

**Meeting of the Central Valley Flood Protection Board
September 28, 2012
Staff Report – Encroachment Permit
Yocha Dehe Wintun Nation
Cache Creek Stream Bank Stabilization, Yolo County**

1.0 – ITEM

Consider approval of Permit No. 18790 (Attachment B)

2.0 – APPLICANT

Yocha Dehe Wintun Nation

3.0 – LOCATION

The project is located on the right bank of Cache Creek adjacent to the Yocha Dehe Golf Club within the Capay Valley, southeast of the Town of Brooks in Yolo County. (Cache Creek Designated Floodway, Yolo County, See Attachment A)

4.0 – DESCRIPTION

The applicant proposes to stabilize an eroding portion of the streambank by constructing a low longitudinal stone toe along 485 feet of the right descending bank of Cache Creek. The rock toe will have four 18 foot re-directive rock vanes, approximately 2,000 willow plantings and a “low-flood terrace”.

5.0 – PROJECT ANALYSIS

The applicant is proposing to construct a three foot high, low longitudinal stone toe along 485 feet of the right descending bank of Cache Creek. The rock toe will have four 18-foot re-directive rock vanes angled 30 degrees upstream and will be planted with approximately 2,000 willow branches to create a low-flood terrace. The low-flood terrace is designed to remain dry at depths up to the Ordinary High Water Mark (OHWM). This project is designed to stabilize an eroding portion of the right bank of Cache Creek.

The purpose of this project is to arrest the increased migration of the stream and to protect the existing and recently planted riparian vegetation. The longitudinal stone toe protection will be approximately 3 feet high, at or about the elevation of the OHWM. The four rock vanes will be constructed to redirect the high energy flows and the channel thalweg away from the bank. The willow plantings will provide cover and increase the roughness along the bank. The goal for the willow cuttings is to provide 80 percent coverage which results in approximately 80 surviving willows. The combination of the stone toe, rock vanes and plantings are designed to arrest further bank erosion.

The project is located within the Cache Creek Designated Floodway and conforms to all standards in California Code of Regulations Title 23.

5.1 – Authority of the Board

- California Code of Regulations, Title 23 - Waters, Division 1, Article 3, §6 - Need for a Permit; Article 5, §107 - Permitted Uses in Designated Floodways, Article 8, §121 - Erosion Control, §131 - Vegetation.

5.2 – Hydraulic Analysis

A hydraulic analysis was conducted by MBK Engineers (MBK) to determine the potential hydraulic impact of the project on the 100-year flood water surface elevation. The methodology used to determine the hydraulic impacts was to develop an existing condition hydraulic model and a project condition hydraulic model.

A one-dimensional HEC-RAS hydraulic model was used to simulate the existing and project condition. The 100-year flow in Cache Creek at this location was estimated to be 61,810 cubic feet per second. The model was originally developed and calibrated by MBK for a hydraulic analysis of the Yocha Dehe Golf Course in 2004 and 2005.

The project places revetment at or around the OHW and extends out a maximum of 40 feet from the streambank. The revetment would reduce the flow conveyance area by approximately 120 square feet. The flow conveyance area during a 100-year flood is approximately 18,000 square feet. This project would block less than one percent of the 100-year flood flow conveyance area. The results of the HEC-RAS model predict no increase in water surface elevation at the project, or upstream and downstream of the project.

The results of this analysis showed that proposed project would have no impact on the 100-year water surface elevation. Board staff concurs with this conclusion.

5.3 – Geotechnical Analysis

The scope of work for this project does not require a geotechnical analysis. The rock revetment is being placed along the streambank to combat high energy and erosive flows. No materials will be excavated from the floodplain.

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

The comments and endorsements associated with this project from all pertinent agencies are shown below:

- The U.S. Army Corps of Engineers comment letter has been received for this application. The District Engineer has no objection to the project, subject to conditions. This letter has been incorporated into the permit as Exhibit A.
- The Yolo County Flood Control and Water Conservation District endorsed the project on June 29, 2012 with no conditions.

7.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA determination:

The Board, acting as the CEQA lead agency, has determined the project is categorically exempt in accordance with CEQA under a Class 4 Categorical Exemption (CEQA Guidelines Section 15304) covering minor alterations to land and vegetation.

8.0 – SECTION 8610.5 CONSIDERATIONS

1. Evidence that the Board admits into its record from any party, State or local public agency, or nongovernmental organization with expertise in flood or flood plain management:

The Board will make its decision based on the evidence in the permit application and attachments, this staff report, and any other evidence presented by any individual or group.

- 2. The best available science that related to the scientific issues presented by the executive officer, legal counsel, the Department or other parties that raise credible scientific issues.

