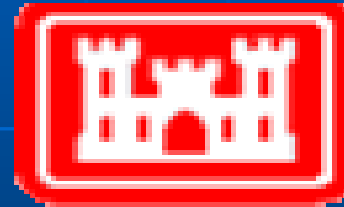


# Geodetic Vertical and Water Level Datum Assessment



**US Army Corps  
of Engineers** ®

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# Difference Between NGVD29 and NAVD88 (2004.65)

This difference is comprised of three factors.

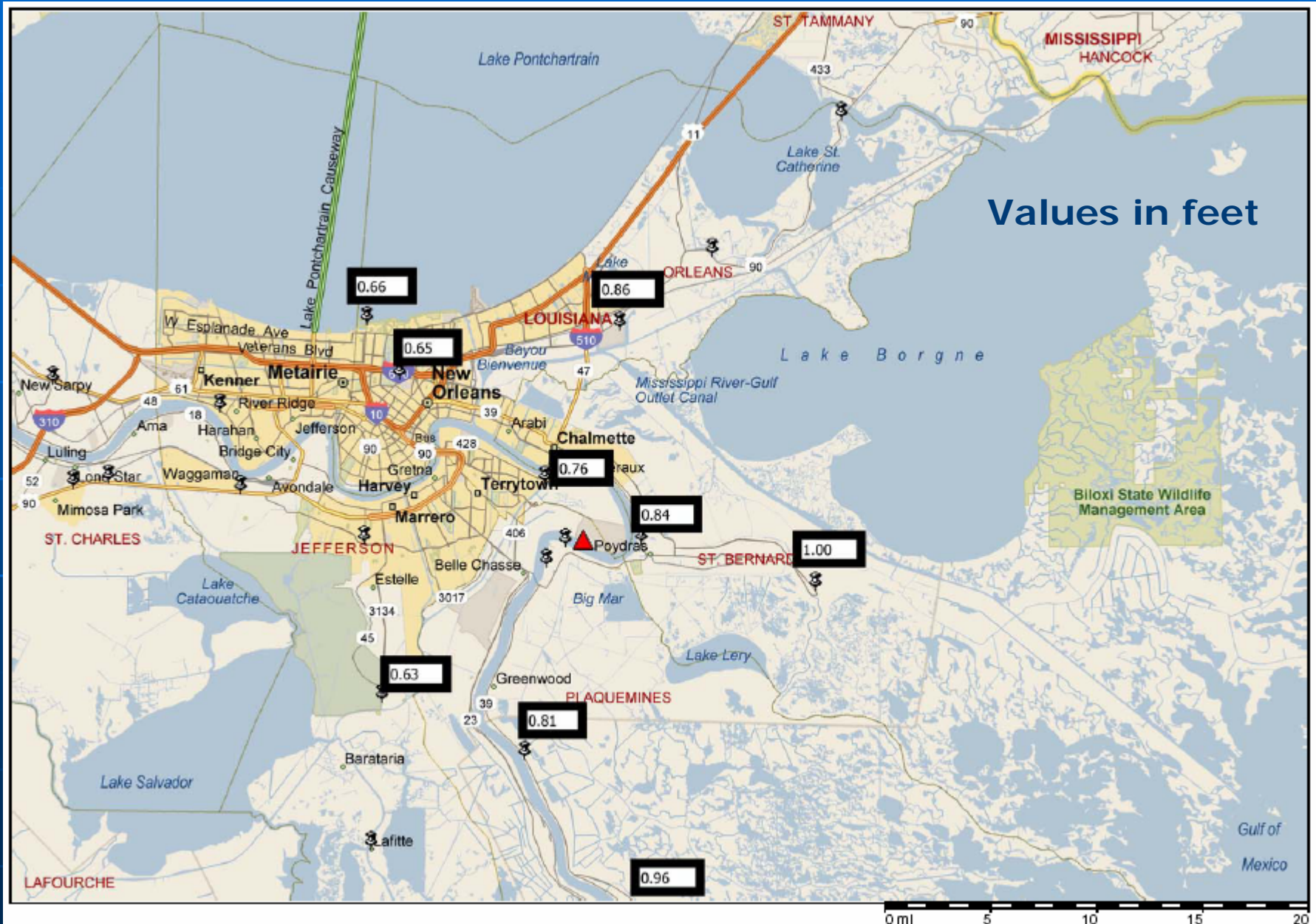
1. ***Datum Shift:*** The reference frame was changed from NGVD29 to NAVD88 (2004.65). This has nothing to do with the physical elevation with respect to sea level. This is only a change in where the elevation is measured from.
2. ***Subsidence:*** Southern Louisiana is sinking due to many factors. This process causes vertical control to become inaccurate as the elevations change, unless monitored.
3. ***Adjustment Error in the Old Elevations:*** Because the marks held fixed were in fact subsiding, the fixed elevations were inaccurate which caused all elevations in the local network to become obsolete. This amount of error is unknown.

