CEMVS-EC-GT (Conroy) 12 Sept, 2011

MEMO TO CEMVN-PM-OF (Wagner)

SUBJECT: Minutes of Initial Meeting of the WBV14c.2 Tiger Team.

1. The subject meeting commenced at 10:00am, Monday, 12 September, 2011 in the District Office of the Corps of Engineers, New Orleans, ED Conference Room. This meeting is a requirement of the Tiger Team Scope of Work which requires an initial meeting of all Tiger Team members, the local sponsor, and the Corps. The attendees included the Tiger Team Members, the Corps, SLFPA-W, OCPR, Fugro Engineers and the joint venture of FFEB. All attendees' names are listed below. Attendees contact information may be found in Table 1. Tiger Team members are indicated by the (TT) annotation following the attendee's name.

CORPS OF ENGINEERS

Kevin Wagner; CEMVN-PM-OW
Richard Pinner; CEMVN-ED-F
Mark Woodward; CEMVN-ED-FD
Brad Arcement (TT); CEMVK-EC-GA
Tim Shows (TT); CEMVK-EC-C
Kim Tullier; CEMVN-ED-FD
John Bivona; CEMVN-EC
Jean Vossen; CEMVN-ED-L
Michael Wielputz (TT); CESAS-EN-GSE
Lanny Barfield (TT); CEMVK-EC-GA
Del Britsch; CEMVN-ED-FG
Patrick Conroy (TT); CEMVS-EC-GT

SOUTHEAST LOUSIANA FLOOD PROTECTION AUTHORITY-WEST (SLFPA-W)

Giuseppe Miserendino; Regional Director, on behalf of Michael Merritt
Michael Merritt (TT); Geologist (arrived during the afternoon session)
David Roark (TT); (absent during this meeting)

OFFICE OF COASTAL RESTORATION AND PROTECTION (OCPR)

Rickey Brouillete; (TT) Engineer
David St. Marie; (TT): HNTB Engineer
John Monzon, James McMenis, and Jas Singh (TT) joined by telephone.

BURNS-COOLEY-DENNIS (BCD)

Eddie Templeton; (TT)

FUGRO Engineers

Blake Cotton and David Valintine

2. Mr. Wagner welcomed everyone to the New Orleans District Office and facilitated the introductions. Wagner charged the Tiger Team with the following tasks:

a. Independently assess the WBV14c.2 levee (hereinafter referred to as 'the levee') and determine if it will perform as designed. However (as noted below in paragraph 4), SLFPA-W believes that the quality of material is an integral issue to this investigation.

b. Determine any necessary corrective actions.

c. Further define the measures to be implemented as part of the inspection plan;

d. Arrive at an understanding/agreement on the inspection/boring plan that will be conducted to provide the assurances on the overall performance of the levee.

e. Develop a process or method on how the team will conduct their tasks, make decisions and develop any recommendations, and

f. Propose any required changes to the current Corps earthwork specification.

g. Discuss how to relate geophysical scanning to other inspection/testing.

3. Messrs. David Valintine and Blake Cotton of Fugro reviewed the geophysical methods described in the Corp's Engineering Manual EM 1110-2-1802 and further explained the basic geophysical concepts of resistivity, conductivity, resolution and scanning contrasts. Valintine and Cotton described the basic technological capabilities and limitations of the Ground Penetrating Radar (GPR) and Electro-Magnetic (EM-38) systems proposed for use at the levee. Both GPR and EM-38 systems are portable systems that can be pulled behind or carried by a worker. Each system will cover a width of 2 to 2.5-feet and simultaneously explore to depths of 2.5 and 5 feet. Per the contract, Fugro will scan the levee slopes, crown, and berms. Post processing the data from both systems will allow for a digital combination and subtraction of the data to allow a more detailed interpretation of that data. But the post processing effort and secondary review will take 7 to 10 days after the field work. Recent heavy rains have created many small erosion rills and features on the slopes that will make it somewhat problematic to pull the GPR system. Fugro agreed to coordinate with the Corps and it's construction contractor, waiting for the contractor to back-drag and smooth the levee surfaces.

