Meeting of the Central Valley Flood Protection Board
January 25, 2019

Permit Staff Report

City of Sacramento – Department of Utilities
Railyards Stormwater Drainage and Outfall Project, Sacramento County

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1.0 – ITEM

Consider approval of Permit No. 19134 (Attachment A).

2.0 - APPLICANT

City of Sacramento – Department of Utilities (City).

3.0 – PROJECT LOCATION

The project is located in the City of Sacramento near the intersection of Railyards Boulevard and Jibboom Street, on the left (east) bank levee of the Sacramento River, approximately 1,200 feet upstream of the I Street Bridge.
(Sacramento River, Sacramento County, Attachment B)

4.0 – PROJECT DESCRIPTION

The City proposes to install a stormwater discharge system to accommodate the Downtown Railyards land development area. The project consists of:

- a concrete outfall structure with flap gates; and
- a riprap lined zone on the lower waterside slope; and
- installation of four (4) 42-inch diameter and one (1) 12-inch diameter cement mortar-lined and coated steel pipes that go up and over the Sacramento River left (east) bank levee; and
- installation of steps on the waterside levee slope; and
- installation of a valve box on the levee crown; and
- placement of fill and retaining walls on the landside levee slope and berm; and

- a pump station structure with a wet well to be constructed approximately 50-feet landward of the landside levee toe and located under the existing elevated I-5 Freeway.

The system has been designed to accommodate for the future construction of the I-Street Bridge and an 18-foot bike trail, neither of which are part of this project. See Attachment C for project plans.

5.0 – AUTHORITY OF THE BOARD

California Water Code § 8534, 8590 – 8610.5, and 8700 – 8710

California Code of Regulations, Title 23, Division 1 (Title 23):

- § 6, Need for a Permit
- § 13.3, Consent Calendar
- § 112, Streams Regulated and Nonpermissible Work Periods
- § 120, Levees
- § 121, Erosion Control
- § 123, Pipelines, Conduits, and Utility Lines
- § 125, Retaining Walls
- § 137, Miscellaneous Encroachments

6.0 - PROJECT ANALYSIS

The proposed project's primary purpose is to convey stormwater runoff from the Railyards area, located north of Downtown Sacramento, and discharge it into the Sacramento River in compliance with Federal, State, and City design standards and requirements. The stormwater system is designed to handle a 100-year rainfall event and has a discharge capacity of approximately 200,000 gallons per minute (450 cubic feet per second (cfs)). The proposed design water surface elevation (DWSE) was determined using Central Valley Hydrology Study (CVHS) 200-year hydrology that includes the new flow of 160,000 cfs for the American River and standard Urban Levee Design Criteria (ULDC) plus 1 foot.

The project components consist of:

1. A concrete-encased outfall structure, with erosion control riprap, will be constructed along the river bank. Four (4) 42-inch diameter and one (1) 12-inch diameter cement mortar-lined and coated steel discharge pipes laid in parallel

formation through the Sacramento River left (east) bank levee, which is a project levee. The invert of the discharge pipes will be placed above the 200-year design water surface elevation (DWSE) of 35.2-feet (North America Vertical Datum 1988 (NAVD 88)).

2. Installation of concrete steps along the waterside levee slope to access the outfall structure.
3. Installation of an 8-foot wide concrete valve box on the levee crown spanning all five pipelines.
4. Two variable height retaining walls, four feet maximum, with compacted fill will be constructed along the east and west sides of Jibboom Street in preparation for future site improvements.
5. A stormwater pump station with a 50-foot wide, 66-foot long, and 30-foot deep wet well (100,000 cubic foot capacity) will be located approximately 50-feet from the existing landside levee toe.

The City is the Local Maintaining Agency (LMA) for the levee in the project area and it will operate and maintain the new discharge facility in a manner that will not negatively impact the levee. To do this, the City will monitor the Sacramento River I-Street Bridge gauge to control the discharge. When the I-Street gauge reaches the monitor stage of 27.5-feet (NAVD 88), the City will be required to reduce the outfall discharge by 50%. When the I-Street gauge reaches the flood stage of 33.5-feet (NAVD 88), no water shall be pumped into the Sacramento River through the outfall structure.

No changes to levee geometry are proposed. The proposed project meets all applicable California Code of Regulations, Title 23, Division 1 Standards (Title 23).

6.1 – Hydraulic Analysis

The proposed project will temporarily alter the landside and waterside geometry of the levee, but it will be restored to pre-existing slope and grade upon completion of the project. The restoration will involve grading the levee slope to a smooth surface, thus removing significant undulations. A cross-section of the project site with the proposed outfall geometry and the construction elements required to build the outfall structure resulted in less than one percent reduction of flow area. At the project site, the reduction in flow area was calculated to be 0.8 percent as shown in Attachment D. These values are based on the 100-year DWSE of 33.1-feet (NAVD 88), which is lower than the 1957 DWSE of approximately 33.7-feet (NAVD 88). The 200-year DWSE would give more flow area for the same blockage, thus a smaller reduction in flow area. Therefore, no hydraulic impact analysis was required for the proposed project.

6.2 – Geotechnical Analysis

Using the SEEP/W (version 7.23) program, a seepage analysis was performed for the pump station and wet well excavation that will be located approximately 50-feet landward from the landside levee toe. A cross section extending from the middle of the Sacramento River to 2,000 feet landward of the levee was evaluated. The seepage analysis was performed using a water surface elevation of 36.4-feet (NAVD 88) and incorporated the potential increase to the water surface elevation due to climate change and sea level rise. The water surface elevation used in the analysis includes an additional 1.2 feet of elevation as an added measure of conservatism for geotechnical analysis. The analysis resulted in no significant uplift on the structure. The seepage analysis report is provided in Attachment E. The proposed project is expected to result in no adverse geotechnical impacts to the Sacramento River East Levee or the Sacramento River Flood Control Project (SRFCP).

7.0 – AGENCY COMMENTS AND ENDORSEMENTS

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

- The City of Sacramento endorsed the project on April 7, 2016 with no conditions and will be responsible for the operation and maintenance of the project.

- The U.S. Army Corps of Engineers (USACE) 33 U.S.C. 408 permission letter has been received for this application. The USACE Sacramento District Engineer approves the request to alter the Federal flood risk reduction project, subject to conditions. The letter is incorporated into the permit as Exhibit A.

8.0 – CEQA ANALYSIS

Board staff has prepared the following California Environmental Quality Act (CEQA) determination:

The Board, acting as a responsible agency under CEQA, has independently reviewed the Draft and Final Subsequent Environmental Impact Reports (SCH Number: 2006032058, June 2016 DSEIR, October 2016 FSEIR) Mitigation Monitoring and Reporting Plan (MMRP) for the Railyards Specific Plan Update, Kaiser Permanente Medical Center, Major League Soccer Stadium, & Stormwater Outfall Project, prepared

by the City of Sacramento (City) as the lead agency. These documents, including project design, may be viewed or downloaded from the Board website at http://cvfpb.ca.gov/event/january-2019-regular-business-meeting/ under a link for this agenda item and are also available for review in hard copy at the Board and City offices.

The City determined that the project, as described in the DSEIR and FSEIR would have a significant effect on the environment and filed a Notice of Determination with the State Clearinghouse on November 14, 2016. The City incorporated mandatory mitigation measures into the project plans to avoid or mitigate impacts. These mitigation measures, included in the City's Final SEIR and MMRP, address impacts to air quality cultural resources, hazards and biological resources. These mitigation measures are within the responsibility and jurisdiction of the City and have been adopted by the City. The Draft and Final SEIR found less than significant impacts under aesthetics, noise transportation, utilities, geology, and hydrology for flood related impacts associated project.

In accordance with CEQA Guidelines Section 15096(e), Board staff independently reviewed the City's Draft SEIR and Final SEIR, and finds these environmental documents prepared by the lead agency adequately address hydrology impacts, including potential flood risk, for the Board's approval of Permit 19134 to authorize work to construct the stormwater outfall structure adjacent to the regulated stream, which is within the Board's jurisdiction as it relates to maintenance of the State's flood control system. The Board, as a responsible agency, is responsible for mitigating and avoiding only the direct and indirect environmental effects of those parts of the project which it decides to carry out, finance, or approve (CEQA Guidelines Section 15096(g); Public Resources Code § 21002.1(d)).

Here, the Board's action is limited to approving an encroachment permit for work to construct and operate the stormwater outfall structure, and the Board's jurisdiction is limited to imposing conditions or mitigation related to maintaining the State Plan of Flood Control. The mitigation measures in the City's SEIR and MMRP do not address issues over which the Board has jurisdiction, therefore, no specific findings under CEQA Guidelines section 15906, subdivision (h) are required; these mitigation measures are within the jurisdiction of the City and have been adopted by the City.

The Draft and Final SEIR identified less than significant impacts related to flood risk, which is the one resource area within the Board's jurisdiction as a responsible agency. The SEIR conclusions related to flood risk are further supported by the USACE hydraulic analysis relied upon by Board staff, which confirm the proposed stormwater outfall structure will result in less than significant hydraulic impacts. Based on staff's

review of the environmental documents, the hydrologic analysis, and the entirety of the record, staff finds there is no substantial evidence to support a fair argument that the project may result in significant impacts related to flood risk within the Board's jurisdiction. Because the Board's approval of the encroachment permit for the proposed outfall structure results in less than significant impacts related to flood risk, which is the only resource area within the Board jurisdiction to address, no findings under CEQA Guidelines section 15906, subdivision (h) or consideration of alternatives is required.

The documents and other materials which constitute the record of the Central Valley Flood Board's proceedings in this matter are in the custody of the Executive Officer, Central Valley Flood Protection Board, 3310 El Camino Ave., Suite 170, Sacramento, California 95821.

9.0 – CA WATER CODE SECTION 8610.5 AND OTHER 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 relate to the scientific issues presented by the executive officer, legal counsel, the Department of Water Resources or other parties that raise credible scientific issues.

   The accepted industry standards for hydrology and hydraulics 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 facilities of the State Plan of Flood Control (SPFC).

   The proposed project is expected to result in no adverse effect on any SPFC facilities because; no changes to the levee geometry are proposed; the impacted cross section area of the outfall structure results in less than 0.8% of blockage for the 200-year DWSE; the seepage analysis incorporated the potential increase to the water surface elevation due to climate change and sea level rise; and any undulations on the levee slope will be smoothed out. The proposed project is consistent with the CVFPP by improving flood risk management by ensuring the project meets current standards and does not negatively impact the flood control system.

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

   The stormwater system is designed to handle a 100-year rainfall event (City of Sacramento current standard is for a 10-year event). If flows exceed this volume, additional water is routed to the Combined Wastewater Treatment Plant and to the Pioneer Reservoir storage and treatment facility. Therefore, there are no expected adverse effects to the proposed project from reasonable projected future events.

10.0 – STAFF RECOMMENDATION

Staff recommends that the Board:

Adopt:

- The CEQA findings: The Board, acting as a responsible agency under CEQA, has independently reviewed and considered the environmental documents prepared for the project. Approving the Permit 19134 would not result in any significant adverse impacts related to flood risk and no additional mitigation measures within the Board's jurisdiction are required; and

Approve:

- Draft Encroachment Permit No. 19134 in substantially the form provided in Attachment A; and

Direct:

- The Executive Officer to take the necessary actions to execute the permit and file a Notice of Determination pursuant to CEQA with the State Clearinghouse.

11.0 – LIST OF ATTACHMENTS

A. Draft Permit No. 19134
B. Location Map, Parcels, and Photos
C. Construction Plans
D. Hydraulic Screening
E. Seepage Evaluation

Reviewers:

Design Review	Humberto Negrete, Permitting Section Staff
Environmental Review	James Herota, Senior Environmental Scientist
Document Review	Gary W. Lemon, P.E., Permitting Section Chief Kelly Soule, Operations Branch Chief Itzia Rivera, Acting Environmental Services Branch Chief Michael C. Wright, P.E., Acting Chief Engineer
Legal Review	Jit Dua, Board Counsel

DRAFT

STATE OF CALIFORNIA
THE RESOURCES AGENCY

THE CENTRAL VALLEY FLOOD PROTECTION BOARD

PERMIT NO. 19134 BD

This Permit is issued to:

City of Sacramento - Department of Utilities
1395 35th Avenue
Sacramento, California 95822

To install a stormwater conveyance system consisting of; construction of a concrete outfall structure with flap gates that discharge out to a riprap lined zone on the lower waterside slope; installation of four (4) 42-inch diameter and one (1) 12-inch diameter cement mortar-lined and coated steel pipe up and over the Sacramento River left (east) bank levee; installation of steps on the waterside levee slope; installation of a valve box, placement of fill, and a retaining walls on the levee crown.

The project is located at the intersection of Railyards Boulevard and Jibboom Street, downstream of the American River and north of the I Street Bridge, at 38.58915˚N 121.50497˚W, City of Sacramento, Sacramento River, 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. 19134 BD

LIABILITY AND INDEMNIFICATION

THIRTEEN: The permittee shall defend, indemnify, and hold the Central Valley Flood Protection Board (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 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.

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

AGENCY CONDITIONS

SIXTEEN: All work approved by this permit shall be in accordance with the submitted drawings and specifications dated 07/2017 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 Board.

SEVENTEEN: Permittee shall pay to the Board, an inspection fee(s) to cover inspection cost(s), including staff and/or consultant time and expenses, for any inspections before, during, post-construction, and regularly thereafter as deemed necessary by the Board.

EIGHTEEN: 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 Board, to prevent further erosion.

NINETEEN: The permittee shall be responsible for the repair of any damages to the project levee, channel, banks, floodway, or other flood control facilities due to construction, operation, or maintenance of the proposed project.

TWENTY: The permittee shall comply with all conditions set forth in the letter from the Department of the Army (U.S. Army Corps of Engineers, Sacramento District) dated _____, which is attached to this permit as Exhibit A and is incorporated by reference.

TWENTY-ONE: The permittee agrees to notify new property/encroachment owner(s) that they are required to submit a permit Name Change request form to the Board upon completion of the sale. The new owner(s) will be required to comply with all permit conditions. Name Change forms are available at http://cvfpb.ca.gov/

TWENTY-TWO: The Board reserves the right to add additional, or modify existing, conditions when there is a change in ownership and/or maintenance responsibility of the work authorized under this permit.

PRE-CONSTRUCTION

TWENTY-THREE: Upon receipt of a signed copy of the issued permit the permittee shall contact the Board by telephone at (916) 574-0609, and submit the enclosed postcard, to schedule a preconstruction conference with the inspector that is assigned to your project. Failure to do so at least 10 working days prior to start of work may result in a delay of the project.

CONSTRUCTION

TWENTY-FOUR: No construction work of any kind shall be done during the flood season from November 1 to April 15 without prior approval of the Board. Failure to submit a Time Variance Request to the Board at least 10 working days prior to November 1 may result in a delay of the project.

POST-CONSTRUCTION

TWENTY-FIVE: All debris generated by this project shall be properly disposed of outside the Sacramento River floodway and project right-of-way.

TWENTY-SIX: The project levee shall be restored to at least the condition that existed prior to commencement of work.

TWENTY-SEVEN: Upon completion of the project, the permittee shall submit as-constructed drawings to the Board and to: Department of Water Resources, Flood Project Inspection Section, 3310 El Camino Avenue, Suite 256, Sacramento, California 95821.

TWENTY-EIGHT: The pipeline shall be tested and confirmed free of leaks by X-ray, pressure tests, or other approved methods during construction or anytime after construction upon request by the Board.

OPERATIONS AND MAINTENANCE

TWENTY-NINE: After each period of high water, debris that accumulates at the site shall be completely removed from the Sacramento River floodway.

THIRTY: 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 Board, Department of Water Resources, City of Sacramento, or any other agency responsible for maintenance and shall, at all times, allow officials from these agencies to access the levee, levee slope, and any adjacent areas as necessary for flood control.

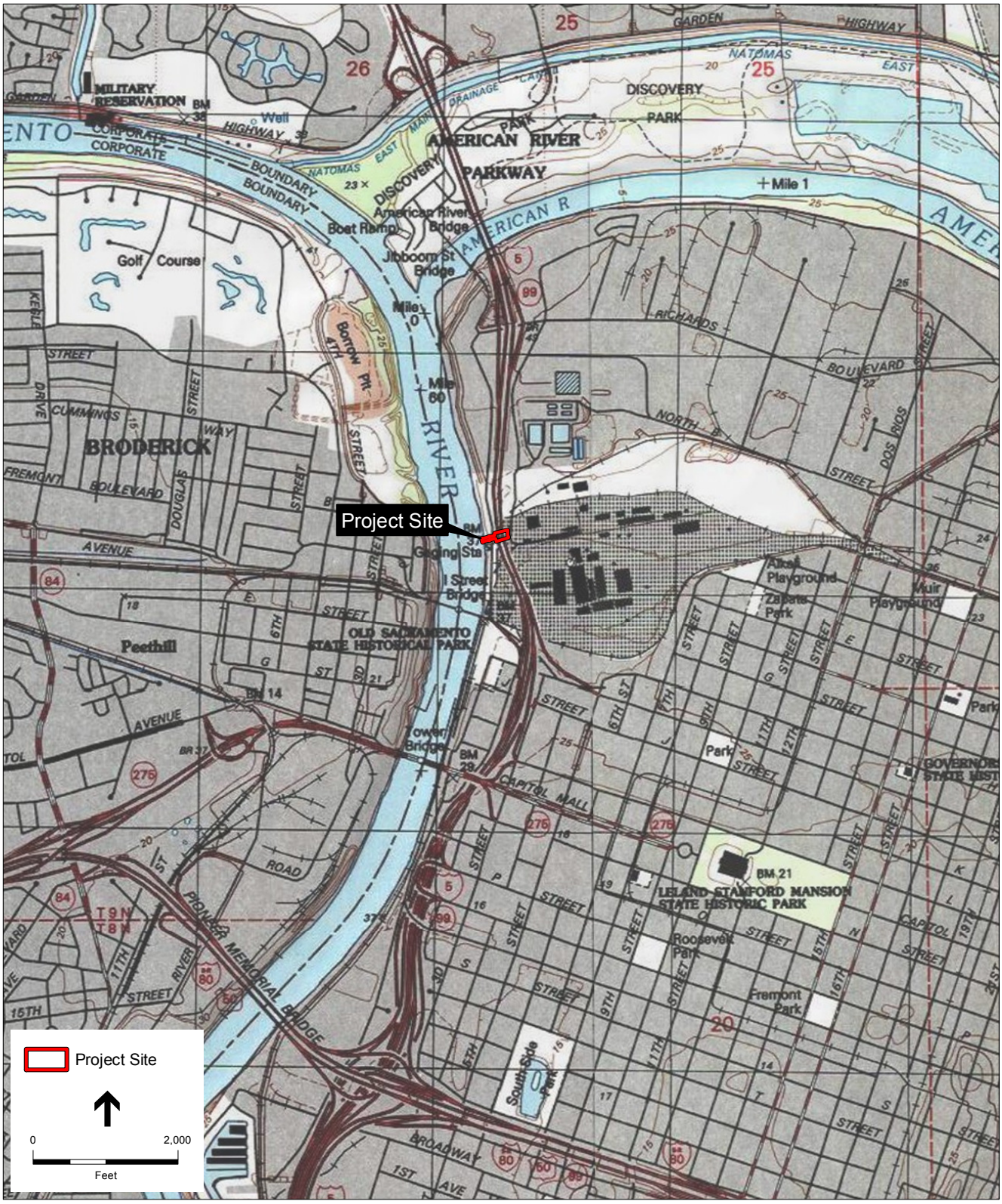
THIRTY-ONE: The permitted encroachment(s) shall not interfere with operation and maintenance of the flood control project. If the permitted encroachment(s) are determined by any agency responsible for operation or maintenance of the flood control project to interfere, the permittee shall be required,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

PROJECT ABANDONMENT / CHANGE IN PLAN OF FLOOD CONTROL

THIRTY-TWO: 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 Board at the permittee's or successor's cost and expense.

THIRTY-THREE: 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 in the discretion of the Board the 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 the project is not maintained or is damaged by any cause. If the permittee does not comply, or in the event of an emergency, the Board may remove the encroachment(s) at the permittee's expense.

END OF CONDITIONS



SOURCE: USGS 7.5' Topo Quad (Sacramento East, 1997; Sacramento West, 1997); ESA, 2016

Railyards Specific Plan Update . 150286

Figure 1

Project Location Map

SOURCE: Google, 2015; Kimley Horn, 2015; City of Sacramento, 2015; ESA, 2016

Railyards Specific Plan Update . 150286

Figure 2

Project Site and Adjacent Parcels

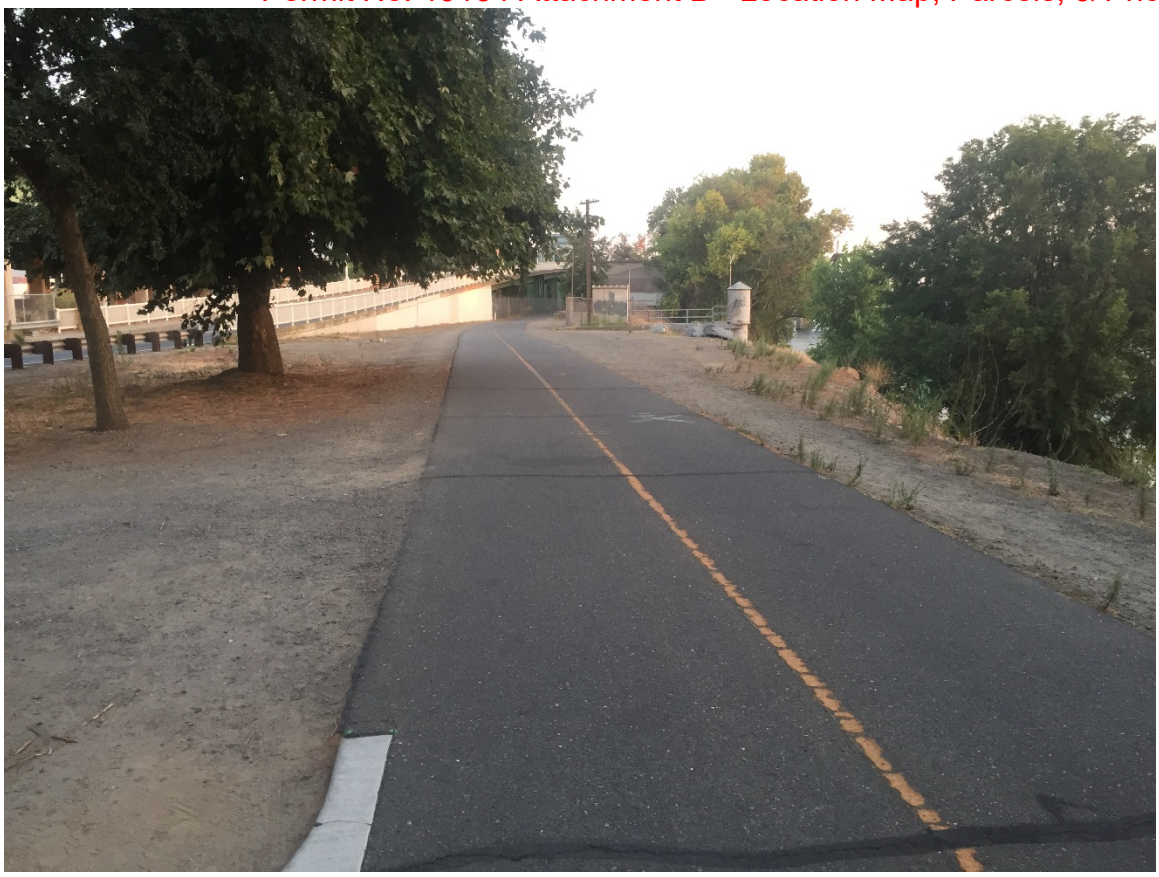


Photo 1: Project Site looking downstream (south)

Photo 2: Project Site looking upstream (north)

Photo 3: Project Site looking landward (east)