The accepted industry standards for the work proposed under this permit as regulated by Title 23 have been applied to the review of this permit.

- 3. Effects of the decision on the facilities of the State Plan of Flood Control, and consistency of the proposed project with the Central Valley Flood Protection Plan as adopted by Board Resolution 2012-52 on June 29, 2012:

The proposed revetment and plantings will have an insignificant effect on the State Plan of Flood Control and the project is consistent with the Central Valley Flood Protection Plan

- 4. Effects of reasonable projected future events, including, but not limited to, changes in hydrology, climate, and development within the applicable watershed:

There will be no effects to the proposed project from reasonable projected future events.

9.0 – STAFF RECOMMENDATION

Staff recommends that the Board find the project exempt from CEQA, approve the permit, and direct staff to file a Notice of Exemption with the State Clearinghouse.

10.0 – LIST OF ATTACHMENTS

- A. Location Maps and Photos
- B. Draft Permit No. 18790
- C. Design Drawings

Design Review:	Ashley Cousin
Environmental Review:	James Herota / Andrea Mauro
Document Review:	Mitra Emami P.E., Eric Butler P.E., Len Marino P.E.



AREA DESIGNATED FOR
STREAM BANK REPAIR



PROJECT SITE LOCATION FOR STREAM BANK REPAIR:
YOCHA DEHE GOLF COURSE
CACHE CREEK
14455 HWY 16
BROOKS CA. 95606

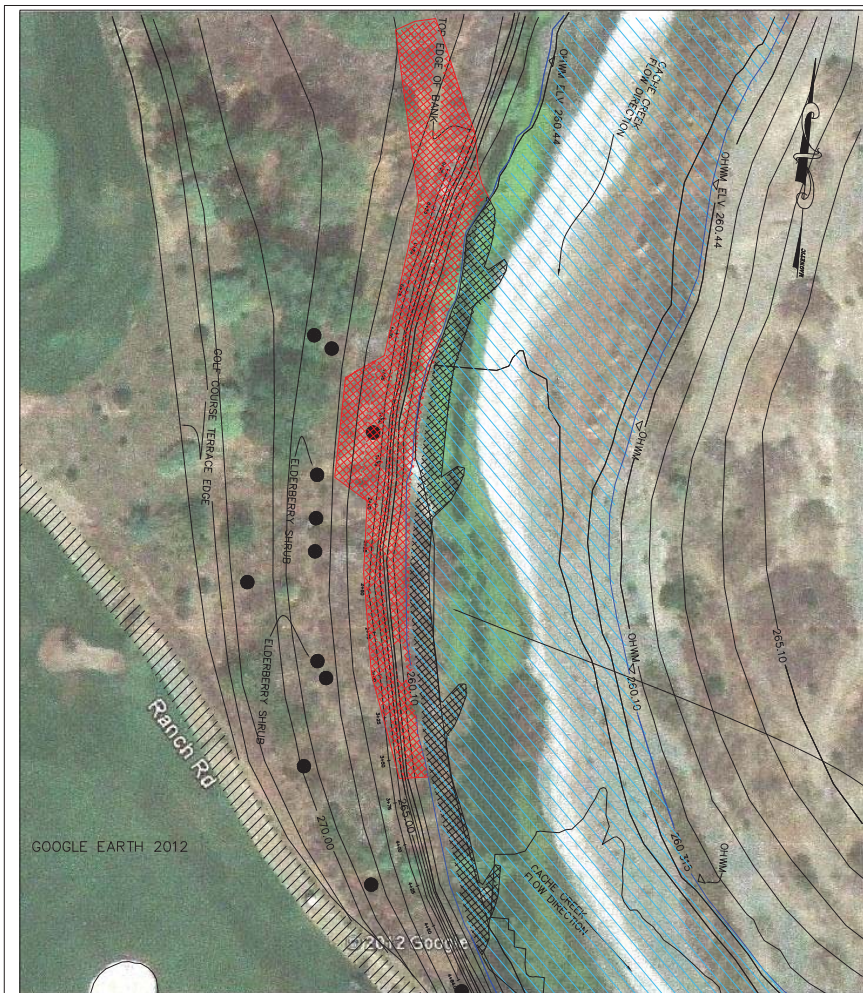
INDEX

1. SITE LOCATION
2. ROCK STORAGE SITE, ROUTE ACCESS
3. CONTOURS, LSTP, STATIONS & VANE LOCATIONS
4. CONTOURS, LSPT LOCATION, VANE LOCATIONS, TEMPORARY & PERMANENTLY DISTURBED AREAS.
5. BANK DEGRADATION, CONTOUR COMPARISON
6. CROSS SECTION, VANE & LSTP TYPICAL
7. CROSS SECTION, LSTP END VIEW, VANE & LSTP W.O. KEYIN & TIE BACK
8. CROSS SECTION, LSTP PHASE ONE, LSTP POLE PLANTING, BACK FILL ACCESS ROAD REMOVAL
9. CROSS SECTION, LSTP TIEBACK & VANE KEYIN
10. TYPICALS; ROCK VANE, ROCK VANE W/KEYIN, LSTP, POLE PLANTING & LIVE SILTATION

