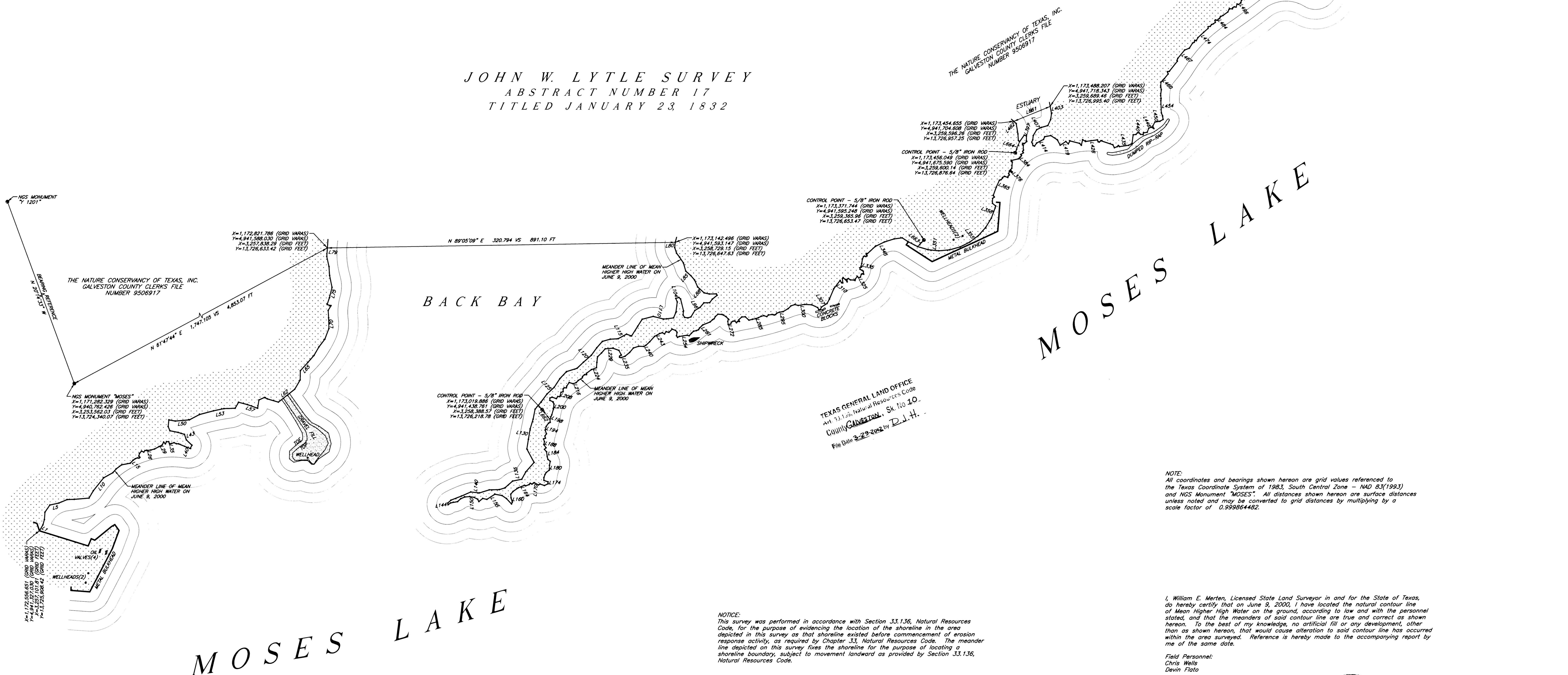


A SURVEY OF THE LINE OF  
MEAN HIGHER HIGH WATER  
IN THE JOHN W. LYTLE SURVEY  
GALVESTON COUNTY, TEXAS

JOHN W. LYTLE SURVEY  
ABSTRACT NUMBER 17  
TITLED JANUARY 23, 1832



TEXAS GENERAL LAND OFFICE  
Art. 13.129, Natural Resources Code  
County GALVESTON, Sk. No 10.  
File Date 3-29-2002 by D.J.H.

NOTE:  
All coordinates and bearings shown hereon are grid values referenced to the Texas Coordinate System of 1983, South Central Zone - NAD 83(1993) and NGS Monument "MOSES". All distances shown hereon are surface distances unless noted and may be converted to grid distances by multiplying by a scale factor of 0.999864482.

