



# The Galveston District Transition from Mean Low Tide (MLT) to Mean Lower Low Water (MLLW)

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# ***MLLW Transition***



## **Presentation outline -**

- What datum is now being used and why?
- What is MLLW and why use it?
- Why the transition to MLLW?
- How will the transition be implemented?
- How long will it take?





## Galveston District is presently using Mean Low Tide (MLT) as vertical datum control for navigation projects

- MLT in the context of District projects is a legacy datum dating from the 1960's and is geodetically tied to terrestrial benchmarks
- At inception, MLT was empirically derived and represented the lowest expected water level including *both* astronomical and meteorological forcing.
- Local subsidence over the past ~ 50 years has resulted in the terrestrial reference network now being ~ 1ft lower relative to LMSL





- Mean Lower Low Water – MLLW

The arithmetic mean of the lower low water heights of the tide observed over a specific 19-year Metonic cycle (the NTDE). Only the lower low water of each pair of low waters of a tidal day is included in the mean.

- It is the depth (sounding) datum used on NOAA nautical charts
- It is the *average* minimum *tidal* depth likely to be encountered by maritime operators.





# MLLW Transition



- **Why the transition to MLLW?**

## **USACE-HQ directive**

ER1110-2-8160, 1 March 2009 directs that *all* USACE navigation projects be *directly* referenced to MLLW as determined by the most recent NOAA National Tidal Datum Epoch (NTDE).

Also, “Ecosystem restoration projects, Civil Works compensatory mitigation projects, or regulatory permitting activities that are referenced to tidal or non-tidal datums shall be defined to a current NSRS, MLLW, or MHW datum, as appropriate to local, state, and federal requirements.”





# MLLW Transition



## MLT Datum timeline -

- 1960's – MLT defined by SWG and related to terrestrial monuments
- Subsequent local land subsidence takes terrestrial monumentation downward
- SWG project authorization documents specify MLT datum be used
- Over time, effective project depth increases because of MLT tie to terrestrial monument subsidence
- 2009 USACE-HQ mandates all navigation projects be referenced to NOAA MLLW





