Meeting of the Central Valley Flood Protection Board
July 27, 2012
Staff Report – Encroachment Permit
Sacramento Area Flood Control Agency (SAFCA)
Unionhouse Creek Improvements, Sacramento County

1.0 – ITEM

Consider approval of Permit No. 18777

2.0 – APPLICANT

Sacramento Area Flood Control Agency (SAFCA); Pete Ghelfi, Director of Engineering.

3.0 – LOCATION

The project is located along Unionhouse Creek in between Franklin Boulevard and Bruceville Road in Sacramento, California (Unionhouse Creek, Sacramento County, please see Attachment A for location maps and photos).

4.0 – DESCRIPTION

The applicant proposes to widen the existing concrete-lined bottom of Unionhouse Creek by 8-feet from Franklin Boulevard to Center Parkway; and to concrete line the side slopes of Unionhouse Creek from Center Parkway to Bruceville Road; and relocate an existing City of Sacramento sump pump (Sump No. 201).

5.0 – PROJECT ANALYSIS

5.2 – Project Background

Sacramento Regional Transit (RT) applied for and received a Central Valley Flood Protection Board (CVFPB) permit on June 19, 2012, to extend their South Corridor Light Rail Line along Unionhouse Creek in Sacramento, California (Permit No. 18166-2). Within that CVFPB permit application package, flood control improvements to Unionhouse Creek were shown as a concrete rectangular shaped channel as part of a future US Army Corps of Engineers (USACE) flood control project. However, the Sacramento Area Flood Control Agency (SAFCA) and the City of Sacramento could not afford the estimated high cost ($40 million) for that USACE channel improvement at this time, so they proposed in this subsequent CVFPB permit application package to widen 1 mile of Unionhouse Creek instead of installing the rectangular shaped channel, and then concrete line an additional 0.5 miles of Unionhouse Creek upstream of this proposed widening, at a cost of about $2 million. The USACE rectangular shaped channel design would have lowered the existing Unionhouse Creek flow line by 2 feet, however SAFCA's proposed widened portion of Unionhouse Creek maintains the

existing flow line elevation. Attachment B shows the difference in proposed flood control improvements for Unionhouse Creek next to the proposed RT Light Rail Line from RT's permit application No. 18166-2 and SAFCA's permit application No. 18777.

SAFCA and the City entered into an agreement in February 2012 for improving Unionhouse Creek as proposed in this permit application, which was submitted to the CVFPB by SAFCA on April 30, 2012. After preliminary permit review, a site inspection was conducted on May 17, 2012 which documented erosion under the Center Parkway Bridge and other channel deficiencies. An incomplete permit application letter was sent to the applicant on May 18, 2012 requesting additional information for the permit application's completeness review. The applicant has submitted information, however at this time vibration impacts from the effects of RT's light rail line on the south side slope of Unionhouse Creek needs to be mitigated (see Special Permit Condition No. 17). A permit number was assigned on July 3, 2012 to expedite the issuance of public notification letters and a transmittal to the US Army Corps of Engineers (USACE) at the request of SAFCA.

5.2 – Authority of the Board

- Title 23, Section 112, Regulated Streams.
- Operation & Maintenance (O&M) Manual for the South Sacramento County Streams, California, San Joaquin River Basin, Flood Control Project.

5.3 – Hydraulic Analysis

A hydraulic analysis was conducted by Wood Rodgers (WR) in May 2012 to evaluate the design proposed by SAFCA and demonstrate that the 100-year water surface elevation (WSE) would be contained in the new channel conveyance. However, the HEC-RAS model developed by WR did not include any improvements as part of the RT light rail project next to Unionhouse Creek in the analysis. CVFPB staff requested WR to re-run the HEC-RAS model considering the proposed RT light rail improvements and received an updated hydraulic report from WR on July 9, 2012. The results concluded that the proposed RT improvements would elevate the 100-year and 200-year WSE for the existing Unionhouse Creek configuration, noting that with RT's embankment above the 100-year WSE, southerly Unionhouse Creek overland release would no longer flow to Consumnes River Boulevard when additional channel capacity is needed. As a result, both peak flows and WSE's will increase and potentially flow north towards residential development. However, when WR ran the HEC-RAS model including a widened and improved Unionhouse Creek as proposed by SAFCA, the model indicated adequate capacity to contain the 100-year flow, and 200-year flow, with a limited amount freeboard. This limited freeboard is less than 3 feet, 2 feet and 1 foot in many locations, and in some locations it is negative. Attachment C shows the Unionhouse Creek hydraulic profile, cross sections, cross section details, detailed calculated freeboard table, aerial photo graphical freeboard representation and the FEMA 100-year floodplain for this area.

5.4 – Geotechnical Analysis

At the request of CVFPB staff, a geotechnical analysis was submitted by the applicant that evaluated the static load of the RT light rail line on the Unionhouse Creek side slopes. However the geotechnical analysis did not evaluate the dynamic loading of the RT rail train on the Unionhouse Creek side slopes. CVPFB staff had requested this information from the applicant in May 2012, and it was received on July 19, 2012. The updated geotechnical analysis indicated high factors of safety for both the static (6.6) and rapid drawdown (4.3) cases, and that loading from the RT light rail trains will not destabilize the proposed slope. The analysis also noted that based on the consultant's experience, especially with the steep 1.8 to 1.0 proposed side slope, there could be surficial instability and erosion in these areas which will require slope protection and/or continued maintenance to mitigate these shallow type of failures.

The vibration analysis in the South Corridor Phase 2 Extension Project Modifications Initial Study/Environmental Assessment did not evaluate effects from the RT light rail train on the Unionhouse Creek side slopes. The vibration analysis report did state that residential housing would have to be located within 30 to 35 feet of the future nearest light rail track before vibration impacts would occur to people in homes. The proposed Unionhouse Creek south top of bank is proposed to be within 20 feet of the centerline of the north light rail line (please see Attachment B for details). Therefore it will experience vibration impacts which the applicant will need to mitigate for and assure slope stability for Unionhouse Creek.

5.5 – Additional Staff Analysis

a. From the site inspection conducted on May 17, 2012, CVFPB staff observed what would be called "minimally acceptable" Unionhouse Creek operation and maintenance rating. Staff strongly suggests that the operation and maintenance of Unionhouse Creek be elevated to a solid "acceptable" rating in the future, considering the minimal amount of proposed freeboard from this channel improvement project, and model assumptions of a good well maintained channel for Manning's "n" friction factors in the HEC-RAS model runs.

b. 320 CVFPB adjacent landowner letters were sent out for public notification for this project on July 5, 2012. To date, 25% of these notices have been returned to the CVFPB by the US Postal Service. The Board reserves the right to retract this permit application if any future written protests are received by August 5, 2012.

c. CVFFB staff concludes that a safety factor (i.e.: freeboard) should be incorporated into this project in the near future, because CVFPB staff also concluded that 37% of the proposed project, as currently designed, provides less than 1 foot of freeboard for the adjacent property owners, calculated as follows:

Total top of bank distance for the proposed UHC project = (2) X 1.5 miles for each side of UHC = 3 miles or 15,840 feet

Top of bank which has less than 1 foot of freeboard:

From Franklin Boulevard to Center Parkway, north side: 5,280 feet (1.00 mile)
From Franklin Boulevard to Center Parkway, south side: 250 feet (0.05 mile)
From Center Parkway to Creek Confluence, north side: 275 feet (0.05 mile)
Total: 5,805 feet (1.10 mile)

5,805 feet / 15,840 feet = 0.366 or 37%
1.10 miles / 3 miles = 0.366 or 37%

6.0 – AGENCY COMMENTS AND ENDORSEMENTS

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

- Bill Busath of the City of Sacramento endorsed this permit application on April 20, 2012, with no conditions noted on the permit application.

- The U.S. Army Corps of Engineers 208.10 Comment letter has not been received for this application. Staff anticipates receipt of a letter indicating that the USACE District Engineer has no objections to the project, subject to conditions. Upon receipt of the letter, CVFPB staff will review the letter to ensure conformity with the permit language and incorporate it into the permit as Exhibit A.

7.0 – CEQA ANALYSIS

Board staff has prepared the following CEQA Findings:

The Board, as a responsible agency under CEQA, has reviewed Initial Study/Mitigated Negative Declaration (IS/MND) (June 2012, SCH# 2012052043) and Mitigation Monitoring and Reporting Program for the Unionhouse Creek Channel Improvements Project prepared by the lead agency, Sacramento Area Flood Control Agency. These documents, including project design, may be viewed or downloaded from the Central Valley Flood Protection Board website at http://www.cvfpb.ca.gov/meetings/2012/07-27-2012.cfm under a link for this agenda item. These documents are also available for review in hard copy at the Board and SAFCA offices.

SAFCA determined that the project would not have a significant effect on the environment and adopted Resolution 2012-072 on June 21, 2012. A Notice of Determination was filed with the Sacramento County Clerk and the State Clearinghouse on June 22, 2012. Board staff finds that although the proposed project could have a

potentially significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. The project proponent has incorporated mandatory mitigation measures into the project plans to avoid identified impacts or to mitigate such impacts to a point where no significant impacts will occur. These mitigation measures are included in the project proponent's IS/MND and address impacts to air quality, biological resources, cultural resources, geology and soils, greenhouse gas emissions, hazards and hazardous materials, noise, and transportation and traffic. The description of the mitigation measures are further described in the adopted IS/MND.

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 entire State Plan of Flood Control:

   The proposed project is a betterment to the surrounding area than what is currently in place for flood control and therefore benefits the entire State Plan of Flood Control.

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

   Changes in hydrology, climate and development within the applicable watershed may affect the flows within the proposed improved Unionhouse Creek over time.

9.0 – STAFF RECOMMENDATION

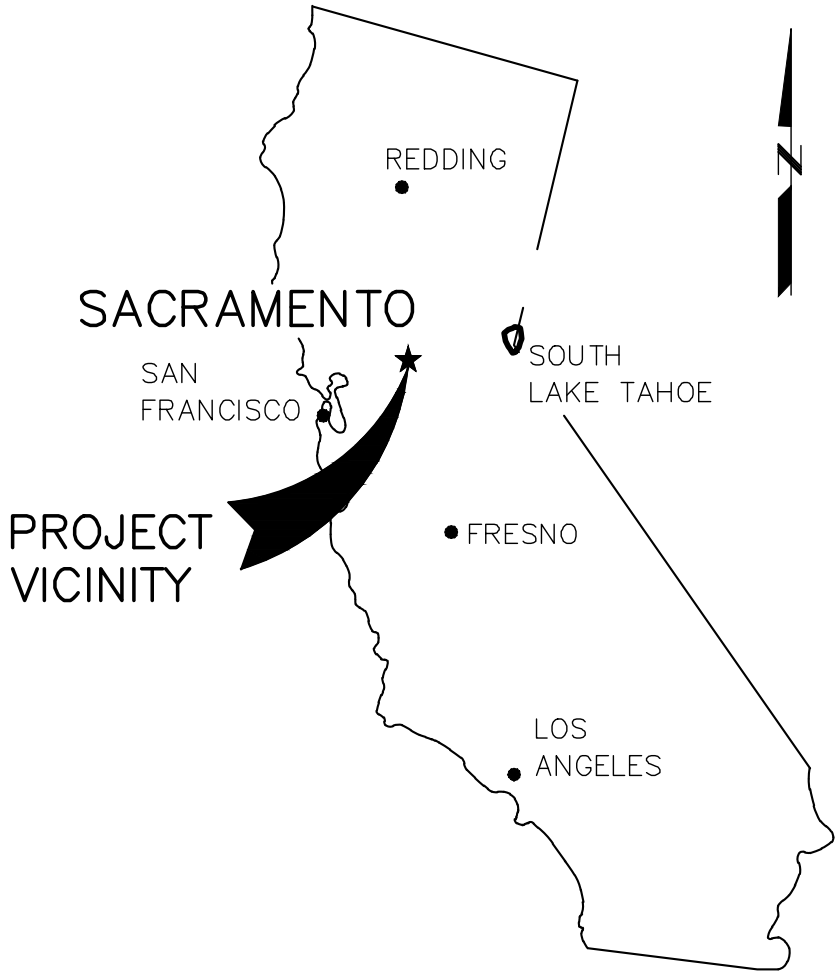
Staff recommends that the Board adopt the CEQA findings and approve the permit, conditioned upon receipt of a U.S. Army Corps of Engineers comment letter indicating that the District Engineer has no objection to the project, subject to any USACE conditions, and subject to the conditions stated in Section 5.5 of this staff report, and direct staff to file a Notice of Determination with the State Clearinghouse.

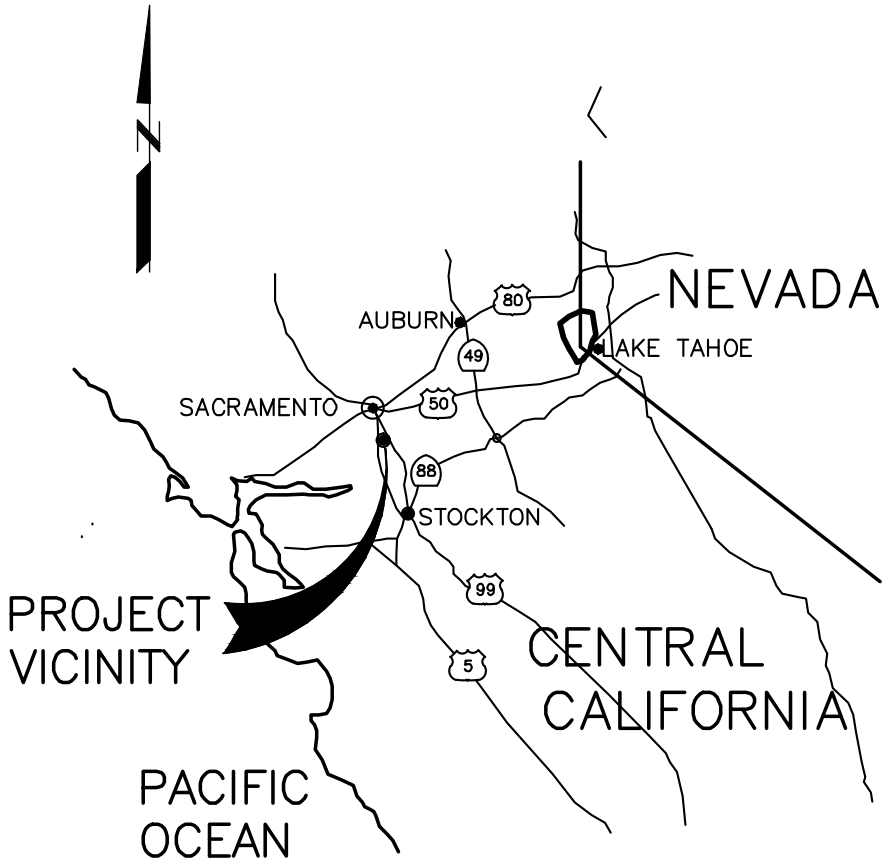
10.0 – LIST OF ATTACHMENTS

A. Location Maps and Photos
B. Permit 18166-2 and Permit 18777 Unionhouse Creek Improvements Comparison
C. Unionhouse Creek Hydraulic Information
D. Draft Permit No. 18777
E. USACE Comment Letter

Design Review:	Jon P. Tice, Jr., PE
Environmental Review:	James Herota / Andrea Mauro
Document Review:	David R. Williams, PE and Len Marino, PE

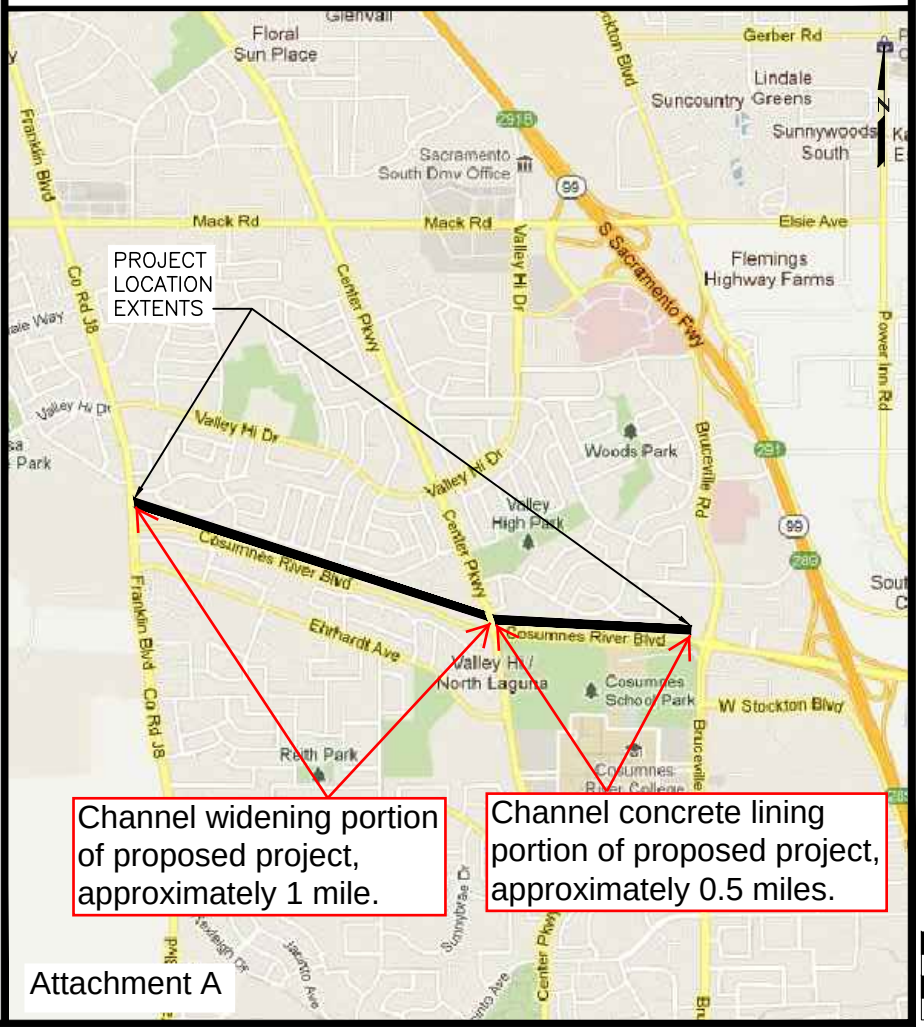
VICINITY MAP





Attachment A

LOCATION MAP



Attachment A

BAR LENGTH ON ORIGINAL DRAWING EQUALS ONE INCH

Photo 1 – View upstream (east) along Unionhouse Creek toward the confluence with Strawberry Creek. This is the eastern boundary of the proposed improvements.

Photo 2 – View downstream along Unionhouse Creek (looking west) just downstream of the confluence with Strawberry Creek. The existing side slopes in the section will be concrete lined.