Mr. Brouillette (OCPR) asked if Fugro had considered the "Ohm-Mapper" system manufactured by GeoMatrix. Mr. Valintine stated that he didn't think the Ohm-Mapper system had the necessary resolution, but that he would contact GeoMatrix to get a current read on their system's capabilities.

Mr. Cotton (Fugro) and Mr. Conroy asked if it would be possible to 'seed' the levee with various sizes of wooden objects to help calibrate the geophysical methods. Mr. Valintine explained that the process of excavating and backfilling around the 'seed' object would leave a different resistivity/conductivity signature than the contractor's original construction and the trace of the buried test object would not be the same as items currently existent in the levee fill. A discussion ensued on the possibility of constructing a test fill seeded with wooden branches and logs. The test fill would be constructed using the same borrow material and construction techniques as the levee. The group agreed that this effort would take time and prolong the start of production geophysical scanning. The team agreed that maximum advantage should be taken of the current fine weather.

At this time, the Fugro representatives left the meeting to begin the geophysical work at the levee, initially at project reaches 70+00 to 80+00 and 100+00 to 110+00 (see paragraph 10). At this time, the group broke up for a 30-minute lunch break.

4. The group reconvened after lunch and began discussing how to determine if the levee would perform as designed? Interspersed with this was a discussion of "was the levee built according to the specification?" A lively, wide ranging discussion of the two topics continued with some contending that if the levee was built "according to the specifications", then it's a given that the levee will perform as designed. But others wanted to first provide an objective assessment of the levee and its ability to perform as designed. The SLFPA-W also viewed the quality of material as an extremely serious issue fundamentally altering the contract by passing high maintenance costs and risk to local taxpayer with unplanned or impermissible changes in materials. At this point, the group began to discuss when the trenching/exploration plan could begin and what criteria would be used to determine if the materials were "good" or "bad"? Mr. Miserendino remained concerned with how the levee was built, stating that the SLFAP-W had an economic stake in the levee and wanted to ensure that the SLFPA received the value that it had paid for

through the cost sharing arrangement. Mr. Pinner recommended that the Tiger Team document all findings from their field investigations and then evaluate that the levee will meet its intended purpose and perform as designed.

5. The group was unable to arrive at any unified consensus on the concept of capability versus quality and took up a different discussion dealing with the original levee construction. The current WBV14c.2 project is a flood-side enlargement of an existing levee. Based on verbal contributions from many meeting attendees, it was determined that the existing levee was constructed in three different lifts:

- The first lift was built to elevation +8.0 under a Corps contract using borrow from the "Highway 45" borrow pit.
- The second lift was placed by the West Jefferson Levee District using borrow from the "2-Mile Canal". This lift re-established the levee grade to the +8.0 level after the settlement and consolidation of the first lift. Both first and second lifts were complete before Katrina.
- The third lift was built to elevation +11.5 to +12.5 under another Corps contract, again using borrow from the "Highway 45" borrow pit.

The group was assured that the earthen materials from the Highway 45 borrow pit was high quality and void of wood and objectionable material. No one in attendance was familiar with the quality of material from the "2-Mile Canal" borrow pit. Someone questioned if, when the existing levee was excavated and used as borrow for the WBV14c.2 levee, could that be a contributing source of objectionable material? Mr. Wagner indicated that it could be because of the observations of debris made in the inspection trenches cut on the landside slopes of the existing levee in January 2011. Given that that the WBV14c.2 drawings identify the existing levee as potential borrow, then the Corps must have believed that the levee borrow was suitable. This was based on government exploration of the existing levee. However, the non-federal sponsor had provided documents of inspection as far back as 1997 that show objectionable material present at some locations in the existing levee and berms. The drawings show that the levee would be brought up to elevation +10.5 using offsite borrow and only then would the existing levee be degraded to provide additional borrow.