NOTICE:  
This survey was performed in accordance with Section 33.136, Natural Resources Code, for the purpose of evidencing the location of the shoreline in the area depicted in this survey as that shoreline existed before commencement of erosion response activity, as required by Chapter 33, Natural Resources Code. The meander line depicted on this survey fixes the shoreline for the purpose of locating a shoreline boundary, subject to movement landward as provided by Section 33.136, Natural Resources Code.

I, William E. Merten, Licensed State Land Surveyor in and for the State of Texas, do hereby certify that on June 9, 2000, I have located the natural contour line of Mean Higher High Water on the ground, according to law and with the personnel stated, and that the meanders of said contour line are true and correct as shown hereon. To the best of my knowledge, no artificial fill or any development, other than as shown hereon, that would cause alteration to said contour line has occurred within the area surveyed. Reference is hereby made to the accompanying report by me of the same date.

Field Personnel:  
Chris Wells  
Devin Flato

*William E. Merten*  
William E. Merten  
Licensed State Land Surveyor  
Hoff Associates, Inc.  
3701 Kirby Drive, Suite 1290  
Houston, Texas 77098  
713-523-7161  
June 30, 2000



MOSES LAKE





# Halff Associates

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3701 KIRBY DRIVE, SUITE 1290  
HOUSTON, TEXAS 77098  
(713) 523-7161  
FAX (713) 523-4373

August 20, 2000

Mr. Ben Thomson, RPLS, LSLs  
Texas General Land Office  
Surveying Division  
1700 N. Congress Avenue  
Austin, Texas 78701

Re: Moses Lake Erosion Abatement Project, Nature Conservancy of Texas Property,  
Galveston County, Texas.

Dear Ben,

Enclosed please find the original and 1 blueline copy of a survey of the above referenced site to be filed in the records of the General Land Office in accordance with the requirements of Section 33.136 of the Natural Resource Code "Property Rights: Preservation of Littoral Rights". Also enclosed is the original and 1 copy of the accompanying Surveyors Report to be filed with the Survey.

If you have any questions or need further information, please do not hesitate to give me a call.

Thank you.

Sincerely,

William E. Merten, RPLS, LSLs  
Director of Surveying - Houston

Cc: Mr. Matt Williams, Nature Conservancy of Texas

TEXAS GENERAL LAND OFFICE  
Art. 33.136, Natural Resources Code  
County Galveston, <sup>Report</sup> ~~SK~~ No. 4 Sketch 10  
File Date 3-29-2002 by D. J. H.

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SURVEYORS REPORT  
SURVEY OF THE LINE OF MEAN HIGHER HIGH WATER  
ALONG A PORTION OF THE JOHN W. LYTLE SURVEY  
GALVESTON COUNTY, TEXAS

At the request of the Nature Conservancy of Texas, Inc. and in my capacity as a Licensed State Land Surveyor in Texas, I have determined the line of Mean Higher High Water for Moses Lake along a portion of the John W. Lytle Survey, Abstract Number 17, in Galveston County, Texas. This survey was performed as per the requirements outlined in the Coastal Public Lands Management Act of 1973, as amended, Chapter 33, Natural Resources Code, and specifically per Section 33.136, Natural Resources Code, "Property Rights: Preservation of Littoral Rights".

The purpose of this survey was to evidence "...the location of the shoreline in the area depicted in this survey as that shoreline existed before commencement of erosion response activity..."(Section 33.136(b), Natural Resources Code).

The John W. Lytle Survey borders on Galveston Bay and Moses Lake and title was received from the Mexican Government on January 23, 1832. Moses Lake is a tidally influenced lake that empties into Galveston Bay.

In the case of Humble Oil & Refining Co. vs. Sun Oil Co. (190 F 2d 191), the court held that "grants issued by the King of Spain and the Mexican State before the adoption of common law in Texas, the boundary between sea and upland must be determined in accordance with principals announced in Las Siete Partidas, the basic law of Spain and Mexico which defines "shore" as all ground covered with water at high tide during the whole year, whether in winter or summer."

In a decision by the Texas Supreme Court in the case of Luttes vs. State (324 SW 2nd 167, on remand 328 SW 2nd 920) it was found that the littoral boundaries for civil law grants differs from the boundaries of common law grants. The court states that for civil law grants (grants by Spain and Mexico) the boundary is the line of Mean Higher High Water (MHHW) and for common law grants (grants made by the Republic and State of Texas) the boundary is the line of Mean High Water (MHW). This case described that the best method of determining MHHW and MHW is to employ the use of scientific tide gauges.