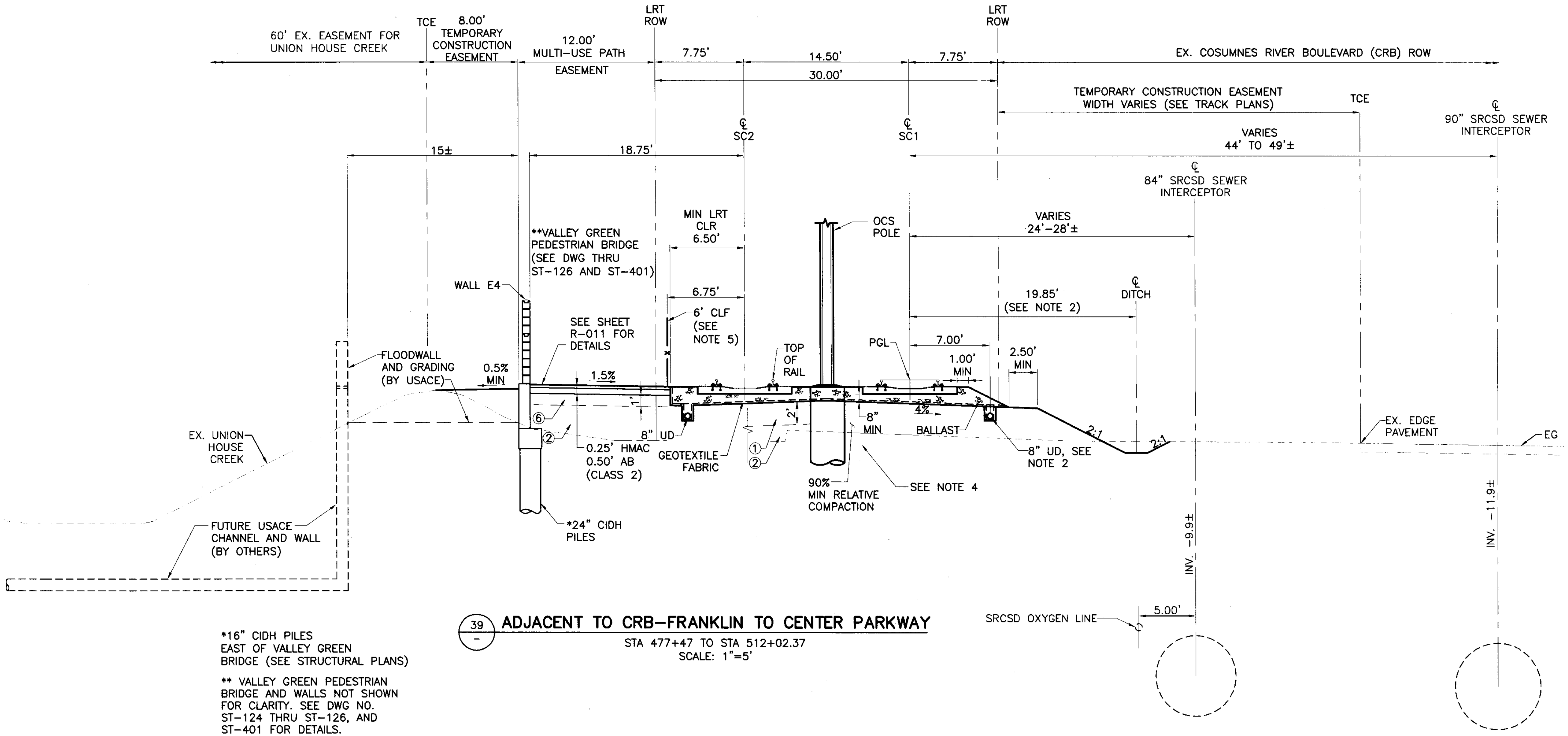
Photo 3 – View looking downstream along Unionhouse Creek (west) toward Center Parkway. The side slopes of this section will be concrete lined. The existing fence will be replaced after construction.

Attachment A

Photo 4 – View looking downstream along Unionhouse Creek (west) just downstream of Center Parkway. The existing concrete-lined bottom will be widened 8-feet and the south embankment will be excavated and constructed at approximately 1.5 – 2:1. The existing fence will be replaced along the new south bank.

Photo 5 – View upstream (east) at Franklin Blvd. The concrete bottom will be widened 8-feet upstream of the concrete shown in the photo. The limit of the existing concrete lining on the south side slope corresponds to Station 10+00 +/- in the attached drawings. This is the western boundary of the proposed improvements.

Attachment A



39 ADJACENT TO CRB–FRANKLIN TO CENTER PARKWAY

STA 477+47 TO STA 512+02.37
SCALE: 1"=5'

*16" CIDH PILES EAST OF VALLEY GREEN BRIDGE (SEE STRUCTURAL PLANS)

** VALLEY GREEN PEDESTRIAN BRIDGE AND WALLS NOT SHOWN FOR CLARITY. SEE DWG NO. ST–124 THRU ST–126, AND ST–401 FOR DETAILS.

*** SIGNALS LOCATED AT SC 490+22 NOT SHOWN FOR CLARITY.

NOTES

1. SEE ADDITIONAL NOTES DWG NO. TC–005.
2. SEE DRAINAGE AND UTILITY PLANS FOR LIMITS AND ELEVATIONS OF DITCHES AND UNDERDRAINS.
3. MANHOLES FOR SRCSD INTERCEPTORS MUST BE MADE FLUSH WITH GRADE. SEE DRAINAGE AND UTILITY PLANS FOR DETAILS.
4. OVEREXCAVATION REQUIRED TO A MINIMUM OF 1' BELOW EXISTING GROUND, OR 2' BELOW BOTTOM OF BALLAST – WHICHEVER IS GREATER.
5. SEE DWG NO. TC–201 FOR FENCE DETAILS.

① PLACE NON–EXPANSIVE SOIL OR LIME/FLYASH–TREATED GENERAL FILL IN TRACK EMBANKMENT FOR A DEPTH OF 2–FEET BELOW BOTTOM OF BALLAST FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

② PLACE SELECT FILL IN THE TRACK EMBANKMENT IN THE ZONE FROM 2–FEET TO 5–FEET BELOW BOTTOM OF BALLAST LINE FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

⑥ 3" ASPHALT CONCRETE, 6" AGGREGATE BASE, AND 12" NON–EXPANSIVE SOIL.

RT Permit No. 18166-2

Attachment B

REVISIONS				
MARK	DATE	DESCRIPTION	BY	CHKD
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SCALE: VERTICAL: AS NOTED
HORIZONTAL: AS NOTED
ORIGINAL SCALE IN INCHES FOR REDUCED PLAN
0 1 2 3

PROJECT ENGINEER: S. BROWN
DESIGNED BY: D. BROWN
DRAWN BY: M. LEON
CHECKED BY: C. LEMLEY
DATE

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER CHAD F. LEMLEY No. 74375 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

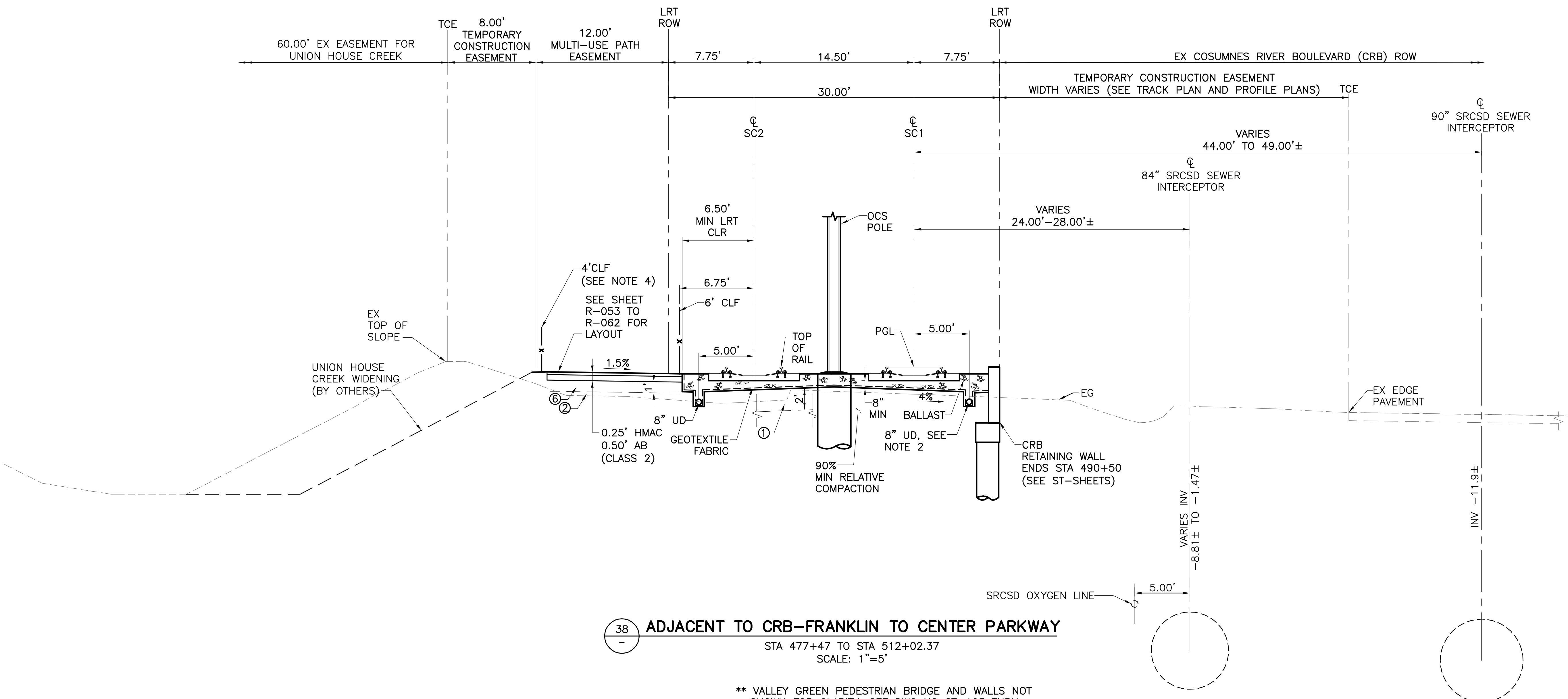
CI: XXXXXXXXXX
FILE: TC–005 – TC–048
SUBMITTAL: 01/26/10

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT

TYPICAL SECTIONS
SHEET 28 OF 44

TC-032
SHEET 87



38 ADJACENT TO CRB-FRANKLIN TO CENTER PARKWAY

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SCALE: 1"=5'

** VALLEY GREEN PEDESTRIAN BRIDGE AND WALLS NOT SHOWN FOR CLARITY. SEE DWG NO ST-123 THRU ST-124, AND ST-401 THRU ST-410 FOR DETAILS.

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SAFCA Permit No. 18777

Attachment B

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		DATE
PROJECT ENGINEER:	K. ANDERSON	
DESIGNED BY:	M. LEON	3/30/12
DRAWN BY:	M. LEON	3/30/12
CHECKED BY:	J. FARNSWORTH	3/30/12

Lockwood, Andrews & Newnam, Inc.
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REGISTERED PROFESSIONAL ENGINEER KEKOA ANDERSON No. 53893 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

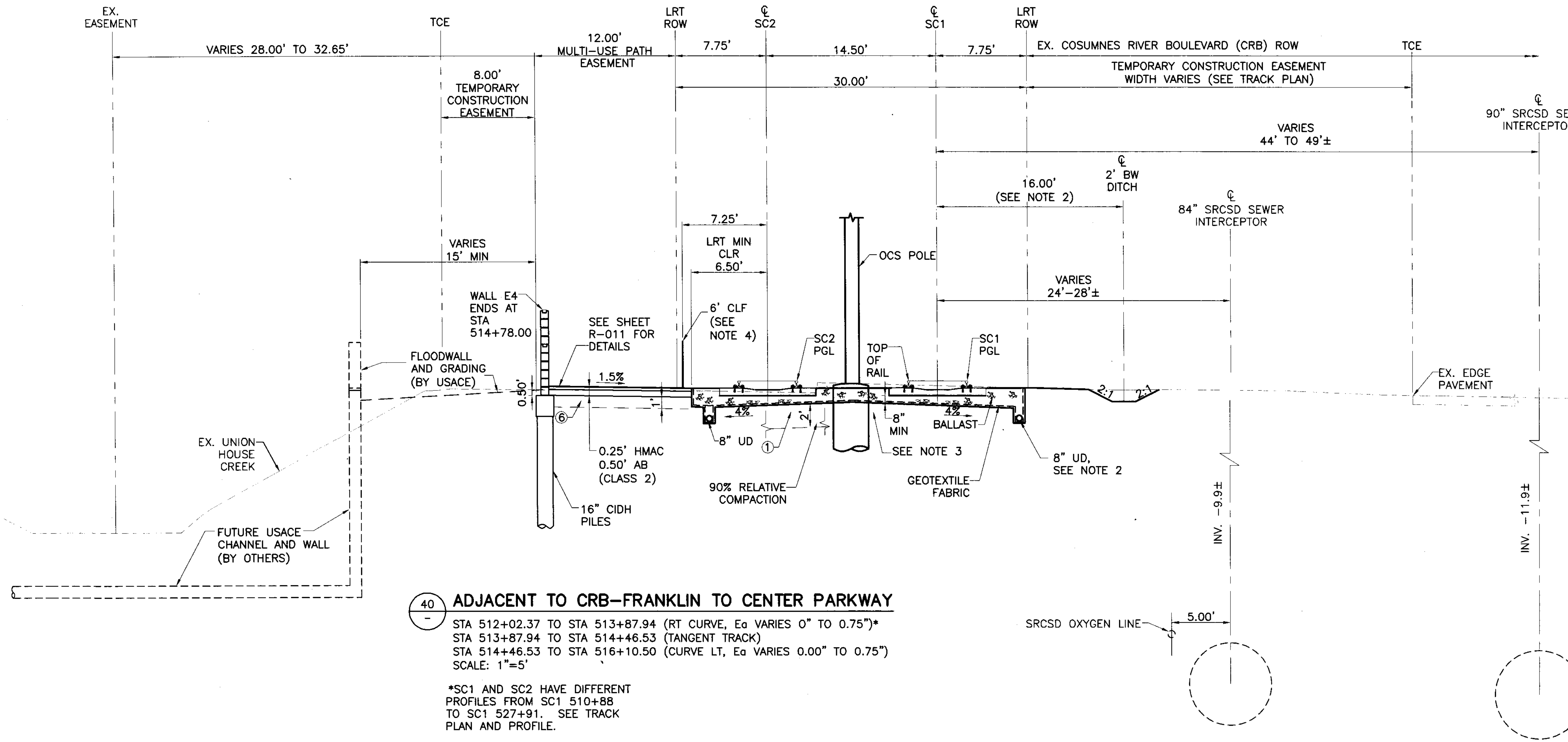
CI: 410.08.02
FILE: TC-005 – TC-047
SUBMITTAL: 03/30/2012

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT
VOLUME 1 - CIVIL, TRACK AND STRUCTURES

TYPICAL SECTIONS
SHEET 27 OF 43

TC-031
SHEET



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ADJACENT TO CRB–FRANKLIN TO CENTER PARKWAY

STA 512+02.37 TO STA 513+87.94 (RT CURVE, Ea VARIES 0" TO 0.75")*
STA 513+87.94 TO STA 514+46.53 (TANGENT TRACK)
STA 514+46.53 TO STA 516+10.50 (CURVE LT, Ea VARIES 0.00" TO 0.75")
SCALE: 1"=5'

*SC1 AND SC2 HAVE DIFFERENT PROFILES FROM SC1 510+88 TO SC1 527+91. SEE TRACK PLAN AND PROFILE.

NOTES

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RT Permit No. 18166-2

Attachment B

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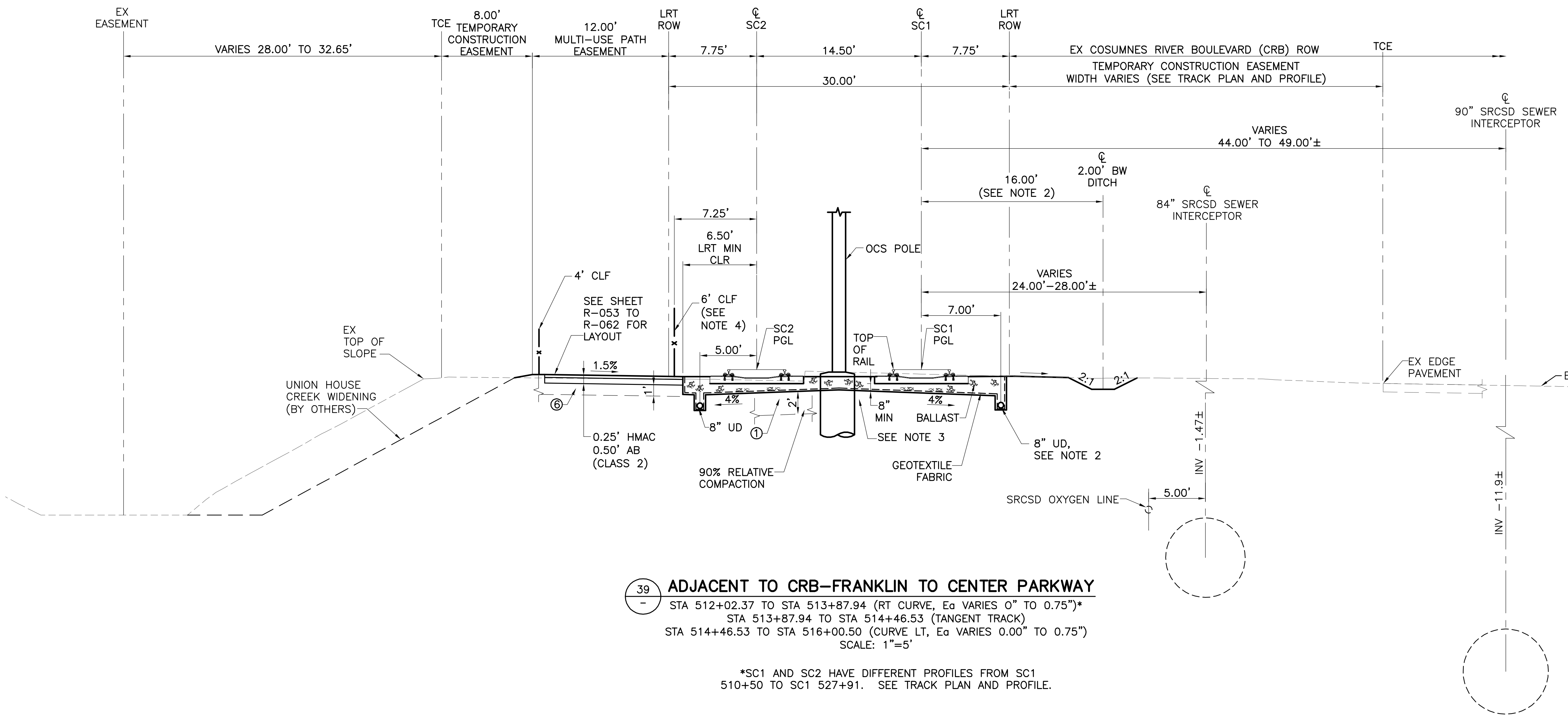
FILE: TC-005 – TC-048
SUBMITTAL: 01/26/10