YOCHA DEHE GOLF CLUB
CACHE CREEK 14455
HWY. 16 BROOKS CA. 95606

FIGURE TITLE		SALIX APPLIED EARTHCARE 2455 ATHENS AVENUE SUITE A REDDING CALIFORNIA
LOCATION MAP: 14455 HWY 16 BROOKS CA.		
DWG. BY B.LAWSON, DATE 3/19/20012		
FIGURE 1 OF 10		

PROJECT TITLE
CACHE CREEK BANK RESTORATION



PROJECT SITE LOCATION FOR STREAM BANK REPAIR:
 YOCHA DEHE GOLF COURSE
 CACHE CREEK
 14455 HWY 16
 BROOKS CA. 95606

- LEGEND**
- ELDERBERRY SHRUB COUNT OF 12
 - CART PATH
 - TERRACE
 - OHWM
 - CACHE CREEK
 - STUDY AREA BELOW
 - STUDY AREA ABOVE

THE ORDINARY HIGH WATER MARK WITHIN THE STUDY WAS OBSERVED ON THE 17th OF FEBRUARY 2012, BY JOHN McCULLAH, BRUCE LAWSON (SALIX EARTHCARE) AND APRIL SAWYER (CBECO inc). FLUCTUATIONS OF WATER WERE CLEARLY INDICATED BY DESTRUCTION OF TERRESTRIAL VEGETATION, NATURAL LINE IMPRESSED ON THE BANK AND SHELVEING.
 STUDY AREA (IMPACTS) BELOW OHWM = 0.15 AC.
 STUDY AREA (IMPACTS) ABOVE OHWM = 0.34 AC.
 TOTAL STUDY AREA OF IMPACTS = 0.49 AC.

PROJECT TITLE
 CACHE CREEK BANK RESTORATION

FIGURE TITLE	
LOCATION MAP: AREA DESIGNATED FOR STREAM BANK REPAIR	
14455 HWY 16 BROOKS CA.	
DWG. BY B.LAWSON, DATE 3/19/20012	
FIGURE 1.1 OF 10	

SALIX APPLIED EARTHCARE
 2455 ATHENS AVENUE SUITE A
 REDDING CALIFORNIA

YOCHA DEHE GOLF CLUB
 HWY. 16 BROOKS CA. 95606

Site Photos



Photo 1: Upstream view of eroding creek bend at project site. The Yocha Dehe Golf Club and cart road border the site to the west. Photo taken during period of high flow March 28, 2012.



Photo 2: Upstream view of eroding bank taken from southern point of proposed Longitudinal Stone Toe Protection. (Photo taken April 16, 2012).



Photo 3: Downstream view of project site and opposite bank. An elderberry shrub is located directly on eroding bank edge next to invasive *Tamarisk parviflora*. A native shrub, recently planted as part of the Tribal Wildlife Grant, and irrigation line are visible next to the elderberry. Golf course is located on ridge in top right corner of photo. (Photo taken April 16, 2012)



Photo 4: Riparian woodland with re-vegetated native grasses north of project site. The proposed temporary access route will traverse this area, avoiding well-established and recently planted riparian vegetation.

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY
THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18790 BD

This Permit is issued to:

Yocha Dehe Wintun Nation
P.O. Box 18
Brooks, California 95606

To stabilize an eroding portion of the streambank by constructing a low longitudinal stone toe along 485 feet of the right descending bank of Cache Creek. The rock toe will have four 18 foot re-directive rock vanes, approximately 2,000 willow plantings and a low-flood terrace. The project is located on the right bank of Cache Creek adjacent to the Yocha Dehe Golf Club within the Capay Valley, southeast of the Town of Brooks in Yolo County. (Section 6, T10N, R2W, MDB&M, Yolo County Flood Control & Conservation District, Cache Creek, Yolo County).

NOTE: Special Conditions have been incorporated herein which may place limitations on and/or require modification of your proposed project as described above.

