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

April 20, 2019

SAN JACINTO RIVER AUTHORITY, GRP OFFICE
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Attention: Mark Smith, GRP Division Director
Copy to: Lance McLeod, PE, PMP, Brown & Gay

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

As in the past 7 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 2 BMs. Of the remaining 45, 22 rose 0.01 feet and 23 remained unchanged. Such small changes may be caused by small increases in soil moisture content at each of the lines.

Looking at the total change in elevation for each of the 47 BMs over the last 4.0 years, there has a drop of 0.07 feet of a single BM located at the midpoint of the BM line that crosses the Egypt Fault at FM 2978. Over the same time period, 8 others on that line dropped 0.01 feet, and 11 showed no elevation change. Looking at the pattern of changes along this 20-BM line, no BM on the upthrown fault block has risen, while 2 have descended 0.01 feet, and 8 have remained stable. Of the 10 on the downthrown block, 1 has descended 0.07 feet, 6 have descended 0.01 feet, and 3 show no elevation change. The only reasonable interpretation of the movement pattern is that this known active fault has been inactive for the past 4 years at this specific location.

The same conclusion is inescapable for 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 years, 2 of the BMs descended 0.02 feet while the other 2 showed no movement. Such changes are much too small over a 4-year period 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 years, 3 of them show no net movement while one has dropped only 0.01 feet. Again, the rate of movement at this location is much too small to attribute solely to differential vertical movement across the fault.

Farther to the east, a 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 the middle of the gap to identify ground movements that would be expected to occur across a known active fault. Over the past 4 years the entire range of their vertical movements was 0.00 feet to minus 0.02 feet. Ten on the expected downthrown side of the possible fault and 3 on the upthrown side show downward movement Six that showed no movement adjoin each other on the expected high side of the possible fault.

Over the past 4 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. At the present, it seems highly likely that there is no fault within the gap between the two known active faults. .

The 9th re-measure of the benchmarks is scheduled for September 2019.

Respectfully submitted,

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