***BOTTOM LINE: NGVD (or assumed MSL equivalency) cannot be used as an elevation reference ... the updated NAVD88 (2004.65) epoch and its relationship to current LMSL must be used***

# Subsidence of Gulf Coast

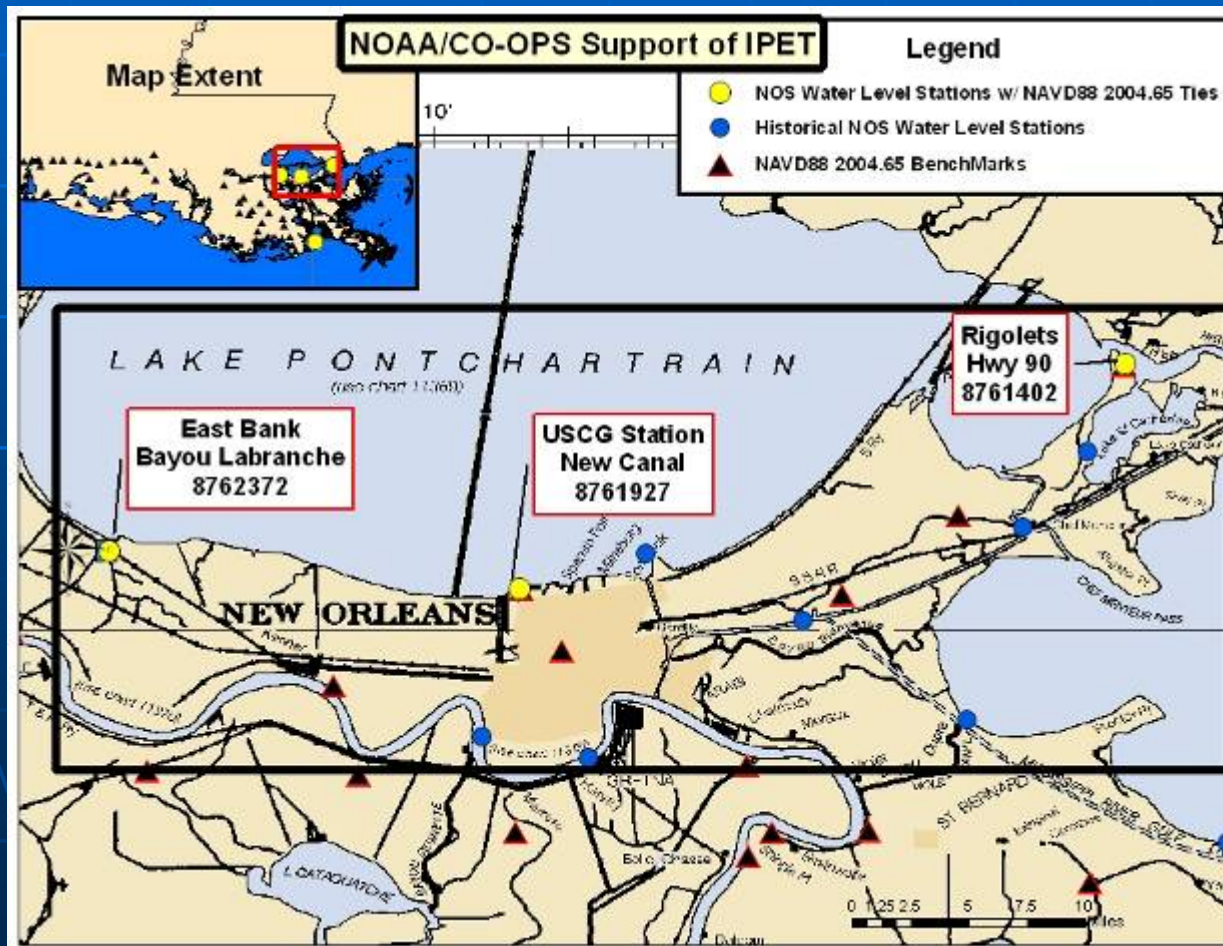
- Entire Gulf Coast region (especially southern Louisiana)
  - Significant and non-linear subsidence rates
  - Considerable uncertainty with regard to relationship between the precise elevations of flood protection structures and the local water surface
  - Need for a relationship between vertical datum and water level (local mean sea level)