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT

TYPICAL SECTIONS
SHEET 29 OF 44

TC-033
SHEET 88



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STA 512+02.37 TO STA 513+87.94 (RT CURVE, Ea VARIES 0" TO 0.75")*
STA 513+87.94 TO STA 514+46.53 (TANGENT TRACK)
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SCALE: 1"=5'

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SAFCA Permit No. 18777

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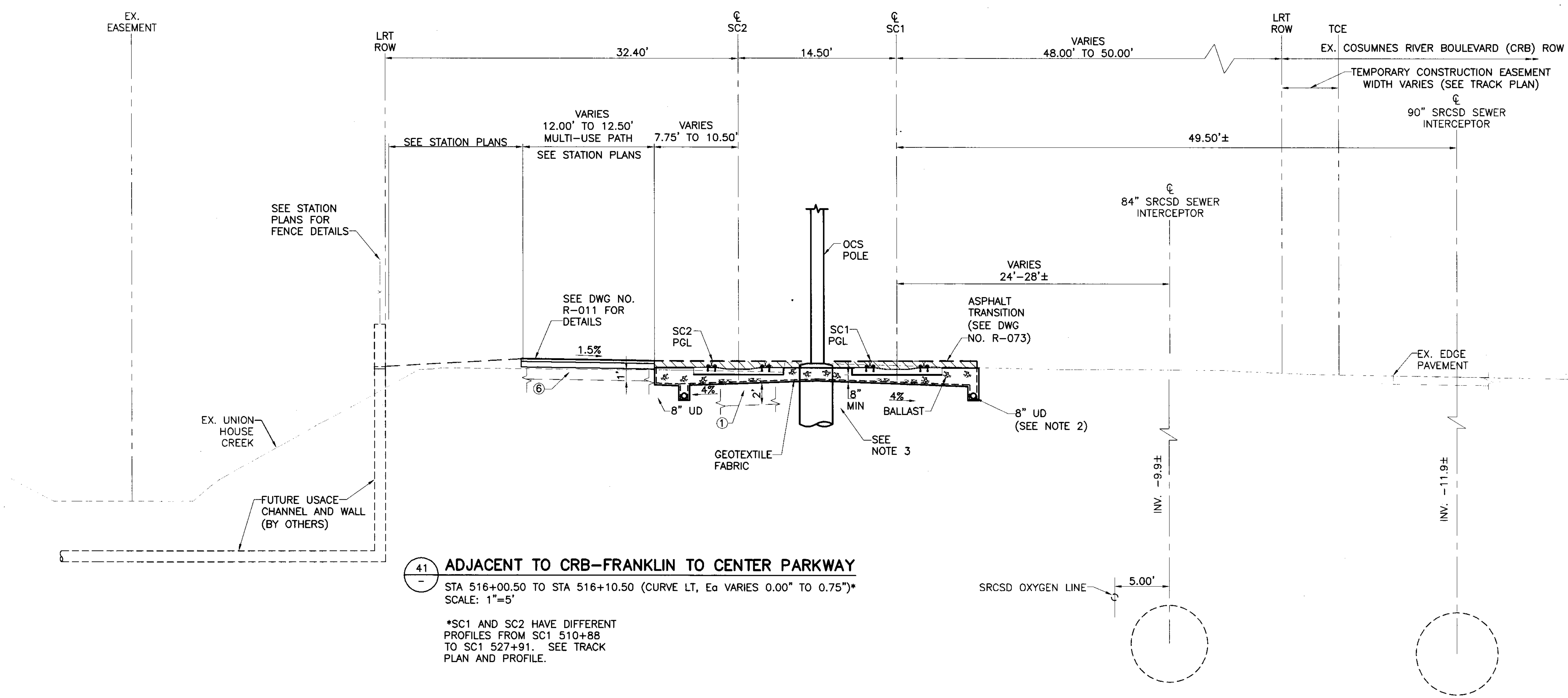
Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT
VOLUME 1 - CIVIL, TRACK AND STRUCTURES

TYPICAL SECTIONS
SHEET 28 OF 43

TC-032
SHEET



41 ADJACENT TO CRB-FRANKLIN TO CENTER PARKWAY

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SCALE: 1"=5'

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RT Permit No. 18166-2

Attachment B

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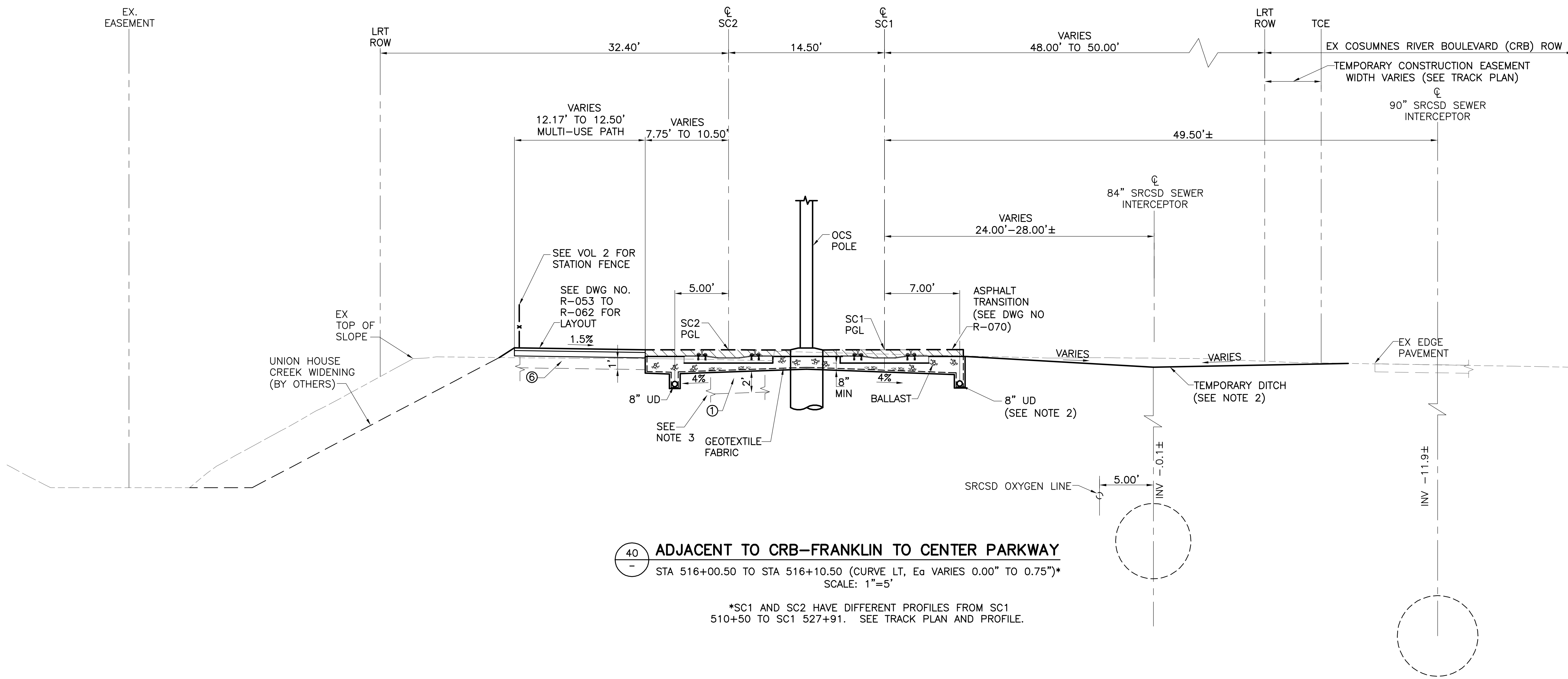
CI: XXXXXXXXXX
FILE: TC-005 – TC-048
SUBMITTAL: 01/26/10

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT

TYPICAL SECTIONS
SHEET 30 OF 44

TC-034
SHEET 89



ADJACENT TO CRB–FRANKLIN TO CENTER PARKWAY

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STA 516+00.50 TO STA 516+10.50 (CURVE LT, Ea VARIES 0.00" TO 0.75")*
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SAFCA Permit No. 18777

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0 1 2 3

		DATE
PROJECT ENGINEER:	K. ANDERSON	
DESIGNED BY:	M. LEON	3/30/12
DRAWN BY:	M. LEON	3/30/12
CHECKED BY:	J. FARNSWORTH	3/30/12

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER KEKOA ANDERSON No. 53893 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

CI: 410.08.02
FILE: TC-005 – TC-047
SUBMITTAL: 03/30/2012

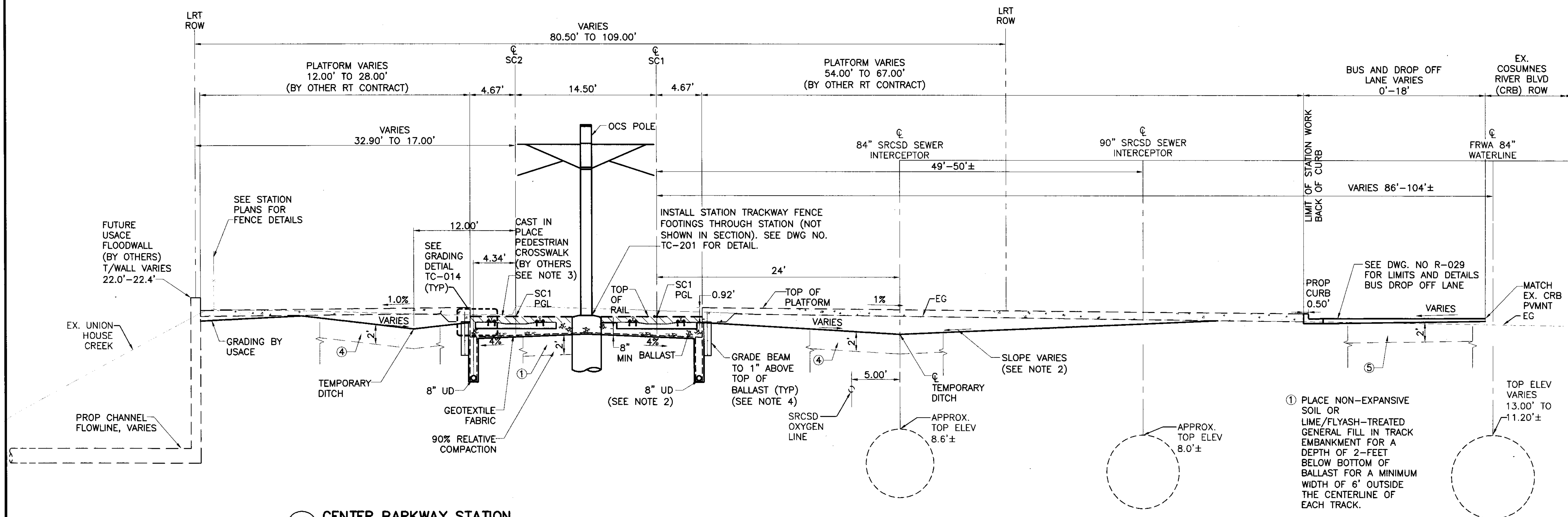
Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT
VOLUME 1 - CIVIL, TRACK AND STRUCTURES

TYPICAL SECTIONS
SHEET 29 OF 43

TC-033
SHEET

NOTES
1. SEE ADDITIONAL NOTES DWG NO. TC-005.
2. SEE DRAINAGE AND UTILITY PLANS FOR LIMITS AND ELEVATIONS OF DITCHES AND UNDERDRAINS.
3. 20' CAST-IN-PLACE PEDESTRIAN CROSSING LOCATED ON BOTH ENDS OF STATION PLATFORMS, SEE PACKAGE C PLANS.
4. FOR GRADE BEAM DETAIL SEE DWG NO. TC-207



① PLACE NON-EXPANSIVE SOIL OR LIME/FLYASH-TREATED GENERAL FILL IN TRACK EMBANKMENT FOR A DEPTH OF 2-FEET BELOW BOTTOM OF BALLAST FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

④ UPPER 2 FEET EMBANKMENT NON-EXPANSIVE SOIL, A MINIMUM OF 3' PAST EDGE OF PLATFORM.

⑤ UPPER 2 FEET NON-EXPANSIVE SOIL WITH R-VALUE ≥ 15, A MINIMUM WIDTH OF 2' OUTSIDE EDGE OF PAVEMENT.

42 CENTER PARKWAY STATION

STA 516+10.50 TO STA 516+32.38 (CURVE LT, Ea VARIES 0.0"-0.04")*
STA 516+32.28 TO STA 519+88.63 (TANGENT TRACK)
STA 519+88.63 TO STA 520+12.50 (CURVE LT, Ea VARIES 0.0"-0.01")
SCALE:1"=5'

* SC1 AND SC2 HAVE DIFFERENT PROFILES FROM SC1 510+88 TO 527+81 SEE TRACK PLAN AND PROFILE.

RT Permit No. 18166-2

Attachment B

REVISIONS				
MARK	DATE	DESCRIPTION	BY	CHKD
△				
△				
△				
△				

SCALE: VERTICAL: AS NOTED
HORIZONTAL: AS NOTED
ORIGINAL SCALE IN INCHES FOR REDUCED PLAN
0 1 2 3

PROJECT ENGINEER: S. BROWN
DESIGNED BY: D. BROWN
DRAWN BY: M. LEON
CHECKED BY: C. LEMLEY
DATE

Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER CHAD F. LEMLEY No. 74375 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

CI: XXXXXXXXXX
FILE: TC-005 - TC-048
SUBMITTAL: 01/26/10

Regional Transit

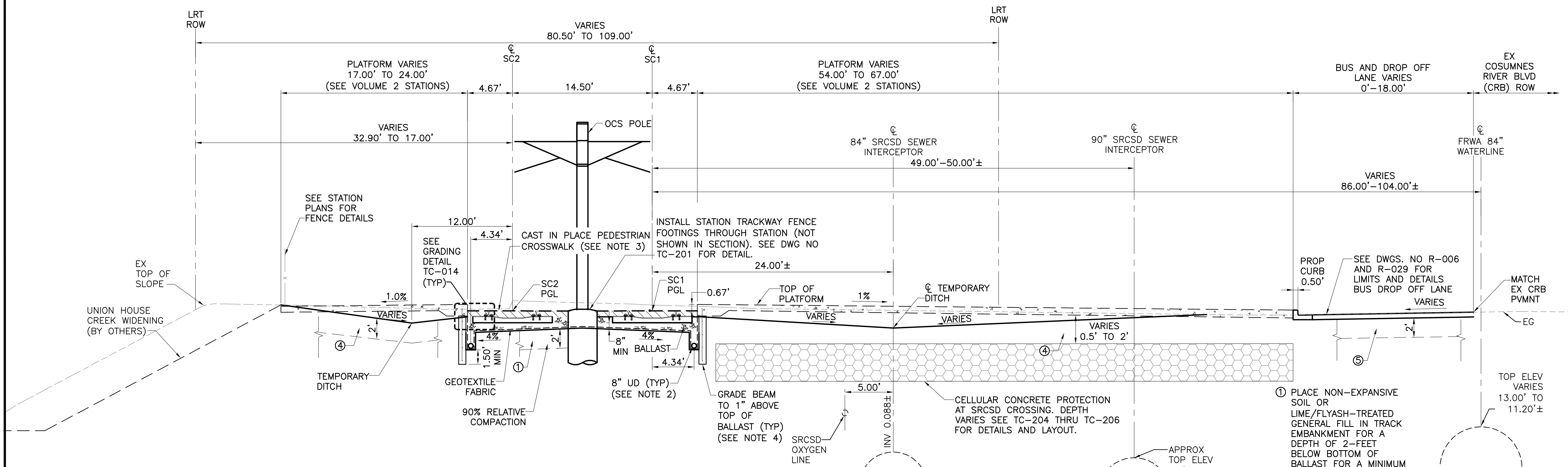
SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT

TYPICAL SECTIONS
SHEET 31 OF 44

TC-035
SHEET 90

NOTES:

1. SEE DWG NO TC–005 FOR ADDITIONAL NOTES.
2. SEE DRAINAGE AND UTILITY PLANS FOR LIMITS AND ELEVATIONS OF DITCHES, UNDERDRAINS AND UTILITIES.
3. 20' CAST–IN–PLACE PEDESTRIAN CROSSING LOCATED ON BOTH ENDS OF STATION PLATFORMS, SEE VOLUME 2 STATIONS.
4. FOR GRADE BEAM DETAIL SEE DWG NO TC–207



41 / – **CENTER PARKWAY STATION**

STA 516+10.50 TO STA 516+32.38 (CURVE LT, Ea VARIES 0.0"–0.04")*
STA 516+32.28 TO STA 519+88.63 (TANGENT TRACK)
STA 519+88.63 TO STA 520+12.50 (CURVE LT, Ea VARIES 0.0"–0.01")
SCALE:1"=5'

* SC1 AND SC2 HAVE DIFFERENT PROFILES FROM SC1 510+50 TO 527+91 SEE TRACK PLAN AND PROFILE.

① PLACE NON–EXPANSIVE SOIL OR LIME/FLYASH–TREATED GENERAL FILL IN TRACK EMBANKMENT FOR A DEPTH OF 2–FEET BELOW BOTTOM OF BALLAST FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

④ UPPER 2 FEET EMBANKMENT NON–EXPANSIVE SOIL, A MINIMUM OF 3' PAST EDGE OF PLATFORM.

⑤ UPPER 2 FEET NON–EXPANSIVE SOIL WITH R–VALUE ≥ 15, A MINIMUM WIDTH OF 2' OUTSIDE EDGE OF PAVEMENT.