(SEAL)

Dated: _____

Executive Officer

GENERAL CONDITIONS:

ONE: This permit is issued under the provisions of Sections 8700 – 8723 of the Water Code.

TWO: Only work described in the subject application is authorized hereby.

THREE: This permit does not grant a right to use or construct works on land owned by the Sacramento and San Joaquin Drainage District or on any other land.

FOUR: The approved work shall be accomplished under the direction and supervision of the State Department of Water Resources, and the permittee shall conform to all requirements of the Department and The Central Valley Flood Protection Board.

FIVE: Unless the work herein contemplated shall have been commenced within one year after issuance of this permit, the Board reserves the right to

change any conditions in this permit as may be consistent with current flood control standards and policies of The Central Valley Flood Protection Board.

SIX: This permit shall remain in effect until revoked. In the event any conditions in this permit are not complied with, it may be revoked on 15 days' notice.

SEVEN: It is understood and agreed to by the permittee that the start of any work under this permit shall constitute an acceptance of the conditions in this permit and an agreement to perform work in accordance therewith.

EIGHT: This permit does not establish any precedent with respect to any other application received by The Central Valley Flood Protection Board.

NINE: The permittee shall, when required by law, secure the written order or consent from all other public agencies having jurisdiction.

TEN: The permittee is responsible for all personal liability and property damage which may arise out of failure on the permittee's part to perform the obligations under this permit. If any claim of liability is made against the State of California, or any departments thereof, the United States of America, a local district or other maintaining agencies and the officers, agents or employees thereof, the permittee shall defend and shall hold each of them harmless from each claim.

ELEVEN: The permittee shall exercise reasonable care to operate and maintain any work authorized herein to preclude injury to or damage to any works necessary to any plan of flood control adopted by the Board or the Legislature, or interfere with the successful execution, functioning or operation of any plan of flood control adopted by the Board or the Legislature.

TWELVE: Should any of the work not conform to the conditions of this permit, the permittee, upon order of The Central Valley Flood Protection Board, shall in the manner prescribed by the Board be responsible for the cost and expense to remove, alter, relocate, or reconstruct all or any part of the work herein approved.

SPECIAL CONDITIONS FOR PERMIT NO. 18790 BD

THIRTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications except as modified by special permit conditions herein. No further work, other than that approved by this permit, shall be done in the area without prior approval of the Central Valley Flood Protection Board.

FOURTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California; including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages arising from the project undertaken pursuant to this permit, all to the extent allowed by law. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

FIFTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board and the State of California, including its agencies, departments, boards, commissions, and their respective officers, agents, employees, successors and assigns (collectively, the "State"), safe and harmless, of and from all claims and damages related to the Central Valley Flood Protection Board's approval of this permit, including but not limited to claims filed pursuant to the California Environmental Quality Act. The State expressly reserves the right to supplement or take over its defense, in its sole discretion.

SIXTEEN: The Central Valley Flood Protection Board, Department of Water Resources, and Yolo County Flood Control and Conservation District shall not be held liable for any damages to the permitted encroachment(s) resulting from flood fight, operation, maintenance, inspection, or emergency repair.

SEVENTEEN: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Central Valley Flood Protection Board.

EIGHTEEN: Upon receipt of a signed copy of the issued (not approved only) permit the permittee shall contact the Department of Water Resources by telephone, (916) 574-0609, and submit the enclosed postcard to schedule a preconstruction conference. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

NINETEEN: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required, at permittee's cost and expense, to modify or remove the permitted encroachment(s) under direction of the Central Valley Flood Protection Board or Department of Water Resources. If the permittee does not comply, the Central Valley Flood Protection Board may modify or remove the encroachment(s) at the permittee's expense.

TWENTY: The permittee may be required, at permittee's cost and expense, to remove, alter, relocate, or reconstruct all or any part of the permitted encroachment(s) if removal, alteration, relocation, or reconstruction is necessary as part of or in conjunction with any present or future flood control plan or project or if damaged by any cause. If the permittee does not comply, the Central Valley Flood Protection Board may remove the encroachment(s) at the permittee's expense.

TWENTY-ONE: If the project, or any portion thereof, is to be abandoned in the future, the permittee or successor shall abandon the project under direction of the Central Valley Flood Protection Board and Department of Water Resources, at the permittee's or successor's cost and expense.

TWENTY-TWO: Upon completion of the project, the permittee shall submit As-Built Drawings to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite 256, Sacramento, California 95821.

TWENTY-THREE: Cleared trees and brush shall be completely burned or removed from the floodway, and downed trees or brush shall not remain in the floodway during the flood season from November 1 to April 15.