6. The group discussed how the WBV14c.2 levee was constructed and tried to recreate the origins of the offsite borrow sources for the levee. It is believed that three sources of offsite borrow were incorporated into the levee:

- The Willow Bend borrow. An existing borrow pit used in previous contracts that provide high quality borrow void of wood and objectionable material.
- The "1st Cell" at the River Birch borrow pit. Another pit know to provide high quality borrow void of wood and objectionable material.

- The "2nd Cell" at the River Birch pit. This cell was opened for this project and it was discovered that the surficial layer of the pit contained wood chips. During borrow excavation, the excavation equipment was likely dragged up through the materials that contained the wood chips and ended up being blended with material from the deeper parts of the excavation. Picker crews were mobilized to remove the wood chips from the fill.

Based on study of the contract drawings and field observations, the group estimated that the levee was built to approximate elevation 10.5 using borrow from the Willow Bend and River Birch "1st Cell" pits. River Birch "2nd Cell" and levee degrade materials were used above elevation 10.5. The disposition of the borrow materials in the floodside and landside stability berms was unknown. Mr. Brouillette (OCPR) asked that the Corps provide a "history of construction" that details which borrow materials were used in what parts of the levee. This information could define how high the levee was built using the Willow Bend and River Birch "1st Cell" materials. Also contractor quality control records showing where/when in-situ density tests were taken and what Proctor curve was used to evaluate the percentage compaction. The Proctor Curves could help identify what material was used. Mr. Wagner agreed to produce the information.

7. The discussion turned to the inspection trenches to be dug into the levee. David St. Marie (OCPR) expects that the trenches will yield a lot of wood. Mr. Merritt noted that on this project there appeared to be a lower rejection rate for debris in the clay. Mr. Merritt further noted that the project administration seemed to have allowed the contractor to blend more wood in the levee building material and asked if the soils organic content counted toward the 1% wood limit. Mr. Pinner responded that the organic content did not count to that 1% limit. Mr. Merritt asked if the organic content impacted on the unit weight or shear strength of the material and again cited the presence of debris as a long term maintenance cost and safety issue; by becoming an obstacle during mowing; or providing an avenue for water by changing the hydraulic conductivity of the structure; or becoming a factor in scouring the levee in potential over-topping scenarios.. Mr. Pinner replied that detailed testing by Virginia Tech University showed that organic contents up to 9 or 12% did not impact upon the unit weight or shear strength. Mr. Wielputz concurred with Mr. Pinner's statement.

8. The team discussed practical ways to evaluate the strength of in-situ, compacted clay that contains rotting wood, if any, within the structure. The team considered the following possibilities and then rejected them for the reasons stated:

- Compact clay samples including ice chips in the compacted samples. When the ice chips melt, they would leave voids in the sample. But given the low permeability of the clay, upon melting the melt water would be unable to drain away and the desired void would not exist.
- Compact clay samples including syrofoam "peanuts" in the compacted samples to create voids in the clay. But the Styrofoam was seen as having a real shear strength that would contribute to the sample strength and not really model the rotted wood.

The team discussed that the best practical method to determine the shears strength of clay containing wood might be from testing the undisturbed samples that will be obtained later in this investigation. Also, slope stability analyses could be run using very conservative values of shear strength for the clay that is assumed to contain wood.

8. The Tiger Team discussed how to process the excavated cuttings from the 10-yd^3 inspection trenches. This included depth to dig when know polluted lift layers were subsequently buried deeper under clean fill. The Tiger Team decided that in the first trench, all of the wood should be picked out instead of screened mechanically and saved for volume determination. The team also decided that the trench should be excavated or peeled away in 6-inch layers and the cuttings placed alongside the trench on a piece of fabric. When photo documenting the conditions of the cuttings, the team should have a six-foot ruler or a survey rod on hand to provide a visual scale reference for the photos. Mr. Brouillette (OCPR) asked if all wood products picked from the trench excavations could be weighed on site. After some discussion about how the data would be used, the team agreed to weight the wood. Analyses of samples of one cubic foot size was also discussed, but continued discussion brought forth the point that if the intent is to determine an in-situ, moist density of the levee fill, the undisturbed samples from the 5-inch diameter tubes could provide a more accurate value of the in-situ density assuming that the sample was not unduly disturbed by embedded wood.

