

WEST Sacramento Levee Improvement Program
Board of Senior Consultants

Comments and Recommendations
Following Meeting No. 3
Of the Board of Senior Consultants
On April 27-28, 2010

Report Prepared by:

Board of Senior Consultants:

Dr. David T. Williams
Dr. Ray E. Martin
Mr. George L. Sills

June 1, 2010

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Mr. Ken Ruzich
General Manager
West Sacramento Area Flood Control Agency (WSAFCA)
1110 W. Capitol Ave.
Sacramento, CA 95691

Dear Mr. Ruzich:

I. Introduction

This report presents the comments and recommendations for the West Sacramento Levee Improvement Program (WSLIP) by the Program's Board of Senior Consultants (BOSC) following a meeting held for, and with, the BOSC on April 27-28, 2010. This meeting was the third formal meeting of the Board and was held to provide to the Board the progress to date of the analyses and designs being developed as part of the effort to provide 200-year flood protection to the Program.

During this meeting, presentations were made to the Board regarding the following subjects (the agenda is attachment 1):

- CHP Academy Design Status
- The Rivers design status
- The Rivers alternatives analysis
- Design Criteria (lessons learned by BOSC on other projects)
- Review Comments

The following comments are related to the meeting proceedings and the issues rose during the meeting with specific comments, by project location, related to submitted reports, plan documents and presentations at the meeting. Also, the BOSC responses to the updated "Instructions to the Board" are shown in Attachment 3.

Please note that a supplemental report may be produced for the evaluation of the 90% submittal should it be deemed appropriate before the next BOSC meeting.

II. General Comments

A. Check and Back check Spreadsheet

Add into the Check and Back check spreadsheet a column for the BOSC to say it looked at the item but there is not action to be taken by the BOSC until what is proposed is completed.

B. Embankment Fill

The current contract specified that the levee embankment select fill, soil type 1 could be SM, SC, (CL-ML), or CH with a liquid limit of 55 or less. As the specifications are currently written, only CH with a LL between 50 and 55 could be used in a zoned area within the embankment. This material would be very difficult to keep separated and could not be easily recognized visually. The BOSC recommends that the designers consider using only SC, ML, (CL-ML), or CL materials as classified in accordance with ASTM D 2487. The embankment could then be constructed as a homogenous fill with these materials having a plasticity index of at least 8 and a minimum of 30 percent passing the No. 200 standard sieve size.

C. Permeability Values

The BOSC believes that the seepage analyses, which include slurry trenches, should use permeability for an SB trench of 5×10^{-7} cm/sec and for a DMM trench of 1×10^{-6} cm/sec. These values should also be specified within the Plans and Specifications.

D. Settlement Plates

Numerous slurry trenches have been instrumental with settlement plates during the past several years. Very little settlement has been measured from these instruments and, at most, had stopped consolidating within a two week period. With this knowledge, the BOSC recommends that the designers consider using a 1000 foot spacing of the settlement plates or at least a minimum of three plates per trench.

E. Questionable Phreatic lines

Numerous phreatic surfaces shown on the stability analyses appear questionable. BOSC requests that these analyses be reviewed by the designers and an explanation of these phreatic surfaces be provided.

F. Levee Embankment Volume Calculations

BOSC requests that the designers make a rough estimate calculation of the total quantity of levee embankment for both the CHP and Rivers Projects. A minimum of three local contractors should be contacted and surveyed as to the local availability so as to obtain these types of materials and this quantity.

III. CHP Academy Site

A. Slope Toe Key Trenches

During the BOSC meeting, the designers agreed to remove all of the slope toe key trenches within the CHP Project. They also stated that the toe key trenches along the Rivers Project would be removed. Along the Rivers Project, the designers would specify a density of the foundation that must be obtained by the contractor prior to placement of the embankment fill. The BOSC concurs that this would be a reasonable approach to insure adequate slope stability along the levee.

B. Landside Slope

The design and P&S documents currently reflect a 2.75H:1V landside slope along portions of the CHP Project. Current Draft design requirements are requiring a minimum of a 3H:1V landside slope. It is the understanding that this slope is being recommended to be steepened because of right-a-way issues. The BOSC requests that the designer determine the length along the levee where the minimum 10 foot offset between the landside levee toe and power pole would be violated. If this area is small, the BOSC recommends that the USACE be contacted and a variance be requested for this short area. Also, any flood fighting along this short area could be accomplished from the CHP Academy property.