TWENTY-FOUR: Revetment shall be uniformly placed and properly transitioned into the bank, levee slope, or adjacent revetment and in a manner which avoids segregation.

TWENTY-FIVE: All debris generated by this project shall be disposed of outside the Cache Creek Designated Floodway.

TWENTY-SIX: No material stockpiles, temporary buildings, or equipment shall remain in the floodway during the flood season from November 1 to April 15.

TWENTY-SEVEN: Fill material shall be placed only within the area indicated on the approved plans.

TWENTY-EIGHT: The revetment shall not contain any reinforcing steel, floatable, or objectionable material. Asphalt or other petroleum-based products may not be used as fill or erosion protection on

the levee section or within the floodway.

TWENTY-NINE: The permittee shall maintain the permitted encroachment(s) and the project works within the utilized area in the manner required and as requested by the authorized representative of the Department of Water Resources or any other agency responsible for maintenance.

THIRTY: The letter from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated August 17, 2012 is attached to this permit as Exhibit A in reference to this project.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. Army Engineer District, Sacramento
Corps of Engineers
1325 J Street
Sacramento, California 95814-2922

Flood Protection and Navigation Section (18790)

AUG 17 2012

Mr. Jay Punia, Executive Officer
Central Valley Flood Protection Board
3310 El Camino Avenue, Room 151
Sacramento, California 95821

Dear Mr. Punia:

We have reviewed a permit application by Yocha Dehe Wintun Nation (application number 18790). This project includes stabilizing an eroding portion of the streambank by constructing a low longitudinal stone toe along 485 feet of the right descending bank of Cache Creek. The project is located adjacent to the Yocha Dehe Golf Club within the Capay Valley, southeast of the Town of Brooks, at 38.7412°N 122.1310°W NAD83, Yolo County, California.

The District Engineer has no comments or recommendations regarding flood control because the proposed work does not affect a federally constructed project.

A Section 10 and/or Section 404 permit (SPK-2012-00486) has been issued for this work.

A copy of this letter is being furnished to Mr. Don Rasmussen, Chief, Flood Project Integrity and Inspection Branch, 3310 El Camino Avenue, Suite LL30, Sacramento, CA 95821.

