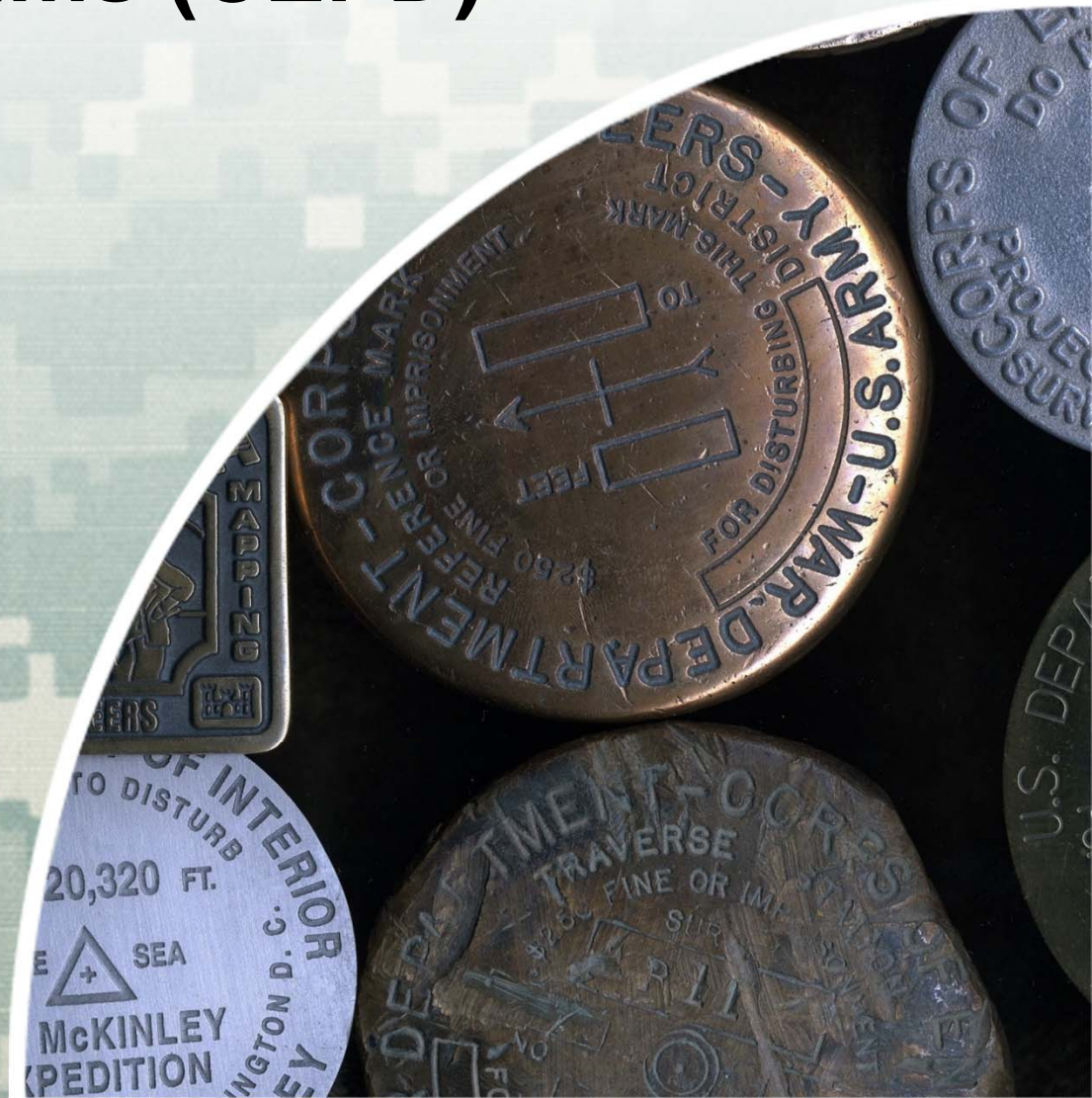
# Overview and Update of the Comprehensive Evaluation of Project Datums (CEPD)

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**Chief Geomatics Section**  
**Alaska District**  
**U.S. Army Corps of Engineers**

