

## Visit report 14/10/16: Tulane University (morning)

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### *Hurricane Katrina, What Happened?*

Friday morning a guide was planned through the areas which were affected by Katrina in 2005. This guide was provided by Stephen A. Nelson from the Tulane University. With cars we visited several stops where he told about the impact of Katrina and other Hurricanes like Betsy and the results of these hurricanes.

The first stop was at the Lower 9<sup>th</sup> Ward near the east side of the Industrial Canal. At this place, Levee-Floodwall failures occurred at two places along the east side of the Industrial Canal. The top of the floodwall was supposed to be at an elevation of 14.5 feet above sea level. However, due to an error involving the use of the wrong data. By the U.S. Army Corps of Engineers and to subsidence, the top of the wall was only at an elevation of 12 feet above sea level. The storm surge on August 29, 2005 reached an elevation of about 15 feet above sea level. The water took most of the houses which were not attached to the foundation.

This event caused that the U.S. Army Corps changed the design of the so called I-floodwalls which were established in 1970s and in 1985. During Katrina these walls lend over which created a crack between the floodwall and the levee where the floodwall is standing. Therefore, the wall was pushed over when water found a way through the crack. And water overtopping caused erosion on the protected side of the levee. After Katrina so called T- wall are build. These are floodwalls which are shaped as a T upside down. So these walls will not lend over and also overtopping of water will not cause erosion on the protected side on the levee. Still these new walls will not be good enough to stand a hurricane like Katrina. This is due to subsidence and a weak spot near the bridge over the Industrial canal. The subsidence and even sea level rise is not taken into account in the floodwall design.

The second stop was near the bridge over the Industry Canal. The original floodwall (i-wall) is still standing on the other side of the road and is still at an elevation about 2.5 feet lower than the new T-wall. It can be said that this area is still vulnerable for storm surges from the Mississippi Gulf Outlet, Intercoastal Waterway and Lake Pontchartrain. To reduce this vulnerability, the U.S. Army Corps build a flood barrier with navigation flood gates. This barrier is designed to resist a one in a hundred-year storm surge. This flood barrier we also visited the other day.

The next stop was at the London Ave. Canal where the floodwalls are breached. This canal is dug in 1800s and the purpose was to drain rainwater out of the low lying areas of New Orleans. This canal contains water from the Lake Pontchartrain. The breach here was about 200 feet wide and has now been replaced by the T-walls. When the flooded area was drained they found an enormous amount of sand which came from not from the canal or lake but from the levee. Sand is highly permeable material so water can easily be transported through the sand grains. When this flow is strong enough piping will occur and sand will flow with the water through or underneath the levee. This will undermine the levee and cause it to collapse. The neighbourhood near the breach was totally floated away. The foundation of some houses can still be seen. Only a small number of houses is rebuilt.

The last stop was at the London Avenue Canal Gate and pumps. The gates and pumps near the end of the London Avenue Canal are built in 2006. It should protect the area against storm surges from Lake Pontchartrain entering the canal. These pumps were also visited and reported in another visit report the other day.