C. Monitoring and Extension of Internal Drainage System

An internal chimney and blanket drainage system is located within the reach west of the termination of the existing water side cutoff wall and beyond the proposed new cutoff wall. The system has a low level trench that connects the two drains and which contains an outfall drainage pipe. The outfall pipe drains to the canal at the west end of the reach, but the discharge is below the normal water level of the canal. Thus, any seepage flow which drains through the pipe cannot be observed to check for movement of soil fines. Soil fines would be an indication of piping, most likely as the result of failure of the geotextile filter which surrounds the drainage system. The blanked drain discharges into a ditch at the landside toe of the levee along the entire reach and acts as an overflow for excess seepage that cannot be carried by the pipe to the canal discharge. It was reported by the design team that seepage was observed flowing from the blanket drain along this reach during a flood event in 2006.

The Board previously recommended that this internal drainage system be abandoned in place. Specifically, the Board recommendation stated.

“It is recommended that the system be abandoned in place and that suitable alternative designs be developed to meet the needs of this segment of the levee system.”

It was the intent of the Board that it be abandoned and filled by grouting.

The drainage system is wrapped in a geotextile that is not considered suitable and may be subject to clogging. A report by Kleinfelder, based on test pits excavated to the surface of the drainage system, indicated it did not appear to be clogged and recommended that it remain in place and not be abandoned. The only failure mode that appears possible, if the drain remains in place, is piping of the embankment material through the geotextile. This could lead to a piping failure of the levee embankment.

The present design calls for removal of the surface of the river side levee embankment to a vertical depth of 5 feet from the top of the existing cutoff wall cap to the crest of the embankment. This excavation will extend about 15 feet in a horizontal direction. Test borings and laboratory testing data indicate that the soils to be excavated do meet the criteria for Type 1 fill material. The material will be used to reconstruct the excavated section in accordance with the project specifications.

The design team reported that seepage and stability analyses were performed assuming 1) the excavation and replacement design was completed on the levee embankment flood side and 2) the internal drainage system was clogged and ineffective. The results indicated that the rehabilitated levee meets design criteria.

After discussion with the design team, it was concluded that the internal drainage system could remain in place and functioning if the system could be monitored. The following actions are recommended by the Board for design team consideration.

1. Design a sump pit at the west end of the reach into which the outfall pipe flow can be periodically monitored for the presence of soil fines.
2. Design blanket drain observation pits at 500-foot intervals along the reach for periodic monitoring of any overflow seepage for the presence of soil fines.
3. In locations where the blanket drain must be extended laterally, due to extension of the levee embankment, a suitable geotextile should be selected as the filter material.

IV. Closing Remarks

Please note that Attachment 3, Instructions to the Board, has been responded to.

As stated in the 2nd meeting letter, the BOSC has not had time to review all the pertinent documents; therefore, the BOSC cannot make a final determination of the adequacy of the design(s). However, the Board feels that from the review of the documents to date and the progress presented in the meeting, the project is well designed and well thought out. The comments and suggestion presented in the report are meant to enhance the project for efficiency and safety. When the additional documents and plans are reviewed, the Board will present another report.

The Board appreciates the efforts of the design team members who prepared and presented numerous valuable summaries of the designs completed to date. The various presentations and discussions were informative to the Board and helped introduce and clarify the design teams' thought processes.

The Board looks forward to future meetings, briefings, and discussions on this project.

Very truly yours,

**West Sacramento Levee Improvement Program
Board of Senior Consultants**



Dr. David T. Williams, P.E. CFM.



Mr. George L. Sills, P.E.



Dr. Ray E. Martin, P.E.

Attachments:

- Attachment 1: Meeting Agenda
- Attachment 2: Charge to the Board
- Attachment 3: Instructions to the Board

Attachment 1

**WEST SACRAMENTO AREA FLOOD CONTROL AGENCY
MEETING AGENDA**

**WEST SACRAMENTO LEVEE IMPROVEMENT PROGRAM
BOARD OF SENIOR CONSULTANTS
MEETING NO. 3**

Date: April 27-28, 2010
Time: 8:00 am to 5:00 pm
Location: Boathouse Conference Room (Same location as meeting No.2)

DAY 1

I. INTRODUCTION 8:00 AM-8:30 AM

- Welcome and Opening Remarks (WSAFCA)
- WSLIP Program Schedule (WSAFCA)
- Meeting Purpose & Expectations (MBK)
- Agenda Overview (HDR)

II. CHP ACADEMY DESIGN STATUS 8:30 AM-9:30 AM

- General Overview of Site Deficiencies and Corrective Measures (HDR)
- Design Modifications since 90% submittal (HDR)
- Outstanding Design Issues

BREAK 9:30 AM-9:45 AM

III. CHP ACADEMY TARGETED COMMENT REVIEW 9:45 AM-12:00 Noon

- Review of Comment Closure Process (MBK)
- Outstanding Comments, New Comments (BOSC)