**September 6, 2012**



**US Army Corps of Engineers**  
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US Army Corps  
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# Performance Evaluation of the New Orleans and Southeast Louisiana Hurricane Protection System

## Final Report of the Interagency Performance Evaluation Task Force

### Volume II – Geodetic Vertical and Water Level Datums

26 March 2007

**FINAL**

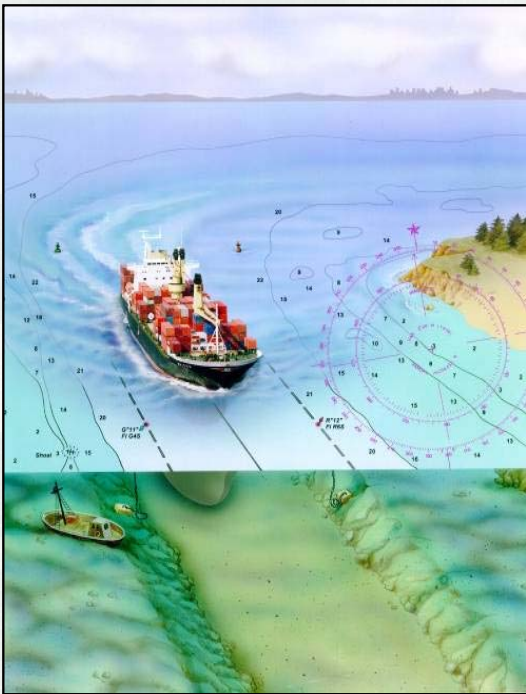


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# Key Points

- **Interagency Performance Evaluation Task Force (IPET)**
  - Little Or No Metadata On Design Documents
  - Use Of Datums Was Inconsistent
  - Designed To Water Surface – Built To NGVD29
- **Comprehensive Evaluation of Project Datums (CEPD)**
  - New Orleans Is Not The Only District With Problems
- **NSRS Regulation (ER 1110-2-8160)**  
“Policies For Referencing Project Elevation Grades To Nationwide Vertical Datums”



# ER 1110-2-8160

CECW-CE  
CECW-CO  
CECW-P

Regulation  
No. 1110-2-8160

DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
Washington, DC 20314-1000

ER 1110-2-8160

1 March 2009

## Engineering and Design POLICIES FOR REFERENCING PROJECT ELEVATION GRADES TO NATIONWIDE VERTICAL DATUMS

**I. Purpose.** This regulation establishes U.S. Army Corps of Engineers (USACE) policies for referencing project elevation grades to nationwide vertical datums established and maintained by the U.S. Department of Commerce. Its purpose is to ensure that controlling elevations and local datums on USACE projects are properly and accurately referenced to nationwide spatial reference systems used by other Federal, state, and local agencies responsible for flood forecasting, inundation modeling, flood insurance rate maps, navigation channels, and

igation Projects. Designed, constructed, dredged, and maintained navigation coastal areas shall be directly referenced to a local Mean Lower Low Water (MLLW) or the latest NTDE as defined by NOAA for the project area.

**Risk Management, Navigation, and Water Control Systems** (to include multipurpose hydropower projects, locks and dams, and non-tidal inland). Designed or constructed flood protection or navigation clearance grades, dynamic water surface profiles, river or pool stages, and stream gages in and water control systems shall be accurately referenced to the NSRS (e.g.,

**Restoration and Regulatory Permitting Actions.** Ecosystem restoration (i.e., compensatory mitigation projects, or regulatory permitting activities that add or non-tidal datums shall be defined to a current NSRS, MLLW, or MHW) are to local, state, and federal requirements.

ER 1110-2-8160  
1 Mar 09

**Subject to High Subsidence Rates.** Project datums and controlling protective is in high subsidence areas require special consideration during PED and must be ally reevaluated and updated after construction. This also applies to areas subject to uplift or earthquakes. Vertical elevations of permanent benchmarks, water level gages, dredging grades, and HSPF flood protection structures must be continuously monitored, and settlement, and loss of protection/clearance. In high subsidence areas, long-term, time-dependent local vertical geodetic control networks and short-term (5-year) cts have been established for those purposes.