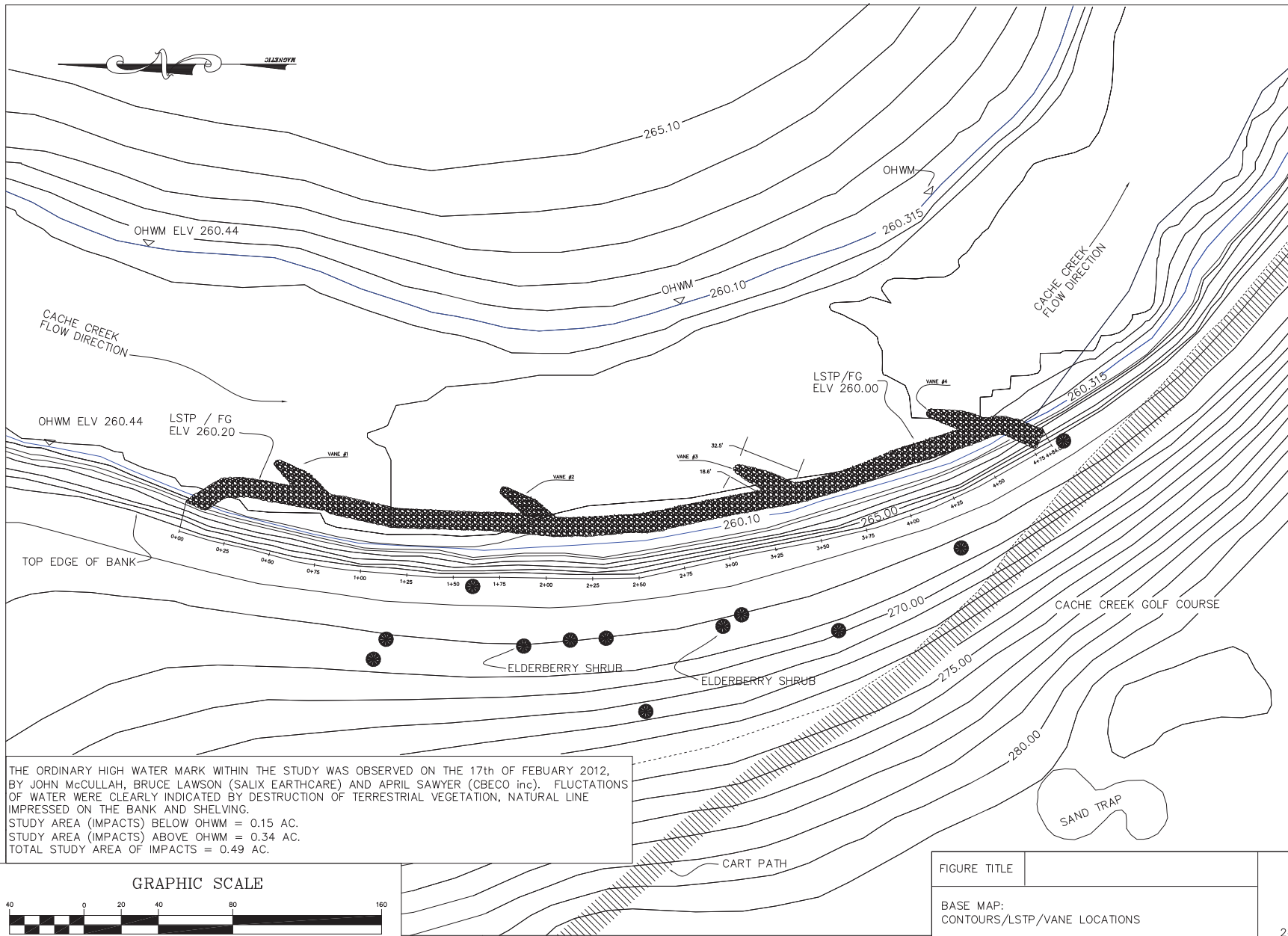
Sincerely,

A handwritten signature in black ink, appearing to read "Megan G. Nagy".

Meegan G. Nagy, P.E.
Chief, Flood Protection and Navigation Section

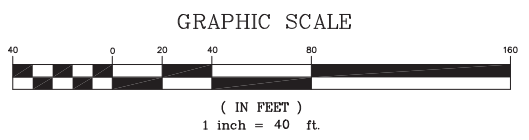
This page intentionally left blank.

YOCHA DEHE GOLF CLUB
 CACHE CREEK 14455
 HWY. 16 BROOKS CA. 95606



- LEGEND**
- ELDERBERRY SHRUB COUNT OF 12
 - LSTP
 - LENGTH 484.00'
 - VANES - 4
 - CART PATH
 - TERRACE
 - OHWM

THE ORDINARY HIGH WATER MARK WITHIN THE STUDY WAS OBSERVED ON THE 17th OF FEBRUARY 2012, BY JOHN McCULLAH, BRUCE LAWSON (SALIX EARTHCARE) AND APRIL SAWYER (CBECO inc). FLUCTUATIONS OF WATER WERE CLEARLY INDICATED BY DESTRUCTION OF TERRESTRIAL VEGETATION, NATURAL LINE IMPRESSED ON THE BANK AND SHELIVING.
 STUDY AREA (IMPACTS) BELOW OHWM = 0.15 AC.
 STUDY AREA (IMPACTS) ABOVE OHWM = 0.34 AC.
 TOTAL STUDY AREA OF IMPACTS = 0.49 AC.

