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January 24, 2011

Mr. Larry Dacus
MBK Engineers
1771 Tribute Road
Sacramento, CA 95815

Dear Mr. Dacus:

Subject: Upper Yuba River Levee Improvement Project
January 20, 2011 Meeting of Board of Senior Consultants

In response to your e-mail of December 13, 2010, we attended the fourth meeting of the Board of Senior Consultants (BOSC) for the Three Rivers Levee Improvement Authority's (TRLIA) Upper Yuba River Levee Improvement Project (UYLIP) on January 20, 2011. The purpose of the meeting was for the BOSC to provide an opinion letter regarding the Robustness, Resiliency, and Redundancy of the design of the UYLIP (as defined in the US Army Corps of Engineers Engineering Circular EC 1165-2-209), based on its review of information provided by TRLIA on the Project.

The UYLIP, sponsored by TRLIA, was designed in accordance with US Army Corps of Engineers (USACE) standards and criteria which in of themselves incorporate resiliency, redundancy and robustness. TRLIA, through this Board of Senior Consultants, has also performed several Safety Assurance Reviews and meetings that provided independent technical evaluations of the adequacy, conservatism, and robustness of the design.

In our judgment, the design of the UYLIP addressed redundancy, robustness, and resiliency through the use of conservative design assumptions and components, and by increasing the size of some design features. Examples of these design assumptions and features include:

- The hydraulic analysis used for design is more conservative and robust than the current Corps hydraulic analysis for the Upper Yuba River System. The TRLIA design assumes a breach in high elevation features (termed the "training levee") along the Yuba River, where the Corps assumes overtopping only. The more robust assumption provides higher design water surface elevations along the proposed levee improvement reach. All recent historic floods (1950, 1955, 1964, 1986, and1997) have flowed through this reach of the Upper Yuba River without overtopping or breaching these high elevation features. In addition TRILA has committed to repairing any breaches that may occur in these high elevation features after flood events. Thus the use of the breached features in estimating design water elevations is considered reasonably conservative. It should also be noted that, even when the high elevation feature were assumed completely removed in the analyses, the resulting water surface elevation was still below the designed crest of the levee at all locations. This observation confirms the conservatism and robustness of the hydraulic design of the levee.

- The design water elevations for this levee reach for the 200-year flood assumes that the downstream levees do not breach or fail for this event, even if they were not designed for

this level of flooding. This assumption results in a conservative design water surface elevation.

- The riverside erosion protection (riprap) was extended above the normal water level to an elevation one foot above the 200-year flood elevation, which is considered a conservative practice.

- Seepage analyses for all levee reaches assumed that no blanket layers existed on the river side of the levee. The assumption of no waterside blanket layer is conservative in that it results in computed exit gradients that are higher than those that would exist if such layers were present.

- In response to a request by the BOSC, a closed-form "blanket theory" seepage analysis was performed and provided results in close agreement with the finite element seepage analyses used for design. This provided validation and confidence in the results of the analyses.

- Several reaches of the levee were originally designed with seepage berms having acceptable exit gradients. However, these berms were replaced with deep slurry cutoff walls resulting in sections with significantly lower exit gradients. This approach provided for a more robust design. A further benefit of this approach is the reduction of pore pressures in the landside slopes that improved the stability factors of safety significantly.

- Sensitivity seepage analyses have been conducted to assess the impact of the assumed permeabilities of the subsurface strata on the computed exit gradients. Sensitivity analyses, in our judgment, help provide confidence in the values selected for design and improve its robustness.

- Lower bound values of shear strengths were conservatively used to analyze the rapid drawdown stability for the 200 year + 3 feet water surface condition, providing acceptable factors of safety. Using average values of strength parameters would have resulted in higher factors of safety. The conservative use of strength parameters in design assures robustness.

- Stability analyses were performed assuming steady-state seepage conditions and a fully developed phreatic surface within the levee embankment. Considering that the entire embankment and levee foundation are above the river surface elevation throughout most of the year, and considering the short duration of the design floods, the assumption of a fully saturated embankment for purposes of stability analysis is considered conservative.