9. The team discussed where to locate the inspection trenches and whether they should be located at 500 or 1000-foot intervals. The group decided that the initial trenches should be excavated at anomalous areas identified by the geophysical surveys before sampling every 1000 feet. The reason offered was that it was too early to samples every 500 feet and then additional trenches would be located between these points as necessary or recommended by team members. Mr. Merritt favored testing all the areas suspected of being the worst and he asked that the rationale for the number of tests ultimately performed be provided in writing or documented by math equations. Mr. Merritt offered two examples of possible mathematical algorithms including a Bernoulli Trial (common to manufacturing) or a Basin Analyses (common in geological prospecting). The team discussed if the trench locations should be randomized to aid in a statistical analysis of the results. Mr. Wielputz didn't believe that randomization would work because the data would be skewed by the trenches excavated at questionable areas identified by the geophysics. A majority of the team agreed that:

- Initial trenches, systematically and regularly spaced on 1000-foot spacings would provide a wide breadth of inspection across the entire levee.
- These would be supplemented by trenches excavated at the locations determined by the geophysical survey.
- Finally, the non-federal partners would be able to add additional test sites in a Phase II investigation program.

Mr. St. Marie stated that a trench should be located within project stations 165+00 to 175+00 where the contractor allegedly "pushed-in" debris into the levee.

10. The group also discussed any known "bad areas" in the levee. Mr. St. Marie identified areas of concern in the existing levee at the "corners" of the north-south reach between project stations 70+00 to 80+00 (concrete observed) and between 100+00 to 110+00 (large logs observed). Fugro will be instructed to begin their geophysical surveying in these reaches. After scanning these areas, then Fugro should methodically scan all of the other areas of the levee.

11. Mr. Templeton (BCD) suggested that the inspection trenches might not need to be located on the floodside/landside stability berms because in a stability analyses, the stability berms mainly provide weight and not shear strength. Mr. Merritt replied that all portions of the levee should be inspected. The team agreed that all parts of the levee would be inspected.

12. Assuming that high quality fill with little objectionable materials was used to construct the levee to elevation +10.5 (see paragraph 6 above), the team discussed the possible impacts that this would have on levee stability. Mr. Barfield and Mr. Arcement stated that 3.5-feet of lower strength material at the levee crown would have little negative impact on the levee's global stability. A wide ranging discussion ensued on ways to determine the shear strength of soils samples containing wood chips/rootlets/sticks. Mr. Wielputz was not convinced that there was any practical way to test such soil samples and obtain high quality, reproducible results. The group decided that stability analyses should be completed assuming a much reduced shear strength in the area of the levee determined to contain such wood products. The team discussed methods to evaluate the shrinkage potential of the compacted clays. Mr. Wielputz stated that since the current ASTM standard for shrinkage tests still utilizes the use of mercury, few, if any soils testing laboratories are available to perform that test.

13. Once the geophysical work was completed in an estimated 12 man days, in the two suspect areas (see paragraph 11), and inspection trenches dug in those area, the geophysical team would "calibrate" their inspection and observations of the rest of the scanned levee. Once the "calibration" was complete, a majority of the team decided that six inspection trenches should be excavated with two on the floodside, two on the crown, and two on the protected side. All Tiger Team members will be on-site to observe this trenching estimate to take place after 26 September 2011 depending on weather.. The contractor will be instructed to backfill the inspection trenches with compacted materials immediately after the Tiger Team completes it's inspection. Mr. Wagner will coordinate with the Tiger Team on the dates for this initial Team inspection.

Respectfully Submitted
Patrick J. Conroy, P.E.
Team Lead
WBV14c.2 Tiger Team

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Table 1 – Tiger Team Contact Information