SAFCA Permit No. 18777

Attachment B

REVISIONS				
MARK	DATE	DESCRIPTION	BY	CHKD
△				
△				
△				
△				

SCALE: VERTICAL: AS NOTED
HORIZONTAL: AS NOTED
ORIGINAL SCALE IN INCHES FOR REDUCED PLAN
0 1 2 3

		DATE
PROJECT ENGINEER:	K. ANDERSON	
DESIGNED BY:	M. LEON	3/30/12
DRAWN BY:	M. LEON	3/30/12
CHECKED BY:	J. FARNSWORTH	3/30/12

Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER KEKOA ANDERSON No. 53893 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

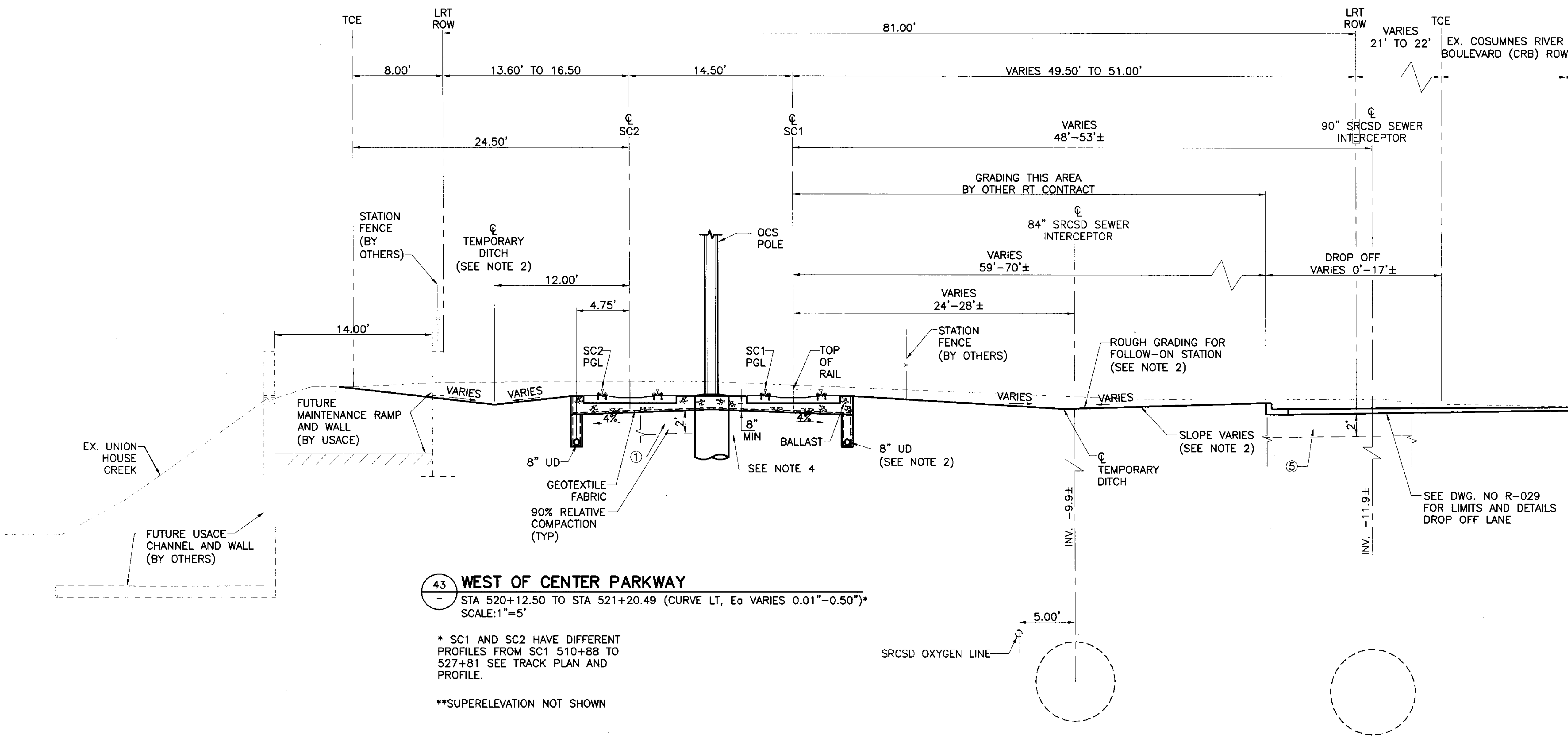
CI: 410.08.02
FILE: TC–005 – TC–047
SUBMITTAL: 03/30/2012

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT
VOLUME 1 - CIVIL, TRACK AND STRUCTURES

TYPICAL SECTIONS
SHEET 30 OF 43

TC-034
SHEET



43 WEST OF CENTER PARKWAY

STA 520+12.50 TO STA 521+20.49 (CURVE LT, Ea VARIES 0.01"–0.50")*
SCALE:1"=5'

* SC1 AND SC2 HAVE DIFFERENT PROFILES FROM SC1 510+88 TO 527+81 SEE TRACK PLAN AND PROFILE.

**SUPERELEVATION NOT SHOWN

NOTES
1. SEE ADDITIONAL NOTES DWG NO. TC-005.
2. SEE DRAINAGE AND UTILITY PLANS FOR LIMITS AND ELEVATIONS OF DITCHES AND UNDERDRAINS.
3. MANHOLES FOR SRCSD INTERCEPTORS MUST BE MADE FLUSH WITH GRADE. SEE DRAINAGE AND UTILITY PLANS FOR DETAILS.
4. OVEREXCAVATION REQUIRED TO A MINIMUM OF 1" BELOW EXIST. GROUND, OR 2' BELOW BOTTOM OF BALLAST, WHICHEVER IS GREATER.

① PLACE NON-EXPANSIVE SOIL OR LIME/FLYASH-TREATED GENERAL FILL IN TRACK EMBANKMENT FOR A DEPTH OF 2-FEET BELOW BOTTOM OF BALLAST FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

⑤ UPPER 2 FEET NON-EXPANSIVE SOIL WITH R-VALUE ≥ 15, A MINIMUM WIDTH OF 2' OUTSIDE EDGE OF PAVEMENT.

RT Permit No. 18166-2

Attachment B

REVISIONS				
MARK	DATE	DESCRIPTION	BY	CHKD
△				
△				
△				
△				

SCALE: VERTICAL: AS NOTED
HORIZONTAL: AS NOTED
ORIGINAL SCALE IN INCHES FOR REDUCED PLAN
0 1 2 3

PROJECT ENGINEER: S. BROWN
DESIGNED BY: D. BROWN
DRAWN BY: M. LEON
CHECKED BY: C. LEMLEY
DATE

Lockwood, Andrews & Newnam, Inc. A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER CHAD F. LEMLEY No. 74375 Exp. 8/30/11 CIVIL STATE OF CALIFORNIA

CI: XXXXXXXXXX
FILE: TC-005 – TC-048
SUBMITTAL: 01/26/10

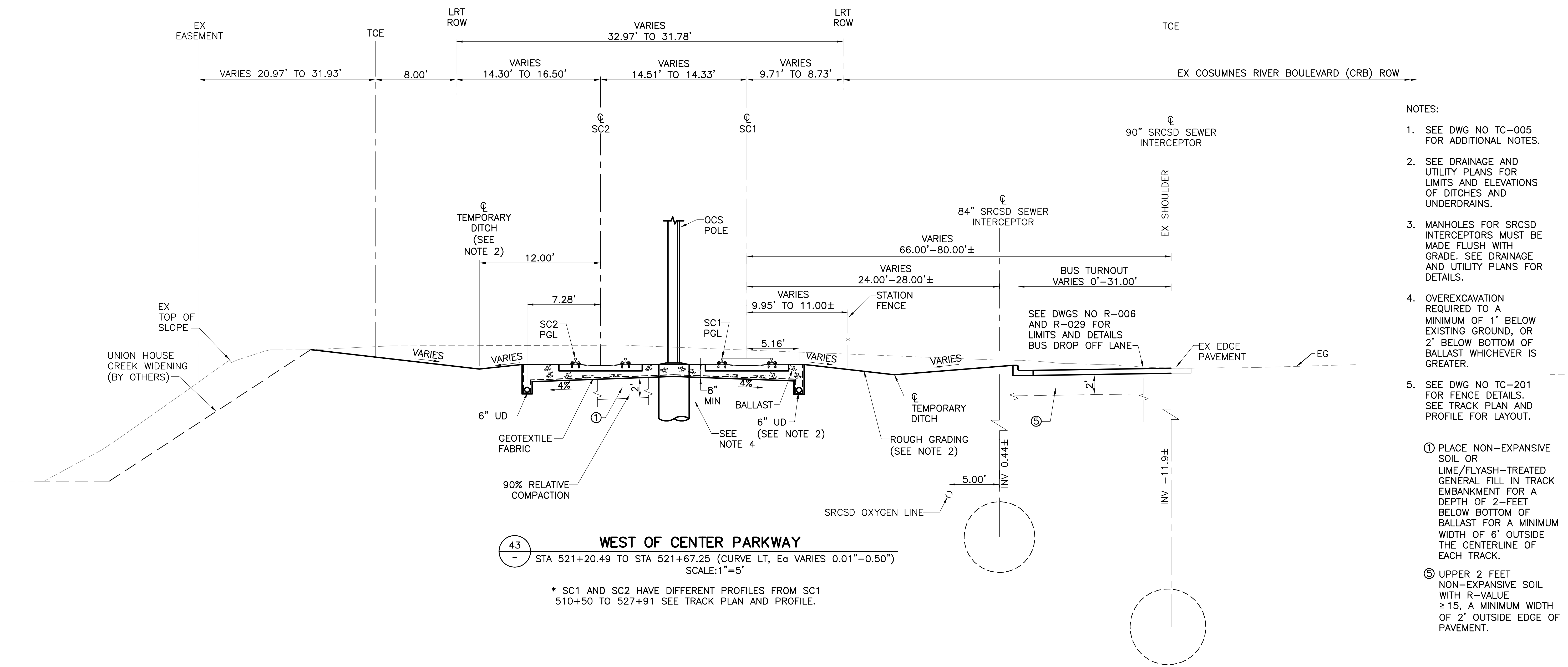
Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT

TYPICAL SECTIONS
SHEET 32 OF 44

TC-036

SHEET 91



43 / –

WEST OF CENTER PARKWAY

STA 521+20.49 TO STA 521+67.25 (CURVE LT, Ea VARIES 0.01"–0.50")

SCALE:1"=5'

* SC1 AND SC2 HAVE DIFFERENT PROFILES FROM SC1 510+50 TO 527+91 SEE TRACK PLAN AND PROFILE.

NOTES:

1. SEE DWG NO TC–005 FOR ADDITIONAL NOTES.
2. SEE DRAINAGE AND UTILITY PLANS FOR LIMITS AND ELEVATIONS OF DITCHES AND UNDERDRAINS.
3. MANHOLES FOR SRCSD INTERCEPTORS MUST BE MADE FLUSH WITH GRADE. SEE DRAINAGE AND UTILITY PLANS FOR DETAILS.
4. OVEREXCAVATION REQUIRED TO A MINIMUM OF 1' BELOW EXISTING GROUND, OR 2' BELOW BOTTOM OF BALLAST WHICHEVER IS GREATER.
5. SEE DWG NO TC–201 FOR FENCE DETAILS. SEE TRACK PLAN AND PROFILE FOR LAYOUT.

(1) PLACE NON–EXPANSIVE SOIL OR LIME/FLYASH–TREATED GENERAL FILL IN TRACK EMBANKMENT FOR A DEPTH OF 2–FEET BELOW BOTTOM OF BALLAST FOR A MINIMUM WIDTH OF 6' OUTSIDE THE CENTERLINE OF EACH TRACK.

(5) UPPER 2 FEET NON–EXPANSIVE SOIL WITH R–VALUE ≥ 15, A MINIMUM WIDTH OF 2' OUTSIDE EDGE OF PAVEMENT.

SAFCA Permit No. 18777

Attachment B

MARK	DATE	REVISIONS DESCRIPTION	BY	CHKD
△				
△				
△				
△				

SCALE: VERTICAL: AS NOTED
HORIZONTAL: AS NOTED

ORIGINAL SCALE IN INCHES FOR REDUCED PLAN
0 1 2 3

		DATE
PROJECT ENGINEER:	K. ANDERSON	
DESIGNED BY:	M. LEON	3/30/12
DRAWN BY:	M. LEON	3/30/12
CHECKED BY:	J. FARNSWORTH	3/30/12

Lockwood, Andrews & Newnam, Inc.
A LEO A DALY COMPANY

REGISTERED PROFESSIONAL ENGINEER KEKOA ANDERSON No. 53893 Exp. 12/31/13 CIVIL STATE OF CALIFORNIA

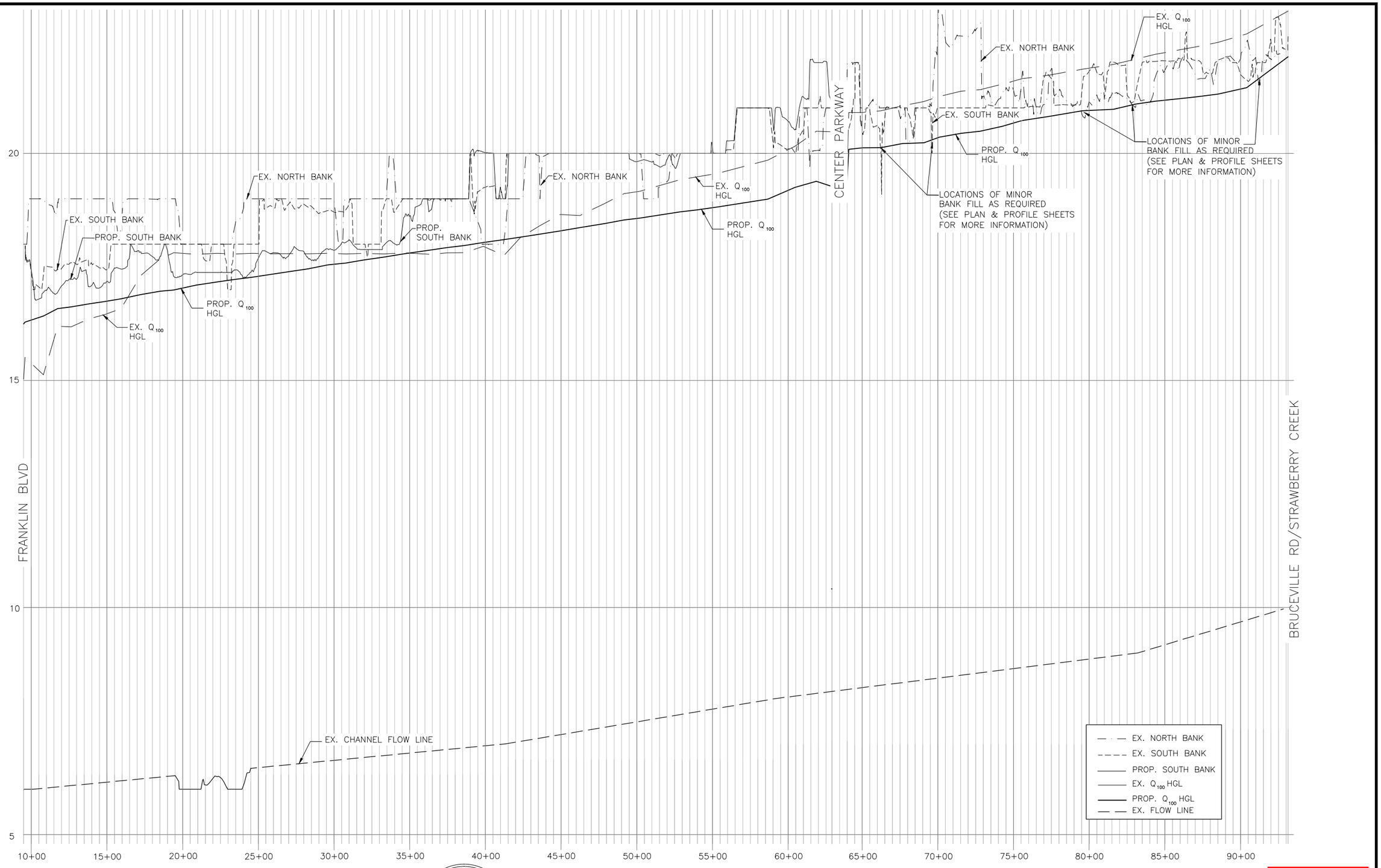
CI: 410.08.02
FILE: TC–005 – TC–047
SUBMITTAL: 03/30/2012

Regional Transit

SOUTH SACRAMENTO CORRIDOR PHASE 2 PROJECT
VOLUME 1 - CIVIL, TRACK AND STRUCTURES

TYPICAL SECTIONS
SHEET 32 OF 43

TC-036
SHEET



Attachment C

REV	DATE	BY	DESCRIPTION

SCALE: PROFILE
H: 1"=300'
V: 1"=1'

WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JJP
DRAWN MAH
CHECKED KBB

REGISTERED PROFESSIONAL ENGINEER
JESSE J. PAICHEL
NO. 79448
Exp. 03/31/14
CIVIL
STATE OF CALIFORNIA

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd, Suite 260
Folsom, CA 95630
Ph: 916-608-2212
Fax: 916-608-2232

SAFCA
Sacramento Area Flood Control Agency

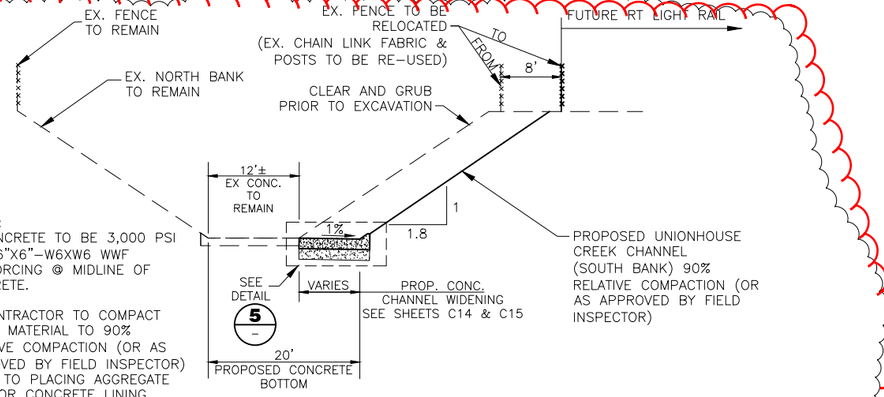
CONTRACT NO. 4144

JUNE 2012

UNIONHOUSE CREEK IMPROVEMENTS

HYDRAULIC PROFILE

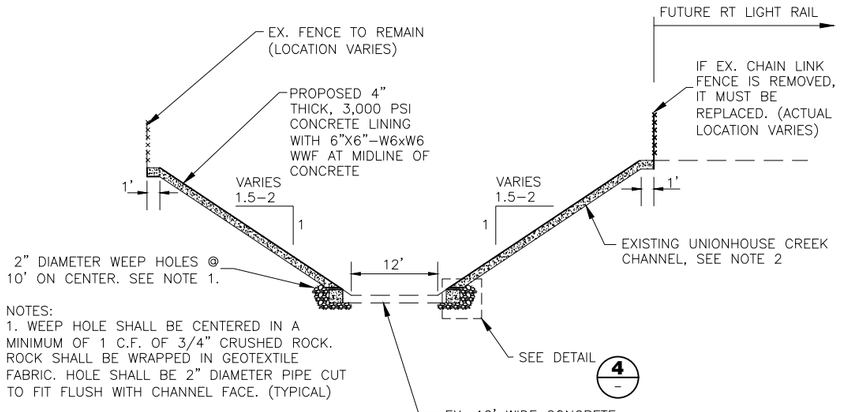
SHEET C0
SHEET 5 OF 25



NOTES:
1. CONCRETE TO BE 3,000 PSI WITH 6"X6"–W6XW6 WWF REINFORCING @ MIDLINE OF CONCRETE.