**and Reliability Models.** The relative accuracies and uncertainties of reference datums (e.g., national datum, local datum, or benchmark, floodwall, levee, navigation datum,

## NSRS Regulation “POLICIES FOR REFERENCING PROJECT ELEVATION GRADES TO NATIONWIDE VERTICAL DATUMS”

referenced to local or superseded datums (e.g., NGVD29, MSL), the current NSRS, and/or hydraulic tidal datums, shall be established as outlined below.

a. **Hurricane & Shore Protection Projects (HSPF).** In coastal areas subject to tidal influence, hurricane and shore protection design or constructed grades shall be directly referenced to NWLON tidal gages and coastal hydrodynamic tidal models established and maintained by the U.S. Department of Commerce (NOAA).

enced to other, superseded datums that are no longer supported by the U.S. source (e.g., NGVD29, MSL, SLD 1929, MSL, 1912, USGS, Cairo Datum, etc.). These older reference datums typically have unknown origins and may contain grade errors relative to updated NSRS and NWLON datums used by USACE. Legacy datums are, however, often critical to long-term hydrologic and are the baseline reference cited in FEMA flood insurance rate maps, maps, emergency operation & maintenance manuals, flood profile models, inundation models, or as-built drawings. The relationship between these metric or hydraulic reference datums and the current nationwide framework of the U.S. Department of Commerce must be accurately modeled, documented in the kept current, especially in high subsidence areas. Long-term effort must be transition from legacy reference datum grades to the NSRS.

COMMANDER:

*S.L. Hill*  
STEPHEN L. HILL  
Colonel, Corps of Engineers  
Chief of Staff



***“We have a professional and ethical obligation...to ensure that they [our projects] are correctly designed, constructed, and maintained on the proper vertical datums to compensate for subsidence/sea level rise in order to provide appropriate flood and hurricane protection and navigation depths.”***

- **Lieutenant General Carl A. Strock, Memorandum For Major Subordinate Commands, December 2006**





# **CEPD Purpose & Objective**

- **Implements lessons learned from Hurricane Katrina IPET Report ... reference CG memo dated 4 Dec 06**
- **Evaluate:**
  - **Accuracy of flood protection system and navigation project elevations**
  - **Adequacy of elevation connections with US Dept of Commerce (NOAA) federal geodetic & water level reference systems**
- **Provide HQUSACE with report on results and estimated cost & date to correct deficiencies**
- **Support National Levee Database Inventory**

