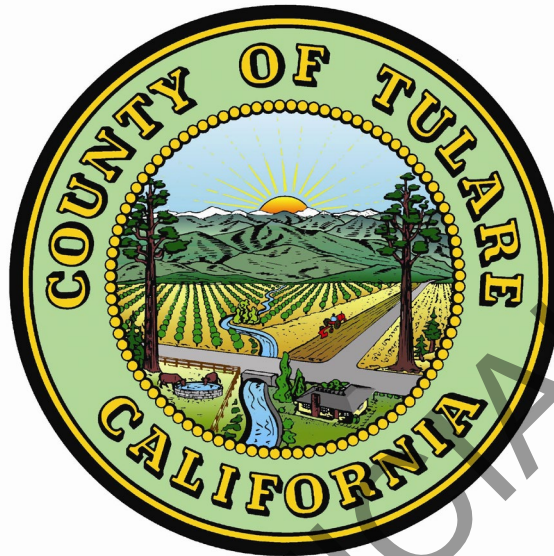


COUNTY OF TULARE

STATE OF CALIFORNIA



**NOTICE TO BIDDERS,
SPECIAL PROVISIONS,
TECHNICAL SPECIFICATIONS,
BID PROPOSAL, CONTRACT AND
CONSTRUCTION QUALITY ASSURANCE PLAN
FOR CONSTRUCTION OF**

**WOODVILLE LANDFILL
UNIT II, PHASE 1 CONSTRUCTION**

FUNDED BY:

TULARE COUNTY SOLID WASTE DEPARTMENT ENTERPRISE FUND

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COUNTY OF TULARE

STATE OF CALIFORNIA

**NOTICE TO BIDDERS,
SPECIAL PROVISIONS,
TECHNICAL SPECIFICATIONS
BID PROPOSAL, CONTRACT AND
CONSTRUCTION QUALITY ASSURANCE PLAN
FOR CONSTRUCTION OF
WOODVILLE LANDFILL
UNIT II, PHASE 1 CONSTRUCTION**

FUNDED BY:

TULARE COUNTY SOLID WASTE DEPARTMENT ENTERPRISE FUND

APPROVED:


BRYCE HOWARD, Director
Tulare County Solid Waste Department

DATE: 08/22/2023

THE SPECIAL PROVISION 39 (ASPHALT PAVEMENT) CONTAINED HEREIN WAS PREPARED BY
OR UNDER THE DIRECTION OF THE FOLLOWING REGISTERED ENGINEER:

SIGNED:


CHRISTOPHER M. RICHGELS, P.E.
Project Manager
Aptim Environmental & Infrastructure, LLC

DATE:

8/15/23



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SPECIAL PROVISIONS
FOR CONSTRUCTION OF
WOODVILLE LANDFILL
UNIT II, PHASE 1 CONSTRUCTION
TABLE OF CONTENTS

NOTICE TO BIDDERS	1
DIVISION I GENERAL PROVISIONS	5
1 GENERAL	5
2 BIDDING	7
3 CONTRACT AWARD AND EXECUTION	9
4 SCOPE OF WORK	13
5 CONTROL OF WORK	14
6 CONTROL OF MATERIALS	17
7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC	18
8 PROSECUTION AND PROGRESS.....	25
9 PAYMENT	26
DIVISION II GENERAL CONSTRUCTION.....	27
10--GENERAL.....	29
12 TEMPORARY TRAFFIC CONTROL	28
13 WATER POLLUTION CONTROL	29
14 ENVIRONMENTAL STEWARDSHIP.....	30
15 EXISTING FACILITIES	32
DIVISION V SURFACINGS AND PAVEMENTS.....	37
39 ASPHALT CONCRETE.....	37
TECHNICAL SPECIFICATIONS.....	57
DIVISION 1 -- GENERAL REQUIREMENTS	
01010 SUMMARY OF WORK	
01025 MEASUREMENT AND PAYMENT	
01039 MEETINGS	

01052 LAYOUT OF WORK AND SURVEYS
01075 TECHNICAL SPECIFICATION DEFINITIONS
01090 REFERENCES
01300 SUBMITTALS
01400 QUALITY CONTROL
01500 MOBILIZATION AND DEMOBILIZATION
01510 CONSTRUCTION FACILITIES
01560 TEMPORARY CONTROLS
01561 CONSTRUCTION CLEANING
01600 MATERIAL AND EQUIPMENT
01630 PRODUCT OPTIONS AND SUBSTITUTIONS
01720 PROJECT RECORD DOCUMENTS
01730 INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS
01800 HEALTH AND SAFETY

DIVISION 2 -- SITE WORK

02200 EARTHWORK
02207 AGGREGATE MATERIALS
02222 EXCAVATION
02225 TRENCHING AND BACKFILL
02310 ROADS
02444 FENCING
02500 OPERATIONS LAYER
02510 LEACHATE COLLECTION AND REMOVAL SYSTEM
02511 LYSIMETER
02589 ELECTRIC LINER LEAK LOCATION SURVEY
02722 DRAINAGE AND EROSION CONTROL
02725 EROSION CONTROL MATTING
02751 STAINLESS STEEL (SS) WIRE ROPE
02771 GEOTEXTILE
02772 HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE
02773 GEOCOMPOSITE
02774 GEOSYNTHETIC CLAY LINER (GCL)

02900 SEEDING AND FERTILIZING

DIVISION 3 -- CONCRETE

03200 REINFORCING STEEL

03300 CONCRETE

DIVISION 11 -- EQUIPMENT

11000 EQUIPMENT

DIVISION 15 -- MECHANICAL

15100 LEACHATE EXTRACTION AND STORAGE

15200 HDPE PIPE

15480 PVC PIPING

DIVISION 16 -- ELECTRICAL

16050 BASIC ELECTRICAL REQUIREMENTS

16100 BASIC ELECTRICAL MATERIALS AND METHODS

16500 LIGHTING

16910 CONTROL PANELS

16911 CELLULAR TELEMETRY

BID PROPOSAL (BID) TO THE BOARD OF SUPERVISORS	B-1
CONTRACT	C-1
PROJECT PLANS (REDUCED SIZE – 11x17).....	ATTACHMENT
CONSTRUCTION QUALITY ASSURANCE MANUAL.....	ATTACHMENT
MITIGATION MEASURES AND REPORTING PROGRAM	ATTACHMENT

BID ITEMS AND APPLICABLE SECTIONS

ITEM NO.	ITEM	UNITS	ESTMATED QUANTITY	SECTION
1.	Mobilization	LS	1	01500
2.	Stormwater Pollution Prevention Plan	LS	1	01560
3.	Excavation	CY	894,600	02222
4.	Earthfill	CY	39,205	02000
5.	Subgrade Preparation Layer	CY	53,625	02200
6.	Geosynthetic Clay Liner	SF	1,496,040	02774
7.	Geomembrane	SF	1,496,040	02772
8.	Drainage Composite	SF	1,496,040	02773
9.	Anchor Trench	LF	4,810	02225
10.	Leachate Collection and Removal System	EA	2	02510
11.	Operations Layer and Cell Access Road	CY	110,410	02500
12.	18" Diameter CMP	LF	95	02722
13.	Culvert 2-30" RCP	LF	90	02722
14.	Culvert 3-36" RCP	LF	90	02722
15.	Culvert 4,5 and 6 Inlet RCP	LF	380	02722
16.	Drainage Channels	LF	3,050	02722
17.	V-Ditch on Unit 1	LF	1,500	02722
18.	12" Aggregate Base Access Road	SF	197,890	02310
19.	HMAC Entrance Road Overlay	TONS	1,084	02310
20.	Leachate Extraction and Storage System	EA	2	15100
21.	Concrete Secondary Containment	EA	2	03300
22.	Electric Service	LS	1	16050
23.	Site Electric	LS	1	16050
24.	Barbed Wire Fence Removal and Replace	LF	1,700	02444
25.	Vegetation and ECM	ACRE	29.5	02900
26.	Geoelectric Leak Location Survey	LS	1	02589
27.	Perforated 6-inch HDPE Pipe	LF	3,600	15200
28.	8-inch Steel Guard Posts	EA	41	03300

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COUNTY OF TULARE
STATE OF CALIFORNIA

NOTICE TO BIDDERS

Completed, signed, sealed Bid Proposal (Bid) for the work shown on the plans entitled:

PLANS FOR THE
WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION
COUNTY OF TULARE; STATE OF CALIFORNIA

will be received at the office of the Clerk of the Board of Supervisors, Administration Building, County Civic Center, 2800 West Burrel Avenue, Visalia, California, 93291, until **2:00 pm on October 18, 2023**. **NOTE:** The bid opening will now be opened publicly at the above listed address and will be broadcasted via Zoom video conferencing. The meeting will be accessible through the following link: **<https://tularecounty-ca.zoom.us/j/2357202363>**, the Meeting ID is **235 720 2363**. **COVID-19 ADVISORY:** Due to the ongoing efforts being made to mitigate the spread of COVID-19, bids may be submitted via mail, but it is the bidder's responsibility to ensure bids are received by the Clerk of the Board prior to the time listed above. Bids may also be dropped off at the above listed address.

General work description: The work to be done consists, in general, of excavation; access road construction; installation of a pan lysimeter consisting of a prepared subgrade, geosynthetic clay liner, HDPE geomembrane liner and drainage geocomposite; and a soil operations layer covering approximately 33 acres. Work also includes providing a leachate collection and removal system consisting of perforated HDPE pipe in trenches and sumps and backfilled with rounded drainage rock, submersible leachate and lysimeter pumps, control systems, and a new power supply and electrical connections. A leachate storage system is required consisting of two 5,100 gallon leachate storage tanks and a concrete secondary containment structure for each system. Other work includes various drainage structures and facilities, aggregate access roads, an HMA Entrance road and securing, transporting and applying all construction water.

The work is shown on the Plans and specified in the special provisions, technical specifications and construction quality assurance manual. Other items or details not mentioned herein that are required by the Plans, Standard Specifications, Technical Specifications or the Special Provisions shall be performed, constructed, furnished or installed. Bidders may visit the project site.

This project is off of the Federal Highway System.

This project is a non-federal aid project with an estimated project cost of approximately **\$11,500,000**

The contract will be awarded to the responsible bidder submitting the lowest priced responsive bid.

The Project is to be completed within ONE HUNDRED NINETY (190) working days from the date to be established in the NOTICE TO PROCEED. The Contract includes provisions for Liquidated Damages if the Project is not timely completed.

Prospective bid holders must be listed on the planholders list to receive electronic copies of Plans, Specifications, and Bid forms (official bid documents). To be added to the planholders list, contact the Resource Management Agency at (559) 624-7000 or through email at RMABids@tularecounty.ca.gov; Office Hours 7:30 AM – 5:30 PM Mon-Thurs.; 8:00 AM – 12:00 PM Fri. Once prospective bidders have been added to the planholders list, the official bid documents will be provided via email. There is no fee for the official bid documents. An unofficial set of Plans, Specifications, and other project information is available for download at the County's website at the following address:

<https://tcgov.link/bids>

FOLLOW THESE INSTRUCTIONS: Print the “Bid” Section from this Special Provisions package, from the official electronic copy obtained through the County, upon being listed on the official Planholder List. Complete all required forms and provide all necessary supplemental documentation. Please submit unbound/unstapled originals at the location described above.

To be considered a plan holder and to receive any addendum, bidders must obtain a set of electronic plans, specifications and Bid forms at the Resource Management Agency, and be listed on the planholders list. Bidders must be on the planholders list for their bid to be considered responsive. All addendums, prebid meeting minutes, bid clarifications, planholders list, and relevant information will be available at the County's website as mentioned above. Addendums will also be provided to contractors on the planholders list via the information provided by the contractor on the planholders list. Bid results will be posted on the County website within two working days of the bid opening.

Technical questions should be directed in writing to Jonah Treviño at the Solid Waste Department, 5955 S. Mooney Blvd, Visalia CA 93277 or at jtrevino@tularecounty.ca.gov. **No questions will be accepted within five (5) working days of the bid opening (Questions must be received by 5:00PM on Wednesday October 11, 2023).** All questions and responses will be continuously posted on the County website.

Before submitting a bid, bidders are encouraged to carefully examine the Plans and Specifications, and related documents, visit the site of the work and fully inform themselves as to all existing conditions and limitations, and include in the bid a sum to cover the cost of all items included in the work.

A pre-bid meeting is scheduled for 10:00AM on Tuesday October 10, 2023, at the Woodville Landfill, 19800 Road 152, Tulare California. The meeting is mandatory, so bidders are required to attend.

The bidder awarded the contract may need to obtain permits, licenses, or enter into other agreements to prosecute the work. Bidders are advised that, unless otherwise stated, the contract price will be full compensation for all required work and no additional compensation will be allowed. If the bidder must obtain permits, licenses, contracts or other services to prosecute the work, the bidder will pay the cost of those items and no other compensation will be paid by the County.

Bids are required for the entire work described herein. Submit the bidder's security in the form of cash, a bidder's bond, or a certified check or cashier's check, in the amount of ten percent (10%) of the amount bid or the bid will be considered nonresponsive.

Comply with the Title VI of the Civil Rights Act of 1964, and in accordance with said Act, no person of the grounds of race, color, sex or national origin, shall be excluded from participation in, be denied of benefits of, or be otherwise subject to discrimination under any service or activity in connection with the project.

Comply with Title VII of the Civil Rights Act 1964, which prohibits discrimination against any employee or applicant for employment because of race, color, religion, sex or national origin.

At the time the bid is submitted, you must possess a current valid California Class **A** Contractor's license.

A contractor or subcontractor is not qualified to bid on, be listed in a Bid (subject to the requirements of Section 4104 of the Public Contract Code), or engage in the performance of any contract for this project, unless currently registered and qualified to perform public work pursuant to California Labor Code section 1725.5. It is not a violation of this section for an unregistered contractor to submit a bid that is authorized by Section 7029.1 of the Business and Professions Code or by Sections 10164 or 20103.5 of the Public Contract Code, provided the contractor is registered to perform public work pursuant to Labor Code section 1725.5 at the time the contract is awarded.

This project is subject to compliance monitoring and enforcement by the California Department of Industrial Relations.

The successful bidder must provide the performance bond, payment bond, workers compensation certificate, and liability insurance policy required by the Special Provisions and contract. **(FOUR MILLION DOLLARS (\$4,000,000))** liability coverage is required for this project.

Substitution of securities for any moneys withheld shall be permitted pursuant to Public Contract Code section 10263. This project is subject to State contract nondiscrimination and compliance requirements pursuant to Government Code, section 12990.

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done, have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, are on file at Resource Management Agency-Permit Center, 5961 South Mooney Boulevard, Visalia, CA 93277 and will be made available to any interested person on request. Also, the General Prevailing Wage Rates for this project, are made available on the County public works website (see link on the previous page) and the California Department of Industrial Relations' Internet website at <http://www.dir.ca.gov/DLSR/PWD>. Contractor shall be responsible to post the general prevailing wage rates at a prominent place at the job site in accordance with section 7-1.02K(2) of the Caltrans Standard Specifications. Future effective general prevailing wage rates, which have been predetermined and are on file with the California Department of Industrial Relations, are referenced, but not printed in the Special Provisions.

AB 626, approved by the Governor of the State of California on September 29, 2016, created a new Public Contract Code section 9204, which specifies new procedural requirements for claims submitted by a contractor on any public works project. Please review the language of the "Public Contract Code Section 9204 Statement" in the Proposal.

You are responsible for compliance by all subcontractors with Labor Code section 1776.

All bidders are invited to attend the bid opening per the link provided. The results of the bid opening will be reported to the Board of Supervisors at a scheduled meeting. The contract will be awarded in the manner and within the time periods provided in Section 3 of the Standard Specifications, Department of Transportation of the State of California, 2018 Edition, as amended by the project Special Provisions, unless the Board of Supervisors exercises its right to reject any or all bids. The Board of Supervisors reserves the right to deem any bid as non-responsive for any information crossed out from the bid packet including information completed by the manufacturer.

The Board of Supervisors reserves the right to reject any or all bids, and/or waive any informality in any bid, and/or determine in its discretion the responsibility of any bidder.

The Board of Supervisors further reserves the right to use County Forces, or to negotiate contracts, or both, to the extent authorized by the Public Contract Code.

By order of the Board of Supervisors.

JASON T. BRITT
County Administrative Officer/
Clerk, Board of Supervisors.

By Original Signed
Deputy

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TERM

Transportation Laboratory or METS

INTERPRETATION

Tulare County Resource Management Agency, except when used to identify a State form, document, or testing procedure.

The project plans for this project were approved September 12, 2023 and are entitled:

**PLANS FOR THE
WOODVILLE LANDFILL
UNIT II, PHASE 1 CONSTRUCTION**

COUNTY OF TULARE; STATE OF CALIFORNIA

The following documents will be supplied to you with the Notice to Proceed:

1. One complete set of full size (22"x34") Project Plans
2. One complete set of half size (11"x17") Project Plans
3. Two complete bid books including:
 - 3.1. Notice to Contractors
 - 3.2. Special Provisions
 - 3.3. Technical Specifications
 - 3.4. Bid
 - 3.5. Contract
4. Electronic versions of full size and half size plans and Special Provisions, Bid and Contract.

Replace "holiday" and its definition in Section 1-1.07B with:

holiday: County legal holidays and every Sunday. When a holiday falls on a Sunday, it shall be observed on the following Monday.

Replace "South Coast Air Quality Management District" and attributes in Section 1-1.11 with:

Reference or agency or department unit	Website	Address	Telephone no.
San Joaquin Valley Air Pollution Control District (Central)	www.valleyair.org	1990 E. Gettysburg Avenue Fresno, CA 93726-0244	(559) 230-6000

2 BIDDING

Replace Section 2-1.06 with the following:

2-1.06 BID DOCUMENTS

2-1.06A General

The *Special Provisions, Bid and Contract (Bid book)* includes bid forms and certifications.

The *Special Provisions, Bid and Contract* book and project plans may be received electronically by requesting to be added to the planholders list by contacting the Resource Management Agency at (559) 624-7000 or through email at RMABids@tularecounty.ca.gov. The unofficial Bid book and project plans can be viewed at the County's Website:

<https://tcgov.link/bids>

The *Special Provisions, Bid and Contract* book includes the *Notice to Bidders*, Technical Specifications, Construction Quality Assurance Plan, and Special Provisions.

The unofficial *Bid book, Special Provisions, Bid and Contract*, project plans, and any addenda to these documents may be accessed at the County Website.

2-1.06B Supplemental Project Information

The County makes supplemental information available as specified in the Special Provisions.

Logs of test borings are supplemental project information.

If an *Information Handout* or cross sections are available, you may view it at the County Website.

If other supplemental project information is available for inspection, you may view it by phoning in a request. Make your request at least 7 days before viewing. Include in your request:

1. Contract number
2. Viewing date
3. Contact information, including telephone number

As-built drawings may not show existing dimensions and conditions. Where new construction dimensions are dependent on existing dimensions, verify the field dimensions and adjust the dimensions of the work to fit the existing conditions, as approved by the Engineer.

Replace Section 2-1.10 with the following:

2-1.10 SUBCONTRACTOR LIST

On the Subcontractor List form, list each subcontractor to perform work in an amount in excess of 1/2 of 1 percent of the total bid or \$10,000, whichever is greater (Pub Contract Code § 4100 et seq.).

For each subcontractor listed, the Subcontractor List form must show:

1. Business name and the location of its place of business
2. State contractor's license number
3. Department of Industrial Relations("DIR") registration number
4. Portion of work it will perform, demonstrated by:
 - 4.1. Bid item numbers for the subcontracted work

- 4.2. Percentage of the subcontracted work for each bid item listed
- 4.3. Description of the subcontracted work if the percentage of the bid item listed is less than 100 percent

Replace Section 2-1.33A with the following:

2-1.33A General

Print the *Bid Proposal (Bid) to the Board of Supervisors* section from this Special Provisions package and complete the forms.

Submit your forms to the Clerk of the Board of Supervisors at the front desk, by mail or by delivery before the bid opening time and date. The address to the Board of Supervisors is provided below:

2800 W Burrel Avenue, Visalia, CA 93291

Failure to submit the forms and information as specified may result in a nonresponsive bid.

If an agent other than the authorized corporate officer or a partnership member signs the bid, file a Power of Attorney with the County either before opening bids or with the bid. Otherwise, the bid may be nonresponsive.

The County only accepts paper bid submittals in person or through mail as described in the Notice to Bidders. Place your completed forms inside a sealed paper envelope, and on the cover of the envelope, include:

1. Name of the contractor
2. Project title
3. Marked as a Bid
4. Bid opening date

Submit the enclosed Bid to the Clerk of the Board of Supervisors prior to bid opening.

Delete Section 2-1.33B Bid Form Submittal Schedules

Replace Section 2-1.34 with the following:

2-1.34 BIDDER'S SECURITY

Submit one of the following forms of bidder's security equal to at least 10 percent (10%) of the bid:

1. Cash
2. Cashier's check
3. Certified check
4. Signed bidder's bond by an admitted surety insurer who is licensed in California

If using a bidder's bond, you must use the form in the *Bid*. Failure to do so will render your bid non-responsive.

Submit cash, cashier's check, certified check, or bidder's bond, to the Clerk of the Board of Supervisors before the bid opening time.

Replace Section 2-1.40 with the following:

2-1.40 BID WITHDRAWAL

An authorized agent may withdraw a bid before the bid opening date and time by submitting a written bid withdrawal request at the location where the bid was submitted. Withdrawing a bid does not prevent you from submitting a new bid. After the bid opening, you cannot withdraw a bid.

AA

3 CONTRACT AWARD AND EXECUTION

Replace all of Section 3 with:

3-1.01 AWARD OF CONTRACT

The Tulare County Board of Supervisors reserves the right to reject any or all Bids, or waive any or all discrepancies or failures in a Bid. The County of Tulare also maintains Part V, Chapter 15 of its ordinance Code, "Public Works Contractor Debarment" and any entity bidding on this project who is included in the list of debarred and suspended persons pursuant to 5-15-5000 of the Tulare County Ordinance Code shall be disqualified from bidding or being awarded a contract with Tulare County pursuant to Tulare County Ordinance 5-15-4000. The decision of the Tulare County Board of Supervisors regarding the amount of a bid, or existence or treatment of a discrepancy or failure in a bid will be final. The award of the contract, if it is awarded, will be to the lowest responsive and responsible bidder whose Bid complies with all the requirements prescribed. Such award, if made, will be made within sixty (60) days after the opening of the Bid. This period may be subject to an extension for such further period as may be agreed upon in writing between the Tulare County Board of Supervisors and the bidder concerned.

All bids will be compared on the basis of the Engineer's Estimate of the quantities of work to be done.

A responsible bidder who submitted the lowest bid as determined by this section will be awarded the contract, if it is awarded. This section does not preclude the County from adding to or deducting from the contract any of the additive or deductive items after the lowest responsible bidder has been determined.

The following failures are not waivable and will cause a bid to be considered non-responsive:

1. **Failure to sign the bid**
2. **Failure to furnish the required bid bond or equivalent as specified in 2-1.34 of the Special Provisions**
3. **Failure to include a total amount of the bid**
4. **Failure to submit a completed addenda certification statement**
5. **Failure to be listed on the planholders list**
6. **Failure to attend Pre-bid meeting as described in the Notice to Bidder section**

The above list is not inclusive of all failures that the Tulare County Board of Supervisors will consider non-responsive. However, the Tulare County Board of Supervisors reserves the right to waive other types of discrepancies or failures. The Tulare County Board of Supervisors' decision or treatment regarding a bid will be final.

The contract must be signed by the successful bidder and returned together with the contract bonds and insurance certificates within **TEN (10) days**, not including Saturday, Sunday or Tulare County legal holidays, after the bidder has received notice from the County that the contract is scheduled for award by the Board of Supervisors.

3-1.02 BID PROTEST PROCEDURES

Any bid protests must be in writing and received by the Director of the Tulare County Solid Waste Department, 5955 S. Mooney Boulevard, Visalia, CA 93277, before 5:00 p.m. no later than two working days following the posting of the bid summary (the "Bid Protest Deadline") and must comply with the following requirements:

A. General. Only a bidder who has actually submitted a Bid is eligible to submit a bid protest against another bidder. Subcontractors and material suppliers are not eligible to submit bid protests. A bidder may not rely on the bid protest submitted by another bidder, but must timely pursue its own protest. A bid protest against

the bids of more than one bidder will be considered as separate protests against each such bidder and will be separately considered. The protesting bidder must submit a non-refundable fee in the amount of \$750.00 per protest, based upon County's reasonable costs to administer the bid protest(s). Any such fees must be submitted to County no later than the Bid Protest Deadline, unless otherwise specified. For purposes of this Bid Protest Procedure, a "working day" means a day that County is open for normal business, and excludes weekends and holidays observed by County.

B. Protest Contents. Each bid protest must contain a complete statement of the basis for the protest and all supporting documentation. Material submitted after the Bid Protest Deadline will not be considered. The protest must refer to the specific portion or portions of the Contract Documents upon which the protest is based. The protest must include the name, address, email address, and telephone number of the person representing the protesting bidder if different from the protesting bidder's.

C. Copies to Protested Bidders. A copy of the protest and all supporting documents must be concurrently transmitted by email, by or before the Bid Protest Deadline, by the protesting bidder to the protested bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest(s).

D. Response to Protest. The protested bidder may submit a written response to the protest, provided the response is received by the Director of the Solid Waste Department, before 5:00 p.m., within two working days after the Bid Protest Deadline or after actual receipt of the bid protest, whichever is sooner (the "Response Deadline"). The response must include all supporting documentation. Material submitted after the Response Deadline will not be considered. The response must include the name, address, email address, and telephone number of the person representing the protested bidder if different from the protested bidder's.

E. Copies to Protesting Bidder. A copy of the response and all supporting documents must be concurrently transmitted by email, by or before the Response Deadline, by the protested bidder to the protesting bidder and any other bidder who has a reasonable prospect of receiving an award depending upon the outcome of the protest.

F. Consideration of Protests. The Director of the Solid Waste Department or his or her designee will inform the protesting and protested bidders in writing of the time and place that the Board of Supervisors will consider the protest(s).

G. Exclusive Remedy. The procedure and time limits set forth in this section are mandatory and are the bidder's sole and exclusive remedy in the event of a bid protest. A bidder's failure to comply with these procedures will constitute a waiver of any right to further pursue a bid protest, including filing a Government Code Claim or initiation of legal proceedings.

H. Right to Award. The County Board of Supervisors reserves the right to award the Contract to the bidder it has determined to be the responsible bidder submitting the lowest responsive bid, and to issue a notice to proceed with the Work notwithstanding any pending or continuing challenge to its determination.

3-1.03 TIED BIDS

The County breaks a tied bid with a coin toss except:

1. If a small business bidder and a non-small business bidder request preferences and the reductions result in a tied bid, the County awards the contract to the small business bidder.
2. If a DBE small business bidder and a non-DBE small business bidder request preferences and the reduction results in a tied bid, the County awards the contract to the DBE small business bidder.

3-1.04 CONTRACTOR REGISTRATION

No contractor or subcontractor may be awarded a contract for public work on a public works project unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

3-1.05 BONDS

The awarded bidder must file with the signed contract, two bonds in the amount and for the purposes specified below. They must be surety bonds and must be issued by corporations duly and legally licensed to transact business in the State of California.

A Performance Bond must be furnished by the awarded bidder in the amount of one hundred percent (100%) of the contract price and must guarantee faithful performance of the contract and must insure the County during the life of the contract and for the term of one (1) year from the date of acceptance of the work against faulty or improper materials or workmanship that may be discovered during that time. The awarded bidder must maintain the Performance Bond at its own expense.

A Payment Bond must be furnished by the awarded bidder in the amount of one hundred percent (100%) of the contract price and must guarantee the payment in full of all claims for labor and material in accordance with the provisions of Sections 9550-9566 of the Civil Code of the State of California. The life of the Payment Bond must extend to thirty (30) days after the notice of completion is recorded. The awarded bidder must maintain the Payment Bond at its own expense.

All bonds required, whether Bid Bonds, Performance, Payment, or other Bonds, must be issued by an admitted surety insurer. All bonds must be issued by the same admitted surety insurer. **All bonds required by these specifications will neither be accepted nor approved by the County unless the bonds are in the form shown in these Special Provisions and are underwritten by an admitted surety.**

An original or certified copy of the unrevoked appointment of an individual duly and currently designated as an attorney-in-fact for the surety must accompany the bid certifying an agent to issue the Performance Bond and the Payment Bond.

The County further reserves the right to satisfy itself as to the acceptability of the surety and the form of bonds. The bidder may be required to submit the following documents:

1. The original, or a certified copy, of the unrevoked appointment, power of attorney, bylaws, or other instrument authorizing the person who executed the bond to do so.
2. A certified copy of the certificate of authority of the insurer issued by the California Insurance Commissioner.
3. A certificate from the County Clerk that the certificate of authority has not been surrendered, revoked, canceled, annulled, or suspended, or in the event that it has, that renewed authority has been granted.
4. A financial statement of the assets and liabilities of the insurer to the end of the quarter calendar year prior to thirty (30) days next preceding the date of the execution of the bond, in the form of an officers' certificate as defined in Corporations Code section 173.

3-1.06 CONTRACTOR LICENSE

For a federal-aid contract, the Contractor must be properly licensed as a contractor from contract award through Contract acceptance (Pub Contract Code § 20103.5).

For a non-federal-aid contract:

1. The Contractor must be properly licensed as a contractor from bid opening through Contract acceptance (Bus & Prof Code § 7028.15).
2. Joint venture bidders must obtain a joint venture license before contract award (Bus & Prof Code § 7029.1).

The Contractor will have the required license until the project is completed.

3-1.08 CONTRACT EXECUTION

The successful bidder must sign the *Contract* form.

Deliver to the Engineer:

1. The signed *Contract* (digital copy acceptable). The Contract must be signed by both the company president or vice president **and** the company secretary or treasurer (the two officers of the company

cannot be the same person) with the Contractors State License Board number and Federal Employer Identification Number.

2. The statutory Performance Bond pursuant to Public Contract Code section 20129 and the statutory Payment Bond pursuant to Civil Code sections 9550 through 9566, with either County Clerks certificates or copies of power of attorney.
3. Certification concerning Workers' Compensation Insurance.
4. Certificate(s) of Insurance in compliance with the requirements of these Special Provisions including general liability, automobile and workers' compensation.
5. Evidence that you possess a current, valid Contractors State License required to perform the work under this Contract. A copy of your license is sufficient.

The Engineer must receive these documents within **TEN (10) days**, not including Saturday, Sunday or Tulare County legal holidays, after the bidder has received notice from the County that the contract is scheduled for award by the Board of Supervisors.

The awarded bidder's bond may be forfeited for failure to execute the contract within the time specified (Pub Contract Code 20172).

A copy of the Contract is included in the *Special Provisions, Bid Proposal, and Contract*.

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4 SCOPE OF WORK

Replace all references to “Department” in Section 4 Scope of Work with:

Engineer

Add following the last paragraph of Section 4-1.06B:

Except as provided for in Public Contract Code section 7102, you have no claim for damages or compensation for any delay or hindrance.

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5 CONTROL OF WORK

Delete the 9th Paragraph of Section 5-1.01

Replace Section 1 of the second paragraph of Section 5-1.02 with the following:

1. The governing ranking of the Contract parts in descending order is:
 - 1.1. Special Provisions
 - 1.2. Construction Quality Assurance Plan
 - 1.3. Project Plans
 - 1.4. Standard Specifications
 - 1.5. Standard Plans
 - 1.6. Supplemental Project Information

Replace Section 5-1.04 with:

5-1.04 QUALITY CONTROL AND ASSURANCE

All work must comply with the Construction Quality Assurance (CQA) Plan attached hereto and made a part of this Contract. The County, or its third party construction quality assurance firm will perform CAQ sampling and testing. You will provide access to the work and assist the CQA monitors in obtaining samples at the frequency in the CQA Plan.

The requirement for a quality control manager is hereby specified. You will designate a construction quality control manager for welding and installing HDPE pipe and geomembrane.

Delete Section 5-1.09 PARTNERING

Replace "Department" in Section 5-1.12 with:

Engineer

Replace fifth paragraph of Section 5-1.13A with the following:

You must perform with your organization work amounting to not less than 30 percent of the original contract price, less the value of specialty items designated with (S) or (S-F)

Replace Section 5-1.26 with:

Refer to Section 01300 of the Technical Specifications regarding the requirements for submittals

Replace Section 5-1.26 with:

5-1.26 CONSTRUCTION SURVEYS

You must set construction stakes and markers to establish the lines and grades required for the completion of the work on the plans and as specified in the Standard Specifications and these Special Provisions and as necessary for the Engineer to check lines, grades, alignment and elevations.

All procedures, methods, and typical stake markings must be in accordance with Chapter 12, Construction Surveys, of the Caltrans "Survey Manual." Copies of the "Survey Manual" may be purchased from Caltrans Publications Unit, 1900 Royal Oaks Drive, Sacramento, and California 95815, (916) 445-3520.

Staking must be performed under the direction of a licensed surveyor or registered civil engineer with the authority to perform land surveying.

Preserve stakes and marks placed. If the stakes or marks are destroyed, replace them at your own cost.

Electronic drawing files in AutoCAD format, containing 2-dimensional linework of horizontal alignments, centerlines and layout lines will be furnished to you for your use in performing construction staking. A Digital Terrain Model (DTM) will not be provided.

In using, modifying, or accessing information from the electronic files, you are responsible for confirmation, accuracy, and checking of the data from the electronic files against the data contained on the contract documents. The County and the Design Engineer hereby disclaim all responsibility from any results obtained in use of electronic files and does not guarantee any accuracy of the information. You assume full responsibility for comparing the electronic file information to the contract documents and immediately notifying the Engineer in writing of any observed discrepancies.

You understand and agree that the electronic files provided pursuant to this Contract are instruments of professional services and will remain the property of the County and will not be disseminated to others for purposes other than this project.

Because of the possibility that information and data delivered in AutoCAD format may be altered, whether inadvertently or otherwise, the County reserves the right to retain hard copy originals of all electronic files delivered to you, which originals will be referred to and will govern in the event of any inconsistency between the two.

In using the electronic information, you understand that the automated conversion of information and data from the system and format used by the Design Engineer to an alternate system or format cannot be accomplished without the possibility of introduction of inaccuracies, anomalies, and errors. In the event the electronic files provided to you in AutoCAD format is so converted, you agree to assume all risks associated therewith, and to the fullest extent permitted by law, to hold harmless and indemnify the County from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising there from or in connection therewith.

In using the electronic information, you recognize that changes or modifications to electronic media introduced by anyone other than the Design Engineer may result in adverse consequences, which the Design Engineer can neither predict nor control. Therefore, and in consideration of the Design Engineer's agreement to deliver its instruments of professional service in AutoCAD format, Contractor agrees, to fullest extent permitted by law, to hold harmless and indemnify the County from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misrepresentation, misuse, or reuse by others of the electronic information provided by the Design Engineer. The foregoing indemnification applies, without limitation, to any use of the electronic files on other projects.

Make all computations necessary to establish the exact position of the work from control points. All computations, survey notes, cut sheets, and other records necessary to accomplish the work must be neat, legible, and accurate. Furnish copies of such computation, notes, cut sheets, and other records to the Engineer on the same day construction stakes are set.

Upon completion of construction staking and prior to acceptance of the contract, furnish all computations, survey notes, cut sheets, and other data used to accomplish the work to the Engineer and shall become the property of the County.

Full compensation for construction surveys shall be included in the contract lump sum price paid for Mobilization and includes furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work required for construction staking, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Replace Section 5-1.27E with:

5-1.27E Change Order Bills

Maintain separate records for change order work costs.

Submit change order bills to the Engineer.

Replace “Reserved” in Section 5-1.28 with:

5-1.28 UTILITIES FOR CONTRACTOR’S USE

Single phase, 120/240V electrical power for the use by the Contractor for purposes related to the work on this project shall be available from a load panel near the Construction and CQA Office location. All temporary connections to this power source must be made and maintained by the Contractor at his expense, but Contractor will not be charged for the cost of the electrical power. Temporary connections to electrical power at other locations on the site may be available to the Contractor subject to the approval of the Engineer. A telephone landline or other utilities for the Contractor’s use are not available and the Contractor must make and maintain any other necessary utility service connections at the Contractor’s expense.

Replace Section 5-1.32 with:

5-1.32 AREAS FOR CONTRACTOR’S USE

Area on site is available for the Contractor’s use will be determined by the Resident Engineer. Use of these work areas and other County-owned property shall be at the Contractor’s own risk. The County shall not be held liable for damage to or loss of materials or equipment located within these areas.

Remove all equipment, materials, and rubbish from the work areas and other County-owned property you occupy and leave the areas in a presentable condition at the completion of the project. Comply with Section 4-1.13.

You must secure, at your own expense, areas required for storage of materials and equipment or for other purposes if sufficient area is not available within the contract limits.

The County does not allow temporary residences on County property.

Add to the last sentence of the last paragraph in Section 5-1.38:

or defects in workmanship and materials.

Replace Section 5-1.43E with:

5-1.43E Alternative Dispute Resolution

The venue for all dispute resolution proceedings should be in Tulare County.

If claims or disputes documented by the Full and Final Potential Claim Record arising under or related to the performance of this Contract cannot be settled through negotiation, the parties agree to first to try in good faith to settle the dispute by non-binding mediation, unless the parties mutually agree otherwise. The mediator should be mutually selected by the parties but in the case of disagreement, the mediator should be selected by lot from among two nominations provided by each party. All cost and fees required by the mediator should be split equally by the parties. If mediation fails to resolve the dispute within 30 days, either party may explore whatever other legal options may be deemed appropriate.

Replace “Contract acceptance” in the first paragraph of Section 5-1.47 with:

the date that the Tulare County Board of Supervisors approves the notice of completion.

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6 CONTROL OF MATERIALS

Replace Sections 6-2.02B, 6-2.02C and 6-2.02D with:

The Contractor shall develop, implement and maintain a quality control program for materials consistent with the requirements of the applicable Technical Specifications and Construction Quality Assurance Plan herein.

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7 LEGAL RELATIONS AND RESPONSIBILITY TO THE PUBLIC

Add following the last paragraph of Section 7-1.02K(1):

Post job site notices in compliance with Title 8 California Code of Regulations section 16451

Replace 2nd paragraph in Section 7-1.02K(2) with:

The general prevailing wage rates and any applicable changes to these wage rates are available:

1. From the Department of Industrial Relations' website
2. On file at the Resource Management Agency Permit Center, 5961 South Mooney Boulevard Visalia, CA 93277, and will be made available to any interested person on request.
3. From the County Public Works website (see link in the Notice to Bidder section).

Replace Section 7-1.02K(3) with:

7-1.02K(3) Certified Payroll Records (Labor Code § 1776)

Keep accurate payroll records.

Submit a copy of your certified payroll records, weekly, including those of subcontractors. Include:

1. Each employee's:
 - 1.1. Full name
 - 1.2. Address
 - 1.3. Social security number
 - 1.4. Work classification
 - 1.5. Straight time and overtime hours worked each day and week
 - 1.6. Actual wages paid for each day to each:
 1. Journeyman
 2. Apprentice
 3. Worker
 4. Other employee you employ for the work
 - 1.7. Pay rate
 - 1.8. Itemized deductions made
 - 1.9. Check number issued
2. Apprentices and the apprentice-to-journeyman ratio

Each certified payroll record must include a Statement of Compliance form signed under penalty of perjury that declares:

1. Information contained in the payroll record is true, correct, and complete
2. Employer has complied with the requirements of Labor Code sections 1771, 1811, and 1815 for any work performed by his or her employees on the public works project
3. Wage rates paid are at least those required by the Contract

The Department allows the use of a form with identical wording as the Statement of Compliance form provided by the Department. Submit all certified payroll directly to the Department of Industrial Relations (DIR) in electronic format and to the Engineer on a weekly basis.

Submitted certified payrolls for hauling and delivering ready-mixed concrete must be accompanied by a written time record. The time record must include:

1. Truck driver's full name and address
2. Name and address of the factory or batching plant
3. Time the concrete was loaded at the factory or batching plant
4. Time the truck returned to the factory or batching plant
5. Truck driver's signature certifying under penalty of perjury that the information contained in this written time record is true and correct

Make certified payroll records available for inspection at all reasonable hours at your main office on the following basis:

1. Upon the employee's request or upon request of the employee's authorized representative, make available for inspection a certified copy of the employee's payroll record.
2. Refer the public's requests for certified payroll records to the Department. Upon the public's request, the Department makes available for inspection or furnishes copies of your certified payroll records. Do not give the public access to the records at your main office.

Make all payroll records available for inspection and copying or furnish a copy upon request of a representative of the:

1. Department
2. Division of Labor Standards Enforcement of the Department of Industrial Relations
3. Division of Apprenticeship Standards of the Department of Industrial Relations

Furnish the Department the location of the records. Include the street address, city, and county. Furnish the Department a notification of a location and address change within five (5) business days of the change.

Comply with a request for the records within ten (10) days after you receive a written request. If you do not comply within this period, the Department withholds from progress payments a one hundred dollar (\$100) penalty for each day or part of a day for each worker until you comply. You are not assessed this penalty for a subcontractor's failure to comply with Labor Code section 1776.

The Department withholds from progress payments for delinquent or inadequate records (Labor Code section 1771.5). If you have not submitted an adequate record by the month's 15th day for the period ending on or before the 1st of that month, the Department withholds up to 10 percent(10%) of the monthly progress estimate, exclusive of mobilization. The Department does not withhold more than ten thousand dollars (\$10,000) or less than one thousand dollars (\$1,000).

Replace "Reserved" in section 7-1.02K(6)(j)(iii) with:

7-1.02K(6)(j)(iii) Material Containing Lead – Non Hazardous Waste

Section 7-1.02K(6)(j)(ii) includes specifications for handling, removing, and disposing of non-hazardous material containing lead.

Submit a lead compliance plan.

Lead has been previously tested in the surrounding soils and traffic stripes. It was determined that lead is present in material on the job site. Average lead concentrations are below 1,000 mg/kg total lead and below 5 mg/L soluble lead, the material on the job site:

1. Is not a hazardous waste
2. Does not require disposal at a permitted landfill or solid waste disposal facility

Reuse all of the excavated material on the right-of-way. Handle the material under all applicable laws, rules, and regulations, including those of the following agencies:

1. Cal/OSHA
2. CVRWQCB, Region 5 – Central Valley Regional Water Quality Control Board

3. California Department of Toxic Substances Control

Payment for conforming to the requirements of this section is included in the prices paid for the various Contract items of work and no additional compensation will be allowed therefore.

See Section 14-11.02 for additional details on work requirements and payment provisions for removal of asbestos and hazardous substances.

Replace Section 7-1.02K(6)(j)(iv) with:

7-1.02K(6)(j)(iv) Material Containing Lead – Hazardous Waste

If lead testing yields concentrations exceeding the limits described per Title 8 California Code of Regulations and Title 22 California Code of Regulations, the material(s) should be treated as hazardous waste and disposal at a permitted landfill or solid waste disposal facility is required.

Follow the provisions of Section 14-11 and confirm with Engineer that no other provisions are required.

Conforming to the requirements of this section is considered change order work.

Replace "Reserved" in section 7-1.02L(1) with:

According to Public Contract Code section§ 6109, with respect to subcontractors which are ineligible to perform work on public works projects according to Labor Code section§ 1777.1 or 1777.7:

1. The Contractor must not allow any such subcontractor to work on this project.
2. The Contractor must repay to the County any money paid to any such subcontractor allowed to work on this project.
3. The Contractor will pay the wages of the workers of any such subcontractor allowed to work on this project.

Replace Section 7-1.05 with:

7-1.05 INDEMNIFICATION AND DEFENSE

- (a) To the fullest extent permitted by law, CONTRACTOR must indemnify, defend (at CONTRACTOR'S sole cost and expense and with legal counsel approved by COUNTY, which approval may not be unreasonably withheld), protect and hold harmless COUNTY, all subsidiaries, divisions and affiliated agencies of COUNTY, and all of their representatives, partners, designees, officers, directors, employees, consultants, agents, successors and assigns, (each, an "Indemnified Party" and collectively, the "Indemnified Parties"), from and against all claims (including, without limitation, claims for bodily injury, death or damage to property), demands, obligations, damages, actions, causes of action, suits, losses, judgments, fines, penalties, liabilities, costs and expenses (including, without limitation, attorneys' fees, disbursements and court costs, and all other professional expert or consultants' fees and costs and COUNTY general and administrative expenses) of every kind and nature whatsoever (individually, a "Claim"; collectively, "Claims") which may arise out of, pertain to, or relate (directly or indirectly) to the negligence, recklessness, or misconduct of CONTRACTOR with respect to any work performed or services provided under this Contract (including, without limitation, the acts, errors and/or omissions of CONTRACTOR, its principals, officers, agents, employees, vendors, suppliers, consultants, sub-consultants, contractors, anyone employed directly or indirectly by any of them or for whose acts they may be liable or any or all of them). CONTRACTOR'S obligation to indemnify applies unless it is finally adjudicated that the liability was caused by the sole active negligence or sole willful misconduct of an Indemnified Party. If it is finally adjudicated that liability is caused by the comparative active negligence or willful misconduct of an Indemnified Party, then CONTRACTOR'S indemnification obligation shall be reduced in proportion to the established comparative liability.

- (b) The duty to defend is a separate and distinct obligation from CONTRACTOR'S duty to indemnify. CONTRACTOR shall be obligated to defend, in all legal, equitable, administrative, or special proceedings, the Indemnified Parties immediately upon tender to CONTRACTOR of the Claim in any form or at any stage of an action or proceeding, whether or not liability is established. Payment to CONTRACTOR by any Indemnified Party or the payment or advance of defense costs by any Indemnified Party cannot be a condition precedent to enforcing the Indemnified Party's rights to indemnification under this Contract. An allegation or determination that persons other than CONTRACTOR are responsible for the Claim does not relieve CONTRACTOR from its separate and distinct obligation to defend under this section. The obligation to defend extends through final judgment, including exhaustion of any appeals. The defense obligation includes an obligation to provide independent defense counsel if CONTRACTOR asserts that liability is caused in whole or in part by the negligence or willful misconduct of an Indemnified Party. CONTRACTOR'S indemnification obligations under this Contract will survive the expiration or earlier termination of this Contract until action against the Indemnified Parties for the matter indemnified is fully and finally barred by the applicable statute of limitations or statute of repose. CONTRACTOR'S liability for indemnification under this Contract is in addition to any liability CONTRACTOR may have to COUNTY for a breach by CONTRACTOR of any of the provisions of this Contract. Under no circumstances may the insurance requirements and limits set forth in this Contract be construed to limit CONTRACTOR'S indemnification obligation or other liability under this Contract.
- (c) CONTRACTOR must indemnify and hold COUNTY harmless from all loss and liability, including attorneys' fees, court costs and all other litigation expenses, for any infringement of the patent rights, copyright, trade secret or any other proprietary right or trademark, and all other intellectual property claims of any person or persons in consequence of the use by COUNTY, or any of its officers or agents, of articles or services to be supplied in the performance of this Contract.

Replace Section 7-1.06 with:

7-1.06 INSURANCE

Bidder's and their subcontractor's attention is directed to the insurance requirements below. It is highly recommended that Bidders confer with their respective insurance carriers or brokers to determine in advance of bid submission the availability of insurance certificates and endorsements as prescribed and provided herein. If an apparent low bidder fails to comply strictly with the insurance requirements, that Bidder may be disqualified from award of the Contract and forfeit its Bidder's Security.

Contractor and subcontractors shall provide and maintain insurance for the duration of the warranty period against claims for injuries to persons and damage to property, which may arise from, or in connection with, performance under the Contract by the CONTRACTOR, its agents, representatives, employees or subcontractors, if applicable.

A. Minimum Scope & Limits of Insurance

- 1) Coverage at least as broad as Commercial General Liability, Insurance Services Office Commercial General Liability coverage occurrence form GC 00 01, with limits no less than LIABILITY COVERAGE (FOUR MILLION DOLLARS (\$4,000,000)) per occurrence including products and completed operations, property damage, bodily injury and personal & advertising injury. If a general aggregate limit applies, either the general aggregate limit shall apply separately to this project/location (ISO CG 25 03 or 25 04) or the general aggregate limit shall be twice the required occurrence limit.
- 2) Comprehensive Automobile Liability Insurance of ONE MILLION DOLLARS (\$1,000,000) per occurrence for bodily injury and property damage. If the annual aggregate applies it must be no less than of TWO MILLION DOLLARS (\$2,000,000).
- 3) Workers' Compensation Insurance as required by the State of California, with Statutory Limits, and Employer's Liability Insurance with limit of no less than of ONE MILLION DOLLARS (\$1,000,000) per accident for bodily injury or disease.
- 4) Contractor's Pollution Liability with a limit of no less than TWO MILLION DOLLARS (\$2,000,000) per occurrence and FOUR MILLION DOLLARS (\$4,000,000) policy aggregate.

B. Specific Provisions of the Certificate

- 1) The General Liability and Automobile Liability policies are to be endorsed to contain the following provisions:
 1. The County, its officers, agents, officials, employees and volunteers are to be covered as additional insureds as respects: liability arising out of work or operations performed by or on behalf of the Contractor; or automobiles owned, leased, hired or borrowed by the CONTRACTOR.
 2. For any claims related to this project, the CONTRACTOR's insurance coverage shall be primary insurance as respects the COUNTY, its officers, agents, officials, employees and volunteers. Any insurance or self-insurance maintained by the COUNTY, its officers, agents, officials, employees or volunteers shall be excess of the CONTRACTOR's insurance and shall not contribute with it.
 3. Each insurance policy required by this Contract shall be endorsed to state that coverage shall not be canceled, except after thirty (30) days prior written notice has been provided to the County.
 4. CONTRACTOR hereby agrees to waive rights of subrogation which any insurer of Contractor may acquire from Contractor by virtue of the payment of any loss. Contractor agrees to obtain any endorsement that may be necessary to affect this waiver of subrogation.
 5. If any of the required insurance is written on a claims made form, the retroactive date must be before the date of contract or the beginning of the contract work and must be maintained and evidence of insurance must be provided for at least five (5) years after completion of the contract work.
- 2) The workers' compensation policy shall be endorsed with a waiver of subrogation in favor of the COUNTY for all work performed by the CONTRACTOR, its employees, agents and subcontractors. CONTRACTOR waives all rights against the COUNTY and its officers, agents, employees and volunteers for recovery of damages to the extent these damages are covered by the workers compensation and employers liability.

C. Deductibles and Self-Insured Retentions

Deductibles and self-insured retentions must be declared and any deductible or self-insured retention over one hundred thousand dollars (\$100,000) shall be forwarded to the COUNTY Risk Manager for approval.

D. Acceptability of Insurance

Insurance must be placed with insurers with a current rating given by A.M. Best and Company of no less than A(-):VII and a Standard & Poor's Rating (if rated) of at least BBB and from a company approved by the Department of Insurance to conduct business in California. Any waiver of these standards is subject to approval by the County Risk Manager.

E. Verification of Coverage

Prior to approval of this Contract by the COUNTY, the CONTRACTOR shall file with the submitting department, certificates of insurance with original endorsements effecting coverage and a copy of the declarations page from the policy in effect in a form acceptable to the COUNTY. Endorsements must be signed by persons authorized to bind coverage on behalf of the insurer. The COUNTY reserves the right to require certified copies of all required insurance policies at any time.

F. Additional Construction Insurance Requirements

- 1) Payment Bond: For public works projects of more than twenty-five thousand dollars (\$25,000) a "payment bond" is required in the full amount of the Contract price, and shall insure to the benefit of persons performing labor or furnishing materials in connection with the work of the Contract. This bond shall be maintained in full force and effect until all work under the Contract is completed and accepted by the COUNTY, or until all claims for materials and labor have been paid, whichever is longer.

- 2) Performance Bond: For public works projects of more than twenty-five thousand dollars (\$25,000) a “performance bond” is required in the full amount of the Contract price and shall insure the faithful performance by Contractor of all work under the Contract. It shall also insure the replacing of, or making acceptable, any defective materials or faulty workmanship.
- 3) Acceptability of Surety: Only California admitted sureties with current AM Best Rating of no less than VII.

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8 PROSECUTION AND PROGRESS

Add to Section 8-1.01:

You must procure all permits, licenses, contracts and other services needed to prosecute the work and secure staging areas, including those on private property. You must pay for all permits, licenses, contracts and other services. Payment is included in the contract price and no additional compensation will be allowed.

The number of working days allowed for completion of the work is set forth in the Notice to Bidders of the Standard Specifications as modified by Article XIII of the Contract. In the case of a conflict between the Standard Specifications and the Contract, the Contract prevails.

The sum to be paid as liquidated damages is set forth in section 8-1.10 of the Standard Specifications as modified by Article XIII of the Contract.

Add to Section 8-1.02A:

Any time the Engineer requests a practicable progress schedule in writing, submit the updated schedule within ten (10) working days of the Engineer's written request.

Replace Section 8-1.02C(3) with:

Submit a description of your proposed schedule for authorization. The schedule shall be submitted on paper. The software used to generate the schedule is the option of the Contractor.

Replace section 8-1.10A with:

The County specifies liquidated damages (Pub Contract Code § 7203, Gov. Code, § 53069.85). Liquidated damages, if any, accrue starting on the first (1st) day after the expiration of the working days through the day of Contract acceptance except as specified in sections 8-1.10B and 8-1.10C.

The County withholds liquidated damages before the accrual date if the anticipated liquidated damages may exceed the value of the remaining work.

Liquidated damages for all work shall be set at **THREE THOUSAND DOLLARS (\$3,000)** per calendar day.

9 PAYMENT

Replace the 12th paragraph beginning with “For these payments, interest starts to accrue...” in Section 9-1.03 with:

For these payments, interest starts to accrue thirty (30) days after the Engineer receives acceptance from you of the progress payment amount determined by the Engineer. Acceptance of the progress payment may be in the form of an invoice matching the progress payment amount or a letter indicating that you accept the amount of the progress payment.

Add the following to Section 9-1.16A

Submit an invoice matching the progress payment amount or a signed letter indicating that you accept the progress payment amount. The Engineer does not process a progress payment without the matching invoice or the progress payment acceptance letter. Once accepted by the Engineer, submit the invoice to the following email address: solidwasteap@tularecounty.ca.gov and include the Engineer's email as well.

Add to end of first paragraph, section 9-1.16B:

Submit a schedule of values for each lump sum item on the bid list.

Replace Section 9-1.16C with:

9-1.16C Materials on Hand

No partial payment will be made for any materials on hand which are furnished but not incorporated into the work except for the liner materials in Item 6, Geosynthetic Clay Liner; Item 8, Drainage Composite; and Item 7, Geomembrane. Once each month at the time the Engineer makes an estimate of the quantity of work and material for the purpose of making progress payments, the Engineer will also measure the number of square feet of aforementioned liner materials that have been manufactured in the same manufacturer's lot, been approved by the CQA Officer for installation, delivered to the site, unloaded and properly stockpiled, but not incorporated into the work. The Contractor shall furnish the Engineer with sufficient invoices or other documentation to determine the Contractor's cost per square foot to purchase and deliver these liner materials to the site. A partial payment will be made in the amount of the delivered cost of these uninstalled liner materials so measured at the determined delivered unit price, less the retention, if any. The partial payment for uninstalled liner materials made in a prior progress payment will be deducted from moneys due the Contractor in the next progress payment for these items of work and the uninstalled material on hand at the time of the estimate for that next progress payment. In no event will the amount paid to the Contractor for the uninstalled materials affect the final pay amount paid to the Contractor for these materials once installed. The Contractor retains full responsibility for the uninstalled liner material until it is installed and accepted per the Contract specifications.

Replace section 9-1.17D(1) with:

9-1.17D(1) General

If you accept the proposed final estimate or do not submit a claim statement within thirty (30) days of receiving the estimate, the Engineer furnishes the final estimate to you and the County pays the amount due within ninety (90) days. This final estimate and payment is conclusive except as specified in sections 5-1.27, 5-1.47, and 9-1.21.

If you submit a claim statement within thirty (30) days of receiving the Engineer's proposed final estimate, the Engineer furnishes a semifinal estimate to the Contractor and the Department pays the amount due within ninety (90) days. The semifinal estimate is conclusive as to the amount of work completed and the amount payable except as affected by the claims or as specified in sections 5-1.27, 5-1.47, and 9-1.21.

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DIVISION II GENERAL CONSTRUCTION

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10 GENERAL

Add to Section 10-1.01:

Coccidioidomycosis, also known as “Valley Fever” or “cocci”, is a disease caused by *Coccidioides* fungi which infect the lungs. When the fungus spores present in soil are disturbed, the spores may become airborne and can be inhaled.

You are hereby notified that the spores which cause Valley Fever are endemic to Tulare County. Activities which disturb soil or expose workers to dust, such as digging, operating earth-moving equipment, driving vehicles, and working in wind-blown areas, may increase the risk of Valley Fever in workers.

Information regarding preventing and recognizing the symptoms of Valley Fever are available from the California Department of Public Health and the California Department of Industrial Relations.

The provisions of this section are made a part of every subcontract executed pursuant to this contract.

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12 TEMPORARY TRAFFIC CONTROL

Add the following paragraph to the end of Section 12-1.01

You are responsible for advance warning and construction area signing for public safety and convenience for any work or equipment operation on site. You shall do no work or storage of equipment or material in the public rights of way on Road 152. Full compensation for temporary traffic control will be considered included in the item of work for Mobilization.

Replace Section 12-1.03 with the following:

12-1.03 FLAGGING COSTS

No need for flagging is anticipated. Any flagging costs will be borne by you as a part of the construction area signing under the pay item for Mobilization.

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13 WATER POLLUTION CONTROL

You shall prepare a Water Pollution Control Plan for complying with the requirements of Section 13-2 Water Pollution Control Program. Full compensation for compliance with Section 13-2, Water Pollution Control Plan, Section 13-4, Job Site Management and 13-9, Temporary Concrete Washouts shall be considered included lump sum price paid for Mobilization and no additional compensation will be allowed therefor.

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14 ENVIRONMENTAL STEWARDSHIP

Add the following to Section 14-1.01:

Comply with all applicable requirements and provisions of the environmental document(s) and the permits obtained for this project.

A delay to the controlling operation due to environmental requirements will be considered a temporary suspension of work under Section 8-1.06. No contract adjustment or additional compensation will be made for delays caused by environmental requirements. The days on which the suspension is in effect shall not be considered working days as defined in Section 8-1.06B.

