

**CARL E. NORMAN, PH.D.  
HOUSTON, TEXAS 77024**

**12625 MEMORIAL DRIVE #77  
713-401-6980 Mobile  
dod895@aol.com**

**CONSULTING GEOLOGIST**

**SPECIALIZING IN ACTIVE FAULTS  
ON THE GULF COASTAL PLAIN**

October 26, 2019

**SAN JACINTO RIVER AUTHORITY, GRP OFFICE  
11998 Pine Valley Drive  
Conroe, Texas 77304**

Attention: Mark Smith, GRP Division Director  
Copy to: Lance McLeod, PE, PMP, Brown & Gay

**SUBJECT: REPORT ON THE NINETH RE-MEASURE OF WATERLINE W1A  
AND W2A BENCHMARK ELEVATIONS IN THE WOODLANDS, TEXAS IN  
SEPTEMBER 2019.**

As in the past 8 remeasurements of the 47 W1A and W2A benchmarks, very little change in their elevations has taken place over the past 6 months. The largest amount was only -0.02 feet (-0.24 inches) at only 6 BMs. Of the remaining 41, 23 descended - 0.01 feet and 18 remained unchanged. Such small changes may be due to variations in soil moisture content at each of the lines.

Looking at the 4.5-year changes in elevation of the 20 BMs crossing the Egypt Fault along FM 2978, there has been a drop of 0.09 feet of a single BM located at the upper edge of the downthrown fault block at the midpoint of the BM line. It was probably placed in the narrow zone of highly disturbed soil between the upthrown and downthrown fault blocks. Over the same time period, 4 BMs on the downthrown block dropped -0.01 feet, and 4 others dropped -0.02 feet. Looking at the pattern of changes along the entire 20-BM line, no BM on either fault block has risen, while 8 have descended -0.01 feet, 5 descended -0.02 feet and 6 have remained stable. The only reasonable interpretation of that movement pattern is that this known active fault has been inactive for the past 4.5 years at this specific location.

This conclusion also applies to a line of 4 BMs across the same fault where it crosses Research Forest Drive a few hundred feet east of FM 2978. Over the past 4.5 years, two of the 4 BMs descended -0.02 feet, one -0.01 feet while the other showed no movement. Such changes over a 4.5-year period are much too small to attribute to a currently active fault.

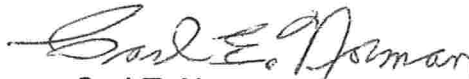
A line of 4 benchmarks along Research Forest Drive crosses the well-known Big Barn Fault just east of Green Bridge Drive. Over the past 4.5 years, 2 of them show no net movement while the other 2 dropped only -0.01 feet. These rates of movement are much too small to attribute solely to differential vertical movement across this known fault.

Farther to the east, an east-west line of 19 benchmarks along the north side of Research Forest Drive, at and near Cat's Cradle Drive, crosses an area where a north-south gap exists between 2 known active faults. Although there is no field or subsurface evidence for the existence of an active fault in the gap, the benchmarks were installed near its center to identify ground movements that might be expected to occur across a known active fault. Over the past 4.5 years the entire range of their vertical movements was -0.4 to 0.0. Three that showed no movement adjoin each other on the expected upthrown side of the possible fault.

Over the past 4.5 years, the 19 benchmarks showed the same pattern of movement, i.e. nearly uniform distribution of elevation changes on both sides of the projected location of the possible fault. These data strongly suggest that no fault exists within the gap between the two known active faults. .

The 10th and final re-measure of the benchmarks is scheduled for March, 2020.

Respectfully submitted,



Carl E. Norman, Ph.D.  
Consulting Geologist  
P.G. 1772; CPG 6831

