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TECHNICAL MEMORANDUM

January 18, 2016

Project: Cities of Lathrop and Manteca
Urban Levee Design Criteria (ULDC) Evaluation

Subject: 7.16 – Levee Vegetation

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1.0 PURPOSE

Detailed analyses and documentation have been performed and developed of the existing levee system of Reclamation District No. 17 (RD17) in order to determine the extent of Urban Levee Design Criteria (ULDC) compliance. The purpose of this technical memorandum is to present the data sources, assumptions, analyses, and results as they pertain to ULDC Item No. 7.16 – Levee Vegetation. The team responsible for undertaking this effort consists of Peterson, Brustad, Inc. (PBI), Kjeldsen, Sinnock and Neudeck, Inc. (KSN), and ENGEO, Inc.

2.0 PROJECT BACKGROUND

Legislation passed in 2007 substantially limits the ability of urban communities to approve residential, commercial and industrial development after July 2016 unless they have an Urban Level of Flood Protection (ULOP) or are making adequate progress toward achieving ULOP 200-year flood protection. Background on this mandate was summarized in "*Position Paper for City of Lathrop, Compliance with SB5: ULOP 200-Year Flood Protection for Lathrop (RD 17)*" dated February 3, 2014, by Glenn Gebhardt, City Engineer for the City of Lathrop.

In April 2014, PBI prepared a Strategic Plan for ULOP Compliance for RD17 communities, which outlined a strategic plan for complying with SB5 for the area protected by RD17 levees on a schedule that will meet the requirements of the law. The main component of this Strategic Plan was to perform a comprehensive ULDC analysis and identify areas of deficiencies for each of the ULDC criteria. The analyses presented in this technical memorandum pertain to one of these ULDC criteria: 7.16 – Levee Vegetation.

3.0 LEVEE ASSESSMENT

The analyses described in this technical memorandum have been developed at a detailed level using an assessment of the existing levee system to determine the extent of ULDC deficiencies. The assessment was based on a combination of new and existing information.

3.1 Data Sources

Existing data sources that were utilized in the levee assessment are as follows:

- Field Surveys of Levee Conditions, performed by KSN in September 2015 and January 2016

3.2 Assumptions

Assumptions that were made in the levee assessment are as follows:

Separate Ongoing Projects:

Construction is currently underway on the RD17 Levee Seepage Repair Project (LSRP). The purpose of this project is to provide seepage remediation of various RD17 levee reaches along the San Joaquin River. Phase I and Phase II have both been completed at a combined cost of approximately $9 million. Phase III is in the midst of the design and permitting stages and is estimated to cost $35 million. The source of funding for LSRP is primarily from annual RD17 property owner assessments and DWR Early Implementation Program (EIP) grants. For purposes of this ULDC analysis, it was assumed that LSRP Phase III will be completed.

Basis of ULDC Analysis:

ULDC states that levee vegetation management should provide for levee integrity, visibility, and accessibility for inspections, maintenance, and flood fighting operations while at the same time protect important and critical environmental resources. RD17 currently implements a comprehensive vegetation control program that primarily includes mowing, spraying, and trimming.

3.3 Analysis

The analysis of levee vegetation consisted of performing a field survey of the RD17 levees. Levee reaches were categorized based on the level of vegetation growth within the Vegetation Management Zone, as described in ULDC and illustrated below in Figure 1. Levee reaches in which groundcovers were observed to be less than or equal to 12 inches high AND trees were observed to be trimmed a minimum 5 feet above ground level were deemed a Low Hazard. Levee reaches that were not deemed a Low Hazard were deemed a High Hazard.

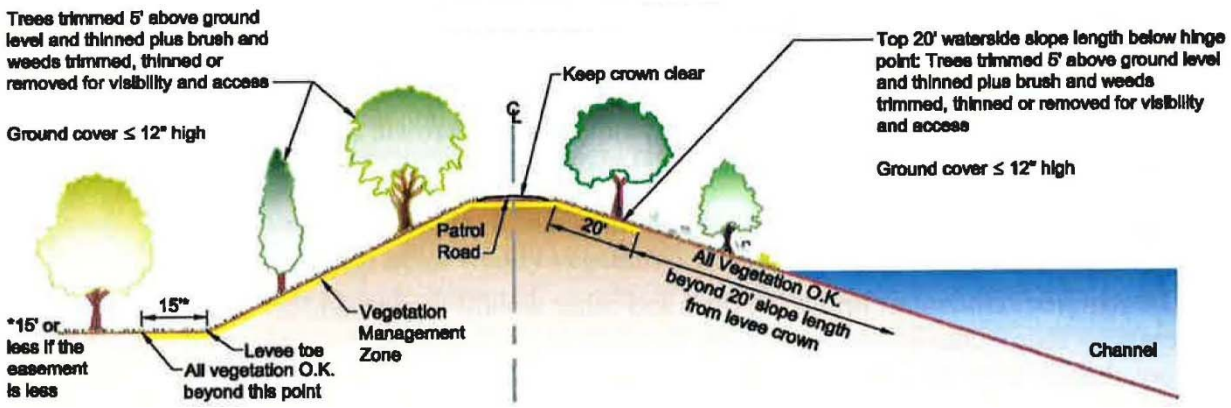

Figure 1 - ULDC Vegetation Management Zone

It should be noted that the analysis of levee vegetation was based on a snapshot in time pursuant to when the field survey was performed. The levee reaches that were deemed a High Hazard may be overstated due to the fact that RD17's vegetation control program is ongoing throughout the year and that some of the noted deficient areas may have already been addressed subsequent to the field survey.