Add following to Section 14-6.03A:

Tulare County has developed a Final Environmental Impact Report (FEIR) for this Site. As a result, Tulare County is required to Monitor and Report on its Mitigation activities. A table (Table 8-1) containing the Mitigation Measures and Reporting Program (MMRP) is included in this Construction Quality Assurance Manual as an Attachment. The contractor is advised that they are responsible to be aware of the Mitigation measures and to avoid any disruption to the measures specified. Any disruption by the contractor must be promptly repaired at the contractor's expense. The contractor will also be required to cooperate with the County, as needed, in monitoring and reporting.

Add the following to Section 14-7.03

In the event that a paleontological find is suspected or discovered that results in a delay of your work, additional working days will be allowed for the time you are delayed. However, you will not be compensated for the delay unless the delay exceeds two working days or 40 man-hours.

Add the following to Section 14-9.02

You shall comply with all applicable requirements of the San Joaquin Valley Air Pollution Control District, particularly Regulation VIII. You shall be responsible for obtaining any required permits, paying any fees imposed by the SJVAPCD. In particular, you shall submit a Dust Control Plan under Regulation VIII to the SJVAPCD. The dust control plan must be approved by the SJVAPCD prior to commencing with construction activities that have the potential to create dust. You shall pay all fees to the SJVAPCD in connection with the dust control plan and construction permit. You shall not begin work until copies of the approved permits and conditions have been provided to the Engineer along with documentation that any required fees have been paid to the SJVAPCD.

You shall minimize equipment idling time.

You shall provide a minimum of two 4,000 gallon water trucks.

You shall suspend excavation, earthmoving and grading activities when sustained winds exceed 20 mph.

You shall limit the area subject to excavation and grading at any one time.

Your equipment shall be equipped with best available control technology to reduce pollution.

You shall curtail construction during periods of high ambient pollution concentration. This may include ceasing activity during peak hours of vehicular traffic on Road 152.

You shall make all of your employees available for a half hour program informing you of sensitive wildlife and archaeological and paleontological finds. Handouts will be provided. This education will be documented by the retention of a signature sheet.

Full compensation for obtaining all necessary permits from the SJVAPCD, paying all fees, complying with all permit and reporting requirements shall be considered as a part of the contract price paid for Mobilization. The application of water for dust control and shall be considered as included in the contract price paid for the various items of work requiring dust control.

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15 EXISTING FACILITIES

Add following to Section 15:

15-7.01 GENERAL

Your attention is directed to the presence of groundwater monitoring wells, landfill gas monitoring probes, groundwater extraction wells, vaults, electrical pull boxes, electrical conductors and landfill gas extraction wells. These facilities are shown on the plans or will be clearly marked in the field by the Engineer. Unless shown on the plans, described otherwise herein or directed by the Engineer; these facilities are to be protected in place. Unless otherwise directed by the Engineer, you will not open or adjust these facilities. You shall not apply any material within a 10 foot radius of these facilities except water and clean soil. You shall provide reasonable access to these facilities by County personnel and their agents for monitoring, maintenance and investigative purposes. You shall direct any questions or concerns about these facilities to the Engineer.

15-7.02 Damage and Replacement

In the event that the groundwater or landfill gas wells are damaged or destroyed by your actions, you shall pay the County for the replacement cost as follows:

Groundwater monitoring well \$60,000.

Groundwater extraction well \$100,000.

Landfill gas probes \$20,000.

Landfill gas extraction wells \$50,000.

Alternatively, you may subcontract to a licensed geotechnical company approved by the Engineer to replace these facilities in a manner specified and approved by the Engineer.

DIVISION V SURFACINGS AND PAVEMENTS

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39 ASPHALT CONCRETE

Replace Section 39 with the following:

39-1.01 GENERAL

39-1.01A Summary

Section 39-1 includes general specifications for producing and placing HMA by mixing aggregate and asphalt binder at a mixing plant and spreading and compacting the HMA mixture.

Produce and place HMA Type A under the Method Construction Process.

39-1.01B Definitions

coarse aggregate: Aggregate retained on a no. 4 sieve.

fine aggregate: Aggregate passing the no. 4 sieve.

supplemental fine aggregate: Aggregate passing the no. 30 sieve, including hydrated lime, Portland cement, and fines from dust collectors.

39-1.02 MATERIALS

39-1.02A Geosynthetic Pavement Interlayer

Geosynthetic pavement interlayer must comply with the specifications for pavement fabric, paving mat, paving grid, paving geocomposite grid, or geocomposite strip membrane.

39-1.02B Tack Coat

Tack coat must comply with the specifications for asphaltic emulsion or asphalts. Choose the type and grade.

Notify the Engineer if you dilute asphaltic emulsion with water. The weight ratio of added water to asphaltic emulsion must not exceed 1 to 1.

Measure added water either by weight or volume in compliance with section 9-1.02 or you may use water meters from water districts, cities, or counties. If you measure water by volume, apply a conversion factor to determine the correct weight.

With each dilution, submit:

1. Weight ratio of water to bituminous material in the original asphaltic emulsion
2. Weight of asphaltic emulsion before diluting
3. Weight of added water
4. Final dilution weight ratio of water to asphaltic emulsion

39-1.02C Asphalt Binder

Asphalt binder in HMA must comply with the specifications for asphalts or section 39-1.02D.

Asphalt binder in HMA Type A must be PG Grade 70-10.

Asphalt binder for geosynthetic pavement interlayer must comply with the specifications for asphalts. Choose from Grades PG 64-10, PG 64-16, or PG 70-10.

39-1.02E Aggregate

Aggregate must be clean and free from deleterious substances.

Aggregate used in HMA Type A must comply with the 3/4-inch HMA Types A and B gradation.

The specified aggregate gradation must be determined before the addition of asphalt binder and includes supplemental fine aggregate. The Department tests for aggregate grading under California Test 202, modified by California Test 105 if there is a difference in specific gravity of 0.2 or more between the coarse and fine parts of different aggregate blends.

Choose sieve size TV within each TV limit presented in the aggregate gradation tables.

The proposed aggregate gradation must be within the TV limits for the specified sieve sizes shown in the following tables:

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**Aggregate Gradation
(Percentage Passing)
HMA Types A and B**

3/4-inch HMA Types A and B

Sieve sizes	TV limits	Allowable tolerance
1"	100	--
3/4"	90–100	TV ± 5
1/2"	70–90	TV ± 6
No. 4	45–55	TV ± 7
No. 8	32–40	TV ± 5
No. 30	12–21	TV ± 4
No. 200	2.0–7.0	TV ± 2

1/2-inch HMA Types A and B

Sieve sizes	TV limits	Allowable tolerance
3/4"	100	—
1/2"	95–99	TV ± 6
3/8"	75–95	TV ± 6
No. 4	55–66	TV ± 7
No. 8	38–49	TV ± 5
No. 30	15–27	TV ± 4
No. 200	2.0–8.0	TV ± 2

3/8-inch HMA Types A and B

Sieve sizes	TV limits	Allowable tolerance
1/2"	100	--
3/8"	95–100	TV ± 6
No. 4	58–72	TV ± 7
No. 8	34–48	TV ± 6
No. 30	18–32	TV ± 5
No. 200	2.0–9.0	TV ± 2

No. 4 HMA Types A and B

Sieve sizes	TV limits	Allowable tolerance
3/8"	100	--
No. 4	95–100	TV ± 7
No. 8	72–77	TV ± 7
No. 30	37–43	TV ± 7
No. 200	2.0–12.0	TV ± 4

Before the addition of asphalt binder and lime treatment, aggregate must have the values for the quality characteristics shown in the following table:

Aggregate Quality					
Quality characteristic	Test method	HMA type			
		A	B	RHMA-G	OGFC
Percent of crushed particles	California Test 205				
Coarse aggregate (% min.)					
One fractured face		90	25	--	90
Two fractured faces		75	--	90	75
Fine aggregate (% min.)					
(Passing no. 4 sieve and retained on no. 8 sieve.)					
One fractured face		70	20	70	90
Los Angeles Rattler (% max.)	California Test 211				
Loss at 100 rev.		12	--	12	12
Loss at 500 rev.		45	50	40	40
Sand equivalent (min.) ^a	California Test 217	47	42	47	--
Fine aggregate angularity (% min.) ^b	California Test 234	45	45	45	--
Flat and elongated particles (% max. by weight @ 5:1)	California Test 235	10	10	10	10

^a Reported value must be the average of 3 tests from a single sample.

^b The Engineer waives this specification if HMA contains less than 10 percent of nonmanufactured sand by weight of total aggregate. Manufactured sand is fine aggregate produced by crushing rock or gravel.

39-1.02F Reclaimed Asphalt Pavement

You may produce HMA Type A or B, using RAP. HMA produced using RAP must comply with the specifications for HMA, except aggregate quality specifications do not apply to RAP. You may substitute RAP aggregate for a part of the virgin aggregate in HMA in a quantity not exceeding 15.0 percent of the aggregate blend.

Assign the substitution rate of RAP aggregate for virgin aggregate with the JMF submittal. The JMF must include the percent of RAP used. If you change your assigned RAP aggregate substitution rate by more than 5 percent (within the 15.0 percent limit), submit a new JMF.

Process RAP from asphalt concrete. You may process and stockpile RAP during the entire project. Prevent material contamination and segregation. Store RAP in stockpiles on smooth surfaces free of debris and organic material. Processed RAP stockpiles must be only homogeneous RAP.

39-1.03 HOT MIX ASPHALT MIX DESIGN REQUIREMENTS

39-1.03A General

The mix design process consists of performing California Test 367 and laboratory procedures on combinations of aggregate gradations and asphalt binder contents to determine the OBC and HMA mixture qualities. The results become the proposed JMF.

Use the *Contractor Hot Mix Asphalt Design Data* form to record aggregate quality and mix design data. Use the *Contractor Job Mix Formula Proposal* form to present the JMF.

Laboratories testing aggregate qualities and preparing the mix design and JMF must be qualified under the Caltrans Independent Assurance Program. Take samples under California Test 125.

The Engineer reviews the aggregate qualities, mix design, and JMF and verifies and authorizes the JMF.

You may change the JMF during production. Do not use the changed JMF until it is authorized. Except if adjusting the JMF as specified in section 39-1.03E, perform a new mix design and submit a new JMF submittal if you change any of the following:

1. Target asphalt binder percentage
2. Asphalt binder supplier
3. Combined aggregate gradation
4. Aggregate sources
5. Substitution rate for RAP aggregate of more than 5 percent
6. Any material in the JMF

39-1.03B Hot Mix Asphalt Mix Design

Perform a mix design that produces HMA with the values for the quality characteristics shown in the following table:

HMA Mix Design Requirements

Quality characteristic	Test method	HMA type		
		A	B	RHMA-G
Air void content (%)	California Test 367	4.0	4.0	Section 39-1.03B
Voids in mineral aggregate (% min.)	California Test 367			
No. 4 grading		17.0	17.0	--
3/8" grading		15.0	15.0	--
1/2" grading		14.0	14.0	18.0–23.0 ^a
3/4" grading		13.0	13.0	18.0–23.0 ^a
Voids filled with asphalt (%)	California Test 367			Note c
No. 4 grading		76.0–80.0	76.0–80.0	
3/8" grading		73.0–76.0	73.0–76.0	
1/2" grading		65.0–75.0	65.0–75.0	
3/4" grading		65.0–75.0	65.0–75.0	
Dust proportion	California Test 367			Note c
No. 4 and 3/8" gradings		0.9–2.0	0.9–2.0	
1/2" and 3/4" gradings		0.6–1.3	0.6–1.3	
Stabilometer value (min.) ^b	California Test 366			
No. 4 and 3/8" gradings		30	30	--
1/2" and 3/4" gradings		37	35	23

^a Voids in mineral aggregate for RHMA-G must be within this range.

^b California Test 304, Part 2.13.

^c Report this value in the JMF submittal.

Report the average of 3 tests. If the range of stability for the 3 briquettes is more than 8 points, prepare new briquettes and test again. The average air void content may vary from the specified air void content by ± 0.5 percent.

39-1.03C Job Mix Formula Submittal

Each JMF submittal must consist of:

1. Proposed JMF on a *Contractor Job Mix Formula Proposal* form
2. Mix design records on a *Contractor Hot Mix Asphalt Design Data* form dated within 12 months of submittal
3. JMF verification on a *Caltrans Hot Mix Asphalt Verification* form, if applicable
4. JMF renewal on a *Caltrans Production Start-Up Evaluation* form, if applicable
5. MSDS for the following:
 - 5.1. Asphalt binder
 - 5.2. Supplemental fine aggregate except fines from dust collectors

If the Engineer requests, sample the following materials in the presence of the Engineer and place in labeled containers weighing no more than 50 lb each:

1. Coarse, fine, and supplemental fine aggregate from stockpiles, cold feed belts, or hot bins. Samples must be at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each

- type of supplemental fines. The Department combines these aggregate samples to comply with the JMF TVs submitted on a *Contractor Job Mix Formula Proposal* form.
2. RAP from stockpiles or RAP system. Samples must be at least 60 lb.
 3. Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical-shaped cans with open top and friction lids.

Notify the Engineer at least 2 business days before sampling materials. For aggregate and RAP, split the samples into at least 4 parts. Submit 2 parts to the Engineer and use 1 part for your testing.

39-1.03D Job Mix Formula Review

The Engineer reviews each mix design and proposed JMF within 5 business days from the complete JMF submittal. The review consists of reviewing the mix design procedures and comparing the proposed JMF with the specifications.

The Engineer may verify aggregate quality characteristics during this review period.

39-1.03E Job Mix Formula Verification

If you cannot submit a *Caltrans Hot Mix Asphalt Verification* form dated within 12 months before HMA production, the Engineer verifies the JMF.

Based on your testing and production experience, you may submit an adjusted JMF on a *Contractor Job Mix Formula Proposal* form before verification testing. JMF adjustments may include a change in the:

1. Asphalt binder content TV up to ± 0.6 percent from the OBC value submitted on a *Contractor Hot Mix Asphalt Design Data* form, except for RHMA-G, do not adjust the TV for asphalt rubber binder below 7.0 percent
2. Aggregate gradation TVs within the TV limits specified in the aggregate gradation tables

For HMA Type A, Type B, the Engineer verifies the JMF from samples taken from HMA produced by the plant to be used. Notify the Engineer at least 2 business days before sampling materials.

In the Engineer's presence and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from cold feed belts or hot bins. Sample RAP from the RAP system. Sample HMA under California Test 125, except if you request and if authorized, you may sample from any of the following locations:

1. At the plant from deposited piles or windrows
2. From the truck with an automatic sampling device
3. Windrow
4. Mat behind the paver

You may sample from a different project, including a non-Department project, if you make arrangements for the Engineer to be present during sampling.

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 2 split parts and keep 1 part for your testing.

The Engineer verifies each proposed JMF within 20 days of receiving all verification samples and the JMF submittal has been accepted. Verification is testing for compliance with the specifications for:

1. Aggregate quality
2. Aggregate gradation TVs within the TV limits
3. Asphalt binder content TV within the TV limit
4. HMA quality specified in the table HMA Mix Design Requirements except:

- 4.1. Air void content, design value ± 2.0 percent
- 4.2. Voids filled with asphalt, report only if an adjustment for asphalt binder content TV is less than ± 0.3 percent from OBC
- 4.3. Dust proportion, report only if an adjustment for asphalt binder content TV is less than ± 0.3 percent from OBC

The Engineer prepares 3 briquettes from a single split sample. To verify the JMF for stability and air void content, the Engineer tests the 3 briquettes and reports the average of 3 tests. The Engineer prepares new briquettes if the range of stability for the 3 briquettes is more than 8 points.

The Engineer may use the briquettes used for stability testing to determine bulk specific gravity under California Test 308. If the same briquettes are used and the tests using bulk specific gravity fail, the Engineer prepares 3 new briquettes and determines a new bulk specific gravity.

If the JMF is verified, the Engineer provides you a *Caltrans Hot Mix Asphalt Verification* form.

If tests on plant-produced samples do not verify the JMF, the Engineer notifies you and you must submit a new JMF submittal or submit an adjusted JMF based on your testing. JMF adjustments may include a change in:

1. Asphalt binder content TV up to ± 0.6 percent from the OBC value submitted on a *Contractor Hot Mix Asphalt Design Data* form except do not adjust the TV for asphalt rubber binder for RHMA-G below 7.0 percent
2. Aggregate gradation TVs within the TV limits specified in the aggregate gradation tables

You may adjust the JMF only once due to a failed verification test. An adjusted JMF requires a new *Contractor Job Mix Formula Proposal* form and verification of a plant-produced sample.

The Engineer re-verifies the JMF if HMA production has stopped for longer than 30 days and the verified JMF is older than 12 months.

For each HMA type and aggregate size specified, the Engineer verifies at the Department's expense up to 2 proposed JMF, including a JMF adjusted after verification failure. The Engineer deducts \$3,000 from payments for each verification exceeding this limit. This deduction does not apply to verifications initiated by the Engineer or if a JMF expires while HMA production is stopped longer than 30 days.

39-1.03F Job Mix Formula Renewal

You may request a JMF renewal by submitting:

1. Proposed JMF on a *Contractor Job Mix Formula Proposal* form
2. Mix design documentation on a *Contractor Hot Mix Asphalt Design Data* form used for the previously verified JMF

If the Engineer requests, sample the following materials in the presence of the Engineer and place in labeled containers weighing no more than 50 lb each:

1. Coarse, fine, and supplemental fine aggregate from stockpiles, cold feed belts, or hot bins. Samples must include at least 120 lb for each coarse aggregate, 80 lb for each fine aggregate, and 10 lb for each type of supplemental fines. The Department combines these aggregate samples to comply with the JMF TVs submitted on a *Contractor Job Mix Formula Proposal* form.
2. RAP from stockpiles or RAP system. Samples must be at least 60 lb.
3. Asphalt binder from the binder supplier. Samples must be in two 1-quart cylindrical-shaped cans with open top and friction lids.

Notify the Engineer at least 2 business days before sampling materials. For aggregate, RAP, and HMA, split samples into at least 4 parts. Submit 2 parts to the Engineer and use 1 part for your testing.

The Engineer reviews each complete JMF renewal submittal within 5 business days.

The Engineer may verify aggregate qualities during this review period.

The Engineer verifies the JMF under section 39-1.03E except:

1. Engineer retains samples until you provide test results for your part on a *Contractor Job Mix Formula Renewal* form.
2. Department tests samples of materials obtained from the HMA production unit after you submit test results that comply with the specifications for the quality characteristics in section 39-1.03E.
3. Engineer verifies each proposed JMF within 30 days of receiving verification samples.
4. You may not adjust the JMF due to a failed verification.
5. For each HMA type and aggregate gradation specified, the Engineer verifies at the Department's expense 1 proposed JMF.

If the Engineer verifies the JMF renewal, the Engineer provides you a *Caltrans Hot Mix Asphalt Verification* form.

39-1.03G Job Mix Formula Acceptance

You may start HMA production if:

1. Engineer's review of the JMF shows compliance with the specifications
2. Engineer verifies the JMF through start-up testing

39-1.04 CONTRACTOR QUALITY CONTROL

39-1.04B Prepaving Conference

Hold a prepaving conference with the Engineer at a mutually agreed time and place. Discuss methods of performing the production and paving work.

39-1.04D Aggregate

Determine the aggregate moisture content and RAP moisture content in continuous mixing plants at least twice a day during production and adjust the plant controller. Determine the RAP moisture content in batch mixing plants at least twice a day during production and adjust the plant controller.

39-1.04E Reclaimed Asphalt Pavement

For Method construction Process – The combined aggregate gradations shall use the mix design RAP values.

39-1.04G Briquettes

Prepare 3 briquettes for each stability and air void content determination. Report the average of 3 tests. Prepare new briquettes and test again when the range of stability for the 3 briquettes is more than 8 points.

You may use the same briquettes used for stability testing to determine bulk specific gravity under California Test 308. If you use these briquettes and tests using bulk specific gravity fail, you may prepare 3 new briquettes and determine a new bulk specific gravity.

39-1.05 ACCEPTANCE CRITERIA

HMA acceptance is specified in the sections for each HMA construction process.

The Department samples materials for testing under California Test 125 and the applicable test method, except samples may be taken:

1. At the plant from a truck or an automatic sampling device
2. At the plant from a deposited pile or windrow
3. From the mat behind the paver

Sampling must be independent of Contractor quality control, statistically based, and random.

If you request, the Department splits samples and provides you with a part.

HMA acceptance is based on:

1. Authorized JMF
2. Accepted QC plan for Standard and QC/QA construction process projects
3. Compliance with the HMA acceptance tables
4. Visual inspection

39-1.06 DISPUTE RESOLUTION

Work with the Engineer to avoid potential conflicts and to resolve disputes regarding test result discrepancies. Notify the Engineer within 5 days of receiving a test result if you dispute the test result.

If you or the Engineer dispute each other's test results, submit quality control test results and copies of paperwork including worksheets used to determine the disputed test results. An independent third party performs referee testing. Before the independent third party participates in a dispute resolution, the party must be accredited under the Caltrans Independent Assurance Program. The independent third party must be independent of the project. By mutual agreement, the independent third party is chosen from an independent, non-biased laboratory having the capabilities to perform the necessary test.

If split quality control or acceptance samples are not available, the independent third party uses any available material representing the disputed HMA for evaluation.

39-1.07 PRODUCTION START-UP EVALUATION

The Engineer evaluates HMA production and placement at production start-up.

Within the first 750 tons produced on the 1st day of HMA production, in the Engineer's presence and from the same production run, take samples of:

1. Aggregate
2. Asphalt binder
3. RAP
4. HMA

Sample aggregate from cold feed belts or hot bins. Take RAP samples from the RAP system. Sample HMA under California Test 125, except if you request and if authorized, you may sample HMA from any of the following locations:

1. At the plant from deposited piles or windrows.
2. From trucks with an automatic sampling device.
3. Windrow
4. Mat behind the paver

For aggregate, RAP, and HMA, split the samples into at least 4 parts and label their containers. Submit 2 split parts and keep 1 part.

For Standard Construction process projects, you and the Department must test the split samples and report test results within 3 business days of sampling. If you proceed before receipt of the test results, the Engineer may consider the HMA placed to be represented by these test results.

39-1.08 PRODUCTION

A lot shall be defined as material from the same mix design of the same Project.

Sublots shall be defined as material from a lot, up to but not to exceed 750 tons HMA.

Core lots shall be defined as material from a subplot, up to but not to exceed 250 tons HMA.

No subplot shall be carried over to the next day of production and paving.

39-1.08A General

Produce HMA in a batch mixing plant or a continuous mixing plant. Proportion aggregate by hot or cold feed control.

HMA plants must be Department qualified. Before production, the HMA plant must have current qualification under the Department's Materials Plant Quality Program.

During production, you may adjust:

1. Hot or cold feed proportion controls for virgin aggregate and RAP
2. Set point for asphalt binder content

39-1.08B Mixing

Mix HMA ingredients into a homogeneous mixture of coated aggregates.

Asphalt binder must be from 275 to 375 degrees F when mixed with aggregate.

Asphalt rubber binder must be from 350 to 425 degrees F when mixed with aggregate.

When mixed with asphalt binder, aggregate must not be more than 325 degrees F, except aggregate for OGFC must be not more than 275 degrees F. These aggregate temperature specifications do not apply if you use RAP.

HMA with or without RAP must not be more than 325 degrees F.

39-1.09 SUBGRADE, TACK COAT, AND GEOSYNTHETIC PAVEMENT INTERLAYER

39-1.09A General

Prepare subgrade or apply tack coat to surfaces receiving HMA. If specified, place geosynthetic pavement interlayer over a coat of asphalt binder.

39-1.09B Subgrade

Subgrade to receive HMA must comply with the compaction and elevation tolerance specifications in the sections for the material involved. Subgrade must be free of loose and extraneous material. If HMA is paved on existing base or pavement, remove loose paving particles, dirt, and other extraneous material by any means including flushing or sweeping.

39-1.09C Tack Coat

Apply tack coat:

1. To existing pavement, including planed surfaces
2. Between HMA layers
3. To vertical surfaces of:
 - 3.1. Curbs
 - 3.2. Gutters
 - 3.3. Construction joints
4. Outside of the limits of geosynthetic pavement interlayer between new and existing HMA layers.

Before placing HMA, apply tack coat in 1 application. The application rate must be the minimum residual rate specified for the underlying surface conditions shown in the following tables:

Tack Coat Application Rates for HMA Type A, Type B, and RHMA-G

HMA overlay over:	Minimum residual rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h asphaltic emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 asphaltic emulsion	Asphalt binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h asphaltic emulsion
New HMA (between layers)	0.02	0.03	0.02
PCC and existing HMA (AC) surfaces	0.03	0.04	0.03
Planed PCC and HMA (AC) surfaces	0.05	0.06	0.04

Tack Coat Application Rates for OGFC

OGFC over:	Minimum residual rates (gal/sq yd)		
	CSS1/CSS1h, SS1/SS1h and QS1h/CQS1h asphaltic emulsion	CRS1/CRS2, RS1/RS2 and QS1/CQS1 asphaltic emulsion	Asphalt binder and PMRS2/PMCRS2 and PMRS2h/PMCRS2h asphaltic emulsion
New HMA	0.03	0.04	0.03
PCC and existing HMA (AC) surfaces	0.05	0.06	0.04
Planed PCC and HMA (AC) surfaces	0.06	0.07	0.05

If you dilute asphaltic emulsion, mix until homogeneous before application.

For vertical surfaces, apply a residual tack coat rate that will thoroughly coat the vertical face without running off.

If you request and if authorized, you may:

1. Change tack coat rates
2. Omit tack coat between layers of new HMA during the same work shift if:
 - 2.1. No dust, dirt, or extraneous material is present
 - 2.2. Surface is at least 140 degrees F

Immediately in advance of placing HMA, apply additional tack coat to damaged areas or where loose or extraneous material is removed.

Close areas receiving tack coat to traffic. Do not track tack coat onto pavement surfaces beyond the job site.

Asphalt binder tack coat must be from 285 to 350 degrees F when applied and shall "break" prior to asphalt placement.

Method Construction Process - Payment for Tack Coat is included within the various items of work and no additional compensation will be made.

39-1.09D Geosynthetic Pavement Interlayer

Place geosynthetic pavement interlayer under the manufacturer's instruction.

Before placing the geosynthetic pavement interlayer and asphalt binder:

1. Repair cracks 1/4 inch and wider, spalls, and holes in the pavement. These repairs are change order work.
2. Clean the pavement of loose and extraneous material.

Immediately before placing the interlayer, apply 0.25 ± 0.03 gal of asphalt binder per square yard of interlayer or until the fabric is saturated. Apply asphalt binder the width of the geosynthetic pavement interlayer plus 3 inches on each side. At interlayer overlaps, apply asphalt binder on the lower interlayer the same overlap distance as the upper interlayer.

Asphalt binder must be from 285 to 350 degrees F and below the minimum melting point of the geosynthetic pavement interlayer when applied.

Align and place the interlayer with no folds that result in a triple thickness, except that triple thickness layers less than 1 inch in width may remain if less than 1/2 inch in height. Folds that result in a triple layer greater than a 1 inch width must be slit and overlapped in a double thickness at least 2 inches in width.

The minimum HMA thickness over the interlayer must be 0.12 foot thick, including conform tapers. Do not place the interlayer on a wet or frozen surface.

Overlap the interlayer borders from 2 to 4 inches. In the direction of paving, overlap the following roll with the preceding roll at any break.

You may use rolling equipment to correct distortions or wrinkles in the interlayer.

If asphalt binder tracked onto the interlayer or brought to the surface by construction equipment causes interlayer displacement, cover it with a small quantity of HMA.

Before placing HMA on the interlayer, do not expose the interlayer to:

1. Traffic, except for crossings under traffic control, and only after you place a small HMA quantity
2. Sharp turns from construction equipment
3. Damaging elements

Pave HMA on the interlayer during the same work shift.

39-1.10 SPREADING AND COMPACTING EQUIPMENT

Paving equipment for spreading must be:

1. Self-propelled
2. Mechanical
3. Equipped with a screed or strike-off assembly that can distribute HMA the full width of a traffic lane
4. Equipped with a full-width compacting device
5. Equipped with automatic screed controls and sensing devices that control the thickness, longitudinal grade, and transverse screed slope

Install and maintain grade and slope references.

The screed must produce a uniform HMA surface texture without tearing, shoving, or gouging.

The paver must not leave marks such as ridges and indentations, unless you can eliminate them by rolling.

Rollers must be equipped with a system that prevents HMA from sticking to the wheels. You may use a parting agent that does not damage the HMA or impede the bonding of layers.

In areas inaccessible to spreading and compacting equipment:

1. Spread the HMA by any means to obtain the specified lines, grades, and cross sections.
2. Use a pneumatic tamper, plate compactor, or equivalent to achieve thorough compaction.

Edge of pavement treatment shall be per the 2018 Standard Plan P75, Case B where tapered safety edge is 30 degrees plus or minus 10 degrees. Tapered safety edge shall be extruded, densified edge of uniform grade and consistency as produced with Carlson brand safety attachment. An equivalent extruded, tapered safety edge will be accepted and approved by the County upon performing an acceptable trial example or demonstration.

39-1.11 TRANSPORTING, SPREADING, AND COMPACTING

Do not pave HMA on wet pavement or a frozen surface.

You may deposit HMA in a windrow and load it in the paver if:

1. Paver is equipped with a hopper that automatically feeds the screed
2. Loading equipment can pick up the windrowed material and deposit it in the paver hopper without damaging base material
3. Activities for deposit, pickup, loading, and paving are continuous
4. HMA temperature in the windrow does not fall below 260 degrees F

You may pave HMA in 1 or more layers on areas less than 5 feet wide and outside the traveled way, including shoulders. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture.

HMA handled, spread, or windrowed must not stain the finished surface of any improvement or existing facility, including pavement.

Do not use petroleum products such as kerosene or diesel fuel to release HMA from trucks, spreaders, or compactors.

HMA must be free of:

1. Segregation
2. Coarse or fine aggregate pockets
3. Hardened lumps

Longitudinal joints in the top layer must match specified lane edges. Alternate the longitudinal joint offsets in the lower layers at least 0.5 foot from each side of the specified lane edges. You may request other longitudinal joint placement patterns.

Until the adjoining through lane's top layer has been paved, do not pave the top layer of:

1. Shoulders
2. Tapers
3. Transitions
4. Road connections
5. Driveways
6. Curve widenings
7. Chain control lanes
8. Turnouts
9. Turn pockets

If the number of lanes changes, pave each through lane's top layer before paving a tapering lane's top layer. Simultaneous to paving a through lane's top layer, you may pave an adjoining area's top layer, including shoulders. Do not operate spreading equipment on any area's top layer until completing final compaction.

If leveling with HMA is specified, fill and level irregularities and ruts with HMA before spreading HMA over the base, existing surfaces, or bridge decks. You may use mechanical equipment other than a paver for these areas. The equipment must produce uniform smoothness and texture. HMA used to change an existing surface's cross slope or profile is not paid for as HMA (leveling).

If placing HMA against the edge of existing pavement, sawcut or grind the pavement straight and vertical along the joint and remove extraneous material.

Rolling must leave the completed surface compacted and smooth without tearing, cracking, or shoving. Complete finish rolling activities before the pavement surface temperature is:

1. Below 150 degrees F for HMA with unmodified binder
2. Below 140 degrees F for HMA with modified binder
3. Below 200 degrees F for RHMA-G

If a vibratory roller is used as a finish roller, turn the vibrator off.

Do not allow traffic on new HMA pavement until its mid-depth temperature is below 160 degrees F.

If you request and if authorized, you may cool HMA Type A and Type B with water when rolling activities are complete. Apply water under section 17-3.

39-1.12 SMOOTHNESS

39-1.12A General

Determine HMA smoothness with a 12-foot straightedge.

39-1.12B Straightedge

The top layer of HMA pavement must not vary from the lower edge of a 12-foot straightedge:

1. More than 0.01 foot when the straightedge is laid parallel with the centerline
2. More than 0.02 foot when the straightedge is laid perpendicular to the centerline and extends from edge to edge of a traffic lane
3. More than 0.02 foot when the straightedge is laid within 24 feet of a pavement conform

39-1.12C Profilograph

Removed

39-1.12D Smoothness Correction

Removed

39-1.13 HOT MIX ASPHALT ON BRIDGE DECKS

Produce and place HMA on bridge decks under the Method construction process.

Aggregate must comply with either 3/4-inch or 1/2-inch HMA Types A and B gradation.

If authorized, aggregate may comply with the no. 4 HMA Types A and B gradation for a section or taper at a bridge end that is less than 1 inch in total depth.

If a concrete expansion dam is to be placed at a bridge deck expansion joint, tape oil-resistant construction paper to the deck over the area to be covered by the dam before placing the tack coat and HMA across the joint.

Do not leave a vertical joint more than 0.15 foot high between adjacent lanes open to traffic.

The tack coat application rate must be the minimum residual rate specified in section 39-1.09C. For HMA placed on a deck seal, use the minimum residual rate specified for a PCC underlying surface.

HMA placed on a deck seal must be placed in at least 2 approximately equal layers. The 1st layer must be at least 1 inch thick after compaction. Protect the deck seal throughout all operations.

For placement of the 1st HMA layer on a deck seal:

1. Comply with the HMA application temperature recommended by the deck seal manufacturer.
2. Deliver and place HMA using equipment with pneumatic tires or rubber-faced wheels. Do not operate other vehicles or equipment on the bare deck seal.
3. Deposit HMA on the deck seal in such a way that the deck seal is not damaged. Do not windrow the HMA material on the bridge deck seal.
4. Place HMA in a downhill direction on bridge decks with grades over 2 percent.
5. Spreading equipment need not be self-propelled.

39-1.14 MISCELLANEOUS AREAS AND DIKES

The following specifications in section 39 do not apply to miscellaneous areas and dikes:

1. HMA construction process
2. HMA mix design requirements
3. Contractor quality control
4. Production start-up evaluation

Miscellaneous areas are outside the traveled way and include:

1. Median areas not including inside shoulders
2. Island areas
3. Sidewalks
4. Gutters
5. Gutter flares
6. Ditches
7. Overside drains
8. Aprons at the ends of drainage structures

Spread miscellaneous areas in 1 layer and compact to the specified lines and grades.

For miscellaneous areas and dikes:

1. Do not submit a JMF.
2. Choose the 3/8-inch or 1/2-inch HMA Type A and Type B aggregate gradations.
3. Minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate and 6.0 percent for 1/2-inch aggregate. If you request and if authorized, you may reduce the minimum asphalt binder content.
4. Choose asphalt binder Grade PG 70-10 or the same grade specified for HMA.

39-1.15 MINOR HOT MIX ASPHALT

39-1.15A GENERAL

39-1.15A(1) Summary

The following specifications in section 39 do not apply to minor HMA:

1. HMA construction process
2. HMA mix design requirements
3. Contractor quality control
4. Production start-up evaluation

39-1.15A(2) Definitions

Reserved

39-1.15A(3) Submittals

Reserved

39-1.15A(4) Quality Control and Assurance

Reserved

39-1.15B MATERIALS

The minimum asphalt binder content must be 6.8 percent for 3/8-inch aggregate gradation and 6.0 percent for 1/2-inch aggregate gradation.

Choose asphalt binder Grade PG 64-10, PG 64-16, or PG 70-10.

If you request and if authorized, you may reduce the minimum asphalt binder content.

Choose the 3/8-inch or 1/2-inch HMA Type A or Type B aggregate gradation.

39-1.15C CONSTRUCTION

Produce HMA at a central mixing plant.

Choose any method and equipment to spread and compact.

The surface must be:

1. Textured uniformly

2. Compacted firmly
3. Without depressions, humps, and irregularities

Smoothness specifications do not apply.

39-1.30 PAYMENT

Section 39-1.30 includes specifications for HMA payment. The weight of each HMA mixture designated in the Bid Item List must be the combined mixture weight.

If recorded batch weights are printed automatically, the bid item for HMA is measured by using the printed batch weights, provided:

1. Total aggregate and supplemental fine aggregate weight per batch is printed. If supplemental fine aggregate is weighed cumulatively with the aggregate, the total aggregate batch weight must include the supplemental fine aggregate weight.
2. Total asphalt binder weight per batch is printed.
3. Each truckload's zero tolerance weight is printed before weighing the 1st batch and after weighing the last batch.
4. Time, date, mix number, load number, and truck identification is correlated with a load slip.
5. Copy of the recorded batch weights is certified by a licensed weighmaster and submitted to the Engineer.

If tack coat, asphalt binder, and asphaltic emulsion are paid with separate contract items, their contract items are measured under section 92 or section 94.

The Department does not adjust the unit price for an increase or decrease in the tack coat quantity. Section 9-1.06 does not apply to tack coat.

Place hot mix asphalt dike of the type specified is measured along the completed length.

Place hot mix asphalt (miscellaneous areas) is measured as the in-place compacted area.

HMA dike is paid for as place hot mix asphalt dike of the type specified in the Bid Item List and by weight for hot mix asphalt.

HMA specified to be placed in miscellaneous areas is paid for as place hot mix asphalt (miscellaneous area) and by weight for hot mix asphalt.

If minor hot mix asphalt is paid by area, it is measured from the dimensions shown.

Payment for tack coat for minor HMA is included in payment for minor hot mix asphalt or the bid item that requires minor HMA.

Geosynthetic pavement interlayer is measured for the actual pavement area covered.

The Contractor shall, at their expense retain a third-party testing laboratory as described in Section 39-1.06 to complete the testing necessary to prove material suitability. No costs shall be borne by the County as a result of this additional testing unless written approval is provided by the Resident Engineer prior to testing.

39-2 METHOD CONSTRUCTION PROCESS

39-2.01 GENERAL

Section 39-2 includes specifications for HMA produced and constructed under the Method construction process.

39-2.02 ACCEPTANCE CRITERIA

39-2.02A Testing

The Department samples for acceptance testing and tests for the quality characteristics shown in the following table:

HMA Acceptance—Method Construction Process

Quality characteristic	Test method	HMA type			
		A	B	RHMA-G	OGFC
Aggregate gradation ^a	California Test 202	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b	JMF ± tolerance ^b
Sand equivalent (min) ^c	California Test 217	47	42	47	--
Asphalt binder content (%)	California Test 379 or 382	JMF ± 0.45	JMF ± 0.45	JMF ± 0.50	JMF ± 0.50
HMA moisture content (% max)	California Test 226 or 370	1.0	1.0	1.0	1.0
Stabilometer value (min) ^{c, d} No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 366	30 37	30 35	-- 23	-- --
Percent of crushed particles Coarse aggregate (% min) One fractured face Two fractured faces Fine aggregate (% min) (Passing no. 4 sieve and retained on no. 8 sieve.) One fractured face	California Test 205	90 75 70	25 -- 20	-- 90 70	90 75 90
Los Angeles Rattler (% max) Loss at 100 rev. Loss at 500 rev.	California Test 211	12 45	-- 50	12 40	12 40
Air void content (%) ^{c, e}	California Test 367	4 ± 2	4 ± 2	TV ± 2	--
Fine aggregate angularity (% min)	California Test 234	45	45	45	--
Flat and elongated particles (% max by weight @ 5:1)	California Test 235	Report only	Report only	Report only	Report only
Voids filled with asphalt (%) ^f No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	76.0–80.0 73.0–76.0 65.0–75.0 65.0–75.0	Report only	--
Voids in mineral aggregate (% min) ^f No. 4 grading 3/8" grading 1/2" grading 3/4" grading	California Test 367	17.0 15.0 14.0 13.0	17.0 15.0 14.0 13.0	-- -- 18.0–23.0 ^g 18.0–23.0 ^g	--
Dust proportion ^f No. 4 and 3/8" gradings 1/2" and 3/4" gradings	California Test 367	0.9–2.0 0.6–1.3	0.9–2.0 0.6–1.3	Report only	--
Smoothness	Section 39-1.12	12-foot straight-edge and must-grind	12-foot straight-edge and must-grind	12-foot straight-edge and must-grind	12-foot straight-edge and must-grind
Asphalt binder	Various	Section 92	Section 92	Section 92	Section 92
Asphalt modifier	Various	--	--	Section 39-1.02D	Section 39-1.02D
CRM	Various	--	--	Section 39-1.02D	Section 39-1.02D

No single test result may represent more than 750 tons or 1 day's production, whichever is less.

For any single quality characteristic except smoothness, if 2 consecutive acceptance test results do not comply with the specifications:

1. Stop production.
2. Take corrective action.
3. Take samples and split each sample into 4 parts in the Engineer's presence. Test 1 part for compliance with the specifications and submit 3 parts to the Engineer. The Department tests 1 part for compliance with the specifications and reserves and stores 2 parts.
4. Demonstrate compliance with the specifications before resuming production and placement.

39-2.03 SPREADING AND COMPACTING EQUIPMENT

Each paver spreading HMA Type A and Type B must be followed by 3 rollers as follows:

1. One vibratory roller specifically designed to compact HMA. The roller must be capable of at least 2,500 vibrations per minute and must be equipped with amplitude and frequency controls. The roller's gross static weight must be at least 7.5 tons.
2. One oscillating type pneumatic-tired roller at least 4 feet wide. Pneumatic tires must be of equal size, diameter, type, and ply. The tires must be inflated to 60 psi minimum and maintained so that the air pressure does not vary more than 5 psi.
3. One steel-tired, 2-axle tandem roller. The roller's gross static weight must be at least 7.5 tons.

Each roller must have a separate operator. Rollers must be self-propelled and reversible.

39-2.04 TRANSPORTING, SPREADING, AND COMPACTING

Pave HMA in maximum 0.25-foot thick compacted layers.

If the surface to be paved is both in sunlight and shade, pavement surface temperatures must be taken in the shade.

Spread HMA Type A and Type B at the atmospheric and surface temperatures shown in the following table:

Minimum Atmospheric and Surface Temperatures				
Compacted layer thickness, feet	Atmospheric, °F		Surface, °F	
	Unmodified asphalt binder	Modified asphalt binder ^a	Unmodified asphalt binder	Modified asphalt binder ^a
< 0.15	55	50	60	55
0.15–0.25	45	45	50	50

^a Except asphalt rubber binder.

If the asphalt binder for HMA Type A and Type B is unmodified asphalt binder, complete:

1. First coverage of breakdown compaction before the surface temperature drops below 250 degrees F
2. Breakdown and intermediate compaction before the surface temperature drops below 200 degrees F
3. Finish compaction before the surface temperature drops below 150 degrees F

If the asphalt binder for HMA Type A and Type B is modified asphalt binder, complete:

1. First coverage of breakdown compaction before the surface temperature drops below 240 degrees F
2. Breakdown and intermediate compaction before the surface temperature drops below 180 degrees F
3. Finish compaction before the surface temperature drops below 140 degrees F

HMA compaction coverage is the number of passes needed to cover the paving width. A pass is 1 roller's movement parallel to the paving in either direction. Overlapping passes are part of the coverage being made and are not a subsequent coverage. Do not start a coverage until completing the prior coverage.

Start rolling at the lower edge and progress toward the highest part.

Perform breakdown compaction of each layer of HMA Type A and Type B with 3 coverages using a vibratory roller. The speed of the vibratory roller in miles per hour must not exceed the vibrations per minute divided by 1,000. If the thickness of the HMA layer is less than 0.08 foot, turn the vibrator off. The Engineer may order fewer coverages if the thickness of the HMA layer is less than 0.15 foot.

Perform intermediate compaction of each layer of HMA Type A and Type B with 3 coverages using a pneumatic-tired roller at a speed not exceeding 5 mph.

Perform finish compaction of HMA Type A and Type B with 1 coverage using a steel-tired roller.

39-3 EXISTING ASPHALT CONCRETE

39-3.01 GENERAL

39-3.01A General

Section 39-3.01 includes general specifications for performing work on existing asphalt concrete facilities.

Work performed on existing asphalt concrete facilities must comply with section 15.

39-3.01B Materials

Not Used

39-3.01C Construction

Before removing a portion of an asphalt concrete facility, make a 2-inch deep saw cut to a true line along the limits of the removal area.

39-3.01D Payment

Not Used

39-3.02 REPLACE ASPHALT CONCRETE SURFACING

39-3.02A General

Section 39-3.02 includes specifications for replacing asphalt concrete surfacing

39-3.02B Materials

HMA to be used for replacing asphalt concrete surfacing must comply with Type A HMA as specified in section 39-2.

The grade of asphalt binder must be PG 64-10.

Tack coat must comply with section 39-1.02B.

39-3.02C Construction

Where replace asphalt concrete surfacing is shown, remove the full depth of the existing asphalt concrete surfacing and replace with HMA. The Engineer determines the exact limits of asphalt concrete surfacing to be replaced.

Replace asphalt concrete in a lane before the lane is specified to be opened to traffic.

Before removing asphalt concrete, outline the replacement area and cut neat lines with a saw or grind to full depth of the existing asphalt concrete. Do not damage asphalt concrete and base remaining in place.

If you excavate the base beyond the specified plane, replace it with HMA.

Do not use a material transfer vehicle for replacing asphalt concrete surfacing.

Before placing HMA, apply a tack coat as specified in section 39-1.09C.

Place HMA using method compaction as specified in section 39-2.

39-3.02D Payment

The payment quantity for replace asphalt concrete surfacing is the volume determined from the dimensions shown.

39-3.03 REMOVE ASPHALT CONCRETE DIKES

39-3.03A General

Section 39-3.03 applies to removing asphalt concrete dikes outside the limits of excavation.

39-3.03B Materials

Not Used

39-3.03C Construction

Reserved

39-3.03D Payment

Not Used

39-3.04 COLD PLANING ASPHALT CONCRETE PAVEMENT

39-3.04A General

Section 39-3.04 includes specifications for cold planning asphalt concrete pavement.

Cold planning asphalt concrete pavement includes the removal of pavement markers, traffic stripes, and pavement markings within the area of cold planning.

39-3.04B Materials

HMA for temporary tapers must be of the same quality that is used for the HMA overlay or comply with the specifications for minor HMA in section 39-1.15.

39-3.04C Construction

39-3.04C(1) General

Do not use a heating device to soften the pavement.

The cold planing machine must be:

1. Equipped with a cutter head width that matches the planing width unless a wider cutter head is authorized.
2. Equipped with automatic controls for the longitudinal grade and transverse slope of the cutter head and:
 - 2.1. If a ski device is used, it must be at least 30 feet long, rigid, and a 1-piece unit. The entire length must be used in activating the sensor.
 - 2.2. If referencing from existing pavement, the cold planing machine must be controlled by a self-contained grade reference system. The system must be used at or near the centerline of the

roadway. On the adjacent pass with the cold planing machine, a joint-matching shoe may be used.

3. Equipped to effectively control dust generated by the planing operation
4. Operated such that no fumes or smoke is produced.

Replace broken, missing, or worn machine teeth.

If you do not complete placing the HMA surfacing before opening the area to traffic, you must:

1. Construct a temporary HMA taper to the level of the existing pavement.
2. Place HMA during the next work shift.
3. Submit a corrective action plan that shows you will complete cold planing and placement of HMA in the same work shift. Do not restart cold planing activities until the corrective action plan is authorized.

39-3.04C(2) Grade Control and Surface Smoothness

Install and maintain grade and transverse slope references.

The final cut must result in a neat and uniform surface.

The completed surface of the planed pavement must not vary more than 0.02 foot when measured with a 12-foot straightedge parallel with the centerline. With the straightedge at right angles to the centerline, the transverse slope of the planed surface must not vary more than 0.03 foot.

Where lanes are open to traffic, the drop-off of between adjacent lanes must not be more than 0.15 foot.

39-3.04C(3) Planed Material

Remove cold planed material concurrently with planing activities such that the removal does not lag more than 50 feet behind the planer.

39-3.04C(4) Temporary HMA Tapers

If a drop-off between the existing pavement and the planed area at transverse joints cannot be avoided before opening to traffic, construct a temporary HMA taper. The HMA temporary taper must be:

1. Placed to the level of the existing pavement and tapered on a slope of 30:1 (horizontal:vertical) or flatter to the level of the planed area
2. Compacted by any method that will produce a smooth riding surface

Completely remove temporary tapers before placing permanent surfacing.

39-3.04D Payment

Not Used

39-3.05 REMOVE BASE AND SURFACING

39-3.05A General

Section 39-3.05 includes specifications for removing base and asphalt concrete surfacing.

39-3.05B Materials

Not Used

39-3.05C Construction

Where base and surfacing are described to be removed, remove base and surfacing to a depth of at least 6 inches below the grade of the existing surfacing. Backfill resulting holes and depressions with embankment material under section 19.

39-3.05D Payment

The payment quantity for remove base and surfacing is the volume determined from the dimensions shown.

39-3.06–39-3.08 RESERVED

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TECHNICAL SPECIFICATIONS

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Technical Specifications

For Construction Of

Woodville Landfill Unit II, Phase 1

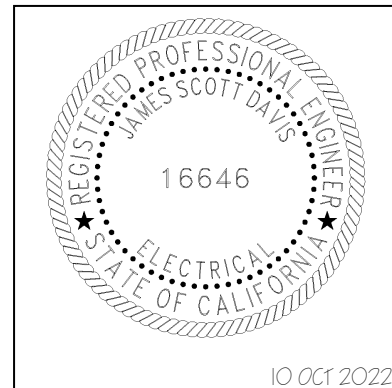
County of Tulare, California

Prepared By:

Aptim Environmental & Infrastructure, LLC



For Divisions 1, 2, 3, 11, 15,



For Division 16

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TABLE OF CONTENTS

Division 1 - General Requirements

<u>Section</u>	<u>Pages</u>
01010 – Summary of Work	01010-1 to 6
01025 – Measurement and Payment	01025-1 to 14
01039 – Meetings .	01039-1 to 5
01052 – Layout of Work and Surveys	01052-1 to 4
01075 – Technical Specification Definitions	01075-1 to 5
01090 – References	01090-1 to 2
01300 – Submittals	01300-1 to 5
01400 – Quality Control	01400-1 to 3
01500 – Mobilization and Demobilization	01019-1 to 2
01510 – Construction Facilities	01500-1 to 6
01560 – Temporary Controls	01560-1 to 4
01561 – Construction Cleaning	01561-1 to 2
01600 – Material and Equipment	01600-1 to 2
01630 – Product Options and Substitutions	01630-1 to 2
01720 – Record Documents	01720-1 to 4
01730 – Installation, Operation, and Maintenance Instructions	01730-1 to 2
01800 – Health and Safety	01190-1 to 5

Division 2 – Site Work

<u>Section</u>	<u>Pages</u>
02200 – Earthwork	02200-1 to 12
02207 – Aggregate Material	02207-1 to 8
02222 – Excavation	02222-1 to 7
02225 – Trenching and Backfilling	02225-1 to 4
02310 – Roads	02310-1 to 3
02444 – Fencing	02444-1 to 1
02500 – Operations Layer	02500-1 to 3
02510 – Leachate Collection and Removal System (LCRS)	02510-1 to 1
02511 – Lysimeter	02511-1 to 1
02589 – Electric Liner Leak Location Survey	02589-1 to 5
02722 – Drainage and Erosion Control	02722-1 to 4
02725 – Erosion Control Matting	02725-1 to 3
02751 – Stainless Steel (SS) Wire Rope	02751-1 to 2

02771 – Geotextile	02772-1 to 8
02772 – High Density Polyethylene (HDPE) Geomembrane	02771-1 to 25
02773 – Geocomposite	02774-1 to 10
02774 – Geosynthetic Clay Liner (GCL)	02775-1 to 10
02900 – Seeding and Fertilizing	02900-1 to 3

Division 3 - Concrete

<u>Section</u>	<u>Pages</u>
03200 – Reinforcing Steel	03200-1 to 2
03300 – Concrete	03300-1 to 7

Division 11 - Equipment

<u>Section</u>	<u>Pages</u>
11000 – Equipment	11000-1 to 8

Division 15 - Mechanical

<u>Section</u>	<u>Pages</u>
15100 – Leachate Extraction and Storage	15100-1 to 10
15200 – High Density Polyethylene (HDPE) Pipe	15200-1 to 5
15480 – PVC Piping	15480-1 to 6

Division 16 - Electrical

<u>Section</u>	<u>Pages</u>
16050 – Basic Electrical Requirements	16050-1 to 8
16100 – Basic Electrical Materials and Methods	16100-1 to 19
16500 – Lighting	16500-1 to 3
16910 – Control Panels	16910-1 to 5
16911 – Cellular Telemetry	16910-1 to 4

End of Table of Contents

Division 1

General Requirements

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SECTION 01010 SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Project Location and Access
- B. General Contract Scope of Work
- C. Existing Site Conditions
- D. Construction Sequence
- E. Construction Drawings
- F. Manufacturer's Specifications and Instructions
- G. Work Quality
- H. Access to Work

1.02 PROJECT LOCATION AND ACCESS

- A. Project Location: The Woodville Municipal Solid Waste Landfill (Woodville Landfill) is located in Tulare County approximately 4 miles northwest of the community of Woodville and approximately 7 miles southeast of the City of Tulare. The County of Tulare (County) is the owner and operator of the Woodville Landfill.
- B. Access: Access to the work area is via the Woodville Landfill's main entrance and gatehouse located on the east side of Road 152, south of Avenue 200 and north of Avenue 192. The entrance to the active landfill is subject to heavy truck traffic and traffic control to allow for efficient operation of the refuse disposal operations. The Contractor, his subcontractors, vendors, and suppliers shall not interfere with these operations and shall obey the traffic control personnel and signs at all times.
- C. Landfill disposal operations will continue in the active disposal portion of Unit I during the course of construction. The landfill is open six days per week; Monday through Friday; 6:00 AM to 4:00 PM and on Saturday 8:00 AM to 4:00 PM.
- D. If Contractor needs to close site access roads for short time periods during the project; these closures shall be scheduled after 4:30 PM and before 6:00 AM. The contractor shall coordinate with site operations at least 48 hours prior to closure.
- E. The Contractor shall coordinate, schedule and manage project activities so as not to interfere with the County operations.

1.03 GENERAL CONTRACT SCOPE OF WORK

- A. General: The work included is primarily site work related to the construction of an approximate 33-acre liner system for Unit II, Phase 1. The work will include site preparation activities, earthwork, construction of a composite liner system composed of geosynthetic clay liner (GCL), geomembrane and geocomposite, leachate collection, removal and storage systems, surface water drainage facilities, access roads, fencing, and stockpiling soil. The work is more fully detailed in these Specifications and the Construction Drawings.
- B. Principal Features:
1. Mobilization of construction equipment and labor, and constructing temporary facilities for the Contractor, including proper storage of equipment and materials.
 2. Compliance with site environmental measures.
 3. Coordinate with Southern California Edison and provide service poles and required connections.
 4. Clearing, grubbing, and stripping.
 5. Construction of new access roads.
 6. Earthwork required for:
 - Establishing grades for landfill cell subgrade
 - Establishing grades for storm water conveyance and impoundments
 - Establishing grades for access roads
 - Anchor trenches
 - Segregation and stockpiling of soils
 - Placing earthfill, landfill cell subgrade preparation soil, and operations layer soil.
 7. Supply and install geosynthetic components for the landfill cell including:
 - Lysimeter
 - Geosynthetic clay liner (GCL)
 - 60-mil high density polyethylene (HDPE) geomembrane
 - Geocomposite
 - Geotextile
 - Limit of Liner markers
 - High-density polyethylene (HDPE) Pipe
 8. Supply and install the following materials from Contractor-selected sources:

- Drainage Aggregate
 - Pipe bedding
 - Hot Mix Asphalt
 - Road base material (Class 2 aggregate base)
9. Supply and install the leachate riser and other associated riser pipes, posts and supports; pumps, tank storage systems and electrical connections and controls.
 10. Coordinate with County's CQA Team in evaluating completed work.
 11. Supply material and construct drainage structures.
 12. Demobilize.
- C. The above description of the work is for general information only, and in no way limits the responsibility of the Contractor for accomplishing the work in strict accordance with the Construction Drawings and Specifications.

1.04 EXISTING SITE CONDITIONS

- A. The Contractor is advised that there are survey monuments, underground utilities, landfill gas collection system components, landfill liner and leachate collection system components, unpaved and paved roads, scales, gatehouse, office(s), parking, an energy recovery facility, fencing, lysimeters, and landfill gas and groundwater monitoring wells on the Project Site. The Contractor shall be responsible for the cost of repair or replacement of any existing facilities and equipment damaged by the Contractor's personnel, equipment, subcontractors, or material suppliers.
- B. The Contractor is advised that the construction of this project may entail working adjacent to buried wastes and refuse. As buried organic materials decompose anaerobically, they generate landfill gas (LFG). This LFG (or biogas) normally consists of about 45 percent carbon dioxide (CO₂), 55 percent methane (CH₄), and minor quantities of other gases dependent on the composition of the buried materials. Occasionally hydrogen sulfide (H₂S) or other toxic gases have been encountered at some landfills, even though this site is not classified as a hazardous waste disposal site.
- C. The landfill is permitted by the state and operated as a Class III landfill that allows for the disposal of "nonhazardous solid waste" as defined in Title 27 of the California Code of Regulations. Notwithstanding above, the County cannot guarantee that toxic or hazardous materials or vapors will not be encountered by the Contractor during the performance of this project.

1.05 CONSTRUCTION SEQUENCE

- A. Unless otherwise specified, directed, or modified, the Contractor shall follow the sequence of operations as set forth below in Article 1.05.B. The Contractor may propose changes in sequence of construction for approval by the County's Resident Engineer. Full

compensation for conforming to such requirements will be considered as included in the related Bid Schedule items of work and no additional compensation will be allowed.

B. General Sequence of Operations:

1. Mobilize.
2. Coordinate with SCE, provide submittals, obtain permits from the County and install electrical service.
3. Secure water source and provide testing and submittals for its use onsite.
4. Clear, grub, and strip work areas.
5. Complete required cell excavations and earthfills.
6. Place select soils in soil stockpiles, as directed by Resident Engineer.
7. Provide submittals for soil and rock components.
8. Provide submittals for geosynthetic components (includes HDPE pipe).
9. Provide submittals for drainage structures as required.
10. Provide submittals for leachate pumping and storage system.
11. Provide submittals for on-site electrical installation.
12. Provide submittals for concrete work.
13. Construct drainage systems.
14. Install subgrade preparation layer.
15. Install lysimeter geosynthetic clay liner (GCL).
16. Install lysimeter HDPE geomembrane.
17. Install lysimeter geocomposite.
18. Install Primary GCL.
19. Install Primary HDPE geomembrane.
20. Construct leachate collection and removal system (Primary geocomposite and piping) on floor and side slopes.
21. Install geotextile separator.
22. Place base and side slope operations layer.
23. Perform geoelectric liner leak location survey and make all necessary repairs until survey is satisfactorily completed
24. Install Leachate storage and containment system including pipe supports and guard posts.
25. Install and test the leachate removal and storage system.
26. Construct access roads (Class 2 Aggregate, HMAC and operation layer soil).
27. Construct barbed wire fence.