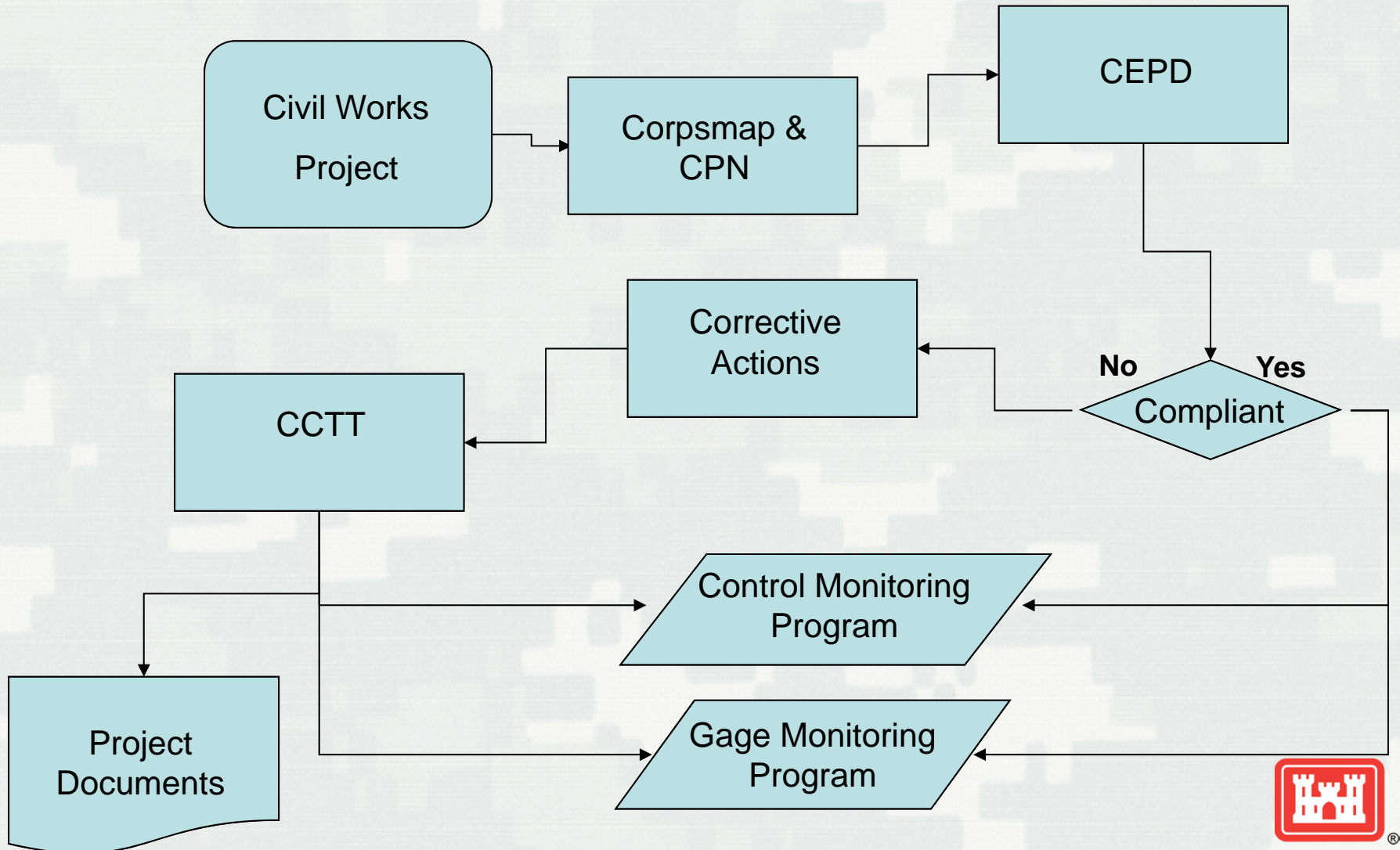


# CEPD Project Requirements

- **All Tidal Projects Vertical Datums must be updated based on current published NOAA/NOS datum and referenced to MLLW based on the 1983-2001 tidal epoch.**
- **All Project Horizontal Control must be based on NAD83 holding published NGS/NSRS values.**
- **All Projects must have a Minimum of Two Primary Control Points with elevations based on NAVD88 holding published NGS/NSRS values.**