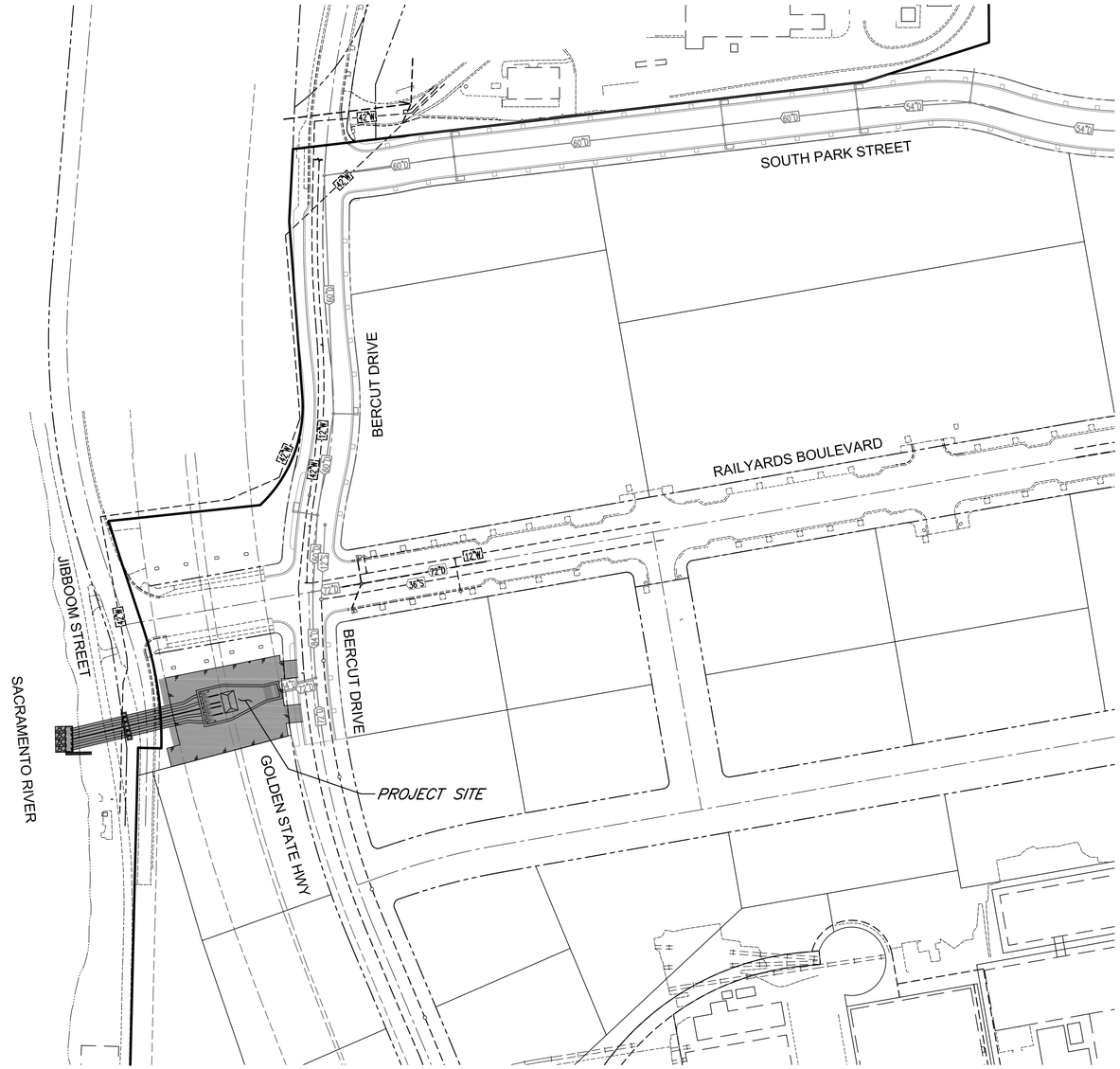
Photo 4: Project Site at waterside slope (future location of outfall structure)

STANDARD SYMBOLS

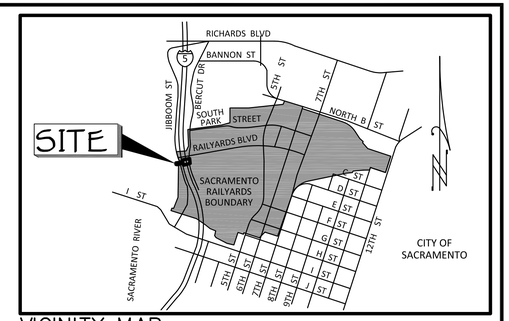
	EXISTING	PROPOSED
DROP INLET	□	■
GRATE TOP YARD DRAIN	⊕	⊕
MANHOLE	○	●
SEWER SERVICE W/CLEANOUT	▷———	——●
STORM DRAIN	12"D 12"SD	12"D 12"SD
SANITARY SEWER	12"S 12"SS	12"S 12"SS
WATER MAIN	8"W	8"W
GATE VALVE	—◇—	—◆—
WATER SERVICE	⊢——	⊢——
STANDARD FIRE HYDRANT	◇—◇—	◆—◆—
DOUBLE PUMPER FIRE HYD.	◇—◇—	◆—◆—
WHARF HYDRANT	◇—◇—	
AIR RELEASE	—△—	—▲—
BUTTERFLY VALVE	—▷◁—	—▶◀—
CHECK VALVE	—N—	—N—
BLOW-OFF	———◇	——●
POWER POLE	PP	
JOINT POLE	JP	
STREET LIGHT	☼ ☼	☼ ☼
PULL BOX	PB	
OVER HEAD LINE	—— OH ——	
ELECTRICAL	—— E —— E ——	
GAS VALVE	⊗	
GAS MAIN	—— G —— G ——	
TELEPHONE	—— T —— T ——	
STREET SIGN	#	#
FENCE	—X— X—	X X
MAIL BOX	MB	
RETAINING WALL		
FLOW LINE		
CONTOUR	20	
EDGE OF PAVEMENT		
CURB, GUTTER & SIDEWALK		
RIGHT OF WAY		
CENTER LINE		
PROPERTY LINE		
SLOPE BANK		
ELEVATION	× 12.6	12.6
HANDICAP RAMP		
DRIVEWAY		
TREE		TO BE REMOVED

CITY OF SACRAMENTO

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION



SITE PLAN



VICINITY MAP

NO SCALE

SHEET INDEX:

OWNER/DEVELOPER:
DOWNTOWN RAILYARDS VENTURE, LLC
3140 PEACEKEEPER WAY
McCLELLAN, CA 95652
CONTACT: BUD SCHIVELEY
PH:(916) 965-7100
FAX:(916) 785-0550

CALIFORNIA COORDINATES N:1976869.7413 E: 6703196.7038
(@ C/L INTX OF JIBBOOM ST & RAILYARDS BLVD)
APN: 002-0010-056

SUBMITTED BY: _____
KENT H. BAKER RCE 26487 BAKER-WILLIAMS ENGINEERING GROUP DATE

ACCEPTED BY: _____
JENNIFER L. JOHNSON, PE C77032, SENIOR ENGINEER, DEVELOPMENT ENGINEERING DATE

ACCEPTED BY: _____
UTILITIES DEPARTMENT DATE

UTILITY REPRESENTATIVES		
UTILITY	REPRESENTATIVE	PHONE NO.
CABLE T.V. COMCAST	BOB ANGELASTRO	830-6732
U.S.A.		800-227-2600
GAS P.G.&E.	DEMETRIUS WILLIAMS	386-5013
ELECTRICITY S.M.U.D.	KIM HOLDER	732-5814
TELEPHONE AT&T	BRIAN MANABE	453-7129
TELEPHONE SUREWEST	JEFF HODSDON	786-1653
WATER CITY OF SACRAMENTO	JESUS REYES	808-1721
SEWER CITY OF SACRAMENTO	JESUS REYES	808-1721
DRAINAGE CITY OF SACRAMENTO	JESUS REYES	808-1721
FIRE CITY OF SACRAMENTO	ROSS WOODMAN	264-5260

REVISIONS			
NO.	DESCRIPTION	DATE	BY

BENCH MARK ELEV. 37.905'
DESCRIPTION BM NO. 297-B2C
SET MAG AND BRASS WASHER MARKED "GPS CITY OF SACRAMENTO", IN 2" IP. STATION IS +/-10 FEET WEST OF WEST EP OF JEDEDIAH SMITH NATIONAL RECREATION TRAIL, ON EAST BANK OF SACRAMENTO RIVER, 330 YARDS UPSTREAM FROM THE "I" ST. RAILROAD BRIDGE, +/-100 FEET NORTH OF THE STATE OF CALIFORNIA AUTOMATIC RIVER GAUGE.

FIELD BOOK 414
SCALE HORIZ. 1"=100' VERT. N/A

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

DRAWN BY: SHAWN F. LONG DATE 07/2017
DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
CHECKED BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017

REGISTERED PROFESSIONAL ENGINEER KENT H. BAKER No. C 26487 EXPIRES 3/31/2018 CIVIL STATE OF CALIFORNIA
KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
COVER SHEET

BAKER-WILLIAMS ENGINEERING GROUP
ENGINEERING SURVEYING PLANNING
6020 Rolland Drive, Suite 19 (916) 331-4336
Carmichael, California 95608 Fax (916) 331-4430

RPC14-0013 | P????????? | P??-0?? | SHEET C-1 OF 6 | 15-11-064

CITY OF SACRAMENTO GENERAL NOTES

1. ALL CONSTRUCTION MATERIALS AND WORKMANSHIP SHALL CONFORM TO THE CITY OF SACRAMENTO STANDARD SPECIFICATIONS, DATED JUNE, 2007 AND ALL APPLICABLE ADDENDA.
2. THE CONTRACTOR SHALL BE IN RECEIPT OF CITY ACCEPTED PLANS PRIOR TO BEGINNING CONSTRUCTION WITHIN THE STREET RIGHT–OF–WAY. ACCEPTANCE OF PLANS BY THE CITY OF SACRAMENTO IS BASED ON INFORMATION CONTAINED ON THE PLANS AND SUPPORTING DOCUMENTS, AND DOES NOT SUBROGATE THE DESIGN ENGINEER'S RESPONSIBILITY FOR THIS PROJECT. ANY AND/OR ALL ERRORS AND OMISSIONS ARE THE RESPONSIBILITY OF THE DESIGN ENGINEER.
3. CONTACT THE CITY OF SACRAMENTO CONSTRUCTION SECTION AT 808–8300 TWO (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL EXISTING UTILITIES AND FOR THE PROTECTION OF AND REPAIR OF DAMAGE TO THEM. CONTACT UNDERGROUND SERVICE ALERT 1–800–642–2444, 48 HOURS BEFORE WORK IS TO BEGIN.
5. RESPONSIBILITY FOR FINAL ACCEPTANCE OF LINE AND GRADE BY THE CITY OF SACRAMENTO WILL BE ASSUMED ONLY IF CONSTRUCTION STAKES ARE SET BY THE CITY SURVEY CREWS OR THEIR DESIGNATED REPRESENTATIVE. CITY WILL SET CONSTRUCTION STAKES ONLY IF SO INDICATED ON THE "NOTICE TO PROCEED" WITH CONSTRUCTION ISSUED FOR THIS PROJECT. CONTACT CITY OF SACRAMENTO CONSTRUCTION SECTION TWO (2) WORKING DAYS IN ADVANCE FOR CONSTRUCTION STAKES WITHIN PUBLIC RIGHT–OF–WAY.
6. FOR ALL TRENCH EXCAVATIONS 5 FEET OR MORE IN DEPTH, THE CONTRACTOR SHALL OBTAIN A PERMIT FROM THE DIVISION OF INDUSTRIAL SAFETY (2424 ARDEN WAY, SUITE 165, SACRAMENTO ––PHONE 916–263–2800) PRIOR TO BEGINNING ANY EXCAVATION. A COPY OF THIS PERMIT SHALL BE AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR AND FURNISH, INSTALL, AND MAINTAIN TEMPORARY SIGNS, BRIDGES, BARRICADES, FLAGMEN, AND OTHER FACILITIES TO ADEQUATELY SAFEGUARD THE GENERAL PUBLIC AND WORK, AND TO PROVIDE FOR THE PROPER ROUTING OF VEHICULAR AND PEDESTRIAN TRAFFIC. CONSTRUCTION OPERATIONS SHALL COMPLY WITH THE WORK AREA AND TRAFFIC CONTROL HANDBOOK (WATCH). THE CONTRACTOR SHALL PROVIDE TO THE CITY TRAFFIC ENGINEER FOR REVIEW, A PLAN SHOWING TRAFFIC CONTROL MEASURES AND/OR DETOURS FOR VEHICLES AFFECTED BY THE CONSTRUCTION WORK. THE APPROVED PLAN SHALL BE DELIVERED TO THE CONSTRUCTION INSPECTOR PRIOR TO THE IMPLEMENTATION OF TRAFFIC CONTROL MEASURES.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING RECORD DRAWINGS FOR ALL WORK THROUGHOUT THE COURSE OF CONSTRUCTION. SUCH DRAWINGS SHALL RECORD THE LOCATION AND GRADE (CITY DATUM) OF ALL UNDERGROUND IMPROVEMENTS CONSTRUCTED AND SHALL BE DELIVERED TO THE CONSTRUCTION INSPECTOR PRIOR TO, AND IN CONSIDERATION, OF THE CITY'S ACCEPTANCE OF WORK.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS OR MARKERS DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL MAINTAIN ALL EXISTING DRAINAGE AND SEWER FACILITIES WITHIN THE CONSTRUCTION AREA UNTIL NEW DRAINAGE AND SEWER IMPROVEMENTS ARE IN PLACE AND FUNCTIONING.
11. IF UNUSUAL AMOUNTS OF BONE, STONE OR ARTIFACTS ARE UNCOVERED, WORK WITHIN 50 METERS OF THE AREA SHALL CEASE IMMEDIATELY AND A QUALIFIED ARCHAEOLOGIST SHALL BE CONSULTED TO DEVELOP, IF NECESSARY, MITIGATION MEASURES TO REDUCE ANY ARCHAEOLOGICAL IMPACT TO A LESS THAN SIGNIFICANT EFFECT BEFORE CONSTRUCTION RESUMES IN THE AREA.
12. COST TO REMOVE AND REPLACE EXISTING PAVEMENT OVER UTILITY LINE TRENCHES SHALL BE INCLUDED IN THE BID PRICE. TRENCHES SHALL BE BACKFILLED AND PAVEMENT SHALL BE REPLACED PER CITY DETAIL T–80. PAVEMENT SHALL BE REPLACED IN KIND (MINIMUM OF 4"AC ON 12"AB) AS DETERMINED IN THE FIELD BY THE CITY INSPECTOR. ALL STRIPING AND PAVEMENT MARKINGS SHALL BE RESTORED (IN THERMOPLASTIC).
13. PAVEMENT REPAIR NECESSARY DUE TO SUBSIDENCE RESULTING FROM TRENCH FAILURE OR OTHER DEFECTS IN WORKMANSHIP SHALL CONSIST OF KEY CUTTING AND OVERLAYING BETWEEN THE TWO NEAREST INTERSECTIONS, AS DETERMINED BY THE CITY INSPECTOR
14. SIDEWALK RAMPS SHALL BE CONSTRUCTED AT THE CENTER OF ALL ROUND CORNERS UNLESS OTHERWISE SHOWN. RAMPS SHALL COMPLY WITH THE MOST RECENT CITY STANDARD RAMP DETAILS, WHICH ARE AVAILABLE FROM THE CITY INSPECTOR.
15. PIPE AND MANHOLE DIMENSIONS ARE TO THE CENTERLINE, UNLESS OTHERWISE NOTED.
16. ALL TAPS TWENTY–FOUR (24) INCHES & SMALLER INTO SEWER & DRAIN MANHOLES SHALL BE CORE BORED WITH KOR–N–SEAL TAPS OR APPROVED EQUAL.
17. ANY WATER ENTERING THE SANITARY SEWER SYSTEM TO BE CONSTRUCTED UNDER THESE PLANS SHALL NOT BE DISCHARGED TO THE EXISTING SYSTEM. PLUGS MUST BE INSTALLED IN EXISTING MANHOLES AS NECESSARY TO PERMIT PUMPING THE NEW SYSTEM CLEAR OF WATER AND DEBRIS PRIOR TO ACCEPTANCE. CARE SHALL BE EXERCISED IN LOCATING PLUGS TO AVOID INTERRUPTING SERVICES TO EXISTING CONNECTIONS. MORTAR OR BRICK PLUGS MUST BE USED, INFLATABLE DEVICES ARE NOT SATISFACTORY.
18. UNLESS OTHERWISE APPROVED, DRAIN PIPE MATERIAL SHALL BE EITHER REINFORCED CONCRETE PIPE CONFORMING TO ASTM, DESIGNATION C76 CLASS III, IV, V OR PVC SDR–35 OR AS SPECIFIED ON PLANS. USE RCP CLASS III OR PVC SDR–35 WITH 18" OR MORE MINIMUM COVER, RCP CLASS IV WITH 12" – 18" MINIMUM COVER, RCP CLASS IV ENCASED IN CDF WITH 6" – 12" MINIMUM COVER, AND CLASS 150 CEMENT MORTAR LINED DUCTILE IRON PIPE CONFORMING TO AWWA C151ENCASED IN CDF WITH 0" – 6" MINIMUM COVER. IN ALL CASES, PROVIDE RUBBER GASKETED JOINTS. (NOTE: MINIMUM COVER IS FROM BOTTOM OF AB TO TOP OUTSIDE DIAMETER OF DRAIN PIPE)
19. DI INLET LEADS SHALL BE RCP CLASS III OR PVC SDR–35 WITH 18" OR MORE MINIMUM COVER, PVC C–900 CLASS 150 OR RCP CLASS IV WITH 12" – 18" MINIMUM COVER, RCP CLASS IV OR PVC C–900 BOTH ENCASED IN CDF WITH 6" – 12" MINIMUM COVER, OR DUCTILE IRON PIPE ENCASED IN CDF WITH 0" – 6" MINIMUM COVER. IN ALL CASES, PROVIDE RUBBER GASKETED JOINTS. (NOTE: MINIMUM COVER IS FROM BOTTOM OF AB TO TOP OUTSIDE DIAMETER OF DRAIN PIPE)
20. SANITARY SEWER PIPE MAINS SHALL BE CONSTRUCTED OF V.C.P., A.B.S. OR PVC UNLESS OTHERWISE SPECIFIED ON THE PLANS.
21. ALL SEWER SERVICES SHALL BE CONSTRUCTED OF A.B.S. PIPE PER CITY STANDARD DRAWINGS S–260 AND S–265, UNLESS OTHERWISE NOTED ON THE PLANS.
22. ALL SEWER SERVICES SHALL BE 4" DIAMETER UNLESS OTHERWISE NOTED.
23. AGGREGATE SUBBASE SHALL CONFORM TO CALTRANS SPECIFICATIONS DATED: 2010, SECTION 25.
24. THE CONTRACTOR SHALL VIDEO RECORD ALL DRAIN AND SEWER PIPES PER CITY STANDARD SPECIFICATIONS.
25. UNLESS OTHERWISE APPROVED, THE CONTRACTOR SHALL BALL AND FLUSH ALL SEWER AND DRAIN SYSTEMS PRIOR TO VIDEO RECORDING. THESE SYSTEMS SHALL BE FREE OF DEBRIS PRIOR TO ACCEPTANCE OF WORK.
26. A STORM WATER PERMIT MUST BE OBTAINED WHEN CONSTRUCTION ACTIVITY RESULTS IN SOIL DISTURBANCE OF ONE (1) OR MORE ACRES. THE STATE WATER RESOURCES CONTROL BOARD, DIVISION OF WATER QUALITY, STORM WATER PERMIT UNIT, P.O. BOX 1977, SACRAMENTO, CA 95812–1977, SHALL BE CONTACTED TO OBTAIN THE PERMIT PRIOR TO BEGINNING CONSTRUCTION.
27. IF WORK SHOWN ON THESE PLANS HAS NOT COMMENCED WITHIN TWO YEARS FROM THE DATE OF THE CITY'S ACCEPTANCE OF THE PLANS, A SUBSEQUENT PLAN REVIEW AT THE CITY'S DISCRETION AND THE DEVELOPER'S EXPENSE MAY BE NECESSARY.
28. CONTRACTOR SHALL COMPLY WITH THE CITY OF SACRAMENTO ADMINISTRATIVE AND TECHNICAL PROCEDURES MANUAL FOR GRADING/EROSION AND SEDIMENT CONTROL.
29. CONSTRUCT SURVEY MONUMENT WELL PER STD. DWG. T–350 AT LOCATIONS INDICATED ON THE FINAL MAP.
30. CONCRETE RESTORATION: COLOR OF NEW CONCRETE SHALL MATCH ADJACENT EXISTING CONCRETE BY ADDING LAMP BLACK.
31. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS.

LIST OF ABBREVIATIONS:

AC ASPHALTIC CONCRETE
AB AGGREGATE SUBBASE
ANG. PT. ANGLE POINT
ARV AIR RELEASE VALVE
BC BEGIN CURVE
BOC BACK OF CURB
BOW BACK OF WALK
BNDY. BOUNDARY
BO BLOW OFF VALVE
BRW BOTTOM RETAINING WALL
BVC BEGIN VERTICAL CURVE
CDF CONTROLLED DENSITY FILL
CH CHORD
CL CLASS
CLR. CLEAR
CO CLEANOUT
COMB. COMBINATION
C.O.T.G. CLEAN OUT TO GRADE
C/L CENTERLINE
CONC. CONCRETE
CONST. CONSTRUCT
CR CURVE RETURN
CSD–1 COUNTY SANITATION DIST.1
CSP CORRUGATED STEEL PIPE
CT COURT
C&G CURB AND GUTTER
DEL DELTA
DIA. DIAMETER
DI DROP INLET
D.I.P. DUCTILE IRON PIPE
DR DRIVE
D/W DRIVEWAY
(E) EXISTING
EX. EXISTING
EC END OF CURVE
ELEV. ELEVATION
EP EDGE OF PAVEMENT
ESA ENVIRONMENTALLY SENSITIVE AREA
ESMT. EASEMENT
EVC END VERTICAL CURVE
FF FINISHED FLOOR ELEVATION
FG FINISHED GRADE
FH FIRE HYDRANT
F/L FLOWLINE
FOC FACE OF CURB
FOW FACE OF WALK
GALV. GALVANIZED
GB GRADE BREAK
GFL GUTTER FLOWLINE
G.I.P. GALVANIZED IRON PIPE
GRT GRATE
GM GAS MAIN
GV GATE VALVE
HGL HYDRAULIC GRADE LINE
HP HIGH POINT
INV. INVERT
I.P. IRON PIPE
IRR IRRIGATION
INTX INTERSECTION
JP JOINT POLE
JT JOINT TRENCH
L LENGTH
LF LINEAR FEET
LN LANE
LP LOW POINT
LT LEFT
L.T.S. LIME TREATED SUBGRADE
MAX. MAXIMUM
MH MANHOLE
MIN. MINIMUM
O.C. ON CENTER
O.D. OUTSIDE DIAMETER
PAC. BELL PACIFIC TELEPHONE
PG PAD GRADE
P.G.&E PACIFIC GAS AND ELECTRIC
PIVC POINT OF INTERSECTION VERTICAL CURVE
P/L PROPERTY LINE
PRC POINT OF REVERSE CURVE
P.S.I. POUNDS per SQUARE INCH
PT POINT
PVC POLYVINYL CHLORIDE PIPE
R RADIUS
RCP REINFORCED CONCRETE PIPE
RD ROAD OR ROOF DRAIN
RT RIGHT
R/W RIGHT OF WAY
S SLOPE
SS (S) SANITARY SEWER
SD (D) STORM DRAIN
SMUD SACRAMENTO MUNICIPAL UTILITY DISTRICT
ST STREET
STA. STATION
SUBD. SUBDIVISION
TBC TOP BACK OF CURB
TC TOP OF CURB
TRW TOP OF RETAINING WALL
TSW TOP OF SOUND WALL
TWM TOP OF WATER MAIN
TW TOP OF WALK
T TRANSFORMER
TP TOP OF PAVEMENT
TYP. TYPICAL
VC VERTICAL CURVE
W WATER
W/ WITH
WM WATER MAIN
YD YARD DRAIN

OTHER (BAKER–WILLIAMS ENGINEERING GROUP)

1. THE CONTRACTOR SHALL COORDINATE ANY CONFLICTS OR OTHER SITUATIONS NOT ADDRESSED ON THESE PLANS WITH THE APPROPRIATE INSPECTOR AND THE ENGINEER PRIOR TO PROCEEDING.
2. THE CONTRACTOR IS HEREBY NOTIFIED THAT PRIOR TO COMMENCING CONSTRUCTION HE IS RESPONSIBLE FOR CONTACTING THE UTILITY COMPANIES INVOLVED AND REQUESTING A VERIFICATION AT THE CONSTRUCTION SITE OF THE LOCATIONS OF THEIR UNDERGROUND UTILITIES WHERE SUCH FACILITIES MAY POSSIBLY CONFLICT WITH THE PLACEMENT OF IMPROVEMENTS AS SHOWN ON THESE IMPROVEMENT PLANS.
3. THE CONTRACTOR SHALL EXPOSE THE ENDS OF EXISTING SEWER AND DRAIN LINES AND VERIFY THEIR LOCATION AND ELEVATION PRIOR TO PLACEMENT OF PIPE. ALL COSTS OF SUCH EXCAVATION AND BACKFILL SHALL BE INCLUDED IN THE PRICE PAID FOR VARIOUS OTHER ITEMS OF WORK.
4. BAKER–WILLIAMS ENGINEERING GROUP SHALL NOT BE RESPONSIBLE FOR GRADING AND DIRT QUANTITIES UNLESS THE CONSTRUCTION STAKING IS PERFORMED BY BAKER–WILLIAMS ENGINEERING GROUP.
5. THE CONTRACTOR SHALL NOTIFY BAKER–WILLIAMS ENGINEERING GROUP 48 HOURS IN ADVANCE OF DOING ANY DISCING, GRADING OR EARTHWORK OF ANY KIND. IN THE EVENT THAT NOTIFICATION IS NOT GIVEN, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF RESETTING ANY SURVEY CONTROL POINTS DESTROYED BY HIS OPERATION.
6. EXISTING A.C. SURFACE SHALL BE CUT IN A NEAT STRAIGHT LINE PARALLEL WITH OR PERPENDICULAR TO THE STREET CENTERLINE AS APPLICABLE AND THE EXPOSED EDGE SHALL BE TACKED WITH EMULSION PRIOR TO PAVING. THE EXPOSED BASE MATERIAL SHALL BE GRADED, RECOMPACTED AND RESEALED PRIOR TO PAVING.
7. IT IS THE CONTRACTORS' RESPONSIBILITY TO EXPOSE AND VERIFY THE ELEVATION OF ALL EXISTING UTILITIES THAT CROSS PROPOSED UTILITIES PRIOR TO PLACING ANY PROPOSED UNDERGROUND PIPES OR CONDUITS. THE ENGINEER SHALL BE NOTIFIED OF THE ELEVATION TO DETERMINE IF CONFLICTS EXIST AND TO POSSIBLY ADJUST PROPOSED FACILITIES.
8. DURING CONSTRUCTION, NEW AND EXISTING PIPES OR UTILITIES LOCATED WITHIN THE CONSTRUCTION AREA SHALL BE PROTECTED WITH PLATE STEEL OR MAINTAIN ADEQUATE COVER TO PREVENT ANY DAMAGE FROM HEAVY EQUIPMENT. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO PIPES OR UTILITIES DURING CONSTRUCTION.
9. THE CONTRACTOR SHALL NOTIFY THE SOILS ENGINEER "STANTEC PROJECT MANAGER ELIAS RASHMAWI ." 48 HOURS IN ADVANCE OF DOING ANY GRADING. (PH. (916) 773–8100)

OPTIONAL NOTES TO BE USED IF APPLICABLE:

THE EXACT WIDTH OF EXISTING PAVEMENT TO BE SALVAGED SHALL BE DETERMINED IN THE FIELD BY THE CONSTRUCTION SECTION.