28. Install Guard posts.
29. Winterize stockpiles.
30. Establish vegetation.
31. Demobilize.
32. Provide project record drawings.
33. Provide training on leachate removal and storage system controls, operations, and maintenance.

1.06 CONSTRUCTION DRAWINGS

- A. Where “as shown,” “as detailed,” “as noted,” or words of like meaning are used in the Contract Documents, it shall be understood that reference is being made to the Construction Drawings unless otherwise specified.

1.07 MANUFACTURER’S SPECIFICATIONS AND INSTRUCTIONS

- A. Unless otherwise indicated or specified, all manufactured materials, products, processes, equipment, or the like shall be installed or applied consistent with the Manufacturer’s instructions, directions, or specifications. Said installation or application shall be in accordance with printed instructions furnished by the Manufacturer of the material or equipment concerned for use under conditions similar to those at the Project Site. Two copies of such instructions shall be furnished to the Resident Engineer and his acceptance thereof obtained before work is begun.
- B. Any deviation from the Manufacturer’s printed recommendations shall be explained and acknowledged as correct for the circumstances, in writing, by the particular Manufacturer. The Contractor will be held responsible for all installations, including material transportation and storage not conforming to the Manufacturer’s recommendations. If any item of material or equipment is found to be installed not consistent with the Manufacturer’s recommendations, the Contractor shall make all changes necessary to achieve such compliance at no cost to the County.
- C. Contractor shall secure all field measurements required for proper and accurate fabrication and installation of the work included in this Contract. Exact measurements are the Contractor’s responsibility. The Contractor shall also furnish or obtain all templates, patterns, and setting instructions required for the installation of all work. All dimensions shall be verified by the Contractor and/or the County’s Surveyor in the field.

1.08 WORK QUALITY

- A. All shop and field work shall be performed by mechanics and workers skilled and experienced in the fabrication and installation of the work feature involved. All work under this Contract shall be performed consistent with the best practices of the various trades involved and consistent with the Construction Drawings, reviewed shop drawings, and these Specifications.

- B. All work shall be erected and installed plumb, level, square and true, or true to indicated angle, and in proper alignment and relationship to the work of other trades. All finished work shall be free from defects and damage.
- C. The Resident Engineer reserves the right to reject any and all materials and work quality that are not considered to be up to the general standards of the various trades involved. Such inferior material or work quality shall be repaired or replaced, as directed, at no additional cost to the County.

1.09 ACCESS TO WORK

- A. The authorized representatives of the following agencies will also have the right of access to inspect the work covered by these Contract Documents during the performance of this Contract:
 - 1. California Regional Water Quality Control Board, Central Valley Region.
 - 2. San Joaquin Valley Air Pollution Control District.
 - 3. CalRecycle.
 - 4. Tulare County Environmental Health Division.
 - 5. Other local, state, and federal agencies.
- B. These inspections will be performed in the presence of the Resident Engineer. Reasonable facilities for the proper handling and inspection of the materials and the work shall be furnished by the Contractor.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

Coordinate with Owner for all items requiring Owner direction for placement.

END OF SECTION 01010

SECTION 01025 MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general requirements for measurement and payment as they apply to this Contract.
- B. The Contractor and the County will compute all quantities. Where necessary, such computations will be based upon surveys performed by the Contractor and the County. Owner may provide their own survey, as desired, to verify quantities. Quantities for final payment will be reviewed and approved by the Resident Engineer.
- C. Tulare County will survey line and grade to verify design point and construction plan details have been properly meet. Verification will occur at the end of different stages of the project and will be performed and agreed to prior to the work being covered up or moving on to the next stage of the project.

1.02 RELATED SECTIONS

- A. Caltrans Standard Specifications – 2018.
- B. Section 01010 – Summary of Work
- C. Section 01052 -Layout of Work and Surveys.
- D. Section 01300 - Submittals.

1.03 MEASUREMENT OF QUANTITIES

- A. Measurement Standards: All work to be paid for at a Contract price per unit of measurement will be verified by the Resident Engineer consistent with United States Standard Measures.
- B. Measurement by Volume:
 - 1. Measurement by volume will be by the cubic dimension listed or indicated in the Bid Schedule. Method of volume measurement will be as determined or directed by the Resident Engineer.
 - 2. Confirmation of volume may be required by utilizing weighing methods. In this event, such volumes will be converted to weight measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Resident Engineer and shall

be agreed to by the Contractor before such method of measurement of pay quantities will be accepted.

- C. Measurement by Area: Measurement by area will be by the square dimension listed or indicated in the Bid Schedule. Method of square measurement will be as determined or directed by the Resident Engineer.
- D. Linear Measurement: Linear measurement will be by the linear dimension listed or indicated in the Bid Schedule. Method of linear measurement will be as determined or directed by the Resident Engineer. Generally, items, components, or work to be measured will be measured at the centerline of the item in place.
- E. Lump-Sum Measurement: Lump-sum measurement will be for the entire item, unit of work, structure, or combination thereof, as listed or indicated in the Bid Schedule and this Specification.

1.04 FIELD MEASUREMENT FOR PAYMENT

- A. The Contractor and the County shall compute all quantities of work performed or of materials and equipment delivered to the site for payment purposes.
- B. The Resident Engineer may at any time verify quantities calculated by the Contractor consistent with the provisions of Section 01052 of these Specifications.

1.05 PAYMENT

- A. Payment will be full compensation for furnishing all permits, labor, materials, tools, equipment, transportation, services, and incidentals, as specified, and for performing all work necessary for completing the erection or installation of the item or work classification, including all adjusting and balancing, testing, cleaning, and all other incidental work.
- B. Full compensation for all expenses involved in conforming to the requirements for measuring materials or work shall be considered as included in the unit or lump-sum prices paid for the materials or work being measured, and no additional compensation will be permitted.
- C. Full compensation for an item of work for which no measurement or payment is specified will be considered to be included in the applicable related item of work in the Bid Schedule or incidental to the Contract. The Items listed in the pay items below are for bidder's information and not all-inclusive. If an item of work, or part of an item of work, is not listed in a pay item it is considered incidental and the cost thereof should be included in the work item to which it pertains.

1.06 VALUES OF UNIT PRICES

- A. The number of units and quantities contained in the Bid Schedule are approximate only, and final payment will be made for the actual number of units and quantities

that are incorporated in or made necessary by the work included in this Contract. The contractor will not be paid for bid items built beyond the construction drawings and Technical Specifications.

- B. In the event that work, and materials or equipment are required to be furnished to a greater or lesser extent than is indicated by the Construction Drawings and Specifications, such work and materials or equipment shall be furnished in greater or lesser quantities.

1.07 CHANGES AND EXTRA WORK

- A. Changes and extra work ordered by the Resident Engineer will be measured and paid for consistent with the requirements of the Caltrans 2018 Standard Specifications.

1.08 REJECTED MATERIALS

- A. Quantities of material wasted or disposed of in a manner not called for under the Contract; rejected loads of material, including material rejected after it has been placed by reasons of the failure of the Contractor to conform to the provisions of the Contract; material not unloaded from the transporting vehicle; material placed outside the limits indicated on the Construction Drawings or established by the Resident Engineer; or material remaining on hand after completion of the work, will not be paid for, and such quantities shall not be included in the final total quantities. No compensation will be permitted for loading, hauling, and disposing of rejected material. Contractor is responsible for removing rejected and unused materials from site at no cost to the Owner.
- B. Any item that is rejected by the owner / Resident Engineer will be removed and replaced per construction plans and technical specifications, at no cost to the County.

1.09 CONTRACT BID ITEMS

The Bid Items for this Project are listed below. If an item of work is not listed, it is considered incidental to the bid item and is assumed to be included in the amount bid.

- A. Mobilization and Demobilization (**Bid Item 1**):
 - 1. Measurement, lump sum shall be limited to 5 percent or less of the total bid price.
 - 2. Payment, contract unit price per lump sum: 50 percent payment for mobilization and 50 percent payment for demobilization after submittal of acceptable As-built Drawings and Resident Engineer acceptance of work.
 - 3. Includes all materials and work necessary to perform the work described in Sections 01010, 01025, 01039, 01052, 01300, 01400, 01500, 01510, 01560, 01561, 01600, 01720, 01730 and 01800. Also, includes all materials and work necessary for layout of work and surveys as described in Section

01052, other sections and as shown on the Construction Drawings. Additionally, includes all permits, Dust Control Plan, Health and Safety Plan, and all materials and work necessary to implement these Plans and work items and install any necessary site safety fencing or erosion control devices.

B. Stormwater Pollution Prevention Plan (SWPPP) (Bid Item 2)

1. Measurement will be lump sum for development and implementation of a SWPPP to meet all local, regional and national requirements.
2. Item includes development, implementation and maintenance of an approved SWPPP, obtaining all necessary permits, submitting Notice of Intent and Notice of Termination, payment of all fees and all monitoring and reporting activities.
3. SWPPP must be submitted to and approved by the County prior to implementation.

C. Excavation (Bid Item 3):

1. Measurement based on neat line dimensions shown on plans and preconstruction survey of original ground.
2. Payment, contract unit price per cubic yard based on survey pre- and post-excavation.
3. Includes all work necessary to clear, grub and strip work areas as described in Section 02222 of these Specifications and as shown on the Construction Drawings, and to perform excavations indicated on the Construction Drawings including establishing subgrade for the cell, constructing perimeter roads, and excavating earthen drainage ditches, channels and basins as described in Section 02200 and 02722 of these Specifications and as shown on the Construction Drawings. Includes cost to selectively excavate and stockpile specified soil materials from within the construction areas, and within the Project area as allowed by the Resident Engineer, including subgrade preparation layer, and operations layer soil, haul, and place at designated soil stockpiles or in interim soil stockpiles as necessary for construction sequence, or discharge for the specific soil material placement.

The quantity of excavation has been adjusted to reflect a small amount of excavation that has occurred since the aerial topographic mapping was prepared. This area is denoted on the Plans.

D. Earthfill (Bid Item 4):

1. Measurement based on volumes determined from preconstruction survey and/or subgrade record surveys performed on earthfill areas. Earthfill areas

shall include cell subgrade, roads and channel fills required to achieve final elevations.

2. Payment, contract unit price per cubic yard, in place.
3. Includes all work necessary to clear, grub and strip work areas as described in Section 02222 of these Specifications and as shown on the Construction Drawings, and to construct earthfills as described in Section 02200 of these Specifications and as shown on the Construction Drawings. Also includes any necessary excavation and hauling from borrow source(s) to complete the earthfills and placement of topsoil in areas to receive vegetation.

E. Subgrade Preparation Layer (Base and side slope Liner Area) **(Bid Item 5):**

1. Measurement based on actual area constructed and neat line vertical dimensions (plan view dimensions) as shown in the Construction Drawings. No adjustment to be made for slope lengths.
2. Subgrade surfaces will be verified and approved for line and grade by the County surveyor before the next stage of the project can be constructed.
3. Payment, contract unit price per cubic yard, as determined by survey.
4. Includes all work necessary to construct the subgrade preparation layer as described in Section 02200 of these Specifications and as shown on the Construction Drawings. Also includes any select excavation, processing, and hauling from the select stockpile source or the Phase 1 excavation.
5. Earthfill required due to any over excavation is the Contractor's responsibility and will not be included in any pay item.

F. Geosynthetic Clay Liner **(Bid Item 6):**

1. Measurement based on actual plan view surface area installed not including overlap, anchor trench or adjustment for slope lengths.
2. Payment, contract unit price per square foot.
3. The price quoted shall include full compensation for furnishing all labor, materials, equipment, tools, accessories, incidentals, materials for seam overlap and anchor trench, and for performing all work necessary including but not limited to, installing, seaming, temporary and permanent anchoring, quality control testing, repairing, and all documentation required to complete the work according to Section 02774 of these Specifications and as shown on the Construction Drawings. Area to be covered includes the Primary and lysimeter GCL.

G. 60-Mil-Thick HDPE Double-sided Textured Geomembrane (**Bid Item 7**):

1. Measurement based on actual plan view surface area installed as determined by survey. Area excludes seam overlap, rub sheets, anchor trench and any adjustment for slope length.
2. Payment, contract unit price per square foot.
3. The price quoted shall include full compensation for furnishing all labor, materials, equipment, tools, accessories, incidentals, materials for seam overlap, rub sheets and anchor trench, and for performing all work necessary including but not limited to, installing, seaming, temporary and permanent anchoring, quality control testing, repairing, and all documentation required to complete the work according to Section 02772 of these Specifications and as shown on the Construction Drawings. Area to be covered includes the Primary and lysimeter HDPE geomembrane.

H. Geocomposite (**Bid Item 8**):

1. Measurement based on actual plan view surface area installed as determined by survey. Area excludes seam overlap, anchor trench and slope lengths.
2. Payment, contract unit price per square foot.
3. The price quoted shall include full compensation for furnishing all labor, materials, equipment, tools, accessories, incidentals, materials for seam overlap and anchor trench, and for performing all work necessary including but not limited to, installing, seaming, temporary and permanent anchoring, quality control testing, repairing, and all documentation required to complete the work according to Section 02773 of these Specifications and as shown on the Construction Drawings. Area to be covered includes the Primary and lysimeter geocomposite and the earthfill and additional geotextile required around the lysimeter riser pipe.

I. Anchor Trenches (**Bid Item 9**)

1. Measurement based on actual linear footage of perimeter and side slope anchor trenches and the footage of the western interim termination installed, as measured by survey.
2. Payment, contract unit price per linear foot.
3. Includes all work and materials necessary to excavate, furnish and install plywood and fiberglass markers (extra provided to Owner), backfill anchor trenches, concrete, HDPE Flap (where applicable) as described in Section 02225 of these Specifications and as shown on the Construction Drawings.

J. Leachate Collection and Removal Systems (**Bid Item 10**)

1. Measurement shall be lump sum for both IIA and IIB. (Coordinate with Leachate Extraction and Storage Systems bid item)
2. Payment, contract lump sum price per each system.
3. Includes all work necessary to supply and install the Leachate Collection and Removal Systems in Areas IIA and IIB, including lysimeter components. Main components of the work include, but is not limited to, the perforated and nonperforated HDPE pipe, perforated and nonperforated PVC piping, LCRS and lysimeter risers, blind flanges, end caps and fittings, stainless steel wire rope, extraction caps and fittings, pipe supports, the stainless steel wire rope (Section 02751), the gravel drainage and sump gravel materials (Section 02207) the geotextile (Section 02771), the concrete aprons as described in Section 03300 of these Specifications, and all as shown on the Construction Drawings and all other items required for a complete installation.

K. Operations Layer (**Bid Item 11**):

1. Measurement based on actual area constructed as measured by survey and neat line vertical dimensions (plan view) for thickness shown on the Construction Plans. No adjustment to be made for slope lengths. Any overfill of Operations Layer soil, which exceeds the tolerances specified must be removed and cubic yardage will be deducted from contractors pay, per bid item cost prior to acceptance and payment.
2. Payment, contract unit price per cubic yard.
3. Includes all work necessary to construct base and side slope liner Operations Layer and Operations Layer soil access road within Areas IIA and IIB as described in Section 02200 of these Specifications and as shown on the Construction Drawings. Also includes any necessary excavation and hauling from excavation or borrow source.

L. 18" Corrugated Metal Pipe (CMP) Culvert (**Bid Item 12**):

1. Measurement based on actual length installed as determined by survey. Proposed length if 95 feet.
2. Payment, contract unit price per linear foot for CMP as described in Technical Specification 02722.
3. Includes all work necessary to supply and install pipe, and fittings including trench excavation, bedding layer, and backfill, as described in Section 02722 of these Specifications Section 66 of the Standard Specifications and as

shown on the Construction Drawings. Also includes inlet and outlet structures and grouted riprap specified.

M. Culvert 2, 30-inch diameter Reinforced Concrete Pipe (RCP) Culvert **(Bid Item 13):**

1. Measurement based on actual length installed as determined by survey. Proposed length for Culvert 2 is 90 feet.
2. RCP must be gasketed Class IV pipe and certified by the manufacturer to withstand HL-93 loads with less than 2-feet of cover.
3. Payment, contract unit price per linear foot for RCP as described in Technical Specification 02722.
4. Includes all work necessary to supply and install pipe, and fittings including trench excavation, bedding layer, and backfill, as described in Section 02722 of these Specifications, Section 19 of the Standard Specifications and as shown on the Construction Drawings. Also includes inlet and outlet structures and grouted riprap specified.

N. Culvert 3, 36-inch diameter Reinforced Concrete Pipe (RCP) Culvert **(Bid Item 14):**

1. Measurement based on actual length installed as determined by survey. Proposed length for Culvert 3 is 90 feet.
2. RCP must be gasketed Class IV pipe and certified by the manufacturer to withstand HL-93 loads with less than 2-feet of cover.
3. Payment, contract unit price per linear foot for RCP as described in Technical Specification 02722.
4. Includes all work necessary to supply and install pipe, and fittings including trench excavation, bedding layer, and backfill, as described in Section 02722 of these Specifications, Section 19 of the Standard Specifications and as shown on the Construction Drawings. Also includes inlet and outlet structures and grouted riprap specified.

O. Culvert 4 and 5, 42-inch diameter Reinforced Concrete Pipe (RCP) Culvert **(Bid Item 15):**

1. Measurement based on actual length installed as determined by survey. Proposed length for Culvert 4 is 170 linear feet and for Culvert 5 is 210 linear feet for a total length of 42-inch pipe of 380 feet.
2. RCP must be gasketed Class IV pipe and certified by the manufacturer to withstand HL-93 loads with less than 2-feet of cover.

3. Item includes 26 linear feet of 18-inch Class IV RCP (Culvert 6), connection to Culvert 4 as shown on the Drawings.
4. Item includes providing and installing a grated inlet and rock riprap as shown on the Drawings.
5. Payment, contract unit price per linear foot for RCP as described in Technical Specification 02722.
6. Includes all work necessary to supply and install pipe, and fittings including trench excavation, bedding layer, and backfill, as described in Section 02722 of these Specifications, Section 19 of the Standard Specifications and as shown on the Construction Drawings. Also includes inlet and outlet structures and grouted riprap specified.

P. Drainage Channels (**Bid Item 16**):

1. Includes all perimeter trapezoidal channel sections.
2. Measurement based on actual length constructed between culverts as determined by survey along the completed flow line.
3. Payment, contract unit price per linear foot.
3. Includes all work and material necessary to perform final grading of the drainage channels in accordance with Sections 02200, 02225 and 02722 of these Specifications and as shown on the Construction Drawings. Excavation and earthfill associated with the perimeter road and channels are included in their respective bid items. Culverts and slope erosion protection are included in their respective bid items.

Q. “V” Drainage Ditch (**Bid Item 17**):

1. Measurement based on actual length constructed as determined by survey along the completed flow line, up to the grated inlet.
2. Payment, contract unit price per linear foot.
3. Includes all work necessary to construct the drainage ditch and associated grouted rock rip rap as specified in Section 02200, 02207 and 02722 of these Specifications and as shown on the Construction Drawings.

R. Aggregate Base for Access Roads (**Bid Item 18**):

1. Measurement based on actual area constructed as determined by survey and neat line thickness shown on the Construction Drawings.

2. Payment, contract unit price per square foot. Contractor will not be paid for roads built beyond what is shown on the construction plans and technical specifications.
3. Includes all work necessary to supply and construct the Class 2 Aggregate Base including pavement fabric as described in Sections 02207, 02200, 02771 of these Specifications and as shown on the Construction Drawings and in accordance with Item 26 of Caltrans Standard Specifications. Excavation and earthfill associated with the perimeter road and channels are included in their respective bid items.

S. Hot Mix Asphalt Entrance Road overlay (**Bid Item 19**):

1. Measurement based on actual area constructed as determined by survey and neat line thickness shown on the Construction Drawings.
2. Payment, contract unit price per ton. Contractor will not be paid for roads built beyond what is shown in construction plans and technical specifications.
3. Includes all work necessary to supply and install the Hot Mix Asphalt (two courses and tack coats) over existing rock base as shown on the Construction Drawings and in accordance with Item 39 of Caltrans Standard Specifications, as modified by the County.

T. Leachate Extraction and Storage Systems (**Bid Item 20**):

1. Measurement based on lump sum price for the extraction and storage system for IIA and IIB. (Coordinate with Leachate Collection and Removal Systems)
2. Payment, contract lump sum price for each system.
3. Includes all work necessary to:
 - a. Supply and install control panels, storage tanks, leachate/lysimeter pumps, piping, unistruts, valves, flow meters, pressure transducers, level sensors and other associated appurtenances for fully functional automated pumping and storage systems;
 - b. Supply one backup pump with level sensor, power and level sensor cables for each system for installation in the deepest application;
 - c. Furnish all material and labor needed to complete the installation of the underground electrical conduit from the control panel locations, all breakout boxes, pull tape, underground warning tape, trench excavation, backfill, control panels, circuit breakers, GFCI receptacles, lights and all associated appurtenances for a fully operational system; furnish and install the leachate storage tanks, inlet

and outlet piping, control valves, level sensors, flow meters, water meters, unistrut anchors, valves, vault boxes and all other associated materials and appurtenances to provide the leachate extraction and storage system according to Sections 02510, 03200, 03300, 11000, 15100, 15200, 15480, 16050, 16100, 16500, 16910 and 16911 of these Specifications and as shown on the Construction Drawings and in accordance with the Manufacturer's recommendations. Also includes the start-up, proper operation of each leachate/lysimeter extraction and storage systems, and training of County personnel on system operations.

- d. Item includes the delivery and storage of two spare pumps with carriage and transducers. Transducer to be installed with power and level sensor cable lengths for the deepest application in service.
- e. All work must be performed by qualified installers approved by the County.
- f. Does not include construction of the secondary containment which is a separate bid item (Bid Item 21).

U. Concrete Secondary Containment System (**Bid Item 21**):

- 1. Measurement based on lump sum price, each system
- 2. Payment, contract unit price per each system.
- 3. Includes all work necessary to furnish and install the concrete secondary containment system including grading, base preparation and aggregate placement, formwork, rebar installation, concrete, finishing and all other associated materials and appurtenances to provide the secondary containment system according to Section 03300 of these Specifications and as shown on the Construction Drawings.

V. Electric Service (**Bid Item 22**):

- 1. Measurement shall be lump sum.
- 2. Payment, contract lump sum price.
- 3. Includes all work necessary to furnish all materials and labor to complete the installation of the service pole, meter box and all items necessary for connection to Southern California Edison (SCE) and to provide a fully operational power source according to Sections 16050 and 16100 of these Specifications and as shown on the Construction Drawings and in accordance with SCE's most recent Electrical Service Requirements. These

requirements can be found at <https://www.sce.com/regulatory/distribution-manuals>.

4. Provide coordination with SCE and the County and obtain all necessary permits and authorizations from each. All work must be in accordance with SCE and County requirements.
3. Includes all work necessary to supply and install underground, or overhead electrical conduits, conductors, ground wire, and pull boxes, including any trench excavation, bedding layer, concrete embedment as required, detectable warning tape, and backfill, as described in Sections 16050 and 16100 of these Specifications and as shown on the Construction Drawings

W. Site Electrical (**Bid Item 23**):

1. Measurement shall be lump sum.
2. Payment, contract lump sum price.
3. Includes all work necessary to supply and install underground electrical conduits, conductors, ground wire, and pull boxes, including trench excavation, bedding layer, concrete embedment as required, detectable warning tape, and backfill, as described in Sections 16050 and 16100 of these Specifications and as shown on the Construction Drawings. This Item includes extending power to the Control Panel Junction boxes for IIA, IIB and IIC (3 total locations). Separate underground conduits and cables for power and transducers for each pump must be provided from two control panel locations (IIA and IIB) to their respective riser break out boxes.

X. Barbed Wire Fence Remove and Replace (**Bid Item 24**):

1. Measurement shall be per linear foot.
2. Payment, contract price per linear foot.
3. Includes all work necessary to remove the existing fence along the south property line, regrade the area to create a smooth ground finish, furnish all materials and labor to install a new 5-strand barbed wire fence in the location of the one removed. The new fence must be firmly connected to the existing fence on both ends, all as described in Technical Specification 02444 and Section 80 of the Standard Specifications and as shown on the Construction Drawings.

Y. Vegetation and Erosion Control Matting (**Bid Item 25**):

1. Measurement shall be per acre.
2. Payment, contract price per acre.

3. Includes all work necessary to establish vegetation in all areas disturbed during construction, whether or not the disturbed area is within the Project Limits in accordance with Specifications 02200, 02225, and 02900 and as shown on the Constriction Drawings.
4. Work includes the installation of Erosion Control Matting in all areas with finished slopes greater than 10%, except in the liner areas associated with Areas IIA and IIB.
5. Contractor to maintain vegetation until the required coverage has been established and the project accepted.

Z. Leak Location Survey (Bid Item 26):

1. Measurement shall be by lump sum.
2. Payment, contract unit price per lump sum.
3. Includes all work necessary for the leak location contractor to perform a geoelectric leak location survey over the constructed liner phase by a qualified specialist in conformance with Section 02589 of these Specifications and as required by the CQA Plan. Any required repairs are the responsibility of the contractor.

AA. Perforated 6-inch HDPE Pipe (Bid Item 27):

1. Measurement shall be by the linear foot for 3,600 linear feet of perforated 6-inch diameter SDR 11 HDPE pipe.
2. Payment, contract unit price per linear foot.
3. Includes all work necessary for obtaining the pipe, perforating in accordance with detail 3 on Drawing C-12 and delivery to the project site. Also includes unloading and storage in a location designated by the Resident Engineer. Storage must be in accordance with the manufacturer's recommendations and the pipes must be covered and secured with water-proof tarps for protection until the project is complete or the County takes possession of the pipe.
4. Any pipe damaged or that does not meet the required specifications must be removed from the site and replaced at no cost to the Owner.

BB. 8-inch steel guard posts (Bid Item 28):

1. Measurement shall be per each guard post installed and approved by the County.
2. Payment, contract unit price per each.

3. Steel posts to be extra strength and comply with ASTM A53.
4. Installation shall be in accordance with detail 3 on Drawing C15 and includes all steel posts, concrete, paint and reflector tape as shown.
5. Quantity shown on plans is 41 guard posts. County may increase or decrease quantity based on site conditions during construction.
6. Locations are shown on the Drawings, but exact locations must be approved by the County prior to installation in order to receive payment.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

(Not used)

END OF SECTION 01025

SECTION 01039 MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Pre-Bid Meeting
- B. Preconstruction Meeting
- C. Progress Meetings
- D. Preparatory Meetings

1.02 PRECONSTRUCTION MEETING

- A. The County's Resident Engineer will schedule the preconstruction meeting after issuing the Notice of Award to the Contractor. The objectives of this meeting are to:
 - 1. Clearly define the roles, responsibility, and authority of each organization and individual involved in the project.
 - 2. Review details of the CQA program.
 - 3. Establish a foundation of cooperation to achieve quality construction.
- B. The following agenda, as related to construction quality assurance, will be addressed by the Resident Engineer.
 - 1. Introduce and discuss role, authority, and responsibilities of each organization and individual involved in the project.
 - 2. Establish lines of communication.
 - 3. Review Technical Specifications and Plans.
 - 4. Distribution of the CQA Manual.
 - 5. Review of CQA activities to be performed.
 - 6. Discuss Contractor's construction schedule and workplan.
 - 7. Discuss Contractor's QC procedures and responsibilities.
 - 8. Discuss submittal review and approval procedures
 - 9. Discuss non-conformance and corrective action procedures.

10. Discuss construction restrictions due to weather conditions.
 11. Discuss and schedule progress meetings.
 12. Discuss Health and safety issues.
- C. Meeting minutes and items for resolution will be recorded by the Resident Engineer and distributed to all parties in attendance.
- D. The following representatives from each organization are required to attend the preconstruction meeting.
1. County's Project Manager or representative.
 2. Contractor's Project Manager and on-site Superintendent.
 3. Installer's Project Manager and on-site Superintendent.
 4. Resident Engineer's Project Manager and CQA Officer.
 5. Regulatory Agency Representative(s) (optional).
- E. The Contractor's attendance at the preconstruction meeting is not a payable item. Any costs incurred by the Contractor for attendance at the preconstruction meeting should be included in the Bid Price for Mobilization.

1.03 PROGRESS MEETINGS

- A. The Resident Engineer will schedule and administer weekly progress meetings. The objectives of these meetings are to: 1) maintain lines of communication; 2) review procedures and results of the CQA program; and 3) maintain and improve the established foundation of cooperation to achieve quality construction. The following agenda will be addressed.
1. Review minutes of previous progress meeting.
 2. Review work progress.
 3. Review and update construction schedule and obtain a schedule from the Contractor, listing the construction activities for the following 2 weeks.
 4. Discuss CQA and CQC related field observations, testing results, problems, decisions, and conflicts.
 5. Review and update Submittal Log.
- B. Meeting minutes and items for resolution will be recorded by the Resident Engineer and distributed to all parties in attendance.

- C. The following representatives from each organization are required to attend the progress meetings.
 - 1. County's Project Manager or representative.
 - 3. Contractor's on-site Superintendent.
 - 4. Installer's on-site Superintendent (during geosynthetic installation).
 - 4. CQA Officer or representative.
- D. The Contractor's attendance at the progress meetings is not a payable item. Any costs incurred by the Contractor for attendance at the progress meetings should be included in the Bid Price for Mobilization.

1.04 PREPARATORY MEETINGS

- A. The Resident Engineer will schedule and administer one or more, as needed, informal preparatory meetings prior to each of the following steps in the sequence of operations. Additional meetings will be scheduled as needed as work progresses.
 - 1. Mobilize.
 - 2. Earthwork
 - a. Clear, grub, and strip work areas.
 - b. Complete required cell excavations and earthfills.
 - c. Place select soils in stockpiles, as directed by the Resident Engineer.
 - d. Provide submittals for soil and rock components.
 - 3. Provide submittals
 - a. geosynthetic components (includes HDPE pipe).
 - b. CMP/RCP as required.
 - c. Provide submittals for leachate pumping and storage system.
 - d. Provide submittals for electrical installation.
 - e. Provide submittals for concrete work.
 - 4. Construct drainage system.
 - 5. Install subgrade preparation layer.
 - 6. Geosynthetics
 - a. lysimeter geosynthetic clay liner (GCL).
 - b. lysimeter geomembrane.

- c. lysimeter geocomposite.
 - d. Primary GCL.
 - e. Primary geomembrane.
 - f. Construct leachate collection and removal system (Primary geocomposite and piping) on floor and side slopes.
 - g. Install geotextile separator.
 - h. Place operations layer.
- 7. Perform geoelectric liner leak location survey and make all necessary repairs until survey is satisfactorily completed.
 - 8. Install and test the leachate removal and storage system.
 - 9. Construct access roads.
 - 10. Install HMA Paving.
 - 11. Winterize stockpiles.
 - 12. Establish vegetation.
 - 13. Demobilize.
 - 14. Provide project record drawings.
 - 15. Provide training on leachate removal and storage system controls, operations, and maintenance.
- B. The objective of these preparatory meetings is to establish a complete understanding of the upcoming construction activities and CQA procedures and testing that will be implemented during construction. To achieve this objective, the following agenda will be addressed.
- 1. Review "Materials" section of the applicable Technical Specifications.
 - 2. Review "Execution" section of the applicable Technical Specifications.
 - 3. Discuss any construction and grade control staking needed to complete the work.
 - 4. Discuss CQA testing, observation, and surveying to be performed.
 - 5. Verify that all submittals have been or will be received and approved in accordance with the schedule.
 - 6. Discuss Contractor's coordination, scheduling, and sequencing of the work.
 - 7. Discuss Contractor's proposed equipment and manpower.
- C. Meeting minutes and items for resolution will be recorded by the Resident Engineer and distributed to all parties in attendance.

- C. The following representatives from each organization are required to attend the preparatory meetings.
1. Contractor's on-site Superintendent.
 2. On-site Superintendent of any Subcontractor, as applicable to the Work.
 3. CQA Officer or representative, as applicable to the Work.
- D. The Contractor's attendance at the preparatory meetings is not a payable item. Any costs incurred by the Contractor for attendance at the preparatory meetings should be distributed and included in the Bid Price for the item for which the meeting is held.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01039

SECTION 01052

LAYOUT OF WORK AND SURVEYS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general requirements for survey work to be performed by the Contractor for layout of work features, for performance of work, and for field measurements of work quantities for payment purposes.
- B. Before commencing any surveys, the Contractor shall give the Resident Engineer three (3) working days' written notice in advance so that the Resident Engineer may witness such work.
- C. County surveyors will verify line and grade for every step of construction work. All lines and grades must be verified before covering up work or moving to the next section of work. Contractor shall give the Resident Engineer three (3) working days' written notice in advance so that the Resident Engineer may schedule the work with the County's surveyors.

1.02 RELATED SECTION

- A. Section 01500 – Mobilization and Demobilization
- B. Section 01300 – Submittals
- C. Section 01720 – Project Record Documents

1.03 DESCRIPTION

- A. Reference Points: The reference points to be provided by the Resident Engineer will include referenced monuments, survey control line(s), and elevation benchmarks in the vicinity of the project. If displaced by the Contractor, replacement of these reference points will be at the expense of the Contractor. All other necessary reference points shall be established by the Contractor.
- B. The Contractor shall furnish all necessary detail surveys including all lines, grades, and appropriate surveys as specified. Surveys shall be performed under direct supervision of a California Registered Professional Land Surveyor.
- C. The Resident Engineer reserves the right to perform any desired checking and correction of the Contractor's survey, but this shall not relieve the Contractor of the responsibility for adequate performance of the work. The Resident Engineer will complete any checking within five (5) working days (Monday - Friday) of receipt of the Contractor's completed survey.
- D. Equipment and Personnel: The Contractor's instruments and other survey equipment shall be accurate, suitable for the surveys required, consistent with recognized professional standards, and in proper condition and adjustment at all times.
- E. Field Notes and Records: The Contractor shall record surveys in field notebooks. The original pages of such records and associated electronic data shall be furnished to the

Resident Engineer at intervals required by the Resident Engineer. The Resident Engineer will have up to five working days to review the data and notify the Contractor of any errors. A duplicate of each field notebook shall be furnished to the Resident Engineer when filled or completed. Electronic notes may be used if printouts are furnished to the Resident Engineer and if the format of the printed information is approved by the Resident Engineer.

- F. Use by the Resident Engineer: The Resident Engineer may at any time use line and grade points and markers established by the Contractor. The Contractor's surveys are a part of the work and may be checked by the Resident Engineer or representatives of the Resident Engineer at any time. The Contractor shall be responsible for (1) any lines, grades, associated electronic data, or measurements which do not comply with specified or proper tolerances, or which are otherwise defective and (2) any resultant defects in the work. The Contractor will be required to conduct resurveys or check surveys to correct errors indicated by review of the field notebooks or otherwise detected at no cost to the County.

1.04 SURVEYS FOR LAYOUT AND PERFORMANCE OF WORK

- A. The Contractor shall perform all surveys for layout and performance of the work, produce the field notes, make necessary calculations, and prepare drawings necessary to carry out and verify such work.

1.05 SURVEYS FOR MEASUREMENT FOR PAYMENT

- A. When the Specifications or the Resident Engineer require Bid Schedule items of work to be measured by surveying methods, the Contractor and/or the County surveyors shall perform the surveys. The Contractor will produce the field notes and calculate final quantities for payment purposes. A duplicate of the note reductions and calculations will be given to the Resident Engineer for review and approval.
- B. The contractor and County surveyors must make all pre-construction surveys necessary for accurate quantity and thickness calculations. Pre-construction survey must be performed prior to performing any work and to the satisfaction of the Resident Engineer.

1.06 SURVEYS FOR AS-BUILT DRAWINGS

- A. The Contractor shall perform a preconstruction topographic survey (topos) immediately prior to the start of work and as-built topos at the completion of the following: top of prepared subgrade, top of earthfills, top of drainage aggregate, top of operations layer and channel/ditch construction. The as-built surveys shall be performed at a minimum 50-foot grid with elevations also taken at grade break points. The location of the survey points for each liner segment (subgrade, top of earthwork [earthfill and prepared subgrade areas], drainage aggregate, and operations layer) shall be directly above the survey point location previously obtained, (i.e., same northing and easting). Thickness data must be measured perpendicular to the slope and contractor must provide additional vertical thickness as needed to provide the required perpendicular thickness. Survey data points shall be provided in Excel and a point file in AutoCAD. Survey points shall have point number, northing, easting, elevation, and description. An AutoCAD drawing shall be created to include a surface for each layer, one (1) foot contours, separate layers for each item, and break lines.

Additional as-built drawings to be completed include the alignment and elevations of the leachate piping, the alignment and elevations of the electrical conduit, the alignment and elevations of drainage structures and pipes and the elevations and alignment of the new access roads. This as-built information will be submitted on drawings to the Resident Engineer in a digital format acceptable to the Resident Engineer indicating the location of survey points (i.e., northing, easting, elevation, point number, and description) and shall be stamped by a California-Registered Professional Land Surveyor. The Resident Engineer shall have up to seven (7) working days to review and approve the as-built surveys. After final approval by the Resident Engineer the Contractor shall submit three sets of final drawings for each survey.

Final drawings shall present elevations of finished layers, the thickness difference between succeeding layers, delineation of the liner geomembrane and surveyed locations of all pipe ends and junctions, leachate pipe risers, electrical vaults and electrical pull boxes.

- B. The Contractor's Surveyor shall prepare and seal a letter certifying that the earthwork layers are within specified grading thickness and meet or exceed specified thickness, excavated and fill quantities, and the letter shall list and accompany the drawing submittals.

The surveyor shall submit certified base grading as-built drawings within two (2) calendar days of survey completion. This submittal must be approved by the Resident Engineer before liner installation begins.

- C. The Contractor shall develop an as-built drawing delineating plan, profile and limits of aggregate base for the access roads.

1.07 SURVEYING ACCURACY AND TOLERANCES IN SETTING OF SURVEY STAKES

- A. Control traverse field surveys and computations shall be performed to an accuracy of at least 1:25,000.
- B. The tolerances generally applicable in setting survey stakes shall be as set forth below. Such tolerances shall not supersede stricter tolerances required by the Specifications or Construction Drawings and shall not otherwise relieve the Contractor of responsibility for measurements in compliance therewith.

<u>Type of Line or Mark</u>	<u>Horizontal Position</u>	<u>Elevation</u>
Permanent reference points	1 in 10,000	±0.01 foot
General excavation and earthwork	1 in 2,000	±0.1 foot

- C. Tolerances for designed thicknesses shown on Construction Drawings and for elevations shown on the Construction Drawings shall be -0.00 to +0.10 foot, unless otherwise stated in these Specifications or on the Construction Drawings.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

(Not used)

END OF SECTION 01052

UNOFFICIAL

SECTION 01075 TECHNICAL SPECIFICATION DEFINITIONS

- A. ASTM International: An international standards organization that develops standards, practices, guides, and test materials. Standards typically used for construction quality control and quality assurance testing.
- B. Backfill: Material placed in trenches or other excavation. Conform to applicable fill as specified.
- C. Base Operations Layer: Layer of soil placed above the geosynthetic materials to protect the base lining and leachate collection system during landfilling.
- D. Batch: A quantity of resin, usually the capacity of one railcar, used in the fabrication of geomembrane materials. The finished roll will be identified by a roll number corresponding to the resin batch used.
- E. Bentonite: Clay soil, comprised primarily of sodium montmorillonite, characterized by high swelling potential and low hydraulic conductivity.
- F. Borrow Excavation: Borrow excavation shall include excavation of materials from borrow areas identified on the Construction Drawings for the purpose of obtaining fill materials. The process may require exclusion of unsuitable materials and minor manipulation of materials.
- G. Bridging: Condition existing when the geosynthetic is not in contact with the underlying material.
- H. California Code of Regulations (CCR), Title 27, Division 2 - Solid Waste: California Regulations for treatment, storage, processing or disposal of waste.
- I. Caltrans: California Department of Transportation.
- J. Coefficient of uniformity (Cu): Ratio of grain diameter (in millimeter [mm]) corresponding to 60 percent passing (by dry weight) to the grain diameter (in mm) corresponding to 10 percent passing (by dry weight).
- K. Cohesionless Materials: Materials classified by Unified Soil Classification System (USCS) as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.
- L. Cohesive Materials: Materials classified by USCS as GC, SC, ML, CL, MH, and CH.
- M. Construction Quality Assurance (CQA): A planned series of observations and tests to verify that quality control functions have been performed adequately and determine compliance with plans and specifications.
- N. Construction Quality Assurance Consultant (CQA Consultant): The monitoring firm responsible for implementation of the CQA program. Also referred to as the "Monitor." The firm or individual hired by the County responsible for monitoring that the tasks outlined in the Contract Documents are performed consistent with the Construction Quality Assurance Manual.
- O. Construction Quality Assurance Monitor (CQA Monitor): Site representative(s) of the CQA Officer responsible for documenting field observations and tests. Also referred to as the

APTIM.

“Monitor.” The firm or individual hired by the County responsible for monitoring that the tasks outlined in the Contract Documents are performed consistent with the Construction Quality Assurance Manual.

- P. Construction Quality Assurance Officer (CQA Officer): The professional representative of the CQA consultant responsible for planning, coordinating, and implementing the CQA plan. The CQA Officer must be a California registered civil engineer or certified engineering geologist as required in Section 20324(b)(2) of Title 27.
- Q. Contract Documents: The official set of documents issued by the County, which includes bidding requirements, contract forms, contract conditions, construction specifications, construction drawings, addenda, and contract modifications.
- R. Construction Drawings: The official plans, profiles, typical cross-sections, elevations, and details, as well as their amendments and supplemental drawings, which show the locations, character, dimensions, and details of the work to be performed. Construction drawings are also referred to as Contract Plans, Project Plans and/or Plans.
- S. Construction Specifications: The qualitative requirements for products, materials, and workmanship upon which the construction is based. Construction specifications are also referred to as contract specifications, specifications, and/or special provisions.
- T. Construction Testing: Testing that occurs during material placement.
- U. Contractor (also General Contractor): The person or persons, firm, partnership, corporation, or any combination, private, municipal, or public, who, as an independent contractor, has entered into a contract with the County.
- V. Corrective Measures: Procedures to be used to rework, repair or replace a deficiency in the quality of an item or to resolve unacceptable or indeterminate activities.
- W. CMP: Corrugated Metal Pipe
- X. D15: Grain diameter (mm) corresponding to 15 percent passing (by dry weight) in a sieve analysis.
- Y. D85: Grain diameter (mm) corresponding to 85 percent passing (by dry weight) in a sieve analysis.
- Z. Design Engineer: The individual or firm responsible for the design and preparation of the project Construction Drawings and Specifications.
- AA. Dewatering: The removal of any water which may accumulate within earthwork areas.
- BB. Drainage Gravel: Granular material placed as a drainage media above the low-permeability layer.
- CC. Documentation Forms: Standardized forms developed for recording required material submittals, material conformance testing and observations, and construction quality assurance testing and observations.
- DD. Earthfill: Fill placed using select excavated materials to the lines and grades indicated on the Construction Drawings.

- EE. Earthwork: A construction activity involving the use of soil materials as defined in the construction specifications.
- FF. Excavation: Excavation of materials from areas identified on the Construction Drawings. The process may require exclusion of unsuitable materials.
- GG. Extrudate: Geosynthetic material produced in the form of a rod or pellets to be used by the Installer to extrusion weld panels of geomembrane together.
- HH. Fishmouth: An opening resulting from the uneven mating of two geomembranes where the upper sheet has excessive length that prevents it from being bonded flat to the lower sheet.
- II. Geomembrane: An essentially impermeable synthetic membrane liner or barrier used to minimize fluid migration in civil engineering works. Synonymous term for flexible membrane liner (FML).
- JJ. Geosynthetic Contractor: The person or firm retained by the Contractor for the installation of the geosynthetic material. Also identified as the subcontractor or installer.
- KK. Geosynthetic Clay Liner (GCL): Relatively thin factory-manufactured liner material consisting of bentonite between two geotextiles (two nonwoven or a nonwoven and woven) that are needle-punched or stitched together.
- LL. Geosynthetic Manufacturer. The party responsible for producing the geosynthetic material.
- MM. Geosynthetic Materials: Products manufactured from polymeric material to be used with geotechnical engineering-related materials as an integral part of civil engineering works. Geosynthetic materials include geomembranes, geotextiles, geocomposites, geonets, GCL, and HDPE pipe and fittings.
- NN. Geosynthetic Quality Assurance Laboratory (Third-Party Laboratory; CQA Laboratory): Party, independent from the County, Manufacturer, Fabricator, and Installer, retained for conducting laboratory tests on samples of geosynthetics for the project.
- OO. Geotextile: Woven or nonwoven synthetic fabric used as a filter, separator, or reinforcement in geotechnical applications.
- PP. Gradation: Particle size gradation of materials as determined consistent with ASTM C136, D422, or D1140.
- QQ. Grouted Rip-Rap – Rock Slope Protection
- RR. Installer: The party or parties retained by the Contractor for field handling, transporting, storing, deploying, seaming, temporary restraining (against wind), and installing the geosynthetics.
- SS. Lift: One-single continuous placement of soils, usually measured in inches of depth.
- TT. Minimum Average Roll Value (MARV): A manufacturing quality control tool used to allow geosynthetic manufacturers to establish published values such that the user/purchaser will have a 97.7% confidence that the property in question will meet published values. For normally distributed data, “MARV” is calculated as the typical value minus two (2) standard deviations from documented quality control test results for a defined population from one specific test

method associated with one specific property. Discussion: MARV is applicable to a geosynthetic's intrinsic physical properties such as weight, thickness, and strength.

- UU. Nonconformance: A deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate. Examples of nonconformances include, but are not limited to, physical defects, test failures, and inadequate documentation.
- VV. Operations Layer: (Same as Base Operations Layer) Layer of soil placed above the geocomposite to protect the liner components and leachate collection system during landfilling.
- WW. Over Excavation: Excavation carried out beyond the lines and grades shown on the Construction Drawings, unless authorized in writing by the Resident Engineer.
- XX. Oversized Excavated Material: Excavated material not suitable for fill because of particle size.
- YY. Panel: The unit area of a geosynthetic material, a roll or portion of a roll that will be seamed or overlapped in the field.
- ZZ. Percent Maximum Density (Relative Compaction): Field dry density expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D1557.
- AAA. Pipe Bedding: Select granular material placed beneath pipes to the lines and grades indicated on the Construction Drawings.
- BBB. Pipe Manufacturer: The party responsible for the production of the pipe from resin and for the resin quality.
- CCC. Procedure: Listed steps or actions that specify or describe how an activity is to be performed.
- DDD. Production Lot: For testing purposes, a production lot shall consist of geosynthetic materials (or pipe) having the same marking numbers or consecutively numbered items from the same manufacturing line.
- EEE. Project Documents: Contractor submittals, construction drawings, record drawings, specifications, shop drawings, construction quality control and quality assurance plans, safety plan, and project schedule.
- FFF. Quality Assurance: A planned, and systematic pattern of procedures and documentation designed to provide adequate confidence that materials or services meet contractual and regulatory requirements, and that these materials will perform satisfactorily in service.
- GGG. Quality Control: Those actions that provide a means of measuring and regulating the characteristics of a material or service to comply with the requirements of the construction documents. Quality control will be performed by the Contractor, manufacturers, suppliers, and subcontractors.
- HHH. Record Drawings: Drawings recording the constructed dimensions, details, and coordinates of the project (also referred to as "as-builts").
- III. Resident Engineer: The Resident Engineer is the official representative of the County and is responsible for construction activities at the facility, including oversight and construction management. The Resident Engineer is responsible for coordinating construction and quality assurance activities for the project. The Resident Engineer shall be responsible for the

resolution of all quality assurance issues that arise during the liner system construction and must be involved in any decision that may affect future operations at the landfill.

- JJJ. RCP – Reinforced Concrete Pipe
- KKK. Satisfactory Materials: Materials meeting the applicable specification requirements.
- LLL. Side Slope Operations Layer: Layer of soil placed above the geosynthetic layers on the side slopes to protect the side slope lining system during landfilling.
- MMM. Soils Quality Assurance Laboratory (Third-Party Laboratory). Party or parties independent from the County and Contractor, retained by the County or Contractor for conducting laboratory tests on soil samples obtained at the site.
- NNN. Standard Dimension Ratio (SDR): Ratio of pipe diameter to wall thickness.
- OOO. Subgrade: In-situ material.
- PPP. Subgrade Preparation Layer: Minimum one-foot layer of soil conditioned and prepared to receive earthfills, GCL, HDPE geomembrane, geocomposite, erosion protection materials, or where other features are to be constructed.
- QQQ. Sump Gravel: Granular material placed as a drainage media in the primary and lysimeter LCRS.
- RRR. Surveyor: The individual or firm responsible for setting grade stakes and other survey markings to establish required elevations for constructing the project in accordance with the drawings and specifications. The surveyor may also perform Record Drawing (as-built) surveys for documenting minimum thickness, grade, or other specified tolerances. Work to be performed by a professional surveyor licensed in California.
- SSS. Third-party Soils Laboratory: A laboratory capable of conducting the tests required by this Specification. This laboratory shall not be affiliated with the Contractor.
- TTT. Testing: Verification that materials meet specified requirements by subjecting that material to a set of physical, chemical, environmental, or operating conditions.
- UUU. Textile Backing (textile or geotextile): Geosynthetic support material comprising of a needle-punched nonwoven, or spunlaced polymer fabric, used for securing bentonite in a GCL.
- VVV. Unsatisfactory Materials: Materials not meeting the applicable specification requirements.
- WWW. USCS. Unified Soil Classification System.

END OF SECTION 01075

SECTION 01090 REFERENCES

PART 1 GENERAL

1.01 SUMMARY

- A. Descriptions
- B. Abbreviations
- C. Standard Construction Specifications

1.02 DESCRIPTIONS

- A. The Contract Documents contain references to various standard Specifications, codes, practices, and requirements for materials, workmanship, installation inspections, and tests, which references are published and issued by the organizations, societies, and associations listed below by abbreviation and name. Such references are hereby made a part of the Contract Documents to the extent cited.
- B. Any material, method, or procedure specified by reference to the number, symbol, or title of a specific specification or standard, such as a Commercial Standard, American National Standard, Federal or State Specification, Industry or Government Code, a trade association code or standard, or other similar standard, shall comply with the requirements in the latest revision thereof and any amendments or supplements thereto in effect on the date of Award of the Contract, except as limited to type, class, or grade, or modified in such reference.
- C. The code, specification, or standard referred to, except as modified in these Specifications, shall have full force and effect as though printed in these Specifications. These Specifications and standards are not furnished to Bidders since Manufacturers and trades involved are assumed to be familiar with their requirements. The Resident Engineer will furnish, upon request, information as to how copies of the referenced Specifications and standards may be obtained.
- D. Whenever the abbreviation is specified, it shall be understood to mean the full name of the respective organization as listed below.

1.03 ABBREVIATIONS

- A. Whenever in the Contract the following abbreviations are used, their meanings shall be as follows:

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISE	Association of Iron and Steel Engineers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute

ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CRSI	Concrete Reinforcing Steel Institute
USEPA	U. S. Environmental Protection Agency
FS	Federal Specifications
GRI	Geosynthetic Research Institute
LEL	Lower explosion limit
MIL	U.S. Military Specifications
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SSPC	Steel Structures Painting Council
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
USBR	U.S. Bureau of Reclamation
WCRSI	Western Concrete Reinforcing Steel Institute

1.04 STANDARD CONSTRUCTION SPECIFICATIONS

- A. The State of California, Department of Transportation, Standard Specifications and Standard Plans, (2018) including revisions dated November 19, 2020.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01090

SECTION 01300 SUBMITTALS

PART 1 GENERAL

1.01 SUMMARY

- A. Provide submittals consistent with the Contract documents. In addition, comply with the following requirements specified hereinafter.
- B. Submit shop drawings to the Resident Engineer sufficiently in advance consistent with prearranged schedule to cause no delay in the Contractor's own work or in that of any other subcontractor and to afford ample time for consideration, checking, correcting, and rechecking. Show complete details of construction and methods of installation including sizes, dimensions, setting numbers, types of materials, provision of hardware, accessory items, build-ins, opening sizes, cut-outs, joints, required blocking, welds, anchorage to other construction, and other pertinent items. Verify dimensions on the job and correlate work with adjoining work.
- C. All shop drawings must be submitted in the same size sheets as the Resident Engineer's drawings or on 8-1/2" x 11" size sheets.
- D. Four copies of approved shop drawings will be required for the Design Engineer's use unless otherwise indicated. Contractor shall determine the number of and furnish such additional copies as may be needed.
- E. The Resident Engineer will return to Contractor two red-lined copies of any shop drawing that has been rejected or returned for revisions. Contractor shall make additional submittals as required. The Resident Engineer's approval of such drawings or schedules shall not relieve Contractor from responsibility for any resulting deficiencies or related unapproved deviations from the Construction Drawings and Specifications.
- F. No shop drawings shall be distributed for field use without appropriate approval.

1.02 RELATED SECTIONS

- A. 01010 – Summary of Work
- B. 01052 – Layout of Work and Surveys
- C. 01800 – Health and Safety
- D. 01500 – Construction Facilities
- E. 01560 – Temporary Controls
- F. 01600 – Materials and Equipment
- G. 01630 – Product Options and Substitutions
- H. 01720 – Project Record Documents
- I. 01730 – Installation, Operation, and Maintenance Instructions
- J. 02200 – Earthwork
- K. 02207 – Aggregate Materials

- L. 02589 – Geoelectric Leak Location Survey
- M. 02723 – Corrugated Metal Pipe (CMP)
- N. 15200 – High Density Polyethylene (HDPE) Pipe
- O. 02771 – Geotextile
- P. 02772 – High Density Polyethylene (HDPE) Geomembrane
- Q. 02773 – Geocomposite
- R. 02774 – Geosynthetic Clay Liner (GCL)
- S. 03300 – Cast-In-Place Concrete
- T. 15200 – HDPE pipe
- U. 15480 – PVC Piping
- V. 16050 – Basic Electrical Requirements
- W. 16100 – Basic Electrical Materials and Methods
- X. 16910 – Control Panels
- Y. 16911 – Cellular Telemetry

1.03 OTHER TYPES OF SUBMITTALS.

- A. Other related drawings pertaining to drainage facilities and other fabricated materials.
- B. Contractor shall submit four (4) copies of the Construction Sequence Plan: Consistent with Section 01010 - Summary of Work, and as stated in other specification sections.
- C. Survey Submittals: Consistent with Section 01052 - Layout of Work and Surveys final drawing for surveys performed by the Contractor will be submitted.
- D. Health and Safety Plan: Consistent with Section 01190 - Health and Safety Plan shall be submitted that addresses Health and Safety issues and complies with OSHA, Cal-OSHA and all other regulatory agency requirements.
- E. Project Record Documents: Consistent with Section 01720 – Project Record Documents shall be submitted and approved before submitting invoice for final payment.
- F. Traffic Control Plan: Consistent with Section 01560, – Traffic Control Plan shall be submitted that addresses traffic control measures to be implemented by the Contractor during the Contract work.
- G. Material Submittals: Consistent with Sections 02200, 02722, 02771, 02772, 02773, 02774, 02950, 03300, 11000, 15100, 15200, 15480, 16100, 16500, 16910, and as stated in other specification sections.
- H. Material delivery tickets or bills of lading.
- I. Equipment Fueling and Maintenance Plan.
- J. Dust Control Plan in compliance with the requirements of the San Joaquin Valley Air Pollution Control District.
- K. Permit from County for Electrical Service Pole.

1.04 SUBMITTALS - GENERAL REQUIREMENTS

- A. The Contractor shall submit to the County all submittals required by the Contract Documents and as required herein, or subsequently required by modifications. All such items required to be submitted for review shall be furnished by and at the expense of the Contractor, and any work affected by them shall not proceed without such review. Submittals and their contents shall be properly prepared, identified, and transmitted as provided herein or as the County may otherwise direct. Except for record documents, and instructional manuals for operation and maintenance, each submittal shall be approved before the material or equipment covered by the submittal is delivered to the site.
- B. Contractor shall allow a total period of not less than two (2) calendar weeks for review and approval of submittals by the County, not including the time necessary for delivery or mailing, and shall cause no delay in the Work. Extension of the Contract Time will not be granted because of the Contractor's failure to make timely and correctly prepared and presented submittals with allowance for the checking and review periods.
- C. At the time of the submission, the Contractor shall give notice, in writing, in the submittal, of any deviation from the requirements of the Contract Documents. The deviations shall be clearly indicated or described. The Contractor shall state in writing, all variation in costs occasioned by the deviations, and his assumption of the cost of all related changes if the deviation is approved.
- D. The Contractor shall deliver submittals by means of dated, signed, and sequence numbered transmittals on the County provided forms, identifying as to initial or resubmittal status, and fully describing the submittal contents. In each transmittal, the Contractor shall state the Project Number and Name, Name and Address of Contractor, Name and Address of Sub-Contractor, Manufacturer, Distributor, and specification Section (as applicable), Articles, and paragraphs to which the submittal pertains; accompanying data sheets, catalogs, and brochures shall be identified in the same manner. Where several types or models are contained in the literature, the Contractor shall delete non-applicable portions, or specifically indicate which portions are intended and applicable. Submittal transmittals shall fully index all items submitted.
 - 1. Incomplete Submittals, including those not correctly transmitted, not correctly titled and identified, or not bearing the Contractor's review and approval stamp, will be returned to the Contractor without review.
 - 2. Interrelated Submittals: Except where the preparation of a submittal is dependent upon the approval of a prior submittal, all submittals pertaining to the Work, shall be submitted simultaneously.
- E. Every submittal of shop drawings, samples, materials lists, equipment data, instruction manuals, and other submittals upon which the proper execution of the Work is dependent, shall bear the Contractor's review and approval stamp certifying that the Contractor: 1) has reviewed, checked and approved the submittal and has coordinated the contents with the requirements of the Contract Documents, 2) has determined and verified all quantities, field measurements, field construction criteria, materials, equipment, catalog numbers, and similar data, or will do so, and 3) states the Work covered by the submittal is recommended by the Contractor and the Contractor's guarantee will fully apply thereto. Contractor's stamp shall be dated and signed by the Contractor in every case.
- F. Submittals will be reviewed only for conformance with the design concept of the Project and with the information given in the Contract Documents. The approval of a separate item, as

such, will not indicate approval of the assembly in which the item functions, nor shall approval be construed as revising, in any way, the requirements for a fully integrated and operable system, as specified. The approval of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract Documents, or for any revision in resubmittals, unless the Contractor has given notice, in writing, of the deviation or revision at the time of submission or resubmission, and written approval has been given to the specific deviation or revision, nor shall any approval relieve the Contractor of responsibility for errors or omissions in the submittals, or for the accuracy of dimensions and quantities, the adequacy of connections, and the proper and acceptable fitting, execution, and completion of the Work.