The Luttes case defined MHHW as a tidal datum that is the average of the higher of the two daily tides observed over a specific 19 year period (epoch) and MHW as a tidal datum that is the average of all high tides over a specific 19 year period (epoch). Tides being defined as the regular and predictable rise and fall in sea level due to the gravitational pull of the sun and moon. Also, sea levels are influenced by weather conditions, geographical location and topography of the coastline. The combination of these

*Sketch 10*  
Galveston Co. Art. 33.136 Report No. 4A  
copy 1

conditions can result in a wide variation in the elevation of the tidal datum from location to location. Due to this variation, the tidal datum had to be determined at the project location. Because of the impracticality of obtaining 19 years of tide readings at a specific location, methods have been developed to correct short term observations between project site staff gauges, secondary tide gauges (gauges with more than one year but less than 19 years of observations) and a primary tide gauge (gauges with more than 19 years of observations).

Tide gauges along the Texas coastline are installed, operated and maintained by a joint effort involving the National Oceanic and Atmospheric Administration (NOAA), the Conrad Blucher Institute (CBI) and Lamar University. Tidal datum's, benchmarks and gauge readings are published and available from NOAA and CBI.

The project site is located in the general vicinity of the Eagle Point Tide Gauge, a secondary gauge referenced to the Galveston Pier 21 Tide Gauge, a primary gauge in use since 1908. Recently, NOAA has adopted new procedures to compute accepted tidal datum's in the Galveston area based on more recent observations. This procedural change is due to the rise in sea level in the Galveston area, being over 0.02 feet per year, which far exceeds the U.S. average rise of 0.005 feet per year. Currently the published tidal datum for the two gauges is based on the 19-year epoch from 1960 to 1979, adjusted for the 5-year series from 1990 through 1994. Due to this relatively rapid change in sea level I felt it was necessary to compute data on a more current epoch in lieu of using the published datum's. A new tidal datum for the Galveston Pier 21 Tide Gauge was calculated for the 19-year epoch ending in May, 2000 and using the standard method, the Eagle Point Tide Gauge was adjusted to this same epoch.

A site staff gauge was installed and observed simultaneously with the Eagle Point Tide Gauge for three high tide cycles. These reading were compared to the Eagle Point Tide Gauge using the amplitude ratio method resulting in a calculated elevation for mean higher high water at the site staff gauge.

The project site is along approximately 6000 linear feet of the northerly shoreline of Moses Lake against property now owned by the Natures Conservancy of Texas, Inc. with the easterly end of the project located approximately 1-1/2 miles from the entrance to Galveston Bay. This area of Moses Lake is an area of extensive erosion as evidenced by the existence of "cut banks" on the shoreline.

Using the calculated elevation for the site staff gauge, points were located on the natural contour line of Mean Higher High Water along the north shoreline of Moses Lake for the entire project length. These points were incorporated into surveyed meanders delineating the littoral boundary between the state owned seabed and privately owned uplands.

The surveyed meander line was tied to the Texas Coordinate System of 1983, South Central Zone - NAD 83 (1993) using NGS Monument "Moses" for reference. The scale factor used for this project is 0.999864482.

Galveston Co. Art. 33.136 *Sketch 10*  
~~Report No. 4A~~  
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In the past the project area has been subject to oil and gas exploration and production as evidenced by the existence of well heads, valves and storage facilities. There are several locations along the area surveyed where these well sites have extended beyond the line of mean higher high water into Moses Lake. Also, there is an area of dumped rip-rap and another area of large concrete blocks placed along the coastline in Moses Lake. These areas have been noted on the survey. To the best of my knowledge no artificial fill or development, other than previously stated, that would cause alteration to the line of mean higher high water has occurred within the area surveyed.

A plat showing the results of this survey was prepared and filed with this report.

Respectfully submitted,



William E. Merten  
Licensed State Land Surveyor  
Halff Associates, Inc.  
3701 Kirby Drive, Suite 1290  
Houston, Texas 77098  
713-523-7161  
June 30, 2000



Sketch 10  
Galveston Co. Art. 33.136 Report No. 4A  
copy 1