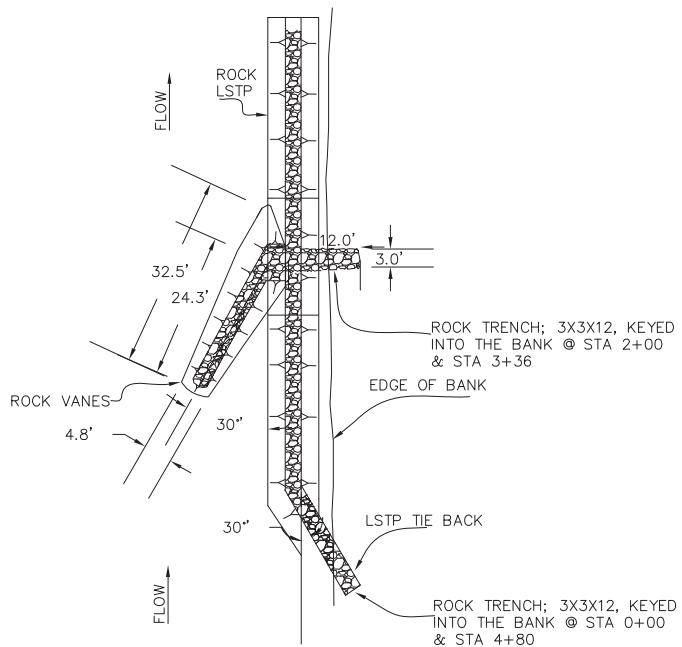


PROJECT TITLE
 CACHE CREEK BANK RESTORATION

FIGURE TITLE	
BASE MAP:	CONTOURS/LSTP/VANE LOCATIONS
DWG. BY	B.LAWSON, DATE 3/19/20012
FIGURE 3 OF 10	

SALIX APPLIED EARTHCARE
 2455 ATHENS AVENUE SUITE A
 REDDING CALIFORNIA

TOP VIEW
VANE & LSTP CONSTRUCTION TIE BACK



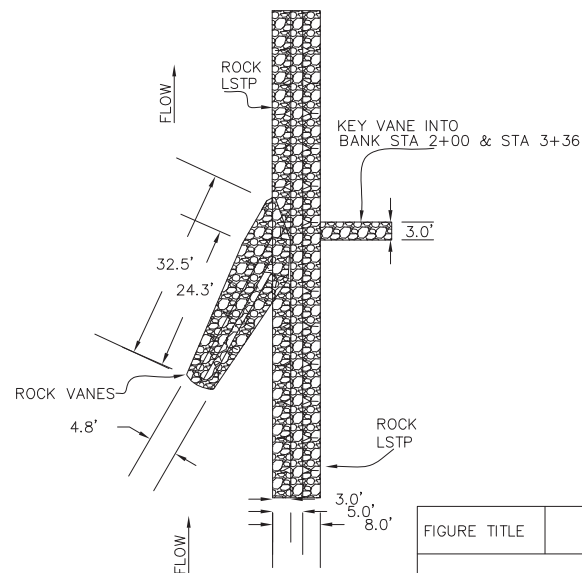
NOTES:

LSTP SHALL BE INSTALLED IN TWO PHASES, 1ST. PHASE CONSTRUCT A PATH 12-13' WIDE 1.5' DEEP FOR TEMPORARY EQUIPMENT ACCESS & CONSTRUCTION. SECOND PHASE, CONSTRUCT PEAKED PORTION OF THE LSTP BY REMOVING THE EXCESS ANGULAR ROCK FROM THE TEMPORARY ACCESS ROAD. TIE BACK THE NORTH END @ STA 0+00 & SOUTH END @ STA 4+80 OF THE LSTP INTO THE EXISTING BANK AT A 30° ANGLE. CONSTRUCT 4 VANES HEADING UP STREAM AT A 30° ANGLE (KEY IN) VANE 2 @ STA. 2+00 & VANE 3 @ STA 3+36 INTO THE EXISTING WEST BANK AS PER CONSTRUCTION SPECIFICATIONS. KEY IN THE LEADING TOE OF THE VANES AND THE LEADING & TRAILING EDGES OF THE LSTP EDGES OF RETEVMENT FOR STABILITY. HEAVY ROCK RIP RAP AND GRADATION SHALL BE ANGULAR AND CLEAN PRIOR TO INSTALLATION.

CONSTRUCTION METHODS & SPECIFICATIONS FOR TIE BACKS & KEYIN:

1. 3'X3'X12'-15' TRENCH OF ANGULAR STONE, TIE BACKS & VANE KEYS SHALL BE EXTENDED BACK INTO THE BANK @ 2X'S BANK FULL ELEVATION (OR), 2. CONTINUE KEYIN TRENCH TO MEET ELV 265.00 ON THE EXISTING WEST BANK. ANGLE LSTP @ 30° TIEBACK & LENGTH SHALL BE DETERMINED BY METHOD #1. OR #2.

TOP VIEW
VANE CONSTRUCTION



YOCHA DEHE GOLF CLUB
CACHE CREEK 14455
HWY. 16 BROOKS CA. 95606

- LEGEND
- ELDERBERRY SHRUB COUNT OF 12
 - LSTP LENGTH 484.00' 5,808 sf
 - VANES - 4 528 sf

PROJECT TITLE
CACHE CREEK BANK RESTORATION

FIGURE TITLE	
CROSS SECTION TYPICAL & LSTP	
VANE TYPICAL DESIGN	
DWG. BY B.LAWSON, DATE 3/19/20012	
FIGURE 6 OF 10	

SALIX APPLIED EARTHCARE
2455 ATHENS AVENUE SUITE A
REDDING CALIFORNIA

YOCHA DEHE GOLF CLUB
 CACHE CREEK 14455
 HWY. 16 BROOKS CA. 95606

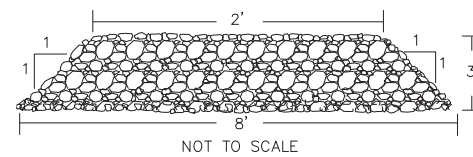
NOTES:

LSTP SHALL BE INSTALLED IN TWO PHASES, 1ST. PHASE CONSTRUCT A PATH 12-13' WIDE 1.5' DEEP FOR TEMPORARY EQUIPMENT ACCESS & CONSTRUCTION. SECOND PHASE, CONSTRUCT PEAKED PORTION OF THE LSTP BY REMOVING THE EXCESS ANGULAR ROCK FROM THE TEMPORARY ACCESS ROAD. TIE BACK THE NORTH END @ STA 0+00 & SOUTH END @ STA 4+80 OF THE LSTP INTO THE EXISTING BANK AT A 30° ANGLE. CONSTRUCT 4 VANES HEADING UP STREAM AT A 30° ANGLE (KEY IN) VANE 2 @ STA. 2+00 & VANE 3 @ STA 3+36 INTO THE EXISTING WEST BANK AS PER CONSTRUCTION SPECIFICATIONS. KEY IN THE LEADING TOE OF THE VANES AND THE LEADING & TRAILING EDGES OF THE LSTP EDGES OF REVETMENT FOR STABILITY. HEAVY ROCK RIP RAP AND GRADATION SHALL BE ANGULAR AND CLEAN PRIOR TO INSTALLATION.

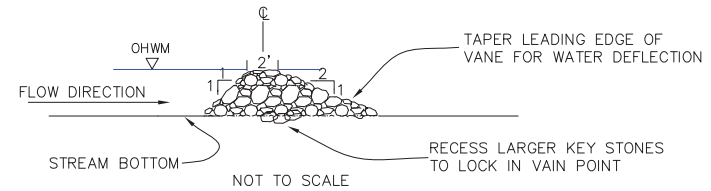
CONSTRUCTION METHODS & SPECIFICATIONS FOR TIE BACKS & KEYIN:

1. 3'X3'X12'-15' TRENCH OF ANGULAR STONE, TIE BACKS & VANE KEYS SHALL BE EXTENDED BACK INTO THE BANK @ 2X'S BANK FULL ELEVATION (OR), 2. CONTINUE KEYIN TRENCH TO MEET ELV 265.00 ON THE EXISTING WEST BANK. ANGLE LSTP @ 30°; TIEBACK & LENGTH SHALL BE DETERMINED BY METHOD #1. OR #2.

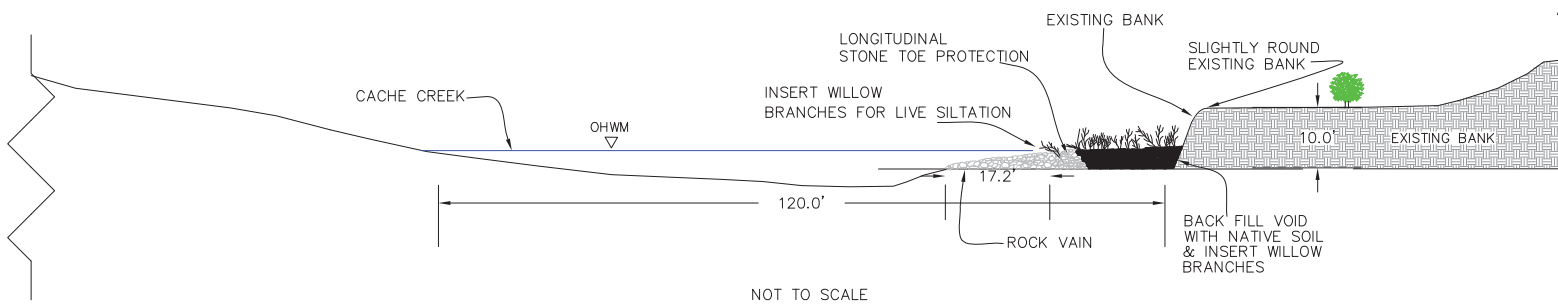
LSTP END VIEW DETAIL



VAIN END VIEW



TYPICAL VANE & LSTP W/OUT KEYIN & TIE BACK CROSS SECTION
 LOOKING DOWN STREAM @ STA 0+50



- LEGEND
- ELDERBERRY SHRUB COUNT OF 12
 - LSTP LENGTH 484.00' 5,808 sf'
 - VANES - 4 528 sf'

FIGURE TITLE	
CROSS SECTION TYPICAL, LSTP END VIEW VANE & LSTP W/OUT KEYIN & TIE BACK TYPICAL DESIGN	
DWG. BY B.LAWSON, DATE 3/19/20012	
FIGURE 7 OF 10	

SALIX APPLIED EARTHCARE
 2455 ATHENS AVENUE SUITE A
 REDDING CALIFORNIA

PROJECT TITLE
 CACHE CREEK BANK RESTORATION