2. CONTRACTOR TO COMPACT NATIVE MATERIAL TO 90% RELATIVE COMPACTION (OR AS APPROVED BY FIELD INSPECTOR) PRIOR TO PLACING AGGREGATE BASE OR CONCRETE LINING

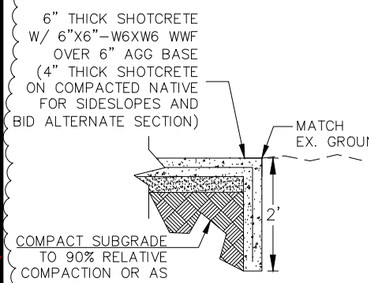
TYPICAL CHANNEL SECTION (FRANKLIN BLVD. TO CENTER PKWY) — A, C2
1"=10'–0"



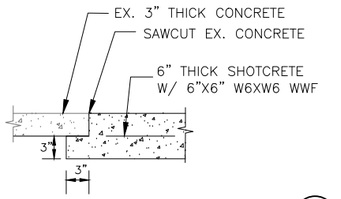
NOTES:
1. WEEP HOLE SHALL BE CENTERED IN A MINIMUM OF 1 C.F. OF 3/4" CRUSHED ROCK. ROCK SHALL BE WRAPPED IN GEOTEXTILE FABRIC. HOLE SHALL BE 2" DIAMETER PIPE CUT TO FIT FLUSH WITH CHANNEL FACE. (TYPICAL)

2. CONTRACTOR TO CLEAR AND GRUB SIDES OF EXISTING CHANNEL AND COMPACT NATIVE MATERIAL TO 90% RELATIVE COMPACTION (OR AS APPROVED BY FIELD INSPECTOR) PRIOR TO PLACING CONCRETE LINING

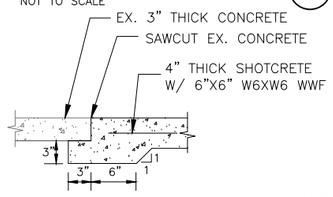
TYPICAL CHANNEL SECTION (CENTER PKWY TO BRUCEVILLE RD) — B, C8
1"=10'–0"



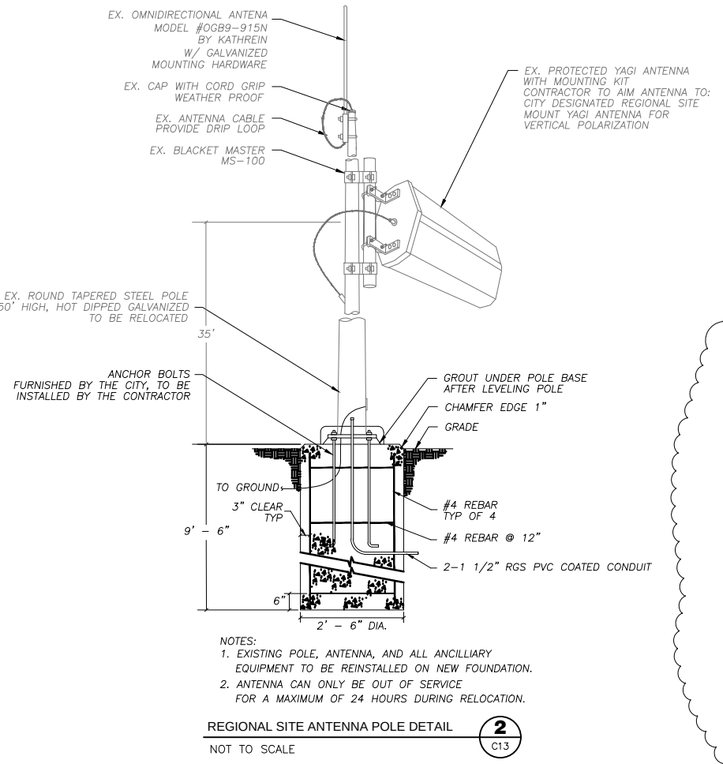
CUTOFF WALL DETAIL — 1, C11
NOT TO SCALE



TYPICAL JOINT TO EXISTING CONCRETE — 9
NOT TO SCALE

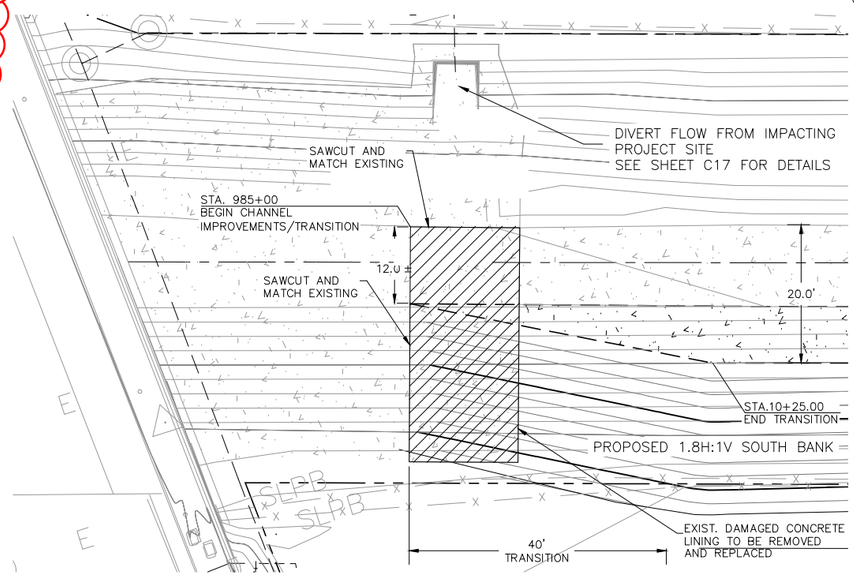


BID ALT. JOINT TO EXISTING CONCRETE — 10
NOT TO SCALE

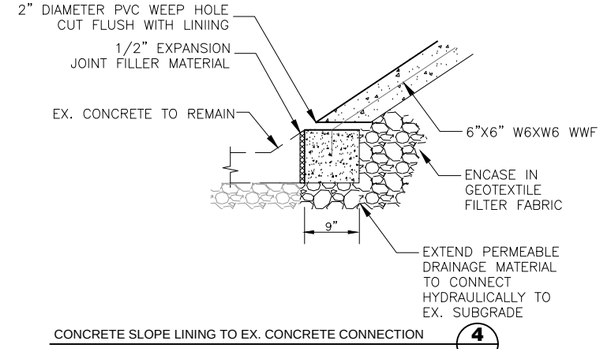


NOTES:
1. EXISTING POLE, ANTENNA, AND ALL ANCILLIARY EQUIPMENT TO BE REINSTALLED ON NEW FOUNDATION.
2. ANTENNA CAN ONLY BE OUT OF SERVICE FOR A MAXIMUM OF 24 HOURS DURING RELOCATION.

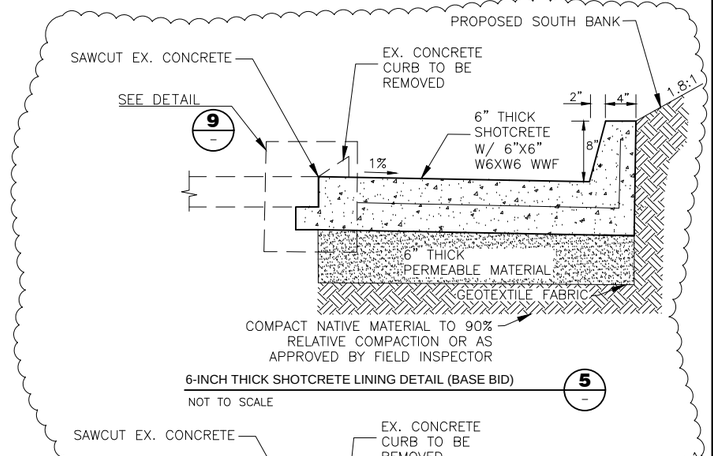
REGIONAL SITE ANTENNA POLE DETAIL — 2, C13
NOT TO SCALE



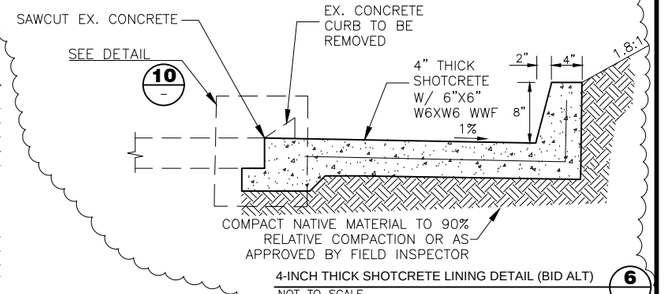
FRANKLIN BLVD TIE-IN DETAIL — 3, C2
1"=10'–0"



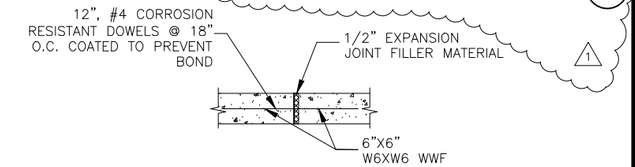
CONCRETE SLOPE LINING TO EX. CONCRETE CONNECTION — 4
NOT TO SCALE



6-INCH THICK SHOTCRETE LINING DETAIL (BASE BID) — 5
NOT TO SCALE

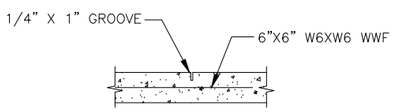


4-INCH THICK SHOTCRETE LINING DETAIL (BID ALT) — 6
NOT TO SCALE



TYPICAL EXPANSION & DAILY START/STOP JOINT — 7
NOT TO SCALE

Attachment C



TYPICAL CONTRACTION JOINT — 8
NOT TO SCALE

NOTES:
1. PROVIDE CONTRACTION JOINTS TRANSVERSELY AT 10 FOOT CENTERS
2. PROVIDE EXPANSION JOINTS TRANSVERSELY AT 80 FOOT CENTERS
3. PROVIDE WEEP HOLES AT 10 FOOT CENTERS
4. COMPACTION SHALL BE AT 90% RELATIVE COMPACTION OR AS APPROVED BY FIELD INSPECTION STAFF

REV	DATE	BY	DESCRIPTION
1	7/06/12	JJP	DETAIL REVISIONS FOR ADDENDUM #1

SCALE:
WARNING
0 1/2 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED
DRAWN MAH
CHECKED KBB

REGISTERED PROFESSIONAL ENGINEER — JESSE J. PATCHETT — NO. 79448 — Exp. 03/31/14 — CIVIL — STATE OF CALIFORNIA

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd, Suite 260
Folsom, CA 95630
Ph: 916–608–2212
Fax: 916–608–2232

SAFCA
Sacramento Area Flood Control Agency

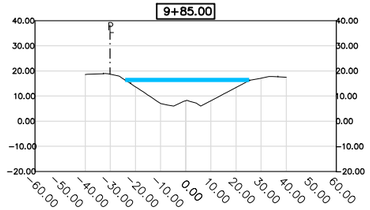
CONTRACT NO. 4144

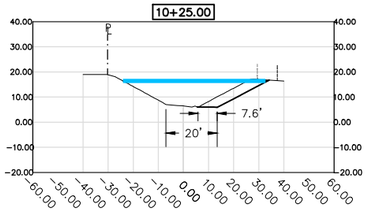
JUNE 2012

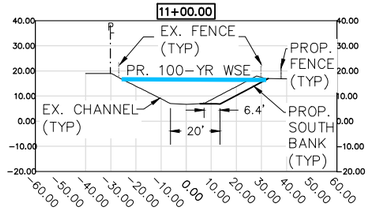
UNIONHOUSE CREEK IMPROVEMENTS

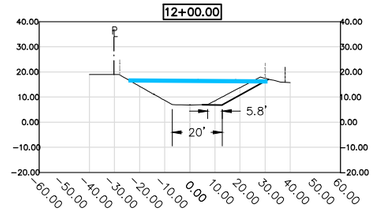
DETAIL SHEET I

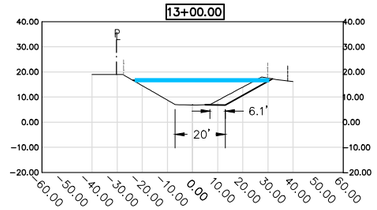
SHEET C12
SHEET 17 OF 25

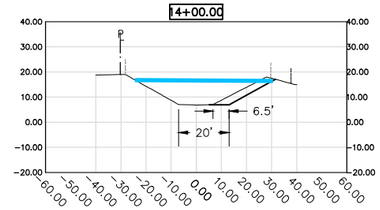


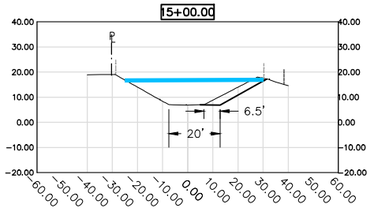


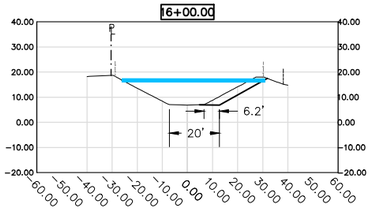


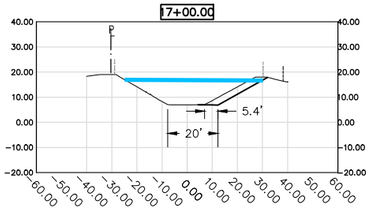


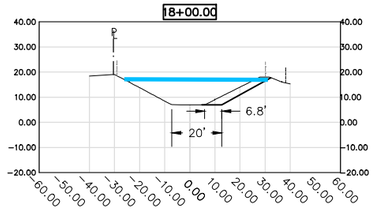


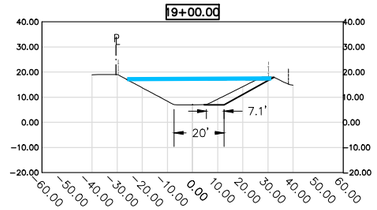


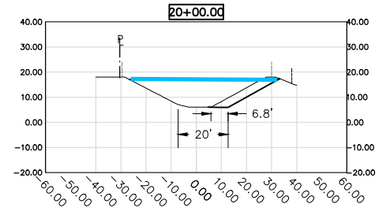


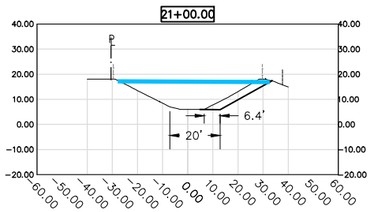


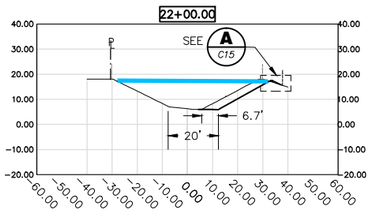


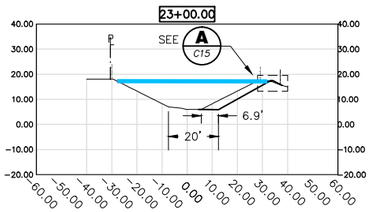


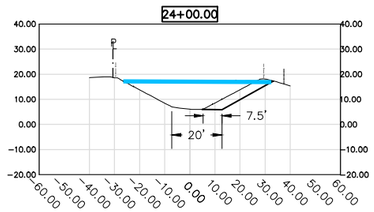


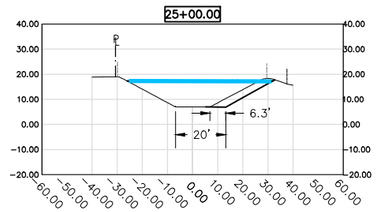


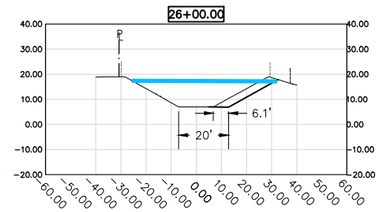


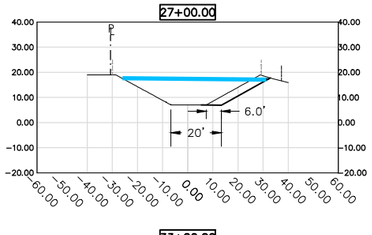


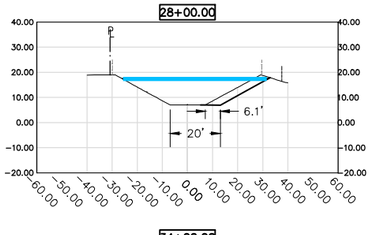


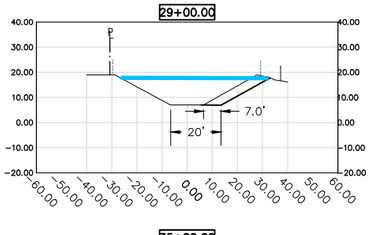


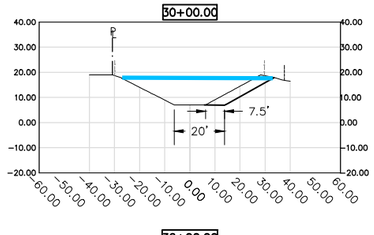


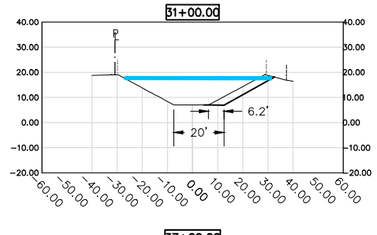


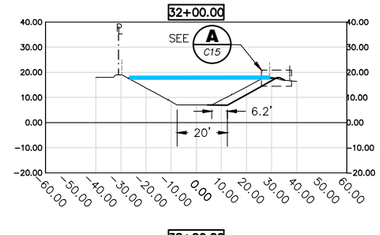


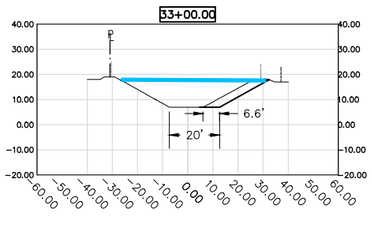


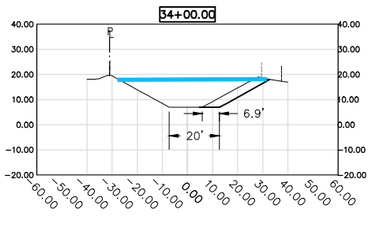


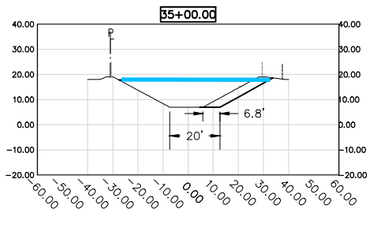


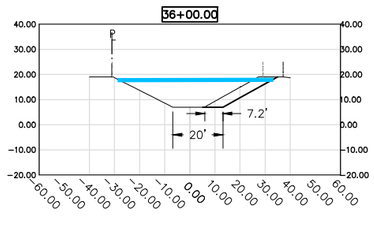


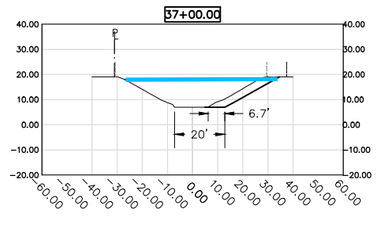


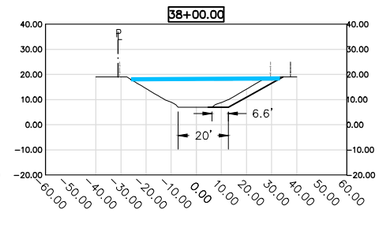


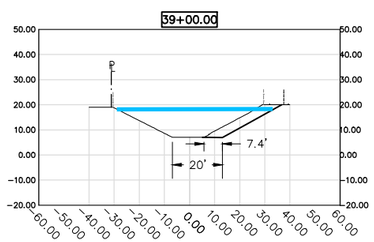


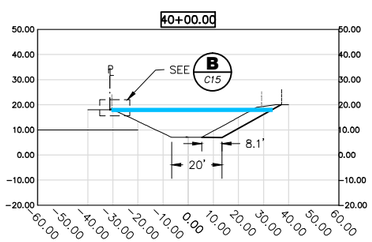


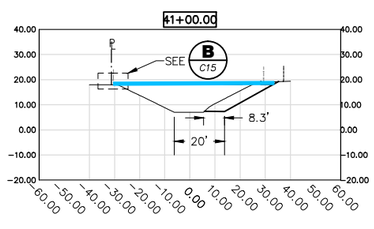


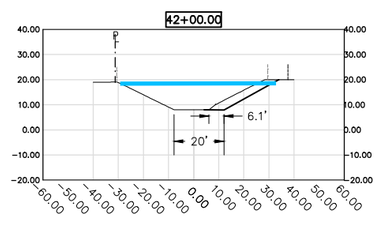


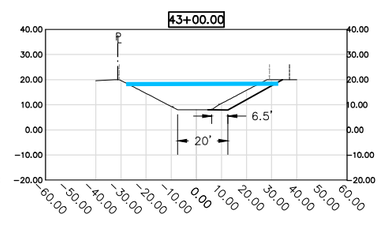


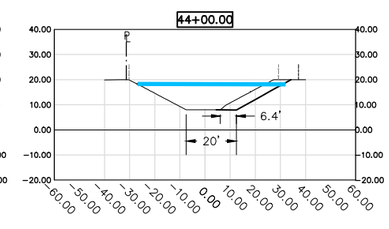












NOTE: CROSS SECTIONS ARE LOOKING UPSTREAM.