When the land subsides, the apparent increase in water level is

# LMSL-2010

Channel Template

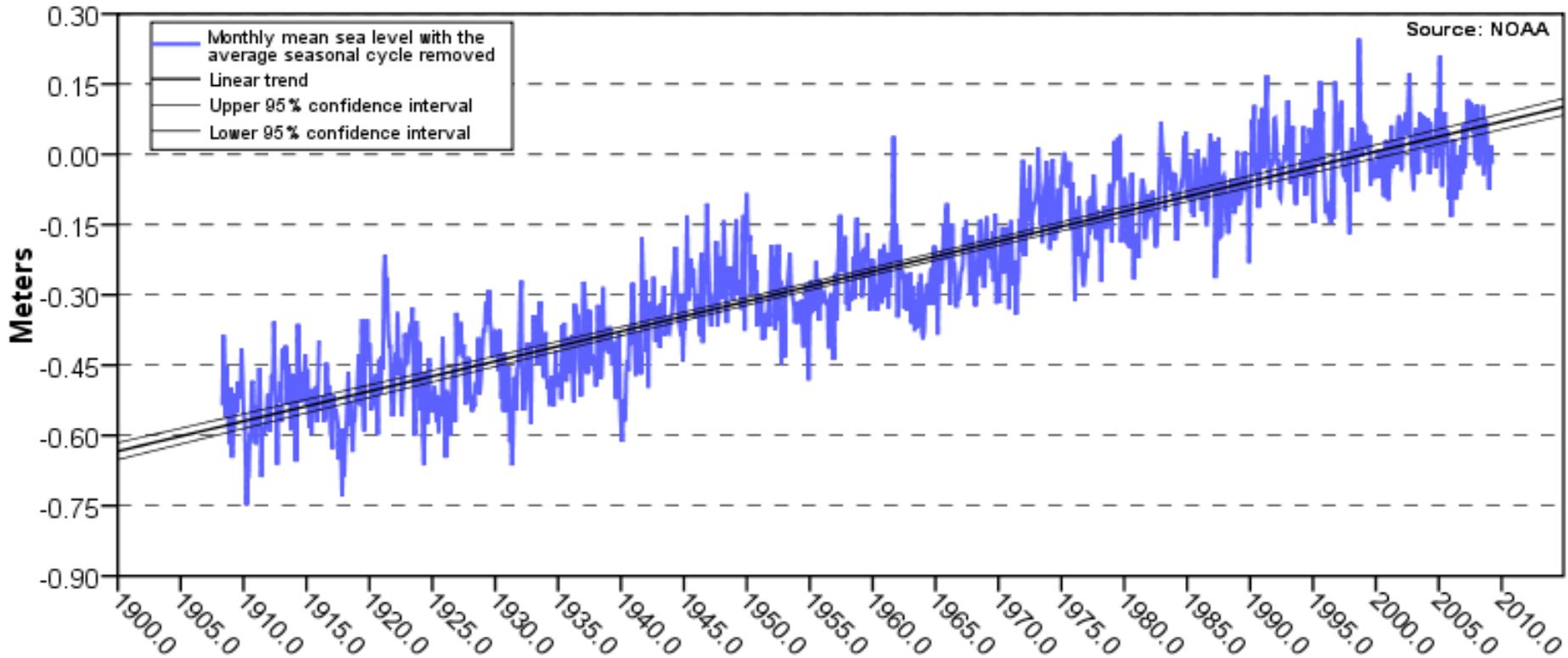




# LMSL rise at Galveston Pier 21



Galveston Pier 21, TX 6.39 +/- 0.28 mm/yr

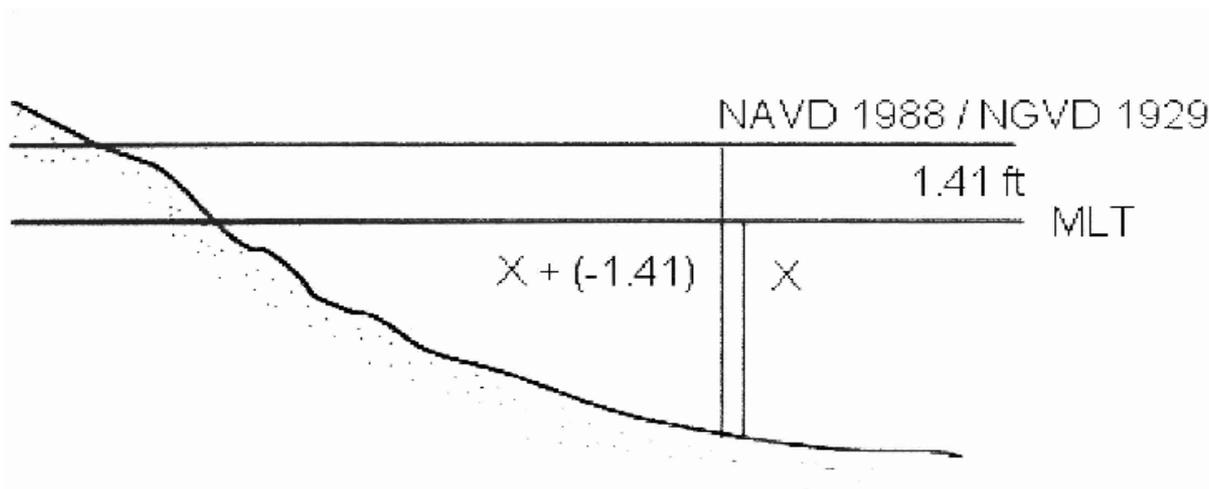


Over a duration of 50 years at 6.39mm/yr = 32.0cm or 1.05ft





# MLT, MLLW, and NAVD88 Relations



Galveston: MLT is 1.41 ft below NAVD 1988.  
Therefore, all points on a profile referenced to MLT  
are 1.41 ft lower than if ref. to NAVD88. Need to add  
-1.41 ft to all elevations on MLT-referenced data  
(e.g., -10.0 MLT = -11.41 NAVD88)

**For NOS Pier 21 tide station, MLLW is -0.14 ft elevation NAVD88  
MLLW is 1.27 ft above MLT  
Primary reference monument is USACE benchmark 7.151**





## **How will the transition be implemented?**

Will be implemented by CESWG under the guidance of the District Datum Coordinator (Terrell Smith, acting).

Southwest Division has requested the District to prepare a “White Paper” on the potential effects of the transition to partners and stakeholders. At issue is interpretation of elements of the directing regulation, ER1110-2-8160.





# *MLLW Transition*



## How long will it take?

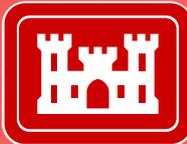
We're not sure – it's a work in progress.

The District will develop a strategy and communication plan, through using public forums and meetings, to keep partners, stakeholders, and the general public informed of the net effects of the transition.

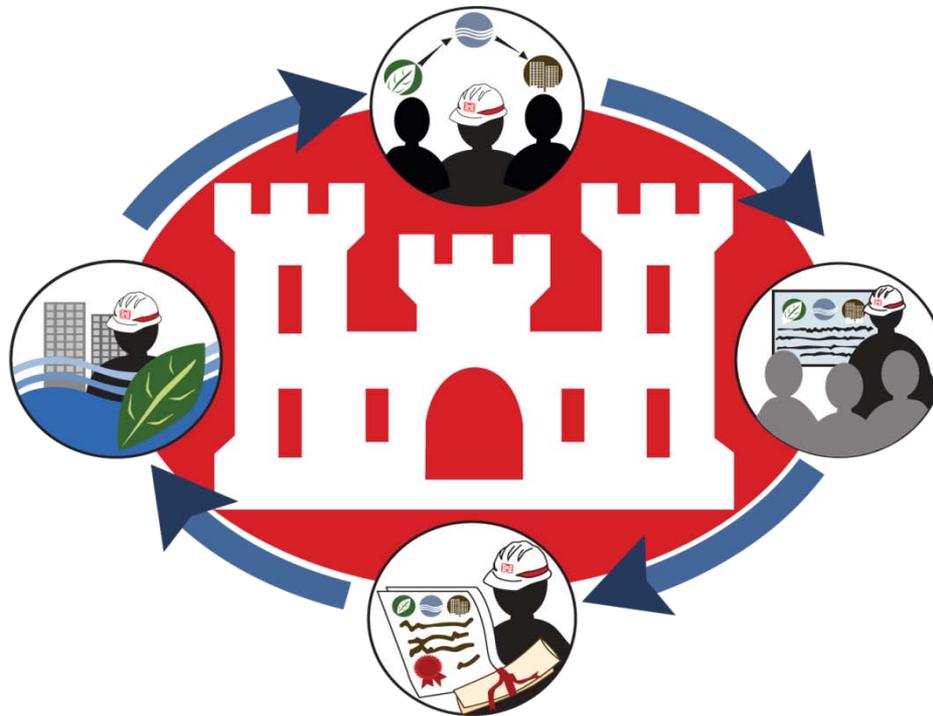




# MLLW Transition



## Questions?





# ***MLLW Transition***