- G. The Contractor shall make all required corrections and shall resubmit the required number of corrected submittals until approved by the County. The Contractor shall direct specific attention, in writing, to revisions other than the corrections called for on previous submittals, and shall state, in writing, all variations in costs, and his assumption of the cost of related changes the same as is required for deviations in 1.04(F). Identify each resubmittal with number of the original submittal, followed by consecutive letters starting with "A" for first resubmittal, "B" for second resubmittal, etc. Note that in addition to any applicable liquidated damages, the Owner reserves the right to deduct monies from the amounts due to Contractor to cover the cost of County's review time beyond the second submission.
- H. The Contractor shall check submittals returned to him for correction and ascertain if the corrections result in extra cost to him above that included under the Contract Documents and shall give written notice to the County within five (5) days, if in his opinion, such extra cost results from corrections. By failing to notify the County or by starting any Work covered by a submittal, the Contractor waives all claims for extra costs resulting from required corrections.
- I. No work represented by required submittals shall be purchased, or paid for, or commenced until the applicable submittal has been approved. Work shall conform to the approved submittals and all other requirements of the Contract Documents, unless subsequently revised by an appropriate modification, in which case, the Contractor shall prepare and submit revised submittals as may be required. The Contractor shall not proceed with any related Work which may be affected by the Work covered under submittals until the applicable submittals have been approved.
- J. Piecemeal submittals will be returned unreviewed. However, for mechanical equipment and the like, separate submittals for embedded items, embedded metal work and anchors, will be reviewed, as applicable.

1.05 FORM OF APPROVAL.

- A. Copies of submittals which are returned to the Contractor, and which are subject to approval will be marked with notations (1), (2), (3) or (4), and may also be marked with notation (5), in which case the action so indicated shall be taken by the Contractor.
 - 1. No Exceptions Taken.
 - 2. Furnish as Corrected
 - 3. Revise and Re-submit.
 - 4. Not reviewed.
 - 5. Rejected.

- B. Returned copies of drawings marked with either notation (1), or (2) authorize Contractor to proceed with the fabrication, or construction, or any combination thereof, covered by such returned drawings, provided, that such fabrication, or construction shall be subject to the comments, if any, shown on such returned copies.
- C. Returned copies of drawings marked with notation (3), (4) or (5) shall be corrected as necessary and a revised submittal shall be submitted in the same manner as before.
- D. Returned copies of drawings marked with either notation (3), (4) or (5) shall be resubmitted not later than seven (7) days after date of transmittal by County.

END OF SECTION 01300

UNOFFICIAL

SECTION 01400 QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Quality assurance and control of work
2. References
3. Field samples
4. Mock-up
5. Inspection and testing laboratory services
6. Manufacturers' field services and reports
7. Geoelectric liner leak location survey

1.02 RELATED SECTIONS

- A. Section 01090 – References.
- B. Section 01300 - Submittals
- C. Section 02200 – Site Earthwork
- D. Section 02722 – Drainage and Erosion Control
- E. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
- F. Section 02771 – Geotextile
- G. Section 02773 – Geocomposite
- H. Section 02774 – Geosynthetic Clay Liner (GCL)
- I. Section 03300 – Cast-in-Place Concrete
- J. Section 11000 – Equipment
- K. Section 15200 – High Density Polyethylene (HDPE) Piping
- L. Section 15480 – PVC Piping

- M. Section 16050 – Basic Electrical Requirements
- N. Section 16100 – Basic Electrical Materials and Methods
- O. Section 16500 – Lighting
- P. Section 16910 – Control Panels
- Q. Section 16911 – Cellular Telemetry

1.03 REFERENCES

- A. Construction Quality Assurance Manual, Woodville Municipal Solid Waste Landfill, Unit II, Phase 1 Construction.

1.04 QUALITY ASSURANCE/CONTROL OF INSTALLATION

- A. Enforce quality control over Suppliers, Manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with Manufacturers' instructions, including each step in sequence.
- C. Should Manufacturers' instructions conflict with Contract Documents, request clarification from Resident Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality.
- F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.05 REFERENCE STANDARDS

- A. Conform to reference standards in Section 01090 of these Specifications, by date of issue current on date of Contract Documents.
- B. Should specified reference standards conflict with Contract Documents, request clarification from Resident Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.06 INSPECTION AND TESTING

- A. The CQA Officer will perform inspections, tests, and other services specified in individual specification sections.

- B. Contractor shall cooperate with the Resident Engineer and CQA Officer; furnish samples of materials, design mix, equipment, tools, storage, and assistance as requested.
- C. Retesting required because of nonconformance to specified requirements will be performed by the CQA Officer. Payment for retesting will be charged to Contractor by deducting inspection or testing charges from the contract sum/price.
- D. Tests will be performed to conform with the provisions of the Quality Assurance Manual.

1.07 GEOELECTRIC LINER LEAK LOCATION SURVEY

- A. The Contractor shall retain a qualified Leak Location Contractor (LLC) per Specification 02589, Article 1.05 A.1., to conduct a geoelectric liner leak location survey of the leachate lysimeter geomembrane liner after gravel placement, and the primary geomembrane liner after base and side slope operations soil layers are placed.
- B. The Contractor shall add water to increase the water content in the operations layer and leachate collection system, as needed for this test as directed by the LLC.
- C. The locations of all identified or indicated leaks will be marked in the field by the LLC.
- D. The Contractor shall repair all leaks detected in this survey, and shall perform all work associated with the removal, repair, and replacement of Operations Soil Layers, Geotextile, Gravel Drainage Layer, Geocomposite, HDPE LCRS Pipe, Sump Gravel, and Geomembrane as needed at no additional cost to Owner.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01400

SECTION 01500 MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the requirements specified in the Contract Documents. If the requirements of this section and conditions noted above conflict, the Contractor shall adhere to the more stringent requirement as determined by the County.
- B. The Contractor shall provide all services associated with the mobilization and demobilization of personnel, equipment, supplies, and incidentals to the Work site in accordance with this Section.
- C. The Contractor shall supply and implement all construction facilities and temporary controls in accordance with this Section and as shown on the Plans.
- D. Construction facilities may include, but not limited to, access road, staging area, temporary building, and temporary utilities (electricity, computer equipment and broadband access, water, and sanitary).
- E. Temporary controls may include, but not limited to, safety, equipment fueling and maintenance, drainage, erosion, and dust control during construction.
- F. The Contractor shall provide dust control and other requirements described in these Specifications.
- G. The Contractor shall provide for traffic control in compliance with Section 12 “Temporary Traffic Control” of the Standard Specifications and these Specifications.
- H. The Contractor shall provide all surveying and construction staking in compliance with Specification 01052.
- I. The Contractor shall provide a Water Pollution Control Plan in compliance with Section 13-2 of the Standard Specifications and these Specifications.
- J. The Contractor and representatives of subcontractors performing work shall attend weekly meetings on site.
- K. The Contractor shall provide construction surveys, and markings in compliance with these Specifications.
- L. Related Sections:
 - 1. Section 01025 – Measurement and Payment

1.02 DEFINITIONS

- A. Mobilization: Mobilization of all construction equipment, materials, supplies, appurtenances, and the like, manned and ready for commencing and performing the Work; assembly and delivery to the site of plant, equipment, materials, and supplies necessary for the performance of the Work but, which are not intended to be incorporated in the Work;

preparation of the Contractor's work area; complete assembly, and in working order, of equipment necessary to perform the required work; personnel services preparatory to commencing actual work; all other preparatory work required to permit commencement of the actual work on construction items for which payment is provided under the Contract, and performance of all services under Section 01052 – Layout of Work and Surveys.

- B. Demobilization: Subsequent removal from the site of all equipment, materials (excluding surplus materials specified to remain on site), supplies and appurtenances, and the like, cleaning and restoration of the site upon completion of the Work, delivery of all field notes, calculations, records and as-built drawings per Section 01052 – Layout of Work and Surveys, to the satisfaction of the County.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

3.01 MOBILIZATION

- A. The Contractor shall perform preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the Work site; for the establishment of all offices, buildings, and other facilities necessary for execution of the Work; and for all other work and operations which must be performed, or costs incurred prior to beginning the Work in accordance with Section 11 of the Standard Specifications.
- B. The Contractor shall give written notice to the Resident Engineer at least 48 hours prior to transporting oversize and/or overload equipment to the Work site.

3.02 DEMOBILIZATION

- A. The Contractor shall perform any work and operations, including, but not limited to, those necessary for the removal of personnel, equipment, supplies, temporary utilities (underground and above ground), construction facilities, excess, surplus, waste materials and incidentals from the Work Site prior to application for final payment.
- B. The Contractor shall clean, and repair damage caused by installation or use of construction facilities or temporary controls.
- C. Payment for Mobilization shall be made in accordance with Public Contract Code Section 10264.

END OF SECTION 01500

SECTION 01510 CONSTRUCTION FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes construction facilities (temporary facilities) required for the construction of the permanent facilities specified under the scope of work of this Contract.
- B. Construction facilities shall include furnishing all equipment, materials, tools, accessories, incidentals and labor, and performing all work for the installation of equipment and for construction of facilities, including their maintenance, operation, and removal, if required, at the completion of the work under the Contract.

1.02 RELATED SECTIONS

- A. Section 01300 – Submittals
- B. Section 01560 – Temporary Controls

1.03 DEFINITION

- A. Construction facilities shall include, but not be limited to, the following temporary offices, utilities, equipment, materials, facilities, and services:
 - 1. Field office for Resident Engineer and CQA personnel
 - 2. Parking areas
 - 3. Access roads and haul roads
 - 4. Storage of materials and equipment
 - 5. Construction equipment
 - 6. Sanitary facilities
 - 7. Electric power
 - 8. Water
 - 9. Heating and cooling
 - 10. Temporary telephone service
 - 11. First aid facilities
 - 12. Security
 - 13. Temporary high speed internet access

1.04 REFERENCES

- A. Construction facilities shall be constructed, installed, maintained, and operated consistent with the applicable federal, state, county, and utility laws, rules, permits, and regulations.

Notwithstanding contrary provisions of General Conditions, Special Conditions, and Standard Specifications, nothing in the Construction Drawings and Specifications shall be construed to permit work not conforming to the above.

1.05 GENERAL REQUIREMENTS

- A. The Contractor shall be responsible for furnishing, installing, constructing, operating, maintaining, removing, and disposing of the facilities, as specified in these Specifications, and as required by the Resident Engineer for the completion of the work under the Contract.
- B. Construction facilities shall be located as approved and maintained in a clean, safe, and sanitary condition at all times until completion of the Contract.
- C. Upon completion of the Contract, the construction facilities shall be left in the status specified in Article 1.19 of this section.
- D. The requirements specified herein are in addition to any requirements specified elsewhere in the Contract Documents. Construction facilities shall meet the requirements for all-weather service.
- E. Land disturbances related to the construction facilities shall be minimized to the greatest extent possible and the land restored, to the extent reasonable and practical, to its original contours by grading to provide positive drainage. Disturbed areas shall be revegetated at the direction of the Resident Engineer.
- F. Utilities shall be designed and constructed to provide uninterrupted service.

1.06 FIELD OFFICE

- A. Contractor shall provide an office for his own staff, if desired, separate from that provided for the Resident Engineer and CQA personnel.
- B. Contractor shall provide an office for the Resident Engineer and CQA personnel which shall include:
 - 1. One room (soils lab, minimum 10' x 12' with one 3-shelf bookcase, two tables (2' x 4'), one desk with chair, three electrical outlets, and ceiling lights.
 - 2. One room (Resident Engineer's office) minimum 12' x 12' with one 3-shelf bookcase, one table 2' x 4', one desk with chair, three electrical outlets, two telephone lines, internet access, and ceiling lights.
 - 3. One room (conference) 12' x 24' with one table 6' x 30" and eight chairs, three electrical outlets, and ceiling lights.
 - 4. Computer: The Contractor shall provide for the County's exclusive possession and use, a computer system with one computer connected to a networked printer, scanner and copier unit. The Contractor shall configure, install, setup, maintain and repair the computer system. The Engineer may use the furnished computer hardware, software and instruction manuals for any purpose related to the project. Before delivery and setup of the computer system, the Contractor shall submit for approval a detailed list of all computer hardware and software the Contractor proposes to furnish. The minimum computer system shall include the following:

- a. Wireless optical mouse
- b. 3Ghz processor (minimum)
- c. 320 gigabyte (minimum) hard disk drive
- d. 24x or faster CD RW/DVD ROM drive
- e. 8 Gb internal memory (minimum)
- f. Windows 10 Professional operating system
- g. Microsoft Office 2013 Professional with Word, Excel, Powerpoint and Project
- h. Adobe Acrobat Professional Version 11 or newer.
- i. The networked copier/scanner/printer capable of black & white and color printing, black & white and color copying, black & white and color scanning for up to 11"x17" size documents, paper printing and toner supplies for 500 8.5"x11 copies and 200 11"x17" copies per month.
- j. Broadband internet connection with minimum 3.0 Mbps download speed
- k. All necessary cables and hardware devices to link the network hardware together.

C. The location of the office(s) shall be as approved by the Resident Engineer.

1.07 PARKING AREAS

- A. Contractor shall provide a parking area for his employees, maintenance, and delivery vehicles, the Resident Engineer's CQA Officer and Contractor's representatives, and for other authorized visitors. Parking for personal cars shall be limited to the office areas.

1.08 TEMPORARY ROADS

- A. Temporary roads, existing roads, or new roads to be constructed by the Contractor for the convenience of the Contractor in the performance of the work under the Contract shall be authorized by the Resident Engineer. The Contractor shall be responsible for all traffic control measures and maintenance of the roadways.
- B. Construction shall be coordinated with and shall be as approved by the Resident Engineer.
- C. Erosion shall be kept to a minimum and suitable grades and radii of curves shall be maintained to facilitate ease of movement of vehicles and equipment.
- D. Longitudinal and cross drainage facilities including, but not limited to, the ditches, structures, pipes, and the like shall be furnished and installed by the Contractor.
- E. Equipment shall be cleaned so that mud, soil, or debris is not carried onto public roads. Contractor shall be responsible for cleaning up any mud, soil, debris, or other objectionable matter which is transported by his equipment on to public roads.

1.09 STORAGE OF MATERIALS AND EQUIPMENT

- A. Contractor shall arrange for the storage of materials, equipment, and debris. Locations and configurations of such facilities shall be subject to the approval of the Resident Engineer.
- B. All operations of the Contractor, including storage of materials, shall be confined to approved areas. Contractor shall be liable for any and all damage caused by him during such use by him of property of the Resident Engineer. Materials shall be stored consistent with Manufacturers' instructions as applicable.
- C. Contractor shall store construction materials and equipment within boundaries of designated areas. Storage of gasoline or similar fuels shall conform to the requirements specified in Article 1.06 of Section 01560.

1.10 CONSTRUCTION EQUIPMENT

- A. Contractor shall erect, equip, and maintain all construction equipment consistent with all applicable statutes, laws, ordinances, rules, and regulations of the County or other authority having jurisdiction.
- B. Scaffolding, staging, runways, hoists, barricades, and similar equipment required for performance of the Contract shall be provided and maintained by the Contractor. Hoists or similar equipment shall be provided with operators and signals, as required.
- C. Contractor shall provide, maintain, and remove upon completion of the work all temporary rigging, scaffolding, hoisting equipment, debris boxes, barricades around openings and excavations, fences, ladders, and all other temporary work, as required for all work hereunder unless otherwise directed by the Resident Engineer.
- D. Construction equipment and temporary work shall conform to all the requirements of state, County, and local authorities, Occupational Safety and Health Administration, and underwriters which pertain to operation, safety, and fire hazard. Contractor shall furnish and install all items necessary for conformity with such requirements, whether or not called for under separate sections of these Specifications or the standard Specifications.

1.11 TEMPORARY SANITARY FACILITIES

- A. Contractor shall provide temporary sanitary facilities for use by all employees and persons engaged in the work, including lower-tier subcontractors, their employees, and authorized visitors.
- B. Sanitary facilities include enclosed chemical toilets and washing facilities. These facilities shall meet the requirements of local public health standards. Open pit or trench latrines will not be permitted.
- C. Sanitary facilities shall be located as approved by the Resident Engineer and shall be maintained in a sanitary condition during the entire course of the work.

1.12 TEMPORARY ELECTRIC POWER

- A. The Contractor shall provide and maintain, during the course and progress of the work, all electrical power and wiring requirements to facilitate the work of all trades and services associated with the work. The Contractor shall arrange with the applicable serving utility company or provide generators and shall pay all charges for providing and maintaining

electrical service including usage costs at the site. All temporary wiring, feeders, and connections shall be furnished by the Contractor.

- B. Routing of temporary conductors, including welding leads, shall not create a safety hazard nor interfere with operation and maintenance of existing facilities.
- C. All temporary wiring installed by the Contractor shall be accomplished consistent with the latest applicable requirements of the local electrical code.
- D. Contractor shall provide power and lighting to the field office(s), and for work as required, at no extra cost to the County, and as follows:
 - 1. A minimum of 100 Amp single phase electric service to the field office.
 - 2. Adequate temporary lighting to the field office, and for work area(s), as required.
 - 3. Exterior areas around the field office and parking areas shall be provided with security flood lighting.

1.13 TEMPORARY WATER

- A. General: Temporary water for potable use shall be provided by the Contractor at no additional cost to the County. Construction water is not available on-site. The Contractor shall be responsible for obtaining all construction and dust control water needed for their operations to follow these specifications. The cost for developing, delivering and applying water is the contractor's responsibility. The cost is to be included in the line item bid for which the water is required.
- B. Potable Water: Contractor shall provide fresh drinking water in single serve containers for his own use.

1.14 TEMPORARY HEATING AND COOLING

- A. Contractor shall provide, at his expense, temporary heating and cooling as necessary for the office facilities, for execution of work and installation of equipment, and for protection of work and materials against injury from dampness, cold, freezing, and extreme heat.

1.15 FIRST AID FACILITIES

- A. First aid equipment and supplies shall be provided to serve all personnel at the Site. The first aid facilities shall be equipped as required by authorities having jurisdiction.

1.16 SECURITY

- A. The Contractor shall make all necessary provisions and be responsible for the security of the work and the Site until final inspection and acceptance of the work.

1.17 SHUT-DOWN TIME OF SERVICES

- A. The Contractor shall not disconnect or shut down any part of the existing utilities and services, except by express permission of the Resident Engineer. The Contractor shall submit a schedule of estimated shut-down times in order to obtain such permission, and shall

notify all interested parties, utilities, County authorities, etc., as required at least 48 hours in advance.

1.18 MAINTENANCE

- A. General: Contractor shall maintain all construction facilities, utilities, temporary roads, services to office, and the like in good working condition as required by the Resident Engineer during the term of the Contract.

1.19 STATUS AT COMPLETION

- A. Upon completion of the work, or prior thereto, when so required by the Resident Engineer, the Contractor shall:
1. Repair damage to the existing access road caused or resulting from the Contractor's work.
 2. Remove and dispose of all construction facilities including office trailers, and other facilities and utilities including all concrete foundations. Similarly, all areas utilized for temporary facilities shall be returned to substantially their near original, natural state, or as otherwise indicated or directed.
 3. Remove temporary roads built for Contractor's convenience and restore the area to near original conditions to the satisfaction of the Resident Engineer.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01510

SECTION 01560 TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes temporary controls required during the term of the Contract for the protection of the environment, and the health and safety of workers and general public.
- B. Temporary controls shall include furnishing all equipment, materials, tools, accessories, incidentals and labor, and performing all work for installation of equipment and construction of facilities, including their maintenance and operation during the term of the Contract. Activities under this section that require the services of a “qualified biologist” will be coordinated, directed and compensated for by the County under separation contract with said biologist.
- C. Temporary controls shall include, but not be limited to, the following:
 - 1. Dust control
 - 2. Noise control
 - 3. Pollution and sediment control
 - 4. Traffic and safety controls
 - 5. Protection of vernal pools
 - 6. Biological resources control
 - 7. Air pollution control
 - 8. Protection of existing monitoring systems
 - 9. Protection of existing roads, fences and other infrastructure.
- D. The work shall be performed as specified in this Specification and as required by the Resident Engineer. The equipment and accessories shall be maintained in clean, safe, and sanitary condition at all times until completion of the Contract.
- E. Upon completion of the Contract, the temporary controls shall be left in the status specified in Article 1.11 of this section.
- F. The requirements specified herein are in addition to requirements specified elsewhere in the Contract Documents. Temporary controls shall meet the requirements for all-weather service.
- G. All land disturbances related to the temporary controls shall be minimized to the greatest extent possible and the land restored, to the extent reasonable and practical, to its original contours by grading to provide positive drainage.

1.02 RELATED SECTIONS

- A. Section 01300 – Submittals
- B. Section 01500 - Construction Facilities

1.03 APPLICABLE PUBLICATIONS

- A. All required facilities, equipment, and utilities shall also be constructed, installed, maintained, and operated consistent with applicable federal, state, county, and utility laws, rules, and regulations. Notwithstanding contrary provisions of General Conditions and Special Conditions, nothing in the Construction Drawings and Specifications shall be construed to permit work not conforming to such laws, rules, and regulations.

1.04 SUBMITTALS

- A. The Contractor shall submit to the Resident Engineer, for approval, a Traffic Control Plan.
- B. At a minimum the Traffic Control Plan shall include the following:
 - 1. Traffic flow map, including Contractor's equipment and landfill traffic flow patterns
 - 2. Alternate routes
 - 3. Times of day and schedule for traffic plan operations
 - 4. Locations of signs and traffic control devices and their types (if required)
 - 5. Flag person's number and locations (if required)

1.05 DUST CONTROL

- A. The Contractor shall be responsible for providing adequate dust control measures during the term of the Contract. Dust palliatives shall not be used without written authorization of the Resident Engineer.
- B. Dust control shall consist of furnishing water supply, required equipment, additives, accessories, and incidentals, and carrying out proper and efficient measures wherever and as often as necessary to reduce dust nuisance, and to prevent dust originating from construction operations during the completion of the Contract, as required by the Resident Engineer.
- C. Contractor is responsible for compliance with Fugitive Dust Regulations issued by the San Joaquin Valley Air Pollution Control District (APCD) and the Landfill's Dust Control Plan.
- D. Water shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses with nozzles that will insure a uniform application of water.
- E. All equipment used for the application of water shall be equipped with a positive means of shut-off.
- F. Unless otherwise permitted by the Resident Engineer or unless all the water is applied by means of pipelines, at least one mobile unit with a minimum capacity of 5,000 gallons shall be available at the Site in operating condition for applying water at the Site during construction.
- G. The Resident Engineer may halt any or all operations if Dust Control is not sufficient in his opinion.

1.06 POLLUTION CONTROL

- A. Pollution of Waterways: The Contractor's construction and related activities shall be performed by methods that prevent entrance or accidental spillage of solid or liquid matter, contaminants, debris, and other objectionable pollutants and wastes into streams, water courses (flowing or dry), and underground water sources. Such pollutants and wastes will

include, but will not be restricted to refuse, earth and earth products, garbage, cement, concrete, sewage effluent, industrial waste, radioactive substances, hazardous chemicals, oil and other petroleum products, aggregate processing tailings, and mineral salts. Pollutants and wastes shall be disposed of consistent with applicable permit provisions or in a manner acceptable to and approved by the Resident Engineer. A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared by the Contractor, and submitted to the County for approval, prior to the start of work that identifies potential pollution sources and measures that will be implemented to address these issues. Contractor is required to submit the SWPPP to the State.

B. Storage and Disposal of Petroleum Products:

1. Petroleum products covered by this section include gasoline, diesel fuel, lubricants, heating oils, and refined and used oil. During project construction, all petroleum products shall be stored in such a way as to prevent contamination of all ground and surface waters.
2. Lubricating oil may be brought into the project area in steel drums or other means, as the Contractor elects. If the total volume of stored oil is greater than 1,320 gallons, then the Contractor shall provide secondary containment facilities. Used lubricating oil shall be stored in steel drums, or other approved means, and shall be returned to the supplier for disposal. It shall not be burned or otherwise disposed of at the project area.
3. If the total volume of stored petroleum products is greater than 1,320 gallons and these products are stored aboveground, the Contractor shall prepare a Spill Prevention Control and Countermeasure Plan consistent with applicable EPA and other state regulations.

1.07 TRAFFIC AND SAFETY CONTROLS

- A. The Contractor shall post construction areas and roads with traffic control signs or devices used for protection of workmen, the public, and equipment. The signs or devices shall conform to the American National Standards Institute Manual on Uniform Traffic Control Devices for Streets and Highways, and the Standard Construction Specifications.
- B. Signs or traffic control devices shall be removed or covered as soon as they have served their purpose. It is particularly important to remove any markings on road surfaces which under conditions of poor visibility could cause a driver to turn off the road or into traffic moving in the opposite direction.
- C. Barricades for protection of employees shall conform to the portions of the American National Standards Institute Manual on Uniform Traffic Control Devices for Streets and Highways relating to barricades.
- D. Material Haul on Public Roads: All requirements stated in the permits shall be followed for using public roads for hauling materials to the Site.
- E. Flag persons, properly equipped with appropriate high-visibility protective clothing and flags, shall be provided at all such times, as necessary, to direct or divert pedestrian or vehicular traffic.
- F. The Contractor shall construct and maintain fences, planking, barricades, lights, shoring, and warning signs as required by local authorities and federal and state safety ordinances, and as required, to protect the property from injury or loss and as necessary for the protection of the

public and provide walks around any obstructions made in a public place for carrying on the work covered in this section. All such protection shall be left in place and maintained until removal is authorized.

- G. In addition, the Contractor shall guard and protect all workers, pedestrians, and the public from excavations, blasting operations, construction equipment, all obstructions, and other dangerous items or areas by means of adequate railings, guard rails, temporary walks, barricades, warning signs, sirens, directional signs, overhead protection, planking, decking, danger lights, etc.

1.08 PROTECTION OF VERNAL POOLS

- A. The Contractor shall at no time enter any wetland preserve areas.

1.09 AIR POLLUTION CONTROL

The Contractor shall comply with all air pollution control rules, regulations, ordinances, and statutes which apply to any work performed pursuant to the contract, including any air pollution control rules, regulations, ordinances, and statutes, specified in Section 11017 of the Government Code.

- A. HEAVY EQUIPMENT EMISSIONS:

- 1. The Contractor is responsible for attaining any necessary permits from the San Joaquin Valley Air Pollution Control District for any and all equipment used for the project as needed.

- B. POWER GENERATOR EMISSIONS:

- 1. The Contractor is responsible for obtaining all permits, complying with regulations, and performing all monitoring and reporting required by the use of fossil fuel powered electricity generators on the project.

- C. DUST CONTROL

- 1. The Contractor shall be responsible for the development and implementation of a dust control plan. The Plan shall be provided to the Resident Engineer.
 - 2. The Contractor shall submit a Construction Notification form directly to the San Joaquin Valley Air Pollution Control District a minimum of 48 hours prior to commencement of earthmoving activities. A copy shall be submitted to the Resident Engineer.

1.10 MAINTENANCE

- A. Contractor shall maintain all temporary controls in good working condition during the term of the Contract for the safe and efficient transport of equipment and supplies, and for construction of permanent works, as required by the Resident Engineer.

1.11 STATUS AT COMPLETION

- A. Upon completion of the work, or prior thereto, when so required by the Resident Engineer, Contractor shall remove all temporary controls, and restore disturbed areas as required.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

(Not used)

END OF SECTION 01560

SECTION 01561 CONSTRUCTION CLEANING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Cleanup during construction.
 - 2. Final cleaning of the site prior to acceptance of the project by the Resident Engineer.
- B. The requirements specified in this section are supplemental to the requirements specified in the General Specifications.

1.02 GENERAL

- A. It is required that the entire site be kept in a neat and orderly condition, and the Resident Engineer may, at any time during construction, order a general cleanup of the Site as a part of the work under this section.
- B. Contractor shall dispose of waste, trash, and debris in a safe, acceptable manner, consistent with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Class III municipal solid waste which is excavated may be disposed of at the working face of the landfill as allowed by the Resident Engineer. All refuse except excavated solid wastes shall be taken across the landfill scale prior to disposal. No charge will be made to the Contractor for proper disposal. No other waste material or debris shall be buried on the Site. Burning of trash and debris on the Site will not be permitted.

1.03 CLEANUP DURING CONSTRUCTION

- A. Cleanup: The Contractor will be required to clean up construction work areas including all office facilities and dispose of waste material. Cleanup of construction work areas will be required on a daily basis. At the close of each day's work all small quantities of waste and debris resulting from construction activities and from office facilities shall be gathered up and disposed of as designated in paragraph B below. Waste and debris shall not be allowed to accumulate in such quantities as to create an unsightly appearance, or safety or fire hazard, nor shall it interfere in any way with free access to, and operation of, existing facilities.
- B. Waste Disposal: The Contractor shall provide suitable receptacles for all construction and office waste material such as wrapping paper, discarded containers, scrap lumber, scrap metals, etc.

1.04 FINAL SITE CLEANUP

- A. Prior to final inspection, the entire Site shall be thoroughly cleaned and shall be put into a neat, acceptable condition. All construction waste and unused materials, dunnage, loose rock

and stones, excess earth, and debris of any description resulting from the work shall be removed from the entire Site unless otherwise approved in writing by the Resident Engineer.

- B. All pavements and paved walks shall be hosed down and scrubbed clean where necessary.
- C. All construction areas shall be thoroughly cleaned to the satisfaction of the Resident Engineer prior to final acceptance of the completed Contract.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTIONS

(Not used)

END OF SECTION 01561

UNOFFICIAL

SECTION 01600 MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes general requirements for materials and equipment including handling, transportation, and storage thereof.
- B. The requirements specified in this section are supplemental to the requirements specified in the Standard Specifications.

1.02 RELATED SECTIONS

- A. Section 01300 - Submittals
- B. Section 01400 - Quality Control
- C. Section 01630 - Product Options and Substitutions

1.03 QUALITY OF MATERIALS

- A. Materials and equipment provided shall be new, except as may be indicated in the Specifications or the Construction Drawings.
- B. The materials and equipment shall be manufactured, handled, transported, stored, and used consistent with the requirements of the Manufacturer and to ensure completed work meets the requirements of the Contract Documents.
- C. The Resident Engineer reserves the right to reject any and all materials brought to the Site not consistent with the Specifications and Construction Drawings.

1.04 HANDLING AND TRANSPORTATION

- A. Handling:
 - 1. Avoid bending, scraping, or overstressing materials and equipment. Protect projecting parts by blocking with wood, by providing bracing, or by other approved methods.
 - 2. Materials and equipment shall be protected from soiling and moisture by wrapping or by other approved means.

3. Small parts of equipment and accessories shall be packaged in containers such as boxes, crates, or barrels to avoid dispersal and loss. Firmly secure an itemized list and description of contents to each such container.
- B. Transportation: Loading, transporting, unloading, and storage of all materials and equipment shall be conducted such that they are kept clean and free from damage.

1.05 STORAGE AND PROTECTION

- A. Provide sheltered, weathertight or heated weathertight storage as required for materials and equipment subject to weather damage.
- B. Provide blocking, platforms, or skids for materials and equipment subject to damage by contact with ground.
- C. Store packaged materials in their original unbroken package or container.
- D. Protect materials and equipment from damage during warehousing operations.

PART 2 - PRODUCTS

(Not Used)

PART 3 - EXECUTION

(Not Used)

END OF SECTION 01600

SECTION 01630 PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes procedures for submission of requests for substitutions of products.

1.02 RELATED SECTIONS

- A. Section 01300 – Submittals
- B. Section 15100 – Leachate Extraction

1.03 SUBSTITUTIONS

- A. The Contractor shall submit to the Resident Engineer for review a complete list of all materials and equipment which differ in any respect from materials and equipment specified in these Specifications or on the Construction Drawings. Include with this list all materials which are proposed by subcontractors for use in the work of this Contract and also materials which are not specifically mentioned in the Specifications.
- B. Whenever the name, brand, or model of a Manufacturer's article, product, item of equipment, or system is specified, it is used as a measure of quality and utility or as standard. No intent to limit competition is inferred or implied. Where more than one Manufacturer's name is specified, the first-named manufacturer is the basis of design. Second, third, and subsequently named manufacturers shall be considered substitutions, but requests for their substitutions are not required.
- C. If the Contractor desires to use any other brand or manufacture of equal quality, appearance, and utility to the product specified, he shall request substitution as provided herein. The Resident Engineer will accept as satisfactory or reject the request for substitution, and his decision shall be final. Unless substitutions are requested as provided herein, no such deviations from the Construction Drawings and Specifications will be permitted.
- D. Requests for substitutions will be considered only when offered by the Contractor as follows:
 - 1. Submit complete technical data, including drawings, complete performance Specifications, provide test data and perform tests as may be required by the Resident Engineer, and submit samples of the article proposed for substitution, as applicable.
 - 2. Submit comparative data of material, equipment, or system to be replaced by proposed substitution.
 - 3. If value is involved in the Contractor's request or proposal for substitution, the amount to be credited to the County or deducted from the contract price, if the proposed substitution is accepted, shall be submitted along with a comparative cost breakdown.
 - 4. Include a statement in the transmittal letter, signed by the Contractor, that the proposed substitution is in full compliance with the Contract Documents.
 - 5. All requests for substitutions, along with required information and exhibits, shall be submitted to the Resident Engineer in accordance with Section 01300.

6. Requests for substitutions shall contain not less than the following information in the heading or subject to the transmittal letter:
 - a. Project title and number
 - b. Subject (unit or division of work)
 - c. Construction Drawing and Specification references: drawing number and detail; specification section, article, paragraph, subparagraph
- E. In the analysis of a proposed substitution for compliance with Specifications, Construction Drawings, and design factors of the project, consideration will be given to the service, performance, and maintenance experience of all elements of the proposed substitution. To this end, the Resident Engineer may require prompt advice of not less than three readily accessible, comparable installations made within the past 5 years of the item proposed for substitution.
- F. The Resident Engineer may require the Contractor to furnish a written warranty, with adequate safeguards to the Resident Engineer, assuring satisfactory performance of a proposed substitute item or system for a stated minimum period of time, usually 1 year.
- G. If a proposed substitution requires changes in related work which, in the opinion of the Resident Engineer, constitutes a deviation from Contract requirements or aspects of design, it may be rejected.
- H. Contractor shall be responsible for the execution of any changes in other parts of his own work or the work of subcontractors of other Contractors, caused by a substitution, at no additional cost to the County.
- I. Contractor shall not proceed with any substitution until the Resident Engineer has accepted the substitution as satisfactory, in writing. Such acceptance shall not relieve the Contractor from complying with the requirements of the Drawings and Specifications.
- J. Failure to propose the substitution of any product a minimum of 14 calendar days in advance of the proposed installation may be deemed sufficient cause for the denial of the request for substitution. The Resident Engineer shall render a decision on the suitability of the proposed substitution within 7 calendar days of receipt of the request.
- K. Any substitutions submitted to the Resident Engineer which do not comply with the above requirements will be returned to the Contractor without the Resident Engineer's review.
- L. Originally specified items shall be furnished unless a request for substitution is submitted and accepted consistent with the foregoing requirements.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01630

SECTION 01720 RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Section includes preparation, maintenance, completion, and submission of all project record drawings, Specifications, and related documents.
- B. The requirements specified herein are in addition to any requirements for record documents specified elsewhere in these Specifications.

1.02 RELATED SECTION

- A. Section 01300 – Submittals

1.03 QUALITY ASSURANCE

- A. Furnish a qualified and experienced person, whose duty and responsibility shall be to maintain record documents.
- B. Accuracy of Records:
 - 1. Coordinate changes within record documents, making legible and accurate entries on each page of Specifications and each sheet of Plans and other documents where such entry is required to show change.
 - 2. Purpose of Project record documents is to provide factual information regarding aspects of Work, both concealed and visible, to enable future modification of Work to proceed without lengthy and expensive site measurement, investigation, and examination.
- C. Make entries within 24 hours after receipt of information that a change in Work has occurred.
- D. Prior to submitting each request for progress payment, request Resident Engineer's review and approval of current status of record documents. Failure to properly maintain, update, and submit record documents may result in delay of Progress Payment made by the County.

1.04 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintain at the Project Site one copy of the following project or Contract Documents for record purposes:
 - 1. Drawings
 - 2. Specifications
 - 3. Addenda

4. Change orders
 5. Resident Engineer's field orders
 6. Reviewed shop drawings
 7. Clarifications or explanatory drawings and Specifications
 8. Inspection reports
 9. Laboratory test records
 10. Field test records
 11. Survey data
- B. Store documents used for record purposes in the field office or other approved location, apart from documents used for construction.
- C. File documents consistent with the Standard Construction Specification sections.
- D. Maintain documents in a clean, dry, legible condition.
- E. Do not use record documents for construction purposes.
- F. Make documents available at all times for inspection by the Resident Engineer.

1.04 RECORD DRAWINGS

- A. Project Drawings:
1. Contractor shall maintain "as-built" or record drawings of all work and subcontracts, continuously as the job progresses. A separate set of prints, for this purpose only, shall be kept at the Project Site at all times.
 2. These drawings shall be kept up-to-date, protected from damage and may be reviewed by the Resident Engineer prior to approval of monthly progress payments.
 3. All deviations from the drawings, exact locations of permanent property markers or monuments, all utilities and services, mechanical and electrical lines, details, and other work shall be finally incorporated on the record drawings.
 4. During the course of construction, actual locations to scale shall be identified on the drawings for all runs of mechanical and electrical work, including all site utilities and services, installed underground, in walls, or otherwise concealed. Deviations from the drawings shall be shown in detail. All main runs, whether piping, conduit, ductwork, or drain lines shall be located, in addition, by dimension and elevation.
 5. No work shall be permanently concealed until the required information has been recorded.

6. Where the Design Engineer's Drawings are not of sufficient size, scale, or detail, Contractor shall furnish his own drawings for incorporation of details and dimensions.
 7. The original final record set of "as-built" drawings, CADD files, and electronic documents shall be delivered to the Resident Engineer prior to the County's acceptance of the project.
- B. Addenda and Change Orders:
1. Changes to the drawings effected by addenda, change orders, or Resident Engineer's field orders shall be incorporated on the reproducible set, and these changes shall be identified by addendum, change order, or Resident Engineer's field order number and effective date.
 2. When revised drawings are issued as the basis of or along with addenda, these revised drawings shall be incorporated into the record set with appropriate annotation.
- C. Shop Drawings:
1. One complete set of reviewed shop drawings, including Manufacturers' printed catalog cuts and data, shall be collected and maintained for record purposes.
 2. Shop drawings shall be filed and maintained separately from project drawings. Shop drawings shall be filed neatly in file folders.
 3. Shop drawings shall be delivered in new paperboard boxes manufactured specifically for the storage of file folders. Boxes shall have covers and cutout handles and shall be accurately identified as to the contents.

1.05 RECORD SPECIFICATIONS

- A. Project Specifications:
1. The Specifications book for record purposes shall be filed in a large, three-ring binder or binders.
 2. Information, changes, and notes shall be recorded in the Specifications in blank areas, such as page margins or the backs of opposite pages, or on separate sheets inserted in the binder. All such information, changes, and notes shall be recorded with red pen or red typewriter ribbon.
 3. In each section, in an appropriate location, record the Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 4. The record Specifications book shall be complete and shall include all documents and forms under proposal stage, contract stage, and completion stage.
- B. Addenda, Change Orders, and Field Orders:
1. All addenda, change orders, and Resident Engineer's field orders shall be incorporated into the front of the Specifications book in reverse chronological order. Use appropriate page dividers to identify addenda and change orders and to separate addenda from the Specifications.

2. In addition, the changes to the Specifications effected by addenda, change order, or field order shall be annotated on the affected page or pages of the Specifications or adjacent thereto.

1.06 SUBMISSION OF DOCUMENTS

- A. At completion of the project, and before submitting invoice for final payment, deliver record documents to the Resident Engineer.
- B. For project drawings, include one set of blue-line or blackline prints.
- C. Record documents shall be delivered neatly and efficiently packaged.
- D. Submission of record documents shall be accompanied with a transmittal letter, in triplicate, containing the following information:
 1. Date of submission.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each record document. (Shop drawings may be grouped in basic categories or divisions of work.)
 5. Certification that each document as submitted is complete and accurate.
 6. Signature of Contractor or his authorized representative.
- E. Record "As Built" drawings shall be marked clearly as such and all deviations shall be legibly marked in red lettering and contained in red "clouds".
- F. Record Documents for liner component installation, thickness, repair location, etc. shall be delivered separately and in a format suitable for inclusion in the Certification Reports.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01720

SECTION 01730

INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS

PART 1 GENERAL

1.01 SUMMARY

- A. This section supplements the requirements specified in the Specifications. If the requirements of this section and the conditions noted above conflict with each other, the Contractor shall adhere to the more stringent requirement as determined by the Resident Engineer.
- B. Section includes preparation and submission of installation, operation and maintenance (O&M) instructions for mechanical and electrical equipment furnished by the Contractor.
- C. The mechanical and electrical equipment are specified in the various sections of the Specifications.
- D. Related Sections:
 - 1. Standard Construction Specifications
 - 2. Section 01300 – Submittals
 - 3. Section 15100 – Leachate Extraction
 - 4. Section 16910 – Control Panels
 - 5. Section 01720 – Project Record Documents

1.02 DESCRIPTION

- A. The Contractor shall prepare the Operations and Maintenance (O&M) Instructions for the site which shall incorporate the requirements specified herein. The Contractor shall integrate instructions from subcontractors with his submittal.
- B. The Contractor shall submit to the Resident Engineer for review, six sets of O&M instructions. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before shipment of the equipment.
- C. The Resident Engineer will review and return O&M instructions as provided in Section 01300 – Submittals, after receipt of all related information necessary for such review.
- D. If subsequent modifications to the equipment require revised O&M procedures, the Contractor shall revise the O&M instructions to show the equipment as installed. Such revisions shall be by issue of replacement pages to the final O&M instructions or be reissue of the O&M instructions at the Contractor's option. The revisions to the O&M instructions shall be submitted no later than 15 days following revision of the equipment.

1.03 CONTENTS

- A. As specified in the following paragraphs, the instructions shall consist of title page, contents page, frontispiece, and information covering description, installation, operation, preventive

maintenance, corrective maintenance, overhaul, parts list and list of recommended spare parts, and an appendix.

- B. The title page shall include the name and function of the equipment, manufacturer's identification number, the County's specification number and title, and the address and telephone number of the manufacturer or his representative, and person to contact for service, operation and maintenance.
- C. The contents shall list all sections and subsection titles of the instructions with reference to the page on which each starts and a list of included drawings.
- D. The frontispiece shall be a recognition illustration of the equipment described in the instructions.
- E. The descriptive information shall consist of drawings and diagrams, and a physical and a functional description of the equipment including major assemblies and subassemblies.
- F. The installation information shall cover pre-installation inspection, installation, calibration, and preparation for operation, both for initial installation and for installation after overhaul.
- G. The operation information shall include step-by-step procedures for starting, restarting, operating, shutdown, and emergency requirements. The information shall also include performance specifications and operating limitations.
- H. The maintenance information shall include step-by-step procedures for inspection, operation checks, cleaning, lubrication, adjustments, repair, overhaul, disassembly, and reassembly of the equipment for proper operation of the equipment. A list of special tools which are required for maintenance shall be included with the maintenance information.
- I. The complete parts list and a list of recommended spare parts shall provide all necessary information, including part number and catalog item numbers if applicable, for identifying parts. Parts or assemblies obtained from another manufacturer shall be identified by the name of that manufacturer and his identifying part number. The size, capacity, or other characteristics of the part shall be supplied if required for identification.
- J. The appendix shall include safety precautions, a glossary and, if available at time of submittal, copies of test reports, start-up reports, and other relevant material.
- K. All information on material or equipment not used in the work shall be deleted from the O&M Manual.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION 01730

SECTION 01800 HEALTH AND SAFETY

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes general requirements for the following:
 - 1. Preparing project Site Specific Health & Safety Plan
 - 2. Implementing project Site Specific Health & Safety Plan

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018 version.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018 version.

1.03 OTHER

- A. The exact nature of materials and wastes disposed of at the landfill is unknown. The possibility exists of encountering gases and/or other substances during the Work that may be potentially hazardous to the safety and health of personnel, especially those working in the vicinity of open excavations and pipes venting gases.
- B. The Contractor is advised that decomposing refuse produces landfill gas which is approximately 50 percent methane (natural gas) by volume. Landfill gas is colorless, can be odorless, may contain hydrogen sulfide, toxic or hazardous materials, is combustible, and may contain no oxygen. Landfill gas can also migrate through several thousand feet of soil adjacent to landfills. The Contractor is advised of the need for precautions against fire, explosion, and asphyxiation when working on the landfill and in or near the excavations on the project site.

1.04 SUBMITTALS

- A. Contractor shall submit within 10 days after Notice to Proceed a general Health and Safety Plan to the County, for informational purposes only.
- B. Contractor shall submit, after Notice to Proceed, but prior to pre-construction meeting, a Site-Specific Health & Safety Plan to be approved by Resident Engineer. Acceptance of the plan by County does not release the contractor of liability in the event of an accident or injury, nor does it place any liability on the Resident Engineer.
- C. All safety requirements are applicable to the Work to be performed under the Contract and any subsequent addenda, modifications, alterations, and extensions thereto.
- D. The Contractor shall be solely and completely responsible for conditions of the Work site, including the safety of all persons and property during performance of the Work and

provision of safety measures on weekends and holidays. This requirement will apply continuously and shall not be limited to normal working hours.

- E. The Contractor shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety measures as may be required by the above-mentioned regulatory agencies.
- F. Contractor shall be solely and completely responsible for the safety of all construction personnel performing the Work, including all Subcontractors. Contractor shall be ultimately responsible for any and all necessary safety precautions and safety programs.
- G. Contractor shall also be held responsible for their own compliance with the provisions of this Section, as well as the compliance of all Subcontractors with the provisions of this Section. Contractor shall be held responsible for any and all violations of the provisions of this Section, as well as violations of any federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety and Health Agency, and Division of Industrial Safety, State of California, and other such safety statutes and requirements which apply to the Work.
- H. No act, service, drawing review or construction review by the Engineer, Design Engineer, CQA Officer or their consultants is intended to include review of the adequacy of the Contractor's safety measures in, on, or near the construction site.
- I. If a conflict should occur between the safety requirements of the Standard Specifications, these Specifications, the approved Health and Safety Plan, Referenced Standards, or other federal, state, and local safety codes, ordinances, and regulations, the more stringent requirement shall prevail.

1.04 POTENTIAL FOR HAZARDS

- A. The Contractor is advised that decomposing refuse produces landfill gas (LFG), which is approximately 50 percent methane and 50 percent carbon dioxide by volume, may be present in the work area. LFG is colorless, can be odorless, may contain benzene, hydrogen sulfide, and other toxic constituents, is combustible, and contains little or no oxygen. LFG can migrate through soil near the surface, so the Contractor is therefore advised of the need for precautions against fire, explosion, and asphyxiation when working in or near excavations which are in or near refuse fill areas.
- B. The Contractor shall be responsible for informing his or her employees and Subcontractors and their employees of the potential danger of LFG on and near landfills.
- C. Smoking shall be prohibited at all times and at all locations within the limits of the Work shown on the Plans, except as designated.
- D. The Contractor shall be familiar with "A Compilation of Landfill Gas Field Practices and Procedures" as prepared by the Solid Waste Association of North America (SWANA).
- E. LFG has the potential to create hazardous conditions if not controlled or recognized. Some of the hazards of LFG include:
 - 1. Fires which may start spontaneously from exposed and/or decomposing refuse.
 - 2. Fires and explosions which may occur from the presence of methane gas.
 - 3. Oxygen deficiency in underground trenches, vaults, conduits and structures.

4. The potential presence of hydrogen sulfide, a highly toxic and flammable gas.
5. The potential presence of benzene, vinyl chloride, and other toxic gases which are known to the State of California to cause cancer, birth defects, and reproductive harm.

1.05 OTHER LANDFILL RELATED HAZARDS

- A. The Contractor is advised that solid waste fills and the decomposing refuse therein may present other unique health and safety considerations. Such considerations include, but are not limited to:
 1. Unstable ground and surface cave-ins due to decomposition and differential settlement of refuse when working over, in, or near refuse fill areas.
 2. Possible caving of trenches and excavations when working over, in, or near refuse fill areas.
 3. Potentially hazardous materials in or near refuse fill areas.

PART 2 PRODUCTS

(Not used)

PART 3 EXECUTION

3.01 HEALTH AND SAFETY PLAN

- A. Prior to start of construction, the Contractor shall submit a written Health and Safety Plan, to the Engineer indicating all proposed safety measures. Said plan shall be prepared in accordance with the requirements of 29 CFR 1910.120 of the Code of Federal Regulations (29 CFR) 1910.120
- B. The Health and Safety Plan shall comply with all federal, state, and local safety codes, ordinances, and regulations, including the requirements of the Occupational Safety & Health Agency (OSHA), and Division of Industrial Safety, State of California. The Contractor shall comply with Section 7-1.02K(6) of the Standard Specifications for safety plan requirements for trenches and excavations. Contractor's attention is further directed to Section 6705 of the Labor Code concerning trench excavation safety plans.

3.02 SITE SAFETY MONITOR

- A. The Contractor shall provide a person who will be designated as the Site Safety Monitor.
- B. The Site Safety Monitor shall be thoroughly trained in rescue procedures and the use of safety equipment and gas detectors as required by the Health and Safety Plan.
- C. At a minimum the Site Safety Monitor shall have taken a certified forty-hour OSHA safety course and eight-hour supplementary health and safety supervisor course which meets the requirements of 29 CFR 1910.120. Certificates of participation shall be submitted to the Resident Engineer prior to start of construction.
- D. The Site Safety Monitor shall have the delegated authority to order any person or worker to follow safety rules related to LFG or other site safety hazards. Failure to observe these rules shall be sufficient cause for removal of the person or worker from the project site.

- E. Supplemental to the Contractor's regular safety program, the Site Safety Monitor shall develop and institute procedures to inform all workers and the public visiting the site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the job site, and the importance of safety precautions to provide for the safety of workers and the public.

3.03 TRENCH AND EXCAVATION SAFETY

- A. Contractor shall comply with all requirements of the trench and excavation safety, including provisions of Section 7-1.02K(6) of the Standard Specifications and all occupational safety and health requirements of the Labor Code. In particular, the Contractor shall:
 - 1. Submit to the Engineer at least fourteen (14) days in advance of excavation, a detailed plan showing the design of sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection from the hazard of caving ground during excavation. Sheeting and shoring plans shall be designed and stamped by a Registered Civil or Structural Engineer with experience in shoring design. The Contractor shall be solely responsible for ensuring the safety of any excavation. Shoring and submittal of any plans for sheeting, shoring, bracing, slopes, or other provisions to be made for worker protection shall not relieve the Contractor from this responsibility.
 - 2. If required, obtain a permit from the division of Industrial Safety for the construction of excavations that are five (5) feet in depth or deeper and into which a person or persons is (are) required to descend.
- B. Contractor shall provide all necessary materials to sheet, shore, brace, or otherwise provide for worker protection in temporary excavations as well as may be required to prevent adjacent surface settlement or damage to public and private property and to ensure safe working conditions at the site.
- C. Contractor shall remove all sheeting, shoring, bracing or similar structures in accordance with the above requirements and in such a manner as to prevent any damage to the Work.
- D. The Contractor shall repair all damages resulting from improper sheeting, shoring, bracing or similar measures, or damages resulting from failure to provide such measures at no expense to the County.

3.04 OTHER SAFETY PRECAUTIONS

- A. In addition to conforming to the safety rules and regulations of governmental authorities having jurisdiction, the Contractor's Health and Safety Plan shall address the following measures:
 - 1. Smoking shall be prohibited on the landfill property, except in designated areas.
 - 2. The use of explosives or firearms shall not be permitted on the site.
 - 3. If refuse is exposed during construction activities, the Resident Engineer shall be notified immediately.

- B. The Contractor may encounter explosive and/or toxic gases during construction. If explosive and/or toxic gases are encountered, the Contractor will stop work in the vicinity and notify the Resident Engineer.
- C. If gases are encountered, all of the Contractors and employees working within the area of the encountered gas must have hazardous waste operations and emergency response (HAZWOPER) training.
- D. Contractor's site-specific safety plan shall include the following measures:
 - 1. Shall comply with the requirements of OSHA, Cal-OSHA and all other regulatory agency requirements.
 - 2. Inhalation of landfill gases shall be avoided. Such gases or oxygen-deficient air may cause nausea and dizziness, which could lead to accidents. Work should proceed in a direction upwind of the excavation where possible unless the excavation is constantly monitored and declared safe.
 - 3. Workers shall avoid contact with exposed refuse, condensate, or leachate. Irritants or hazardous materials may be present.
 - 4. Fire extinguishers with a rating of at least A, B, and C shall be available at all times on the Site.
 - 5. Start-up and shutdown of equipment shall be avoided in areas of exposed refuse.
 - 6. Hot work (welding, cutting, or torching) shall not be conducted in areas containing leachate or landfill gas unless the absence of gases or vapors has been verified using a combustible gas indicator.

END OF SECTION 01800

Division 2 Site Work

**SECTION 02200
SITE EARTHWORK**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Fill placements
2. Disposal of excess/unsuitable excavated materials
3. Furnishing fill materials from Contractor's sources

B. Related Sections:

1. Section 02207 – Aggregate Materials
2. Section 02222 – Excavation
3. Section 02225 – Trenching and Backfilling
4. Section 02310 – Access Road
5. Section 02500 – Operations Layer
6. Section 02722 – Drainage and Erosion Control
7. Section 02771 - Geomembrane
8. Section 02772 – Geotextile
9. Section 02774 – Geocomposite
10. Section 02775 – Geosynthetic Clay Liner (GCL)

1.02 DEFINITIONS

- A. Refer to Section 01075 – Technical Specification Definitions.

1.03 REFERENCES

A. American Society for Testing and Materials:

1. C136 Test Method for Sieve Analysis of Fine and Coarse Aggregate
2. D422 Method for Particle-size Analysis of Soils

3. D1140 Test Method for Amount of Material in Soils Finer than the No. 200 (75 um) Sieve
4. D1556 Test Method for Density of Soil in Place by the Sand Cone Method
5. D1557 Test Method for Moisture Density Relations of Soils and Soil-aggregate Mixtures Using 10-pound (4.54 kilograms) Hammer and 18-inch (457 millimeters) Drop
6. D2167 Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
7. D2434 Test Method for Permeability of Granular Soils (Constant Head)
8. D2487 Standard Test Method for Classification of Soils for Engineering Purposes
9. D2488 Standard Practice for Description and Identification of Soils (Visual-manual Procedure)
10. D2850 Standard Test Method for Unconsolidated, Undrained Compressive Strength of Cohesive Soils in Triaxial Compression (UU)
11. D4318 Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
12. D4643 Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method
13. D4767 Standard Test Method for Consolidated Undrained Triaxial Compression Test on Cohesive Soil (CU)
14. D4959 Test Method for Determination of Water (Moisture) Content of Soil by the Direct Heating Method
15. D5084 Standard Test Method of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
16. D5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction Angle by the Direct Shear Method
17. D6938 Standard Test Method for In-place Density and Water Content of Soil and Soil Aggregate by Nuclear Methods (Shallow Depth)

- B. State of California, Department of Transportation, Standard Specifications and Standard Plans, 2018.

1.04 QUALITY ASSURANCE

A. Contractor Qualifications:

1. The earthwork contractor shall hold a current California, Class A, Contractor's license.
2. The earthwork contractor shall have worked in a similar capacity on at least five projects similar in complexity to the project described in the Contract Documents.
3. The earthwork contractor's proposed site supervisor shall have worked in a similar capacity on at least two projects similar in size and complexity to the project described in the Contract Documents.

- B. The CQA Officer and/or CQA Monitor will take soil samples and perform moisture, density, gradation, and other tests to ascertain that the work is being performed in compliance with these Specifications. The CQA Officer and/or CQA Monitor will conduct density and other tests on the fill, and related laboratory testing as specified in the Construction Quality Assurance Plan and as outlined in Tables 02200-1, 02200-2, 02200-3 and 02200-4. The Contractor shall remove surface material and render assistance as necessary to enable sampling and testing.

C. Methods of Sampling and Testing:

1. Particle-size Analysis: ASTM D422, C136, and D1140
2. In-place Density: ASTM D2167, or D6938
3. Moisture Content: ASTM D2216, D4643, D4959, D6938
4. Laboratory Moisture-Density Relations: ASTM D1557
5. Classification of Soils: ASTM D2487, D2488
6. Liquid Limit, Plastic Limit, and Plasticity Index: ASTM D4318
7. Permeability of Granular Soils: ASTM D2434
8. Permeability of Fine-Grained Soils: ASTM D5084

- D. Suitability of Materials: The suitability of all materials will be determined and verified in the field by the CQA Officer. Fill material shall be approved material from required excavations, stockpiles, or Contractor-selected off-site sources, as

directed by the Resident Engineer. Table 02200-4 summarizes the minimum material properties.

- E. The CQA Officer may direct that inspection trenches or test pits be cut into fills to determine that the Specifications have been met. Such trenches or pits will be of limited depth and size and shall be backfilled with the material excavated there from, or other fill material meeting the requirements for the zones cut into. Backfill shall be compacted to a density at least equal to that specified for contiguous fills.
- F. Tolerances: See Table 02200-3.