Attachment C

SAFCA C-SHEETS.dwg

3/19/2007

REV	DATE	BY	DESCRIPTION

SCALE: 1"=30'

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JJP
DRAWN MAH
CHECKED KBB

REGISTERED PROFESSIONAL ENGINEER JESSE J. PATCHETT NO. 79448 Exp. 03/31/14 CIVIL STATE OF CALIFORNIA

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd, Suite 260
Folsom, CA 95630
Ph: 916-608-2212
Fax: 916-608-2232

SAFCA Sacramento Area Flood Control Agency

CONTRACT NO. 4144

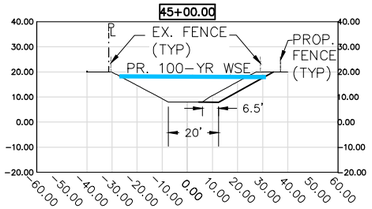
JUNE 2012

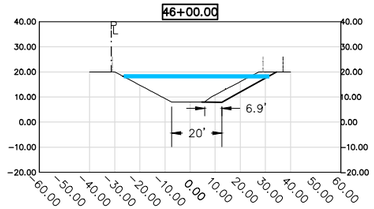
UNIONHOUSE CREEK IMPROVEMENTS

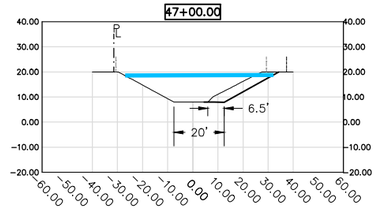
CHANNEL CROSS SECTIONS 1

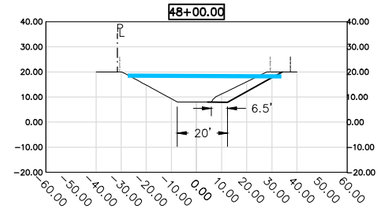
SHEET C14

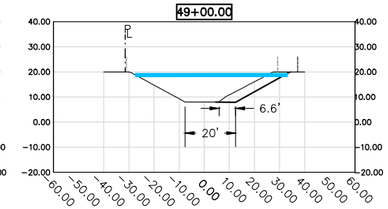
SHEET 19 OF 25

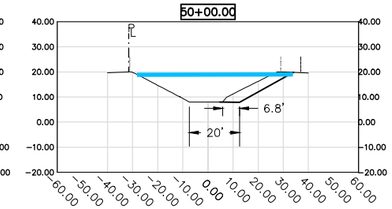


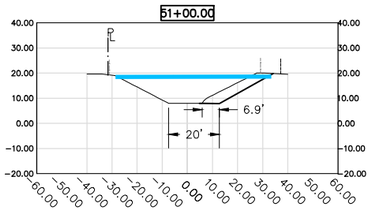


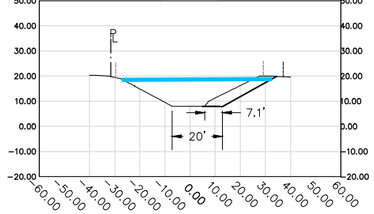


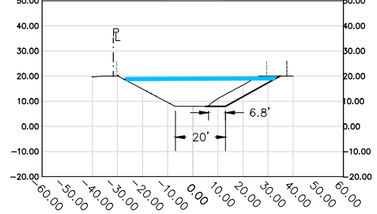


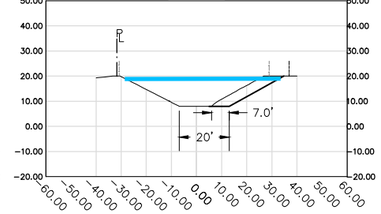


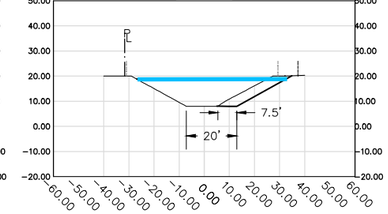


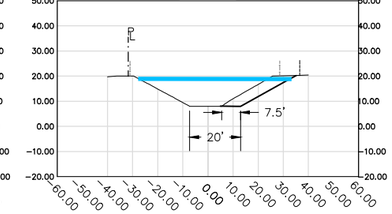


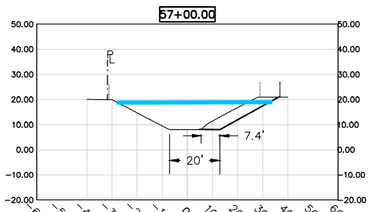


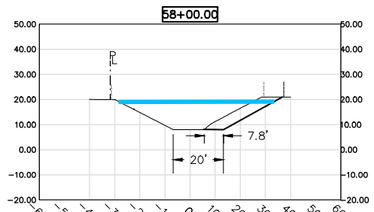


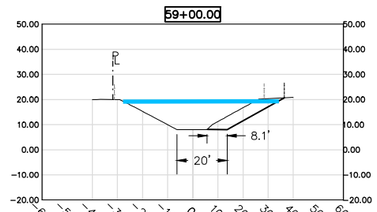


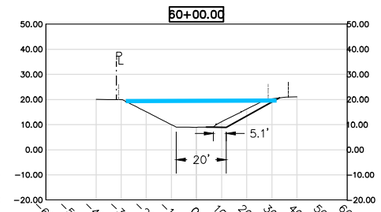


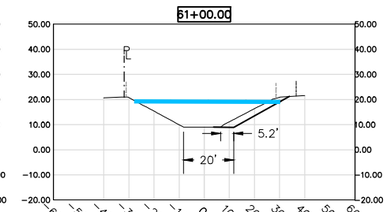


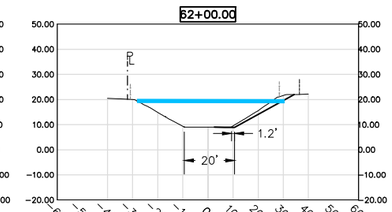


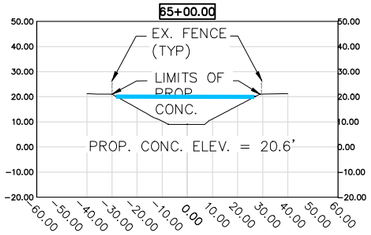


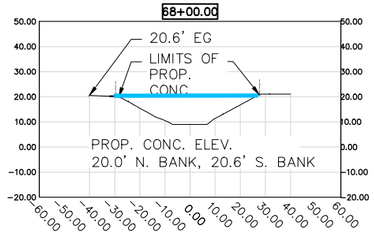


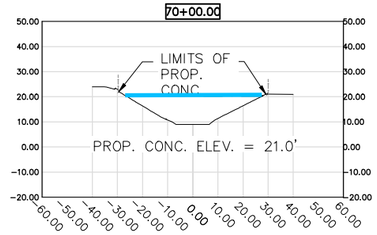


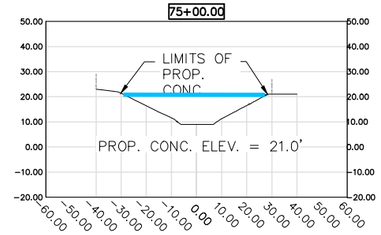


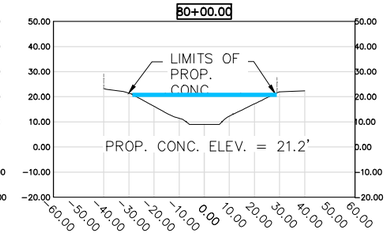


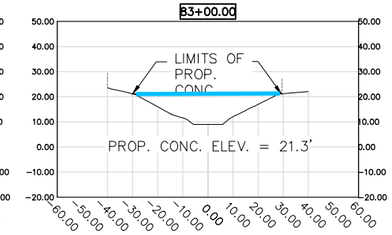


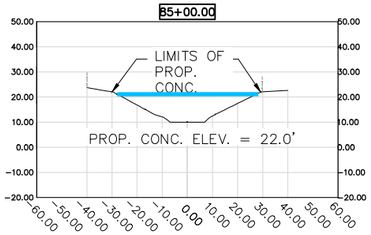


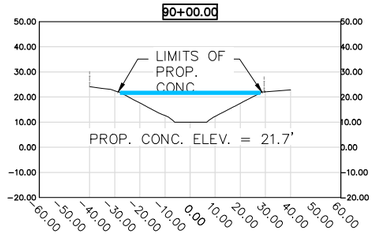






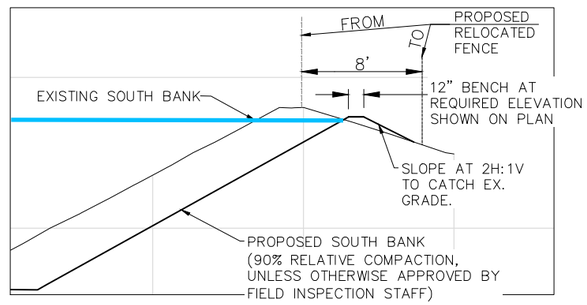




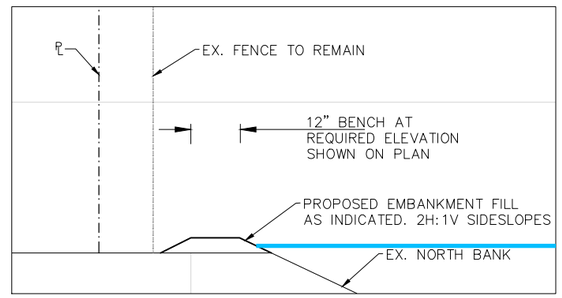


Attachment C

NOTE: CROSS SECTIONS ARE LOOKING UPSTREAM.



TYPICAL SOUTH BANK FILL DETAIL
1"=5'
A C14



TYPICAL NORTH BANK FILL DETAIL
1"=1'
B C14

SAFCA C-SHEETS.dwg
3/19/2007

REV	DATE	BY	DESCRIPTION

SCALE: 1"=30'

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE.

DESIGNED JJP
DRAWN MAH
CHECKED KBB

REGISTERED PROFESSIONAL ENGINEER JESSE J. PATCHETT NO. 79448 Exp. 03/31/14 CIVIL STATE OF CALIFORNIA

PETERSON . BRUSTAD . INC
ENGINEERING . CONSULTING
1180 Iron Point Rd, Suite 260
Folsom, CA 95630
Ph: 916-608-2212
Fax: 916-608-2232

SAFCA Sacramento Area Flood Control Agency

CONTRACT NO. 4144

JUNE 2012

UNIONHOUSE CREEK IMPROVEMENTS

CHANNEL CROSS SECTIONS II

SHEET C15
SHEET 20 OF 25

Attachment C

Tice, Jon

From: Jesse Patchett [jpatchett@pbieng.com]
Sent: Monday, July 09, 2012 11:28 AM
To: Tice, Jon
Cc: Jonathan Kors; 'ghelfip@SacCounty.NET'; Chris Ferrari (cferrari@WoodRodgers.com); cperkins@cityofsacramento.org; Darryl Abansado; kbrustad
Subject: FW: Unionhouse Creek - RT Impacts Analysis
Attachments: UHC Freeboard Summary 100_200_Yr.pdf

Jon,

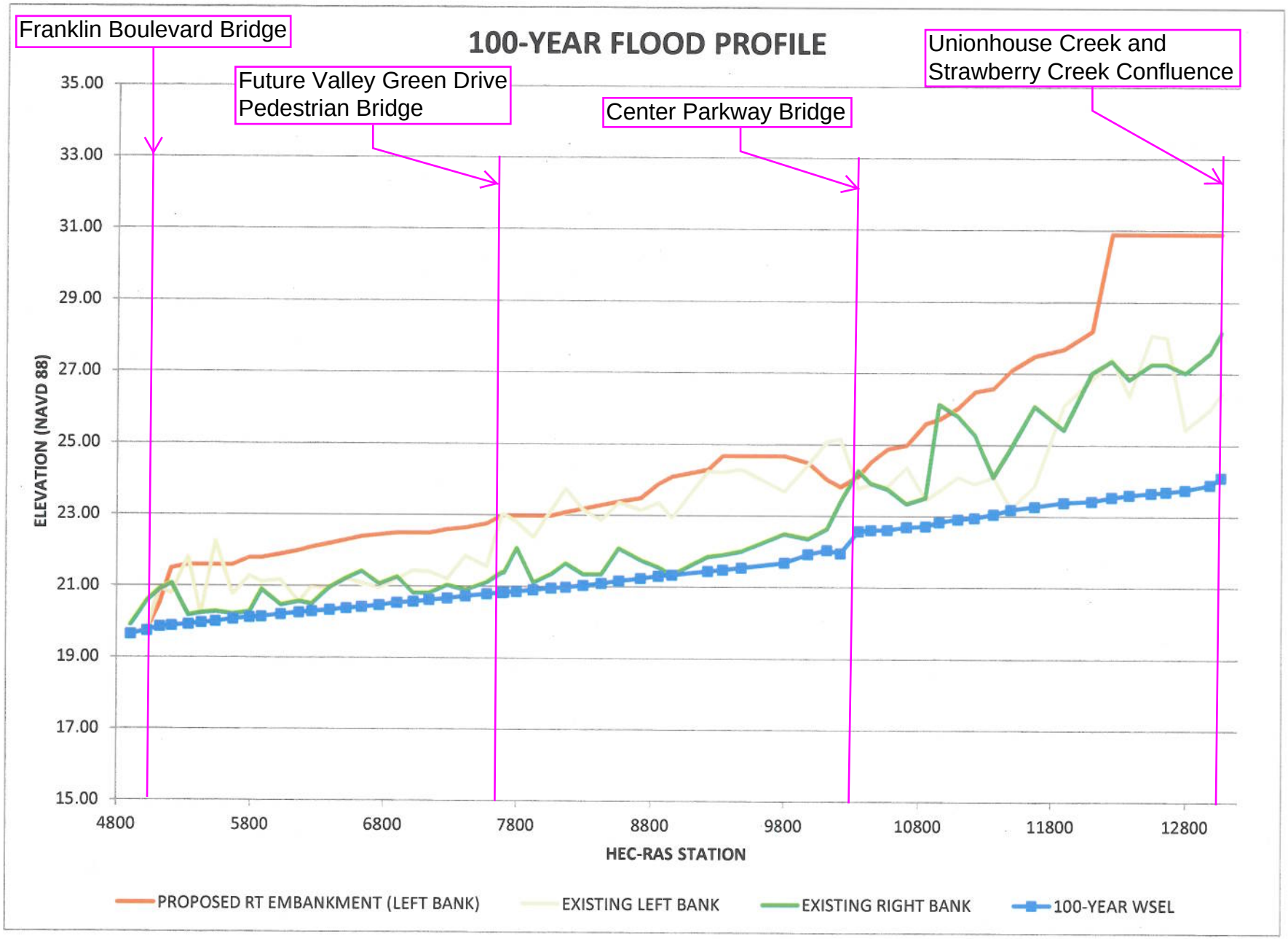
I understand Board staff has requested additional information on the hydraulic modeling from Wood Rodgers. I have attached a table prepared by Wood Rodgers which illustrates the HGLs in UHC considering the RT improvements adjacent to the channel.

If you have any further requests for information associated with the UHC widening project, please feel free to contact me or Karl Brustad directly.