4.0 DEFICIENCY RESULTS

The levee reaches that were identified as a Low Hazard are indicated below in Table 1. These reaches require only regular, ongoing maintenance and have historically performed well. Therefore, they are deemed compliant and no further action is required.

Table 1 – Levee Vegetation - Low Hazard

Station from	Station to	Length (feet)
0+00	327+72	32,772
327+82	337+34	952
337+44	623+89	28,645
635+03	985+95	35,092
		97,461

The levee sections that were identified as a High Hazard are indicated below in Table 2. These sections are deemed deficient.

Table 2 –Levee Vegetation – High Hazard

Station from	Station to	Length (feet)	Deficient Items
327+72	327+82	10	tree limbs
337+34	337+44	10	tree limbs
623+89	635+03	1,114	groundcover + tree limbs
		1,134	

As stated earlier, RD17 currently implements a comprehensive vegetation control program. It is recommended that existing, ongoing operations and maintenance efforts for all levee reaches deemed a High Hazard be augmented to emphasize and better address vegetation control at these particular reaches. Figure 2 consists of an overall map that summarizes the deficiencies of the RD17 levee system with respect to levee vegetation.

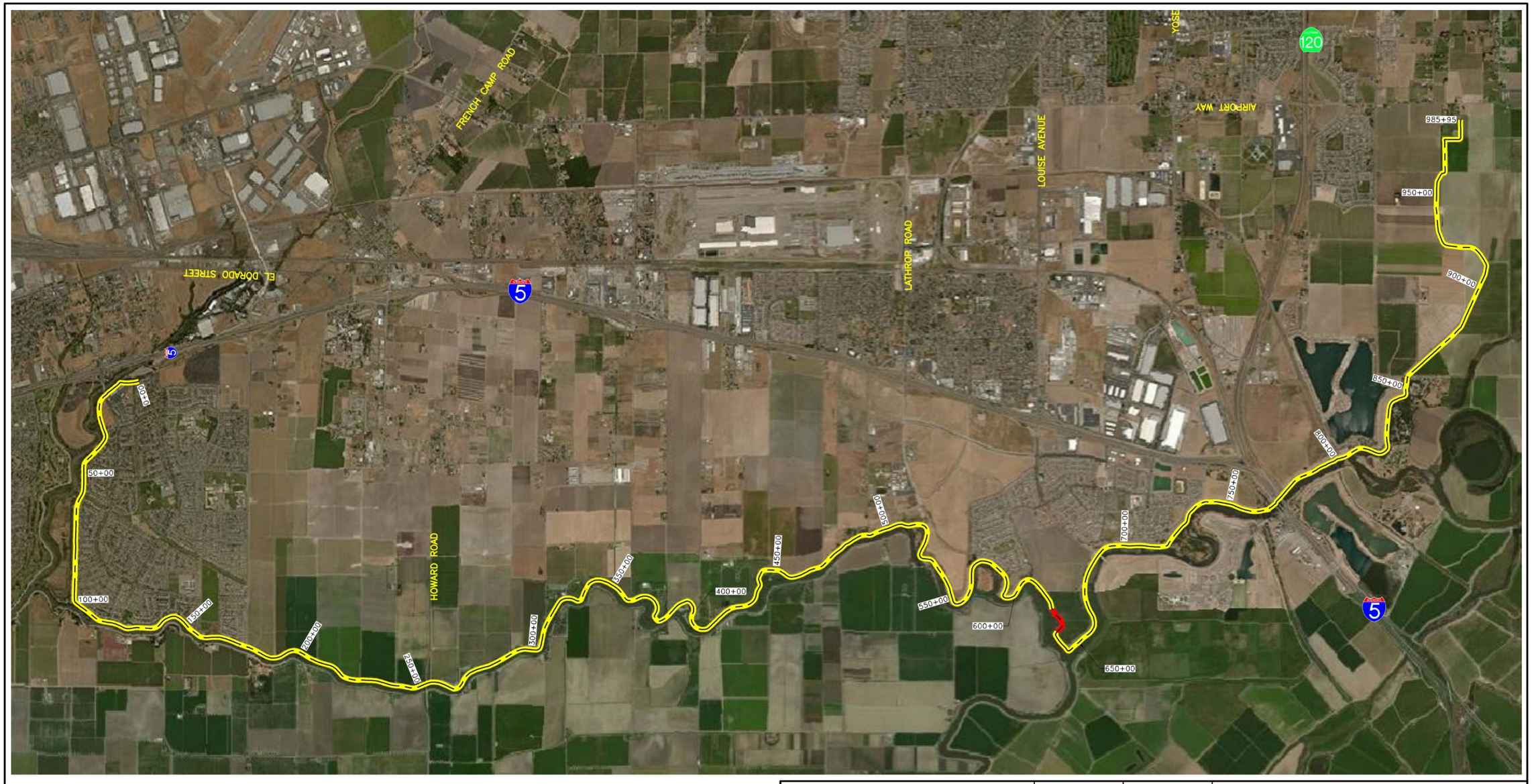

Figure 2 - Summary of Deficiencies