# CEPD Work Flow

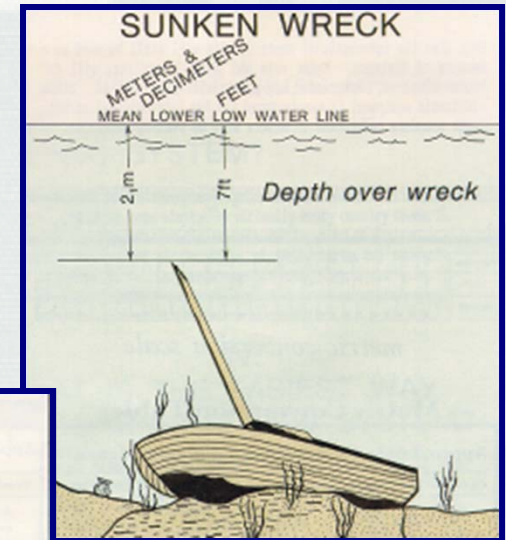
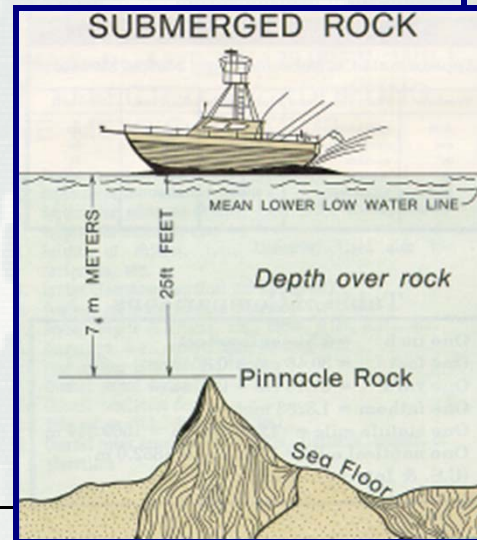
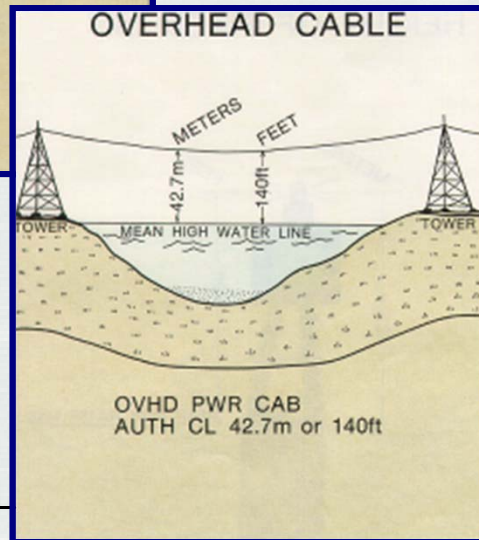
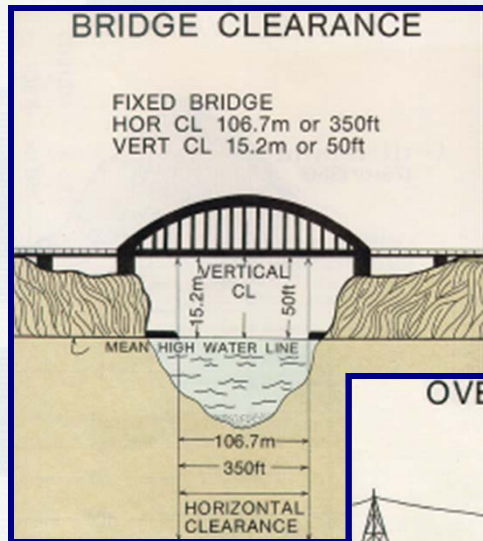