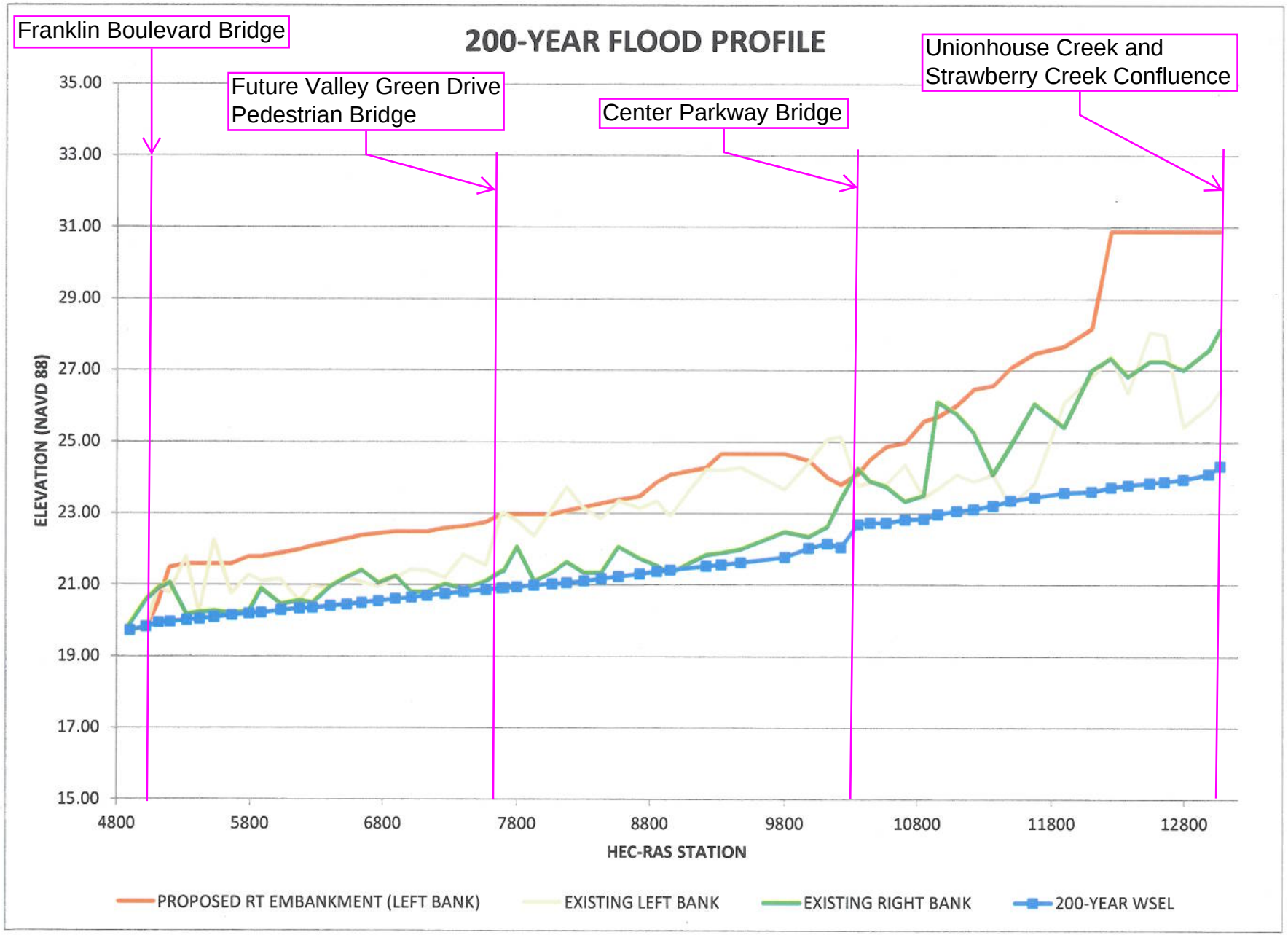
Thank you,

Jesse Patchett, PE, CFM

Peterson Brustad Inc.
1180 Iron Point Road, Suite 260
Folsom, CA 95630
Phone (916) 608-2212 x 123
Fax (916) 608-2232
Cell (916) 932-6677



Attachment C



Attachment C

CITY OF SACRAMENTO
SOUTH SACRAMENTO STREAMS GROUP
FLOOD EVALUATION OF UNIONHOUSE CREEK FOR REGIONAL TRANSIT PROJECT -
BRUCEVILLE ROAD TO FRANKLIN BLVD.

								100-Yr Freeboard		200-Yr Freeboard	
Reach	HEC-RAS River Sta	Distance to Franklin Blvd.	Existing Left Bank	Proposed RT Embankment	Right Bank Elev.	100-Yr HGL	200-Yr HGL	Left Bank	Right Bank	Left Bank	Right Bank
		(ft)	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft)	(ft)	(ft)	(ft)
Unionhouse Creek	Franklin Blvd. Bridge										
Unionhouse Creek	4894.371	14	19.70	18.46	19.89	19.63	19.72	0.07	0.26	-0.02	0.17
Unionhouse Creek	5015.861	136	19.70	19.46	20.56	19.73	19.82	-0.03	0.83	-0.12	0.74
Unionhouse Creek	5111.365	231	20.91	20.46	20.89	19.84	19.94	0.62	1.05	0.52	0.95
Unionhouse Creek	5199.161	319	20.75	21.46	21.05	19.87	19.96	1.59	1.18	1.50	1.09
Unionhouse Creek	5323.601	444	21.78	21.56	20.16	19.91	20.01	1.65	0.25	1.55	0.15
Unionhouse Creek	5419.478	539	20.17	21.56	20.23	19.95	20.04	1.61	0.28	1.52	0.19
Unionhouse Creek	5528.544	649	22.23	21.56	20.26	19.99	20.09	1.57	0.27	1.47	0.17
Unionhouse Creek	5660.334	780	20.73	21.56	20.20	20.06	20.15	1.50	0.14	1.41	0.05
Unionhouse Creek	5787.883	908	21.26	21.76	20.26	20.11	20.20	1.65	0.15	1.56	0.06
Unionhouse Creek	5878.764	999	21.09	21.76	20.89	20.13	20.22	1.63	0.76	1.54	0.67
Unionhouse Creek	6024.877	1145	21.14	21.86	20.46	20.20	20.29	1.66	0.26	1.57	0.17
Unionhouse Creek	6165.092	1285	20.52	21.96	20.56	20.25	20.34	1.71	0.31	1.62	0.22
Unionhouse Creek	6261.51	1382	20.95	22.06	20.49	20.28	20.36	1.78	0.21	1.70	0.13
Unionhouse Creek	6396.422	1516	20.89	22.16	20.95	20.32	20.41	1.84	0.63	1.75	0.54
Unionhouse Creek	6521.36	1641	21.18	22.26	21.21	20.37	20.45	1.89	0.84	1.81	0.76
Unionhouse Creek	6635.518	1756	21.06	22.36	21.41	20.41	20.50	1.95	1.00	1.86	0.91
Unionhouse Creek	6764.65	1885	20.93	22.41	21.05	20.46	20.55	1.95	0.59	1.86	0.50
Unionhouse Creek	6894.309	2014	21.17	22.46	21.25	20.53	20.61	1.93	0.72	1.85	0.64
Unionhouse Creek	7013.046	2133	21.41	22.46	20.80	20.56	20.64	1.90	0.24	1.82	0.16
Unionhouse Creek	7131.13	2251	21.38	22.46	20.80	20.61	20.70	1.85	0.19	1.76	0.10
Unionhouse Creek	7265.336	2385	21.18	22.56	21.02	20.66	20.75	1.90	0.36	1.81	0.27
Unionhouse Creek	7406.593	2527	21.82	22.61	20.89	20.72	20.81	1.89	0.17	1.80	0.08
Unionhouse Creek	7569.366	2689	21.53	22.73	21.11	20.78	20.87	1.95	0.33	1.86	0.24
Unionhouse Creek	7684.832	2805	22.99	22.96	21.38	20.82	20.91	2.14	0.56	2.05	0.47
Unionhouse Creek	Valley Green Pedestrian Bridge										
Unionhouse Creek	7700		22.99	22.96	21.38	20.83	20.92	2.13	0.55	2.04	0.46
Unionhouse Creek	7796.955	2917	22.78	22.96	22.07	20.85	20.94	2.11	1.22	2.02	1.13
Unionhouse Creek	7922.903	3043	22.35	22.96	21.10	20.90	20.99	2.06	0.20	1.97	0.11
Unionhouse Creek	8058.478	3178	23.12	22.96	21.34	20.95	21.03	2.01	0.39	1.93	0.31
Unionhouse Creek	8167.354	3287	23.72	23.06	21.64	20.98	21.06	2.08	0.66	2.00	0.58
Unionhouse Creek	8296.68	3417	23.12	23.16	21.34	21.03	21.11	2.13	0.31	2.05	0.23
Unionhouse Creek	8429.941	3550	22.84	23.26	21.34	21.09	21.18	2.17	0.25	2.08	0.16
Unionhouse Creek	8560.594	3681	23.33	23.36	22.07	21.16	21.24	2.20	0.91	2.12	0.83
Unionhouse Creek	8721.513	3842	23.12	23.46	21.74	21.23	21.31	2.23	0.51	2.15	0.43
Unionhouse Creek	8852.143	3972	23.33	23.86	21.54	21.30	21.38	2.56	0.24	2.48	0.16
Unionhouse Creek	8954.219	4074	22.91	24.06	21.33	21.33	21.42	2.73	0.00	2.64	-0.09
Unionhouse Creek	9220.174	4340	24.21	24.26	21.84	21.44	21.53	2.82	0.40	2.73	0.31
Unionhouse Creek	9331.778	4452	24.19	24.65	21.90	21.48	21.57	3.17	0.42	3.08	0.33
Unionhouse Creek	9474.535	4595	24.27	24.65	22.00	21.54	21.63	3.11	0.46	3.02	0.37
Unionhouse Creek	9800.024	4920	23.66	24.65	22.49	21.68	21.78	2.97	0.81	2.87	0.71

Attachment C

CITY OF SACRAMENTO
SOUTH SACRAMENTO STREAMS GROUP
FLOOD EVALUATION OF UNIONHOUSE CREEK FOR REGIONAL TRANSIT PROJECT -
BRUCEVILLE ROAD TO FRANKLIN BLVD.

100- AND 200-YEAR
FREEBOARD EVALUATION

								100-Yr Freeboard		200-Yr Freeboard	
Reach	HEC-RAS River Sta	Distance to Franklin Blvd.	Existing Left Bank	Proposed RT Embankment	Right Bank Elev.	100-Yr HGL	200-Yr HGL	Left Bank	Right Bank	Left Bank	Right Bank
		(ft)	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft) NAVD 88	(ft)	(ft)	(ft)	(ft)
Unionhouse Creek	9979.019	5099	24.41	24.46	22.35	21.92	22.03	2.54	0.43	2.43	0.32
Unionhouse Creek	10120.45	5240	25.06	23.99	22.63	22.04	22.16	1.95	0.59	1.83	0.47
Unionhouse Creek	10220.65	5341	25.14	23.79	23.38	21.95	22.05	1.84	1.43	1.74	1.33
Unionhouse Creek	Center Parkway Bridge										
Unionhouse Creek	10353.68	5474	23.75	24.09	24.26	22.57	22.70	1.52	1.69	1.39	1.56
Unionhouse Creek	10445.83	5566	23.86	24.49	23.90	22.60	22.74	1.89	1.30	1.75	1.16
Unionhouse Creek	10566.94	5687	23.80	24.85	23.75	22.61	22.74	2.24	1.14	2.11	1.01
Unionhouse Creek	10708.77	5829	24.34	24.96	23.34	22.69	22.83	2.27	0.65	2.13	0.51
Unionhouse Creek	10850.53	5971	23.43	25.56	23.51	22.71	22.85	2.85	0.80	2.71	0.66
Unionhouse Creek	10953.42	6073	23.68	25.69	26.12	22.83	22.98	2.86	3.29	2.71	3.14
Unionhouse Creek	11096.38	6216	24.07	26.01	25.79	22.91	23.07	3.10	2.88	2.94	2.72
Unionhouse Creek	11223.09	6343	23.88	26.46	25.27	22.95	23.12	3.51	2.32	3.34	2.15
Unionhouse Creek	11367.26	6487	24.07	26.56	24.09	23.05	23.22	3.51	1.04	3.34	0.87
Unionhouse Creek	11498.06	6618	23.19	27.06	24.90	23.18	23.36	3.88	1.72	3.70	1.54
Unionhouse Creek	11676.07	6796	23.83	27.46	26.07	23.27	23.45	4.19	2.80	4.01	2.62
Unionhouse Creek	11894.71	7015	26.08	27.66	25.41	23.38	23.58	4.28	2.03	4.08	1.83
Unionhouse Creek	12102.85	7223	26.81	28.16	27.01	23.42	23.61	4.74	3.59	4.55	3.40
Unionhouse Creek	12248.39	7368	27.39	30.87	27.34	23.53	23.73	7.34	3.81	7.14	3.61
Unionhouse Creek	12377.93	7498	26.35	30.87	26.82	23.59	23.79	7.28	3.23	7.08	3.03
Unionhouse Creek	12542.15	7662	28.05	30.87	27.25	23.65	23.85	7.22	3.60	7.02	3.40
Unionhouse Creek	12652.9	7773	27.98	30.87	27.25	23.68	23.89	7.19	3.57	6.98	3.36
Unionhouse Creek	12794.24	7914	25.41	30.87	27.01	23.74	23.95	7.13	3.27	6.92	3.06
Unionhouse Creek	12982.85	8103	25.98	30.87	27.57	23.88	24.10	6.99	3.69	6.77	3.47
Unionhouse Creek	13067.53	8188	26.43	30.87	28.14	24.08	24.32	6.79	4.06	6.55	3.82
Unionhouse Creek	Bruceville Road										

= LESS THAN 2 FEET OF FREEBOARD.

= LESS THAN 1 FOOT OF FREEBOARD.

Attachment C

JULY 2012

SACRAMENTO AREA FLOOD CONTROL AGENCY
UNIONHOUSE CREEK CHANNEL IMPROVEMENTS
EXISTING CONDITIONS
HYDRAULIC MODEL WORKMAPS
MAY 2012

NORTH

0 100 200

Feet

- Existing Levee
- Existing Floodwall
- City of Sacramento Hydraulic Model Study Stream Limits
- RS 90.90 → HEC-RAS Cross Section (RS = River Station)
- 9+48 ▬ Stationing For Proposed Improvements (PBI Dated May 2012)

VALLEY HI DR
CHINQUAPIN WAY
MONTEROSA CT
SOLANA WAY
SAN ROGUE CT
BECKET WAY
PALMARITAS CT
TORRENTE WAY
TIERRA BUENA CT
CALLER ROYALE WAY
FRANKLIN BLVD
CAMINO ROYALE DR
VILLA ROYA
COSUMNES RIVER BLVD
LAGUNA DR

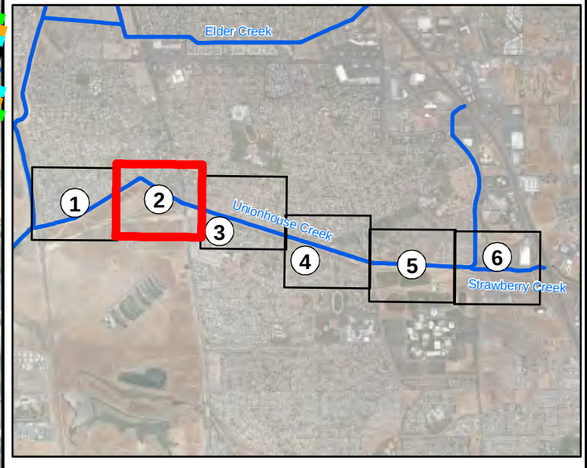
RS 2650.42
RS 2785.45
RS 2934.91
RS 3128.76
RS 3273.90
RS 3377.57
RS 3499.75
RS 3684.90
RS 3914.52
RS 4099.92
RS 4237.21
RS 4368.46
RS 5015.86
RS 5111.3

Unionhouse Creek

Begin Channel Improvements Per PBI Stations

9+48 10+00 10+50 11+00 11+50 12+00

Less than 3 feet of freeboard.
Less than 2 feet of freeboard.
Less than 1 foot of freeboard.



Attachment C

WOOD RODGERS
DEVELOPING INNOVATIVE DESIGN SOLUTIONS
3301 C Street, Bldg. 100-B Tel: 916.341.7760
Sacramento, CA 95816 Fax: 916.341.7767

Less than 3 feet of freeboard.

Less than 2 feet of freeboard.

Less than 1 foot of freeboard.

KINGSDALE WAY
GOODWIN CIR
HALKEEP WAY
PEGLER WAY
CAMINO ROYALE DR
YVETTE WAY
MAJORCA CIR
PITCAIRN CT
PONCIA CT
VILLA ROYALE WAY
CORNINA CT
PORT ROYALE WAY
PAVIA WAY
SAN REMO WAY
YVONNE WAY
LAGUNA DR
COSUMNES RIVER BLVD
BOLINAS CT
BRENHAM CT
CLOVE CT
EULER WAY
ELSTER CT
EINSTEIN CT
EDDINGTON WAY
WINTERHEAD LN
Unionhouse Creek

RS 5419.48
RS 5528.54
RS 5660.3
RS 5787.88
RS 5878.76
RS 6024.85
RS 6165.09
RS 6261.51
RS 6396.42
RS 6521.36
RS 6635.52
RS 7131.13
RS 7265.34
RS 7406.59
RS 7569.3
RS 7684.83
RS 7796.96

SACRAMENTO AREA FLOOD CONTROL AGENCY
UNIONHOUSE CREEK CHANNEL IMPROVEMENTS
EXISTING CONDITIONS
HYDRAULIC MODEL WORKMAPS
MAY 2012

NORTH

0 100 200
Feet

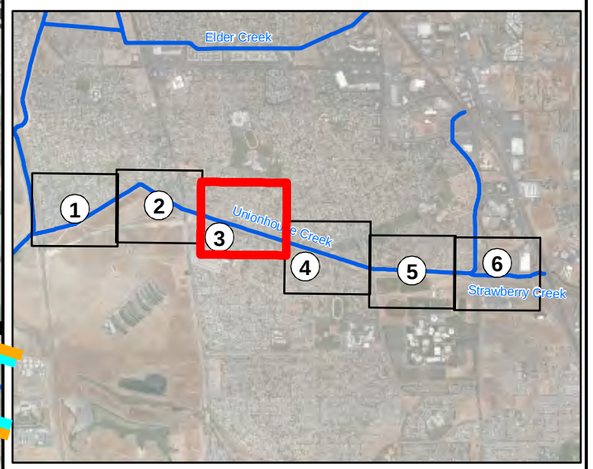
Existing Levee

Existing Floodwall

City of Sacramento Hydraulic Model Study Stream Limits

RS 90.90 → HEC-RAS Cross Section (RS = River Station)

9+48 Stationing For Proposed Improvements (PBI Dated May 2012)



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SACRAMENTO AREA FLOOD CONTROL AGENCY
UNIONHOUSE CREEK CHANNEL IMPROVEMENTS
EXISTING CONDITIONS
HYDRAULIC MODEL WORKMAPS
MAY 2012

NORTH

0 100 200

Feet

Existing Levee

Existing Floodwall

City of Sacramento Hydraulic Model Study Stream Limits

RS 90.90 → HEC-RAS Cross Section (RS = River Station)

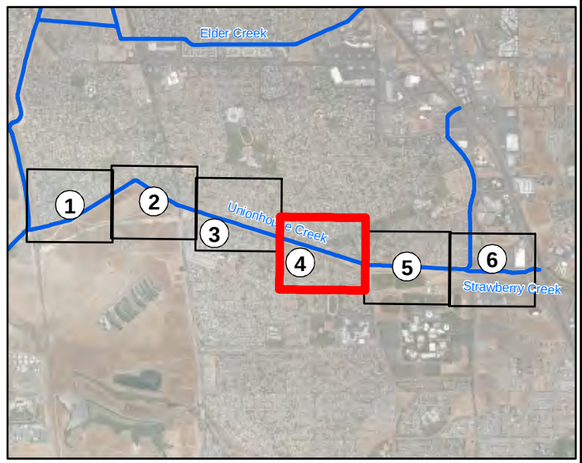
9+48 Stationing For Proposed Improvements (PBI Dated May 2012)

End Channel Widening
Begin Concrete Channel Lining

Less than 3 feet of freeboard.