EXISTING ASPHALT PAVEMENT SHALL BE CUT TO A NEAT STRAIGHT LINE. THE EXPOSED EDGE SHALL BE TACKED WITH EMULSION PRIOR TO PAVING.

THE EXACT LIMITS OF PAVEMENT OVERLAY SHALL BE DETERMINED IN THE FIELD BY THE CONSTRUCTION SECTION.

EXACT LIMITS OF CURB AND GUTTER, SIDEWALK, DRIVEWAY, AND PAVEMENT REMOVAL AND RECONSTRUCTION SHALL BE DETERMINED IN THE FIELD BY THE CONSTRUCTION SECTION.

SIX INCH (6') PERFORATED TUBING USED FOR SUBDRAINS SHALL BE CORRUGATED POLYETHYLENE TUBING CONFORMING TO ASTM F405 AND SHALL BE INSTALLED WHERE SHOWN ON THE PLANS WITH SLOPE TO MATCH GUTTER FLOW LINE. TUBING SHALL BE INSTALLED 2'–0" MINIMUM BELOW GUTTER FLOW LINE.

FILTER FABRIC USED FOR SUBDRAINS SHALL CONFORM TO CALTRANS SPECIFICATIONS DATED JULY, 1992, SECTION 88. FABRIC LINING TO BE COMPLETELY AROUND TUBING TRENCH AND COMPLETELY OVERLAPPED ON THE TOP SIDE OF TRENCH.

COMPACTION OF TRENCH BACKFILL BY MEANS OF JETTING IS NOT PERMITTED WITHIN THE CITY OF SACRAMENTO UNLESS SPECIFICALLY APPROVED IN WRITING BY THE CITY ENGINEER.

GUTTER SLOPES FROM FLOWLINE TO LIP SHALL BE FIVE PERCENT BETWEEN ROUND CORNER CURB RETURNS. THE FIVE PERCENT SLOPED SHALL BE TRANSITIONED TO THE STANDARD GUTTER SLOPE OVER A DISTANCE OF THREE TO FIVE FEET, AS DIRECTED IN THE FIELD BY RESIDENT ENGINEER. THE GUTTER SLOPE ADJACENT TO HANDICAP RAMPS SHALL IN NO CASE BE GREATER THAN FIVE PERCENT.

USE THE FOLLOWING NOTE FOR LOCAL AND MINOR COLLECTOR STREETS ONLY:
TOP (FINAL) LIFT OF AC SHALL BE 1/2–INCH MIX.

MMRP NOTES:

4.4–7
IF DISCOVERY IS MADE OF ITEMS OF PALEONTOLOGICAL INTEREST, THE CONTRACT SHALL IMMEDIATE CEASE ALL WORK ACTIVITIES IN THE VICINITY (WITHIN APPROXIMATELY 100 FEET) OF THE DISCOVERY. AFTER CESSATION OF EXCAVATION THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE CITY. THE CONTRACTOR SHALL NOT RESUME WORK UNTIL AUTHORIZATION IS RECEIVED FROM THE CITY. ANY INADVERTENT DISCOVERY OF PALEONTOLOGICAL RESOURCES DURING CONSTRUCTION SHALL BE EVALUATED BY A QUALIFIED PALEONTOLOGIST. IF IT IS DETERMINED THAT THE PROJECT COULD DAMAGE A UNIQUE PALEONTOLOGICAL RESOURCE (AS DEFINED PURSUANT TO CEQA GUIDELINES), MITIGATION SHALL BE IMPLEMENTED IN ACCORDANCE WITH PRC SECTION 21083.2 AND SECTION 15126.4 OF THE CEQA GUIDELINES. IF AVOIDANCE IS NOT FEASIBLE, THE PALEONTOLOGIST SHALL DEVELOP A TREATMENT PLAN IN CONSULTATION WITH THE CITY.

4.4–1(C)
IN THE EVENT THAT UNANTICIPATED ARCHAEOLOGICAL RESOURCES OR HUMAN REMAINS ARE ENCOUNTERED, COMPLIANCE WITH FEDERAL AND STATE REGULATIONS AND GUIDELINES REGARDING TREATMENT OF CULTURAL RESOURCES AND HUMAN REMAINS SHALL BE REQUIRED. THE FOLLOWING DETAILS THE PROCEDURES TO BE FOLLOWED IN THE EVEN THAT NEW CULTURAL RESOURCE SITES OR HUMAN REMAINS ARE DISCOVERED.

I. IF A MONITORING ARCHAEOLOGIST OR A MEMBER OF THE CONSTRUCTION TEAM BELIEVES THAT AN ARCHAEOLOGICAL RESOURCE HAS INADVERTENTLY BEEN UNCOVERED, ALL WORK ADJACENT TO THE DISCOVERY SHALL CEASE, AND AN SOI QUALIFIED ARCHAEOLOGIST IMMEDIATELY NOTIFIED. APPROPRIATE STEPS SHALL BE TAKEN, AS DIRECTED BY THE ARCHAEOLOGIST TO PROTECT THE DISCOVERY SITE. THE AREA OF WORK STOPPAGE WILL BE ADEQUATE TO PROVIDE FOR THE SECURITY, PROTECTION, AND INTEGRITY OF THE ARCHAEOLOGICAL RESOURCES IN ACCORDANCE WITH FEDERAL AND STATE LAW. AT A MINIMUM THE AREA WILL BE SECURED TO A DISTANCE OF 50 FEET FROM THE DISCOVERY. VEHICLES, EQUIPMENT, AND UNAUTHORIZED PERSONNEL SHALL NOT BE PERMITTED TO TRAVERSE THE DISCOVERY SITE. THE ARCHAEOLOGIST SHALL CONDUCT A FIELD INVESTIGATION AND ASSESS THE SIGNIFICANCE OF THE FIND. IMPACTS TO CULTURAL RESOURCES SHALL BE LESSENED TO A LESS–THAN–SIGNIFICANT LEVEL THROUGH DATA RECOVERY OR OTHER METHODS DETERMINED ADEQUATE BY THE ARCHAEOLOGIST AND CONSISTENT WITH THE SECRETARY OF THE INTERIOR'S STANDARDS FOR ARCHAEOLOGICAL DOCUMENTATION. ALL IDENTIFIED CULTURAL RESOURCES SHALL BE RECORDED ON THE APPROPRIATE DPR 523 (A–L) FORM AND FILED WITH THE NORTH CENTRAL INFORMATION CENTER.

II. IF HUMAN REMAINS ARE DISCOVERED AT THE PROJECT CONSTRUCTION SITE DURING ANY PHASE OF CONSTRUCTION, ALL GROUND–DISTURBING ACTIVITY WITHIN 50 FEET OF THE RESOURCES SHALL BE HALTED AND THE COUNTY CORONER SHALL BE NOTIFIED IMMEDIATELY, ACCORDING TO SECTION 5097.98 OF THE STATE PUBLIC RESOURCES CODE AND SECTION 7050.5 OF CALIFORNIA'S HEALTH AND SAFETY CODE. IF THE REMAINS ARE DETERMINED BY THE COUNTY CORONER TO BE NATIVE AMERICAN, THE NATIVE AMERICAN HERITAGE COMMISSION (NAHC) SHALL BE NOTIFIED WITHIN 24 HOURS, AND THE GUIDELINES OF THE NAHC SHALL BE ADHERED TO IN THE TREATMENT AND DISPOSITION OF THE REMAINS. IF THE REMAINS ARE DETERMINED TO BE CHINESE, OR ANY OTHER ETHNIC GROUP, THE APPROPRIATE LOCAL ORGANIZATION AFFILIATED WITH THAT GROUP SHALL BE CONTACTED AND ALL REASONABLE EFFORTS SHALL BE MADE TO IDENTIFY THE REMAINS AND DETERMINE AND CONTACT THE MOST LIKELY DESCENDENT. THE APPROVE MITIGATION SHALL BE IMPLEMENTED BEFORE THE RESUMPTION OF GROUND–DISTURBING ACTIVITIES WITHIN 50 FEET OF WHERE THE REMAINS WERE DISCOVERED.

IF THE REMAINS ARE OF NATIVE AMERICAN ORIGIN, THE LANDOWNER OR THE LANDOWNER'S REPRESENTATIVE SHALL CONTACT THE NATIVE AMERICAN HERITAGE COMMISSION TO IDENTIFY THE MOST LIKELY DESCENDENT. THAT INDIVIDUAL SHALL BE ASKED TO MAKE A RECOMMENDATION TO THE LANDOWNER FOR TREATING OR DISPOSING OF, WITH APPROPRIATE DIGNITY, THE HUMAN REMAINS AND ANY ASSOCIATED GRAVE GOODS AS PROVIDED IN PUBLIC RESOURCES CODE SECTION 5097.983.

IF THE MOST LIKELY DESCENDANT FAILS TO MAKE A RECOMMENDATION OR THE LANDOWNER OR HIS OR HER AUTHORIZED REPRESENTATIVE REJECTS THE RECOMMENDATION OF THE DESCENDANT, AND IF MEDIATION BY THE NATIVE AMERICAN HERITAGE COMMISSION FAILS TO PROVIDE MEASURES ACCEPTABLE TO THE LANDOWNER, THEN THE LANDOWNER OR AUTHORIZED REPRESENTATIVE SHALL REBURY THE NATIVE AMERICAN HUMAN REMAINS AND ASSOCIATED GRAVE GOODS WITH APPROPRIATE DIGNITY ON THE PROPERTY IN A LOCATION NOT SUBJECT TO FURTHER SUBSURFACE DISTURBANCE.

BAKER–WILLIAMS ENGINEERING GROUP SURVEY NOTES:

1. ALL FIELD STAKING SHALL BE PERFORMED UNDER THE CHARGE OF A RESPONSIBLE REGISTERED CIVIL ENGINEER, LICENSED BEFORE JAN.1,1982 OR LICENSED LAND SURVEYOR. THE OWNER SHALL PROVIDE ONE SET OF CONSTRUCTION CONTROL STAKES; ANY ADDITIONAL STAKING NECESSARY SHALL BE PROVIDED BY THE ENGINEER/SURVEYOR AT THE EXPENSE OF THE CONTRACTOR.
2. THE CONTRACTOR SHALL REQUEST IN WRITING CONSTRUCTION STAKING FOR ANY PARTICULAR PHASE OF WORK NO LESS THAN THREE WORKING DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION. CONTACT BAKER–WILLIAMS ENGINEERING GROUP WITH STAKING REQUESTS (916) 331–4336, EXT. 127.
3. PRIOR TO ANY CORRECTIVE ACTION BY THE CONTRACTOR WHICH MAY BE NECESSARY DUE TO ALLEGED STAKING ERRORS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER FOR VERIFICATION AND RESTAKING IF NECESSARY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING MONUMENTS AND OTHER SURVEY MARKERS ON THE JOB SITE. MONUMENTS AND SURVEY MARKERS DESTROYED DURING CONSTRUCTION SHALL BE REPLACED AT CONTRACTOR'S EXPENSE.
5. BAKER–WILLIAMS ENGINEERING GROUP ASSUMES NO RESPONSIBILITY FOR ANY WORK CONSTRUCTED IF STAKED BY OTHERS.
6. IF BAKER WILLIAMS ENGINEERING GROUP DOES NOT PERFORM THE CONSTRUCTION STAKING IT IS THE RESPONSIBILITY OF THE SURVEYOR PERFORMING THE CONSTRUCTION STAKING TO PREPARE AND SUBMIT THE REQUIRED RECORD DRAWINGS.

REVISIONS

NO.	DESCRIPTION	DATE	BY

BENCH MARK ELEV. 37.905'
DESCRIPTION BM NO. 297–B2C
SET MAG AND BRASS WASHER MARKED "CPS CITY OF SACRAMENTO", IN 2" Ø. STATION IS +/–10 FEET WEST OF WEST EP OF JEDEDIAH SMITH NATIONAL RECREATION TRAIL, ON EAST BANK OF SACRAMENTO RIVER, 330 YARDS UPSTREAM FROM THE 7" ST. RAILROAD BRIDGE, +/–100 FEET NORTH OF THE STATE OF CALIFORNIA AUTOMATIC RIVER GAUGE.

FIELD BOOK 414
SCALE HORIZ. N/A VERT. N/A

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

DRAWN BY: SHAWN F. LONG DATE 07/2017
DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
CHECKED BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017

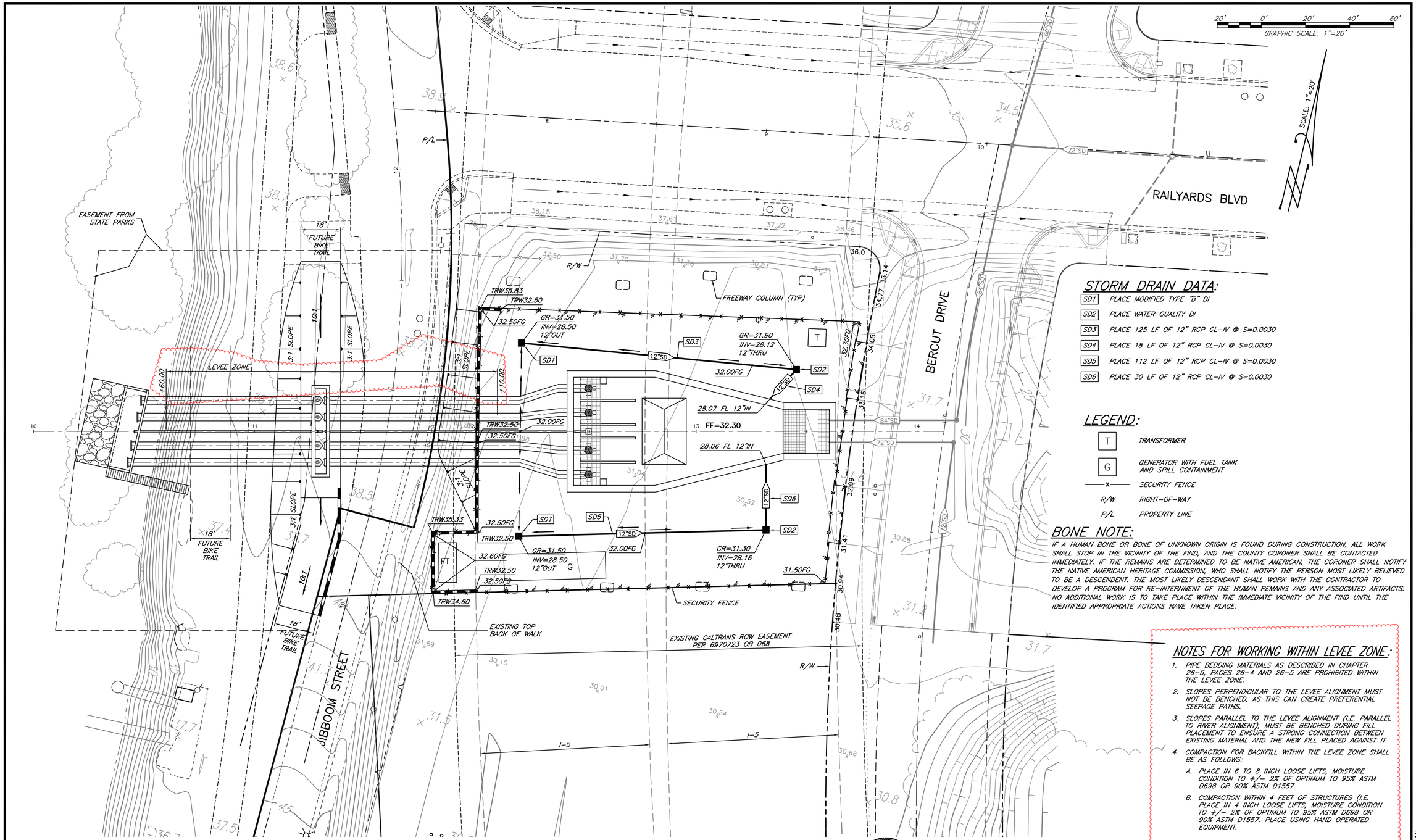
REGISTERED PROFESSIONAL ENGINEER KENT H. BAKER No. C 26487 EXPIRES 3/31/2018 CIVIL STATE OF CALIFORNIA
KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
GENERAL NOTES

BAKER–WILLIAMS ENGINEERING GROUP
ENGINEERING SURVEYING PLANNING
6020 Rutland Drive, Suite 19 (916) 331–4336
Carmichael, California 95608 Fax (916) 331–4430

RPC14-0013 | P?????????? | P??-0?? | SHEET C-2 — OF — 6 | 15-11-064

1511064–DET–NTS



STORM DRAIN DATA:

SD1	PLACE MODIFIED TYPE "B" DI
SD2	PLACE WATER QUALITY DI
SD3	PLACE 125 LF OF 12" RCP CL-IV @ S=0.0030
SD4	PLACE 18 LF OF 12" RCP CL-IV @ S=0.0030
SD5	PLACE 112 LF OF 12" RCP CL-IV @ S=0.0030
SD6	PLACE 30 LF OF 12" RCP CL-IV @ S=0.0030

LEGEND:

T	TRANSFORMER
G	GENERATOR WITH FUEL TANK AND SPILL CONTAINMENT
—x—	SECURITY FENCE
R/W	RIGHT-OF-WAY
P/L	PROPERTY LINE

BONE NOTE:

IF A HUMAN BONE OR BONE OF UNKNOWN ORIGIN IS FOUND DURING CONSTRUCTION, ALL WORK SHALL STOP IN THE VICINITY OF THE FIND, AND THE COUNTY CORONER SHALL BE CONTACTED IMMEDIATELY. IF THE REMAINS ARE DETERMINED TO BE NATIVE AMERICAN, THE CORONER SHALL NOTIFY THE NATIVE AMERICAN HERITAGE COMMISSION, WHO SHALL NOTIFY THE PERSON MOST LIKELY BELIEVED TO BE A DESCENDENT. THE MOST LIKELY DESCENDANT SHALL WORK WITH THE CONTRACTOR TO DEVELOP A PROGRAM FOR RE-INTERNMENT OF THE HUMAN REMAINS AND ANY ASSOCIATED ARTIFACTS. NO ADDITIONAL WORK IS TO TAKE PLACE WITHIN THE IMMEDIATE VICINITY OF THE FIND UNTIL THE IDENTIFIED APPROPRIATE ACTIONS HAVE TAKEN PLACE.

NOTES FOR WORKING WITHIN LEVEE ZONE:

1. PIPE BEDDING MATERIALS AS DESCRIBED IN CHAPTER 26-5, PAGES 26-4 AND 26-5 ARE PROHIBITED WITHIN THE LEVEE ZONE.
2. SLOPES PERPENDICULAR TO THE LEVEE ALIGNMENT MUST NOT BE BENCHED, AS THIS CAN CREATE PREFERENTIAL SEEPAGE PATHS.
3. SLOPES PARALLEL TO THE LEVEE ALIGNMENT (I.E. PARALLEL TO RIVER ALIGNMENT), MUST BE BENCHED DURING FILL PLACEMENT TO ENSURE A STRONG CONNECTION BETWEEN EXISTING MATERIAL AND THE NEW FILL PLACED AGAINST IT.
4. COMPACTION FOR BACKFILL WITHIN THE LEVEE ZONE SHALL BE AS FOLLOWS:
   - A. PLACE IN 6 TO 8 INCH LOOSE LIFTS, MOISTURE CONDITION TO +/- 2% OF OPTIMUM TO 95% ASTM D698 OR 90% ASTM D1557.
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REVISIONS			
NO.	DESCRIPTION	DATE	BY

BENCH MARK ELEV. 37.905'
DESCRIPTION BM NO. 297-B2C
SET MAG AND BRASS WASHER MARKED "GPS CITY OF SACRAMENTO", IN 2" IP. STATION IS +/-10 FEET WEST OF WEST EP OF JEDEDIAH SMITH NATIONAL RECREATION TRAIL, ON EAST BANK OF SACRAMENTO RIVER, 330 YARDS UPSTREAM FROM THE "I" ST. RAILROAD BRIDGE, +/-100 FEET NORTH OF THE STATE OF CALIFORNIA AUTOMATIC RIVER GAUGE.