IV. LUNCH (To Be Provided) 12:00 Noon-1:00 PM

V. THE RIVERS DESIGN STATUS 1:00 PM-2:00 PM

- General Overview of Site Deficiencies and Corrective Measures (HDR)
- Design Modifications since 90% submittal (HDR)
- Outstanding Design Issues

BREAK 2:00 PM-2:15 AM

- VI. THE RIVERS TARGETED COMMENT REVIEW** **2:15 AM-4:00 PM**
- Review of Comment Closure Process
 - Outstanding Comments, New Comments (BOSC)

DAY 2

- VII. OUTSTANDING EIP SITE COMMENTS** **8:00 AM-8:30 AM**

- VIII. PROBLEM IDENTIFICATION AND ALTERNATIVES ANALYSIS COMMENT REVIEW** **8:30 AM-9:30 AM**
- Outstanding Comments, New Comments (BOSC)

- IX. BOSC Working Session** **9:30 AM – 11:30 PM**
- Note: Design team to be available, as needed, to address BOSC questions

- X. LUNCH** (*To be provided*) **11:30 AM-12:30 PM**

- XI. REVIEW COMMENTS** **12:30 PM – 2:30 PM**
- Overview of Comments
 - Comment Clarification & Discussion
 - Summary of Actions for Comment Resolution

- XII. CONCLUSIONS & ACTIONS** **2:30 PM – 3:00 PM**

Attachment 2

**WEST SACRAMENTO LEVEE IMPROVEMENT PROGRAM
BOARD OF SENIOR CONSULTANTS**

CHARGE TO THE BOARD

The West Sacramento Area Flood Control Agency (WSAFCA) has assembled this Board of Senior Consultants (Board) to conduct an independent and external expert review of the levee improvements under design by the WSAFCA and its consultants for construction. The Board is charged with confirming that the design investigation and analysis and associated recommendations for levee improvements at each site are acceptable for providing 200-year level of flood protection in an urban environment. The Board shall consider current and relevant regulations, policy, standards, and guidance for the design and construction of flood protection measures in rendering its opinion. The Board shall document its findings that will include, but is not limited to, responding to the instructions provided by WSAFCA. WSAFCA shall be responsible for providing the Board with instructions, the historic data and records, programmatic or planning studies, and design phase data and documentation necessary to understand the technical context and natural setting within which the levee improvement recommendation has been proposed.

Attachment 3

**WEST SACRAMENTO LEVEE IMPROVEMENT PROGRAM
BOARD OF SENIOR CONSULTANTS**

INSTRUCTIONS TO THE BOARD, Meeting No. 3

WSAFCA requests that the Board specifically consider the following concerns:

1. Has sufficient geotechnical data (quantity and quality) been collected to adequately characterize each EIP Site and support the levee improvement design alternative recommended?

A draft plan for supplemental borings by Kleinfelder has been submitted and will be reviewed and evaluated.

2. Are the stability and seepage models assembled analyzed for the geotechnical bases of design - including model stratigraphy, material strengths and hydraulic conductivities - considered legitimate representations of the boring log, cone penetration test, and laboratory data collected from the project locations?

It appears that some of the stability analyses have unusual phreatic surfaces. These should be verified or corrected. All other analyses appear to be adequate.

3. What considerations are raised regarding shifting the levee template waterward at the east end of the Rivers site to establish a wider inspection and O&M maintenance corridor without relocating the residential fence in this area?

Geotechnically, the shifting of the levee template does not pose a problem. Hydraulically, the impacts must be determined.

4. What further considerations are raised regarding a) the City of West Sacramento's Emergency Response Plan, b) barge traffic on the Deep Water Ship Channel during flood events, c) the hydraulic model used to develop design water surface elevations for the EIP levee improvements, and d) the wind wave run up analysis for CHP academy?

The appropriate documents, except the wind wave run-up analysis report, have been presented and reviewed by the BOSC. These documents provided the needed information and are satisfactory to the BOSC.

5. What considerations are raised regarding re-establishing the CHP Academy landside slope at a 2.5(H):1.0(V) or 2.75(H):1.0(V) grade?

See main portion of the report, section IIIB.

6. Is the interim level of flood risk increased due to the proposed project termination points? Are any levee deficiencies magnified or created at the temporary or permanent limits of construction?

Based upon the design information provided for the Rivers Project, no adverse effects are apparent. At the CHP site, Kleinfelder investigated this site and said that there was not a problem. This was satisfactory to the BOSC.

In providing commentary on these and other matters related to the documents reviewed for these projects, please provide the following where possible:

- A clear statement of the degree of concern;
- The basis of the concern;
- The significance of the concern; and
- The actions needed to resolve the concern