Less than 2 feet of freeboard.

Less than 1 foot of freeboard.



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J:\Jobs\8239.007-MorrisonCreekLOMR\Morrison_Unionhouse_Creeks_CLOMR_LOMR\GIS\Tasks\TechMemo\Unionhouse_Mapbook_XSECT_20120518_V1.mxd 5/18/2012 2:12:42 PM jbuchanan

SACRAMENTO AREA FLOOD CONTROL AGENCY
UNIONHOUSE CREEK CHANNEL IMPROVEMENTS
EXISTING CONDITIONS
HYDRAULIC MODEL WORKMAPS
MAY 2012

NORTH

0 100 200

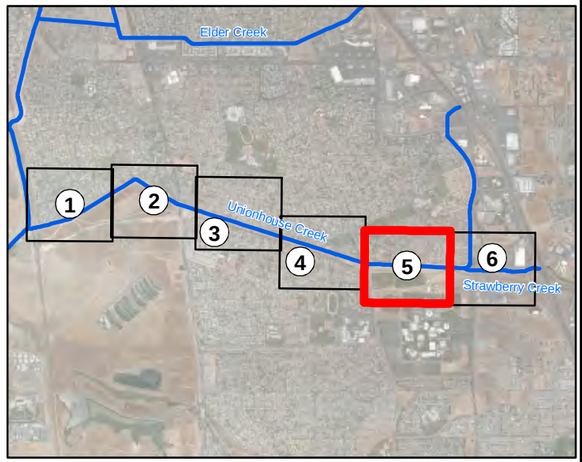
Feet

- Existing Levee
- Existing Floodwall
- City of Sacramento Hydraulic Model Study Stream Limits
- RS 90.90 → HEC-RAS Cross Section (RS = River Station)
- 9+48 — Stationing For Proposed Improvements (PBI Dated May 2012)

Less than 3 feet of freeboard.

Less than 2 feet of freeboard.

Less than 1 foot of freeboard.



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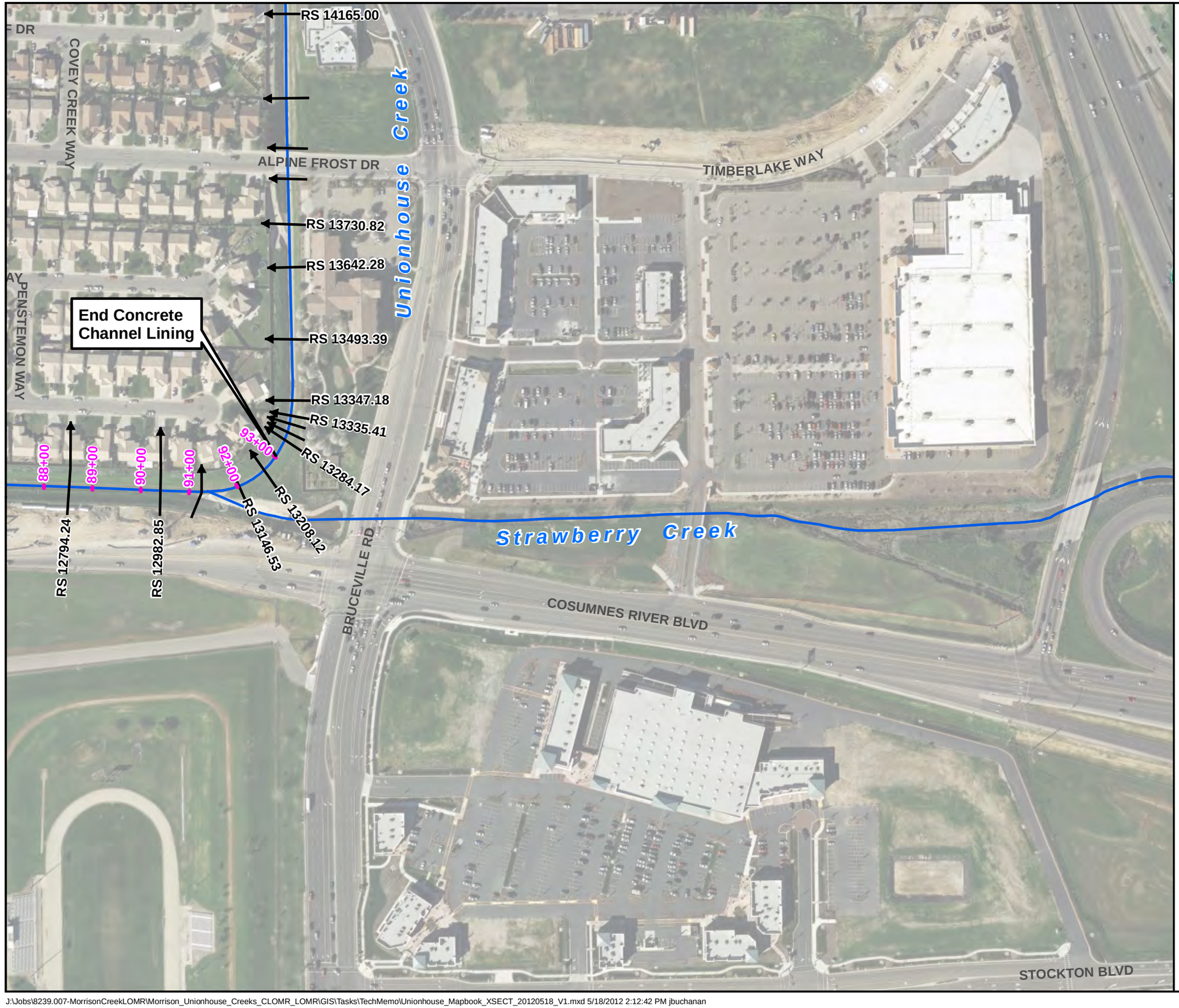
UNIONHOUSE CREEK CHANNEL IMPROVEMENTS
EXISTING CONDITIONS
HYDRAULIC MODEL WORKMAPS
MAY 2012

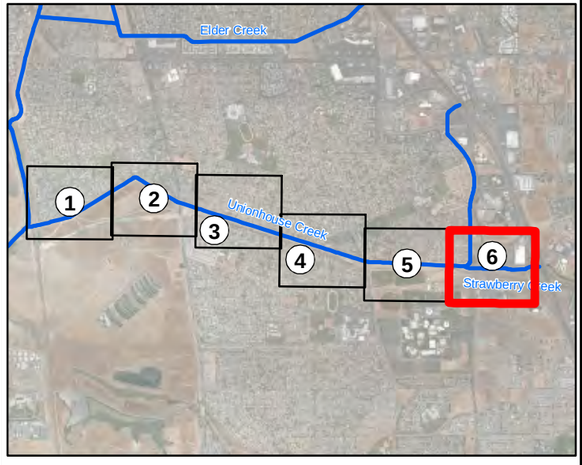


NORTH

0 100 200

Feet

- Existing Levee
- Existing Floodwall
- City of Sacramento Hydraulic Model Study Stream Limits
- RS 90.90 → HEC-RAS Cross Section (RS = River Station)
- 9+48 — Stationing For Proposed Improvements (PBI Dated May 2012)



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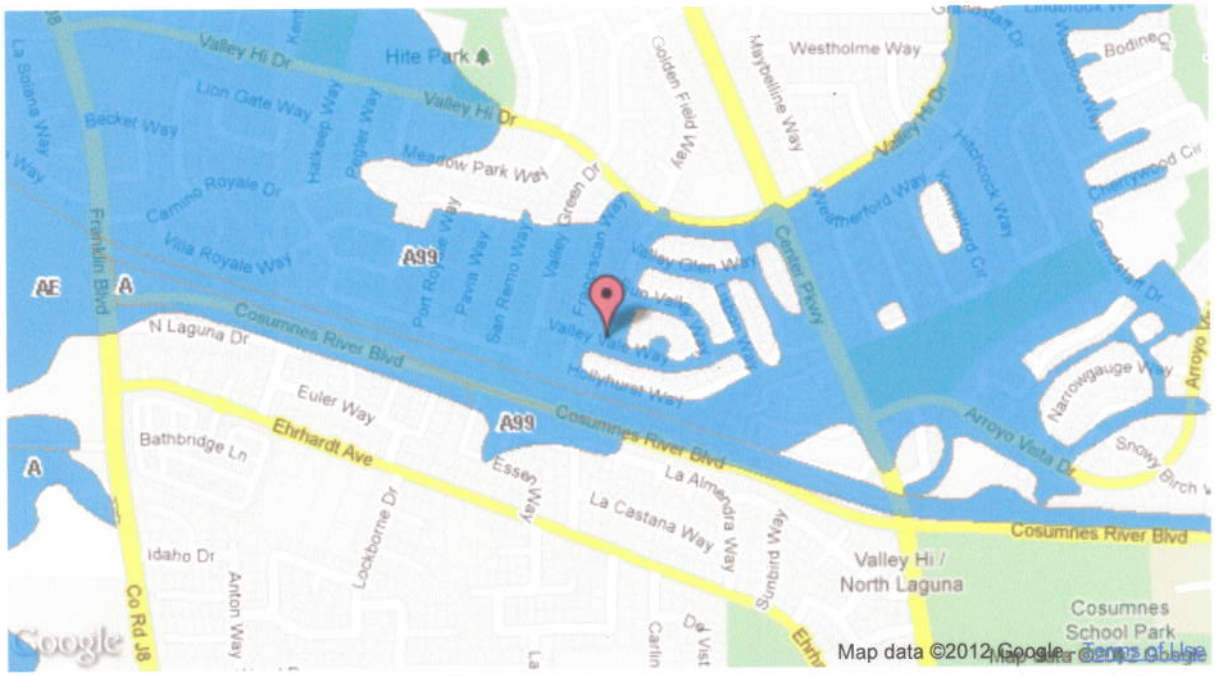
J:\Jobs\8239.007-MorrisonCreekLOMR\Morrison_Unionhouse_Creeks_CLOMR_LOMR\GIS\Tasks\TechMemo\Unionhouse_Mapbook_XSECT_20120518_V1.mxd 5/18/2012 2:12:42 PM jbuchanan

CA.GOV | DEPARTMENT OF WATER RESOURCES

Floodplain Information



Floodplains are displayed using semi transparent colors. When viewing overlapping floodplains, the combination of multiple semi transparent colors will not match the legend colors. For accurate color representation, view floodplains individually.

Legend:

100-Year Floodplains

FEMA Effective

Disclaimer:

The BAM does not replace existing FEMA regulatory floodplains shown on Flood Insurance Rate Maps (FIRM). For more information on the FEMA regulatory floodplains, please contact FEMA directly. The BAM floodplains identify potential flood risks that may warrant further studies or analyses for land use decision making. The floodplains shown delineate areas with potential exposure to flooding for three different storm events: one with storm flows that have a 1% chance of being equaled or exceeded in any year (100-year), one with storm flows that have a 0.5% chance of being equaled or exceeded in any year (200-year), and one with storms flows that have a 0.2% chance of being equaled or exceeded in any year (500-year). These flows and resulting flooded area are based on the best available floodplain information and may not identify all areas subject to flooding.

The floodplain map is best viewed and printed in color

Attachment C

Attachment D

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 18777 BD

This Permit is issued to:

Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, California 95814

To widen the existing concrete-lined bottom of Unionhouse Creek by 8-feet from Franklin Boulevard to Center Parkway; and to concrete line the side slopes of Unionhouse Creek from Center Parkway to Bruceville Road; and relocate an existing City of Sacramento sump pump (Sump No. 201). The project is located along Unionhouse Creek in between Franklin Boulevard and Bruceville Road in Sacramento County. (Section 9, 16, T7N, R5E, MDB&M, City of Sacramento, Unionhouse Creek, Sacramento 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. 18777 BD

THIRTEEN: No work authorized by this permit shall be performed until the Department of Water Resources has received, reviewed, and approved in writing, a complete set of final submitted plans, drawings, and specifications for the project. The Central Valley Flood Protection Board shall have up to 30 days after receipt of plans, drawings, and specifications for the review process. The Central Valley Flood Protection Board and/or the Department of Water Resources may extend this review period up to 15 days by written notification.

FOURTEEN: All addendums or other changes made to the submitted documents by the permittee after issuance of this permit are subject to submittal and review for approval by the Central Valley Flood Protection Board prior to incorporation into the permitted project. Upon review and approval of any new submitted documents the permit shall be revised, if needed, prior to construction related to the proposed changes. The Central Valley Flood Protection Board shall have up to 90 days after receipt of any documents, plans, drawings, and specifications for the review process. The Central Valley Flood Protection Board and/or the Department of Water Resources may extend this review period by written notification.

FIFTEEN: The permittee is responsible for all liability associated with construction, operation, and maintenance of the permitted facilities and shall defend and hold harmless the State of California, or any departments thereof, from any liability or claims of liability associated therewith.

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

SEVENTEEN: The permittee shall contact the Department of Water Resources by telephone, (916)

574-0609, and submit the enclosed postcard to schedule a preconstruction conference, and the Central Valley Flood Protection Board Construction Supervisor at (916) 574-2646. Failure to do so at least 10 working days prior to start of work may result in delay of the project.

EIGHTEEN: The mitigation measures approved by the CEQA lead agency and the permittee are found in its Mitigation and Monitoring Reporting Program (MMRP) adopted by the CEQA lead agency. The permittee shall implement all such mitigation measures.

NINETEEN: The permittee shall provide a geotechnical analysis which addresses effects of vibration on side slope stability from the proposed Regional Transit Light Rail Light just south of Unionhouse Creek. The permittee shall mitigate these effects if the analysis shows additional side slope improvements are needed to maintain slope stability.

TWENTY: Keys shall be provided to the local maintenance agency and the Department of Water Resources for all locks on gates providing access to the Unionhouse floodway and access ramps.

TWENTY-ONE: A temporary bench mark, set to a known datum, shall be placed at the project site prior to the beginning of construction and shall be maintained through the construction of the project.

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

TWENTY-THREE: No excavation shall be made or remain in the channel section during the flood season from November 1st to April 15th.

TWENTY-FOUR: Temporary staging, formwork, stockpiled material, equipment, and temporary buildings shall not remain in the floodway during the flood season from November 1st to April 15th.

TWENTY-FIVE: Prior to commencement of excavation, the permittee shall create a photo record, including associated descriptions, of the channel conditions. The photo record shall be certified (signed and stamped) by a licensed land surveyor or professional engineer registered in the State of California and submitted to the Central Valley Flood Protection Board within 30 days of beginning the project.

TWENTY-SIX: A civil engineer registered in the State of California representing the permittee shall provide periodic reports and records to the Department of Water Resources that are acceptable to the Central Valley Flood Protection Board which certifies that all work accomplished by contract to the permittee was thoroughly inspected and performed in accordance with submitted drawings, specifications, and permit conditions.

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

TWENTY-EIGHT: Prior to placement of fill against the channel side slopes, all surface vegetation shall be removed to a depth of 6 inches. Organic soil and roots larger than 1-1/2 inches in diameter shall be removed to a depth of 3 feet.

TWENTY-NINE: All fill material shall be native or imported material, conducive for channel slopes, and free of lumps or stones exceeding 3 inches in greatest dimension, vegetative matter, or other

unsatisfactory material. Fill material shall be compacted in 4- to 6-inch layers to a minimum of 90 percent relative compaction as measured by ASTM Method D1557-91.

THIRTY: Fill material placed within 2 feet of a structure shall be compacted with appropriate hand-operated compaction equipment.

THIRTY-ONE: Revetment shall be uniformly placed and properly transitioned into the channel bank, or adjacent revetment, and in a manner which avoids segregation.

THIRTY-TWO: Revetment shall be quarry stone or cobbles and shall be D50 = 12 inches, and be placed 24 inches thick.

THIRTY-THREE: 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 channel side slopes or within the floodway.

THIRTY-FOUR: In the event existing revetment on the channel side slopes is disturbed or displaced, it shall be restored to its original condition upon completion of the proposed installation.

THIRTY-FIVE: The permittee shall replant or reseed the channel slopes to restore sod, grass, or other non-woody ground covers if damaged during project work.

THIRTY-SIX: The channel slope and general project work area shall be restored to at least the condition that existed prior to commencement of work.

THIRTY-SEVEN: All debris generated by this project shall be disposed of outside the Unionhouse Creek floodplain area.

THIRTY-EIGHT: The permittee shall assume all responsibility for the protection, relocation, or removal of the permitted project works if required by the Central Valley Flood Protection Board.

THIRTY-NINE: In the event that levee or bank erosion injurious to the adopted plan of flood control occurs at or adjacent to the permitted encroachment(s), the permittee shall repair the eroded area and propose measures, to be approved by the Central Valley Flood Protection Board, to prevent further erosion.

FORTY: Five years from the effective date of this permit and at the end of each subsequent five-year period, for as long as the work herein approved shall continue, the Department of Water Resources will make an inspection and review of permittee's operation and submit an evaluation report to the Central Valley Flood Protection Board. Should this review produce evidence that the work as approved in this permit is adversely affecting the functioning of the designsted floodway, the permittee will be required, within 30 days after receipt of notification, to make any necessary corrections at his expense. If permittee does not comply with the Department's request, the Department of Water Resources will perform said work and bill permittee for its services. This periodic evaluation could result in imposing new terms and conditions that may affect the approved plan of work.

FORTY-ONE: 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.

FORTY-TWO: Any vegetative material, living or dead, that interferes with the successful execution, functioning, maintenance, or operation of the adopted plan of flood control must be removed by the permittee at permittee's expense upon request by the Central Valley Flood Protection Board, Department of Water Resources, or local maintaining agency. If the permittee does not remove such vegetation or trees upon request, the Central Valley Flood Protection Board reserves the right to remove such at the permittee's expense.

FORTY-THREE: 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.

FORTY-FOUR: 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.

FORTY-FIVE: 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.

FORTY-SIX: Upon completion of the project, the permittee shall submit copies of compaction test results, all permit related inspection reports, construction documentation and a complete set of as-constructed drawings to: Department of Water Resources, Flood Project Inspection Section, P.O. Box 219000, Sacramento, California 95821-9000.

FORTY-SEVEN: The permittee shall comply with all conditions set forth in the letter from the Department of the Army dated XXXX HH, 2012, which is attached to this permit as Exhibit A and is incorporated by reference.

FORTY-EIGHT: The permittee will be required to execute an Agreement Establishing a Covenant Running with the Land relative to compliance with the permit conditions within 90 days of date of issue of permit.

FORTY-NINE: This permit is not valid until the enclosed Agreement Establishing a Covenant Running with the Land has been signed, notarized, and returned to the Central Valley Flood Protection Board.