# Difference Between NGVD 29 (1991) and NAVD88 (2004.65)



# Relationship Between NOAA Local Mean Sea Level and NAVD88 (2004.65)

<u>Station</u>	<u>LMSL – NAVD88 (2004.65) Difference</u>
Grand Isle	0.2'
Rigolets	0.15'
USCG	0.25'
E Bank, Bayou Labranche	0.4'

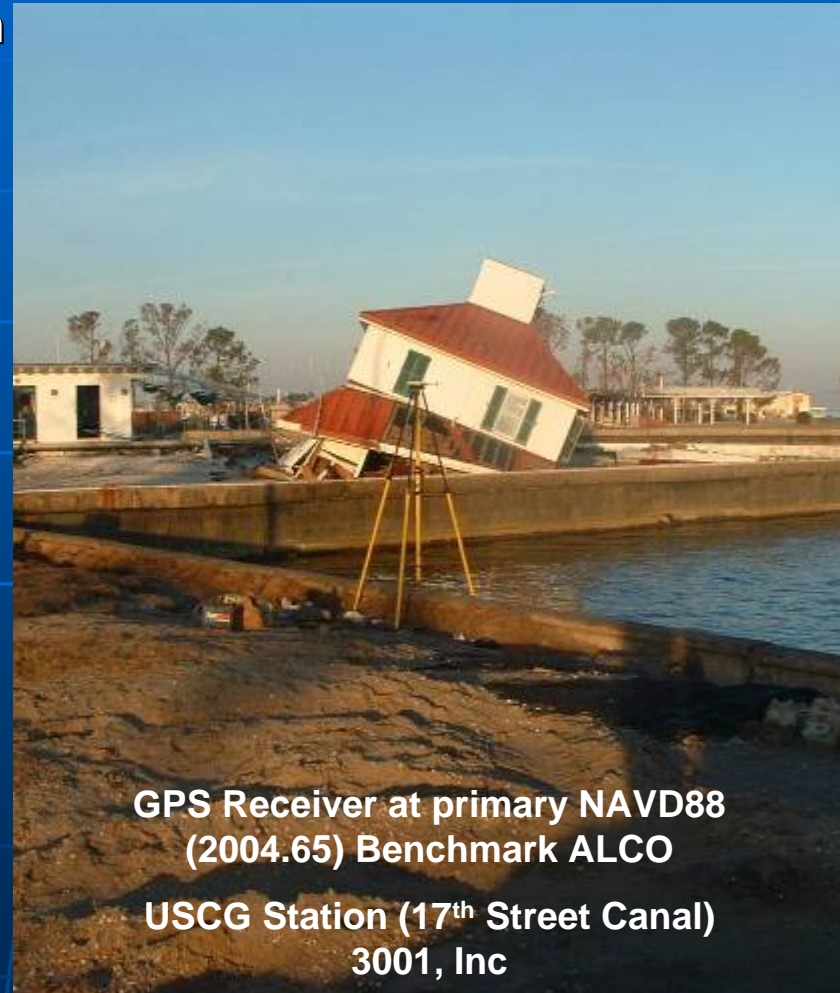


# Objectives

- Incorporate more bench marks into the current vertical reference system NAVD88 (2004.65) epoch
- Reference all elevations to the current NAVD88 (2004.65) epoch such as;
  - Sea levels, river levels, lake levels, structures (pumps), levees, flood walls, models, DEM's, LIDAR, High Water Marks, etc.
- Develop relationships between current NAVD88 (2004.65) epoch and other vertical datums & reference systems in SE Louisiana to include Local Mean Sea Level
- Provide field survey support to other IPET Teams
- Provide education on vertical datums used for Flood Control and Hurricane Protection design and construction

# Approach

- Perform Historical analysis of vertical control used in design and construction
- Use GPS and conventional leveling to:
  - Perform surveys on/around FC & HP structures, pump stations, etc.
  - Update existing elevations to NAVD88 (2004.65)
  - Tie historical and active tide stations to the national geodetic network (water level datums)
- Establish consistent elevation references for all flood control & hurricane protection structures within study area



**GPS Receiver at primary NAVD88  
(2004.65) Benchmark ALCO**

**USCG Station (17<sup>th</sup> Street Canal)  
3001, Inc**

# Status as of 17 Jan 06

- Completed Milestones:
  - *Data Collection Plan*
    - 3 Phases of Field Surveys Defined
    - Statements of Work developed for A-E task orders
  - *Relationship between Local Mean Sea Level and NAVD88 (2004.65) in Report 1*
    - NOAA CO-OPS computed a preliminary relationship between the LMSL and the NAVD88 (2004.65) values for Lake Pontchartrain region