- Seepage and stability analyses were performed for all levee reaches using the 200-year+3 feet water surface elevation. As shown in the attached table, the results of these analyses provided exit gradients and factors of safety that exceed the minimum requirements for all conditions analyzed.

- Instrumentation in the form of piezometers had been incorporated in the design of the levee reach to provide verification of the adequacy of the improvements. Amendments are being made to the Operations and Maintenance manuals to include the frequency of monitoring of instrumentation. This would contribute to the redundancy and resiliency of the design.

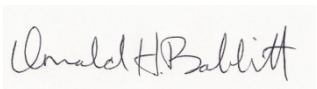
- Site-specific surveys were performed for this reach of the levee to verify differences between the NGVD 29 and NAV 88 Datums. This action contributes to the robustness of the design.

- A 50-foot-wide access corridor at the landside toe of the levee has been included for about 90 percent of the length of the project, to provide room for levee toe inspections, flood fighting, and future possible levee modifications and improvements.

- The seepage berm incorporated at the upstream end of the levee is wider than what would be called for by current Corps criteria.

In summary, the design and plans and specifications of the UYLIP, in addition to having been reviewed by the current BOSC, have also undergone rigorous reviews by the Corps of Engineers, the California Department of Water Resources, and the Central Valley Flood Protection Board. All of these regulatory agencies have concurred that the design is adequate to provides protection for the 200-year design water surface elevations used.

Respectfully submitted,



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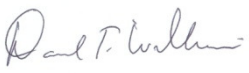

David T. Williams, P.E.
Bard of Senior Consultants

Attachment:
- Summary table of Exit Gradients and Stability Factors of Safety

Upper Yuba Levee Improvement Project
Summary of Exit Gradients and Stability Factors of Safety

Geotechnical Model Station	200-Yr Design WSEL for Evaluation	Exit Gradient 1/ Existing Condition	Stability FS 2/ Existing Condition	Exit Gradient 1/ Project Condition	Stability FS 2/ Project Condition	200-Yr + 3 Feet Design WSEL for Evaluation	Exit Gradient Existing Condition	Stability FS 2A/ Existing Condition	Exit Gradient Project Condition	Stability FS 2A/ Project Condition	Design WSEL Training Levee Removed Scenario
183+50	81.0	0.95	1.98	0.12 4/	1.98	84.0	11/	3/	0.15 4/	1.95	81.4
198+00	81.7	0.25	1.84	<.10 5/	2.39	84 10/	0.32	1.58	<.10 5/	2.38	82.3
201+00	81.9	0.63	3/	<.10 5/	1.69	84 10/	11/	3/	<.10 5/	1.69	82.6
243+50	85.0	0.79	3/	0.3 6/	2.06	88.0	11/	3/	0.43 6/	1.9	85.7
254+00	85.8	1.27	3/	<.10 7/	1.5	88.8	11/	3/	<.10 7/	1.49	86.2
288+00	87.5	1.27	3/	Berm Toe 8/	9/	90.5	11/	3/	0.68 at Berm Toe 8/	9/	87.5
301+00	89.7	0.53	1.15	Berm Toe 8/	1.87	92.7	11/	3/	0.63 at Berm Toe 8/	1.58	89.8

1/ Safe Gradient is considered to be <0.5
2/ FS = Factor of Safety. Desired FS is 1.4 2A/ Desired FS is 1.2
3/ FS for Existing conditions not computed
4/ Project Condition is Cutoff Wall to Elev. +13 (63 Feet Deep)
5/ Project Condition is Cutoff Wall to Elev. +10 (70 Feet Deep)
6/ Project Condition is Cutoff Wall to Elev. +25 (55 Feet Deep)
7/ Project Condition is Cutoff Wall to Elev. +35 (45 Feet Deep)
8/ Safe Gradient is considered to be <0.8 at Berm Toe. Project Condition is 80 Foot Seepage Berm
9/ Model Station 288+00 evaluated for seepage only
10/ Existing Top of Levee is 84.0 Which Limited WSEL Used for Evaluation
11/ Exit Gradient for Existing Conditions not Computed for those Model Section which Exceeded Exit Gradient Criteria at 200-Yr Elevation