# Tidal Datum Significance?

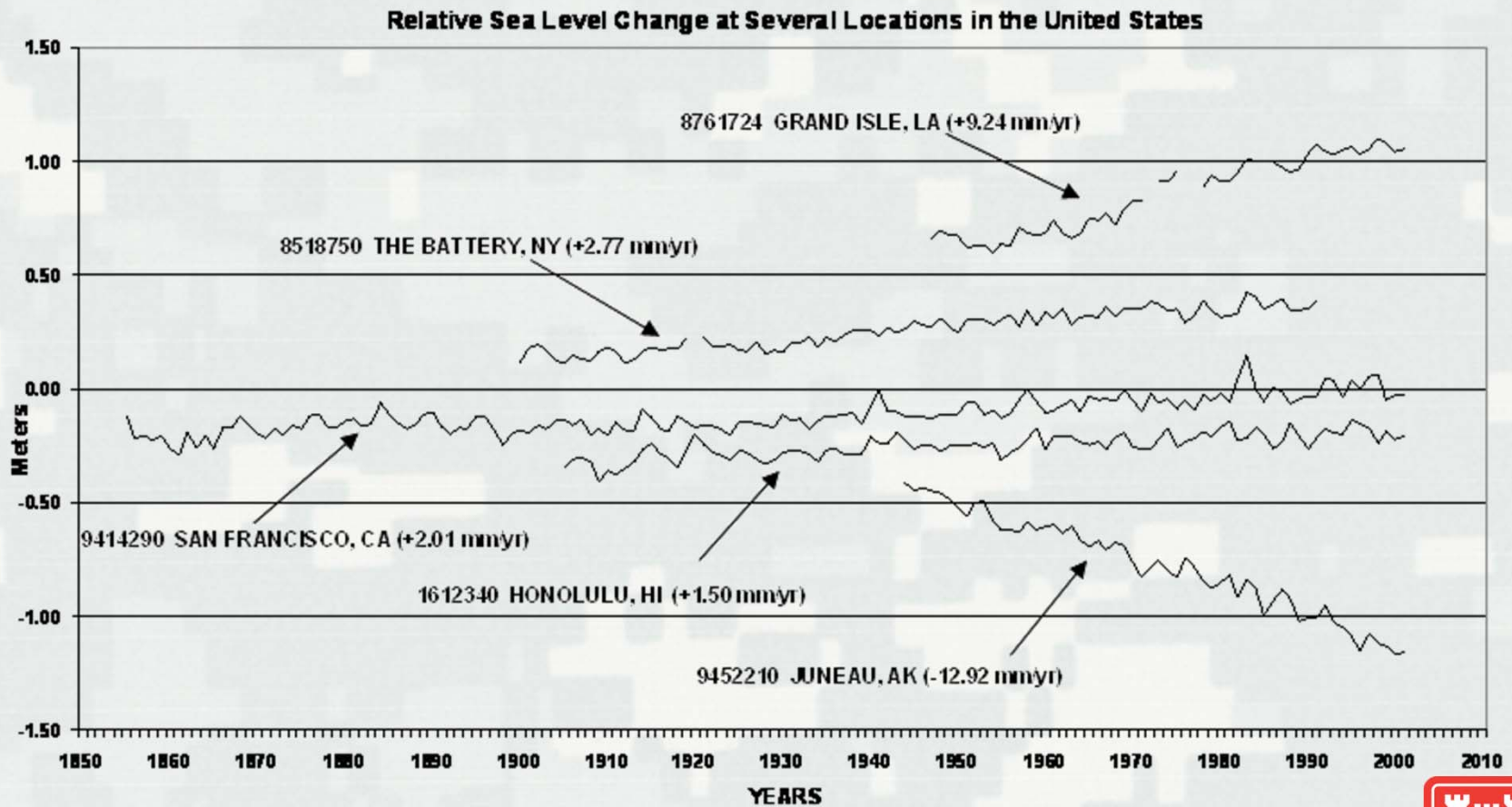
Subsidence and uplift both affect the relationship between the water surface and structures and hazards.

This relationship should be monitored and documented!