1.05 SUBMITTALS

- A. The Contractor shall submit documented evidence with its bid to show compliance with experience requirements of Article 1.04 A. Include names and phone numbers of references.
- B. The Contractor shall submit certificates of compliance for the aggregate layer and road base material to the Resident Engineer for approval at least 14 calendar days before he intends to place these materials. The certificates of compliance shall include the results of gradation and permeability tests as specified in Table 02200-1 conducted by a third-party soils laboratory.
- C. Shear strength testing submittal for the geosynthetic and soil interfaces is covered in Section 02772 – HDPE Geomembrane.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Sources: Materials shall be obtained from identified on-site stockpiles, on-site borrow areas, or from Contractor-selected (Resident Engineer-approved) off-site sources.
- B. All fill materials shall be free of organic and other deleterious materials as determined by the CQA Officer.
- C. Properties and testing procedures for earthwork materials specified in Part 2 - Products are summarized on Tables 02200-1 through 02200-4.

2.02 EARTHFILL

- A. Sources: On site stockpiles, borrow excavations or off-site borrow.
- B. Consists of clean, nonexpansive sand, silt, or clay soils or clay mixtures.
- C. Maximum particle size of 3 inches.

- D. Maximum particle size of 1/2 inch within 6 inches of geosynthetics.
- E. Placed in conformance with Tables 02200-2 and 02200-3.

2.03 SUBGRADE PREPARATION LAYER

- A. Sources: On-site stockpiles, borrow excavations or off-site borrow.
- B. Consists of clean, nonexpansive silty clay, silty sand, clayey sand, or sandy clay soils.
- C. Maximum particle size of 1/2 inch.
- D. Minimum content of material, by dry weight, passing the No. 200 U.S. Standard Sieve shall be 30 percent.
- E. Placed in conformance with Tables 02200-2 and 02200-3.
- F. Contractor to work with Resident Engineer to identify and selectively stockpile soil that will meet the requirements as set forth above.
- G. Contractor shall process on-site materials as necessary to achieve the required specifications.
- I. Contractor shall prepare the top surface of the subgrade layer preparation areas for geosynthetics using a method approved by the Resident Engineer.

2.04 OPERATIONS LAYER SOIL

- a. See Specification 02250.

PART 3 - EXECUTION

3.01 PROTECTION OF EXPOSED SURFACES DURING TEMPORARY SUSPENSION OF WORK

- A. In accordance with Section 10 of the Standard Specifications, when the Resident Engineer deems it necessary to suspend the work due to unsuitable weather, or any other conditions the Resident Engineer considers unfavorable for the suitable prosecution of the work; the Contractor shall comply with the following provisions:
 - 1. For excavated or filled areas, or stockpiles placed by the Contractor, the Contractor shall provide labor, materials, and equipment to maintain and protect exposed surfaces of cut and fill areas against wind and water erosion. The Contractor shall be responsible for protective method effectiveness.

3.02 EARTHWORK - GENERAL

- A. Required lines, levels, contours, and datum shall be identified by the Contractor before the start of earthwork operations.
- B. Earthwork shall conform to lines and grades indicated on the Construction Drawings and as specified in this section.
- C. Materials excavated which conform to *Part 2 – Products* of these Specifications, shall be selectively excavated and used as fill and/or stockpiled as designed on the drawings for later use.
- D. Temporary drainage ditches shall be constructed and maintained to provide drainage during construction.
- E. Contractor will be responsible for providing siltation control and management and dust control during construction.
- F. Care shall be taken during earthwork operations to avoid damaging components of the landfill including geotextiles, geomembranes, geonets, and pipes. Damage caused by the Contractor shall be repaired at the Contractor's expense consistent with the applicable specification requirements.

3.03 EXCAVATION

- A. Pumping and Drainage
 - 1. The Contractor at all times during construction shall be prepared to and shall provide and maintain proper equipment and facilities to remove all water entering excavations and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition.
 - 2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of subgrade soils at the bottom of the excavation.
 - 3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.
 - 4. Conveyance of dewatered liquids in open trenches will not be allowed. Permission to use any storm sewers, or drains, for waste disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. The Contractor shall not cause flooding by overloading or blocking flow in the drainage facilities and shall leave the facilities unrestricted and clean as

originally found. Any damage to the facilities shall be repaired or restored as directed by the Resident Engineer at no cost to the County.

3.04 USE OF EXCAVATED MATERIALS

A. Excavated Materials:

1. Materials excavated from the site shall be used as fill for construction of various features including site grading, subgrade preparation and operations layer or stockpiled at locations designated by the Resident Engineer for future use as identified by the Resident Engineer.
2. Where used in fills, such material shall be transported directly from the excavation and placed in its final position whenever possible. If required by the Contractor's schedule, the material may be placed temporarily in stockpiles at approved locations. Material in stockpiles shall be protected from contamination of any kind that would render it unsuitable for use in fills.
3. All operations in the stockpile areas throughout the work shall be in strict conformity with the requirements of this section. The Contractor shall ensure that turbid water from the stockpile areas does not enter nearby waterways. Siltation control and management measures shall be constructed by the Contractor.
4. Select soils excavated for construction shall be deposited in stockpiles designated on the Construction Drawings, or as directed by the Resident Engineer.
5. The top surface of all stockpiles shall be graded and wheel-rolled or otherwise provided with a smooth, compacted surface to promote run-off and minimize ponding. The side slopes of stockpiles shall be completely track-walked by a dozer such that the resultant individual track marks are oriented horizontally to resist erosion.

B. Excess/Oversized/Unsuitable Materials:

1. Excess excavated materials, oversized materials, or materials unsuitable for use as fill shall be disposed of at a location designated by the Resident Engineer.
2. Concrete rubble, garbage, refuse, and debris, and any waste material which is harmful to the environment shall be disposed of at locations designated by the Resident Engineer.

3.05 EARTHFILL CONSTRUCTION

A. General Requirements:

1. Materials shall be placed and compacted to the lines and grades shown on the Construction Drawings or as required by the Resident Engineer.
2. If any portion of the materials placed as fill does not meet the specified requirements, the Contractor shall remove such material and replace it with fill materials meeting the Specifications at no additional cost to the County.
3. Constructed fills shall be maintained to meet the requirements of this Specification until final completion and acceptance of the work. This shall include all measures to prevent erosion. During seasonal or other extended shutdowns, all exposed surfaces shall be protected with special treatments specified in Article 3.01 above.
4. Water to be used for construction and dust control must be secured, delivered and applied by the contractor. Submit water quality tests to the Resident Engineer for approval of the water source.

B. Placing Requirements:

1. No material shall be placed on any portion of the subgrade or against or upon any structure until consent to place such fill has been obtained from the CQA Officer or authorized CQA Monitor.
2. Conform to the requirements of Table 02200-3 for placement, lift thickness, placement tolerance, subgrade and lift density, moisture content, and test methods.
3. Prior to placement of materials, the in-place density of the underlying material shall be as specified in Table 02200-3.
4. Materials may require moisture conditioning (wetting or drying) prior to placement and compaction. Some materials may require spreading and extended drying time prior to placement and compaction. Moisture-conditioning requirements shall be as specified in Table 02200-3.
5. Materials shall be placed in continuous and approximately horizontal lifts for their full length and width, unless otherwise specified or specifically permitted by the Resident Engineer.
6. Method of dumping and spreading materials shall ensure uniform distribution of the material.

7. Loose thickness of each lift of materials shall be as specified in Table 02200-3.
8. Unless otherwise indicated, earthfill materials shall be placed to a grade no flatter than 2 percent to facilitate drainage of water. In areas where ponding cannot be prevented or ponding has occurred and fill is required to be placed, placing shall begin only after the area is dewatered and permission is obtained from the Resident Engineer.

C. Compaction Requirements:

1. Each lift of earthfill material shall be compacted to the applicable minimum density specified in Table 02200-3.
2. During compaction, the moisture content range of the earthfill shall be maintained relative to the ASTM D1557 optimum moisture content as specified in Table 02200-3. A uniform moisture distribution shall be obtained by disking, blading, or other methods approved by the CQA Officer prior to compaction of a lift.
3. If the rolled surface of any in-place lift is too wet for proper compaction of the next succeeding lift to be placed thereon, then the materials from the in-place lift shall be removed and allowed to dry, or worked with harrow, scarifier, or other suitable equipment to reduce the water content, and then recompacted before the next succeeding lift is placed.
4. Fill compacted to densities lower than the specified minimum density, or fill compacted at moisture contents outside the specified acceptable range of moisture content shall be reworked to meet the density and moisture requirements or removed and replaced by acceptable fill compacted to meet these requirements.
5. Compaction equipment shall be approved by the Resident Engineer.

3.06 PREPARATION OF SUBGRADE

- A. All subgrade areas shall be scarified, moisture conditioned and recompacted as specified in Table 02200-3 and Section 02774. All areas to receive geosynthetics shall be steel drum rolled a minimum of two passes (base and side slopes). The steel drum roller is to remain on site during the geosynthetic placement activities to correct subgrade inconsistencies as directed by the CQA Officer.

3.07 BACKFILLING

A. General:

1. See Specification 02225 for additional information.

2. Backfill trenches to the ground surface with materials as specified, or otherwise shown on the Construction Drawings.
3. Reopen trenches which have been improperly backfilled. Refill and compact as specified, or otherwise correct to the approval of the CQA Officer.
4. Do not allow or cause any of the work performed or installed to be covered up or enclosed by work of this Section prior to required inspections, tests, and approvals.
5. Should any of the work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no additional cost to the County.

B. Bedding and Backfill Around Pipes

1. Take special care in bedding and backfilling operations to not damage pipe and pipe coatings.
2. Place pipe bedding material to the thickness as shown on Construction Drawings. Tamp bedding material under pipe haunches to compact in accordance with Specification 02225.
3. Place backfill material to completely surround pipe without voids.
4. Place select backfill in layers not exceeding 6 inches in thickness and compact to 90 percent relative compaction of ASTM D 1557 at 2 percent below to 4 percent above optimum moisture content.
5. See Technical Specification 02225, Trenching and Backfilling, for additional information.

3.08 FIELD QUALITY ASSURANCE

- A. The CQA Officer or authorized CQA Monitor will take samples and perform tests throughout the construction period, and the Contractor shall cooperate in providing access for the CQA Officer to areas where testing is to be performed and shall schedule his earthwork activities to avoid interference with the testing operations.
- B. The CQA Officer or authorized CQA Monitor will perform the tests listed in Table 02200-1 and 2 on a regular basis; these tests are a minimum requirement. Additional tests may be performed at the CQA Officer's discretion.
- C. Placement tolerance shall be as specified in Table 02200-3.

Table 02200-1
Minimum Material Evaluation Testing Frequency

ASTM Test Designation ¹	General Earthfill (cy)	Subgrade Preparation Layer (cy)	Operations Layer (cy)	Operations Layer Cell Access Road (cy)
D2488 (Visual Soil Description)	5,000	10,000	15,000	5,000
D2487 (Soil Classification)	5,000	5,000	15,000	5,000
D1557 (Moisture-Density)	5,000	5,000	---	5,000
D6913/D7928 (Particle Size)	5,000	10,000	15,000	5,000
D1140 (#200 Sieve Wash)	5,000	10,000	15,000	5,000
D4318 (Atterberg Limits)	5,000	10,000	---	5,000

¹ Minimum one test per material type.

Table 02200-2
Minimum Soil Construction Testing Frequency

ASTM Test Designation ¹	General Fill/ Road Base (cy)	Subgrade and Subgrade Preparation Layer (cy)	Operations Layer (cy)	Operations Layer Cell Access Road (cy)
D2937 (Drive-Cylinder) ²	1 per every 40 Nuclear Gage	1 per every 40 Nuclear Gage	---	1 per every 40 Nuclear Gage
D2216/D4643 (Moisture Content) ²	1 per every 20 Nuclear Gage	1 per every 20 Nuclear Gage	---	1 per every 20 Nuclear Gage
D6938 (Nuclear Moisture-Density) ³	250	250	---	250

¹ Minimum one test per material type.

² Verification of Nuclear Density gauge.

³ A minimum of four tests per day.

Table 02200-3
Fill Placement and Compaction

Fill	Maximum Loose Lift Thickness (in.)	Moisture Content	Minimum Subgrade and Lift Density	Method of Test	Finished Grade Tolerance (ft)
Subgrade under Aggregate Base	8	±3% of Optimum	95%	ASTM D1557	±0.1
General Earthfill	8	±3% of Optimum	90%	ASTM D1557	±0.2
Subgrade Preparation Layer	8	+1 to +4% of Optimum	90%	ASTM D1557	0.0 to +0.1
Operations Layer	24	---	---	---	0.0 to +0.1
Soil Access Road	8	±3% of Optimum	95%	ASTM D1557	±0.1

Table 02200-4
Properties for Earthwork Materials

Material and Property	Test ¹	Requirements
General Earthfills and Subgrade		
Material Gradation		
• Maximum Particle Size	D6913/D7928	3 inches
• Maximum Particle Size within 6" of Geosynthetic	D6913/D7928	1/2 inch; otherwise 3" maximum
• USCS Classification	D2488	nonexpansive sand, silt, clay or mixtures thereof
Subgrade Preparation Layer		
• Maximum Particle Size	D6913/D7928	1/2 inch
• Gradation	D6913/D7928	Minimum 30% passing No. 200 Sieve
Operations Layer, Base and Side Slope		
• Material Gradation	D6913/D7928	Maximum particle size = 2.0 inch; 1/2 inch within 6 inches of geosynthetic materials
• USCS Classification	D2488	sand, silt, clay, and mixtures thereof

¹ Minimum one test per material type.

END OF SECTION 02200

SECTION 02207 AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Furnish aggregate base material for access roads and beneath concrete containment structure.
- B. Furnish LCRS and sump gravel for leachate drainage.
- C. Furnish sand bedding for stormwater culverts, cleanouts, and electrical conduit.
- D. Furnish Rock Slope Protection (RSP) or grouted rock riprap for outfalls and other locations as shown on the plans.

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society of Testing and Materials*. Current Edition.
- D. *California Test Methods*. California Department of Transportation, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM A 33 Standard Specification for Concrete Aggregates.
- B. ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D 422 Standard Test method for Particle-Size Analysis of Soils.
- D. ASTM D 1557 Test Method for Laboratory Compaction Characteristics Using Modified Effort
- E. ASTM D 2434 Standard Test method for Permeability of Granular Soils (Constant Head).
- F. CTM 229 California Durability Index (Caltrans Transportation Laboratory) Test 229.
- G. CTM 231 Method of Test for Relative Compaction of Untreated and Treated Soils and Aggregates using Nuclear Gauges.
- H. CTM 301 Method for Determining the Resistance "R" Value of Treated and Untreated Bases, Subbases, and Basement Soils by the Stabilometer.

1.04 SUBMITTALS

- A. Name and location of source and laboratory test results for aggregate to verify that the material meets or exceeds the product requirements specified herein.
- B. At least two weeks prior to beginning any aggregate materials installation, the Contractor shall provide, in triplicate, the name and location of the proposed borrow source, and laboratory test results on the aggregate material from the proposed borrow source to the CQA Officer which show that the aggregate material has the properties specified in Part 2 of this Section. The Engineer will provide the Contractor with an approval or rejection of the borrow source and aggregate material within ten working days of receipt of the borrow source information and laboratory test results.

1.05 QUALITY CONTROL

- A. If Engineer's review of Contractor's submittals for aggregate material indicates that any material does not meet specified requirements, the Contractor shall provide an alternative material and submit corresponding test results to the Engineer for approval.
- B. Testing of aggregate materials shall be conducted in accordance with the CQA Manual and Specifications 02200 and 02207.
- C. Testing and observation for aggregate material shall conform to the following guidelines:
 - 1. Prior to placement operations, the CQA Monitor will sample the actual aggregate material to be used at the site and send the samples to the Soils Testing Laboratory for the following tests, as appropriate.
 - a. Sieve Analysis (ASTM C 136).
 - b. Permeability (ASTM D 2434 - modified).
 - c. Durability Index (California Test Method 229)
 - 2. Material will be verified by the CQA Monitor at the borrow source just before loading into trucks for site delivery or at the site just after unloading and stockpiling.
 - 3. The Contractor shall allow at least 48 hours for the CQA Monitor's final CQA verification testing to be completed prior to covering the aggregate material.
 - 4. The CQA Monitor will continuously observe and test (according to specifications) all unloading, stockpiling, and placement operations to verify that the material is consistent and has no organic, deleterious, or other unsuitable matter or substances.
 - 5. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
 - 6. If any portion of the aggregate material is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observation, the Contractor, at his expense, shall remove and replace that portion to meet the requirements of this Section, without causing damage to any underlying geosynthetic material, as directed by the CQA Monitor.

- D. Surveying of aggregate material shall conform to the following guidelines:
1. The Contractor shall allow at least 48 hours for the CQA verification surveying to be conducted prior to covering the gravel.
 2. If it is demonstrated by the CQA verification surveying that any areas of the aggregate material are less than the required thickness shown on the Plans, the Contractor, at his expense, shall add additional material required to bring the deficient area to the required thickness in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to re-verify the thickness by survey.

PART 2 PRODUCTS

2.01 GENERAL

- A. Material used shall be from the same source throughout the Work.

2.02 AGGREGATE BASE

- A. The aggregate base material shall be clean, hard, sound, durable, uniform in quality, free of any surface coatings, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, disintegrated material, organic matter, oil, alkali, or other deleterious substance. The aggregate base material may contain recycled material i.e., Portland cement concrete and asphalt concrete, meeting the grading specifications. The Engineer may waive durability requirements and allow other inorganic material in recycled aggregate base material.
- B. Aggregate base shall conform to requirements of Section 26, "Aggregate Bases" of the Standard Specifications and these Technical Specifications. Aggregate base shall meet the requirements for Class 2, 3/4" maximum per the Standard Specifications.
- C. Includes supply and placement of Paving Fabric between the prepared subgrade and Class 2 aggregate.

2.03 LCRS and SUMP GRAVEL

- A. LCRS and SUMP gravel shall conform to the provisions of these Technical Specifications. The Contractor shall submit documentation for the gravel material to the Engineer for approval at least 14 days before he intends to place these materials.
- B. LCRS and SUMP gravel shall be clean, hard, sound, durable, uniform in quality and composition, free of any surface coatings, and free of any detrimental quantity of soft, friable, thin, elongated, or laminated pieces, degraded or weathered material, significant carbonates, organic matter, oil, alkali, deleterious matter, or other unsuitable matter. LCRS and SUMP gravel shall not contain limestone or other material which will adversely react with the leachate.
- C. LCRS and SUMP gravel shall have a Durability Index of not less than 60 as determined from California Test Method 229.

- D. LCRS and SUMP gravel shall be rounded to subrounded in shape and have a size distribution determined by ASTM C 136 as follows:

LCRS and Sump Gravel Gradation	
U.S. Standard Sieve	% Passing (by weight)
2-in. (50.8 mm)	100
1 1/2-in. (38.0 mm)	90-100
1-in. (25.4 mm)	5-40
3/4-in. (19.0 mm)	0-15
3/8-in. (9.5 mm)	0-5
No. 200	0-2

- E. LCRS and SUMP gravel shall have a coefficient of permeability greater than 1.00 cm/sec determined by ASTM D 2434 (modified).

2.04 PIPE BEDDING

- A. Pipe bedding material for non-perforated HDPE pipe shall conform to Section 19-3.02C of the Standard Specifications.
- B. Pipe bedding material for Corrugated Metal Pipe (CMP) shall conform to Specification 02722.
- C. Pipe bedding material for Reinforced Concrete Pipe (RCP) shall conform to Specification 02722.

2.05 CONCRETE AGGREGATE

- A. Coarse and fine aggregate for concrete shall conform to Section 90-1.02C of the Standard Specifications. All aggregate shall be thoroughly washed. Maximum aggregate size shall be 3/4 inch in diameter. See Specification 03300.

2.06 GROUTED ROCK RIPRAP

- A. The term Grouted Rock Riprap used throughout the Contract Documents is synonymous with Rock Slope Protection as described in Section 72 of the Standard Specifications.
- B. Stone and/or recycled concrete for grouted rock riprap shall be Class I per Sections 72-3.02C of the Standard Specifications. RSP fabric shall be per Section 72-1.02 of the Standard Specifications.
- C. Concrete and rock riprap for the grouted riprap shall be supplied from the source approved by the Resident Engineer based on the submittal requirements.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the aggregate material to the lines, grades, and thickness shown on the Plans.
- B. If any portion of the aggregate materials fail to meet the specified requirements, the Contractor shall remove such material and replace with material meeting the Specifications at no additional cost to the County.
- C. Constructed aggregate material shall be maintained to meet the requirements of this specification until final completion and acceptance of the work. This shall include all measures to prevent erosion. During seasonal or other extended shutdowns, all exposed surfaces shall be protected. In addition, the aggregate material shall be protected from any contamination which reduces permeability or other quality. Any contaminated materials shall be removed and replaced at no cost to the County.

3.02 STOCKPILING

- A. Materials shall be stockpiled on site at location(s) designated by the Resident Engineer.
- B. Stockpile shall be in sufficient quantities to meet Project schedule and requirements.
- C. Surface water shall be directed away from stockpile site(s) so as to prevent erosion or deterioration of materials.
- D. Stockpiles are not allowed on non-compacted Operations Layer soil.

3.03 STOCKPILE CLEANUP

- A. Remove surplus aggregate base material or leave surplus aggregate base material stockpiled area in a clean and neat condition at the direction of the Resident Engineer. Grade site surface to prevent free standing surface water.

3.04 LCRS PLACEMENT

- A. LCRS and SUMP gravel shall be placed by the Contractor in such a way as to not damage the integrity of the underlying HDPE pipe, geotextile, geonet composite, or geomembrane. If damaged, the Contractor shall repair the damaged area at his expense and to the satisfaction of the Resident Engineer.
- B. The Contractor shall adjust the schedule for placement of LCRS and SUMP gravel in the base liner and LCRS area at the direction of the Engineer to ensure that the development of wrinkles and stress-bridging in the underlying geomembrane does not occur due to the heat of daylight hours. Night work may be required with floodlights.
- C. Equipment traffic for placement of the LCRS and SUMP gravel shall not be allowed directly upon any geosynthetic material or on less than the full required thickness of LCRS gravel.

- D. LCRS and SUMP gravel placed in trenches or around pipes shall not be allowed to drop directly onto any HDPE pipe, nor from a height of more than 2 feet onto any underlying geosynthetic material or other LCRS gravel.
- E. In no instance shall the LCRS and SUMP gravel be less than the minimum thickness specified.

3.05 AGGREGATE MATERIAL PLACEMENT

- A. Prior to placing aggregate base on subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.
- B. All synthetic materials underlying aggregate shall be inspected and approved by the CQA Monitor prior to placement of aggregate.
- C. The class 2 aggregate base shall be spread in uniform lifts with a maximum compacted thickness of 6 inches. The compaction of each layer of compacted base material shall be not less than 95 percent relative compaction per ASTM D1557.
- D. Drainage gravel and sump gravel materials shall be placed in a single continuous and approximately horizontal lift, unless otherwise specified or specifically permitted by the Resident Engineer.
- E. Method of dumping and spreading materials shall ensure uniform distribution of the material and shall not cause folds in the underlying geosynthetic materials.
- F. Maximum lift thickness can be found in Table 02207-3. Do not operate equipment over geosynthetic materials with less than 24 inches of drainage materials in place. Do not operate haul equipment over drainage gravel and sump gravel prior to placing operations layer.
- G. Equipment used and placement method shall be approved by the Resident Engineer prior to the start of work. Approval does not absolve the Contractor of responsibilities for damage to the underlying geosynthetic or pipe materials.
- H. Contractor is responsible for repairing any geosynthetic or pipe materials damaged during aggregate placement at no cost to the County.
- I. The Contractor shall adjust the schedule for placement of the LCRS and SUMP gravel at the direction of the Resident Engineer to ensure that the development of wrinkles and stress-bridging in the underlying geomembrane does not occur due to the heat of daylight hours. Night work may be required with floodlights.
- J. LCRS gravel placed in trenches or around pipes shall not be allowed to drop directly onto any HDPE pipe, nor from a height of more than 2 feet onto any underlying geosynthetic material or other LCRS gravel.

3.06 GROUTED ROCK RIPRAP PLACEMENT

- A. Rock riprap shall be placed in accordance with the requirements for placement in Section 02722 (Drainage and Erosion Control).

3.07 ROAD BASE (CLASS 2 AGGREGATE BASE) CONSTRUCTION

- A. Road base material shall be placed and compacted to the lines and grades shown on the drawing and shall conform to the requirements of Section 26 of the Standard Specifications, 2018.

Table 02207-1
Minimum Aggregate Material Evaluation Testing Frequency

ASTM Test Designation ¹	Class 2 Road Base (cy)	LCRS Drainage Gravel / Sump Gravel ² (cy)	Grouted Rip-Rap ² (cy)
D2488 (Visual Soil Description)	5,000	1,000	---
D2487 (Soil Classification)	5,000	1,000	---
D1557 (Moisture-Density)	5,000	---	---
C136 (Sieve Analysis)	5,000	1,000	1,000
D4318 (Atterberg Limits)	---	---	---
D2434 Permeability	---	1,000 ³	---

¹ Minimum one test per material type.

² Quarry certification required for drainage layer and sump gravel.

³ Constant-head, rigid wall permeability test D2434.

Table 02207-2
Minimum Aggregate Construction Testing Frequency

ASTM Test Designation ¹	Class 2 Road Base (cy)	LCRS Drainage Gravel / Sump Gravel (cy)	Grouted Riprap (cy)
D2216/D4643 (Moisture Content) ³	1 per every 20 Nuclear Gage	---	---
D6938 (Nuclear Moisture-Density) ²	250 ²	---	---

¹ Minimum one test per material type.

² A minimum of one test per 250 cubic yard or four (4) per day, whichever is greater.

³ Verification of Nuclear Density gauge

Table 02207-3
Aggregate Placement and Compaction

Fill	Maximum Loose Lift Thickness (in.)	Moisture Content	Minimum Lift Density	Method of Test	Finished Grade Tolerance (ft)
Drainage Gravel / Sump Gravel	12	---	---	---	0.0 to +0.1
Class 2 Road Aggregate	8	±3% of Optimum	95%	ASTM D6938	0.0 to +0.2
Grouted Riprap	---	---	--	---	---

Table 02207-4
Properties for Aggregate Materials

Material and Property	Test	Requirements
LCRS and Sump Gravel		
• Material Gradation	C 136	<3% passing No. 200 sieve, maximum particle size = 1 1/2 inch, rounded to subrounded See Gradation requirement above in Section 2.03 D.
• USCS Classification	D2488	GP, GW containing no limestone or other material that could adversely react with the landfill leachate
• Minimum Laboratory Permeability	D2434	1.0 cm/sec
• Durability Index	CA 229	Greater than or equal to 60
Class 2 Road Base	C 136	See Section 26, Caltrans Standard Specifications, 3/4-inch maximum particle size
Grouted Riprap	C 136	See Section 72, Caltrans Standard Specifications, Class 1 rock and Class 8 RSP Fabric

END OF SECTION 02207

SECTION 02222 EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall perform all excavation which includes all clearing, grubbing, excavation, grading, and subgrade preparation necessary to provide a base for a composite liner and LCRS, perimeter berm, roads and drainage ditches, basins and sumps as shown on the Plans.
- B. Excavation to be performed by the Contractor shall also include construction of any necessary haul roads, stockpiling of all excavated materials, hauling and disposal of any excavated refuse, and provision of temporary dust, erosion, and drainage control measures.
- C. Unless noted otherwise within this Section or allowed through specific agreement with the County, the Contractor shall furnish for all labor, materials, tools, equipment, machinery, water, heat, utilities, or any other facilities or services necessary to complete the excavation in accordance with this Section and as shown on the Plans.
- D. The Contractor shall moisture condition and compact the prepared subgrade prior to geosynthetic liner installation and shall coordinate work with other Contractors (geosynthetic installer).

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.
- D. Section 02200 – Earthwork
- E. Section 02225 – Trenching and Backfilling

1.03 SUBMITTALS

- A. At least two weeks prior to beginning any general earthwork construction in accordance with the requirements of this Section, the Contractor shall provide to the Resident Engineer, in triplicate and as applicable, the name and location of material sources and laboratory test results and/or material data sheets which show that the materials have the properties specified in Part 2 of this Section. The Resident Engineer will provide the Contractor with an approval or rejection of each proposed material within ten working days of receipt of the material source information and laboratory test results and/or material data sheets.

1.04 QUALITY ASSURANCE VERIFICATION

- A. Testing and Observation
 - 1. The CQA Monitor will periodically observe performance of the excavation to verify conformance with the execution requirements in Part 3 of this Section.

2. If any portion of the excavation is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall rework or replace that portion to meet the requirements of this Section as directed by the Resident Engineer.
- B. Surveying
1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the excavation to the lines, grades, and dimensions shown on the Plans. The Resident Engineer will provide data on existing control points for use by the Contractor's Surveyor.
 2. All grades and dimensions of completed areas of the excavation will be verified by the Resident Engineer or CQA Monitor by field survey.
 3. If it is demonstrated by verification surveying that any portion of the excavation does not meet the required lines, grades, or dimensions shown on the Plans, the Contractor, at his expense, shall rework or replace that portion to bring the deficient area to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimension by survey.

PART 2 MATERIALS (Not Used)

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction staking, grading control, and other staking necessary to perform the excavation to the lines, grades, and dimensions shown on the Plans.
- B. Unless provided otherwise within this section all excavation activities shall conform to the applicable requirements of Sections 19 of the Standard Specifications.
- C. The Contractor shall instruct all personnel and maintain strict control over all excavation activities to protect and maintain the integrity of all existing environmental monitoring and control systems and any other facilities for the existing landfill. The cost of repairing any damage to these existing features will be determined by the Resident Engineer and be borne by the Contractor. The total repair cost to be borne by the Contractor will include those for exploration to determine extent of damage, mobilization of work crews, materials, material delivery, CQA testing and observation, and additional design and reporting.

3.02 RESTRICTIONS

- A. The Contractor shall not interfere with landfill operations in any way during the performance of excavation or any other site work.

3.03 CLEARING AND GRUBBING

- A. All areas within the limits of the excavation shall be cleared of all vegetative growth, such as brush, grass, weeds, or other deleterious material.
- B. The areas within the limits of the excavation shall be grubbed to a depth necessary to remove all deleterious material.

- C. Clearing and grubbing shall be performed prior to beginning excavation in any area.
- D. Cleared and grubbed debris shall be stockpiled separately from excavated material or disposed of in accordance with Part 3.08B of this section.
- E. Cleared and stripped topsoil shall be stockpiled separately from excavated material or disposed of in accordance with Part 3.08B of this section.
- F. Measurement and payment for clearing and stripping shall be considered included in the Contract Unit Price Paid for various items of work in which clearing, and stripping is required, and no additional compensation will be allowed therefor.

3.04 EXCAVATION

- A. Control points and property line markers that are removed, damaged, or destroyed by the Contractor shall be reestablished by the Resident Engineer at the Contractor's expense.
- B. Boulders encountered by the Contractor during excavation shall be removed, separated by size as directed by the Resident Engineer, and stockpiled separately from excavated material or disposed of in accordance with these Specifications.
- C. Excavation for drainage and erosion control structures shall conform to Section 19-2.03H of the Standard Specifications.
- D. The leading edge of anchor trenches shall be rounded to avoid sharp bends when placing geosynthetic materials
- E. Excavation shall be conducted in areas and to the grades indicated on the Construction Drawings or specified herein.
- F. At all times, the Contractor shall conduct operations in such a manner as to prevent free standing water.
- G. The Contractor shall selectively excavate material from the excavation area and place it in fills required at the site or in the designated stockpile and/or spoil areas, as specified in Article 3.04, or use it for other purposes, as approved by the Resident Engineer.
- H. Unsuitable (including concrete rubble and/or refuse) or low-density subgrade material that cannot be compacted in-place to a minimum 90 percent relative compaction of the ASTM D1557 maximum dry density shall be removed as directed by the Resident Engineer and disposed of. The disposed materials shall be replaced with compacted earthfill meeting the requirements specified in Section 02200.
- I. Adequate working space shall be provided within limits of the excavation for personnel safety.
- J. Except as otherwise noted, care shall be exercised to preserve the material below and beyond the lines of all excavation. Where excavation is carried below grade, the Contractor shall backfill with earthfill to the required grade and conform to the requirements of Table 02200-4 (Specification 02200) for placement, lift thickness, placement tolerance, subgrade and lift density, moisture content, and testing.
- K. Any excavation to be carried out for the convenience of the Contractor shall conform to the limits approved by the Resident Engineer and shall be at no additional expense to the County.
- L. Excavated material shall be placed at sufficient distance from the edge of excavations to prevent cave ins or bank slides. Side slopes of stockpiles shall not be steeper than 3.0:1

(horizontal:vertical) unless approved by Owner. Side slopes of excavations shall be no steeper than 2.5:1 (horizontal:vertical) unless otherwise noted.

- M. Except where rock is encountered, do not excavate below the depth indicated or specified.
- N. Where rock is encountered, over excavate rock to a minimum depth of 4 inches below the trench depth indicated or specified.

3.05 GRADING

- A. The excavation shall be constructed in conformance with the lines, grades, and dimensions shown on the Plans; all distances and measurements, except elevations and structural dimensions, shall be made on a horizontal plane unless otherwise stated in this Section.
- B. When completed, the grading plane for the cell bottom at any point shall not vary more than 0.10 foot above or below the grade shown on the Plans on slopes less than 10% nor vary more than 0.20 foot above or below the grade shown on the Plans on slopes greater than 10%.
- C. Unsuitable materials, as determined by the Resident Engineer, encountered at the subgrade elevation shall be removed and stockpiled separately from excavated material or disposed of in accordance with Part 3.08B of this Section. If, after removal of the unsuitable materials, a surface in accordance with this Part and Part 3.06 of this Section does not result, overexcavation correction procedures in Part 3.05D of this Section shall be followed.
- D. If any portion of the excavation area is excavated by the Contractor below the design (prepared subgrade) elevations shown on the Plans, the Contractor shall perform overexcavation correction procedures, resulting in a surface which meets the requirements of this Part and Part 3.06 of this Section, as directed by the Resident Engineer. Overexcavation correction procedures may consist of excavating, grading, and surface preparation of the entire overexcavated slope, or some portion thereof, to a lower subgrade elevation determined by the Resident Engineer; backfilling with engineered fill and compacting to provide a firm and unyielding subgrade in accordance with the requirements of Section 02200; or as otherwise directed by the Resident Engineer. The cost of overexcavation correction procedures, redesign, additional surveying, County administration, and other incidental fees resulting from the overexcavation shall be paid by the Contractor, unless the overexcavation is performed at the direction of the Resident Engineer to remove unsuitable materials or boulders at the subgrade elevation.

3.06 SUBGRADE PREPARATION

- A. All completed excavated surfaces (subgrade) below access roads or structures shown on the Plans shall be scarified in-place to a depth of at least 6 inches, uniformly moisture conditioned to within 2 percentage points of the optimum moisture content, be free of individual particles or protrusions greater than 2.0 inch in diameter and compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557.
- B. All completed excavated surfaces (subgrade) where geosynthetics are to be placed shall have a 12-inch prepared subgrade layer constructed below the geosynthetics. The prepared subgrade layer shall be installed in maximum 6-inch compacted lifts, moisture conditioned to within +1 to +3 percentage points of the optimum moisture content, be free of individual particles or protrusions greater than 0.50-inch in diameter and be compacted to at least 90 percent of the maximum dry density as determined by ASTM D1557. Surface shall be maintained and smooth rolled prior to placement of any geosynthetics. Subgrade shall be

maintained at the desired moisture content and not be allowed to dry until covered with the geosynthetic clay liner (GCL).

- C. Clasts in the subgrade shall be rounded or subrounded as determined by ASTM Method D2488.
- D. Coordinate scheduling of subgrade preparation with Geosynthetic Installer's deployment activities to minimize rework.
- E. The Contractor shall be available on-site to maintain lines, grades, moisture, density of finished subgrade, and remove protruding particles or objects until covered by geosynthetic liner. The steel drum roller is to remain on site during the geosynthetic placement activities to correct subgrade inconsistencies as directed by the CQA Officer.

3.07 DITCH EXCAVATION:

- A. General: Ditches shall be cut accurately to cross sections and grades where indicated. All roots, stumps, rock, and foreign matter in the sides and bottom of ditches shall be trimmed and dressed or removed to conform to the slope, grade, and shape of sections indicated. Care shall be exercised not to over excavate ditches. Over excavated ditches shall be backfilled to required grade with satisfactory, thoroughly compacted material. Ditches shall be maintained until final acceptance of the work. Where ditches planned in natural materials are over excavated and do not include erosion protection such as rip rap or concrete lining (as shown on the Construction Drawings), the Contractor shall provide erosion protection equivalent to the undisturbed natural material.
- B. Ditches shall be excavated at locations shown on the Construction Drawings to collect and transport storm run-off, wastewater, and water bound material to the retention basins.
- C. Ditches shall be excavated true to line and grade. Any erosion which occurs to ditch excavation before the Resident Engineer's acceptance of project shall be repaired with compacted backfill. All such repairs shall be considered as maintenance costs prior to the Resident Engineer's acceptance and shall not be considered extra work for payment purposes.

3.07 HAUL ROAD CONSTRUCTION

- A. The Contractor shall construct and maintain any haul road necessary to perform excavation.
- B. The location of all haul roads proposed for construction and use by the Contractor must be approved by the Resident Engineer.

3.08 STOCKPILING

- A. The Contractor shall place all excavated materials, other than cleared and grubbed debris, boulders, or any other non-soil materials, at a location approved by the Resident Engineer.
- B. Cleared and grubbed debris, boulders, or any other non-soil or unsuitable materials shall be stockpiled or disposed of in a separate location near the excavated soil stockpile(s) as directed by the Resident Engineer.
- C. Stockpile slopes shall be no steeper than 4H:1V at any location unless approved by the Resident Engineer.

- D. A 10-foot wide (minimum) terrace shall be located at 50-foot (maximum) intervals in stockpile elevation, battered toward the slope at a minimum grade of 3 percent, and graded at 3 percent in profile to drain toward the perimeter of the stockpile except as shown on the plans or approved by the Resident Engineer.
- E. The minimum slope at the top or at any location on a stockpile shall be 3 percent.
- F. The entire surface of the final stockpile shall be graded to drain in sheet flow toward the terraces or the perimeter of the stockpile; no swales, gullies, depressions, or other configurations which could result in concentrated flow or ponding of stormwater on the surface of the stockpile will be allowed.
- G. The Contractor shall make a separate stockpile of select excavated material that meets the requirements of Engineered Fill. The Contractor shall make a separate stockpile of excavated material that does not meet the specifications for the Engineered Fill.

3.09 DUST CONTROL

- A. Dust control shall comply with all requirements of the San Joaquin Valley Air Pollution Control District. Contractor to prepare and implement a dust control plan and submit a Construction Notification to the District and the Resident Engineer.
- B. A minimum of two (2) water trucks with operators shall be in operation at all times during excavation to provide dust control at all excavation, haul road, stockpile and staging areas. If necessary, additional water trucks or other equipment with operators shall be provided and used by the Contractor to maintain these areas in a misted condition at all times during excavation at no additional cost to the County. The Resident Engineer will require additional water trucks to be provided by the Contractor if adequate dust control and soil moisture requirements are not being met.
- C. The Contractor shall be responsible for developing a water supply for construction water and dust control and delivering and applying water as needed. Full compensation for developing a water supply and delivering and applying water shall be considered as included in the price paid for the various contract items requiring water.
- D. The Resident Engineer will require all excavation activities to cease if the Contractor's dust control efforts do not follow the approved Dust Control Plan or fail to meet any of the requirements of this Part, until such time that the Contractor can demonstrate a return to compliance.

3.10 EROSION CONTROL

- A. Erosion and sediment control measures shall be implemented by the Contractor in accordance with the approved Erosion and Sediment Control Plan, and as directed by the Resident Engineer for all excavation work areas including haul roads and stockpile areas, adjacent areas which have been disturbed, or other affected areas.
- B. The Contractor shall maintain erosion and sediment control measures until the final graded surface (prepared subgrade) of the excavation is approved by the Resident Engineer, and until the surface is covered with geosynthetic liner materials. If erosion creates a final subgrade surface which is not in accordance with any requirements of this Section, overexcavation correction procedures in Part 3.05D of this Section shall be performed by the Contractor, at the expense of the Contractor, including payment of all incidental fees.

3.11 DRAINAGE CONTROL

- A. The Contractor shall provide ample means and devices with which to promptly remove and dispose of all water from any source entering the excavation or stockpile area(s) and maintain these at all times during excavation and until the final graded surface of the excavation and stockpile are approved by the Resident Engineer.

3.12 ARCHAEOLOGICAL AND PALEONTOLOGICAL RESOURCES

- A. The Resident Engineer shall serve as the Archaeological and Paleontological Monitor. The Contractor shall notify the Resident Engineer in the event that he suspects that an archaeological or paleontological discovery is found during excavation for the Resident Engineer's investigation. Should a paleontological or archaeological discovery be made during excavation, the Contractor shall cease work in that area until the discovery is evaluated or recovered. The Contractor may resume work elsewhere on the project that does not disturb the discovery until the evaluation or recovery is completed. Should the discovery result in an unavoidable delay to the Contractor, the Contractor shall immediately notify the Resident Engineer of the delay in writing. Additional working days will be allowed for such a delay. The Contractor shall not charge the County for the delay under Sections 8-1.06 or 8-1.07 of the Standard Specifications until such delay exceeds a total of 20 hours for the project, after which the Contractor may be entitled to compensation under said sections.

END OF SECTION 02222

SECTION 02225 TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 GENERAL

- A. The work encompassed by this Section shall consist of performing all operations and furnishing all labor, materials, tools, equipment, and incidentals as necessary to:
 - 1. Trench for underground utilities including all stripping, excavation and trench shoring in accordance with these Technical Specifications.
 - 2. Backfill trench and place engineered fill from pipe springline to finish grade elevations.
 - 3. Trench and backfill for all anchor trenches with materials shown on the Plans in accordance with these Technical Specifications.

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.
- D. Section 02200 – Earthwork
- E. Section 02222 - Excavation

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM D 422 Standard Test Method for Particle-Size Analysis of Soils
- B. ASTM D 1557 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- C. ASTM D 2216 Standard Test Methods for Laboratory Determination Water (Moisture) Content of Soil and Rock by Mass
- G. ASTM D 6938 Standard Test Methods for In-Place and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.04 SUBMITTALS

- A. Materials for trench backfill shall be supplied from sources proposed by the Contractor that meet the material specifications established by these Technical Specifications and as approved by the Resident Engineer.
- B. Prior to use of materials for trench backfill, the Contractor shall provide, for Resident Engineer's approval, laboratory test results for designated material stockpile that demonstrate conformity to material specified.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pipe Bedding: Pipe bedding (to pipe springline) shall conform to Section 19-3.02F(2) of the Standard Specifications.

- B. Backfill: Material from the top of the pipe bedding layer, to finish grade shall conform to the following grading:

<u>Sieve Size</u>	<u>Percentage Passing</u>
3"	100
1"	90 - 100
No. 4	35 - 100
No. 30	20 - 100

- C. Anchor Trench: Anchor trench backfill material shall meet the requirements for earth fill per the requirements of these Technical Specifications.
- D. Plywood: Plywood shall be ¾-inch thick exterior grade C-D, mill reject, or better.

PART 3 EXECUTION

3.01 PREPARATION

- A. The Contractor shall identify required points of connection, lines, levels, contours, and datum locations. Locations for utilities and points of connection that are shown on the Plans are approximate. The Contractor shall locate utilities to best serve the intended use and to avoid mechanical and structural interference.

3.02 EXCAVATING

- A. Excavate trenches to the lines and grades as shown on the Plans. Remove water or materials that interfere with the work.
- B. Trench to the minimum width necessary for proper installation of pipe within sides as nearly vertical as possible. Uniformly grade the bottom to provide uniform bearing for the pipe.
- C. Where it becomes necessary to excavate beyond the limits of normal excavation lines in order to remove boulders or other interfering objects, backfill the voids remaining after removal of the objects as directed by the CQA Monitor.
- D. When the void is below the subgrade for the pipe bedding, use select backfill to fill in and compact the void.
- E. When the void is in the side of the trench or open cut, use select backfill to fill in and compact the void.
- F. Remove boulders and other interfering objects and backfill and compact voids left by such removals.
- G. Cut out soft areas of trench subgrade not capable of compaction in place. Backfill with engineered fill as indicated in these Technical Specifications and compact to density equal to or greater than requirements for subsequent backfill material.
- H. The trench bottom shall be compacted and firm, continuous, relatively smooth and free of rocks and/or unsuitable material prior to the installation of bedding for underground utilities.

3.03 SHORING, SHEETING, AND BRACING OF TRENCH

- A. Sheet and brace the trench when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, workers, and the public.

- B. The Contractor shall secure a trench permit from the California Division of Industrial Safety prior to the excavation of any trench over five feet in depth.
- C. Shoring and sheeting shall be removed as the backfill is completed in a manner that will not damage the pipe or permit voids in the backfill.
- D. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state, or local public agency having jurisdiction. The most stringent of these requirements shall apply.

3.04 BACKFILLING

- A. Backfill trenches to the lines and grades as shown on the Plans.
- B. Employ a placement method that does not disturb or damage utilities in trench.
- C. Bedding material shall be placed at trench bottom for HDPE and RCP pipes in one continuous layer not exceeding 6 inches compacted depth and compacted to 90 percent of maximum dry density as determined by ASTM D1557 at or above the optimum moisture content. The top of the first 6-inches of compacted bedding material shall be graded so that the pipe is placed to within 0.05 feet of the grade shown on the Plans for HDPE pipe and to within 0.01 feet for RCP. Bedding material will not be required for installing corrugated metal pipe.
- D. After placing the bedding material for HDPE and RCP pipes or native material for corrugated metal pipe, backfill shall be placed in 6-inch lifts around the sides and to the finished grades above the top of the pipe, tamped in place, and compacted to 90 percent of maximum dry density as determined by ASTM D1557 at or above the optimum moisture content.
- E. Maintain optimum moisture content of bedding material to attain required compaction density.
- F. Backfill with earthfill placed in lifts with a maximum uncompacted thickness of 8 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Backfill shall then be brought to a uniform moisture content, at 2 percent below to 3 percent above optimum moisture content, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557. Earthfill under pavement shall be compacted to 95 percent of the maximum dry density as determined by ASTM D1557 at 2 percent below to 3 percent above the optimum moisture content.
- G. Where tests by the CQA Monitor indicate that the moisture content or density of any lift, or portion thereof, of trench backfill fails to meet the specified requirement, the subject layer, or portion thereof, shall be re-worked, at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the in-place fill has been inspected and accepted by the Resident Engineer.
- H. Jetting of trenches shall not be permitted, unless allowed by the Resident Engineer.
- I. Controlled Density Fill (CDF) shall be discharged from the mixer by any reasonable means into the area to be filled and brought uniformly to the elevation as shown on the Plans. Trench sections to be filled with CDF shall be contained at either end by bulkheads or earth fill. CDF shall be protected from freezing for at least 72 hours after placement and may not be placed at temperatures less than 40°F.

3.05 BACKFILLING FOR ANCHOR TRENCH

- A. Begin anchor trench backfill only when geosynthetic installations has been completed in accordance with deployment and seaming criteria.
- B. Backfill trenches to the lines and grades as shown on the Plans.
- C. Process and place first loose lift thickness not exceeding 12 inches and compacted to 90 percent of maximum dry density as determined by ASTM D1557.
- D. Place remaining backfill in lifts with a maximum uncompacted thickness of 8 inches. Each layer shall be spread evenly and thoroughly mixed to obtain a near uniform condition in each layer. Backfill shall then be brought to a uniform moisture content within 3 percent of optimum, mixed as required to establish uniform moisture, and compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557.
- E. Do not damage geosynthetic installation.
- F. Where tests by the CQA Monitor indicate that the moisture content or density of any lift, or portion thereof, of trench backfill fails to meet the specified requirement, the subject layer, or portion thereof, shall be re-worked, at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the in-place fill has been inspected and accepted by the Resident Engineer.

3.06 FIELD QUALITY CONTROL

- A. Testing and observation of trenching and backfilling shall be conducted in accordance with the CQA Plan.
- B. Anchor Trench backfill shall be tested a minimum of every 250 linear feet of trench.
- C. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
- D. If field testing by the CQA Monitor indicates that the moisture content or density of any backfill material fails to meet the specified requirement, the subject material or portion thereof shall be re-worked at the Contractor's expense, until the required moisture and density have been attained. No additional backfill shall be placed until the backfill has been inspected and accepted by the Resident Engineer.
- E. Where work is interrupted by rain, operations subject to the moisture and density requirements shall not be resumed until observations and field tests by the CQA Monitor indicate that the moisture content and density of the in-place fill are within the limits specified. This requirement will not preclude the Contractor from diskings or aerating the subject materials to achieve acceptable conditions.
- F. Pipe embedment and backfill shall be tested a minimum of one (1) compaction test per 100 linear feet of trench.
- G. Anchor Trench backfill shall be tested at a minimum of one (1) compaction test per 250 linear feet of Anchor Trench per 6-inch lift.

END OF SECTION 02225

SECTION 02310 ROADS

PART 1 GENERAL

1.01 SUMMARY

- A. Roads for this Project include a Hot Mix Asphalt (HMA) Entrance Road, Operations Layer Soil cell access road and Aggregate Base access road. HMA shall follow the requirements of Section 39 of the Standard Specifications, as modified by the County. The Operation Layer Soil access road shall follow Specification 02500.
- B. The Contractor shall furnish all labor, tools, equipment, materials, and incidentals necessary for the construction of Aggregate Base Access Roads at the locations and to the dimensions shown on the Plans including of the following:
 - 1. Grading and subgrade preparation
 - 2. Earthfill
 - 3. Reinforcement geotextile (Paving Fabric)
 - 4. Aggregate base
- B. The Contractor shall construct 12" Aggregate Base Access Road as shown on the Plans. During construction of 12" Aggregate Base Access Road, the Contractor shall maintain uninterrupted public access to the landfill. The Contractor shall provide any necessary temporary traffic control during construction to protect the public and the new work. At the completion of 12" Aggregate Base Access Road construction, the Contractor may place County owned cones, barricades and barriers to direct public traffic onto the newly constructed access road and away from the construction area, if needed. The Contractor may request relief of maintenance of the newly constructed 12" Aggregate Base Access Road once it has been completed and accepted.

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM C 136 Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D 422 Standard Test method for Particle-Size Analysis of Soils.
- C. ASTM D 1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ [2,700 kN-m/m³])

1.04 QUALITY ASSURANCE VERIFICATION

- A. Testing and Observation
 - 1. Testing and observation of the access roads shall be conducted in accordance with the CQA Manual for this project.

2. The Contractor shall cooperate with the CQA Monitor during observation, testing, and collection of samples.
3. The CQA Monitor will perform testing or sample materials for road construction and send the samples to the Soils Testing Laboratory for all tests required in the sections of the Standard Specifications referenced in Part 2 of this Section, or in the Specifications for that material.
4. The CQA Monitor will continuously observe all construction operations to verify conformance with the material requirements of Part 2 of this Section and the execution requirements of Part 3 of this Section.
5. If any portion of the road construction is determined by the Resident Engineer to not meet the requirements of this Section, based on either testing or observations, the Contractor, at his expense, shall rework or remove and replace that portion to meet the requirements of this Section as directed by the Resident Engineer.

PART 2 PRODUCTS

2.01 EARTHFILL

- A. Any earthfill for road construction as shown on the Plans shall conform to the requirements of Section 02222 – Earthwork of these Technical Specifications.

2.02 AGGREGATE BASE

- A. The aggregate base for the road construction shall conform to the requirements of Section 02207 – Aggregate Materials of these Technical Specifications and Section 26 of the Standard Specifications.

2.03 REINFORCEMENT GEOTEXTILE

- A. The reinforcement geotextile for the Aggregate Base access road construction shall conform to the requirements of Section 02771 – Geotextile of these Technical Specifications.

2.04 HOT MIX ASPHALT

- A. The hot mix asphalt shall conform to Section 39 of the Standard Specifications, as modified by the County, and is a Special Provision to these specifications.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the access roads to the lines, grades, and dimensions shown on the Plans.

3.02 SUBGRADE

- A. The subgrade for Aggregate Base access roads shall be scarified a minimum of six (6) inches, uniformly moisture conditioned to between one (1) percentage point below and three (3) percentage points above the optimum moisture content and compacted to at least 95 percent of the maximum dry density as determined by ASTM D1557.

3.03 EARTHFILL

- A. Any earthfill for access road construction as shown on the Plans shall conform to the requirements of Section 02222 – Earthwork of these Technical Specifications.

3.04 AGGREGATE BASE

- A. Prior to aggregate base placement and compaction, reinforcement geotextile shall be placed on the road subgrade, as shown on the Plans, in accordance with the manufacturer's instructions and Section 02771 – Geotextile of these Technical Specifications.
- B. Trucks and other construction equipment shall not drive on reinforcement geotextile prior to covering with the full thickness of aggregate base.
- C. Trucks shall back-dump aggregate base onto the reinforcement geotextile, driving on previously dumped aggregate base to progress.
- D. Aggregate base shall be moisture conditioned within three (3) percentage points of optimum moisture content and compacted to a minimum of 95 percent of maximum dry density per ASTM D1557.
- E. Access roads shall be “proof rolled” in the presence of the Resident Engineer or their representative with a heavy wheel-load vehicle, such as a loaded water truck, to identify weak areas. Weak areas shall be reworked to the Engineer's satisfaction without additional compensation.

3.05 REINFORCEMENT GEOTEXTILE

- A. Prior to placing geotextile on the subgrade for access roads, the stability of the subgrade shall be checked in the presence of the CQA Officer by proof rolling with a roller or loaded water truck. Areas which are not suitable shall be allowed to air dry until stable or shall be over-excavated and backfilled with aggregate base, at the Contractor's expense.
- B. Reinforcement geotextile shall be installed over the access road subgrade and seamed as specified in Section 02771 – Geotextile of these Technical Specifications, as shown on the Plans, and in accordance with the manufacturer's instructions.
- C. Reinforcement geotextile shall be installed (unrolled) in the direction of traffic (longitudinally).
- D. Reinforcement geotextile panels shall be overlapped a minimum of two feet on sides and ends.
- E. Trucks and other construction equipment shall not drive on reinforcement geotextile prior to covering with the full thickness of aggregate base.

END OF SECTION 02310

SECTION 02444 FENCING

PART 1 GENERAL

1.01 SUMMARY

- A. The work encompassed by this Section shall consist of removing and replacement of barbed or barbless fencing located along the southern boundary of the Site and as shown on the Construction Drawings. Work shall consist of the following:
 - 1. Remove existing fence and post materials to allow for grading along the southern boundary.
 - 2. Smooth the ground surface at the fence location to blend into other work and remove sudden changes in grade. See Item 80-1.03 of the Standard Specifications.
 - 3. Install posts, wire, supports, braces, corners and other appurtenances for a 5-strand barbed wire fence.

PART 2 PRODUCTS AND CONSTRUCTION

2.01 BARBED WIRE

- A. Comply with Section 80 of the Standard Specifications.

2.02 STEEL POSTS

- A. Comply with Section 80 of the Standard Specifications.

2.03 OTHER

- A. Comply with Section 80 of the Standard Specifications.

END OF SECTION 02444

SECTION 02500 OPERATIONS LAYER

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall furnish all tools, materials, equipment, and incidentals as necessary to haul, place, and grade the material to install the Operations Layer and Operations Layer cell access road in the locations and to the dimensions shown on the Plans.

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.

PART 2 MATERIALS

2.01 SOURCE

- A. Onsite material meeting the requirements of this Section shall be used for the Operations Layer and the Operations Layer access road. The Contractor may need to segregate suitable onsite material for placement within one foot of the top of the liner system.

2.02 PROPERTIES

- A. Soil used for the Operations Layer and the Operations Layer access road shall be soil or soil/rock mixture that is free of organic matter, debris, and/or deleterious or other unsuitable materials.
- B. The material within six inches of the top of the liner system (lower six inches of the Operations Layer) shall not contain rock or clods over ½-inch in the greatest dimension. Rocks or clods exceeding 1/2 inches in greatest dimension shall be screened and/or removed by the Contractor.
- C. The Operations Layer and the Operations Layer access road material above the first six inches of the top of the liner system shall not contain rock or clods over 2 inches in greatest dimension. Rocks or clods exceeding 2 inches in greatest dimension shall be screened and/or removed by the Contractor.
- D. See Specification 02200 for additional information.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction, grading control, and other staking necessary to construct the Operations Layer and the Operations Layer access road to the lines, grades, and thickness shown on the Plans.
- B. Operations Layer fill materials, including the Operations Layer cell access road, shall be placed and compacted to the lines and grades shown on the Construction Drawings or as required by the Resident Engineer.
- C. Adjacent to slopes, maintain a distance of at least 3 feet between operating equipment and the exposed geosynthetic layer, unless modified by the Resident Engineer.
- D. If any portion of the materials placed as operations layer does not meet the specified requirements, the Contractor shall remove such material and replace it with materials meeting the Specifications at no additional cost to the County.
- E. The constructed Operations Layer shall be maintained to meet the requirements of this specification until final completion and acceptance of the work. This shall include all measures to prevent erosion. During seasonal or other extended shutdowns, all exposed surfaces shall be protected with special treatments as needed to protect the work.
- F. Contractor shall repair any geosynthetic materials damaged during fill placement at no cost to the County.

3.02 PLACEMENT

- A. Placement of Operations Layer shall not commence until authorization has been given after acceptance of the liner system installation.
- B. Operations Layer material shall be placed by spreading each full lift thickness in advance of a low ground pressure, wide-tracked bulldozer (Maximum size: Caterpillar D6 or equivalent); no vehicles or equipment shall drive directly on the liner system. No vehicles or equipment other than bulldozers used for spreading and track-walking and low ground pressure equipment shall drive directly on less than the full required thickness of the Operations Layer except with Engineer's approval. Conform to the requirements of Table 02200-3, in Technical Specification 02200, for placement lift thickness, moisture content, compaction and placement tolerance.
- C. No vehicles or equipment shall drive directly on any liner system component.
- D. The Contractor shall adjust the schedule for placement of Operations Layer on the base liner and LCRS area at the direction of the Engineer to ensure that the development of wrinkles and stress-bridging in the underlying geomembrane does not occur due to the heat of daylight hours. Night work may be required with floodlights.
- E. Place only in an uphill or cross-slope direction (not in a downhill direction) to prevent putting tension in the underlying geosynthetics.