FIELD BOOK 414
SCALE HORIZ. 1"=20' VERT. N/A

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

DRAWN BY: SHAWN F. LONG DATE 07/2017
DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
CHECKED BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017

REGISTERED PROFESSIONAL ENGINEER KENT H. BAKER No. C 26487 EXPIRES 3/31/2020 STATE OF CALIFORNIA CIVIL
KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
GRADING & SITE PLAN

BAKER-WILLIAMS ENGINEERING GROUP
ENGINEERING SURVEYING PLANNING
6020 Rutland Drive, Suite 19 (916) 331-4336
Carmichael, California 95608 Fax (916) 331-4430

RPC14-0013 | P????????? | P??-0?? | SHEET C-3 OF 6 | 15-11-064

1511064-GRD-SITE-PLAN

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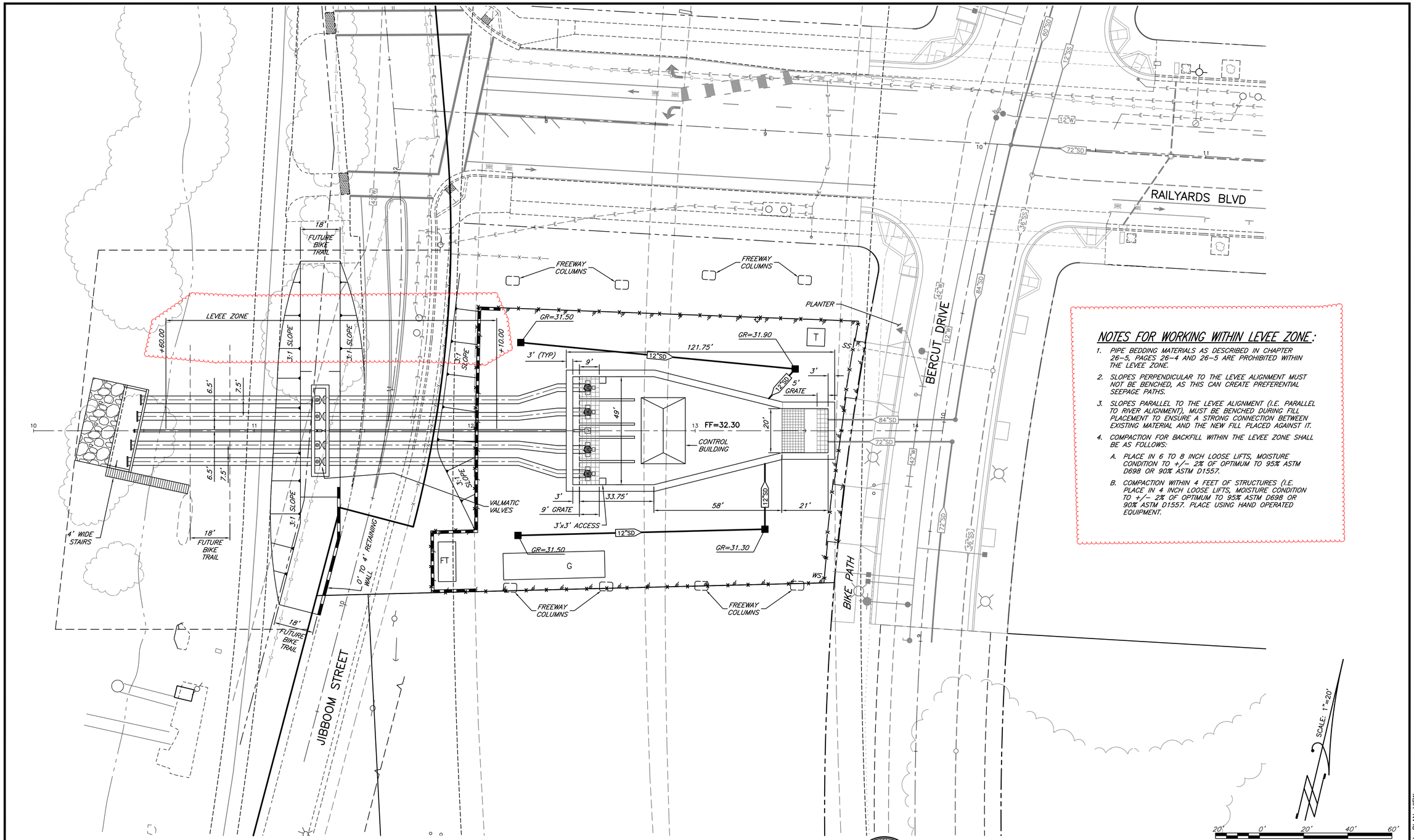

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SCALE: 1"=20'

20' 0' 20' 40' 60'

GRAPHIC SCALE: 1"=20'

REVISIONS			
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FIELD BOOK 414
SCALE
HORIZ. 1"=20'
VERT. N/A

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

DRAWN BY: SHAWN F. LONG DATE 07/2017
DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
CHECKED BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017

REGISTERED PROFESSIONAL ENGINEER KENT H. BAKER No. C 26487 EXPIRES 3/31/2020 CIVIL STATE OF CALIFORNIA
KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
PLAN VIEW STA.9+00 TO STA.15+00

BAKER-WILLIAMS ENGINEERING GROUP
ENGINEERING SURVEYING PLANNING
6020 Rutland Drive, Suite 19 (916) 331-4336
Carmichael, California 95608 Fax (916) 331-4430

RPC14-0013 | P?????????? | P??-0?? | SHEET C-4 — OF — 6 | 15-11-064

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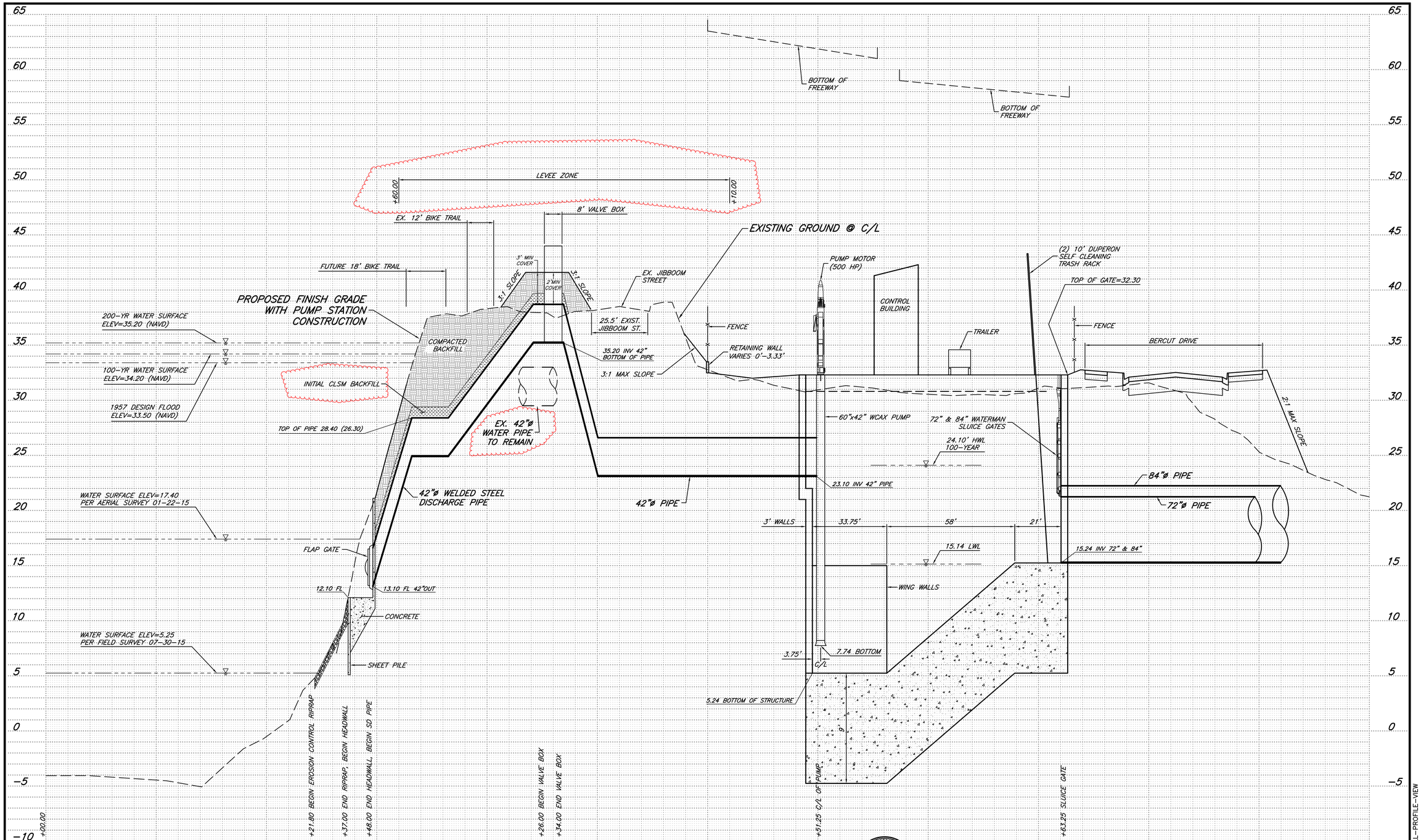
1511064-PIPE-OUTFALL-PLAN-VIEW



REVISIONS			
NO.	DESCRIPTION	DATE	BY

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DESCRIPTION BM NO. 297-B2C
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FIELD BOOK 414
SCALE HORIZ. 1"=20' VERT. 1"=4'

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

DRAWN BY: SHAWN F. LONG DATE 07/2017
DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
CHECKED BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017

REGISTERED PROFESSIONAL ENGINEER — KENT H. BAKER — No. C 26487 — EXPIRES 3/31/2020 — CIVIL — STATE OF CALIFORNIA
KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
PROFILE VIEW STA.9+00 TO STA.15+00

ENGINEERING SURVEYING PLANNING
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RPC14-0013 | P????????? | P??-0?? | SHEET C-5 — OF — 6 | 15-11-064

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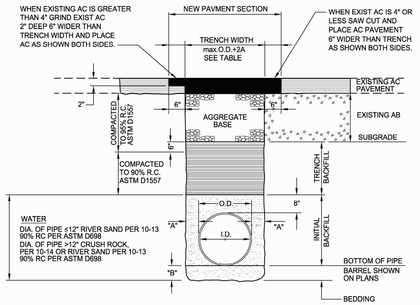
1511064—PIPE—OUTFALL—PROFILE—VIEW



TYPICAL TRENCH SECTION

NOTES:

1. A TACK COAT OF ASPHALTIC EMULSION OR PAVING GRADE ASPHALT SHALL BE APPLIED TO EXISTING A.C. PAVEMENT AT ALL CONTACT SURFACES PRIOR TO PERMANENT A.C. PAVING PER SECTION 22-7 OF STANDARD SPECIFICATIONS.
2. UNLESS OTHERWISE SPECIFIED, PERMANENT PAVEMENT SHALL CONFORM IN QUALITY AND THICKNESS TO THE TYPE OF PAVEMENT REMOVED, BUT IN NO CASE SHALL BE LESS THAN FOUR INCHES (4") OF ASPHALTIC CONCRETE ON TWELVE INCHES (12") OF AGGREGATE BASE CLASS 2.
3. EXISTING PAVEMENT SHALL BE SAWCUT AND REMOVED IN SUCH A MANNER SO AS NOT TO TEAR, BULGE OR DISPLACE ADJACENT PAVEMENT. EDGES SHALL BE CLEAN AND VERTICAL WHEN PRACTICAL. ALL CUTS SHALL BE PARALLEL OR PERPENDICULAR TO STREET CENTERLINE.
4. ALL EXCAVATION AND BACKFILL SHALL CONFORM TO THE REQUIREMENTS OF THE STANDARD SPECIFICATIONS.
5. R.C. - RELATIVE COMPACTION AS DETERMINED BY ASTM DESIGNATION D 1557 OR 698.
6. NO SOLID BLOCKING PERMISSIBLE BENEATH PIPE.
7. JETTING BACKFILL IS NOT PERMITTED.

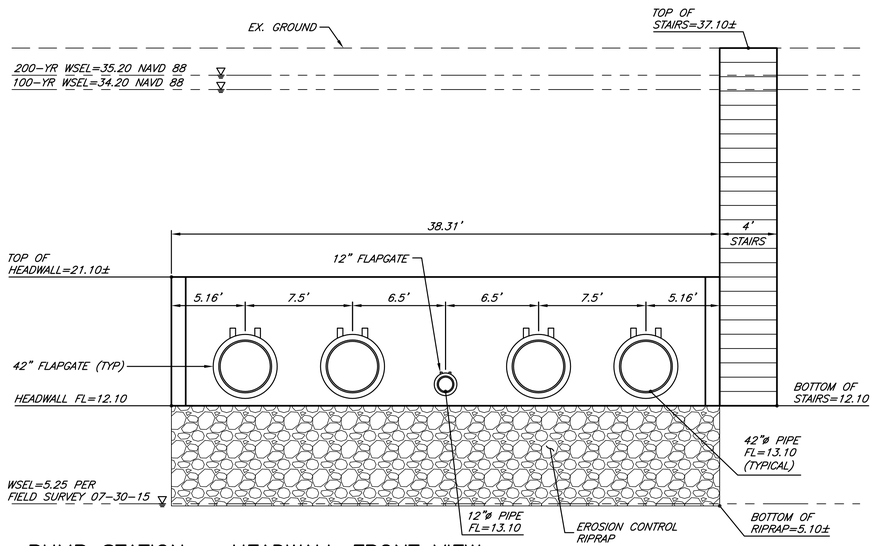
TABLE		
DIMENSION NAME	PIPE DIAMETER (INCHES)	DIMENSION (INCHES)
A (MIN. TRENCH CLEARENCE)	≤12	8
	>12	10
B (MIN. BEDDING BELOW PIPE)	≤12	3
	>12	6

REV.	DATE	DESCRIPTION

CITY OF SACRAMENTO
DEPARTMENT OF UTILITIES

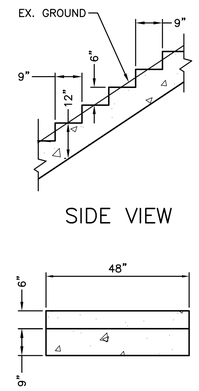
BACKFILL AND RESURFACING IN PAVED AREAS

APPR'D BY: D.O.B. NO SCALE
DATE: MAY 2007 DWG. NO. W - 701



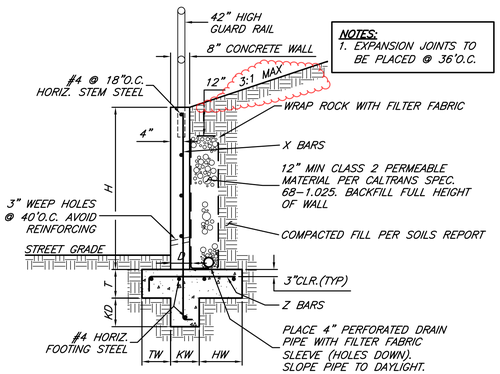
PUMP STATION – HEADWALL FRONT VIEW

SCALE: 1"=5'



STAIR DETAIL

SCALE: 1"=2'



H	TW	KW	HW	KD	T	Z BARS	STEM 'W'	D	X BARS
32"	0'-9"	1'-0"	0'-9"	1'-0"	1'-0"	#4@18"	8"	4"	#5@18"
40"	0'-9"	1'-0"	0'-9"	1'-0"	1'-0"	#4@18"	8"	4"	#5@18"
48"	1'-0"	1'-0"	1'-6"	1'-0"	1'-0"	#4@18"	8"	4"	#5@18"

WALL DETAIL

NOT TO SCALE

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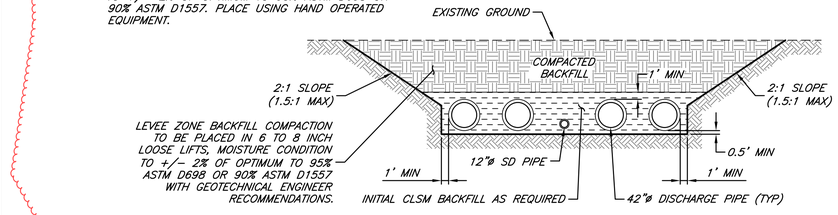

LEVEE ZONE PIPE TRENCH SECTION

NOT TO SCALE

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FIELD BOOK 414
SCALE HORIZ. N/A VERT. N/A

CITY OF SACRAMENTO
DEPARTMENT OF PUBLIC WORKS

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DESIGN BY: KENT H. BAKER R.C.E. 26487 DATE 07/2017
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REGISTERED PROFESSIONAL ENGINEER KENT H. BAKER No. C 26487 EXPIRES 3/31/2020 CIVIL STATE OF CALIFORNIA

KENT H. BAKER RCE#26487

IMPROVEMENT PLANS FOR
SACRAMENTO RAILYARDS
STORM WATER PUMP STATION
CONSTRUCTION DETAILS

BAKER-WILLIAMS ENGINEERING GROUP
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6020 Rutland Drive, Suite 19 (916) 331-4336
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SHEET C-6 — OF — 6
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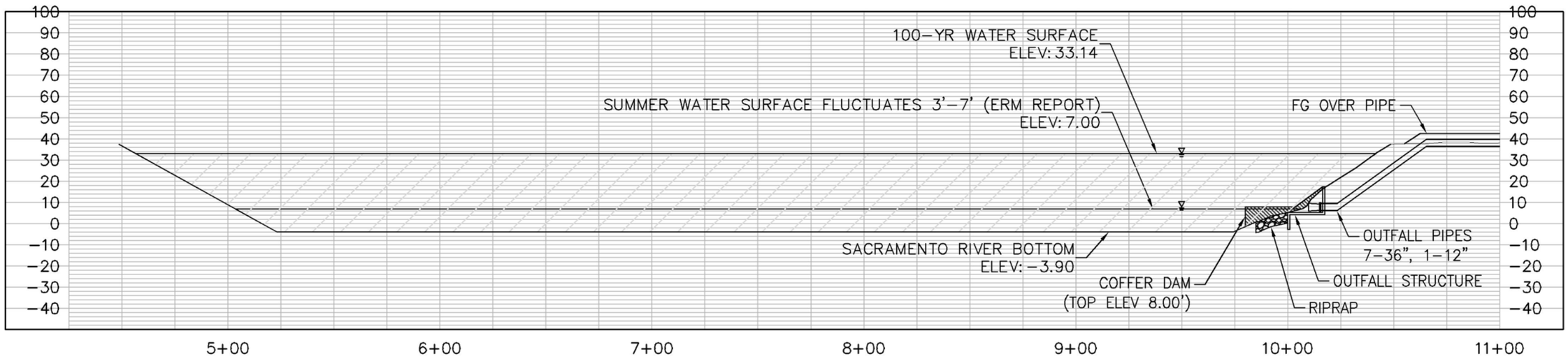
	Total Cross Section Area	Impacted Cross Section Area	Percent of Impact to 100-yr Cross Section
100-yr Water Surface Elevation (33.14') NAVD88	19374	149	0.77%

NOTES:

1. OUTFALL CONSTRUCTION TO BE SCHEDULED FROM AUGUST-OCTOBER
2. TOP OF COFFER DAM SET 1' ABOVE SUMMER HIGH WATER LEVEL AT 8.0'



GRAPHIC SCALE

50 0 25 50 100

(IN FEET)

1 inch = 50 ft.

Sacramento Railyards
Outfall Construction Channel Impacts

Kimley»Horn © 2015

October 1, 2015

K:\SAC_LDEV\097922008 Railyards\700 NOTA\08 CADD\Exhibits\Storm Drain Master Plan\Levee Outfall Exhibit.dwg

GEOTECHNICAL SEEPAGE EVALUATION
TECHNICAL MEMORANDUM
SACRAMENTO RAILYARDS STORM WATER PUMP STATION

Sacramento, California

Prepared by:

BLACKBURN CONSULTING
2491 Boatman Avenue
West Sacramento, CA 95691

Revised July 2016

Prepared for:

Downtown Railyard Venture, LLC
3140 Peacekeeper Way
McLellan, CA 95652

West Sacramento Office:
2491 Boatman Ave. ▪ West Sacramento, CA 95691
(916) 375-8706 ▪ Fax (916) 375-8709

blackburn consulting

Main Auburn Office: (530) 887-1494
Fresno Office: (559) 438-8411
Modesto Office: (209) 522-6273

Geotechnical ▪ Geo-Environmental ▪ Construction Services ▪ Forensics

BCI File No. 1698.X.01
Revised July 25, 2016

Mr. Alan Hersh, Senior Vice President
Downtown Railyard Venture, LLC
3140 Peacekeeper Way
McClellan, CA. 95652

Subject: **Geotechnical Seepage Evaluation Technical Memorandum**
Sacramento Railyards Storm Water Pump Station
Sacramento, California

Dear Mr. Hersh,

Blackburn Consulting (BCI) is pleased to submit this revised Geotechnical Seepage Evaluation Technical Memorandum (TM) for the proposed Sacramento Railyards Storm Water Pump Station. BCI revised our previous March 23, 2016 TM to reflect new fill associated with the proposed Pump Station construction and future I Street bridge construction. This TM provides our geotechnical seepage evaluations for the below-grade pump station. The evaluations include construction excavation and post-construction conditions as requested by the US Army Corps of Engineers (USACE).

Thank you for including BCI on your team for this important project. Please call if you have questions or require additional information.

Sincerely,

BLACKBURN CONSULTING

Nicole C. Hart, P.E.
Senior Engineer

David J. Morrell, P.E., G.E.
Senior Project Manager

GEOTECHNICAL SEEPAGE EVALUATION TECHNICAL MEMORANDUM
SACRAMENTO RAILYARDS STORM WATER PUMP STATION
SACRAMENTO, CA

TABLE OF CONTENTS

1. PURPOSE

Blackburn Consulting (BCI) prepared this Geotechnical Seepage Evaluation Technical Memorandum (TM) for Downtown Railyard Venture, LLC (DRV) to assist with their overall permitting process for construction of the storm water drainage and outfall structure associated with the Sacramento Railyards. This TM supports the Storm Water Drainage and Outfall Structure Project Summary Report prepared by MBK Engineers, on behalf of DRV, which provides information to support permit decisions made by the USACE under Section 14 of the River and Harbors Act (i.e. Section 408) and by the Central Valley Flood Protection Board (CVFPB) under Title 23 of the California Water Code (i.e. encroachment permit).

Due to the proximity of the pump station to the Sacramento River East Levee, BCI understands that the USACE requested a seepage evaluation for the below-grade pump station construction excavation and post-construction condition. The evaluation includes determination of potential buoyancy uplift forces for the completed structure as a result of a 200-year flood event. BCI prepared this TM for the design team for use in the overall permitting process. This TM shall not be used by others or for other locations without BCI's written permission.

2. SCOPE OF SERVICES

BCI performed the following to prepare this TM:

- Reviewed existing available geotechnical seepage evaluations performed by others for the Sacramento River levee system near the project site. Section 4 of this report contains a list of the documents reviewed.
- Reviewed existing subsurface explorations performed by others near the proposed pump station site and subsurface and laboratory testing data obtained from BCI's explorations performed for this project.
- Constructed a representative subsurface cross-section perpendicular to the Sacramento River and extending through the proposed pump station site.
- Performed a preliminary seepage evaluation and met with the design team twice to present the preliminary results and discuss development of this TM.
- Performed a seepage evaluation based on the discussions presented during the meetings.
- Performed an updated seepage evaluation based on revised pump station location/stationing and wet well bottom elevation.
- Performed an updated seepage evaluation based on the cross-section reconfiguration to accommodate the future realignment of the bike trail in accordance with the current design of the new I Street bridge to be located just upstream of the pump station and outfall structure.

3. PROJECT DESCRIPTION

Based on information provided by MBK and review of the 65% Submittal Improvement Plans for the project, we understand that the primary purpose of the Sacramento Railyards Storm Water Pump Station and Outfall Project is to convey storm water collected in the redevelopment area to the Sacramento River. The project includes:

- A below-grade pump station to be located beneath the existing I-5 Viaduct Bridge just south of the proposed Railyards Boulevard extension, and just east of Jibboom Street and the Sacramento River levee. The pump station will include:
  - A wet well, trash rack chamber and meter vault extending about 15-25 feet below existing grade.
  - A gallery of 12-inch to 36-inch storm water outfall pipes extending from the pump station to a new isolation/vacuum breaker vault constructed in the levee crown, then down the existing waterside levee waterside slope to a planned outfall structure to be located within the levee toe area. The pipe invert depths will range from about 5 to 15 feet below finish grade and the pipes will be installed using open-cut trench methods. New fill material will be placed through the project area to ensure adequate cover for proposed discharge pipes and vault while meeting the pipe invert requirements to be at or above the 200-year water surface elevation.
  - Motor control center building to be constructed within the footprint of the pump station wet well, trash rack chamber and meter vault. The finish floor will be near existing grade.
  - Standby generator pad with finish floor elevations near existing grade.
- Concrete paved truck loading bay area.

We understand that the outfall structure and pipes, and associated new fill, will be constructed first followed by construction of the pump station wet well structure the following construction season. The future I Street bridge construction new fill and bike path improvements will be constructed after the pump station project is complete.

Figure 1 presents the Vicinity Map. Figure 2 presents the Site Plan.

4. RELEVANT EVALUATIONS BY OTHERS

Sacramento area levees that protect the Cities of Sacramento and West Sacramento have been studied in detail as part of several different efforts. Previous studies by BCI, the USACE and URS (for the California Department of Water Resources) provide a geotechnical assessment of the existing levee system at and near the project site with respect to steady-state through seepage, underseepage, landside slope stability, waterside rapid drawdown slope stability and seismic vulnerability. These assessments evaluated subsurface conditions along the levee system, including development of geotechnical design parameters for typical soil types based on laboratory testing, correlations and engineering judgement.

BCI reviewed the following documents during preparation of the evaluation cross-section and development of geotechnical parameters used in our analysis:

- Geotechnical Data Report, Southport Early Implementation Project (BCI GDR), BCI June 2015.
- Draft Geotechnical Basis of Design Report, West Sacramento Early Implementation Project 90% Design (BCI Draft BODR), BCI 2015.
- Geotechnical Evaluation Report, Volume 1, Sacramento River Study Area, Urban Levee Evaluations Project (URS GER), URS July 2014.
- Geotechnical Evaluation Report, Volume 2, Remedial Alternatives, Sacramento River Study Area, Urban Levee Evaluations Project (URS RM), URS January 2015.
- West Sacramento Project General Reevaluation Report, Geotechnical Appendix, 2015, (USACE GRR GA), prepared by the USACE.
- American River Watershed, Common Features General Reevaluation Report (USACE AR GRR), prepared by the USACE.

The following provides brief descriptions of the primary documents BCI reviewed.

4.1 Geotechnical Data Report and Draft Geotechnical Basis of Design Report, Southport Early Implementation Project – Up to 90% Design

BCI prepared the Geotechnical Data Report (BCI GDR) and the Draft Geotechnical Basis of Design Report (BCI Draft BODR) up to 90% for the Southport Early Implementation Project (Southport EIP). BCI is currently under contract to complete the design up to 100%, anticipated completion in 2016. The BCI GDR and BCI Draft BODR present geotechnical data, analysis and recommendations for levee improvement measures to support the Southport EIP design and addresses steady-state through seepage, underseepage and slope stability and waterside rapid drawdown slope stability for the various levee improvement measures which include strengthen-in-place and a setback levee.

These documents present BCI's evaluation of the proposed levee improvement measures with respect to geotechnical seepage and levee stability requirements provided by several guideline documents including the USACE Levee Design Manual, EM 1110-2-1913, 30 April 2000 and the Technical Letter Design Guidance for Levee Underseepage (ETL 1110-2-569, 1 May 2005). The documents also present BCI's recommended geotechnical soil parameters for levee evaluation/analysis for a wide range of anticipated soil types based on laboratory testing, correlations and review of other levee evaluation reports conducted in the Sacramento area.