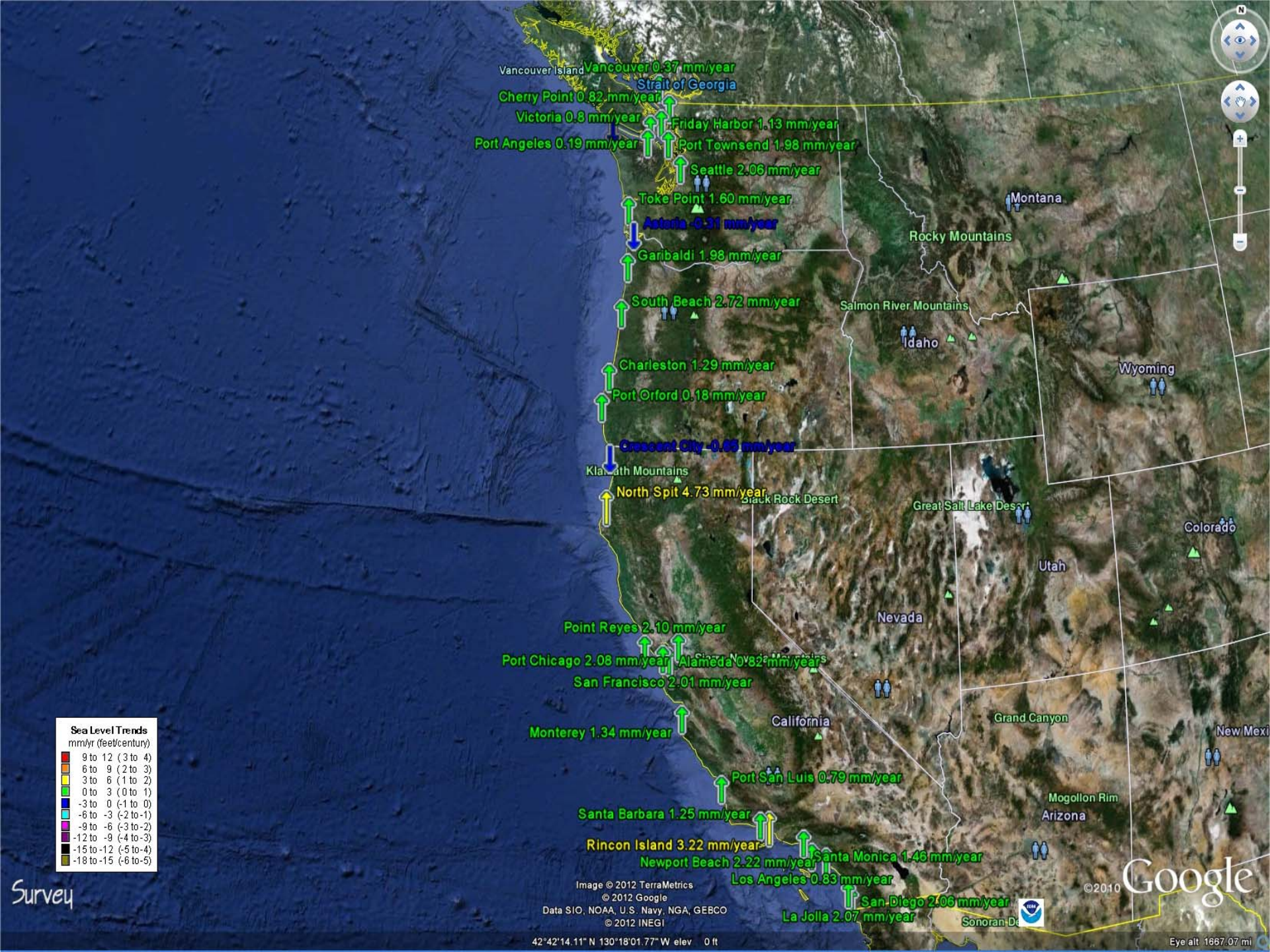


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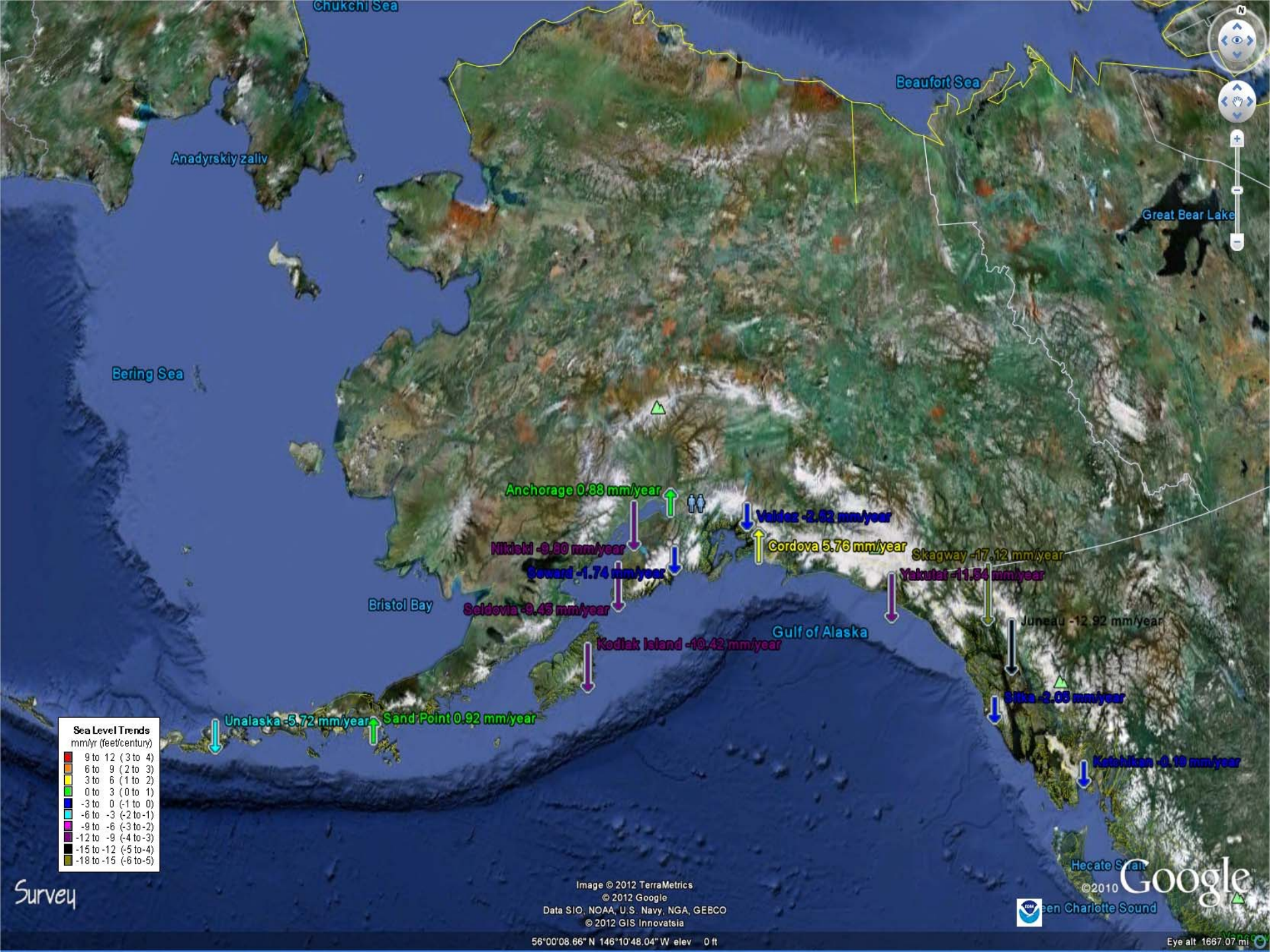
# Relative Sea Level Change