- F. Place without damaging the underlying geosynthetics. No disking, ripping, or other mixing of the soil will be permitted on the geosynthetic materials. No vehicle shall drive directly on the liner system.
- G. Place in a manner that prevents the development of wrinkles in the underlying geosynthetics. Remove the wrinkles in a manner approved by the Engineer. If folding occurs, the Contractor shall repair at his expense.
- H. The constructed Operations Layer shall be maintained to meet the requirements of this specification until final completion and acceptance of the work. This shall include all measures to prevent erosion. During seasonal or other extended shutdowns, all exposed surfaces shall be protected and repaired as directed by the Resident Engineer.
- I. Contractor shall repair any geosynthetic materials damaged during fill placement at no cost to the County.

3.03 FIELD QUALITY CONTROL

- A. Field testing shall be in accordance with Specification 02200.
- B. Visual observation of the Operations Layer shall be conducted in accordance with the CQA Plan.
- C. If field inspection indicates that any area of the Operations Layer does not meet thickness requirements, the Contractor shall rework the material in those areas at his expense until the Operations Layer is in conformance with the requirements of this Part.

3.04 SURFACE GRADING

- A. When completed, the surface of the Operations Layer shall conform to the grades shown on the Plans and at no point on the completed grading plane shall the grade vary below the designated grades. The surface of the Operations Layer shall not be over the designated grades by more than 0.10 feet nor less than the required thickness at any location.

END OF SECTION 02500

SECTION 02510 LEACHATE COLLECTION AND REMOVAL SYSTEM (LCRS)

PART 1 GENERAL

1.01 SUMMARY

- A. The work encompassed by this Section shall consist of performing all operations and furnishing all labor, materials, tools, equipment and incidentals necessary for the construction and installation of the following:
 - 1. Place LCRS and Sump Gravel for the primary sump and trenches in accordance with the Plans and in compliance with Section 02207 of these Technical Specifications.
 - 2. Place 6" perforated HDPE Pipe in the LCRS trench, 6" Solid HDPE cleanout riser pipe, 18" perforated HDPE Pipe in LCRS sump, 18" Solid HDPE Riser Pipes, and riser concrete apron, cleanout riser concrete apron, pipe supports, and guard posts in accordance with the Plans and in compliance with Section 15200 and Section 03300 of these Technical Specifications.
 - 3. Geotextile Filter covering the LCRS Gravel in the LCRS sump and LCRS trench in accordance with the Plans and in compliance with Section 02771 of these Technical Specifications.
 - 4. See Section 02511 for information regarding Lysimeter construction.

PART 2 LCRS PRODUCTS

2.01 HDPE PIPE

- A. HDPE pipe shall meet the requirements Section 15200 of these Specifications.
- B. LCRS and Sump Gravel shall meet the requirements of Section 02207 of these Specifications.
- C. Geotextile Filter shall meet the requirements of Section 02771 of these Specifications.
- D. LCRS Geomembrane shall meet the requirements of Section 02772 of these Specifications.
- E. LCRS Geocomposite shall meet the requirements of Section 02773 of these Specifications.
- F. LCRS Geosynthetic Clay Liner (GCL) shall meet the requirements of Section 02774 of these Specifications.
- G. All Products used shall be clean and free from solvent or adhesive.

PART 3 EXECUTION

(Not Used)

END OF SECTION 02510

SECTION 02511 LYSIMETER

PART 1 GENERAL

1.01 SUMMARY

- A. The work encompassed by this Section shall consist of performing all operations and furnishing all labor, materials, tools, equipment and incidentals necessary for the construction and installation of the following:
 - 1. Lysimeter Gravel for the Lysimeter sump in accordance with the Plans and in compliance with Section 02207 of these Technical Specifications
 - 2. 18" Perforated HDPE Pipe in the lysimeter sumps, and 18" Solid HDPE Riser Pipe, pipe supports, and guard posts in accordance with the Plans and in compliance with Section 15200 of these Technical Specifications.
 - 3. Geotextile Filter covering the Lysimeter Sump Gravel in accordance with the Plans and in compliance with Section 02771 of these Technical Specifications.
 - 4. GCL, Geomembrane and geocomposite Lysimeter placement below the liner sumps in accordance with the Plans and in compliance with Sections 02774, 02772 and 02773 of these Technical Specifications.
 - 5. See Section 02510 for information regarding LCRS construction.

PART 2 PRODUCTS

2.01 HDPE PIPE

- A. HDPE pipe shall meet the requirements Section 15200 of these Specifications.
- B. Lysimeter Sump Gravel shall meet the requirements of Section 02207 of these Specifications.
- C. Geotextile Filter shall meet the requirements of Section 02771 of these Specifications.
- D. Lysimeter Geomembrane shall meet the requirements of Section 02772 of these Specifications.
- E. Lysimeter Geocomposite shall meet the requirements of Section 02773 of these Specifications.
- F. Lysimeter Geosynthetic Clay Liner (GCL) shall meet the requirements of Section 02774 of these Specifications.
- G. All Products used shall be clean and free from solvent or adhesive.

END OF SECTION 02511

SECTION 02589 ELECTRIC LEAK LOCATION SURVEYS

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements for performance of an electronically based liner leak survey for post-construction liner monitoring of the lysimeter and the upper (primary) 60-mil HDPE geomembrane layers.
- B. The successful performance of an electrically based liner leak survey requires the conductive media above and below the liner to be electrically isolated from each other except through the leaks being sought. It is also necessary to have a continuous electrically conducting pathway under the geomembrane from the leaks being sought to the point at which a current return electrode can be placed in the leaked liquid.
- C. This test is intended to identify potential construction-related defects in the pan lysimeter and lining system that may cause the lining system to leak. As a result, the Electric Leak Location Surveyor (ELLS) shall, at a minimum, identify defects equivalent to a hole with a diameter of 0.25 inches or larger, and in accord with ASTM D7007.

1.02 RELATED SECTIONS IN THE CONSTRUCTION DOCUMENTS

- A. Section 02200 – Site Earthwork: Subgrade Preparation Layer and Operations Soil Layer
- B. Section 02207 – Aggregate Materials
- C. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
- C. Section 02773 – Geocomposite
- D. Section 02774 – Geosynthetic Clay Liner (GCL)

1.03 REFERENCES

- A. ASTM D 6747 Standard Guide for Selection of Techniques for Electrical Detection of Potential Leak Paths in Geomembranes.
- B. ASTM D 7002 Standard Practice for Electrical Leak Location on Exposed Geomembranes Using the Water Puddle Method.
- C. ASTM D 7007 Standard Practices for Electrical Methods for Locating Leaks in Geomembranes Covered with Water or Earthen Materials.

1.04 QUALIFICATIONS

- A. The Leak Location Contractor responsible for performing the surveys shall have qualifications and experience in conducting the proposed survey method including having tested a minimum of 10,000,000 square feet of geomembrane liner within the previous three years. In addition, the leak location surveys must be supervised by a professional or technician with a minimum of three years and 1,000,000 square feet of liner testing experience using the proposed leak location survey methods. The leak location supervisor must be on-site full-time during the performance of the leak location survey. A qualified

Leak Location Contractor is Leak Location Services, Inc. of San Antonio, Texas, (210) 408-1241, or equivalent.

1.05 SUBMITTALS

- A. The ELLS retained by the Contractor shall submit the following items to the Resident Engineer for approval within 15 calendar days of the Notice to Proceed:
1. Qualifications: The proposed ELLS shall submit documentation on experience in performing large-scale leak location surveys for geomembranes covered with soil. The Leak Location Contractor shall have performed at least 8,000,000 square feet of surveys in the previous 3 years.
 2. Description of the proposed methodology for electrical leak location.
 3. Description of required site preparations.
 4. Duration of surveys.
 5. Description of the leak location testing plan that includes requirements for the Contractor to add and/or maintain moisture content in the site earthwork items in contact with the geosynthetic materials sufficient to enable performing the leak testing on the 60-mil HDPE geomembrane (lysimeter and sump), and a plan of the liner area showing where the 60-mil HDPE geomembrane must be left uncovered for leak location testing.
 6. Quality control and field calibration procedures.
 7. Sample of the final report to be issued by the ELLS following the completion of the survey.

1.06 CONSTRUCTION QUALITY ASSURANCE

- A. The geomembrane leak location surveys shall be observed by the CQA Officer.
- B. The Contractor shall be aware of the leak detection activities outlined herein for both the lysimeter and primary liner systems and shall account for these activities in the construction schedule.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

3.01 INFORMATION REQUIRED

- A. The Design Engineer shall provide the Leak Location Contractor with drawings showing:
1. All layers constituting the lysimeter and primary lining systems;
 2. Details of all liner penetrations;
 3. Peripheral details, including welds between the lysimeter and primary geomembrane liners, and welds to adjacent lining systems;

4. Structures and obstructions above the respective lining systems, as applicable; and
5. Electrical equipment above the primary geomembrane liner, as applicable.

3.02 DEMONSTRATION

- A. The preparation and operation of the liner leak location system and survey parameters shall be performed in accordance with ASTM D-7007 guidelines and verified by performing tests over two artificial leaks. An artificial leak is an electrical simulation of a leak, consisting of an area of metal the size of the desired leak connected to an insulated wire. The other end of the wire is connected to a ground electrode.

The test parameters and procedures for the demonstration shall include:

1. An artificial leak with a diameter of 0.64 cm (0.25-inch) shall be placed at ground surface and an artificial leak with a diameter of 1.27 cm (0.5-inch) shall be buried at a depth of 2 feet below ground surface.
2. A line of data shall be performed and recorded directly over the artificial leak for a distance of at least 20 feet in front and behind the artificial leak with the artificial leak disconnected to measure and quantify the background noise level (BN). The background noise level shall be defined as the difference between the maximum and minimum measured voltage with the artificial leak disconnected.
3. The artificial leak shall be connected, and leak location measurements shall be made and recorded along closely spaced parallel lines in the vicinity of the artificial leak. The lines shall be centered on the artificial leak and extend at least 20 feet in front and behind the artificial leak. This data is the leak signal plus noise signal (S+N).
4. The recorded leak location data shall be examined to determine the peak-to-peak leak signal plus noise signal to background noise ratio $R=(S+N)/BN$ for each of the recorded data lines. The measured leak signals must have characteristics of a leak. Wild data points that deviate from the theoretical leak signals shall not be used to determine R.
5. The two farthest lateral lines of data with an R value greater than 3.0 shall be noted. The average of the lateral distance from the leak for these two lines is defined to be the leak detection distance for the artificial leak.
6. If unfavorable site conditions prevent an R ratio of 3.0 from being obtained, the leak location equipment shall be demonstrated to be able to detect an artificial leak from a smaller distance no less than 1 foot to verify that the leak location equipment is operational.

- B. If required, an actual hole may be introduced into the primary lining system by the ELLS in order to calibrate the electrical survey. This hole shall be repaired and tested as required. The ELLS may only calibrate to an actual hole if equipment is on-site to immediately repair hole after calibration.

3.03 SITE PREPARATION

- A. The ELLS will identify actions required by Contractor to prepare the site for a survey, such as:
1. Plugging pipes with inflatable bungs
 2. Painting/covering metal and concrete

3. Moving/disconnecting electrical equipment
 4. Cleaning/preparing soil surfaces
 5. Gridding over the soil surface
 6. Providing electrode access to leak detection zone
 7. Removing/marking obstructions to the survey
- B. As outlined in the contract documents, the Contractor will provide an electrically conductive medium within the lysimeter and primary drainage materials by ensuring an adequate moisture content therein. If the natural moisture content in the lysimeter or primary drainage material does not provide for an adequate conductive medium, then the Contractor will add sufficient water as directed by the ELLS. The Contractor shall document the volume of any water introduced into the systems.
- C. As outlined in the contract documents, the Contractor will assist the ELLS with other preparations that may be necessary to meet the performance requirements of the leak location survey.

3.03 EXECUTION

- A. Survey site to ensure electrical conditions are appropriate for the leak survey.
- B. Disconnect electrical equipment within the lining system as required.
- C. Confirm or establish required grid markings for leak location data on operations layer soils. The leak location data shall be performed:
- With a uniform measurement density of greater than one measurement every 10 square feet; or
 - On survey lines spaced no further apart than twice the leak detection distance determined for the artificial leak as discussed in Part 3.02 of these specifications. The measurement electrode spacing shall be no less than that used for the performance demonstration. The spacing between measurements shall be no more than that used for the performance demonstration.
- D. Activate lining system with an injector electrode in the medium above the liner, and the current return electrode placed between the lysimeter and primary liners.
- E. The data shall be recorded, plotted, and analyzed for leak signals. The positions of these leak signals shall be located, and the leaks excavated. The leaks will be repaired by the Contractor in accordance with the specified requirements for HDPE geomembrane.
- F. Following repair(s), the leak location survey shall be repeated on the two closest survey lines for a distance extending 20 feet before and beyond the leak. If another leak signal is detected, the entire repair and resurvey process shall be repeated until no additional leaks are detected.
- G. The Leak Location Surveyor shall inform the Resident Engineer and mark the locations of all identified or indicated leaks with flags, or spray paint, and written coordinates.

3.04 REPORTING

- A. Provide daily results of the leak location survey to the Resident Engineer.
- B. Provide a written report within 7 calendar days of completion of survey documenting:

1. Methodology used
2. Site activities
3. Equipment calibration data
4. Map of surveyed liner areas and approximate location and size of leaks
5. Descriptions of leaks, repairs and re-testing
6. Photographs
7. Summary of field data per ASTM D 7007

END OF SECTION 02589

UNOFFICIAL

SECTION 02722 DRAINAGE AND EROSION CONTROL

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall install (including necessary excavations), and provide all materials for all ditches and transitions, Corrugated Metal Pipe (CMP) and Reinforced Concrete Pipe (RCP) (including anchorage, bedding, inlet and outlet, and all necessary fittings), concrete drainage inlets, and stormwater channel and inlet and outlet sections (including all fittings, backfill and slope erosion protection) required for drainage and erosion control in the locations and to the dimensions and grades shown on the Plans.

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.

1.03 SUBMITTALS

- A. At least two weeks prior to beginning any drainage or erosion control construction in accordance with the requirements of this Section, the Contractor shall provide to the Engineer, in triplicate, the name and location of material sources, laboratory test results and/or material data sheets conforming with relevant details shown on the Plans.
- B. The Contractor shall provide the name and location of source, laboratory test results, and product data sheets showing that the material meets or exceeds the product requirements.
- C. At least two weeks prior to delivery of materials to the site, the Contractor shall submit the following to the Engineer for Approval:
 - 1. Samples, manufacturer's product data sheets, and manufacture's installation guidelines for the following materials to verify that the materials meet or exceed the corresponding product requirements:
 - 2. CMP fittings and anchor assembly stakes and hardware.
 - 3. RCP, bedding and backfill materials.
 - 4. Aggregate and concrete for Slope Protection.
 - 5. Grated Inlet details.

1.04 QUALITY ASSURANCE VERIFICATION

- A. Testing and Observation
 - 1. The CQA Monitor will test or sample materials and send the samples to the Soils Testing Laboratory for all tests required in the sections of the Specifications referenced in Part 2 of this Section.
 - 2. The CQA Monitor will continuously observe all construction operations to verify conformance with Part 3 of this Section.

3. If any portion of the drainage and erosion control structures is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor shall, at his expense, rework or remove and replace that portion to meet the requirements of this Section as directed by the Engineer.

PART 2 MATERIALS

2.01 STORMWATER CHANNEL

- A. Earth fill for stormwater channel shall be onsite material that conforms with Section 02224. The Contractor may need to segregate suitable onsite material for use to construct the channel.

2.02 CORRUGATED METAL DRAINPIPE

- A. Corrugated metal pipe (CMP) shall be of 16-gauge continuous helical lock steel with smooth interior conforming the requirements of Section 66-4 of the Standard Specifications. All CMP pipe and standard assembly fittings required for complete assembly shall be galvanized and conform with the requirements of Section 66-3.02 of the Standard Specifications for zinc coated steel.
- B. CMP bedding material shall be native material and conform to Section 66-1.04 of the Standard Specifications.
- C. CMP backfill material shall consist of native material excavated from the drainpipe trench.
- D. CMP (including all couplings and fabricated fittings) and drainpipe bedding shall be supplied from the source approved by the Engineer based on the submittal requirements in Part 1.03A of this Section.

2.03 REINFORCED CONCRETE DRAINPIPE

- A. Reinforced Concrete Pipe (RCP) shall be of Class IV pipe with rubber gaskets. Another Class, no less than Class IV, may be used if shown to be able to withstand HL-93 loads with less than two feet of cover as shown on the Plans. The RCP must conform with the requirements of Section 65 of the Standard Specifications.
- B. RCP bedding material shall be sand to the pipe spring line and in accordance with Section 19-3.02F of the Standard Specifications.
- C. RCP backfill material shall consist of native material excavated from the drainpipe trench or from other on-site sources.
- D. RCP (including all gaskets and fabricated fittings) and drainpipe bedding shall be supplied from the source approved by the Engineer based on the submittal requirements in Part 1.03A of this Section.

2.04 CONCRETE DRAINAGE INLET STRUCTURE

- A. Cementitious material used in the concrete drainage structures shall conform to ASTM C 150, Type II Portland Cement and provide a minimum 28-day compressive strength of 2,500 psi when tested in accordance with ASTM C 143 and ASTM C39.

2.05 GROUTED ROCK RIPRAP

- A. Grouted riprap shall be used for Rock Slope Protection (RSP) as shown on the Plans. Rock shall be Class I and RSP fabric shall be Class 8 and comply with Section 72-3 of the Standard Specifications.
- B. Rock placement shall be by Method A and shall meet the requirements of Specification 02207
- C. Concrete and riprap for the grouted riprap shall be supplied from the source approved by the Engineer based on the submittal requirements in this Section.

2.06 GRATED INLET

- A. A concrete grated inlet shall have an opening of at least 24" by 24". The inlet and associated concrete box will connect to an 18-inch diameter RCP which is connected to Culvert 4 as shown on the Plans. The inlet shall be Oldcastle Precast GI22 or approved equal.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction, grading control, and other staking necessary to construct drainage and erosion control structures to the lines and grades shown on the Plans.

3.02 STOCKPILING

- A. The Contractor shall stockpile drainage and erosion control materials in areas designated by the Resident Engineer.

3.03 EXCAVATION

- A. Excavation for drainage and erosion control structures shall be in conformance with the requirements in Part 3.02 of Section 02225.

3.04 STORMWATER DRAINAGE CHANNEL

- A. Stormwater drainage channel shall be excavated to the lines and grades as shown on the Plans and in accordance with Section 02222 – Excavation of these Technical Specifications.
- B. Placement of earthfill shall be in conformance with the requirements for earthfill in Technical Specification Sections 02200 and 02225.

3.05 DRAINPIPE

- A. Drainpipe to be placed underground shall be placed in trenches and bedded in conformance with Section 66-1 and Section 65 of the Standard Specifications and these Technical Specifications.
- B. Trench sides and bottoms shall be relatively smooth, and free of rocks, loose soil, or refuse prior to bedding and drainpipe placement.
- C. Drainpipe backfill shall be placed in accordance with requirements for earth fill in Section 02222.
- D. Drainpipe to be placed above ground shall be placed in conformance with Section 66 of the Standard Specifications and these Technical Specifications.

3.06 GROUTED ROCK RIPRAP

- A. Rock riprap shall be placed to the average thickness shown on the Plans with a maximum thickness deviation of four inches at any location.
- B. Rock riprap shall not be placed by dumping.
- C. The Contractor shall move and place individual riprap stones as necessary to obtain a stable three-point bearing for each stone and a well-graded distribution along the entire length of ditch; the placed riprap shall be free of pockets of small stones or clusters of larger stones.
- D. Placement of concrete for the grouted rock riprap shall conform to Section 72-5.03 of the Standard Specifications.

END OF SECTION 02722

**SECTION 02725
EROSION CONTROL MATTING**

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall install (including necessary excavations) and provide all materials for erosion control matting in all locations with slopes greater than 10%, as shown on the Construction Drawings. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to install the erosion control matting (ECM).

1.02 REFERENCES

- A. Caltrans Standard Specifications. California Department of Transportation, 2018.
- B. Standard Plans. California Department of Transportation, 2018.
- C. Specification 02200 – Earthwork.
- D. Specification 02900 – Seeding and Fertilizing.
- E. American Society for Testing and Materials. Current Edition.

1.03 SUBMITTALS

- A. At least two weeks prior to beginning any drainage or erosion control construction in accordance with the requirements of this Section, the Contractor shall provide five (5) copies to the Resident Engineer of the name and location of material sources, laboratory test results and/or material data sheets with relevant details of the materials to be used including the ECM.
- B. At least two weeks prior to delivery of materials to the site, the Contractor shall submit the following to the Resident Engineer for Approval:
 - 1. Samples, manufacturer's product data sheets, and manufacturer's installation guidelines for the materials to verify that the materials meet or exceed the corresponding product requirements for straw, netting and anchorage staples.

1.04 QUALITY ASSURANCE VERIFICATION

- A. Testing and Observation
 - 1. Testing and observation of the drainage and erosion control components shall be conducted in accordance with the CQA Plan.
 - 2. The Contractor shall cooperate with the CQA Monitor during observations, testing, and collection of samples.
 - 3. If any portion of the erosion control matting is determined by the CQA Monitor to not meet the requirements of this Section, based on either testing or observations, the Contractor shall, at his expense, rework or remove and replace that portion to meet the requirements of this Section as directed by the Resident Engineer.
- B. Surveying
 - 1. The Contractor shall provide all construction staking, grading control, and other staking necessary to construct the drainage and erosion control components to the lines,

grades, and dimensions shown on the Plans. The Engineer will provide data on existing control points in the vicinity of the Work site for use by the Contractor's Land Surveyor or eligible Engineer

2. All lines, grades and dimensions of installed drainage and erosion control components may be verified by the Resident Engineer or CQA Monitor by field survey.
3. If it is demonstrated by the CQA Monitor through verification survey or observation that any portion(s) of the drainage or erosion control components does not meet the required lines, grades, dimensions or material quality shown on the Plans or described herein, the Contractor, at his expense, shall rework or replace that portion(s) to bring the deficient area(s) to grade or the proper dimension in accordance with all requirements of this Section. A deduction will be made from the Contractor's compensation (based on standard wage rates) to retest the materials and re-verify the grade or the proper dimensions by survey.

PART 2 MATERIALS

2.01 EROSION CONTROL MATTING

- A. Erosion control matting shall be lightweight and have an approximate 0.50-inch x 0.50-inch mesh.
- B. Erosion control matting shall biodegrade or photodegrade within two years of installation.
- C. U-staples to anchor the netting shall be 0.50-inch by 10-inch U-staples as recommended by the manufacturer or as approved by the Resident Engineer.

2.02 STRAW

- A. Straw for erosion control shall be certified weed free.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall provide all construction, grading control, and other staking necessary to construct drainage and erosion control components to the lines and grades shown on the Plans.

3.02 STOCKPILING

- A. The Contractor shall stockpile drainage and erosion control materials in areas approved by the Resident Engineer.

3.03 EARTHFILL

- A. Earthfill under the areas covered by erosion control matting shall be in conformance with the requirements in Section 02200 (Earthwork).

3.04 EROSION CONTROL – SLOPES

- A. Following the application of seed and fertilizer, straw shall be blown onto all surface slopes that are steeper than 10 percent. Blown straw shall be applied to achieve a minimum thickness of 1.5 inches in place.

- B. Following the application of the straw, cover the straw with a lightweight biodegradable or photodegradable matting having an approximate 0.50-inch x 0.50-inch mesh. Space matting anchors at a frequency on 1 foot on center along the edges, and one (1) every 35 square feet for interior areas. The matting shall be lapped one foot at the edges or as recommended by the manufacturer.

END OF SECTION 02725

UNOFFICIAL

SECTION 02751 STAINLESS STEEL (SS) WIRE ROPE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes supplying and installing polymeric-coated, 300 series, stainless steel wire rope as shown on the Construction Drawings, as specified herein, and as needed for complete installations.
- B. Related Sections:
 - 1. Section 15200 – HDPE Pipe
 - 2. Section 15480 – PVC Piping

1.02 SUBMITTALS

- A. The Contractor shall submit the following Manufacturer data to the Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Engineer's acceptance of applicable submittals before material shipment.
 - 1. Manufacturer's specifications for 300 series stainless steel wire rope and end fasteners.
 - 2. Manufacturer's certification that materials meet or exceed the specified requirements.
 - 3. Supply three (3) samples of the stainless-steel wire rope (with polymeric coating).
 - 4. Catalog "cuts" for the stainless-steel end fasteners.

1.03 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed to perform of the work of this Section.

PART 2 PRODUCTS

2.01 300 SERIES STAINLESS-STEEL WIRE ROPE

- A. Provide in the lengths indicated on the Construction Drawings.

- B. Provide in sufficient length to provide a single continuous length of stainless-steel wire rope with no splices or joints within each pipe as indicated on the Construction Drawings. Wire length shall be sufficient to allow for temperature expansion/contraction of LCRS piping and wire rope, without tension in the wire. Provide a minimum of 10-feet additional wire rope for each pipe installation.
- C. Provide 3/16-inch-diameter stainless steel wire rope with a minimum tensile strength of 1,000 pounds.
- D. Provide polymeric coating on all stainless-steel wire rope.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section shall be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 STAINLESS STEEL WIRE ROPE INSTALLATION

- A. Install within each pipe as indicated on the Construction Drawings.
- B. Install within each pipe during or after pipe installation, at Contractor's option.
- C. Method of installation shall be suitable to provide a continuous length of stainless-steel wire rope without splices or joints.
- D. Install the stainless-steel wire rope without damaging the HDPE LCRS pipe or other project components.
- E. Coil end of stainless-steel wire rope and attach approved end fasteners to prevent slippage into HDPE LCRS pipes.

END OF SECTION 02751

SECTION 02771 GEOTEXTILE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installing filter and reinforcement geotextile fabric in areas as shown on the Construction Drawings and described in this Section.
- B. The Contractor shall furnish, transport to the site, and install all geotextile for filter and reinforcement as shown on the Plans and specified herein.
- C. The Contractor shall furnish all labor, tools, supervision, transportation, sewing thread, and equipment necessary for the installation of all geotextiles, including that needed for testing and joining materials in field (sewing, heat bonding, etc.).
- D. Related Sections:
 - 1. Section 02200 – Site Earthwork
 - 2. Section 02207 – Aggregate Materials
 - 3. Section 02310 - Roads
 - 4. Section 15200 – High Density Polyethylene Pipe (HDPE) Pipe
 - 5. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
 - 6. Section 02773 – Geocomposite
 - 7. Section 02774 – Geosynthetic Clay Liner (GCL)

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *ASTM International*, latest version.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM D 4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
- B. ASTM D 4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity

- C. ASTM D 4533 Standard Test Method for Trapezoid Tearing Strength of Geotextiles
- D. ASTM D 4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- E. ASTM D 4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile
- F. ASTM D 4759 Standard Practice for Determining the Specification Conformance of Geosynthetics
- G. ASTM D 4833 Standard Test Method for Index Puncture Resistance of Geomembrane, and Related Products
- H. ASTM D 4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- I. ASTM D 5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- H. ASTM D 5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- I. ASTM D 6241 Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile Related Products Using 60-mm Probe

1.04 DEFINITIONS

- A. Refer to Section 01075 – Technical Specification Definitions

1.05 SUBMITTALS

- A. The Contractor shall submit samples, Manufacturer's specifications and a complete description of geotextile fabric and thread proposed for use to the Resident Engineer for review in accordance with Section 01300 – Submittals, a maximum or within fifteen (15) calendar days after County's Notice to Proceed. The geotextile fabric and thread shall meet or exceed requirements of this Section.
- B. The Contractor shall submit the Manufacturer's specifications and quality control certificates to the Resident Engineer for services in accordance with Section 01300 – Submittals. The submittal shall include a certification that geotextile fabric and thread materials meet or exceed parameters provided in this Section and as shown on the Construction Drawings. The contractor shall obtain the Resident Engineer's acceptance of applicable submittals before geotextile shipment.
- C. A certification from the GCL manufacturer that the manufacturing process used to produce the GCL includes 100% needle detection of all manufactured products, a mechanism for removal of needles and method for verification that needles have been removed. The certification should include a statement attesting that the needle detection and removal process has been applied to all GCL supplied to this project and that the material supplied be "needle free."

- D. A copy of the current calibration certification document for the needle detection and magnetic system for the manufacturing line(s) from which the material to be supplied was manufactured.
- C. The Contractor shall furnish written instructions from the manufacturer for storage and handling of the geotextile a minimum of seven (7) working days prior to geotextile shipment.
- D. The Contractor shall submit Manufacturer and Installer's warranties to the County within fifteen (15) calendar days following installation completion.

1.06 TRANSPORT AND STORAGE

- A. The geotextile shall be labeled, delivered, and stored in accordance with ASTM D 4873 unless otherwise agreed upon by the Resident Engineer. The protective wrapping shall be maintained during periods of shipment and storage.
- B. The geotextile rolls shall be transported to the Work site by the Contractor with opaque protective coverings in an enclosed or covered trailer.
- C. At least seven days prior to any site delivery, the Contractor shall notify the Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot number and roll dimensions for each shipment shall also be provided to the Resident Engineer prior to site delivery.
- D. Unloading and storage (stacking) of the geotextile rolls at the site is the responsibility of the Contractor; who shall observe and certify, in writing, that the unloading and storage of geotextile rolls was performed in accordance with the submitted Manufacturer's recommended procedures.
- E. The Contractor shall transport geotextile rolls from the storage area in a manner that does not damage the geotextiles, and in accordance with the Manufacturer's recommended procedures.
- F. Document geotextile that was damaged during the transportation, loading, unloading, delivery, and provide the documentation to the Resident Engineer and the CQA Monitor. Any rejected rolls shall be replaced at the Contractor's expense.
- G. Manufacturer shall provide unloading straps with rolls delivered to the site.
- H. If the CQA Monitor determines material is damaged or has excessive sunlight (UV) exposure, the Contractor shall immediately replace the geotextile at no additional cost to the County.

PART 2 PRODUCTS

2.01 GEOTEXTILE

- A. The geotextile shall be nonwoven, continuous-filament needle-punched polypropylene or polyester, or staple-filament needle-punched polyester; yarn oriented into a stable network that maintains its structure during handling, placement, and long-term service.

- B. The geotextile shall be manufactured in North America, unless otherwise approved in writing by the Resident Engineer.
- C. Geotextile supplied for this project shall be new material specifically manufactured for this project. Off-the-shelf material is not acceptable.
- D. The geotextile shall be chemical resistant and cannot be heat burnished or contain recycled materials.

2.02 MANUFACTURER SOURCE QUALITY CONTROL

- A. The Manufacturer shall certify that quality control tests have been performed on the geotextile, at the minimum frequencies shown in Tables 02771-1 and 02771-2, and that the specified minimum average roll value (MARV) requirements were achieved.

Table 02771-1
Filter Geotextile – LCRS and SUMP
Minimum Average Roll Value (MARV) Property Values

Property	Test Designation	Test Requirement	Frequency
Mass per Unit Area	ASTM D5261	>8.0 oz/yd ²	1 per 100,000 sf
Grab Tensile Strength ¹	ASTM D4632	>205 lbs	1 per 100,000 sf
Grab Tensile Elongation ²	ASTM D4632	>50%	1 per 100,000 sf
Trapezoid Tear ¹	ASTM D4533	>85 lbs	1 per 100,000 sf
Puncture Resistance	ASTM D6241	>525 lbs	1 per 100,000 sf
Punch Elongation	ASTM D6241	1.5 in	1 per 100,000 sf
Apparent Opening Size (AOS)	ASTM D4751	≤0.21 mm	1 per 540,000 sf
Water Flow Rate ³	ASTM D4491	>100 gal/min/ft ²	Note 4

¹ Measured in weakest direction.

² Measured in direction of lower elongation.

³ Measured under 500 psi normal load.

⁴ Provide certification and test results. Test results may be for geotextile type, in lieu of actual product shipped.

Table 02771-2
Reinforcement Geotextile – Paving Fabric under Aggregate Base
Minimum Average Roll Value (MARV) Property Values

Property	Test Designation	Test Requirement	Frequency
Mass per unit Area	ASTM D5261	>4.1 oz/yd ²	1 per 100,000 sf
Grab Tensile Strength --- Machine Direction --- Cross Direction	ASTM D4632	>100 lbs >100 lbs	1 per 100,000 sf
Apparent Elongation --- Machine Direction --- Cross Direction	ASTM D4632	>50% >50%	1 per 100,000 sf
Trapezoid Tear --- Machine Direction --- Cross Direction	ASTM D4533	120 lbs 120 lbs	1 per 100,000 sf
Hydraulic Bursting Strength (minimum)	ASTM D3786	>200 psi	1 per 100,000 sf

2.03 SEWING EQUIPMENT

- A. The thread used for sewing of geotextiles shall be polymeric and have strength properties equal to or greater than the geotextile.
- B. The thread used for sewing of geotextiles shall be chemical resistant.
- C. The thread used for sewing the geotextiles shall be equivalent to that recommended by the geotextile Manufacturer submitted in accordance with Part 1.05A of this Section.

PART 3 EXECUTION

3.01 PREPARATION AND EXAMINATION

- A. The Contractor shall verify that the material and surface upon which the geotextile is to be placed is complete and in accordance with the Specifications for that material or surface prior to geotextile installation. The Contractor shall correct conditions detrimental to timely and proper completion of the work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 Approval to Install

- A. Prior to installation of geotextile, approval from the CQA Officer shall be obtained. If required, deficiencies in the underlying materials shall be corrected as applicable.

3.03 INSTALLATION

- A. Geotextile shall be installed in accordance with Manufacturer's instructions.
- B. Geotextile shall be installed with sufficient tension to prevent excessive overlapping,

insufficient overlapping, wrinkles, and folds.

- C. Geotextile shall not be dragged across rough or textured surfaces to avoid damage on the geotextile.
- D. When installed over geosynthetics, the underlying surface shall be free of foreign objects, entrapped excessive dust, stones, or moisture that could damage or clog drains or filters or hamper subsequent seaming.
- E. Geotextile panels shall be overlapped with sufficient material to create a prayer fold for sewing operations.
- F. Geotextile shall be ballasted during installation and until the geotextile is covered with the overlying material. The Installer shall be responsible for the geotextile until the geotextile is covered. Material used to fill sandbags shall be the same as the material to be placed over the geotextile.
- G. Unless ultraviolet light stabilized, geotextiles shall be covered within a time frame acceptable to the Manufacturer or within 48 hours.
- H. Temporary anchorage for the geotextile during placement is the responsibility of the Contractor.
- I. Geotextile shall be anchored as shown on the Plans when installation is complete.
- J. Geotextile damaged during installation shall be removed and/or repaired with a sewn patch. Holes or tears in geotextiles shall be repaired as follows:
 - 1. On 10% or steeper slopes: patch from the same geotextile material and continuously sew or heat bond in place with a minimum overlap of 24 inches in all directions.
 - 2. Remove all sheets with tears exceeding 20 percent of the roll width and replace with new materials.
 - 3. On slopes flatter than 10:1, patch from the same geotextile material and continuously sew in place with a minimum overlap of 24 inches in all directions.
 - 4. Remove soil and other material which may have penetrated through the torn geotextile before repairing.
- K. Care shall be taken to protect other in-place geosynthetic materials when cutting geotextile. Installer shall repair, or replace, at the Resident Engineer's discretion, underlying geosynthetic components damaged during geotextile installation at no cost to the County.
- L. Terminal ends of geotextile, where the type and purpose of the geotextile changes as shown on the Plans, shall be overlapped a minimum of four feet.
- M. Portions of the geotextile wasted by the Installer, and rendered unusable, as determined by the CQA Monitor, shall be disposed of by the Contractor under the direction of the Resident Engineer.

3.04 SEAMING AND OVERLAPS

- A. All seams for geotextile filter shall be made by sewing; alternate seaming methods may be allowed if it is demonstrated by the Contractor that the method will create a seam that is acceptable for the intended purpose and will not reduce the properties of the geotextile below those specified in Part 2 of this Section or cause damage to any underlying geosynthetic materials.
- B. Geotextile shall be overlapped 6 inches prior to seaming. The Installer shall not seam horizontally on slopes greater than 10% (i.e., seam up and down, not across slopes).
- C. Soil materials which could adversely affect sewing operations shall be cleaned from geotextile prior to sewing.
- D. A prayer fold shall be created within the overlap prior to sewing.
- E. The prayer fold shall be sewn with a 401 two-thread chain stitch.

3.05 FIELD QUALITY ASSURANCE

- A. The Manufacturer and Installer shall participate in and conform with all terms and requirements of the County's Quality Assurance Plan. The Contractor shall be responsible for assuring this participation. Quality assurance requirements are as specified in this Section and the Quality Assurance Plan. Product conformance sampling and testing by the Third-Party Laboratory and written acceptance of the product by the CQA Officer must be obtained prior to product shipment by the Manufacturer.
- B. Conformance Testing (Performed by the CQA staff or a representative of the Third-Party Laboratory):
 - 1. Conformance samples shall be obtained at the Manufacturer's plant at the frequency shown in Table 02771-1 and Tables 02771-2. A representative of the Third-Party Laboratory shall obtain samples and forward the samples to the laboratory for testing. Samples shall be obtained across the entire roll width, excluding the first 2 feet of the roll. Sample size shall be 3-feet long by the roll width. The machine direction shall be marked on the samples (and each piece if cut into smaller segments).
 - 2. The following tests shall be performed on the conformance samples to determine geotextile characteristics and results shall be evaluated according to ASTM D4759 per Table 02771-1.
 - a. Mass per unit area (ASTM D 5261)
 - b. Grab tensile strength (ASTM D 4632)
 - c. Grab elongation (ASTM D 4632)
 - d. Trapezoid tear (ASTM D 4533)
 - e. Puncture resistance (ASTM D 6241)

- f. Punch elongation (ASTM D 6241)
- g. Apparent opening size (ASTM D 4751)
- h. Water flow rate (ASTM D 4491)

3.06 PROVISIONS OF EXTRA MATERIAL

- A. Upon completion of geotextile installation, leave extra material with the County, at a location specified by the Resident Engineer, as follows:
 - 1. Quantity: 1,000 square feet.
 - 2. Same material specified for this Project
 - 3. New, unused material, on roll; not scrap material
 - 4. Material shall be free of cuts, defects, soils, and contamination

END OF SECTION 02771

SECTION 02772 HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installing double-side-textured high-density polyethylene (HDPE) geomembrane for the lysimeter, and liner as shown on the Construction Drawings and described in this Section.
- B. The Contractor shall furnish and transport to the Work site all geomembrane as shown on the Plans and a sufficient amount of extrudate rod to complete the extrusion welding necessary for testing and repairing the geomembrane.
- C. The Contractor shall furnish all labor, tools, supervision, transportation, and equipment necessary for the installation of the geomembrane, including that needed for testing and welding materials in the field.
- D. Related Sections:
 - 1. Section 02200 – Site Earthwork
 - 2. Section 02589 – Geoelectric Liner Leak Location Survey
 - 3. Section 15200 – High Density Polyethylene (HDPE) Pipe
 - 4. Section 02771 – Geotextile
 - 5. Section 02773 – Geocomposite
 - 6. Section 02774 – Geosynthetic Clay Liner (GCL)
 - 7. Construction Quality Assurance (CQA) Manual

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.
- D. *GRI Specifications, Guides and Practice*. Geosynthetic Institute, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM D 638 Standard Test Method for Tensile Properties of Plastics
- B. ASTM D 792 Standard Test Method for Specific Gravity and Density of Plastics by Displacement
- C. ASTM D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting

- D. ASTM D 1204 Standard Test Method for Linear Dimensional Changes to Nonrigid Thermoplastic Sheeting or Film at Elevated Temperatures
- E. ASTM D1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer
- F. ASTM D 1505 Test Method for Density of Plastics by the Density-Gradient Technique
- G. ASTM D 1603 Test Method for Carbon Black in Olefin Plastics
- H. ASTM D 3895 Standard Test Method for Copper Induced Oxidative Induction Time of Polyolefins by Thermal Analysis
- I. ASTM D 4218 Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- J. ASTM D 4437 Standard Practice for Non-destructive Testing (NDT) for Determining the Integrity of Seams Used in Joining Flexible Polymeric Sheet Geomembranes
- K. ASTM D 4759 Standard Practice for Determining the Specification Conformance of Geosynthetics
- L. ASTM D 4833 Standard Test Method for Index Puncture Resistance of Geomembranes and Related Products
- M. ASTM D 5199 Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes
- N. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method
- O. ASTM D 5397 Standard Test Method for Notched Constant Tensile Load Test of Geomembrane
- P. ASTM D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- Q. ASTM D 5617 Standard Test Method for Multi-Axial Tension Test for Geosynthetics
- R. ASTM D 5641 Standard Practice for Geomembrane Seam Evaluation by Vacuum Chamber
- S. ASTM D 5721 Standard Practice for Air-Oven Aging of Polyolefin Geomembranes
- T. ASTM D 5885 Standard Test Method of Oxidation Induction Time of Polyolefin Geosynthetics by High-Pressure Differential Scanning Calorimetry
- U. ASTM D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembrane
- V. ASTM D 6243 Standard Test Method for Determining the Internal Interface Shear

APTIM.

Resistance of Geosynthetic Clay Liner by the Direct Shear Method

- W. ASTM D 6365 Standard Practice for the Nondestructive Testing of Geomembrane Seams Using the Spark Test
- X. ASTM D 6392 Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes
- Y. ASTM D 6693 Standard Test Method for Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes
- Z. ASTM D 7238 Standard Test Method for Effect of Exposure of Unreinforced Polyolefin Geomembrane Using Fluorescent UV Condensation Apparatus
- AA. ASTM D 7466 Standard Test Methods for Measuring the Asperity Height of Textured Geomembrane
- AB. FTMS 101C Puncture Resistance
- AC. GRI-GM 6 Pressurized Air Channel Test for Dual Seamed Geomembranes
- AD. GRI-GM 13 Test Methods, Test Properties and Testing Frequency for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes
- AE. GRI-GM 14 Selecting Variable Intervals for Taking Geomembrane Destructive Seam Samples Using the Methods of Attributes
- AF. GRI-GM 19 Seam Strength and Related Properties of Thermally Bonded Homogeneous Polyolefin Geomembrane/Barriers

1.04 SUBMITTALS

- A. The Contractor shall identify the Geomembrane Manufacturer, and shall furnish the following Installer qualifications with the bid form in accordance with Article 1.05 of this Section:
 - 1. Installer approval by Manufacturer
 - 2. Installer qualifications
 - 3. Personnel qualifications
- B. The Contractor shall submit the following Quality Control Documents and warranty information to the Resident Engineer at the times indicated below:
 - 1. Manufacturer's Quality Control Manual within fifteen (15) calendar days after County's Notice to Proceed.
 - 2. The Contractor shall submit samples, Manufacturer's specifications and a complete description of the Geomembrane prepared for use to the Resident Engineer for review in accordance with Section 01300 – Submittals, a maximum or within fifteen

- (15) calendar days after County's Notice to Proceed. The Geomembrane shall meet or exceed requirements of this section.
3. Samples of Manufacturer's material warranty and Installer's installation warranty fifteen (15) calendar days after the County's Notice to Proceed.
 4. Certificate of Acceptance of Geomembrane Subsurface by Installer for each area to be covered by the geomembrane, signed by the installation supervisor and the CQA Officer, prior to the start of installation (beginning installation shall mean acceptance and approval of existing subsurface condition).
 5. Quality control documentation prepared during installation, within fifteen (15) calendar days following partial completions during on-going construction.
- C. The Contractor shall submit the following Manufacturer data to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before material shipment.
1. Resin Data:
 - a. Statement of production date or dates.
 - b. Certification stating that resin meets Specification requirements.
 - c. Certification stating all resin is from the same resin supplier.
 - d. Copy of quality control certificates issued by the resin supplier.
 - e. Test reports from resin supplier.
 2. Geomembrane:
 - a. Statement of production date or dates.
 - b. Laboratory test results and certification stating geomembrane meets the Specification requirements presented in Tables 02772-1 and 02772-2.
 - c. Certification stating all geomembrane is furnished by one manufacturer, and all geomembrane is manufactured from one resin type obtained from one resin supplier.
 - d. Statement certifying that no reclaimed polymer is added to resin (other than up to 10 percent reworked geomembrane material).
 - e. Geomembrane delivery, storage, handling, and installation instructions.
 - f. Representative samples of the geomembrane used for interface strength testing presented in Tables 02772-3 and 02772-4. Submitted geomembrane samples shall be a minimum of one-foot by one-foot square and come from the same roll as the actual geomembrane samples used in the interface strength tests.
 - g. Test results and certification stating interface shear strength properties meet the specification requirements presented in Tables 02772-3 and 02772-4.
 3. Welding Extrudate:
 - a. Production date or dates.
 - b. Manufacturer's certification stating that the welding extrudate is of the same resin type and formulation as the geomembrane.

- c. Manufacturer's quality control test results for the welding extrudate supplied and used for this project.
- D. The Contractor shall submit the following plan, schedule and drawings to the Resident Engineer for review in accordance with Section 01300 – Submittal. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before geomembrane shipment.
 - 1. A Geomembrane Installation Plan approved by the Manufacturer.
 - 2. An installation schedule that shall include workdays, hours to be worked per day, week and per shift. Indicate any weather delay built into schedule.
 - 3. Panel Layout Drawings that, once approved, shall be the basis for installing the geomembrane.
- E. Submit the following equipment and personnel information seven (7) calendar days prior to installation:
 - 1. Equipment list stating quantity and types to be used and record of appropriate calibration(s).
 - 2. List of personnel assigned to perform the seaming operations along with the necessary qualifications listed below.
- F. Submit to the Resident Engineer within fifteen (15) calendar days following installation completion:
 - 1. Certificate stating the geomembrane has been installed in accordance with the Contract Documents.
 - 2. Manufacturer's material warranty and the Installer's installation warranty.
 - 3. Record Drawings showing measured locations of panels, seams, repairs, patches, and destructive samples. Record Drawings shall be prepared in accordance with Section 01720 and provided for Resident Engineer approval.
 - 4. Copies of test results conducted by Installer.

1.05 QUALITY CONTROL

- A. The number of resin lots utilized in the production of the geomembrane must be minimized (i.e. resin lot associated with the geomembrane contains a minimum of 40 rolls of finished product).
- B. Use adequate numbers of skilled workman who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.
- C. All workers that will be performing welding operations (fusion or extrusion welds) must have sufficient training in that activity. A Master Welder must be on-site during all welding operations. A Master Welder must have a minimum of 5,000,000 square feet of demonstrated experience in the type of welding to be performed AND be certified by the International Association of Geosynthetic Installers as a Certified Welding Technician (CWT). All other personnel performing welding operations must have a minimum of

1,000,000 square feet of demonstrated experience in the type of welding to be performed and work under the direction of the Master Welder.

- D. The manufacturer will not charge any time or material expenses to the County, related to a plant visit by the Resident Engineer, the CQA staff or designated representative to visit the plant during manufacturing.
- E. Render assistance as necessary for CQA Monitor to collect product samples.

1.06 DELIVERY, STORY, AND HANDLING

- A. Conform to the manufacturer's requirements to prevent damage to the geomembrane.
- B. Delivery:
 - 1. At least seven days prior to any site delivery, the Contractor shall notify the Resident Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Resident Engineer prior to site delivery.
 - 2. Materials shall be delivered to the site only after the Resident Engineer accepts required submittals. Deliveries made without required submittals will not be allowed to unload until approval is received.
 - 3. The Geomembrane Received Log shall be completed by the CQA staff during geomembrane delivery.
 - 4. Manufacturer shall provide unloading straps with the rolls delivered to the site.
 - 5. Deliver in rolls, do not fold.
- C. On-Site Storage:
 - 1. Unloading and storage (stacking) of the geomembrane rolls at the site is the responsibility of the Contractor; however, unloading and storage of geomembrane rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures.
 - 2. The Contractor shall transport geomembrane rolls from the storage area in a manner that does not damage the geomembrane, and in accordance with the Manufacturer's recommended procedures. Do not drag panels or rolls on ground surface.
 - 3. The storage area for the geomembrane rolls will be located by the Contractor and must be approved by the Resident Engineer, in accordance with the manufacturer's recommendations.
 - 4. The Contractor shall store geomembrane rolls to protect them from puncture, dirt, grease, water, moisture, mud, mechanical abrasions, excessive heat or other damage.
 - 5. The geomembrane shall be stored on a prepared level surface, but not on wooden pallets.
 - 6. Any damaged geomembrane rolls shall be stored separately at the locations designated by the Resident Engineer or the CQA Monitor. The Resident Engineer will be the final authority regarding damage.

7. Geomembrane rolls shall not be stacked more than three rolls in height.

D. On-Site Handling

1. Use appropriate handling equipment to load, move, or deploy geomembrane from rolls. Appropriate handling equipment includes cloth chokers and spreader bar for loading, and spreader and roll bars for deployment. The geomembrane shall not be dragged over underlying GCL. A plastic slip sheet or other means shall be used to position the geomembrane without dragging it over the GCL.
2. Do not fold geomembrane; folded geomembrane shall be rejected.
3. Contractor shall be responsible for pick-up and transportation of material from storage area to work area.

E. Damaged Geomembrane

1. Geomembrane damage shall be documented by the CQA staff and Installer.
2. Damaged geomembrane shall be replaced at no cost to the County.

1.07 WEATHER CONDITIONS

A. Geomembrane shall not be deployed when:

1. The ambient air temperature is above 104 degrees Fahrenheit (°F) or below 32°F, measured 6 inches above the geomembrane surface. Deployment may be acceptable during prevailing warmer or colder weather conditions if the provisions for seaming, sampling, and testing per Articles 3.03 through 3.06 can be satisfied, and approval is received from the Resident Engineer.
2. During precipitation.
3. In the presence of excessive moisture (fog, dew, mist, etc.).
4. In areas of ponded water.
5. In the presence of excessive winds (sufficient to lift panels and prohibit efficient placement of the panels).
6. When the subsurface moisture content or density does not meet the specified values; unless Resident Engineer approval is obtained.

1.08 WARRANTIES

- A. The Contractor shall provide a five-year pro rata warranty for the geomembrane against deterioration due to exposure to the elements, either exposed or buried.
- B. The Contractor shall provide a two-year non-pro rata warranty for the geomembrane against installation defects.
- C. The Contractor's warranty shall cover the full material replacement and installation costs against installation defects.

PART 2 PRODUCTS

2.01 GENERAL

- A. The resin used in the production of the geomembrane material shall be HDPE, new, first quality, compounded and manufactured specifically for producing HDPE geomembrane. Resin types shall not be intermixed. Reclaimed polymer shall not be added to the geomembrane resin. The manufacturer may recycle edge trim from the roll being produced. Edge trim shall be returned immediately to the process but shall not exceed two percent of the total required. Edge trim that has been stored and edge trim from other manufacturing lines shall not be recycled.
- B. The geomembrane shall be nominal 60-mil-thick double-side-textured HDPE as shown on the Construction Drawings and shall meet the latest requirements GRI GM13 except where modified by this specification. In addition, the manufacturer's Quality Assurance Laboratory must be GAI-LAP Accredited.
- C. Geomembrane supplied for this project shall be new material specifically manufactured for this project. Off-the-shelf material is not acceptable. Materials not specifically approved for the project will not be allowed on-site.
- D. Geomembrane shall be supplied in rolls, free of holes, pinholes, bubbles, blisters, excessive gels, undispersed resins, contamination by foreign matter, and nicks and cuts on roll edges. Each roll shall be identified with labels indicating at minimum identification number, nominal thickness, length, width, manufacturer, lot & roll number, and plant location.
- E. All additives for UV protection, thermal stability, color, texturing, or processing agents must not "bloom" to the surface over time or inhibit welding.
- F. For each separately run lot of HDPE Geomembrane manufactured for this project (a lot is a group of consecutively numbered rolls from the same manufacturing line), the Contractor shall provide for direct shear testing for interface strength in accordance with ASTM Standard D5321 "Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method" and in the case of GCL, conduct interface direct shear testing in accordance with ASTM D6243 "Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by Direct Shear Method." Issues and procedures related to soil preparation shall be governed by ASTM D3080 "Standard Method for Direct Shear Test of Soils Under Consolidated Drained Conditions." Geosynthetic materials shall be oriented and sheared in the machine direction.

The laboratory testing equipment shall be capable of providing:

- Total strain of at least 3 inches
- Constant rate of strain
- Minimum test sample size of 12-inches by 12-inches
- Means of producing and maintaining "saturated" conditions

The Contractor shall arrange for the sampling and documentation of samples of geosynthetic materials approved for the project, arrange for appropriate soil samples (subgrade

preparation layer and operations layer in the presence of the Resident Engineer), and shall arrange for shipment of the samples to an independent GRI-approved testing laboratory for direct shear testing. Procedures presented in Section 7.5.2 of ASTM D3080 shall be used to prepare soil test specimens at ninety (90) percent of the maximum dry density as established by ASTM D1557 or as specified to be installed. The samples shall be maintained at a moisture content of 2 to 4 percent above optimum content (ASTM D1557) for direct placement in the shear box. Shearing shall take place once the sample is fully consolidated.

The geomembrane shall meet the interface shear strength requirements of Table 02772-1 and be tested at a frequency of three tests per test configuration (four samples under different normal stress increments as specified). Testing at each of the normal stresses shall be undertaken on individual samples, i.e. multi-stage testing of the sample will not be allowed.

A detailed laboratory test report consistent with ASTM D6243 procedures shall be submitted and, at a minimum, shall include:

- Initial and final moisture content and density
- Any deviations or peculiarities in test
- Vertical displacement (i.e. displacement in the plane perpendicular to the shear direction) vs. time during submergence, compression/consolidation and shearing
- Shear stress versus shear strain
- Interpreted strength values

The laboratory test report shall also describe the observed condition of the geomembrane specimens after testing. This shall include:

- Clamping method and any deformation that occurred during testing
- Abrasion of geomembrane
- Elongation of geomembrane
- Other physical changes in material such as wrinkling
- Differential movement between specimen and contact surfaces
- Tilting

All geomembrane and geotextile samples are to be returned to the Resident Engineer at the completion of the testing program. These samples, along with the laboratory test report, shall constitute a submittal that must demonstrate the minimum interface friction strength of the composite section. This adequacy shall be determined during a review completed by the Resident Engineer.

All costs associated with direct shear interface testing shall be borne by the Contractor/manufacturer.

Table 02772-1
Minimum Acceptable Large Displacement Interface Shear Strength Values

Test Configuration	ASTM	Test Condition	Hydration Time Required Prior to Shearing ^{1, 4}	Strain Rate	Min. Shear Displmnt.	Min. Adhesion ²	Minimum Friction Angle ^{1, 5, 6}
				(inch/minute)	(inches)	(psf)	(deg)
Upper Surface of GCL/Textured Lower Surface of HDPE Geomembrane ²	D6243	Submerged	24 hours under corresponding normal load ⁵	0.01	3.0	N/A	12
Textured Upper Surface of HDPE Geomembrane/ Lower Surface of Geocomposite ³	D5321	Submerged	24 hours under corresponding normal load ⁵	0.01	3.0	N/A	12
Upper Surface of Geocomposite/ Operations Soil Layer ³	D5321	Submerged	24 hours under corresponding normal load ⁵	0.01	3.0	N/A	12
Lower Surface of GCL/Prepared Subgrade Layer Soils ²	D6243	Submerged	24 hours under corresponding normal load ⁵	0.01	3.0	N/A	12
Subgrade Layer Soils/ Lower surface of GCL/ textured HDPE/ geocomposite/ Operations Soil layer ⁷	D5321	Submerged	24 hours under corresponding normal load ⁵	0.01	3.0	N/A	12

¹ The normal stress shall be applied in a single increment.

² The internal shear strength of the GCL should be tested simultaneously by placing in a floating configuration.

³ The internal shear strength of the geocomposite should be tested simultaneously by placing in a floating configuration.

⁴ Vertical displacements shall be monitored. Hydration is complete when the specimen reaches equilibrium.

⁵ Normal stresses shall be a minimum of 2,500, 6,000 and 12,000 psf for each test configuration.

⁶ Friction angle (secant) is determined from a best-fit line assuming no adhesion (residual/large displacement).

⁷ All five components making up the liner system shall be tested together.

Notes:

psf = pounds per square foot

G. Welding Extrudate:

1. Extrudate used to produce extrusion welds shall be made from the same resin type and formulation as the geomembrane.
2. Extrudate shall be free of contamination by moisture or foreign matter.

2.02 MANUFACTURER SOURCE QUALITY CONTROL

A. Resin:

1. The resin used for manufacturing the geomembrane shall be new virgin material, first quality, compounded High Density Polyethylene (HDPE), and manufactured specifically for producing geomembrane.
2. Preferred, but not required to have upper white surfaces.

3. Preferred, but not required to have a 4- to 6-inch-wide smooth edge to promote welding.
4. No mixing of different resin types shall occur during geomembrane manufacturing.
5. No second run or recycled materials shall be used during geomembrane manufacturing. Reworked material from manufacturing of geomembrane such as edge trim can be used up to a maximum of 2 percent of the final product.
6. Resin material shall meet the following minimum requirements of Table 02772-2. The following properties shall be verified by the geomembrane manufacturer prior to utilizing the resin in manufacturing.

Table 02772-2
Properties for HDPE Resin

Property	Test Designation	Test Requirements ¹	Frequency
Density	ASTM D1505	0.932 to 0.945 g/cm ³	1 per Resin Lot (i.e. Batch, Railcar)
Melt Flow Index	ASTM D1238 Condition E	≤1 g per 10 minutes	1 per Resin Lot (i.e. Batch, Railcar)
Resin Properties	D1248	97	% virgin polymers

¹ Tests are to be conducted on natural resin prior to the addition of carbon black or other color additive.