4.2 Geotechnical Evaluation Report, Volumes 1 and 2, Sacramento River Study Area (URS GER and URS RM)

The 2014 URS GER and 2015 URS RM report on the existing condition of 15 miles of urban project levees in the Sacramento River Study Area. The Sacramento River Study extends downstream from the confluence of the American and Sacramento Rivers to the Town of

Freeport in Sacramento County, California. The URS GER contains a review of available historical information on the Sacramento levee systems, an evaluation of subsurface conditions as presented in the 2009 URS Geotechnical Data Report (URS GDR) and 2011 Supplemental Geotechnical Data Report (URS SGDR), levee and levee foundation material characterization, and seepage and slope stability analyses. The 2015 URS RM provides an evaluation of conceptual levee remediation measures and seismic vulnerability of the Sacramento levee systems which did not meet ULE criteria.

URS divided the Sacramento levees into reaches with similar levee geometry and subsurface conditions based on fairly limited subsurface exploration data. URS based the material properties for both seepage and stability analyses on the Guidance Document for Geotechnical Analysis (URS Guidance Document). The Sacramento Railyards Storm Water Pump Station site is located within Reach B identified in these documents.

4.3 USACE West Sacramento Project, General Reevaluation Report (GRR)

The USACE prepared a Geotechnical Appendix (USACE GRR GA) to the General Reevaluation Report for the West Sacramento Project. The July 2015 Geotechnical Appendix presents findings from the USACE's geotechnical evaluation and recommendations to address levee deficiencies within the West Sacramento GRR study area. These deficiencies include seepage and slope stability deficiencies within the study area, which is located just south of the project area.

5. GEOLOGY AND GEOMORPHOLOGY

5.1 Regional Geology

The site is located within the Great Valley geomorphic province of California. The Great Valley is a gently-sloping to essentially flat alluvial plain east of the Coast Ranges and west of the Sierra Nevada. It is a northwest trending structural trough that was formed by the westward tilting of the Sierra Nevada block.

The Sacramento Valley is underlain by alluvial, lacustrine, and marine sedimentary deposits that have accumulated as the structural trough formed and the adjacent mountain ranges were elevated. The thickness of the sediments varies from a thin veneer along the valley margins to thousands of feet at the axis of the trough.

5.2 Local Geology

BCI evaluated the local geology through available geologic maps and literature, site review, and subsurface exploration. Based on the Geologic Map of the Sacramento Quadrangle[1] and the Geologic Map of Late Cenozoic Deposits of the Sacramento Valley and Northern Sierran

[1] Wagner, D.L., et al, 1981, CDMG Map No. 1A-Geology

Foothills[2], the site is immediately underlain by Holocene (less than 11,000 years old) age alluvial deposits.

The natural alluvial deposits in the area typically consist of unconsolidated silt, sand, and gravel, which were deposited by present day river systems. The recent (Holocene age) alluvial deposits are horizontally bedded, channeled, and relatively thin (generally less than 50 feet thick). Our subsurface exploration indicates that recent alluvium in the project area is underlain by older (Pleistocene age) alluvium of the Riverbank and/or Turlock Lake Formations, estimated to be between 11,000 and 1.8 million years old. These formations generally consist of semi-consolidated silt, sand, and gravel deposited as alluvial fans by the streams and rivers that drained the Sacramento Valley and Sierra Nevada.

The project site is reclaimed land that was filled in between the late 1860's to the early 1900's. The actual lateral/vertical extent of the fill is not known. The URS GER provides a summary of the geomorphology within the project area. Deposits beneath the levee consist of early channel meanders of the American River, wetland delta and former floodplain prior to cultural relocation. Several former lakes existed in the area, including Sutter Lake, which were remnants of previous late Holocene channel locations. This area has historically been subjected to repeated flooding and deposition of floodplain deposits.

6. SUBSURFACE INVESTIGATION AND LABORATORY TESTING

6.1 Subsurface Investigation

BCI retained Taber Drilling to drill and sample 4 exploratory borings within the pump station improvement areas to depths of 5 to 95 feet from October 9-15, 2015. The drillers used both a CME 55 track drill rig and CME truck-mounted drill rig to drill the borings using a combination of 8-inch (Outer Diameter, O.D.) hollow stem auger, 6-inch O.D. solid stem auger and 2.9-inch to 3.7-inch O.D. rotary wash drilling methods. The deeper borings (BCI-15-B1 and BCI-15-B2) were drilled consistent with BCI's September 14, 2015 "Proposed Geotechnical Drilling Work Plan" approved by the Department of Toxic Substances Control.

BCI obtained relatively undisturbed samples at various intervals using Modified California Samplers (equipped with 2.4-inch I.D. brass liners), Standard Penetration Test samplers (1.5-inch I.D.) and hydraulically-pushed, 3-inch diameter Shelby tube samples. The drillers used an automatic trip hammer (140-lbs with a 30-inch drop) to drive the Modified California and SPT samplers. Samples were sealed in relatively air tight containers and delivered to our laboratory for testing. BCI logged the borings consistent with the Unified Soil Classification System (USCS).

In addition to completing the above subsurface investigation, BCI also reviewed existing[3] Cone Penetration Test (CPT) data for CPT No. WSESAR_002C, which was located in the levee crown area just north of the proposed outfall pipes.

[2] Helley, E.J. and Harwood, D.S., 1985, U.S. Geological Survey, Map MF-1790

Figures 3a through 3c present the Log of Test Borings, show the CPT and boring locations, logged soil conditions, and a graph of the friction ratio and tip bearing values for the above referenced CPT.

6.2 Subsurface Conditions

Soil

In Borings BCI-15-B1 and BCI-15-B2, we generally observed loose to medium dense poorly-graded sand with silt and medium dense silty sand to depths of about 11 to 13 feet (Elev. 18.6 to 16.0 ft., NGVD 29). Beneath the sand, we observed interlayered, soft to medium stiff lean clay, silt, and silt with sand to depths of about 26 to 30.5 feet (Elev. 3.3 to -0.9 ft., NGVD 29). Underlying these soils, we observed loose to medium dense poorly-graded sand with silt (occasional layer of silty sand and well-graded sand with silt) to depths of about 68 to 69 feet (Elev. -40 ft., NGVD 29), followed by dense to very dense poorly-graded gravel to depths of about 86 to 86.5 feet (Elev. -57.0 ft., NGVD 29). The gravel is underlain by dense poorly-graded sand, medium stiff sandy silt, very dense silty sand and stiff to very stiff clay the maximum depths (Elev. -67.5 to -65.4 ft., NGVD 29) explored in these borings.

In Boring BCI-15-1A, we observed fill consisting of medium dense, poorly graded sand with gravel and poorly-graded gravel to depth of about 6.5 feet (Elev. 23.4 ft., NGVD 29) where we encountered refusal to drilling.

In Boring BCI-15-B3, we observed medium dense silty sand with gravel and silty sand to the 5 ft. depth explored (Elev. 26.0 ft., NGVD 29).

In general, the existing CPT test data for CPT No. WSESAR_002C generally correlate with the soil conditions encountered in our deeper borings.

Refer to the Figures 3a-3c (Log of Test Borings) for a more detailed description of the subsurface conditions encountered, including a plot of the CPT data.

Groundwater

BCI encountered groundwater in Borings BCI-15-B1 and BCI-15-B2 at a depth of about 29 feet (Elev. 0.6 to 0.0 ft., NGVD 29).

[3] *Phase 1 Geotechnical Data Report (P1GDR)*, Sacramento River Study Area, Urban Levee Geotechnical Evaluations Program Contract 4600007418, Prepared by URS Corporation for the California Department of Water Resources, January 2009.

6.3 Laboratory Testing

BCI performed laboratory tests on representative soil samples obtained from the exploratory borings. Tests include:

- Moisture Content and Unit Weight for design parameter development/correlation,
- Sieve Analysis and Plasticity Index for classification and hydraulic conductivity correlations,
- Hydraulic Conductivity on native "undisturbed" samples for underseepage analysis.

Appendix A contains a summary of test results and lab result reports. The Log of Test Borings contain the moisture content and unit weight results. Tests were performed in accordance with current ASTM test methods.

7. GEOTECHNICAL DESIGN CRITERIA

7.1 Geotechnical Evaluation Criteria

This evaluation is not a typical levee seepage evaluation. Geotechnical evaluation criteria are generally required to evaluate the performance of existing, improved or new levees. The levee near the project site is considered high ground/wide levee; therefore, seepage analyses with respect to the existing levee and landside levee toe would not be required. The project site is located within Reach B of the URS GER. The URS GER stated that this reach meets underseepage and through seepage criteria due to the high ground condition within the reach.

BCI performed two post-construction seepage evaluation at the 200-yr Design Water Surface Elevation to provide information to the design team with respect to anticipated hydrostatic forces during high water events. The first post-construction seepage evaluation considered the interim new fill associated with the pump station construction. The second post-construction seepage evaluation considered the cross-section reconfiguration based on the realignment of the bike trail in accordance with the current design of the new I Street bridge. BCI also performed an underseepage evaluation for the construction excavation for the below grade pump station to evaluate potential average exit gradients at the excavation toe during construction.

For this analysis, BCI considered geotechnical evaluation criteria which generally follow the Urban Levee Design Criteria (ULDC), prepared by DWR and dated May 2012, with consideration to the following guideline documents:

- "Design and Construction of Levees", Engineer Manual, EM 1110-2-1913, USACE, 30 April 2000.
- "Design Guidance for Levee Underseepage", Engineer Technical Letter ETL 1110-2-569, USACE, May 1, 2005.
- "Recommendations for Seepage Design Criteria, Evaluation and Design Practices," prepared by the 2003 CESPK Levee Task Force, prepared for USACE, 15 July 2003.
- "Guidance Document for Geotechnical Analyses", Urban Levee Evaluations Project, Contracts 4600007418 and 4600008101, Version 13 Draft 1, URS, July 2013.

7.2 Water Surface Elevation

MBK provided water surface elevations for the seepage evaluations. Based on the guidance documents referenced above, water surface criteria for this study are defined as:

- ***Design Water Surface Elevation (DWSE)*** for steady-state seepage analyses: 200-year WSE plus potential increase due to climate change, updated hydrology, updated hydraulic models and sea level rise. BCI used a DWSE of 34.0 feet NGVD 29 datum (city datum) as suggested by MBK. The DWSE includes an additional 1 foot of elevation as an added measure of conservatism for geotechnical analysis.
- ***Winter WSEs*** for steady-state seepage analyses during construction activities. BCI used a conservative winter WSE of 10.2 feet NGVD 29 datum, determined using the mean for the months of January through March from Water Years 1984 to 2014.

7.3 Underseepage Criteria

Average exit gradients for levee analyses are generally evaluated under steady-state conditions at DWSE and Hydraulic Top of Levee (HTOL) water levels. The average exit gradient is defined as the average head loss per foot traveling upward through the blanket. Elevated average exit gradients may result in sand boils and piping and may potentially lead to levee failure.

As discussed above, the levee is high ground/wide levee; therefore, a seepage evaluation at the landside levee toe was not performed nor required by the USACE. However, the proposed pump station project will include an excavation near the landside levee toe. The average hydraulic exit gradient criteria for underseepage design at the bottom of an empty ditch or depression at the levee toe is less than or equal to 0.5, and less than or equal to 0.8 from 150 feet to 300 feet from the landside levee toe. For ditches, depressions between the landside levee toe and 150 feet from the landside levee toe, the acceptable average exit gradient is determined through linear interpolation of the maximum allowable average exit gradient between 0.5 and 0.8.

The proposed pump station wet well is located approximately 50 feet from the landside levee toe. Therefore, the allowable exit gradient criteria at the excavation toe is 0.6 based on interpolation.

8. GEOTECHNICAL EVALUATION

As requested by the USACE, BCI performed a steady-state seepage analysis at the DWSE for the pump station post-construction condition to provide information to the design team regarding potential buoyancy (uplift) forces that could act on the structure during a 200-year flood event. BCI performed evaluations based on the new fill associated with the Pump Station construction and on the cross-section reconfiguration based on the realignment of the bike trail in accordance with the current design of the new I Street bridge. BCI also performed a steady-state seepage analysis at the winter WSE and at a low WSE elevation of 4 feet for the proposed construction excavation in order to evaluate the average exit gradient at the excavation toe. To perform these evaluations, BCI conducted the following:

- Reviewed the cross-section and analysis prepared by URS contained in the URS GER.
- Prepared a representative cross-section from the centerline of the Sacramento River to 2000 feet landside.
- Evaluated subsurface explorations and associated laboratory data to determine appropriate seepage parameters including hydraulic conductivity values.
- Performed a seepage analysis using SEEP/W 2007.

8.1 Geotechnical Analysis Cross-Section

BCI evaluated a cross-section extending from the middle of the Sacramento River to 2000 feet landside. Figure 2 presents the location of the cross-section. The design team provided the terrain model and bathymetry used in the analysis. To create the cross-section, BCI used a CPT formally drilled on the levee crest (WSESAR_002C) and two explorations drilled by BCI within the project footprint (BCI-15-B1 and BCI-15-B2).

The existing levee and upper ten feet of the subsurface soil landside of the levee consists predominantly of silty sand and poorly-graded sand with silt. Lean clay/silt underlies the silty sand/poorly-graded sand with silt to approximate Elevation 0 feet, and is underlain by poorly-graded sand with silt and poorly-graded gravel aquifer to about Elevation -60 feet. Clay underlies the aquifer to the depth explored. Figure 4 presents the cross-section subsurface profile used in the analysis.

8.2 Hydraulic Conductivity Values

For seepage analysis, BCI used hydraulic the conductivity values presented in the BCI BODR, which considered hydraulic conductivity values proposed by the USACE in the USACE GRR.

To determine the hydraulic conductivity values in the BCI GBODR, BCI performed a review of hydraulic conductivity values used by others in the Sacramento and West Sacramento area near the project site. BCI compared these values with BCI hydraulic conductivity laboratory test data and discussed the values extensively with the Board of Senior Consultants for the Southport EIP and representatives of the USACE during the development of the BCI BODR. BCI believes these values are appropriate for this project given the proximity of the project site with the site analyzed during the preparation of the BCI BODR and the similarity in subsurface soil conditions encountered as each respective site.

BCI also conducted three hydraulic conductivity tests on fine grained soil samples obtained during the subsurface exploration program for this project. These test results indicate similar hydraulic conductivity values when compared to BCI's previous hydraulic conductivity tests on similar soils performed for BCI's BODR, further confirming that these values are appropriate for analysis.

Table 1 presents the hydraulic conductivity values proposed for this evaluation.

Table 1: Railyards Storm Water Drainage and Outfall Structure Hydraulic Conductivity Values				
USCS Designation	**Soil Description**	**Hydraulic Conductivity Values**		
		Kh (ft/day)	**Kh (cm/s)**	**Kv (cm/s)**
CL	Medium stiff to hard Lean Clay, Native	0.0028	$1x10^{-6}$	$2.5x10^{-7}$
CL	New Fill	0.01	$4x10^{-6}$	$1x10^{-6}$
ML	Medium stiff Silt	0.028	$1x10^{-5}$	$2.5x10^{-6}$
CL/ML	Interbedded layers of medium stiff Silt and medium stiff to hard Lean Clay	0.016	$5.6x10^{-6}$	$1.4x10^{-6}$
SM	Variable percent fines Silty Sand	2.27	$8x10^{-4}$	$2x10^{-4}$
SP-SM	Poorly-graded Sand with Silt (8% -12% fines)	14.74	$5.2x10^{-3}$	$1.3x10^{-3}$
SM, SP-SM	Interbedded layers of variable percent fines Silty Sand and Poorly-graded Sand with Silt	8.5	$3x10^{-3}$	$7.5x10^{-4}$
GP	Poorly-graded Gravel	70.87	$2.5x10^{-2}$	$2.5x10^{-3}$

To determine the hydraulic conductivity values for the interbedded layers, BCI averaged the hydraulic conductivity values of each individual material type. The cross-section presented on Figure 4 presents the hydraulic conductivity values used in the analysis for each layer.

8.3 Underseepage Evaluation and Results

To perform the analysis, BCI used the program SEEP/W, Version 7.23, with the proposed hydraulic conductivity values presented in Table 1 as input parameters. BCI then applied the following boundary conditions to the model:

- Fixed-head set to the river stage along the boundary nodes of the waterside levee slope and river bottom,
- No-flow condition along the bottom of the model, and along both the waterside and landside vertical edge of the model,
- Potential seepage surface for nodes on the landside levee slope and ground surface,
- Fixed-head condition set at the bottom elevation of the pump station to represent the post-construction condition, and
- Potential seepage surface along the construction excavation walls for the construction excavation during the condition with the winter WSE.

Figures 5 and 6 present the DWSE Steady-State Seepage Evaluations for Post Pump Station Construction for the Pre and Post I Street Bridge Construction conditions, respectively. As shown on the figures, the highest total head that occurs under the structure is 32.75 feet.

Figures 7 and 8 present the Interim Steady-State Seepage Evaluation with Excavation using the average winter WSE and a low WSE of 4 feet. As noted in the figures, the average exit gradient at the excavation toe exceeds the maximum levee evaluation criteria of 0.6 under both WSE conditions.

9. LIMITATIONS

BCI prepared this TM for Downtown Railyards Venture LLC. This TM should not be used by others or for other projects without BCI's written permission.

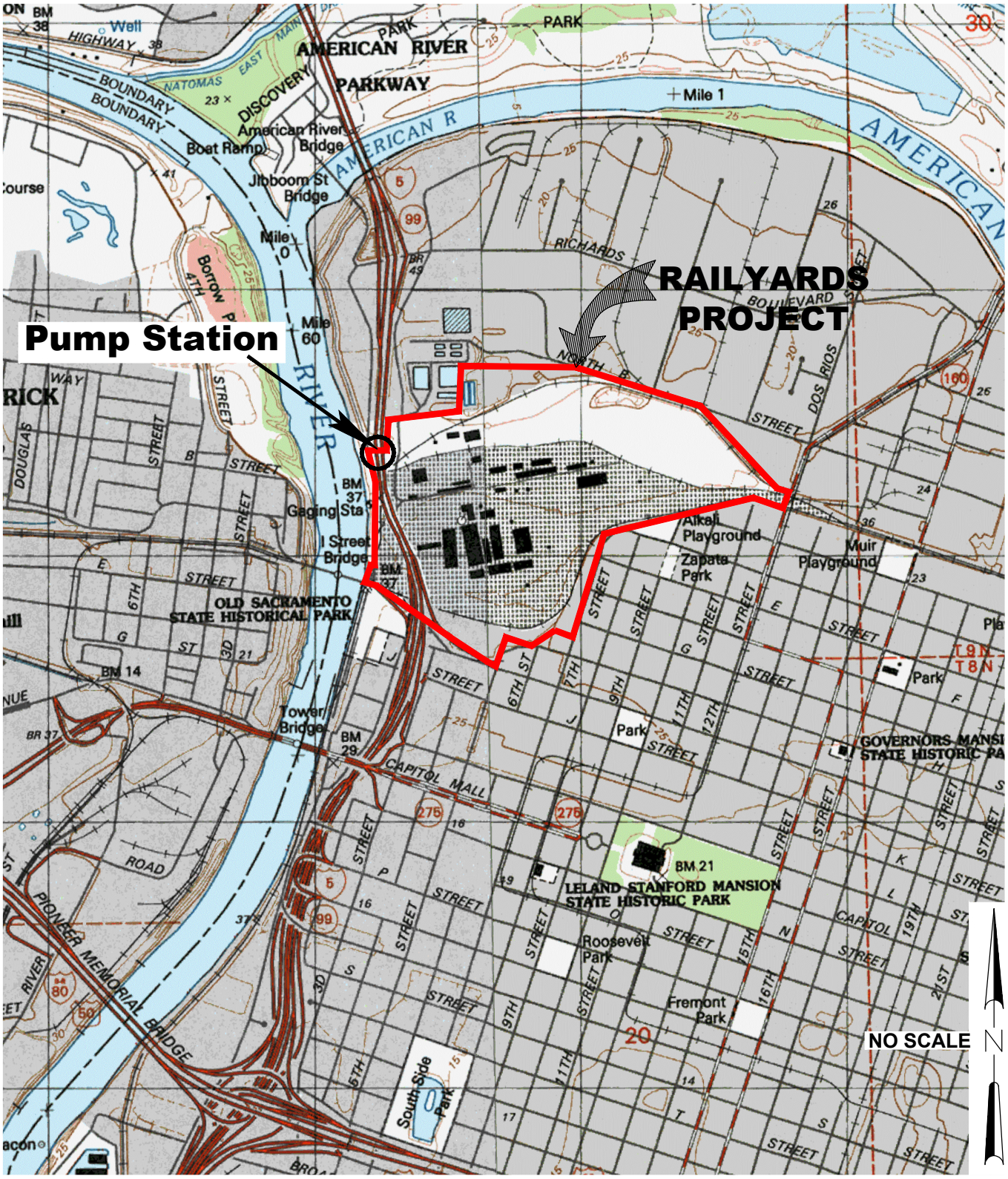
BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. We do not warranty our services.

Our scope did not include evaluation of on-site hazardous material or biological pollutants. Please contact BCI if you would like an evaluation of these items.

Figures 3a-3c presents our exploratory boring logs. The lines designating the interface between soil types are approximate. The transition between soil types may be abrupt or gradual. Subsurface conditions could vary between borings or at other locations across the site. Our recommendations are based on the final logs, which represent our interpretation of the field logs, laboratory test results and general knowledge of the site and geological conditions.

GEOTECHNICAL SEEPAGE EVALUATION TECHNICAL MEMORANDUM SACRAMENTO RAILYARDS STORM WATER PUMP STATION

FIGURES



Source: MAPTECH Terrain Navigator Pro, v. 7.01, USGS topographic map, 7.5 Minute Quadrangle, 1:24000, Sacramento East and Sacramento West, 1992.

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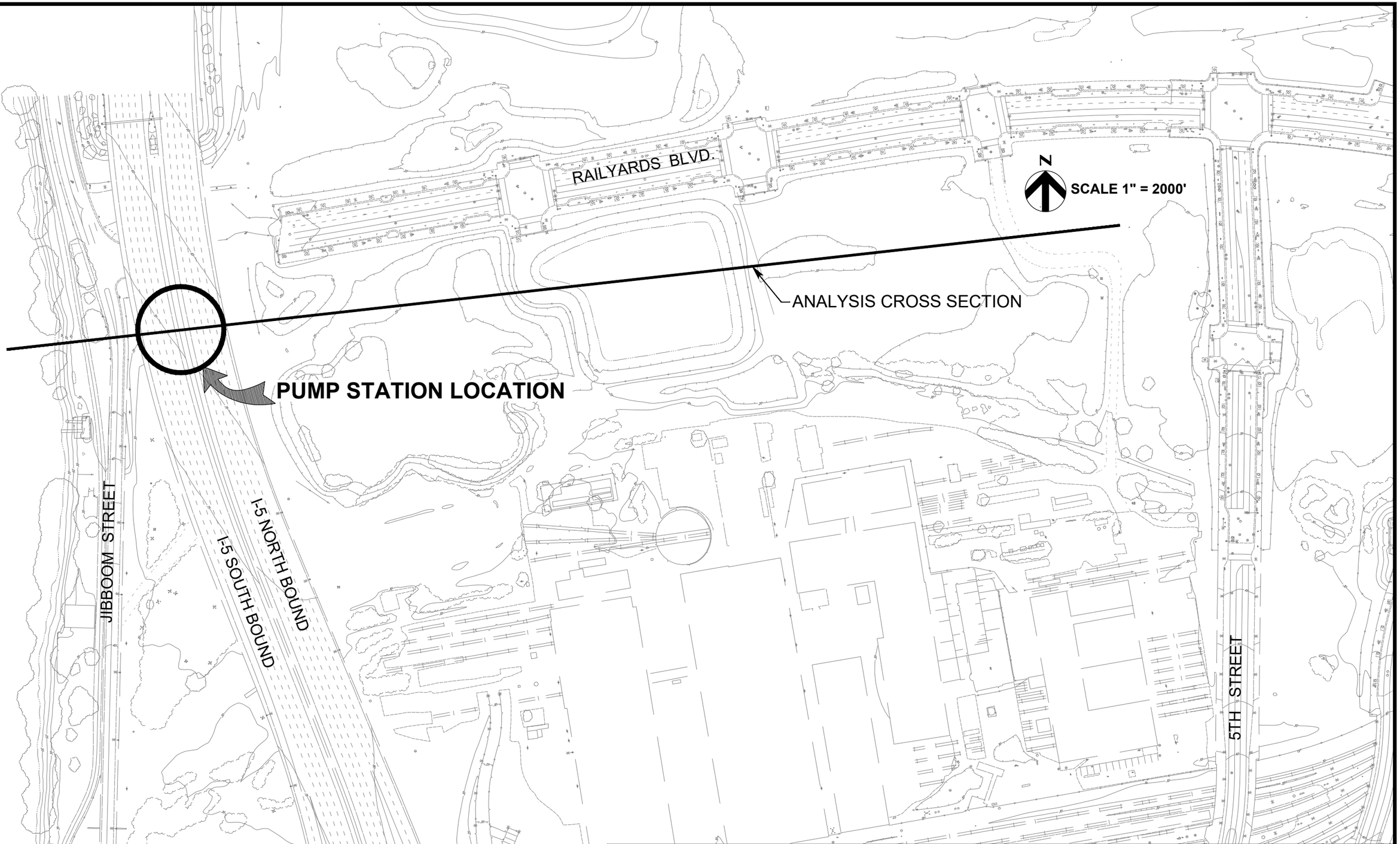
VICINITY MAP

Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01

July 2016

Figure 1



Source: Railyards Project Topography provided by Kimley Horn, 2015. Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elevation NGVD 29 (City) = NAVD88 +2.1 feet.