Anadyrskiy zaliv

Beaufort Sea

Great Bear Lake

Bering Sea

Anchorage 0.88 mm/year

Valdez -2.62 mm/year

Nikolski -9.80 mm/year

Cordova 5.76 mm/year

Seward -1.74 mm/year

Skagway -17.12 mm/year

Seldovia -9.45 mm/year

Yakutat -11.94 mm/year

Bristol Bay

Gulf of Alaska

Kodiak Island -10.42 mm/year

Juneau -12.92 mm/year

Unalaska -5.72 mm/year

Sand Point 0.92 mm/year

Sitka -2.05 mm/year

Ketchikan -8.16 mm/year

Hecate Strait

Sea Level Trends	
mm/yr (feet/century)	
9 to 12 (3 to 4)	
6 to 9 (2 to 3)	
3 to 6 (1 to 2)	
0 to 3 (0 to 1)	
-3 to 0 (-1 to 0)	
-6 to -3 (-2 to -1)	
-9 to -6 (-3 to -2)	
-12 to -9 (-4 to -3)	
-15 to -12 (-5 to -4)	
-18 to -15 (-6 to -5)	

Image © 2012 TerraMetrics

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Data SIO, NOAA, U.S. Navy, NGA, GEBCO

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56°00'08.66" N 146°10'48.04" W elev 0 ft



© 2010

Green Charlotte Sound

Eye alt 1667.07 mi

# CEPD Status

## Alaska District:

53	District Projects Evaluated...
42	Navigation Projects
14	District Navigation Projects Compliant

## Honolulu District:

76	District Projects Evaluated...
27	Navigation Projects
26	District Navigation Projects Compliant





# CEPD Status

## **Los Angeles District:**

- 68 District Projects Evaluated...
- 14 Navigation Projects
- 9 District Navigation Projects Compliant

## **Portland District:**

- 40 District Projects Evaluated...
- 21 Navigation Projects
- 10 District Navigation Projects Compliant





# CEPD Status

## **Sacramento District:**

35	District Projects Evaluated...
2	Navigation Projects
0	District Navigation Projects Compliant

## **San Francisco District:**

22	District Projects Evaluated...
16	Navigation Projects
0	District Navigation Projects Compliant



# CEPD Status

## Seattle District:

- 47 District Projects Evaluated...
- 23 Navigation Projects
- 5 District Navigation Projects Compliant



# Questions?



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