2.03 GEOMEMBRANE

- A. All geomembrane shall be manufactured by the same Manufacturer in the United States or Canada.
- B. Geomembrane shall be textured on both sides using a method, which fully integrates the texture asperities with the sheet; no spray-on texturing shall be allowed.
- C. Additives for UV protection, thermal stability, or processing agents must not “bloom” to the surface of the geomembrane over time or inhibit welding.
- D. Finished geomembrane rolls shall be free from blemishes, holes, pin holes, bubbles, blisters, excessive gels, undispersed resins, undispersed carbon black, contamination by foreign materials, nicks, and cuts.
- E. The geomembrane shall meet the following minimum requirements of the latest version of GRI GM13 and as modified in Table 02772-3. These properties shall be verified by the geomembrane manufacturer as follows.

Table 02772-3
Properties for Textured HDPE Geomembrane

Test	Test Designation	MQC Test Frequency	Requirements
Sheet Thickness	ASTM D5994	10 per roll	Minimum average – 57 60 mil ±10%
Asperity Height ¹	ASTM D7466	Every second roll ^{1,2}	Minimum 20 mils average measurement and as needed to meet shear strength requirements
Sheet density	ASTM D1505 or D792 Method B	1/100,000 sf	Minimum 0.940 g/cc
Tensile Properties ³			
Yield Strength	ASTM D6693, Type IV	1/100,000 sf ¹¹	Min. 126 lb. per in. width
Break Strength	ASTM D6693, Type IV	1/100,000 sf ¹¹	Min. 90 lb/in
Yield Elongation	ASTM D6693, Type IV	1/100,000 sf ¹¹	Min. 12% each sample
Break Elongation	ASTM D6693, Type IV	1/100,000 sf ¹¹	Min. 100%
Tear Resistance	ASTM D1004, Die C	1/100,000 sf	Min. 42 lbs
Puncture Resistance	ASTM D4833	1/100,000 sf	Min. 90 lbs.
Stress Crack Resistance ⁴	ASTM D5397	Per GRI GM10	Min. 300 hrs @ 30% stress at yield
Carbon Black Content	ASTM D1603 ⁵	1/100,000 sf	2 to 3%
Carbon Black Dispersion	ASTM D5596	1/100,000 sf	Category 1 or 2 for 8 of 10 readings and Category 1,2 or 3 for 2 of 10 readings ⁶
Standard Oxidation Induction Time B	ASTM D3895 or ASTM D5885	One per formulation	100 minutes minimum at 200°C
Oven Aging at 85 degrees C or High pressure OIT (min avg) %percent retained after 90 days ⁸	ASTM D5721 ASTM D3895 ASTM D5885	One per formulation	55 percent for standard or 85 percent for high pressure
Ultraviolet Resistance ⁸	ASTM D7238, D5885 ¹⁰	One per formulation	50 percent

¹ Report all ten readings and an average reading for each test.

² Alternate the measurement side.

³ Machine direction (MD) and cross machine direction (XMD) average values should be on the basis of 5 test specimens each direction. Yield elongation is calculated using a gage length of 33 mm. Break elongation is calculated using a gage length of 50 mm.

⁴ The SP-NCTL test is not appropriate for testing geomembranes with textured or irregular rough surfaces. Test should be conducted on smooth edges of textured rolls or on smooth sheets made from the same formulation as that being used for the textured sheet.

⁵ Other methods such as D4218 (muffle furnace) or microwave methods are acceptable if an appropriate correlation to D1603 (tube furnace) can be established.

⁶ Carbon black dispersion (only near spherical agglomerates) for 10 different views: nine in Categories 1 and 2 and one in Category 3.

⁷ It is also recommended to evaluate samples at 30 and 60 days to compare with the 90-day response.

⁸ The condition of the test should be 20-hr. UV cycle at 75 degrees C followed by 4-hr. condensation at 60 degrees C.

⁹ Not recommended because the high temperature of the Std-OIT test produces an unrealistic result for some of the antioxidants in the UV exposed samples.

¹⁰ For High Pressure OIT (D 5885) UV resistance is based on percent retained value regardless of the original HP-OIT value.

¹¹ MQC testing shall be one per 50,000 sf or per 20,000 pounds.

2.04 EXTRUDATE ROD

- A. All extrudate rod shall be made from the same resin as the geomembrane.
- B. All additives shall be thoroughly dispersed throughout the rod.
- C. Extrudate rod shall be free of contamination by moisture or foreign materials.

2.05 EQUIPMENT

- A. Welding equipment and accessories shall meet the following requirements:
 - 1. Equipped with gauges showing temperatures both in the apparatus and at the nozzle (extrusion welder) or at the wedge (wedge welder).
 - 2. Maintained in adequate number to avoid delaying work.
 - 3. Supplied by a power source capable of providing constant voltage under a combined-line load.
 - 4. Provided with splash pad large enough to catch spilled fuel under an electric generator.
- B. Tensiometers, capable of quantitatively measuring geomembrane seam strength, shall meet the following requirements:
 - 1. Equipped with a gauge accurate to ± 2 pounds per inch (ppi) of geomembrane seam width.
 - 2. Provided with required dies.
 - 3. Documentation that required calibration is current.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Damage to geomembrane subsurface during geomembrane deployment or other activities shall be repaired prior to installation.
- B. Beginning installation shall mean acceptance and approval by the Installer of the existing subsurface condition.
- C. Installation shall not begin until approved by the Resident Engineer and CQA Officer.

3.03 DEPLOYMENT

- A. Each panel deployed shall be assigned a simple and logical identifying code consistent with the Installer's submitted panel layout drawings. The coding system shall be subject to approval by the CQA Officer.
- B. No more panels shall be deployed in one day than can be welded during that same day.
- C. Geomembrane shall be visually inspected during deployment for imperfections and faulty or suspect areas shall be marked for repair. At the Resident Engineer's discretion, geomembrane areas requiring more than one repair per 5,000 square feet shall be removed and replaced at no cost to the County.
- D. Deployment of the geomembrane shall conform to the following requirements:
 - 1. Repair damage to subsurface or GCL prior to deployment of geomembrane. All particles in excess of 1/4 inch projecting diameter shall be removed.
 - 2. Geomembrane panels shall be unrolled using methods that will not damage, stretch, or crimp the geomembrane and shall protect the underlying subsurface from damage.
 - 3. Ballast, that will not damage the geomembrane, shall be used to prevent uplift due to wind and to hold geomembrane in place where temperature fluctuations may cause lift (e.g., bases of slopes, bottom of trenches, etc.).
 - 4. Methods used shall minimize wrinkles.
 - 5. Personnel walking on the geomembrane shall not engage in activities or wear types of shoes that could damage the geomembrane. Smoking shall not be permitted while working on the geomembrane.
 - 6. Vehicular traffic of any kind directly on the geomembrane shall not be permitted, except as approved by the Resident Engineer.
 - 7. Equipment shall not damage the geomembrane by handling, trafficking, leakage of hydrocarbons, or any other means. Geomembrane shall be protected, as needed, by placing a compatible protective cover over the geomembrane.
 - 8. Textured geomembrane shall not be dragged over GCL. A slip sheet or other means shall be employed so that geomembrane is not dragged over GCL.
 - 9. Geomembrane folds shall be removed by cutting out folded material and repairing in accordance with Section 3.06, or by pulling on the geomembrane sheet adjacent to the fold. All geomembrane folds that excessively crimp or damage the material shall be cut out and repaired.
- E. Sufficient material shall be provided to allow for geomembrane shrinkage and contraction. Methods used to determine the amount of additional material required shall be approved by the Resident Engineer.
- F. Installer or Contractor shall take necessary measures to prevent excess condensation on the geomembrane from adversely impacting the subsurface.
- G. Geomembrane must be deployed to completely cover GCL at the end of each day.

- H. Installer shall maintain and submit to the CQA monitor, daily deployment logs and panel layout drawings as the deployment progresses. They should include panel numbers, seam numbers, panel dimensions and deployment quantities.

3.04 SEAMING

- A. Seams shall meet the following requirements:
1. Seams shall be oriented perpendicular to the line of the slope crest (i.e., down and not across slope).
 2. Number of seams in corners, odd-shaped geometric locations, and outside corners shall be minimized.
 3. No horizontal seams shall be allowed on slopes greater than 10% . Seams perpendicular to slopes greater than 10% shall be located on flat areas at least six (6) feet away from the crest or toe of the slope.
 4. Seam coding system shall be compatible with panel coding system established in accordance with Article 3.03 of this Specification.
 5. If seaming with a wedge welder, panels shall be shingled on all slopes such that the overlapping panel is upgradient of the underlying panel.
- B. During Welding Operations:
1. At least one Master Welder, meeting the qualifications requirements specified in Article 1.05 of this Specification, shall be present at all times during welding operations and shall direct all welding operations.
 2. Other welders, meeting the qualification requirements specified in Article 1.05 of this Specification, shall be provided in adequate number to avoid delaying work.
 3. The Master Welder shall provide direct supervision over other welders.
- C. Trial Welds:
1. Trial welds shall be performed on geomembrane samples to verify welding equipment operations and performance of seaming methods and conditions.
 2. No welding equipment or welder shall be allowed to perform production welds until equipment and welders have successfully completed trial weld.
 3. Frequency of Trial Welds:
 - a. Minimum of two (2) trial welds per day or shift for each welding apparatus and each technician utilizing the equipment, shall be made: one made prior to the start of work, and one completed at mid shift. If equipment is shut down for longer than 1 hour an additional trial weld shall be performed.
 - b. Trial welds shall be performed when requested by the CQA Monitor.
 4. Trial welds shall be made under the same surface and environmental conditions as the production welds (i.e., in contact with geomembrane subsurface and similar ambient temperature).
 5. Trial weld sample shall be at least three (3) feet long and 12 inches wide with the seam centered lengthwise.

6. Two (2), 1-inch-wide test strips shall be cut from opposite ends of the trial weld (total of 4). Two specimens shall be tested for peel strength, peel separation, and two specimens tested for shear strength utilizing the procedures outlined in ASTM D6392 per Table 02772-4. Results of tests performed on the trial weld specimens shall conform to the latest version of GRI GM19 Table 1(a) for 60 mil HDPE geomembrane. The requirements are summarized as follows:

Table 02772-4
Properties for HDPE Trial Welds

Property	Test Designation	Test Requirement ³
Wedge Weld: ^{1,2}		
Peel Strength	ASTM D6392	90 lb/in
Peel Separation		25 % maximum
Shear Strength		120 lb/in
Extrusion Weld: ²		
Peel Strength	ASTM D6392	78 lb/in
Peel Separation		25 % maximum
Shear Strength		120 lb/in

¹ Both tracks of the wedge weld shall be tested for peel properties.

² 2 of 2 specimens must pass all criteria.

³ Acceptable break (failure) codes per the description outlined in ASTM D6392 are:

Wedge Weld = AD and AD-Brk <25 %

Extrusion Weld = AD1, AD2 and AD-WLD (as long as strength is achieved)

7. The trial weld shall be repeated, in its entirety, when any of the trial weld samples fail in either peel or shear.
8. When repeated trial welds fail, the tested welding apparatus and welder shall not be used for welding until the reason for the failing tests is identified and corrected.
9. If the welding machine continually fails field testing, it shall be tagged and removed from the site.
- D. Install geomembrane using the following general seaming procedures:
- The surface of the geomembrane shall be clean of grease, moisture, dust, dirt, debris, or other foreign material.
 - Panels shall overlap by a minimum of three (3) inches for extrusion and four (4) inches for hot-wedge welds unless otherwise approved by the Resident Engineer.
 - Solvents or adhesives shall not be used unless the product is approved in writing

- by the Manufacturer and Resident Engineer.
4. Adequate material shall be provided to allow peel testing of both sides of a double-wedge weld.
- E. The Installer shall weld to the outside edge of panels placed under anchor berms or in anchor trenches.
- F. If required, the Installer shall provide a firm subsurface by using a flat board, a conveyor belt, or similar hard surface directly under the seam overlap to achieve adequate support during seaming operations.
- G. Adequate lighting shall be provided if seaming operations are carried out at night.
- H. Fishmouths or wrinkles at seam overlaps shall be cut to achieve a flat overlap. The cut fishmouths or wrinkles shall be extrusion welded or patched where the overlap is more than three (3) inches. When there is less than three (3) inches overlap, an oval or round patch extending a minimum of six (6) inches beyond the cut in each direction shall be used.
- I. The Installer shall log every two (2) hours:
1. Temperature on the geomembrane surface
 2. Extrudate temperatures in barrel and at nozzle (extrusion welder)
 3. Operating temperature of hot wedge (hot-wedge welder)
 4. Preheat temperature
- J. The Installer shall seam only when the ambient air temperature is between 32°F and 104°F, measured 6 inches above the geomembrane surface, unless other limits are approved, in writing, by the Resident Engineer.
- K. Defects and Repairs:
1. The geomembrane shall be examined for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. The geomembrane surface shall be clean at the time of the examination.
 2. Each suspect location shall be repaired and non-destructively tested. Geomembrane shall not be covered at locations that have been repaired until test results with passing values are available.
- L. Extrusion seaming shall conform to the following requirements:
1. Adjacent panels shall be tack bonded together using procedures that do not damage the geomembrane, allow required tests to be performed, and are not detrimental to final seaming.
 2. Welding apparatus shall be free of heat-degraded extrudate before welding.
 3. The geomembrane surface shall be abraded a maximum of 1/4 inch beyond the weld bead area.
 4. The geomembrane surfaces shall be cleaned of oxidation using a disc grinder, or equivalent, not more than a 1/2 hour before extruding seam.
 5. The top edges of the geomembrane shall be beveled before extrusion welding.
 6. The ends of all seams, which are more than five (5) minutes old, shall be ground when restarting the weld.

7. Grinding shall not remove more than five (5) percent of liner thickness.
 8. Grind marks shall be perpendicular, not parallel, to seams.
- M. Hot-wedge welding shall conform to the following requirements:
1. Welding apparatus shall be automated, self-propelled, and equipped with devices giving applicable temperatures and pressures.
 2. Edges of cross seams shall be ground to a smooth incline (top and bottom) prior to welding.
 3. A smooth insulating plate or fabric shall be placed beneath the hot-wedge welding apparatus after usage.
 4. The Installer shall use methods to protect against moisture build-up between geomembrane panels.
 6. The Installer shall place a patch over the intersection of all seams in accordance with the repair procedures described in Article 3.06.

3.05 FIELD QUALITY CONTROL AND ASSURANCE

- A. General:
1. The Manufacturer and Installer shall participate in and conform with all terms and requirements of the County's Quality Assurance Manual. The Contractor shall be responsible for assuring this participation. Quality assurance requirements are as specified in this Section and the CQA Manual. Product performance sampling and testing by the Third-Party Laboratory and written acceptance of the product by the CQA Officer must be obtained prior to product shipment by the Manufacturer.
 2. The Installer shall perform all quality control procedures and testing in accordance with the approved Geomembrane Installation Quality Control Plan.
 3. The Installer shall maintain an accurate geomembrane panel layout drawing during installation. The drawing shall include: 1) roll and panel numbers; 2) seam numbers; 3) geomembrane limits; 4) anchor trench locations; and 5) seam test sample dates and locations.
- B. Conformance Testing (Performed by a representative of the Third-Party Laboratory):
1. Conformance samples shall be obtained at the Manufacturer's plant at a frequency of one sample per lot or one sample every 100,000 sf whichever produces the greater number of samples. A representative of the Third-Party Laboratory shall obtain samples and forward the samples to the laboratory for testing. Samples will be obtained across the full width of the roll, excluding the first 2 feet of the roll.
 2. Sampling procedures shall conform to the following requirements:
 - a. Samples consist of five 1-foot by 1-foot specimens taken randomly across the entire roll width and should not include the first 2 feet of the roll.
 - b. The roll number and machine direction shall be marked on the samples

with an arrow. The sampler shall be responsible for markings.

- c. The five specimens shall be sent together as one sample to the laboratory.
 3. The following tests shall be performed on the conformance samples to determine geomembrane characteristics and results shall be evaluated according to ASTM D4759 per Table 02772-3:
 - a. Thickness: ASTM D5994
 - b. Tensile strength and elongation: ASTM D6693
 - c. Puncture testing: ASTM D4833
 - d. Tear resistance: ASTM D1004
 - e. Asperity height: ASTM D7466
 4. Where optional procedures are noted in the test method, the requirements of the Specifications shall prevail.
 5. Additional tests may be performed to verify material or welding conformance with the Specification (performed by the CQA staff with assistance from the Installer).
- C. Field Construction Testing (Performed by Installer):
1. Non-destructively test all field seams over their full length using a vacuum test unit, air pressure (for double fusion seams only), spark testing, or other methods approved by the Resident Engineer. Non-destructive testing shall be carried out as the seaming progresses and not at completion of all seaming. Provide the CQA Monitor with copies of all test results, daily logs and drawings showing the locations of all tests and repairs.
 2. Vacuum testing shall conform to the following requirements:
 - a. The equipment shall consist of the following:
 - 1) Vacuum box assemblies consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, a port hole or valve assembly, and a vacuum gauge. Two different size boxes shall be provided; one greater than 18 inches in length and the other less than 12 inches
 - 2) A vacuum pump assembly equipped with a pressure control
 - 3) A rubber pressure/vacuum hose with fittings and connections
 - 4) A soapy solution and an applicator
 - b. Testing shall conform to the following procedure:
 - 1) Brush soapy solution on geomembrane
 - 2) Place vacuum box over the wetted seam area
 - 3) Ensure that a leak-tight seal is created
 - 4) Apply approximately 10 inches of mercury (5 psi gauge) of vacuum
 - 5) Examine the geomembrane through the viewing window for the

- presence of soap bubbles for not less than fifteen (15) seconds
- 6) All areas where soap bubbles appear shall be marked and repaired as described in this Section and retested
3. Air-Pressure Testing (for double seam with an enclosed space) shall conform to the latest version of GRI GM6 and as modified herein.
 - a. The equipment shall consist of the following:
 - 1) An air pump (manual or motor driven) equipped with pressure gauge capable of generating and sustaining pressure up to 50 psi and at least 30 psi, and mounted on a cushion to protect the geomembrane
 - 2) A rubber hose with fittings and connections
 - 3) A sharp hollow needle, or other approved pressure feed device
 - 4) A pressure gauge with an accuracy of one (1) psi
 - b. Testing shall conform to the following procedure:
 - 1) Seal both ends of the seam to be tested
 - 2) Insert needle or another approved pressure-feed device into the channel created by the double-wedge weld
 - 3) Energize the air pump to a minimum pressure of 35 psi, close the valve, and sustain the pressure for at least five (5) minutes
 - 4) If pressure loss exceeds 2.0 psi or does not stabilize, locate faulty area and repair as described in this Section and retest
 - 5) Puncture opposite end of the seam to release air. If blockage is present, locate and test seam on both sides of blockage
 - 6) Remove needle or other approved pressure-feed device and seal penetration holes by extrusion welding
 4. Spark Testing for penetrations or other difficult areas not accessible for vacuum testing.
 - a. Equipment and Materials.
 - 1) 24-gauge copper wire.
 - 2) Low-amperage electric detector, 20,000 to 30,000-volt, with brush-type electrode capable of causing visible arc up to 3/4 inch from copper wire.
 - b. Procedures.
 - 1) Place copper wire within 1/4 inch of the edge of extrusion seam or clamp seal.
 - 2) Pass electrode over seam or clamp area and observe for spark. If a spark is detected perform a repair.
 5. Non-Destructive Testing for Fusion Weld
 - a. The Installer shall maintain, and submit to the CQA Monitor, daily welding logs on which are recorded welding machine number, operator,

- machine settings, operating temperature, time, and date for each seam welded.
- b. The Installer shall maintain air pressure test logs on which are recorded seam numbers, beginning and ending air pressures, beginning and ending test times, lengths of tested seam, defective areas found, and confirmation of repair
6. Destructive Testing (assigned by the CQA Monitor and collected, shipped and tested by the Installer) shall conform to the following requirements:
- a. Location and frequency of testing shall be as follows:
 - 1) Collect destructive test samples at a minimum frequency of one test per 500 feet of seam length as located by the CQA Monitor.
 - 2) Collect destructive samples at a minimum frequency of one test per 200 feet of seam length where new geomembrane is attached to liner terminations installed more than 6 months previously.
 - 3) Test locations shall be determined during seaming. Locations may be prompted by appearance of excess heating, contamination, offset welds, or suspected defect. The CQA Monitor shall be responsible for choosing the locations. The CQA Monitor shall not notify the Installer in advance of selecting locations where seam samples will be taken.
 - 4) The test frequency may be increased at the discretion of the CQA Monitor.
 - 5) Samples shall be tested by an independent, third-party testing laboratory approved by the CQA Monitor. The laboratory must be GAI-LAP Accredited.
 - 6) All costs associated with shipping, handling and testing are to be paid by the contractor, or installer, including any required re-tests.
 - b. Sampling shall conform to the following procedure:
 - 1) The Installer shall cut samples at locations designated by the CQA staff as the seaming progresses to obtain laboratory test results before the geomembrane is covered.
 - 2) The CQA staff shall number each sample and mark the sample number and location on the panel layout drawing.
 - c. The Installer shall immediately repair all holes in the geomembrane resulting from destructive sampling. The continuity of the repair shall be tested in accordance with this Section.
 - d. The destructive sample shall be 12-inches wide by 48-inches long with the seam centered lengthwise. Two 1-inch-wide strips shall be cut from each end of the sample and tested and evaluated as described in Article 3.04, Paragraph C.6 and Table 02772-5. The remaining sample shall be cut into three (3) parts for distribution as follows:
 - 1) One portion for the Installer: 12 inches by 12 inches

- 2) One portion for Third Party Laboratory or approved alternative testing: 12 inches by 18 inches
 - 3) One portion for the County to archive: 12 inches by 12 inches
- D. Laboratory testing by the Third-Party Laboratory or approved alternative shall conform to the latest version of GRI GM19 and as modified herein:
1. Samples shall be tested by an independent, third-party testing laboratory approved by the CQA Monitor. The laboratory must be GAI-LAP Accredited.
 2. All costs associated with shipping, handling and testing are to be paid by the contractor including any required re-tests.
 3. Five peel and five shear specimens shall be cut from each laboratory sample. The specimens shall be cut in the pattern shown in Figure 1 of ASTM D6392.
 4. Minimum acceptable values to be obtained for these tests shall be as summarized in Table 02772-5.
 5. Test results shall be provided within 24 hours after receiving samples at the geosynthetics testing laboratory with copies provided to the Resident Engineer and CQA Monitor.

Table 02772-5
Properties for HDPE Field Welds

Property	Test Designation	Test Requirement ³
Wedge Weld: ^{1,2}		
Peel Strength	ASTM D6392	90 lb/in (minimum)
Peel Separation		25 % (maximum)
Shear Strength		120 lb/in (minimum)
Shear Elongation		50% (maximum)
Extrusion Weld: ²		
Peel Strength	ASTM D6392	78 lb/in (minimum)
Peel Separation		25 % (maximum)
Shear Strength		120 lb/in (minimum)
Shear Elongation		50% (maximum)

¹ Both tracks of the wedge weld shall be tested for peel properties.

² 4 of 5 specimens must pass all criteria; the 5th specimen must meet at least 80% of the specified strength requirement.

³ Acceptable break (failure) codes per the description outlined in ASTM D6392 are:

Wedge Weld = AD and AD-Brk <25 %

Extrusion Weld = AD1, AD2 and AD-WLD (as long as strength is achieved)

- E. The following procedure shall be used for a destructive test failure:
1. The Installer shall follow one of two options:
 - a. Reconstruct the seam between any two (2) passed test locations by removing the failed seam and replacing with new material or cap stripping.
 - b. Trace the weld to an intermediate location at least ten (10) feet minimum or to where the seam ends, in both directions from the location of the failed test. Check the next seam welded using the same welding device if required to obtain additional sample (i.e., if one side of the seam is less than 10 feet long).
 2. The Installer shall obtain four 1-inch samples at both locations for additional field testing.
 3. If these additional test samples pass field tests, then laboratory samples shall be taken.
 4. If the laboratory samples pass, then the seam shall be reconstructed or capped between the test sample locations.
 5. If any additional samples fail, then the process shall be repeated to establish the zone in which the seam shall be reconstructed.
- F. Acceptable seams shall conform to the following requirements:
1. Acceptable seams shall be bounded by two locations from which samples have passed destructive tests.
 2. For reconstructed seams exceeding 50 feet, a sample taken from within the reconstructed seam shall also pass destructive testing.
 3. Whenever a sample fails, additional testing may be required for seams that were welded by the same welder and welding apparatus or were welded during the same shift.
- G. Seams that cannot be non-destructively tested shall conform to the following requirements:
1. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.
 2. If the seam cannot be tested prior to final installation, the entire seam shall be cap stripped. The seaming and cap-stripping operations shall be observed by the CQA staff and Installer.

3.06 REPAIR PROCEDURES

- A. Damaged geomembrane shall be removed and replaced with acceptable geomembrane if damage cannot be satisfactorily repaired.
- B. Repair, removal, and replacement shall be at Contractor's expense if the damage results from the Contractor's, Installer's, or the Contractor's subcontractor activities.

- C. Any portion of the geomembrane exhibiting a flaw, or that fails a destructive or non-destructive test shall be repaired. The Installer shall be responsible for repair of damaged or defective areas. Agreement upon the appropriate repair method shall be decided between the CQA staff and the Installer. Procedures available include:
1. Patching: Used to repair large holes (over 3/8-inch diameter), tears (over 2 inches long), undispersed raw materials, and contamination by foreign matter.
 - a. Abrade flexible membrane surfaces to be repaired (extrusion welds only) no more than one (1) hour prior to the repair.
 - b. Clean and dry all surfaces at the time of repair.
 - c. Extend patch at least 6 inches beyond the edge of the defect, and round all corners of material to be patched and the patches to a radius of at least 3 inches.
 - d. Extrusion weld completely around the patch and test all welds.
 2. Abrading and Re-welding: Used to repair small seam sections (less than 12 inches long).
 - a. Abrade flexible membrane surfaces to be repaired (extrusion welds only) no more than one (1) hour prior to the repair.
 - b. Extrusion weld the repaired seam and test all welds.
 3. Spot Welding: Used to repair small tears (less than ½ inches long), pinholes, or other minor, localized flaws, where geomembrane thickness has been reduced by more than four (4) mils by overgrinding, etc.
 - a. Place extrudate over the small tear or other area to be repaired and test.
 4. Capping: Used to repair large lengths of failed seams.
 - a. Same as Patching except used to cover seams.
 5. Removing the unsatisfactory material and replacing with new material.
- D. In addition, the following procedures shall be observed:
1. Geomembrane surfaces to be repaired shall be abraded (extrusion welds only) no more than 1 hour prior to the repair.
 2. All geomembrane surfaces shall be clean and dry at the time of repair.
 3. The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the CQA Officer.

4. Patches or caps shall extend at least 6 inches beyond the edge of the defect, and all corners of material to be patched and the patches shall be rounded to a radius of at least 3 inches.
- E. Repairs shall be verified using the following procedure:
1. Each patch repair shall be numbered and logged (performed by Installer and observed by CQA staff).
 2. Each repair shall be non-destructively tested using methods specified in this Section.
 3. Destructive testing may be required at the discretion of the CQA Officer.

3.07 PROVISION OF EXTRA MATERIAL

- A. Upon completion of the geomembrane installation, leave extra material with the County, at a location designated by the Resident Engineer, as follows:
1. Quantity: 1,000 square feet.
 2. Same material as specified for this Project.
 3. New, unused material, on a roll; not scrap material.
 4. Material shall be free of scratches, defects, mud, and contamination.

END OF SECTION 02772

SECTION 02773 DRAINAGE GEOCOMPOSITE

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall furnish and transport to the site all drainage geocomposite as shown on the Plans.
- B. The Contractor shall furnish all labor, tools, supervision, transportation, connection materials (plastic ties, sewing thread), and equipment necessary for the installation of the drainage geocomposite, including that needed for testing and connecting materials in field.
- C. Section includes furnishing and installing primary and lysimeter geocomposite consisting of a high-density polyethylene (HDPE) geonet core with a nonwoven geotextile heat bonded to both sides as shown on the Construction Drawings and described in this Section.
- D. Related Sections:
 - 1. Section 02200 – Site Earthwork
 - 2. Section 02207 – Aggregate Material
 - 3. Section 02500 – Operations Layer
 - 4. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
 - 5. Section 02774 – Geotextile
 - 6. Section 02774 – Geosynthetic Clay Liner (GCL)
 - 7. Section 15200 – High Density Polyethylene (HDPE) Pipe

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.
- D. *GRI Specifications, Guides and Practice*. Geosynthetic Institute, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM D 792 Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- B. ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient

Technique.

- C. ASTM D 1603 Standard Test Method for Carbon Black in Olefin Plastics
- D. ASTM D 1621 Standard Test Method for compressive Properties of Rigid Cellular Plastics
- E. ASTM D 4218 Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique.
- F. ASTM D 4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
- G. ASTM D 4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- H. ASTM D 4716 Standard Test Method for Constant Head Hydraulic Transmissivity (In-Plane Flow) of Geotextiles and Geotextile Related Products.
- I. ASTM D 4751 Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- J. ASTM D 4759 Standard Practice for Determining the Specification conformance of Geosynthetics
- K. ASTM D 4873 Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
- L. ASTM D 5035 Standard Test Method for Breaking Force and Elongation of Textile Fabrics (Strip Method).
- M. ASTM D 5199 Standard Test Method for Measuring Nominal Thickness Geotextiles and Geomembranes.
- N. ASTM D 5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
- O. ASTM D 5321 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
- P. ASTM D 7005 Standard Test Method for Determining the Bond Strength (Ply Adhesion) of Geocomposites.
- Q. GRI-GC8 Standard Guide for Determination of the Allowable Flow Rate of a Drainage Composites.
- R. GRI-GC13 Standard Guide for Joining and Attaching Geonets and Drainage Composites.

1.04 SUBMITTALS

- A. The Contractor shall submit samples, Manufacturer's specifications and a complete description of the Geocomposite prepared for use to the Resident Engineer for review in

accordance with Section 01300 – Submittals, a maximum or within fifteen (15) calendar days after County’s Notice to Proceed. The Geocomposite shall meet or exceed requirements of this section.

- B. The Contractor shall submit the following Manufacturer data to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer’s acceptance of applicable submittals before geocomposite material shipment.
1. Geotextile:
 - a. Certification stating that the geotextile used in the production of the geocomposite meets the product requirements (Table 02773-2).
 - b. Copy of quality control tests performed by geotextile manufacturer (prior to heat bonding to the geonet core).
 - c. A certification from the geotextile manufacturer that the manufacturing process used to produce the geotextile includes 100% needle detection of all manufactured products, a mechanism for removal of needles and method for verification that needles have been removed. The certification should include a statement attesting that the needle detection and removal process has been applied to all geotextile supplied to this project and that the material supplied be “needle free.”
 - d. A copy of the current calibration certification document for the needle detection and magnetic system for the manufacturing line(s) from which the material to be supplied was manufactured.
 2. Geocomposite:
 - a. Certification stating that the geonet core of the geocomposite meets the product requirements listed in Table 02773-1 and the geocomposite meets the product requirements listed in Table 02773-3.
 - b. Copy of the quality control tests performed by the geocomposite manufacturer to include all tests outlined in Table 02773-3.
 - c. Samples of the geocomposite used for interface strength testing presented in Section 02772. Submitted geocomposite samples shall be a minimum dimension of one foot by one foot square and come from the same roll as the actual geocomposite samples used in the interface strength tests.
- C. The Contractor shall submit a copy of the Manufacturer’s Quality Control Plan and recommended installation procedures fifteen (15) calendar days after County’s Notice to Proceed.
- D. The Contractor shall furnish written instructions from the Manufacturer for storage and handling of the geocomposite a minimum of seven (7) working days prior to geocomposite shipment to the Site.

1.05 TRANSPORT AND STORAGE

- A. The geonet composite (geocomposite) rolls shall be shipped by the Supplier with opaque protective coverings in a closed trailer or covered on an open trailer.
- B. At least seven (7) days prior to any site delivery, the contractor shall notify the Resident Engineer of the date, time, material quantity and number of trucks for delivery. A copy of the packing list showing lot & roll numbers approved for delivery shall be provided to the Resident Engineer prior to delivery. Any geocomposite delivered that is not approved for delivery will not be unloaded.
- C. Roll numbers, Manufacturer's name, product identification, lot number and roll dimensions shall be marked on protective covering.
- D. Unloading and storage (stacking) of the geonet composite rolls at the site is the responsibility of the Contractor; however, unloading and storage of geonet composite rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures.
- E. The Contractor shall transport geonet composite rolls from the storage area in a manner that does not damage the geonet composite, and in accordance with the Manufacturer's recommended procedures.
- F. During shipment and storage, the geocomposite rolls shall be elevated off the ground and adequately covered to protect them from the following:
 - Site construction
 - Damage precipitation
 - Extended ultraviolet radiation including sunlight
 - Chemicals that are strong acids or strong bases
 - Flames including welding sparks
 - Temperatures in excess of 160°F (71°C)
 - Any other environmental condition that may damage the property values of the geotextile
- G. Manufacturer shall provide unloading straps with rolls delivered to the site.
- H. If the CQA Monitor determines material is damaged or has excessive sunlight (UV) exposure, the Contractor shall immediately make all repairs and replacements at no additional cost to the County.
- I. Geocomposite damaged during transportation, loading, unloading, delivery, and storage shall be documented and rejected by the CQA Monitor.
- J. Damaged geocomposite rejected by the CQA Monitor shall be replaced at no cost to the County and removed from the site.

1.06 QUALITY CONTROL

- A. Use adequate numbers of skilled workman who are trained and experienced in the

necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.

- B. Render assistance as necessary for the CQA Monitor to collect product samples for Quality Assurance testing.

1.07 WARRANTY

- A. Geocomposite shall be provided with Manufacturer's and Installer's warranty and the material and workmanship shall meet the warranty provisions of this Contract.

PART 2 PRODUCTS

2.01 GEOCOMPOSITE

- A. Product comprised of nonwoven, needle-punched, continuous or staple filament, polyester or polypropylene geotextile, heat-bonded to both sides of an integrally formed, solid rib, extruded, HDPE, geonet core.
- B. Geocomposite supplied for this project shall be new material specifically manufactured for this project. Off-the-shelf material is not acceptable.
- C. The bonding process shall not introduce adhesives or other foreign products.
- D. The geonet shall have uniform channels and open areas to provide uniform flow of water. The geonet shall be profiled mesh extruded to form a diamond shaped net.
- E. The geonet shall maintain the design transmissivity performance under the site-specific normal load as described in Paragraph 2.02 C of this Section.
- F. The geocomposite shall be resistant to biological, chemical, and ultraviolet degradation such that long-term performance (i.e. transmissivity) is not disrupted or significantly reduced.

2.02 MANUFACTURER SOURCE QUALITY CONTROL

- A. The geonet core shall conform to the following minimum requirements:

Table 02773-1
Properties for Geonet Core

Property	Test Designation	Requirement	Frequency
Thickness (unit)	ASTM D5199	250 mil	1 per 100,000 sf
Density	ASTM D1505	0.935 g/cm ³	1 per 100,000 sf
Percent Carbon Black	ASTM D1603/D4218	2-3%	1 per 100,000 sf
Tensile Strength Break in Machine Direction	ASTM D5035	65 lb/in	1 per 100,000 sf
Compressive Strength	ASTM D1621	10,000 psf min.	1 per 500,000 sf

- B. The geotextile (prior to being heat bonded to the geonet core) shall conform to the following minimum average roll value (MARV) requirements:

Table 02773-2
Properties for Geotextile (Prior to Heat Bonding)

Property	Test Designation	Requirement	Frequency
Mass Per Unit Area	ASTM D5261	6 oz/yd ²	1 per 100,000 sf
Grab Tensile Strength	ASTM D4632	160 lbs.	1 per 100,000 sf
Apparent Opening Size	ASTM D4751	>70 to <80 US sieve	1 per 500,000 sf
Permittivity	ASTM D4491	1.5 sec ⁻¹	1 per 500,000 sf

- C. The geocomposite shall conform to the following minimum requirements:

Table 02773-3
Properties for Geocomposite

Property	Test Designation	Requirement	Frequency
Geocomposite Transmissivity	ASTM D4716	-	-
Design Transmissivity	Note 1	$\geq 1.0 \times 10^{-4}$ m ² /sec	1 per project
Routine Transmissivity	Note 2	$\geq 2.0 \times 10^{-4}$ m ² /sec	1 per 500,000 sf
Ply Adhesion	ASTM D7005	1.0 lb/in	1 per 100,000 sf
Interface Shear Strength	Note 3	Note 3	Note 3
Creep Reduction Factor (Note 4)	GRI-GC8	<1.19	certification

Notes:

- Design transmissivity shall be conducted under the following conditions:
Gradient = 0.017
Normal Load = 10,000 psf
Boundary Conditions = (top) Operations Layer soil / geocomposite / HDPE textured liner (bottom)
Seat Time = 100 hrs
- Routine transmissivity shall be conducted under the following conditions:
Gradient = 0.017
Normal Load = 10,000 psf
Boundary Conditions = (top) stainless steel plate / geocomposite / stainless steel plate (bottom)
Seat Time = 15 minutes
- Interface shear strength shall be tested according to Section 02772-High Density Polyethylene (HDPE) Geomembranes.
- Creep reduction at Normal load of 10,000 psf

2.03 EQUIPMENT

- A. Equipment and accessories shall meet the following requirements:

1. Maintained in adequate number in order to avoid delaying work.
2. Supplied by a power source capable of providing constant voltage under a combined-line load.
3. Provided with a protective lining and splash pad large enough to catch spilled fuel under an electric generator, if used.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.
- C. The Installer shall verify that the material and surface upon which the geocomposite is to be placed is complete and in accordance with the Specifications for that material prior to beginning geocomposite installation. Installer and CQA Monitor shall sign a subgrade acceptance form attesting to this statement.
- D. The contractor is responsible for temporary anchorage during installation and until permanent anchorage is constructed and completed.

3.02 APPROVAL TO DEPLOY

- A. Prior to installation of geocomposite, approval from the CQA Officer shall be obtained. If required, deficiencies in the subsurface shall be corrected as specified.

3.03 DEPLOYMENT

- A. Geocomposite shall be installed in accordance with the Manufacturer's instructions unless otherwise stated in this Specification.
- B. Place geocomposite with the long dimension down the slope. Geocomposite shall be installed to drain to leachate trenches and leachate sumps.
- C. On slopes, the geocomposite shall only be deployed using full length rolls placed in the direction of the slope. No end seams shall be placed on the slopes. Reposition geocomposite by hand, if necessary, after unrolling to minimize wrinkles.
- D. Geocomposite shall be installed with sufficient tension to prevent excessive overlapping, insufficient overlapping, wrinkles, and folds.
- E. The geocomposite shall be secured during deployment by placing sandbags as ballast. Ballast shall be left in place until the geocomposite is covered. Material used to fill sandbags shall be the same as the material to be placed over the geocomposite.
- F. Care shall be taken to protect other in-place geosynthetic materials when cutting geocomposite. Installer shall repair, or replace, at the County's CQA Monitor's discretion,

landfill components damaged during geocomposite installation at no cost to the County.

- G. During deployment, the Installer shall not entrap excessive dust, stones, or moisture in geocomposite component that could damage or clog the polymer net or hamper subsequent seaming.
- H. Geocomposite shall be anchored as shown on the Plans when installation is complete; temporary anchorage during placement is the responsibility of the Installer.
- I. The geocomposite shall be examined over its entire surface to ensure that no potentially harmful foreign objects, such as needles, are present. Foreign objects, if encountered, shall be removed.

3.04 SEAMS AND OVERLAPS

- A. The geotextile and geonet will be secured or seamed to the adjacent edge of the geocomposite at all overlaps.
- B. Geonet Components:
 - 1. The geonet components shall be overlapped by at least 4 inches. These overlaps will be secured by tying.
 - 2. Tying will be achieved by plastic cable ties. Tying devices will be white or yellow for easy inspection. Metallic devices will not be used.
 - 3. Tying will be at a minimum of every 4 feet along the slope, every 12 inches across the slope, and every 12 inches in any anchor trench
- C. Geotextile Components:
 - 1. The bottom layers of geotextile will be overlapped. Geotextiles will be overlapped a minimum of 6 inches. The top layers of geotextiles will be continuously sewn, or heat bonded (i.e., spot sewing is not allowed). Use polymeric thread as specified in Section 02771.

3.05 REPAIRS

- A. Any holes or tears in the geocomposite will be repaired by placing a patch extending 2 feet (0.6 m) beyond the edges of the hole or tear. The patch will be secured by tying approved tying devices every 6 inches (15 cm) through the geonet of the patch, and through the geotextile and geonet components of the geocomposite needing repair. The geotextile component of the patch shall be heat sealed to the geotextile of the geocomposite needing repair.
- B. Any method of underpatching shall require approval from the CQA Monitor. If the hole or tear width across the roll is more than 50 percent of the width of the roll, the damaged area will be cut out and the two portions of the geonet will be joined in accordance with Article 3.05, Paragraph A above.

3.06 FIELD QUALITY ASSURANCE

A. General:

1. The Manufacturer and Installer shall participate in and conform with all terms and requirements of the County's Quality Assurance Plan. The Contractor shall be responsible for assuring this participation. Quality assurance requirements are as specified in this Section. Product conformance and testing by the Third-Party Laboratory, and written acceptance of the product by the CQA Officer must be obtained prior to product shipment by the manufacturer.

B. Conformance Testing (Performed by a representative of the Third-Party Laboratory):

1. Conformance samples shall be obtained at Manufacturer's plant at a frequency of one sample every 100,000 sf. A representative of the Third-Party Laboratory shall obtain samples and forward to the laboratory for testing. Samples shall be obtained across the entire roll width, excluding the first 2 feet of the roll. Sample size shall be 2-feet long by the roll width. The sampler shall mark the machine direction on the sample.
2. The following tests shall be performed on the conformance samples to determine geonet core characteristics and results shall be evaluated according to ASTM D4759 per Table 02773-1. Measurements shall be conducted on the edge of the sample where the geotextile and geonet are unbonded.
 - a. Thickness (ASTM D5199)
3. The following tests shall be performed on the conformance samples to determine geocomposite characteristics and results shall be evaluated according to ASTM D4759 per Table 02773-2.
 - a. Routine transmissivity (ASTM D4716) (one per 500,000 sf)
 - b. Ply Adhesion (ASTM D7005)
4. The following test shall be performed on one randomly selected conformance sample to determine long-term design transmissivity characteristics. This test shall be conducted once per project and material type or more often as deemed necessary by the Resident Engineer.
 - a. Design transmissivity (ASTM D4716)

C. Additional tests may be performed at the discretion of the CQA Monitor/CQA Officer.

3.07 PROTECTION

A. When placing soil materials over geocomposite ensure the following:

1. Operations Layer material shall be placed by spreading each full lift thickness in advance of a low ground pressure, wide-tracked bulldozer (Maximum size: Caterpillar D6 or equivalent); no vehicles or equipment shall drive directly on the liner system. No vehicles or equipment other than bulldozers used for spreading and

track-walking and low ground pressure equipment shall drive directly on less than the full required thickness of the Operations Layer except with Engineer's approval..

2. No damage to geocomposite.
3. No slippage of geocomposite over underlying layers.
4. No excessive tensile stresses in geocomposite.
5. Refer to Table 02200-3 for soil lift thickness and placement tolerance.

END OF SECTION 02773

UNOFFICIAL

SECTION 02774 GEOSYNTHETIC CLAY LINER (GCL)

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall furnish and transport to the Work site all Reinforced Geosynthetic Clay Liner (GCL) as shown on the Plans.
- B. The Contractor shall furnish all labor, tools, supervision, transportation, and equipment necessary for the installation of the GCL, including that needed for testing and seaming materials in field.
- C. Section includes furnishing and installing GCL as shown on the Construction Drawings and described in this Section.
- D. Related Sections:
 - 1. Section 02200 - Site Earthwork
 - 2. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
 - 3. Section 02771 – Geotextile
 - 4. Section 02773 – Geocomposite

1.02 REFERENCES

- A. *Caltrans Standard Specifications*. California Department of Transportation, 2018.
- B. *Caltrans Standard Plans*. California Department of Transportation, 2018.
- C. *American Society for Testing and Materials*. Current Edition.
- D. *GRI Specifications, Guides and Practice*. Geosynthetic Institute, Current Edition.

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ASTM D 2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.
- B. ASTM D 4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- C. ASTM D 4643 Standard Test Method for Determination of Water (Moisture) Content of Soil by Microwave Oven Heating
- D. ASTM D 4759 Standard Practice for Determining the Specification Conformance of Geosynthetics

- E. ASTM D 4873 Standard Guide for Identification, Storage and Handling of Geosynthetic Rolls and Samples
- F. ASTM D 5084 Standard Test Method for Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
- G. ASTM D 5261 Standard Test Methods for Mass Per Unit Area (weight) of Fabrics.
- H. ASTM D 5321/6243 Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic Friction by the Direct Shear Method.
- I. ASTM D 5887 Standard Test Method for Measurement of Index Flux through Saturated GCL Specimens using a Flexible Wall Permeameter.
- J. ASTM D 5888 Standard Guide for Storage and Handling of Geosynthetic Clay Liners.
- K. ASTM D 5889 Standard Practice for Quality Control of Geosynthetic Clay Liners.
- L. ASTM D 5890 Standard Test Method for Swell Index of Clay Mineral Component of Geosynthetic Clay Liners.
- M. ASTM D 5891 Standard Test Method for Fluid Loss of Clay Component of Geosynthetic Clay Liners.
- N. ASTM D 5993 Standard Test Method for Measuring the Mass per Unit Area of Geosynthetic Clay Liners.
- O. ASTM D 6243 Standard Test Method for Determining the Internal and Interface Shear Resistance of Geosynthetic Clay Liner by the Direct Shear Method
- P. ASTM D 6495 Standard Guide for Acceptance Testing Requirements for Geosynthetic Clay Liners.
- Q. ASTM D 6496 Standard Test Method for Determining Average Bonding Peel Strength Between Top and Bottom Layers of Needle-Punched Geosynthetic Clay Liners.
- R. ASTM D 6768 Standard Test Method for Tensile Strength of Geosynthetic Clay Liners.

1.04 SUBMITTALS

- A. The Contractor shall submit samples, Manufacturer's specifications, and a complete description of the geosynthetic clay liner proposed for use to the Resident Engineer for review in accordance with Section 01300 – Submittals, a maximum or within fifteen (15) calendar days after County's Award. The geosynthetic clay liner shall meet or exceed requirements of this section.
- B. The Contractor shall submit the following Manufacturer data to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before material shipment.

1. Geotextile:
 - a. Copy of quality control tests performed by geotextile manufacturer.
 2. Bentonite:
 - a. Copy of quality control tests performed by bentonite supplier.
 - b. Copy of quality control tests performed by GCL manufacturer.
 3. GCL:
 - a. Certification stating that the GCL meets the product requirements (Table 02774-1)
 - b. Copy of quality control tests performed by GCL manufacturer.
 - c. Certificate of compliance for the GCL that the required shear strengths listed in Section 02772, Table 02772-1 can be met.
 - d. A certification from the GCL manufacturer that the manufacturing process used to produce the GCL includes 100% needle detection of all manufactured products, a mechanism for removal of needles and method for verification that needles have been removed. The certification should include a statement attesting that the needle detection and removal process has been applied to all GCL supplied to this project and that the material supplied be "needle free."
 - e. A copy of the current calibration certification document for the needle detection and magnetic system for the manufacturing line(s) from which the material to be supplied was manufactured.
 - f. Samples of the GCL used for interface strength testing presented in Section 02772. Submitted GCL samples shall be a minimum dimension of one-foot by one-foot square and come from the same roll as the actual GCL samples used in the interface strength tests.
- C. The Contractor shall furnish the following with the bid form in accordance with Article 1.05 of this Section:
1. Installer qualifications
 2. Manufacturer's representative
- D. The Contractor shall submit the following Quality Control Plans, Installation Procedures (Manufacturer) panel layout drawing(s) and obtain the Resident Engineer's acceptance by the times indicated:
1. Manufacturer's Quality Control Plan including list of quality control tests to be performed and typical testing frequencies, and recommended installation procedures

and the Installer's proposed panel layout drawing identifying panels and overlaps a minimum of fifteen (15) calendar days prior to geosynthetic clay liner shipment.

2. Certificate of Acceptance of GCL Subsurface by Installer for each area to be covered by the GCL, signed by the installation supervisor, prior to the start of installation (beginning installation shall mean acceptance and approval of existing subsurface condition).
- E. The Contractor shall submit to the Resident Engineer within fifteen (15) calendar days following completion of the installation:
1. Manufacturer's warranty against manufacturer defects (material not in compliance with this specification). The warranty shall cover the full material replacement cost not including installation.
 2. Certificate stating the GCL has been installed in accordance with the Contract Documents.
 3. Record Drawings showing location of panels, seams, and patches. Record drawings shall be prepared in accordance with Section 01720 and provided for Resident Engineer approval.

1.05 QUALIFICATIONS

- A. Installer shall meet the following requirements:
1. Have experience in a similar capacity involving GCL on at least 5 landfill projects and have installed a minimum of 1,000,000 square feet of GCL.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor shall be responsible for the protection of the GCL against damage during transportation to the site, during storage at the site, and prior to placement of subsequent construction materials.
- B. GCL rolls shall be shipped in an enclosed trailer or on a trailer and completely covered with waterproof tarps.
- C. GCL labeling, shipment, and storage shall follow ASTM D4873 and D5888, as modified according to this Specification.
- D. GCL rolls shall not be stacked more than three (3) rolls high.
- E. Product labels shall clearly show the manufacturer or supplier name, style name, roll number, and roll dimensions.
- F. If any special handling is required, it shall be so marked on the outside surface of the wrapping, i.e., "Do not stack more than three rolls high", etc.
- G. The GCL shall be supplied dry (unhydrated, less than 20% moisture content) and be delivered to the site undamaged.

- H. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of GCL must be discarded before installation or the roll rejected if the moisture content of the bentonite has become excessively high as determined by the CQA Monitor.
- I. At least seven days prior to any site delivery, the Contractor shall notify the Engineer of the date, time, material type, material quantity, and number of trucks for delivery. A copy of the packing list showing lot and roll numbers for each shipment shall also be provided to the Engineer prior to site delivery.
- J. Storage area should be relatively flat and well drained. During storage the GCL rolls shall be elevated off the ground and adequately covered to protect them from the following:
 - 1. Site construction damage
 - 2. Precipitation and humidity
 - 3. Chemicals that are strong acids or strong bases
 - 4. Flames, sparks, temperatures in excess of 49 deg C (120 deg F)
 - 5. Any environmental condition that might damage the GCL.
- K. Unloading and storage (stacking) of the GCL rolls at the site is the responsibility of the contractor; however, unloading and storage of GCL rolls shall be performed in accordance with the submitted Manufacturer's recommended procedures and these specifications.
- L. Each GCL roll shall be wrapped with a material that will protect the bentonite from moisture and the GCL from damage due to shipment, water, sunlight, contaminants, and exposure to the elements including rain.
- M. The materials shall be shipped less than one month prior to scheduled installation.
- N. The Contractor shall protect the work described in this Section before, during, and after installation, and shall protect the installed work specified in other Sections as well as work completed by the County. Only non-damaged, sufficiently dry material (as determined by the CQA Monitor) shall be included within the construction.
- O. The Contractor shall preserve integrity and readability of roll labels. Any roll that does not have an identifying roll number and lot number shall be rejected.
- P. If the CQA Monitor determines the GCL is damaged, the Contractor shall replace it in a timely manner so as to prevent delays in the progress of the work. Any material damaged by the Contractor, or damaged by others due to improper delivery and/or storage, as determined by the CQA Monitor, shall be replaced by the Contractor at no cost to the Owner.

1.06 CONTROL

- A. The Manufacturer shall allow, at no expense to the project, the CQA Officer or designated representative to visit the plant during manufacturing.
- B. Use adequate numbers of skilled workman who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and

the methods needed for proper performance of the work of this Section.

- C. The Installer shall aid the CQA Monitor in product sampling for Quality Assurance testing by providing personnel and equipment necessary to move, cut and protect GCL rolls.

1.07 WARRANTIES

- A. The Contractor shall provide a two-year pro rata warranty for the GCL against manufacturer's defects from the date of geomembrane installation.
- B. The Contractor shall provide a two-year non-pro rata warranty for the GCL against installation defects.
- C. The Contractor's warranty shall cover the full material replacement and installation costs against installation defects.

PART 2 PRODUCTS

2.01 GEOSYNTHETIC CLAY LINER (GCL)

- A. The GCL rolls shall be a minimum of 15 feet in width and each roll shall be identified by a unique roll number and the date of manufacturer.
- B. GCL rolls shall be of adequate lengths to reach from the top of slope to the bottom of slope. GCL shall not be overlapped or seamed perpendicular to the slope on slopes greater than 10%.
- C. The GCL shall be encapsulated by nonwoven geotextile. Geotextiles shall be needle punched or stitched together through the bentonite layer to form a stable composite. All geotextile material must be certified to be needle-free by the manufacturer.
- D. GCL supplied for this project shall be new material specifically manufactured for this project. Off-the-shelf material is not acceptable.
- E. Continuous water-proof lap lines and match lines shall be printed directly on the GCL at 6 and 12 inches from the edges of the rolls respectively.
- F. GCL shall be wrapped around a structurally-sound core that can support the weight of GCL without excessive bending or buckling. The core shall be accessible to stringers or rods placed full-length within the core.
- G. Water content of the bentonite at the time of installation shall not be greater than either 12 percent by weight, or the initial moisture content measured at the time of passing conformance shear strength tests.
- H. No secondary fixation of the needle-punch fibers shall be allowed.
- I. If the GCL is required by the manufacturer to be installed with a particular side facing up, that side must be marked accordingly throughout the roll length.

- J. If the GCL becomes hydrated or wet prior to being covered, it shall be removed and replaced at the contractor's expense.

2.02 MANUFACTURER SOURCE QUALITY CONTROL

- A. The delivered GCL shall demonstrate the following minimum average roll value properties as described in ASTM D6495, "Standard Guide for Acceptance Testing Requirements for Geosynthetic Clay Liners" and as modified herein in Table 02774-1. The GCL shall be tested at the following specified frequencies by the Manufacturer with copies of all test results submitted to the Resident Engineer as outlined in Specification 01300:

Table 02774-1
Properties for Geosynthetic Clay Liner

Property	Test Designation ³	Test Requirement	MQC Frequency
Bentonite			
Moisture Content	ASTM D 4643	<12%	1/50 tons
Free Swell	ASTM D 5890	>24 millimeters/ 2 grams	1/50 tons
Fluid Loss	ASTM D5891	< 18 millimeters	1/ 50 tons
Geotextile			
Mass per Unit Area	ASTM D 5261	> 5.8 oz/sy	1/200,000 sf
Grab Tensile Strength	ASTM D 4632	150 lbs MARV	1/200,000 sf
Composite GCL			
Bentonite Mass Per Unit Area (dried 0% moisture)	ASTM D5993	0.75 lb/ft ² – oven dry bentonite	1/40,000 ft ²
GCL Peel Strength ¹	ASTM 6496	35 lbs. minimum 3.5 lbs/in minimum	1/40,000 ft ²
GCL Grab Tensile Strength ¹	ASTM D6768	150 lbs. minimum	1/200,000 ft ²
GCL Index Flux ²	ASTM D5887	1x10 ⁻⁸ m ³ /m ² /sec maximum	1/200,000 ft ²
GCL Permeability	ASTM D5084	5x10 ⁻⁹ cm/sec maximum	1/200,000 ft ²
Interface Shear Strength	Note 4	Note 4	Note 4

¹ Tensile testing performed in machine direction.

² Testing according to Manufacturer's recommendations and in compliance with the specified ASTM test method.

³ Alternate tests are allowed only with prior written approval of Design Engineer.

⁴ See Section 02772, Table 02772-1 for interface shear test requirements.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

- A. GCL subgrade shall be smooth and level and meet the requirements of Section 02200, Article 3.06 and be free of individual particles or protrusions greater than one half inch in diameter, ruts or ridges greater in depth or height than one (1) inch, organics, deleterious materials, or other unsuitable matter prior to GCL installation.

3.02 DEPLOYMENT

- A. General:
 - 1. Deploy only after subgrade is accepted by CQA Officer and Installer.
 - 2. Deploy manually or by use of spreader bar attached to loader or backhoe.
 - 3. Take care not to entrap objects or moisture beneath GCL.
 - 4. Do not deploy GCL during periods of rain or drizzle.
 - 5. Do not deploy GCL over subgrade that has moisture on the surface.
 - 6. Place same non-woven geotextile against geomembrane to match interface shear test conditions in Section 02771.
 - 7. GCL panels shall not be dragged over the prepared subgrade surface. Use a rub sheet to deploy the GCL.
 - 8. GCL panels shall be deployed parallel to the slope by unrolling down the entire length of the slope. Corrections or adjustments shall be made to panels which become askew to the parallel line of the slope.
- B. Restraining and Protecting:
 - 1. Restrain GCL against wind using sandbags filled with fine-grained material.
 - 2. Sandbags must remain until GCL is covered.
 - 3. GCL must be covered with geomembrane the day it is installed. If overlying geomembrane edges are to be pulled back to inspect GCL such action shall occur at no additional cost the County. Torn, punctured, or hydrated material shall be removed and replaced at no additional cost to the County.

3.03 JOINING

- A. Overlaps:
 - 1. Use the lap line and match line guides, overlap a minimum of 6 inches along length for GCL to be placed on the base and 12 inches along the length for GCL to be placed on side slopes greater than 10 percent slope.

2. Overlap a minimum of 12 inches along width and in sump and lysimeter areas.
3. Overlaps or Seams are not allowed perpendicular to slopes greater than 10 percent. In these areas GCLs must be placed in one piece along the entire slope, unless otherwise approved by the Resident Engineer.
4. GCL panels shall not be dragged over the prepared subgrade surface. A plastic slip sheet may be used to position the GCL without dragging it over the prepared subgrade.
5. GCL must be placed continuously along slopes greater than 10 percent and extend throughout the anchor trench at the top of slope and 5-feet beyond the toe of slope.

B. Seams:

1. Spread loose bentonite or bentonite paste at the rate of 4 ounces per lineal foot of overlap or in accordance with the manufacturer's recommendations, whichever is greater.
2. For the Lysimeter GCL to Primary GCL seam, spread two rows of loose bentonite or bentonite paste at the rate of 4 ounces per lineal foot (each row, for a total of 8 ounces per lineal foot) of overlap or in accordance with the manufacturer's recommendations, whichever is greater.
2. Bentonite shall be the same material used in the GCL.
3. Use line spreader if powder bentonite is used to reduce wind-blown particles.
4. Do not sew or use mechanical connections (except for repairs).