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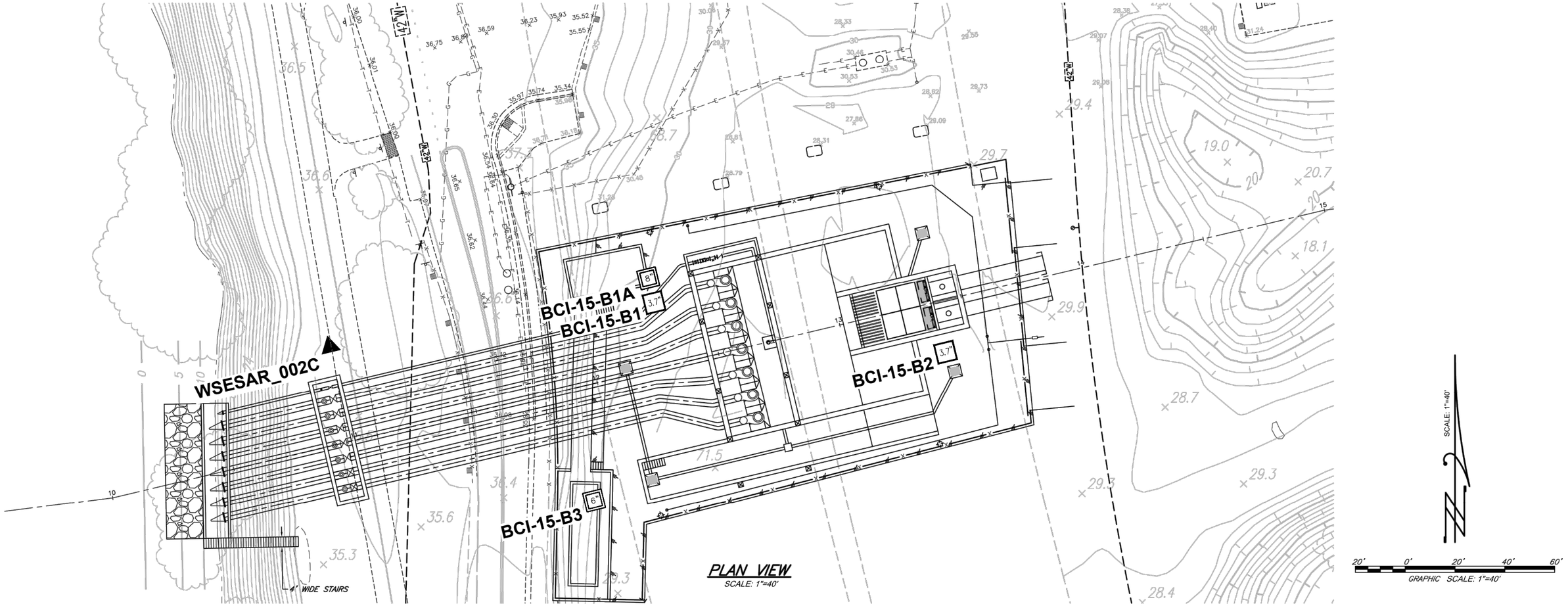
SITE PLAN

Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01

July 2016

Figure 2



Source: Railyards Project Topography provided by Kimley Horn, March 2016. Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elevation NGVD 29 (City) = NAVD88 minus 2.1 feet.

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LOG OF TEST BORINGS (1 of 3)

Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01

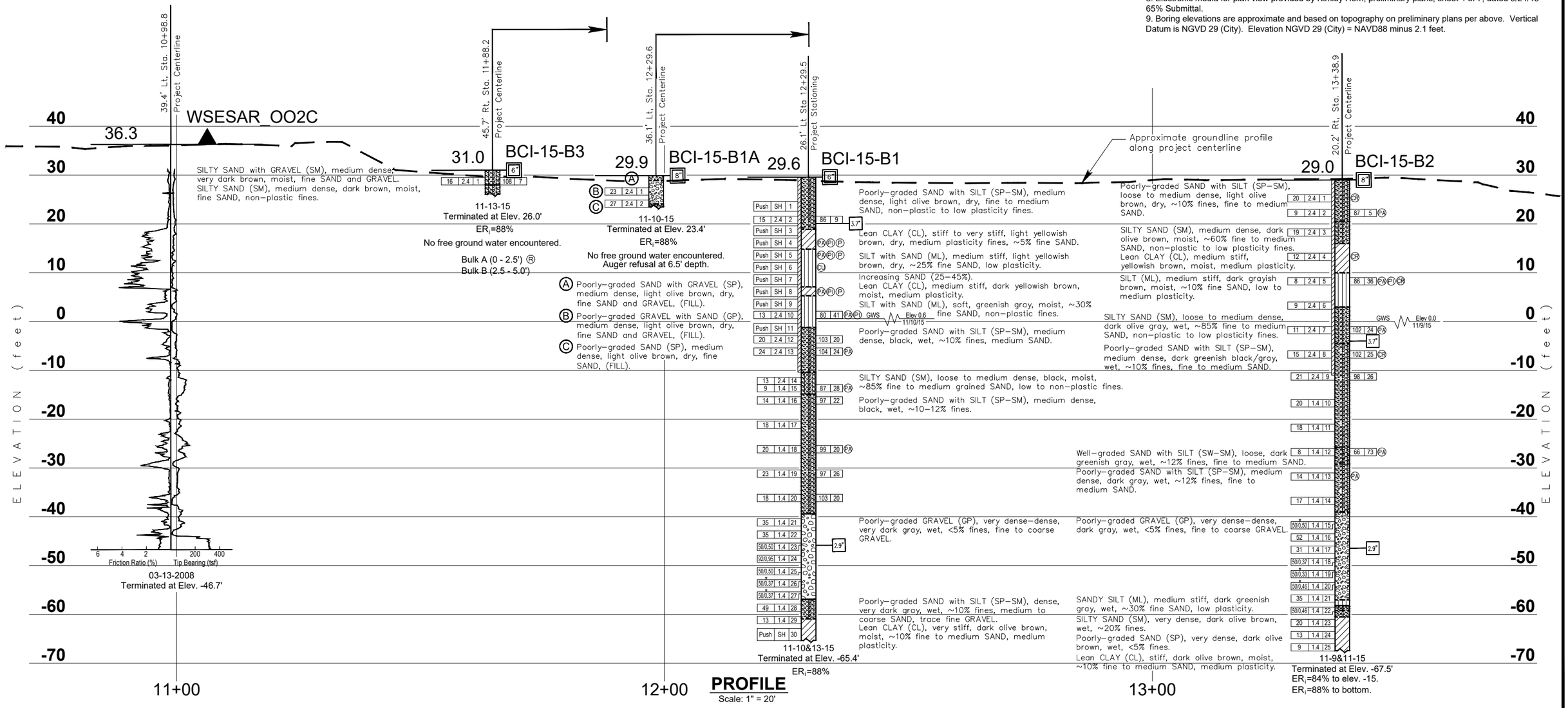
July 2016

Figure 3a

FOR PLAN VIEW
SEE LOG OF TEST BORINGS 1 OF 2

NOTES:

1. Field classification of soils was in general accordance with ASTM D2487-11, Unified Soil Classification System.
2. Standard Penetration tests were performed in accordance with ASTM D 1586 using an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. Where indicated by an asterisk (*) the number of blows shown is for only that fraction of the initial 0.5 ft. "seating drive" interval penetrated.
4. If laboratory tests are not shown as being performed, the soil descriptions presented in the LOTB are based solely on the visual practices described in the before mentioned Manuals.
5. The length of each sampled interval is shown graphically on the boring log.
6. Consistency of soils shown in ( ) where estimated.
7. Groundwater surface (GWS) reflect the fluid level in the borings on the specified date. Groundwater surface is subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time. In general, ground water at the site will be encountered at or near the adjacent river level.
8. Electronic media for plan view provided by Kimley Horn, preliminary plans, sheet 4 of 7, dated 9/24/15 65% Submittal.
9. Boring elevations are approximate and based on topography on preliminary plans per above. Vertical Datum is NGVD 29 (City). Elevation NGVD 29 (City) = NAVD88 minus 2.1 feet.



PROFILE
Scale: 1" = 20'

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LOG OF TEST BORINGS (2 of 3)
Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 3b

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL, (JUNE, 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly-graded GRAVEL Poorly-graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly-graded GRAVEL with SILT Poorly-graded GRAVEL with SILT and SAND
GP-GC	Poorly-graded GRAVEL with CLAY (or SILTY CLAY) Poorly-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly-graded SAND Poorly-graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly-graded SAND with SILT Poorly-graded SAND with SILT and GRAVEL
SP-SC	Poorly-graded SAND with CLAY (or SILTY CLAY) Poorly-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean Clay ORGANIC lean Clay with SAND ORGANIC lean Clay with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435-04)
- (CL) Collapse Potential (ASTM D 5333-03)
- (CP) Compaction Curve (CTM 216-06)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767-04)
- (DS) Direct Shear (ASTM D 3080-04)
- (EI) Expansion Index (ASTM D 4829-03)
- (M) Moisture Content (ASTM D 2216-05)
- (OC) Organic Content-% (ASTM D 2974-07)
- (P) Permeability (CTM 220-05)
- (PA) Particle Size Analysis (ASTM D 422-63) (2002)
- (PI) Platicity Index (AASHTO T 90-00) Liquid Limit (AASHTO T 89-02)
- (PL) Point Load Index (ASTM D 5731-05)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301-00)
- (SE) Sand Equivalent (CTM 217-99)
- (SG) Specific Gravity (AASHTO T 100-06)
- (SL) Shrinkage Limit (ASTM D 427-04)
- (SW) Swell Potential (ASTM D 4546-03)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166-06) Unconfined Compression-Rock (ASTM D 2938-95) (2002)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850-03)
- (UW) Unit Weight (ASTM D 2937-04)
- (VS) Vane Shear (AASHTO T 223-96) (2004)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} -Value (Blows / 12 in.)
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		>12 in.
Cobble		3 to 12 in.
Gravel	Coarse	3/4 to 3 in.
	Fine	No. 4 to 3/4 in.
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

CONSISTENCY OF COHESIVE SOILS

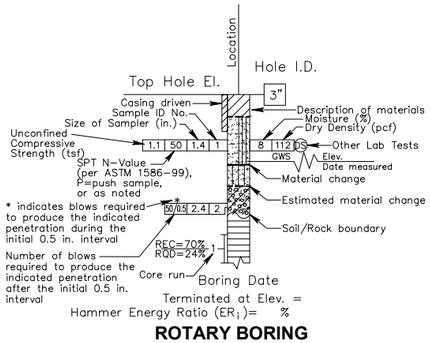
Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	<0.25	<0.25	<0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

PLASTICITY OF FINE-GRAINED SOILS

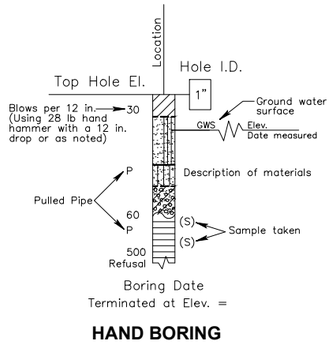
Description	Criteria
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

BOREHOLE IDENTIFICATION

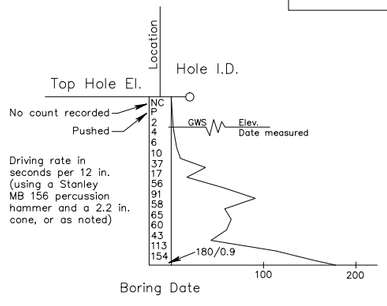
Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
	D	Dynamic Cone Penetration Boring
	CPT	Cone Penetration Test (ASTM D 5778-95)
	O	Other



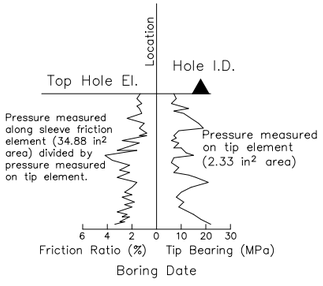
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

SOIL LEGEND

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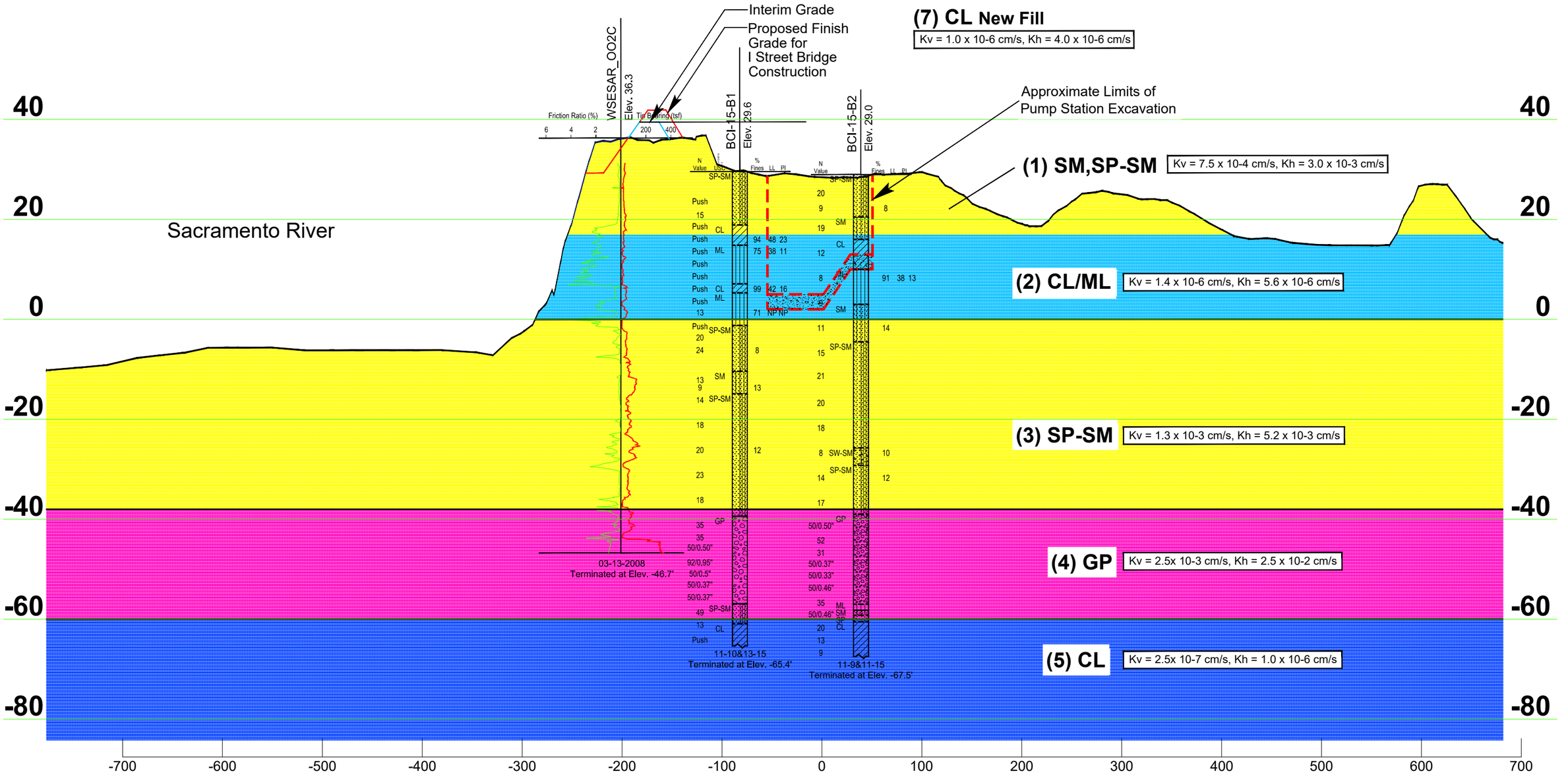
LOG OF TEST BORINGS (3 of 3)

Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01

July 2016

Figure 3c



LEGEND

Kv, Kh = - Hydraulic Conductivity values for soil layer

1 inch = 100 ft Hor.
1 inch = 20 ft Vert.

Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elev. NGVD 29 (City) = NAVD88 minus 2.1 feet.

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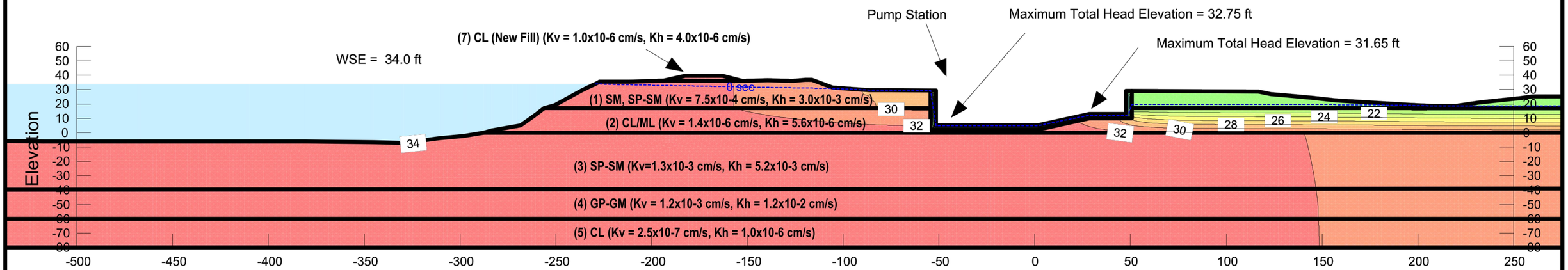
SUBSURFACE PROFILE FOR SEEPAGE ANALYSIS

Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 4

7/25/2016 1698.x 01 Fig4 Storm Water Pump Station.dwg

Sacramento Railyards Storm Water Pump Station
Steady-State Seepage Evaluation Post Pump Station Construction **(Pre I Street Bridge Construction)**
200-yr DWSE = 34.0 feet



Material ID and Type, Hydraulic Conductivity (Kh), Anisotropic Ratio (Kv/Kh)

(1) Silty Sand, Poorly-graded Sand with Silt	Kh=8.5 ft/day	(=3x10-3 cm/s)	0.25
(2) Clay/Silt	Kh=0.016 ft/day	(=5.6x10-6 cm/s)	0.25
(3) Poorly-graded Sand with Silt	Kh=14.74 ft/day	(=5.2x10-3 cm/s)	0.25
(4) Poorly-graded Gravel with Silt	Kh=34.02 ft/day	(=1.2x10-2 cm/s)	0.10
(5) Clay	Kh=0.0028 ft/day	(=1x10-6 cm/s)	0.25
(6) Concrete	Kh=2.8x10-8 ft/day	(=1x10-11 cm/s)	1.00
(7) Clay, New Fill	Kh=0.01 ft/day	(=4x10-6 cm/s)	0.25

Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elev. NGVD 29 (City) = NAVD88 minus 2.1 feet.

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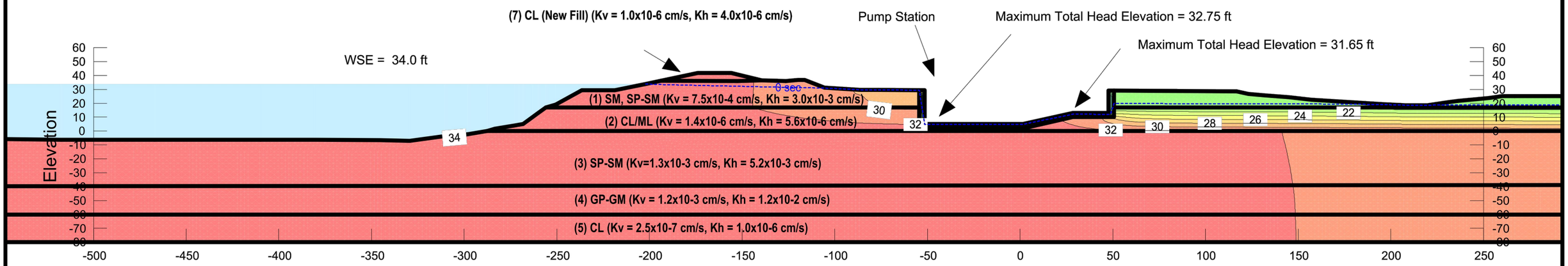
DWSE STEADY-STATE SEEPAGE EVALUATION POST PUMP STATION CONSTRUCTION
(Pre I Street Bridge Construction)
Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 5

7/27/2016 1698.x 01 Fig5 Storm Water Pump Station.dwg

Sacramento Railyards Storm Water Pump Station
Steady-State Seepage Evaluation, Post Pump Station Construction **(Post I Street Bridge Construction)**
200-yr DWSE = 34.0 feet



Material ID and Type, Hydraulic Conductivity (Kh), Anisotropic Ratio (Kv/Kh)

(1) Silty Sand, Poorly-graded Sand with Silt	Kh=8.5 ft/day	(=3x10-3 cm/s)	0.25
(2) Clay/Silt	Kh=0.016 ft/day	(=5.6x10-6 cm/s)	0.25
(3) Poorly-graded Sand with Silt	Kh=14.74 ft/day	(=5.2x10-3 cm/s)	0.25
(4) Poorly-graded Gravel with Silt	Kh=34.02 ft/day	(=1.2x10-2 cm/s)	0.10
(5) Clay	Kh=0.0028 ft/day	(=1x10-6 cm/s)	0.25
(6) Concrete	Kh=2.8x10-8 ft/day	(=1x10-11 cm/s)	1.00
(7) Clay, New Fill	Kh=0.01 ft/day	(=4x10-6 cm/s)	0.25

Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elev. NGVD 29 (City) = NAVD88 minus 2.1 feet.

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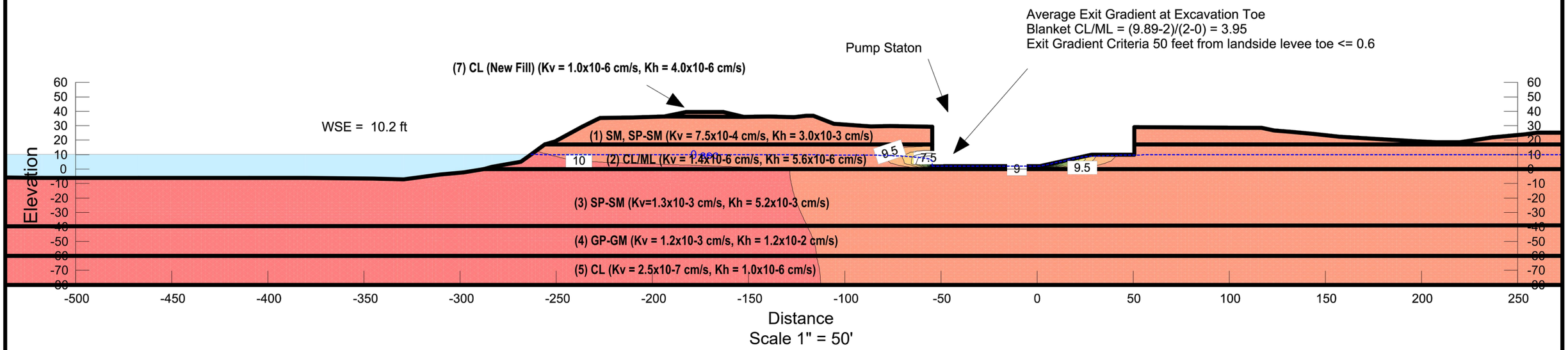
DWSE STEADY-STATE SEEPAGE EVALUATION POST PUMP STATION CONSTRUCTION
(Post I Street Bridge Construction)
Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 6

7/27/2016 1698.x 01 Fig6 Storm Water Pump Station.dwg

Sacramento Railyards Storm Water Pump Station
Interim Steady-State Seepage Evaluation During Pump Station Wet Well Excavation
Winter WSE = 10.2 feet



Material ID and Type, Hydraulic Conductivity (Kh), Anisotropic Ratio (Kv/Kh)

(1) Silty Sand, Poorly-graded Sand with Silt	Kh=8.5 ft/day	(=3x10-3 cm/s)	0.25
(2) Clay/Silt	Kh=0.016 ft/day	(=5.6x10-6 cm/s)	0.25
(3) Poorly-graded Sand with Silt	Kh=14.74 ft/day	(=5.2x10-3 cm/s)	0.25
(4) Poorly-graded Gravel with Silt	Kh=34.02 ft/day	(=1.2x10-2 cm/s)	0.10
(5) Clay	Kh=0.0028 ft/day	(=1x10-6 cm/s)	0.25
(6) Concrete	Kh=2.8x10-8 ft/day	(=1x10-11 cm/s)	1.00
(7) Clay, New Fill	Kh=0.01 ft/day	(=4x10-6 cm/s)	0.25

Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elev. NGVD 29 (City) = NAVD88 minus 2.1 feet.