    - Field reconnaissance surveys performed for 75% of the GPS surveys that will connect NOAA tide gages to NAVD88 (2004.65)
    - NOAA, NGS provided historical elevation adjustment showing changes in elevation from NGVD 29 and NAVD 88



# High Water Mark Surveys

## Jefferson, Orleans and St Bernard Parishes

### (Support to CHL / MVN / TF Guardian)

- Tied in approximately 100 time-stamped surge elevations and HWM points throughout Region—100% complete
- Time sequenced (local observer) surge elevations at Orleans Marina (17<sup>th</sup> St Canal) and Lakefront Airport—100% complete
- Consolidated data with MVN H&H/TF Guardian data base of HWMs



### *Orleans Marina (17<sup>th</sup> St Canal) Local Observer's Logged Water Surface Estimates*

11.91 ft 11:00 AM 29 Aug 05

5.61 ft 6:00 AM 29 Aug 05

5.06 ft 4:00 AM 29 Aug 05

3.73 ft 3:00? AM 29 Aug 05

2.97 ft 1:30 AM 29 Aug 05

# Activities in Support to IPET

- Verification of Current & Reconstructed Floodwall Elevations:
  - Established a tidal gage in November 2005 at the 17 Street Canal to monitor current sea level relationships to the newest NAVD88 datum epoch (2004.65). Verified floodwall elevations on Lakefront outfall canals and IHNC relative to this latest tidal and vertical epoch.
- LIDAR Ground Truthing:
  - Currently performing ground truthing surveys throughout the region to calibrate various LIDAR-based elevation models used by TF Guardian.
- Densification of Control Benchmarks:
  - Established approximately 75 vertical benchmarks throughout the region. These control points are being used for TF Guardian construction activities.
- High Water Mark Surveys:
  - IPET HWM surveyed points are being incorporated into the MVN database

# Questions?



High Water Mark Elevation  
5544 St Ferdinand St