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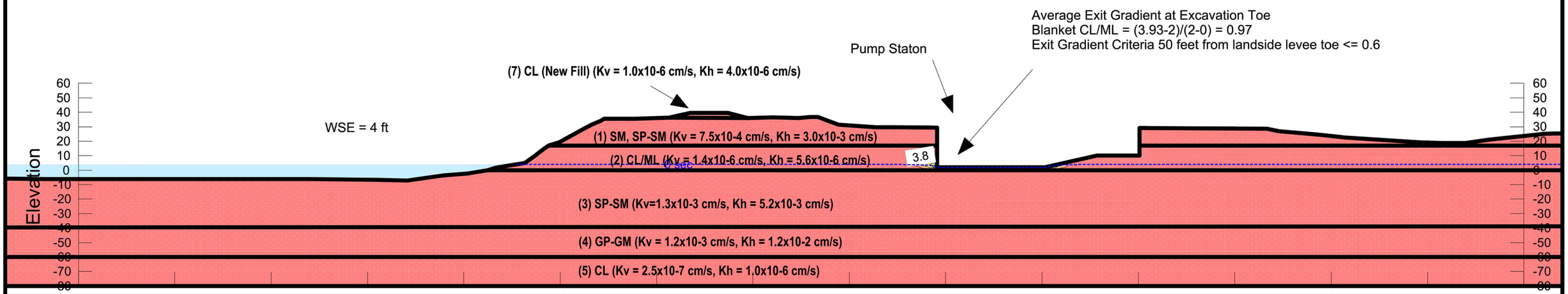
INTERIM STEADY-STATE SEEPAGE EVALUATION WITH EXCAVATION (WSE=10.2')
Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 7

7/25/2016 1698.x 01 Fig7 Storm Water Pump Station.dwg

Sacramento Railyards Storm Water Pump Station
Interim Steady-State Seepage Evaluation During Pump Station Wet Well Excavation
WSE = 4 feet



Material ID and Type, Hydraulic Conductivity (Kh), Anisotropic Ratio (Kv/Kh)

(1) Silty Sand, Poorly-graded Sand with Silt	Kh=8.5 ft/day	(=3x10-3 cm/s)	0.25
(2) Clay/Silt	Kh=0.016 ft/day	(=5.6x10-6 cm/s)	0.25
(3) Poorly-graded Sand with Silt	Kh=14.74 ft/day	(=5.2x10-3 cm/s)	0.25
(4) Poorly-graded Gravel with Silt	Kh=34.02 ft/day	(=1.2x10-2 cm/s)	0.10
(5) Clay	Kh=0.0028 ft/day	(=1x10-6 cm/s)	0.25
(6) Concrete	Kh=2.8x10-8 ft/day	(=1x10-11 cm/s)	1.00
(7) Clay, New Fill	Kh=0.01 ft/day	(=4x10-6 cm/s)	0.25

Surface Data: Based on topographic survey from the 65% design using benchmark 297-B2E. Vertical Datum is NGVD 29 (City). Elev. NGVD 29 (City) = NAVD88 minus 2.1 feet.

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INTERIM STEADY-STATE SEEPAGE EVALUATION WITH EXCAVATION (WSE=4.0')
Geotechnical Seepage Evaluation
Technical Memorandum
Sacramento Railyards Storm Water Pump Station

File No. 1698.x 01
July 2016
Figure 8

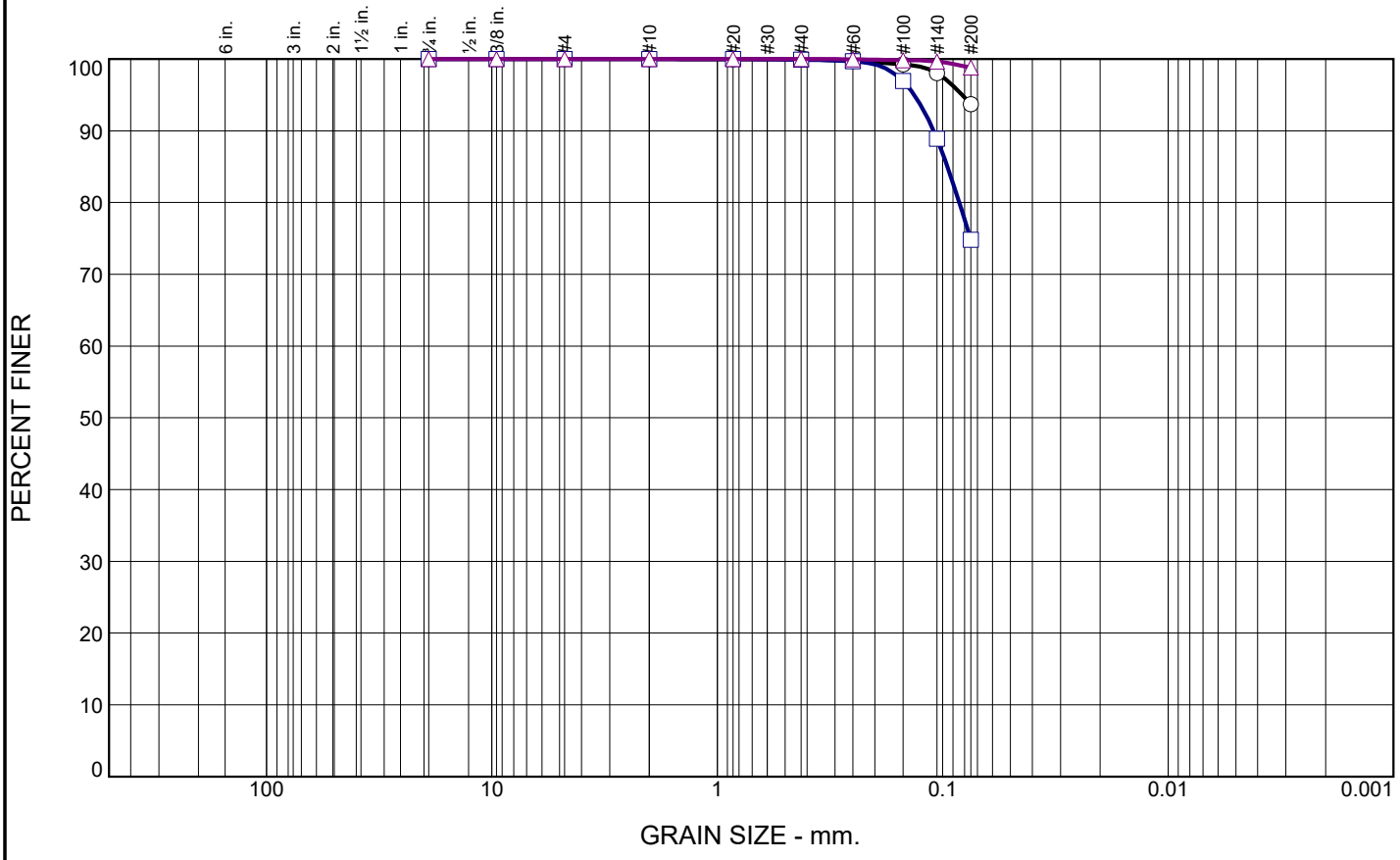
7/25/2016 1698.x 01 Fig8 Storm Water Pump Station.dwg

GEOTECHNICAL SEEPAGE EVALUATION TECHNICAL MEMORANDUM SACRAMENTO RAILYARDS STORM WATER PUMP STATION

APPENDIX A

Laboratory Test Results

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0	0	6	94		CL	48	25	23
□	0	0	25	75		ML	38	27	11
△	0	0	1	99		CL	42	26	16

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100	100	100
3/8"	100	100	100
GRAIN SIZE			
D_{60}			
D_{30}			
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	PERCENT FINER ○	□	△
#4	100	100	100
#10	100	100	100
#20	100	100	100
#40	100	100	100
#60	100	100	100
#100	99	97	100
#140	98	89	100
#200	94	75	99

Material Description

○ Lean CLAY, dark yellowish brown

□ SILT with SAND, dark grayish brown

△ Lean CLAY, dark grayish brown

REMARKS:

○

□

△

○ Source of Sample: BCI-15-B1 Depth: 13.33-13.92' Sample Number: 4C

□ Source of Sample: BCI-15-B1 Depth: 16.42-17.0' Sample Number: 5D

△ Source of Sample: BCI-15-B1 Depth: 23.33-23.92' Sample Number: 8C

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W. Sacramento, CA

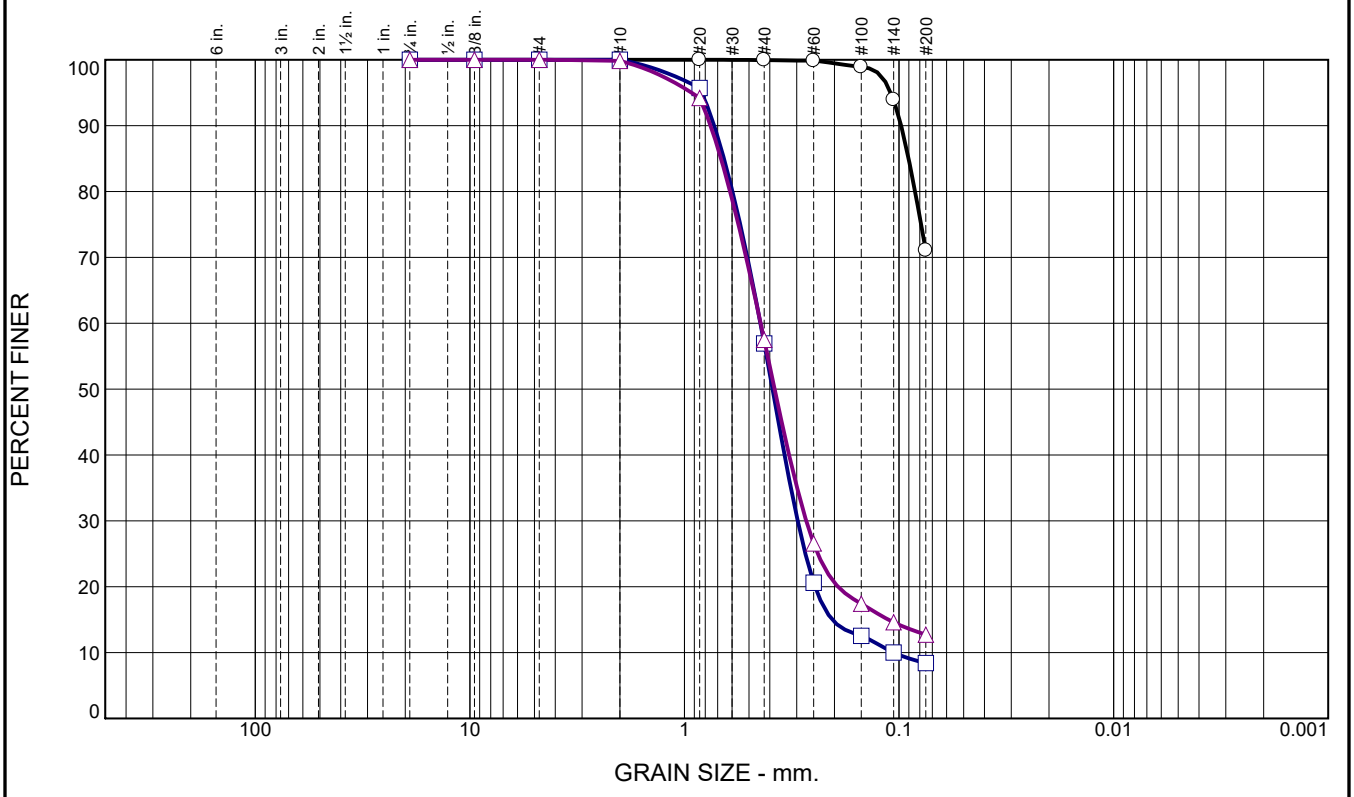
Client: Downtown Railyard Venture, LLC

Project: Sacramento Railyards Storm Water Pump Station Project

Project No.: 1698.X-01

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0	0	29	71		ML		NP	
□	0	0	92	8		SP-SM			
△	0	0	87	13		SM			

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100	100	100
3/8"	100	100	100
GRAIN SIZE			
D_{60}		0.4426	0.4415
D_{30}		0.2967	0.2709
D_{10}		0.1057	
COEFFICIENTS			
C_c		1.88	
C_u		4.19	

SIEVE number size	PERCENT FINER ○	□	△
#4	100	100	100
#10	100	100	100
#20	100	96	94
#40	100	57	57
#60	100	21	27
#100	99	13	17
#140	94	10	15
#200	71	8.4	13

Material Description

○ SILT with SAND, very dark greenish gray

□ Poorly graded SAND with SILT, very dark greenish gray

△ SILTY SAND, greenish black

REMARKS:

○

□

△

○ Source of Sample: BCI-15-B1 Depth: 28.5-29.0' Sample Number: 10C

□ Source of Sample: BCI-15-B1 Depth: 36.0-36.5' Sample Number: 13C

△ Source of Sample: BCI-15-B1 Depth: 43.25-44.0' Sample Number: 15A/B/C

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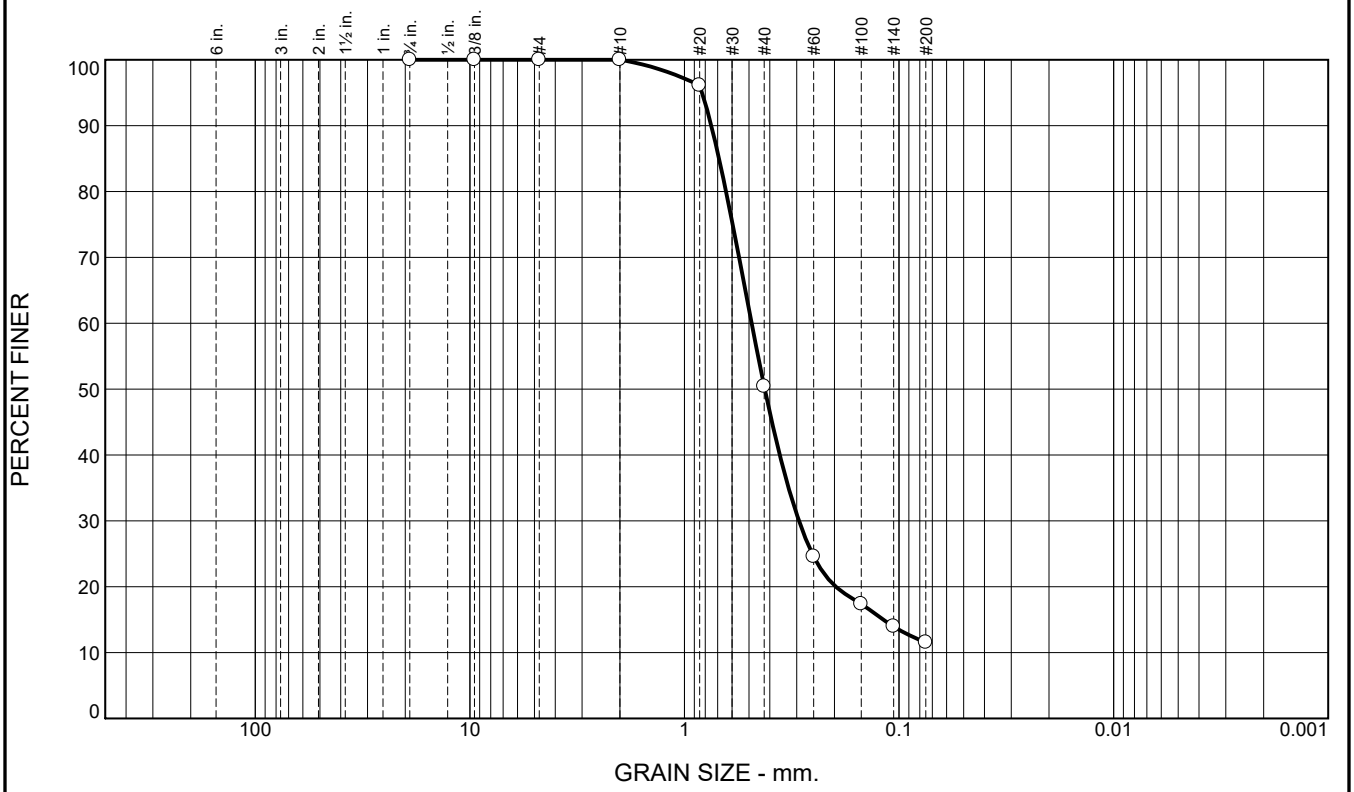
Project No.: 1698.X-01

Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0	0	88	12		SP-SM			

SIEVE inches size	○		
3/4"	100		
3/8"	100		
GRAIN SIZE			
D_{60}	0.4865		
D_{30}	0.2928		
D_{10}			
COEFFICIENTS			
C_c			
C_u			

SIEVE number size	○		
#4	100		
#10	100		
#20	96		
#40	50		
#60	25		
#100	17		
#140	14		
#200	12		

Material Description

○ Poorly graded SAND with SILT, very dark greenish gray

REMARKS:

○

○ Source of Sample: BCI-15-B1 Depth: 56.0-56.5' Sample Number: 18B/C

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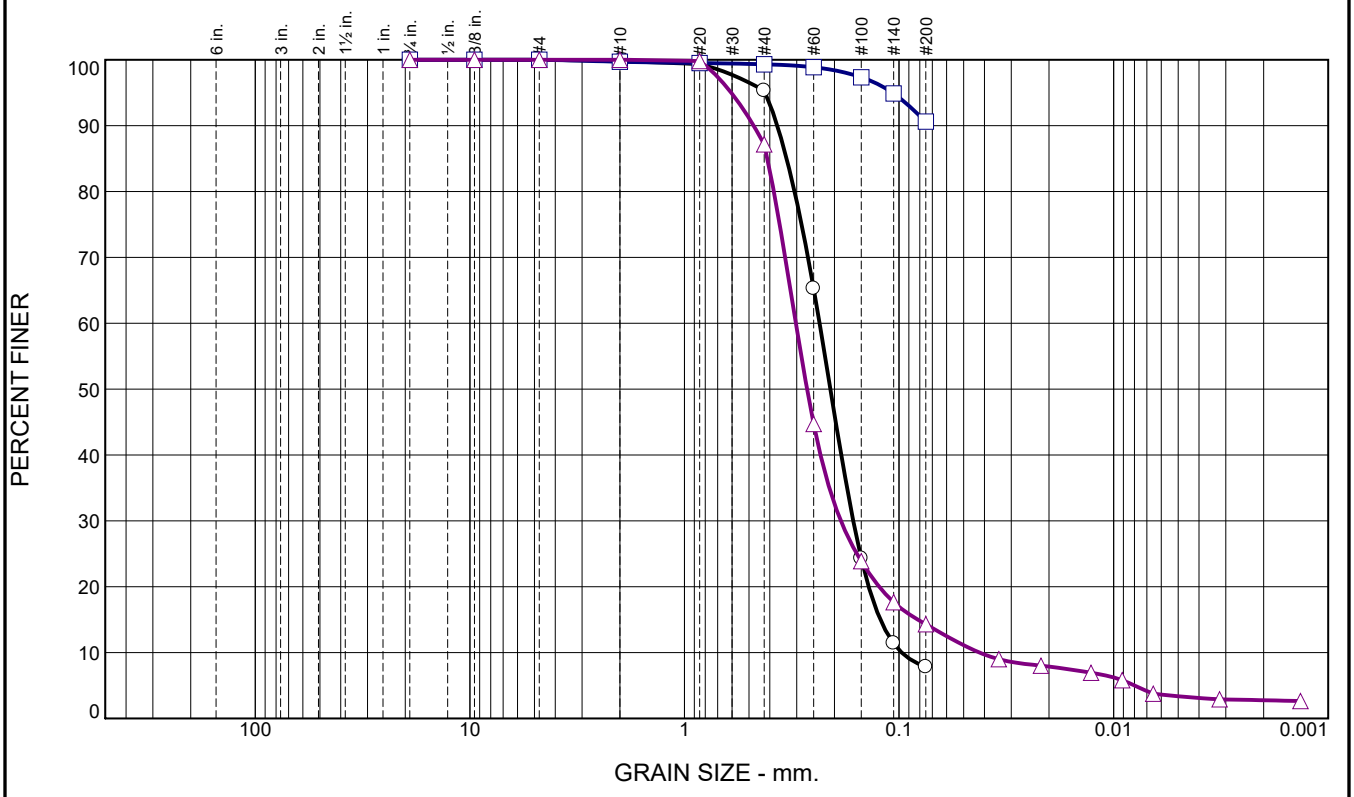
Project: Sacramento Railyards Storm Water Pump Station Project

Project No.: 1698.X-01 Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0	0	92	8		SP-SM			
□	0	0	9	91		ML	38	25	13
△	0	0	86	11	3	SM			

SIEVE inches size	PERCENT FINER ○	□	△
3/4"	100	100	100
3/8"	100	100	100
GRAIN SIZE			
D_{60}	0.2345		0.3026
D_{30}	0.1635		0.1868
D_{10}	0.0972		0.0421
COEFFICIENTS			
C_c	1.17		2.74
C_u	2.41		7.19

SIEVE number size	PERCENT FINER ○	□	△
#4	100	100	100
#10	100	100	100
#20	99	100	100
#40	95	99	87
#60	65	99	45
#100	24	97	24
#140	11	95	18
#200	7.8	91	14

Material Description

○ Poorly graded SAND with SILT, brown

□ SILT, very dark grayish brown

△ SILTY SAND, greenish black

REMARKS:

○

□

△

○ Source of Sample: BCI-15-B2 Depth: 6.0-6.5' Sample Number: 2C

□ Source of Sample: BCI-15-B2 Depth: 21.0-21.5' Sample Number: 5C

△ Source of Sample: BCI-15-B2 Depth: 31.0-31.5' Sample Number: 7C

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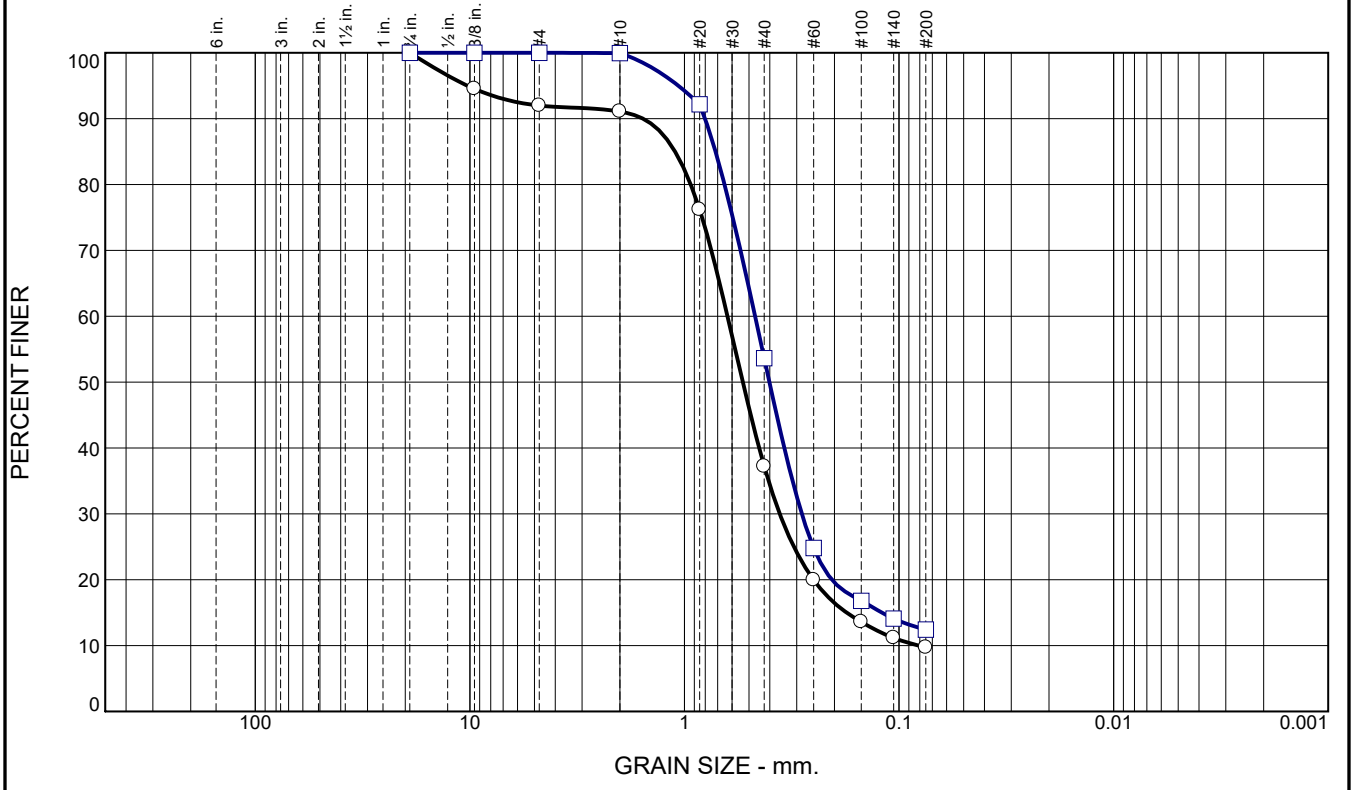
Figure

Particle Size Distribution Report



	+3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	LL	PL	PI
○	0	8	82	10		SW-SM			
□	0	0	88	12					

SIEVE inches size	○ PERCENT FINER	□ PERCENT FINER
3/4"	100	100
3/8"	95	100

GRAIN SIZE	○	□
D_{60}	0.6300	0.4686
D_{30}	0.3597	0.2840
D_{10}	0.0811	

COEFFICIENTS	○	□
C_c	2.53	
C_u	7.76	

SIEVE number size	○ PERCENT FINER	□ PERCENT FINER
#4	92	100
#10	91	100
#20	76	92
#40	37	54
#60	20	25
#100	14	17
#140	11	14
#200	9.7	12

Material Description

○ Well-graded SAND with silt, very dark greenish gray

□ Poorly-graded SAND with SILT, very dark gray

REMARKS:

○

□

○ Source of Sample: BCI-15-B2 Depth: 56.0-56.5' Sample Number: 12B/C

□ Source of Sample: BCI-15-B2 Depth: 61.0-61.5' Sample Number: 13B/C

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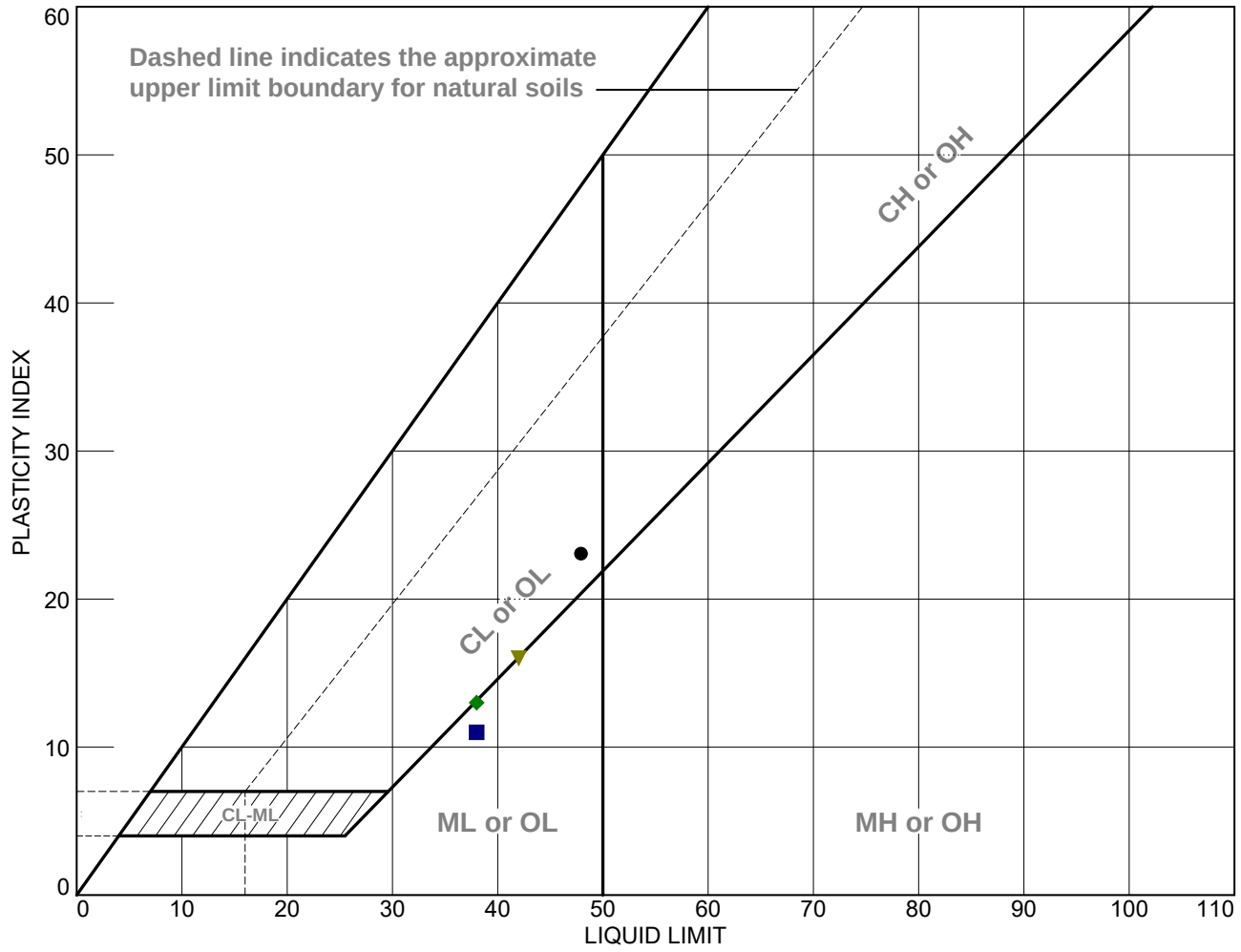
Project: Sacramento Railyards Storm Water Pump Station Project

Project No.: 1698.X-01

Figure

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	BCI-15-B1	4C	13.33-13.92'		25	48	23	CL
■	BCI-15-B1	5D	16.42-17.0'		27	38	11	ML
▲	BCI-15-B1	10C	28.5-29.0'		NP			ML
◆	BCI-15-B2	5C	21.0-21.5'		25	38	13	ML
▼	BCI-15-B1	8C	23.33-23.92'		26	42	16	CL

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Client: Downtown Railyard Venture, LLC

Project: Sacramento Railyards Storm Water Pump Station Project

Project No.: 1698.X-01 **Figure**

Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-4c **Depth** 13.33-13.92'
Material Description: Lean CLAY with Silty Sand Lenses, dark yellowish brown
Sample Collection Date: 11/10/15

Sample Data:

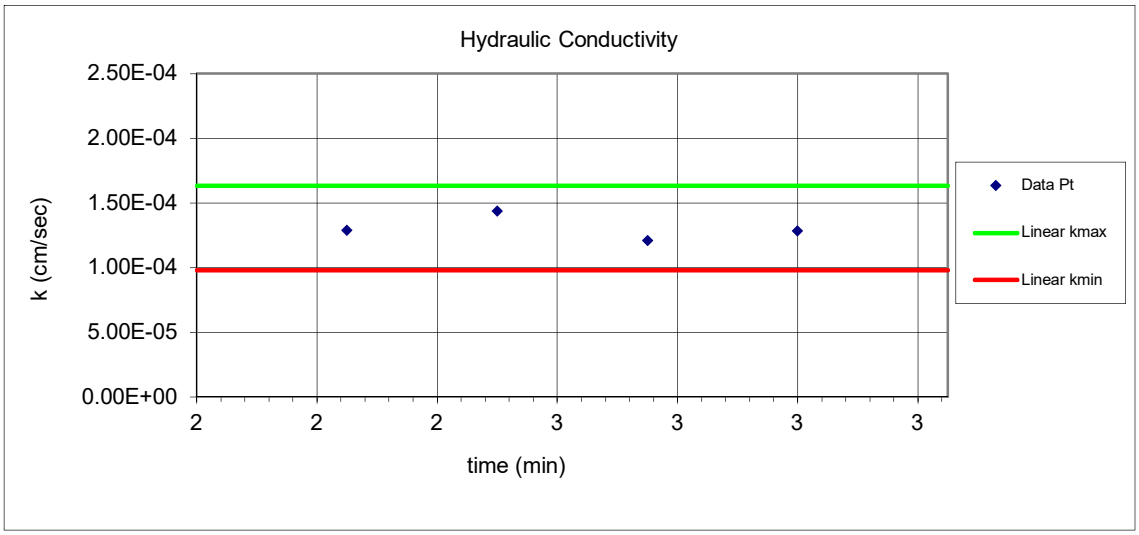
Type of Sample = Shelby

Initial Data:			**Final Data:**		
Sample Length =	8.5	cm	Sample Length =	8.4	cm
Sample Diameter =	7.37	cm	Sample Diameter =	7.35	cm
Area =	42.7	cm^2	Area =	42.5	cm^2
Volume =	363.2	cm^3	Volume =	358.6	cm^3
Wet Weight=	556.3	g	Wet Weight=	604.7	g
Moisture =	31.3	%	Moisture =	42.8	%
Dry Density =	1.17	g/cm^3	Dry Density =	1.18	g/cm^3
Dry Density =	72.8	pcf	Dry Density =	73.7	pcf
Saturation =	65.3	%	Saturation =	91.2	%
Specific Gravity =	2.65	(assumed)	Specific Gravity =	2.65	(assumed)

Testing Parameters:

B Value =		0.954			
Cell Pressure	P_C=	77	psi	Permeant:	Deaired Water
Bottom Pressure	P_b=	70	psi	Aver. Temp=	69.5 °F
Top Pressure	P_T=	70	psi	Burette Area=	0.194 cm^2
Consolidation	=	7	psi	Initial Hydraulic Gradient=	4.97
Confining Pressure	=	1008	psf	Final Hydrualic Gradient=	1.37

Results: **Average k (cm/sec)= 1.31E-04 cm/sec**

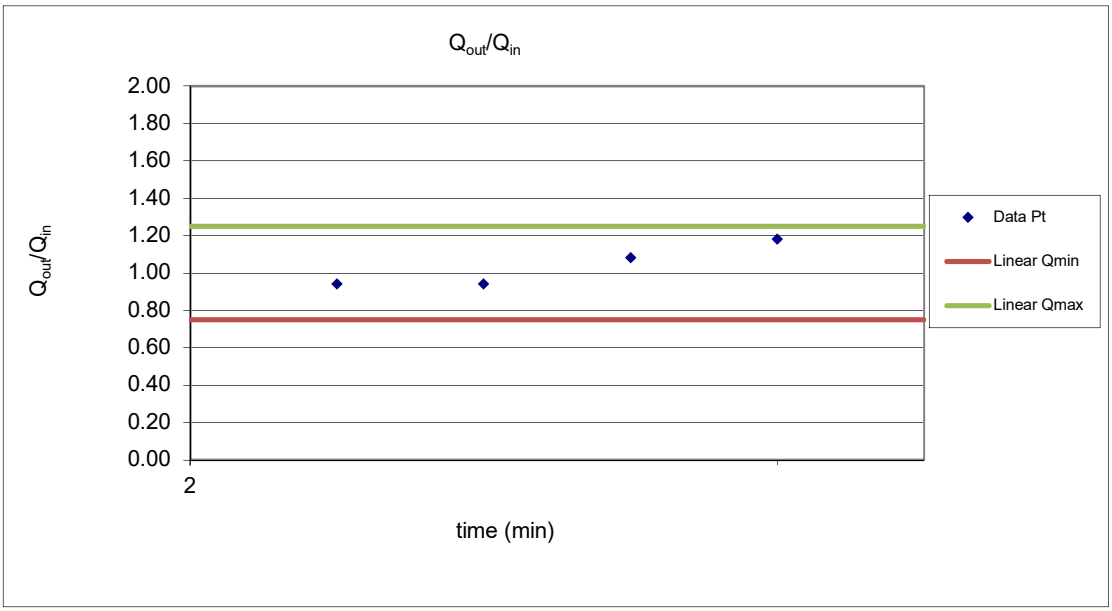


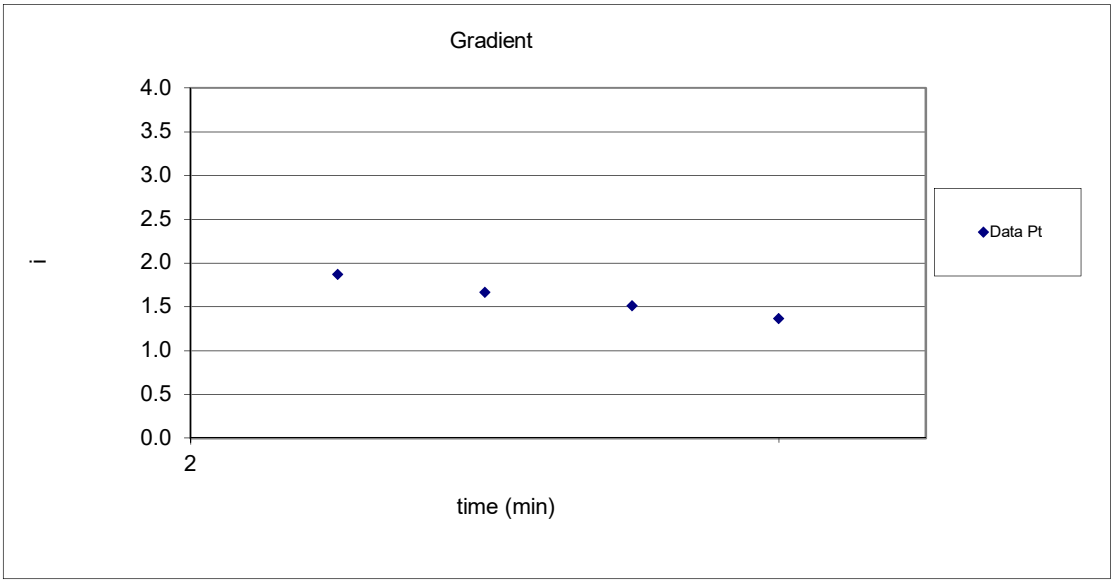
Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-4c **Depth** 13.33-13.92'
Material Description: Lean CLAY with Silty Sand Lenses, dark yellowish brown
Sample Collection Date: 11/10/15

Average k (cm/sec): 1.31E-04 cm/sec





Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-5d **Depth** 16.5-17.0'
Material Description: SILT with SAND, dark grayish brown
Sample Collection Date: 11/10/15

Sample Data:

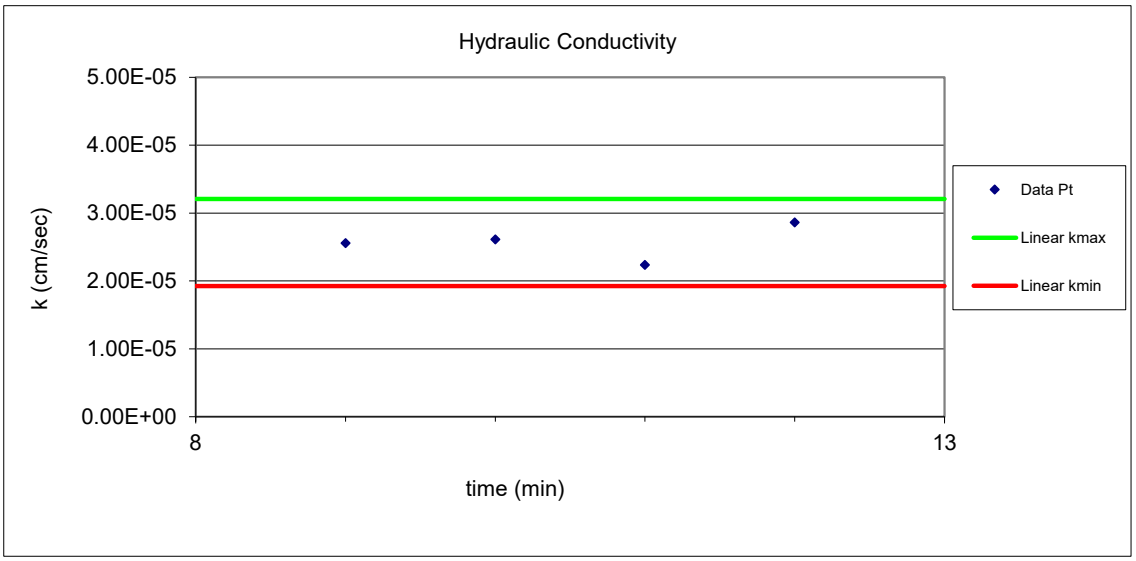
Type of Sample = Shelby

Initial Data:			**Final Data:**		
Sample Length =	8.9	cm	Sample Length =	8.9	cm
Sample Diameter =	7.40	cm	Sample Diameter =	7.38	cm
Area =	43.0	cm^2	Area =	42.8	cm^2
Volume =	382.9	cm^3	Volume =	378.7	cm^3
Wet Weight=	649.7	g	Wet Weight=	660.1	g
Moisture =	36.2	%	Moisture =	38.4	%
Dry Density =	1.25	g/cm^3	Dry Density =	1.26	g/cm^3
Dry Density =	77.7	pcf	Dry Density =	78.6	pcf
Saturation =	85.2	%	Saturation =	92.3	%
Specific Gravity =	2.65	(assumed)	Specific Gravity =	2.65	(assumed)

Testing Parameters:

B Value =		0.98				
Cell Pressure	P_C=	80	psi	Permeant:	Deaired Water	
Bottom Pressure	P_b=	70	psi	Aver. Temp=	69.5	°F
Top Pressure	P_T=	70	psi	Burette Area=	0.194	cm^2
Consolidation	=	10	psi	Initial Hydraulic Gradient=	5.03	
Confining Pressure	=	1440	psf	Final Hydrualic Gradient=	2.04	

Results: **Average k (cm/sec)= 2.57E-05 cm/sec**

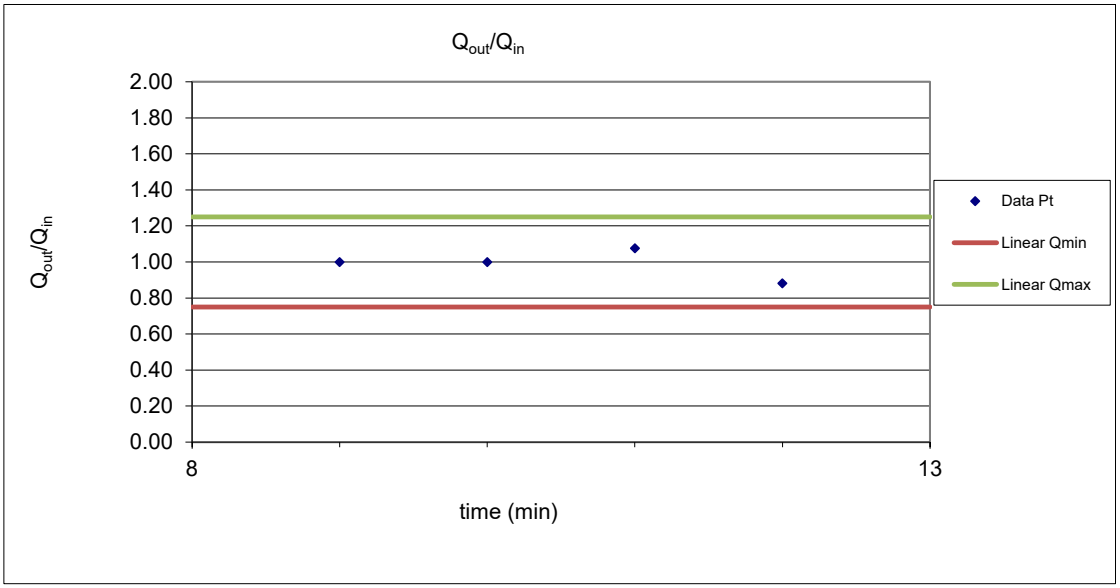


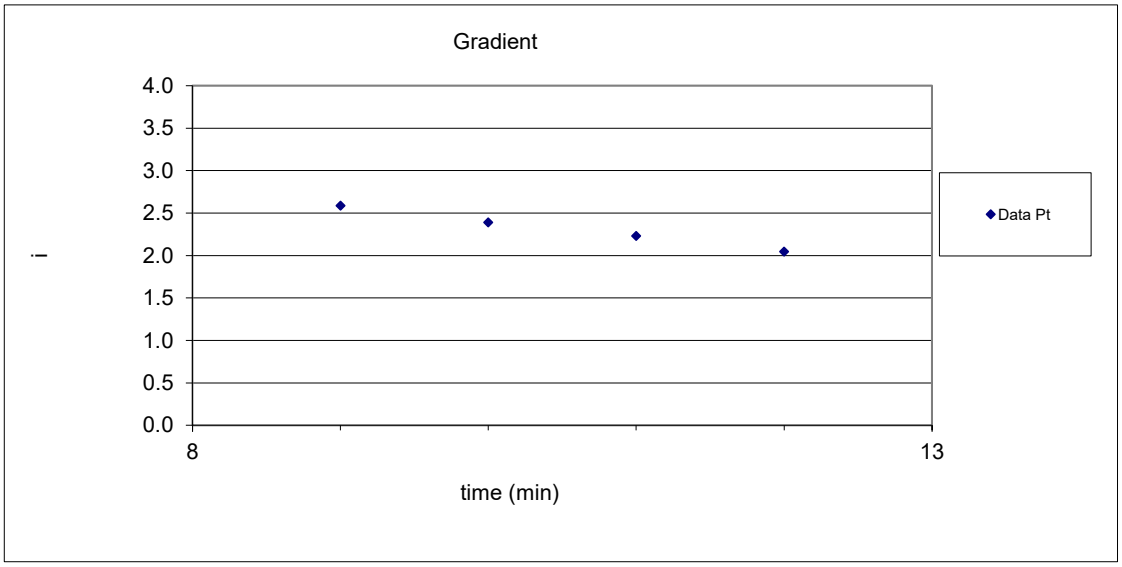
Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-5d **Depth** 16.5-17.0'
Material Description: SILT with SAND, dark grayish brown
Sample Collection Date: 11/10/15

Average k (cm/sec): 2.57E-05 **cm/sec**





Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-8c **Depth** 23'9"-23'11"
Material Description: Lean CLAY, dark grayish brown
Sample Collection Date: 11/10/15

Sample Data:

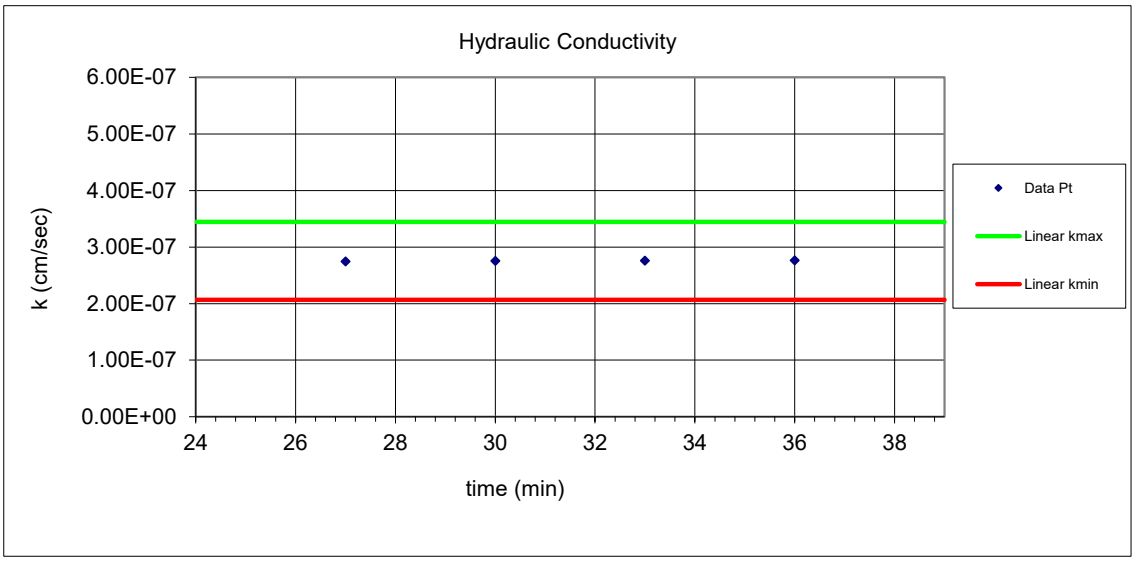
Type of Sample = Shelby

Initial Data:			**Final Data:**		
Sample Length =	9.0	cm	Sample Length =	8.6	cm
Sample Diameter =	7.23	cm	Sample Diameter =	7.12	cm
Area =	41.0	cm^2	Area =	39.8	cm^2
Volume =	369.8	cm^3	Volume =	343.0	cm^3
Wet Weight=	639.7	g	Wet Weight=	619.6	g
Moisture =	44.3	%	Moisture =	39.8	%
Dry Density =	1.20	g/cm^3	Dry Density =	1.29	g/cm^3
Dry Density =	74.8	pcf	Dry Density =	80.7	pcf
Saturation =	97.1	%	Saturation =	100.4	%
Specific Gravity =	2.65	(assumed)	Specific Gravity =	2.65	(assumed)

Testing Parameters:

B Value =		0.965				
Cell Pressure	P_C=	57	psi	Permeant:	Deaired Water	
Bottom Pressure	P_b=	43	psi	Aver. Temp=	67.4	°F
Top Pressure	P_T=	42	psi	Burette Area=	0.194	cm^2
Consolidation	=	15	psi	Initial Hydraulic Gradient=	10.30	
Confining Pressure	=	2160	psf	Final Hydrualic Gradient=	10.17	

Results: **Average k (cm/sec)= 2.76E-07 cm/sec**



Hydraulic Conductivity of Saturated Porous Material
ASTM D 5084 (Method C)

Project: Sacramento Railyards Storm Water Pump Station
Project Number: 1698.X-01
Date: 11/24/2015

Sample Number: BCI-15-B1-8c **Depth** 23'9"-23'11"
Material Description: Lean CLAY, dark grayish brown
Sample Collection Date: 11/10/15

Average k (cm/sec): 2.76E-07 **cm/sec**