3.04 FIELD QUALITY CONTROL AND QUALITY ASSURANCE

A. General:

1. Field quality control is the responsibility of the Installer who must document that the installation proceeds in accordance with this Specification.
2. Field quality assurance is the responsibility of the CQA Officer who is assisted by the CQA Monitor and the Installer. CQA consists of inspections, field testing, laboratory testing, and record keeping.
3. The Manufacturer and Installer shall participate in and conform with all terms and requirements of the County's Quality Assurance Plan. The Contractor shall be responsible for assuring this participation. Quality assurance requirements are as specified in this Section and the Quality Assurance Plan. Product conformance sampling and testing by the Third-Party Laboratory and written acceptance of the product by the CQA Officer must be obtained prior to product shipment by the Manufacturer.

- B. The Installer and CQA Monitor shall inspect:
1. The underlying surface for entrapped particles that may impact the GCL.
 2. The surface of the GCL for punctures, tears, thinning, or other evidence that the material may not meet specification requirements.
 3. The GCL for evidence of premature hydration such as wet areas or swelling. Hydrated areas shall be removed and replaced with dry material.
 4. Evidence of broken needles or metal fragments. If such materials or items are found the CQA staff shall notify the Resident Engineer for assessment of corrective procedure to be followed by the Contractor.
 5. Overlaps using the lap lines and match lines as a guide. The CQA Monitor shall periodically measure the distance of the lap lines and match lines from the edge of the GCL.
 6. GCL is seamed with the correct type and amount of bentonite as required.
 7. The CQA Monitor must approve each section of the GCL before the GCL is covered.
- C. Conformance Testing (Performed by a representative of the Third-Party Laboratory):
1. Conformance samples shall be obtained at the Manufacturer's plant at a frequency of one sample every 100,000 sf and a minimum of one sample per lot. A representative of the Third-Party Laboratory shall obtain samples and forward the samples to the laboratory for testing. Samples shall be obtained across the entire roll width, excluding the first outer wrap of the roll. Sample size shall be 2-feet long by the roll width. Samples may be cut into smaller specimens for shipping. The sampler shall mark the machine direction on the sample (and each piece if cut into smaller segments).
 2. The following tests shall be performed on the conformance samples to determine GCL characteristics and results shall be evaluated according to ASTM D4759.
 - a. Mass per Unit Area of Bentonite (ASTM D5993)
 - b. Grab Tensile Strength of GCL (ASTM D4632)
 - c. Index Flux of GCL (ASTM D5887)
 - d. Peel Strength (ASTM D6496)
 3. Any roll that cannot be identified shall be rejected.
 4. Mark the roll number and machine direction on each sample or specimens.

END OF SECTION 02774

**SECTION 02900
SEEDING AND FERTILIZING**

PART I GENERAL

1.01 SUMMARY

- A. The Contractor shall seed and fertilize all disturbed soil surfaces, all perimeter excavation and fill slopes, earthen drainage ditches and berms in accordance with this Section. Seed shall be applied at the end of the project after the access roads, drainage structures, berms and soil layers have been placed to grade and have all finish grading completed. The Contractor shall furnish all labor, supervision, tools, materials, equipment, transportation, and incidentals as necessary to seed and fertilize the various areas identified herein.

1.02 REFERENCES

- A. Caltrans Standard Specifications. California Department of Transportation , 2018.
- B. Caltrans Standard Plans. California Department of Transportation, 2018.
- C. Specification 02725 – Erosion Control Matting.

1.03 SUBMITTALS

- A. Prior to seeding, the Contractor shall submit to the Resident Engineer, in triplicate, the name and location of material sources, laboratory test results, and/or material data sheets conforming to the relevant details shown on the Plans and as outlined herein.
- B. Prior to seeding, the Contractor shall submit to the Resident Engineer, in triplicate, the results of laboratory tests of the soil in the area to receive seeding and recommended fertilization rates.
- C. After seeding, the Contractor shall submit to the CQA Monitor the certified tags from the seed bags.

1.04 QUALITY ASSURANCE

- A. Testing and Observation
 - a. Testing and observation of the seeding, fertilizing and mulching shall be conducted in accordance with the CQA Manual.
 - b. If any portion(s) of the seeding and fertilizing is determined by the CQA Monitor to not meet the requirements of this Section, the Contractor, at his expense, shall rework that portion(s) to meet the requirements of this Section as directed by the Resident Engineer.

PART 2 PRODUCTS

2.01 SEED

- A. Seeding and Fertilizing shall conform to the provisions of Section 21 of the Standard Specifications.
- B. The seed shall consist of a mix of the following species and be applied at the rate shown below:

• Meadow Barley	10 lbs/AC
• Alkali Barley	6 lbs/AC
• Saltgrass	6 lbs/AC
• Pinpoint clover	3 lbs/AC
• Popcorn Flower	2 lbs/AC
• Goldfields	2 lbs/AC

2.02 FERTILIZER

- A. Fertilizer shall consist of the following components and percentages or as needed based on testing by Contractor:

• Ammonia Phosphate Sulfate	16 percent
• Phosphoric Acid	20 percent
• Water Soluble Potash	0 percent

2.03 Erosion Control Matting

- A. See Specification 02725.

PART 3 EXECUTION

3.01 GENERAL

- A. Install Erosion Control Matting on all areas steeper than 10% in accordance with Specification 02725.
- B. The method and equipment used to spread the seed and fertilizer shall be subject to the approval of the Resident Engineer.
- C. Seed and fertilizer shall be applied after the access roads, drainage structures and berms, and soil layers have been placed to grade and approved.
- D. Seed and fertilizer shall not be applied to the access roads, inside the cell disposal area or inside stormwater retention basins.

3.02 APPLICATION

- A. The application of seed and fertilizer shall be performed by hydroseeding methods using the following steps:

1. Step 1: Seed and fiber shall be hydroseeded onto the designated surfaces at a rate of 150 lbs/AC and 500 lbs/AC, respectively.
 2. Step 2: Hydromulch, with tackifier and fertilizer, shall then be applied at rates of 500 lbs/AC (fiber), 150 lbs/AC (tackifier [M-binder, organic bean base glue]), and 200 lbs/AC (fertilizer).
- B. The seed and fertilizer shall be spread uniformly over all areas subject to revegetation.

3.03 MAINTENANCE AND REPLACEMENT

- A. General:
1. Begin maintenance of seeded areas immediately after each portion is planted and continue until final acceptance or for a specific time period as stated below, whichever is the longer.
 2. Provide and maintain temporary piping, hoses, and watering equipment as required to convey water from water sources, provided by the Contractor, to keep planted areas uniformly moist as required for proper growth.
 3. Protection of new materials:
 - a. Provide barricades, coverings or other types of protection necessary to prevent damage to existing improvements indicated to remain. Repair and pay for all damaged items.
 4. Replace unacceptable materials with materials and methods identical to the original specifications unless otherwise approved by the Resident Engineer at no cost to the County.
- B. Maintain all areas seeded until 80% of area seeded has established vegetation as determined by Resident Engineer.
- C. Water according to need to maintain survival of planting.
- D. Regrade and replant eroded or bare areas until project accepted by Owner.

END OF SECTION 02900

Division 3

Concrete

SECTION 03200 REINFORCING STEEL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. The Contractor shall furnish and install reinforcing steel where shown on the Construction Drawings, as specified herein, and as needed for a complete and proper installation.

1.02 RELATED SECTIONS

- A. Section 03300 – Cast-in-Place Concrete

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. Uniform Building Code (UBC) Section 1701 Structural Tests and Inspections – Special Inspections.
- B. ASTM A 615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. Concrete Reinforcing Steel Institute (CRSI)
- D. California Department of Transportation, Standard Specifications and Standard Plans, (2018).

1.04 QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with the requirements of Section 1701 of the UBC. The Contractor shall notify the Resident Engineer at least two working days in advance of reinforcing bar placement.
- B. If the Resident Engineer's review of the Contractor's submittals indicates materials do not meet specified requirements, the Contractor shall provide alternate material and submit corresponding test results and/or certification to the Engineer for approval.
- C. If field inspections indicate that the work does not meet installation specifications, the Contractor, at his expense, shall remove the work and replace in accordance with the required specifications.

1.05 CONTRACTOR'S SUBMITTALS

- A. The Contractor shall submit the name and location of the source and manufacturer's certificates for steel reinforcement to be used showing that the material meets or exceeds the product requirements.

PART 2 PRODUCTS

2.01 REINFORCING STEEL

- A. Comply with the following as minimums:

1. Bars: ASTM A615, grade 60 unless otherwise shown on the Drawings, using deformed bars for number 3 and larger,
 2. Welded Wire Fabric: ASTM A185,
 3. Bending: ACI 318.
- B. Fabricate reinforcement to the required shapes and dimensions, within fabrication tolerances stated in the CRSI "Manual of Standard Practices."
- C. Do not use reinforcement having any of the following defects:
1. Bar lengths, depths, or bends exceeding the specified fabricating tolerances,
 2. Bends or kinks not indicated on the Drawings or required for this Work,
 3. Bars with cross-section reduced due to excessive rust or other causes.

PART 3 EXECUTION

3.01 PREPARATION AND PLACEMENT

- A. Comply with the following, as well as the specified standards, for details and methods of reinforcing placement and supports.
1. Clean reinforcement and remove loose dust and mill scale, earth, and other materials which reduce bond or destroy bond with concrete.
 2. Position, support, and secure reinforcement to prevent displacement by forms, construction, and the concrete placement operations.
 3. Place reinforcement to obtain the required coverages for concrete protection.
 4. Install welded wire fabric in as long lengths as practicable, overlapping adjoining pieces one full mesh minimum.
 5. Unless otherwise shown on the Construction Drawings, or required by governmental agencies having jurisdiction, overlap bars 32 diameters minimum.
 6. Unless otherwise noted, place reinforcing steel with the following clearances:
 1. Cast against earth: 3 inches
 2. Cast against forms, backfilled with earth: 2 inches
 3. Cast against forms, not backfilled with earth: 1.5 inches
 4. In slabs: mid-depth

END OF SECTION 03200

SECTION 03300 CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and installing all cast-in-place concrete, including formwork and reinforcement, where shown on the Construction Drawings, as specified herein, and as needed for a complete and proper installation. Concrete is required in, but not limited to, the leachate secondary containment, riser pipe apron, grouted riprap, guard posts, fence posts, support posts, electrical trench and pull box, concrete pipe and grated inlet.

1.02 RELATED SECTIONS

- A. Section 02200 – Earthwork
- B. Section 02722 – Drainage and Erosion Control
- C. Section 03200 – Reinforcing Steel
- D. Section 15100 – Leachate Extraction
- E. Section 15200 – HDPE Pipe
- F. Section 15480 – PVC Piping
- G. Section 16050 – Basic Electrical Requirements

1.03 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ACI 301 Specifications for Structural Concrete for Buildings
- B. ACI 308 Standard Practice for Curing Concrete
- C. ACI 318 Building Code Requirements for Reinforced Concrete
- D. ASTM C 33 Standard Specification for Concrete Aggregates.
- E. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- F. ASTM C 42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- G. ASTM C 94 Standard Specification for Ready-Mixed Concrete
- H. ASTM C 143 Standard Test Method for Slump of Portland Cement Concrete.
- I. ASTM C 150 Standard Specification for Portland Cement.
- J. UBC Section 1701 Structural tests and Inspections – Special Inspections
- K. UBC Section 1905 Concrete – Concrete Quality, Mixing and Placing.
- L. The State of California, Department of Transportation, Standard Specifications and Standard Plans, (2018).

1.04 QUALITY CONTROL

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Field inspection and testing will be performed in accordance with the requirements of Section 1701 of the UBC. The Contractor shall notify the Engineer at least two days in advance of concrete placement.
- C. Before any cement is deployed from cement trucks, one (1) slump test shall be performed by the CQA monitor in accordance with ASTM C143. These tests shall be performed per project and per day. If a slump test fails, the cement loads will be rejected. See section 3.05 of this this specification.
- D. Comply with ACI 301, except as may be modified herein.
- E. Provide access for, and cooperate with, the CQA Monitor and testing laboratory.
- F. Do not commence placement of concrete until mix designs have been reviewed and approved by the Resident Engineer, and all governmental agencies having jurisdiction, and until copies of the approved mix designs are at the Site and the batch plant, and the reinforcing steel has been inspected and approved by the Resident Engineer.
- G. If the Resident Engineer's review of Contractor's submittals indicates that materials do not meet specified requirements, Contractor shall provide alternate material and submit corresponding test results and/or certification to the Engineer for approval.
- H. Four (4) concrete test cylinders will be taken by an independent testing laboratory for every 150 cubic yards of concrete placed, but not less than one set per day per storage facility or riser pipe apron. One of the test cylinders shall be tested at 7 days for 70 percent of design strength, two shall be tested at 28 days for full design strength, and one shall be held until the final acceptance of the project.

1.05 CONTRACTOR'S SUBMITTALS

- A. The Contractor shall provide the name and location of source, laboratory test results, and product data sheets (mix design) for the concrete to be used showing that the material meets or exceeds the product requirements. If more than one (1) concrete mix is to be used, mix designs for each area shall be submitted and clearly marked as to the area of work that the mix is intended for.
- B. The Contractor shall submit, in accordance with Specification 01300, a proposed schedule and layout of concrete placement including construction, contraction and expansion joints needed for each apron and containment structure.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of ACI 301.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Design, erect, support, brace, and maintain formwork so it will safely support vertical and lateral loads which might be applied until such loads can be supported safely by the

concrete structure. Forms shall comply with the applicable requirements of standard specifications Section 51-1.05.

- B. Construct formwork to the exact sizes, shapes, lines, and dimensions shown on the Construction Drawings, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
- C. Tulare County will verify cement forms for line and grade before cement can be placed. If forms are not set correctly, they shall be re-set at contractor's expense.

2.02 MOISTURE BARRIER

- A. Where so indicated on the Construction Drawings, provide a moisture barrier consisting of the following:
 - 1. Four inches of clean dry sand, evenly spread as a cushion.
 - 2. "Visqueen" or equal 6 mil thick plastic sheeting.
 - 3. Two inches of clean dry sand, evenly spread on top of the installed plastic sheeting.

2.03 REINFORCEMENT

- A. Reinforcing steel product must comply with the criteria specified in Section 03200.

2.04 CONCRETE

The class, strength, mix, curing and testing of concrete shall conform to provisions of ACI 308 unless otherwise specified in plans or in these specifications.

- A. Comply with the Following as Minimums:
 - 1. Portland Cement: ASTM C150, Type I or II, low alkali.
 - 2. Aggregate, General:
 - a. ASTM C33, uniformly graded and clean.
 - b. Do not use aggregate known to cause excessive shrinkage.
 - 3. Aggregate, Coarse: Crushed rock or washed gravel with maximum size between 3/4-inch and 1-inch, and with a minimum size number 4 sieve.
 - 4. Aggregate, Fine: Natural washed sand of hard and durable particles varying from fines to particles passing a 3/8-inch screen, of which at least 12 percent shall pass a 50-mesh screen and no more than 3 percent shall pass the number 200 sieve.
 - 5. Water: Clean and potable.
- B. Provide concrete with the following compressive strengths:
 - 1. Leachate Storage Structure 3,500 psi at 28 days
 - 2. Riser Pipe Apron 2,800 psi at 28 days
 - 3. Minor Concrete 2,500 psi at 28 days

- C. Surface Treatment: Except as otherwise directed by the Resident Engineer or shown on the Construction Drawings, all newly placed concrete slabs shall be cured with pigmented curing compounds conforming to the requirements of ASTM Designation: C309 Type 2, Class B.

2.05 MINOR CONCRETE

- A. Concrete for fence posts, guard posts, and other non-structural features shall conform to the requirements for minor concrete in Section 90-2 of the Caltrans Standard Specifications.

2.06 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Resident Engineer.

PART 3 EXECUTION

3.01 GENERAL

- A. Mix and place concrete in conformance with Section 1905 of the UBC and in accordance with ACI quality standards.
- B. Comply with Section 90 of the Standard Specifications except as specified herein.

3.02 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completions of the Work. Notify the Resident Engineer of such conditions and proposed corrective action before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.03 REINFORCEMENT

- A. Install reinforcing steel in accordance with the criteria specified in Section 03200.

3.04 EMBEDDED ITEMS

- A. Do not embed piping or conduit in structural concrete.
- B. Embedded items shall be set in concrete as indicated on the Construction Drawings.
- C. Set bolts, inserts, and other required items in the concrete, secured so they will not be displaced, and in the precise locations needed. Set anchor bolts within tolerances recommended by the manufacturer. Anchor bolts may be epoxied if approved through a submittal.
- D. Do not cut in-place concrete to place work left out through oversight, except by approval of the Resident Engineer.

3.05 MIXING CONCRETE

- A. Transit mix the concrete in accordance with provisions of Section 90 of the Caltrans Standard Specifications.
- B. Upon arrival at the job site before the concrete is discharged from the mixer.

1. Slump allowance shall be between 2 and 4 inches as determined using ASTM C143.
 2. Supply test cone and all other required materials to perform test.
- C. Do not use concrete that has stood for over 30 minutes after leaving the mixer, or concrete that is not placed within 60 minutes after water is first introduced into the mix.

3.06 TESTING

- A. Provide strength tests of concrete Samples in accordance with reference document in Article 1.04.
- A. Prepare standard test cylinders from concrete batches specified by the Resident Engineer, and test samples in accordance with ASTM C39.
- B. Submit certified test results to the Resident Engineer.
- C. If any one of the samples fails to meet the specified 28-day minimum ultimate compressive strength, all concrete poured on that day will be assumed to be defective and cores from selected areas shall be taken as directed by the Resident Engineer and tested in accordance with ASTM C42.
- D. If the compressive strength of the concrete cores fails to meet the specified strength test criteria, the in-place concrete will be considered defective and shall be removed or adequately strengthened as directed by the Resident Engineer.
- F. Perform all required additional coring, testing of cores, and repair work pertaining to defective concrete at no additional cost to the County.

3.07 CONCRETE PLACEMENT

- A. Preparation:
 1. Remove foreign matter accumulated in the forms and footing excavations.
 2. Rigidly close openings left in the formwork.
 3. Wet wooden formwork sufficiently to tighten up cracks; wet other material sufficiently to maintain workability of the concrete.
 4. Use only clean tools.
 5. Do not place concrete in weather conditions which may be detrimental to the quality of the final product, including:
 - a. temperature below 32°F
 - b. during precipitation
 - c. in the presence of excessive moisture (fog, dew, mist, etc.)
- B. Conveying:
 1. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
 2. Deposit concrete in its final location, as practicable, so as to avoid separation due to rehandling and flowing.

3. Do not use concrete which becomes non-plastic and unworkable, or does not meet required quality control limits, or has been contaminated by foreign materials.
 4. Remove rejected concrete from the job site.
 - C. Placing Concrete in Forms:
 1. Deposit concrete in horizontal layers not deeper than 24 inches and avoid inclined construction joints.
 2. Remove temporary spreaders in forms when concrete has reached the elevation of the spreaders.
 - D. Placing Concrete Slabs:
 1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or Section is completed.
 2. Bring slab surfaces to the correct level and slope with a straightedge, and then strike off.
 3. Use bullfloats or darbies to smooth the surface, leaving the surface free from bumps and hollows.
 4. Do not sprinkle water on the plastic surface. Do not disturb the slab surface prior to start of finishing operations.
- 3.08 CONSOLIDATION
- A. General:
 1. Consolidate each layer of concrete immediately after placing, by use of internal concrete vibrators supplemented by hand spading, rodding, or tamping.
 2. Do not vibrate forms or reinforcement.
 3. Do not use vibrators to transport concrete inside the forms.
- 3.09 JOINTS
- A. Construction Joints:
 1. Do not use horizontal construction joints except as may be shown on the Drawings.
 2. If additional construction joints are found to be required, secure the Resident Engineer's approval of joint design and location prior to start of concrete placement.
 - B. Expansion Joints:
 1. Do not permit reinforcement or other embedded metal items that are being bonded with concrete to extend continuously through any expansion joint, except for saw-cut joints.
 2. Fill expansion joints full depth with expansion joint material approved by the Resident Engineer.

3.10 CONCRETE FINISHING

- A. Except as may be shown otherwise on the Construction Drawings, provide the following finishes at the indicated locations.
 - 1. Class I Trowel Finish: Apply to exposed vertical surfaces above finished ground and to at least 1 foot below finished ground.
 - 2. Non-slip Broom Finish: Apply to horizontal surfaces of slabs and bases.
- B. Finished work shall contact a 10-foot straight edge in any direction with a 1/8-inch maximum tolerance.
- C. Provide finished concrete surfaces conforming to the following tolerances:
 - 1. Maximum Variation from Plumb in all Vertical Lines and Surfaces: 1/4 inch in 10 feet.
 - 2. Maximum Variation from Level or Grades Indicated: 1/4 inch in 10 feet.
 - 3. Maximum Variation in Cross-Sectional Dimensions and Slab Thickness: minus 1/4 inch, plus 1/4 inch.

3.11 CURING

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for the period necessary for hydration of cement and hardening of concrete.
- C. Cure surfaces in accordance with ACI 308 or in accordance with the Standard Specification section 90.
- D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 4 days minimum.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days minimum.
- F. Forms for slabs may be removed after a minimum of 24 hours, or when the concrete is strong enough to not be damaged during form removal, whichever is longer. Forms for walls may be removed after the concrete has reached the required 28-day compressive strength.

3.12 PROTECTION OF WORK

- A. Protect all concrete pours from damage or premature loadings prior to complete curing of the concrete.

3.13 REMEDIAL WORK

- A. Repair or replace deficient or damaged work as directed by the Resident Engineer and at no additional cost to the County.

END OF SECTION 03300

Division 11 Equipment

SECTION 11000 EQUIPMENT

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes furnishing all labor, materials, equipment, and incidentals necessary to fabricate, install, test, and make ready for use an automatic operated landfill leachate pumping and storage system, including all required piping, valves, pressure transducers, pumps, flow meters, hour meters, totalizers, tanks and equipment enclosure housing; all as shown on the Construction Drawings and as specified herein.

1.02 RELATED SECTIONS

- A. Section 01730 – Installation, Operation, and Maintenance Instructions
- B. Section 02200 – Earthwork
- C. Section 03300 – Concrete
- D. Section 15200 – HDPE Pipe
- E. Section 15480 – PVC Piping
- F. Section 16050 – Basic Electrical Requirements
- G. Section 16100 – Basic Electrical Materials and Methods
- H. Section 16910 – Control Panels
- I. Section 16911 – Cellular Telemetry

1.03 SUBMITTALS

- A. The Contractor shall submit the following materials list, Manufacturer's Specifications, installation procedures, and Shop Drawings to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before material shipment.
 - 1. Materials list of items proposed to be provided under this Section;
 - 2. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements of this project;

3. Manufacturer's recommended installation instructions which, when approved by the Resident Engineer, will become part of the basis for accepting or rejecting actual installation procedures used on the work.
 4. Shop Drawings in sufficient details showing the fabrication, installation, anchoring, and interfacing of the work of this Section with the work of other sections.
 5. List of recommended spare parts for pumps.
- B. Shop Drawing: Within 15 calendar days after the Contractor has received the County's Notice to Proceed, submit Shop Drawings in sufficient detail showing the fabrication, installation, anchoring, and interfacing the work of this Section with the work of other sections.
- C. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Resident Engineer three complete operation and maintenance manuals and as-constructed Record Drawings as specified in Sections 01720 and 01730.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.
- B. Without additional cost to the County, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- C. Regulatory Requirements:
1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern unless otherwise approved by the Resident Engineer.
 3. In addition to complying with the specified requirements, comply with the directions of the Resident Engineer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Materials and equipment delivered to the site shall be handled, transported and stored in accordance with the requirements of the manufacturer and to ensure completed work meets the requirements of the Contract Documents.

1.06 WARRANTY

- A. Contractor will provide a one-year warranty on all materials, equipment, and labor furnished for all work performed. The warranty period begins upon final payment made by the County for this Contract.

1.07 SYSTEM STARTUP

- A. The Contractor is required to coordinate and verify that the system is properly installed and provide a training session to be given by a factory representative of the manufacturer of the equipment for select site personnel and the Resident Engineer. The Resident Engineer shall be notified 7 days prior to the intended start-up of the equipment.

1.08 MAINTENANCE

- A. Contractor will be required to be available for two weeks after the initial system startup system to make any necessary adjustments, repairs, or maintenance for proper system operation at no cost to the County.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide only equipment that is new, and of the type and quality specified.
- B. All equipment furnished under this section shall be rated for service in harsh and potentially explosive environments and shall have a proven performance of not less than five years in actual landfill collection and pump service.

2.02 PIPE AND FITTINGS

- A. All pipe and fittings shall conform to the requirements of Sections 15200 – HDPE Pipe and 15480 – PVC Piping unless noted otherwise.

2.03 SUMP PUMPS

- A. General:
 - 1. Provide a complete leachate sump pumping system including submersible sump pumps, sump level controls, flowmeters, totalizers and pump control

panels as described in Technical Specification 15100 – Leachate Extraction and Storage Systems.

2. Provide two complete spare pumps with carriage and transducers. Transducer to be installed with power and level sensor cable lengths to be installed in the deepest application in service.

B. Leachate Sump Pumps:

Provide submersible pumps and motors as described in Technical Specification 15100 – Leachate Extraction and Storage Systems. Pumps and motors shall be suitable for installation in an inclined side slope riser pipe.

1. Pump and motor performance requirements for the Landfill shall be as follows:
 - a. Fluid pumped: Leachate
 - b. Flowrate, gpm: 5 - 15
 - c. Total dynamic head at Specified flowrate, ft: 75
 - d. Operating range, gpm: 2-14
 - e. Motor size, max. hp: 0.5
 - f. Motor type: AC Induction
 - g. Motor voltage: 230/208
 - h. Motor phase: single phase
 - i. Pump discharge, inch NPT: 1-1/4 inch.
2. Pump and motor materials of construction shall be as follows:

a.	All metallic pump components in contact with the pumped fluid	Stainless steel, 300 series
b.	Pump shaft bearings	Teflon
c.	Impeller seal rings	Teflon
d.	Check valve housing	Stainless steel, 300 Series
e.	Check valve	Stainless steel, 300 Series
f.	Check value seat	Teflon

- | | | |
|----|---|--------------------------------|
| g. | Motor-to-pump coupling | Stainless steel,
300 Series |
| h. | All metallic motor components in
contact with pumped fluid | Stainless steel
300 Series |
| i. | Shaft seal, diaphragm, slinger | Viton |
| j. | Lead bushing | Viton |
| k. | Seal cover | Tefzel |

3. Additional features shall include:

- a. Pump and motor suitable for installation in an inclined 18-inch diameter side slope riser pipe.
- b. Wheels at both ends of the pump and motor for ease of removal past an 18-inch elbow.
- c. Stainless steel pump pull cable attached at the pump and the top end of the riser pipe with at least 10 feet of slack.
- d. 1-1/4-inch HDPE flexible discharge hose for landfill cell with minimum pressure rating of 125 psi, firmly attached to pump and fitted with a stainless-steel quick coupling for connection to the leachate force main, in accordance with manufacturer's requirements.
- e. Motor submersible and hermetically sealed.
- f. Motor thermal overload protection in motor windings.
- g. Motor power cable insulation, no splice, waterproof and chemically resistant, of sufficient length to connect motor to extraction riser pipe cap fittings, with at least 5 feet of slack.

4. Breakout Box:

- a. Provide one lockable breakout box, EPG Companies, Inc. Model BJBL 600B, or approved equal for each transducer on each installed pump.
- b. Provide one breakout box, Hoffman Model A808CFHL, or approved equal for each power cable for each installed pump.

- c. Transducer and power cables to be installed in flexible conduit from the breakout box to the pumps.
 - d. Breakout box to be pole-mounted at four feet above finished grade.
5. Pump Level Control System. Provide one pump control panel and level sensor for each pump. Sensor system shall include:
- a. NEMA 4 cabinet with lockable outer door with window
 - b. Disconnect switch, motor starter, overload relay.
 - c. Motor "Ready" and "Run" lights
 - d. Motor start winding control with Hand-Off-Auto selector switch
 - e. Level Controller
 - f. Lighting arrestor
 - g. Corrosion inhibitor
6. Level sensor system shall include:
- a. Submersible pressure transmitter of 316 stainless steel and Viton construction
 - b. Operating range of 0 to 15 feet of water with a 4 to 20 mA output signal
 - c. Intrinsically safe transmitter circuitry
 - d. Shielded single cable with vent tube with chemical resistant polyurethane cable jacket
 - e. 3.5-inch digit LED display
 - f. Temperature and atmospheric pressure compensation
 - g. Minimum of 3 high and 3 low display/alarm/activation set points
7. Pump level control system function shall be as follows:
- a. The level sensor, attached to the bottom of the submersible pump, transmits a 4 to 20 ma signal proportional to liquid level (pressure) to the level controller in the control panel.
 - b. The digital readout indicates the transmitted signal as inches of water level.

- c. The sensor/controller/readout/ system shall be factory calibrated such that the 4-20ma signal corresponds to 0 to 180 inches of water level above the sensor.
- d. The initial control settings shall be as follows:

<u>Function</u>	<u>Setting Inches of Water Above Sensor</u>
Pump Start	12
Pump Stop	6
High-level alarm	18

- e. The high-level condition shall be transmitted to the control panel through a red blinking light on top of the panel.

2.04 INSTRUMENTATION

A. Flow meter and readout:

- 1. For each sump wellhead: provide one flow meter with a read out at the Control Panel for total flow. Flow capacity from 0 to 80 gpm, and 175 psi maximum operating pressure.
- 2. Contractor to coordinate the purchase and installation of the Control Panel with project requirements including Electrical

2.05 NUTS, BOLTS AND WASHERS

- A. Bolts, nuts and washers for all applications shall be 316 stainless steel, conforming to the requirements of ASTM A593.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

- A. The landfill leachate equipment and all accessories, pipes, and fittings shall be off-loaded, stored and handled with extreme care to avoid any damage. All items shall be closely inspected for damage prior to off-loading. All damaged items shall be rejected and sent back immediately to the manufacturer/supplier. Damage occurring as a result of storage or handling shall be cause for rejection.
- B. Provide two complete carriage mounted backup pumps and motors with level sensors, power and level sensor cables for installation in the deepest application. A hose need not be provided for the backup pumps.

3.02 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

3.03 INSTALLATION OF EQUIPMENT

- A. Coordination of delivery schedules for equipment to be provided by the Contractor.
- B. Installation of all components to be performed by properly trained and skilled workers.
- C. Coordinate as required with other trades to assure proper and adequate provision in the work of those trades for interface with the work of this Section.
- D. Install the work of this Section in strict accordance with the original design, the approved Shop Drawings, pertinent requirements of governmental agencies having jurisdiction, and the manufacturer's recommended installation procedures as approved by the Design Engineer, anchoring all components firmly into position for long life under hard use.
- E. Upon completion of the installation, make all required arrangements, conduct all required tests, make all required changes, and secure all required inspections and approvals. Contractor to provide pump manufacturer's technical representative for on-site testing, operation, and training at completion of system installation.
- F. Testing:
 - 1. Prior to acceptance, an operational test of the landfill leachate system shall be performed to determine if the installed equipment meets the purpose and intent of the specifications. Tests shall demonstrate that the equipment is not mechanically, structurally, or otherwise defective; is in safe and satisfactory operating condition; and conforms with the specified operating characteristics. Tests shall include checks for excessive vibration, leaks in all piping and seals, correct operations of control systems and equipment, proper alignment, excessive noise levels, and power consumption.
 - 2. If any deficiencies are revealed during any test, such deficiencies shall be corrected, and the test re-conducted.
- G. When final approvals have been received, demonstrate to select site personnel and the Resident Engineer that the contents of the operation and maintenance manuals are complete as required under Sections 01720 and 01730.

END OF SECTION 11000

Division 15
Mechanical

SECTION 15100 LEACHATE EXTRACTION AND STORAGE SYSTEMS

PART 1 GENERAL

1.01 SUMMARY

- A. The work encompassed by this Section shall consist of performing all operations and furnishing all labor, materials, tools, equipment, and incidentals as necessary for installation of the following:
1. Leachate extraction pumping systems as outlined in this section consisting of pumps and motors with power cables (complete pump assembly); system controllers and level sensor(s), deployment and retrieval system to include pump carriage along with a 3/16" diameter, 300 series, stainless-steel pump pull cable, and associated discharge hose/pipe and appropriate fittings to exit the sumps or risers and connect to the storage tanks. Each system to be tested, complete and per the conditions shown on the Plans and specified herein. Operations and Maintenance training to be provided to the Owner.
 2. For each area or cell, furnish and install a complete leachate extraction pumping system and level sensor described above in both the primary and lysimeter sumps for each system, connecting both pumps to the control panel. In addition, furnish two complete carriage mounted backup pumps and motors with level sensors, power and level sensor cables for installation in the deepest application. A hose need not be provided for the backup pumps.
 3. Leachate storage tanks, high level sensors, sight gauge, tank tie-downs, piping between tanks, valves, discharge pipes from the extraction risers to the tanks including any anchor assemblies, flow meters, hour meters, totalizers, and any incidentals for a complete installation. All cement anchors shall be stainless steel.
 4. Connect each leachate extraction system (IIA and IIB) to the electrical power supply and control panel.
 5. All work shall be performed by trade professionals.
- B. Coordinate with Division 16 of these specifications.

1.02 EXPERIENCE ASSURANCE

- A. All equipment within the leachate extraction pumping systems listed in this section shall be provided by a single manufacturer (Leachator™ Pumping Systems, Inc. of Cumming, Georgia 1- 800-640-9208) who shall have complete responsibility for the systems. The manufacturer shall be a duly incorporated, licensed, and insured entity with a minimum of ten (10) years experience in providing complete leachate extraction pumping systems for landfills and other wastewater applications.
- B. The supplier of the leachate extraction and removal systems shall provide all warranty and warranty services without regard for or dependence on pass through warranties, which may or may not be provided by the original equipment manufacturer (OEM) of various

components of the systems for a period of 60 months from date of start-up by the manufacturer's representative.

- C. Any system manufacturer or supplier not specifically named as an approved manufacturer must provide a complete submittal package to the Resident Engineer prior to the bid date for pre-approval as an equal system provider. It is the Resident Engineer's purpose to ensure that the equipment provided on the project be of satisfactory performance and quality to give the end-user the maximum long lived benefit as possible. To simplify comparison, the manufacturer seeking approval will address each paragraph as either "no exception taken" meaning acceptance of both the fact and spirit of the specification or "exception taken" with relevant information and data arguing equality to the specification requirement.

1.03 QUALITY ASSURANCE

- A. Without additional cost to the County, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Contract Documents.
- B. Regulatory Requirements:
 - 1. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 - 2. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirements will govern unless otherwise approved by the Resident Engineer.
 - 3. In addition to complying with the specified requirements, comply with the directions of the Resident Engineer.

1.04 SUBMITTALS

- A. At least 14 days prior to delivery of the system components to the site, the contractor shall submit the following, in triplicate, to the Engineer for approval.
 - 1. A complete list of components provided
 - 2. List of recommended spare parts for pumps
 - 3. Manufacturer's Specifications and other data needed to prove compliance with the specified requirements of this project
 - 4. Manufacturer's recommended installation instructions which, when approved by the Resident Engineer, will become part of the basis for accepting or rejecting actual installation procedures used on the work
 - 5. Pump curves
 - 6. Motor data
 - 7. System layout drawing
 - 8. Control panel drawings consisting of wiring schematic(s)
 - 9. Bill of materials and component layout drawing

10. Shop drawings in sufficient detail showing the fabrication, installation, anchoring, and interfacing of the work of this Section with the work of other sections
11. Warranty statement.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Materials and equipment delivered to the site shall be handled, transported and stored in accordance with the requirements of the manufacturer and to ensure completed work meets the requirements of the Contract Documents.

PART 2 PRODUCTS

2.01 PUMPS

- A. The Contractor shall furnish and install a complete simplex leachate extraction pumping system as manufactured by Leachator™ Pumping Systems, Inc. of Cumming, Georgia (1-800-640-9208) or approved equal.
- B. Pump shall be of centrifugal multi-stage turbine submersible design suitable for primary landfill leachate. The pump shall be coupled to a submersible motor that is non-overloading throughout the operating curve of the pump.
- C. Pump shall be Leachator™ Model LPS010MSTG1X005-09, or approved equal, rated for a minimum duty performance of 13 gallons per minute (GPM) at 75' Total Dynamic Head (TDH) and as an additional point on the curve, a minimum of 8 GPM at 150' TDH. Shut-off head shall be a minimum 200' TDH.
- D. Pump motors shall be ½ horsepower and shall operate on 240-volt, single phase, 60 hertz supply power.
- E. Pump design shall include the following features:
 1. Integral check valve of 300 series stainless steel.
 2. All series 300 stainless steel construction shall include impellers, bowls, guide vanes, and inlet screen.
 3. Each impeller shall have a Teflon seal ring to reduce hydraulic losses.
 4. All shaft bearings shall be Teflon.
 5. A stainless-steel flow inducer shall be provided at the pump inlet.
- F. Pumps shall be suitable for installation in an inclined side slope riser pipe.
- G. Provide one breakout box, EPG Companies, Inc. Model BJBL 600B, or approved equal for each transducer cable for each installed pump. Provide one breakout box, Hoffman Model A808CFHL, or approved equal for each power cable for each installed pump. Transducer and power cables to installed in separate flexible conduits from the breakout box to the pumps. Mount breakout boxes four (4) feet off ground for access. Coordinate with Owner on exact location.
- H. Extend the underground power and transducer cables from the Control Panel to the breakout boxes.

- I. Additional features shall include:
 - 1. Wheels at both ends of the pump and motor for ease of removal.
 - 2. A 3/16" diameter, 300 series stainless steel pump pull cable attached at the pump and the top end of the riser pipe with at least 10 feet of slack.

2.02 MOTOR DESIGN

- A. The motor shall be squirrel-cage induction type motor for submersible application and conform to NEMA standards.
- B. All materials coming in contact with leachate shall be 300 series stainless steel, Viton, Teflon or Tefzel.
- C. The motor shall not require the use of oil or grease for lubrication.
- D. The motor shall have a Kingsbury type thrust bearing capable of handling the maximum thrust load of the pump.
- E. Motor pressure equalizing diaphragm assembly shall be Viton.
- F. Motor shall be suitable for installation in an inclined side slope riser pipe.
- G. Additional features shall include:
 - 1. Wheels at both ends of the pump and motor for easy removal.
 - 2. Thermal overload protection in motor windings.
 - 3. Power cable insulation, no splice, waterproof and chemically resistant, of sufficient length to connect motor to extraction riser pipe cap fittings, with at least 5 feet of slack.

2.03 CARRIAGE

- A. The pump shall be mounted in a series 300 stainless steel carriage.
- B. The carriage shall provide a low center of gravity and all wheels shall remain in contact with the inner contour of the riser pipe. The wheels shall be constructed of non-corrosive material with self-lubricating qualities and must be able to travel over welding beads typically found in riser pipe fabrications and pass-through elbows in riser pipe. A stainless-steel inlet suction screen shall be provided to prevent debris from entering the inlet of the pump.
- C. The level sensor shall be carriage mounted and be removable or replaceable without disassembly of the pump assembly or removal of the pump from the carriage. Sensor cable shall be field trimmed to proper length at time of installation by the installing contractor.
- D. A safety/retrieval cable assembly with properly sized cable clips, snap hooks, and anchor eye bolt constructed of 300 series stainless steel shall be provided.

2.04 DISCHARGE HOSE

- A. Discharge hose shall be a minimum 1" thermoplastic vinyl nitrile rubber (VNBR) flexible hose rated for 300 PSI and -20 to +180 degrees Fahrenheit.
- B. Hose shall be field trimmed to proper length at time of installation by the installing contractor.

2.05 DISCHARGE HOSE FITTINGS

- A. All hose fittings shall be 300 series stainless steel. All hose bands shall be hi-torque 300 series stainless construction. All hose fittings and bands shall be suitable for the application.

2.06 DISCHARGE EXIT FITTINGS

- A. A riser side exit disconnect fitting shall be provided, that will allow quick connection/disconnection of the pump discharge hose from the riser exit and allow the pump to be removed without interference of the stationary fittings. The exit arrangement shall thread through the riser pipe as to provide a gas tight connection.
- B. All fittings shall be 300 series stainless steel construction.
- C. The exit connections will penetrate the riser wall approximately 6" from the top of the riser pipe by means of 300 series stainless-steel, male threaded exit nipple or similar approved connection.

2.07 DISCHARGE PIPE, VALVES AND FITTINGS

- A. The pipe extending from the extraction riser exit to the leachate storage tank and pipe between tanks shall be 2" PVC pipe in accordance with the following:
 - 1. Provide necessary flexible transition from discharge exit connection to 2" Schedule 80 PVC pipe.
 - 2. PVC pipe shall meet the requirements of ASTM D1784 and ASTM D1785 for Schedule 80 PVC pipe.
 - 3. PVC pipe shall be manufactured from a PVC compound, which meets the requirements of Cell Classification 1254-B PVC as outlined in ASTM D1784.
 - 4. PVC fittings shall meet the requirements of ASTM D2464, ASTM D2466 and ASTM D2467 for Schedule 80 PVC pipe fittings.
 - 5. PVC pipe fittings shall be manufactured from a PVC compound which meets the requirements of Cell Classification 1254-B PVC as outlined in ASTM D1784.
 - 6. PVC pipe fittings shall be industrial, heavy duty, hub style.

7. Socket fittings shall be pressure rated as for the corresponding pipe size prescribed by ASTM D1785. Threaded fittings shall be pressure rated at 50 percent of the rating for socket fittings.
 8. All PVC cements shall meet the requirements of ASTM D2564 for solvent cemented PVC joints.
- B. Shut off valves at storage tanks shall conform to the following:
1. Ball-type valves shall be used consisting of Type 316 stainless steel construction. Flanged-type fittings shall be used to connect valves to PVC leachate lines to allow for future removal and/or replacement of valves.
 2. Valves shall have a minimum pressure rating of 150 psi.
 3. Valve liners and seals shall be Teflon, Viton or approved equivalent.
 4. Valve shall be equipped with a locking mechanism, lockable valve handwheel cover, or handle of sufficient size with openings that will allow for attachment of chain and lock.

2.08 CONTROL PANELS

- A. Coordinate with Division 16.
- B. Each system controller shall be manufactured and registered by a UL certified UL508, UL913 and UL698 panel shop permitted to make industrial control panels relating to hazardous locations and intrinsically safe apparatus and associated apparatus for use in Class I, Division 1, Hazardous Locations. The system controllers will comply with all necessary requirements of the National Electrical Code for Class I, Division 1, Hazardous Locations. If anything specified herein or shown on the Plans conflicts with the requirements for Class I, Division 1 installation, the Contractor shall provide and install the components that meet the requirements for Class I, Division 1 installations.
- C. The control panels shall provide level indication, pump operation, and motor protection.
- D. The inner door shall be polished aluminum dead front mounted on a continuous aircraft type hinge. The dead front door shall contain cutouts for the mounted equipment and operator accessible equipment and provide protection of personnel from live internal wiring.
- E. Operator accessible components mounted on the dead front door shall include the following:
1. H-O-A Switch
 2. Primary Pump Run Indicating Light (Green)
 3. Lysimeter Pump Run Indicating Light (Green)
 4. Primary Motor Overload Indicating Light (Red)
 5. Lysimeter Motor Overload Indicating Light (Red)
 6. Primary Sump Digital Level Indicator (mounted at eye level)
 7. Lysimeter Sump Digital Level Indicator (mounted at eye level)

8. Elapsed Time Meter for each pump
 9. Main Disconnect Breaker Switch
 10. Pump Breaker Switches
 11. Control Circuit Breaker Switch
 12. High Level Tank Lockouts (2) – one for each tank
 13. High Level Secondary Containment Lockout
- F. The back plate shall consist of 12-gauge sheet steel and finished with a primer coat and two coats of baked on enamel. All hardware mounted to the sub-panel shall be accomplished with machine thread tapped holes. Sheet metal screws are not acceptable. All devices shall be permanently identified with phenolic engraved nameplates.
- G. The panel power distribution shall include all necessary components and shall be completely wired with standard copper conductors. Control wiring shall be properly sized and installed in Panduit type wiring trays.
- H. An individual circuit breaker shall be provided from main power, each pump, and control circuit. All circuit breakers shall be heavy-duty thermal magnetic or motor circuit protectors similar and equal to Square D type FAL. Circuit breakers shall be indicating type, ON-OFF-TRIP positions, where the handle in the middle position indicates a Trip. Thermal magnetic breakers shall be quick-make and quick-break on manual or automatic operation. Breakers shall have inverse time characteristics secured through the use of bimetallic tripping elements supplemented by a magnetic trip. Breakers shall be designed so that an overload on one pole automatically trips and opens all legs. Field installed handle ties shall not be acceptable.
- I. Motor starters shall be open frame, across the line, NEMA rated with individual protection in each leg. Motor starter contacts and coil shall be replaceable from the front of the starter without removing it from the panel. Overload heaters shall be block type, utilizing melting alloy spindles and shall provide visual trip indication and an alarm contact for visual alarm. The overload shall be sized for the full load amp draw of the pump. Adjustable type overloads, definite purpose contactors, fractional size starters, and horsepower rated contactors or relays shall not be acceptable.
- J. A fused-type control transformer shall be used to provide the 120 VAC control circuit.
- K. Individual surge arrestors shall be provided in the control panel for incoming supply power, control circuit and the 4 to 20 mA instrument circuit.
- L. A thermostat-controlled heater shall be provided to control the inside temperature and alleviate the buildup of condensation in the control panels.
- M. A corrosion inhibitor shall be provided within the enclosure.
- N. A top mounted, 40 watt, weatherproof/shatterproof red visual high-level alarm beacon shall be provided.
- O. 120v duplex receptacle and 240v single cell GFI receptacle.

- P. Control Panels shall be installed on the north side of each control panel support structure with readouts and switches facing north.

2.09 SUMP LEVEL CONTROLS

- A. A panel mounted digital readout display controller with 3-1/2" digits shall be provided to indicate level in the sumps. The pump "ON", "OFF" and "HIGH LEVEL" selections shall be capable of being set/adjusted on the front of the unit by means of a screwdriver. The controllers shall be capable of accepting a 4 to 20 mA signal from a submersible transducer and provide a level indication range of 0 to 138.6 inches of liquid. When a high-level condition occurs, the display will flash until the condition is corrected.
- B. A submersible transducer with adequately sized cable shall be provided for each system. The transducer shall be constructed of 300 series stainless steel and shall be mounted to the pump carriage. Transducer shall provide a 4 to 20 mA output signal and come equipped with built-in surge protection. Static accuracy shall be no less than 1.0%.
- C. All wires associated with the transducers shall be shielded transducer cable and installed in its own conduit and junction box.
- D. A permanent aneroid bellows type breather device shall be mounted in the control panels to prevent moisture in the vent tube.
- E. A panel mounted intrinsically safe barrier shall be provided for the transducer signal.

2.10 REMOTE TANK LOCKOUT

- A. A storage tank high level lockout shall be provided to temporarily prevent the leachate extraction pumps from pumping from the primary leachate sump or lysimeter sump if a high-level condition exists in the storage tanks or secondary containment. The lockout will automatically reset once the tank liquid level drops and adequate storage capacity is available. Signal from the pump system controllers to the tanks shall be intrinsically safe.
- B. A float switch sensor for high liquid lockout, shall be provided with an adequate length of cables as specified. A float switch sensor shall be SJE-Rhombus SignalMaster® (Minnesota, MN, 888-342-5753), or approved equivalent.

2.11 CABLE FITTINGS

- A. Non-metallic, compression type threaded cable exit fittings, properly sized for the pump power cable and level sensor cable shall be provided for installation in the riser.

2.12 STORAGE TANKS

- A. Mount the following NPT compression-type bulkhead fittings on tanks for each storage system at the locations indicated and as shown on the Plans:
 - 1. Two (2) 2-inch diameter female NPT fitting for tank fill.
 - 2. One (1) 2-inch diameter female NPT fitting for float switch sensor.

3. Two (2) 2-inch diameter female NPT fittings for PVC leachate discharge piping.
 4. Two (2) 2-inch diameter female NPT fittings for PVC drain piping.
 5. Two (2) 2-inch diameter female NPT fitting for equalizer/overflow pipe.
 6. Two (2) 1-inch diameter female NPT fittings for sight gage (tube).
 7. One (1) 1-inch diameter female NPT fittings for sampling.
- B. Tank appurtenances shall include a removable screw-in access port, full drainage floor-level outlet with stainless steel lockable ball valve, check-valve air vent, and secured ladder.
- C. A one-inch (1") sight tube shall be mounted to the side of each tank with a stainless-steel valve at both connections, and cleanout plugs at each end of tube.
- D. All cement anchors shall be stainless steel.

2.13 LIQUID LEVEL SENSOR

- A. One (1) float switch high-level sensor for each tank. SJE-Rhombus SignalMaster® (Minnesota, MN, 888-342-5753), or approved equivalent.

2.14 FLOAT SWITCH LEVEL SENSOR FOR SECONDARY CONTAINMENT

- A. One (1) float switch high-level sensor for the secondary containment sets at 6-inch above top of slab. SJE-Rhombus SignalMaster® (Minnesota, MN, 888-342-5753), or approved equivalent.

2.15 POWER SUPPLY

- A. Electrical power to the leachate and lysimeter pumps and control panel shall be obtained from buried conductors in pull boxes located near the proposed leachate pump control panel. Power conductors to the junction box at the riser pipes shall be buried in accordance with the electrical drawings. The Contractor shall comply with applicable electrical codes and manufacturer's requirements and recommendations in making the connection between the control panel and the electrical conductors in the pull box.

PART 3 EXECUTION

3.01 START-UP AND MAINTENANCE

- A. The manufacturer of the systems shall provide field installation assistance, start-up, calibration, and training of the systems. The scheduling of this service shall be coordinated with the Contractor to ensure the riser is in place and the control panels are connected to final power source, prior to the arrival of the manufacturers certified technician.
- B. A start-up report shall be provided to include all component settings and motor operating characteristics. The report shall certify the systems have been properly installed or note any found deficiencies that need to be corrected.

- C. At the time of start-up, the Contractor shall coordinate with the manufacturer and the Resident Engineer to provide operator training and troubleshooting.
- D. A complete operations and maintenance manual with index for the systems shall be provided by the Contractor. Information shall include manufacturers contact list, equipment list, equipment cut sheets, parts breakdowns, control panel information and a troubleshooting guide.
- E. The Contractor will be required to be available for two weeks after the initial system startup to make any necessary adjustments, repairs, or maintenance for proper system operation at no cost to the County.

END OF SECTION 15100

UNOFFICIAL

SECTION 15200 HDPE PIPE

PART 1 GENERAL

1.01 SUMMARY

- A. The Contractor shall provide and install all HDPE pipe and all associated couplings and fittings; and furnish all labor, tools, supervision, transportation, and equipment necessary for the installation (including testing and field butt fusion welding), of the HDPE pipe, as shown on the construction Drawings and described in this section.
- B. Related Sections
 - 1. Section 02200 – Earthwork
 - 2. Section 02772 – High Density Polyethylene (HDPE) Geomembrane
 - 3. Section 02771 – Geotextile
 - 4. Section 02773 – Geocomposite
 - 5. Section 02774 – Geosynthetic Clay Liner (GCL)
 - 6. Section 15100 – Leachate Extraction

1.02 REFERENCES

- A. ASTM D 638 Standard Test Method for Tensile Properties of Plastics.
- B. ASTM D 696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between –30 degrees C and 30 Degrees C With a Vitreous Silica Dilatometer.
- C. ASTM D 748 Standard Specification for Natural Block Mica and Mica Films Suitable for Use in Fixed Mica-Dielectric Capacitors.
- D. ASTM D 790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
- E. ASTM D 1238 Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
- F. ASTM D 1248 Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
- G. ASTM D 1505 Standard Test Method for Density of Plastics by the Density-Gradient Technique.
- H. ASTM D 1525 Standard Test Method for Vicat Softening Temperature of Plastics.
- I. ASTM D 1603 Standard Test Method for Carbon Black In Olefin Plastics.

- J. ASTM D 1693 Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.
- K. ASTM D 2240 Standard Test Method for Rubber Property—Durometer Hardness.
- L. ASTM D 2657 Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
- M. ASTM D 2837 Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
- N. ASTM D 3035 Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter.
- O. ASTM D 3261 Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
- P. ASTM D 3350 Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
- Q. ASTM F714-08 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
- R. California Department of Transportation, Standard Specifications and Plans, (2018).

1.03 SUBMITTALS

- A. The Contractor shall submit, at least fourteen (14) days prior to pipe delivery, Manufacturer's specifications, and Manufacturer's laboratory certification to the Resident Engineer for review in accordance with Section 01300 – Submittals. The submittals shall include one (1) sample of each type of piping, with proposed perforations where applicable. The submittal shall document the pipe and fittings meet or exceed the requirements presented in this Section and as shown on the Construction Drawings. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before pipe shipment.
- B. The Contractor shall submit, at least fourteen (14) days prior to welding the pipe, a welding certification certificate for each individual intended to be used for pipe welding demonstrating that they meet the requirements of Article 1.04 Paragraph A.

1.04 QUALIFICATIONS

- A. The pipe welding technician shall have a minimum of 5 years of experience welding HDPE pipe utilizing the equipment and/or procedure proposed for use by the Installer of Manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. All submittals for HDPE pipe and fittings shall be approved by the Resident Engineer prior to delivery of these materials to the site.

- B. The Contractor shall store HDPE pipe at locations approved by the Resident Engineer. The HDPE pipe shall be stored on clean, level, dry ground to prevent undue scratching or gouging of the pipe. If the HDPE pipe must be stacked for storage, HDPE pipe shall not be stacked more than eight layers high or higher than the Manufacturer's recommendations. The handling of the HDPE pipe shall be done in such a manner that it is not damaged by dragging over sharp objects or cut by chokers or lifting equipment. Store HDPE pipe with support to prevent developing a permanent set. Stack the heaviest series of HDPE Pipe on the bottom.
- C. HDPE pipe damaged during transportation, loading, unloading, delivery, storage, or during construction shall be documented by the CQA Monitor and the Contractor.
- D. The Contractor shall repair or replace damaged HDPE pipe at no cost to the County and to the satisfaction of the Resident Engineer.

1.05 QUALITY CONTROL

- A. Use adequate numbers of skilled workman who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. The installation of the HDPE Pipe will be continuously observed by the CQA Monitor to verify compliance with all requirements of this Section.
- C. The Contractor shall cooperate with the CQA Monitor during observation of HDPE pipe installation activities.
- D. The CQA Monitor may conduct whatever tests are considered necessary to confirm that the HDPE pipe is satisfactorily installed. The Contractor shall cooperate with the CQA Monitor to allow the tests to be conducted expeditiously.
- E. If any portion of the installed HDPE pipe is determined by the CQA Monitor to not meet the requirements of this Section, as a result of either testing or observations, the Contractor, at his expense, shall remove and replace that portion to meet these specifications as directed by the Engineer.

PART 2 PRODUCTS

2.01 PIPE

- A. All HDPE pipe and fittings shall comply with ASTM F714-06a.
- B. All HDPE pipe and fittings shall be comprised of PE 4710 polyethylene with a minimum cell classification of 445474C.
- C. HDPE pipe shall be homogeneous throughout, uniform in color, and free of cracks, holes (except where specified), foreign materials, blisters, or deleterious faults.
- D. Segments of HDPE pipe having cuts or gouges in excess of 20 percent of wall thickness of the pipe shall be cut out and removed.

- E. HDPE pipe shall be SDR 11 or better.
- F. Perforations, where required, shall be drilled 0.50-inch (1/2-inch) diameter holes placed along the pipe as shown in the Drawings.
- G. The HDPE pipe shall be cleaned of mill cuttings prior to delivery to the site.

2.02 MANUFACTURER SOURCE QUALITY CONTROL

- A. The delivered pipe shall be HDPE and shall meet the requirements presented in Article 2.01 and those presented on the Construction Drawings.
- B. Provide HDPE pipe with holes formed in locations and dimensioned as shown on Construction Drawings. Slots are not allowed.
- C. HDPE pipe shall be cleaned of mill cuttings prior to delivery to the site.

2.03 PIPE COUPLINGS AND FITTINGS

- A. HDPE couplings and fittings shall conform to the Construction Drawings and ASTM D3261.
- B. HDPE couplings, fittings, and end caps, and removable access caps at riser pipes shall be prefabricated. Fabricate, transport, and install consistent with the Manufacturer's recommendations and the Construction Drawings.
- C. Fittings and couplings shall be marked with the Manufacturer's name or logo, size, and material from which they were molded.
- D. All fittings and couplings, which will be fusion welded to the pipe, shall be manufactured using the same resin and additives and shall be from the same Manufacturer as the HDPE pipe.
- E. Fasteners (bolts, nuts, washers, etc.) for riser pipe supports and riser pipe caps shall be 300 series stainless-steel. Threaded rod is not acceptable.
- F. Mechanical connections must be approved by the Resident Engineer and may consist of sleeves, socket, screw, or heat-shrink connections.

2.04 EQUIPMENT

- A. Equipment for handling, welding, and laying HDPE pipe shall be as recommended by the Pipe Manufacturer.

PART 3 EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 PIPE INSTALLATION

- A. The HDPE pipe couplings and fittings shall be cleaned of all foreign material such as dirt, grease, oil, or moisture prior to placement.
- B. The HDPE pipe shall be laid in a manner that does not damage pipe or underlying geosynthetics.
- C. The HDPE pipe shall be laid to the lines and grades shown on the plans.
- D. HDPE pipe installation procedures shall provide for the least possible amount of lifting and moving.
- E. HDPE fittings shall not be used as the point of attachment for a lifting or pulling line.

3.03 PIPE CONNECTIONS

- A. Fusion weld all HDPE pipe connections consistent with the Manufacturer's recommendations unless otherwise shown on the Construction Drawings or approved by the Resident Engineer.
- B. Prohibition against the use of solvents: Solvents and solvent cements shall not be used in the assembly or installation of the HDPE pipe and fittings.

3.04 EXTRA PIPE

- A. Provide the Owner with 3,600 linear feet of 6-inch SDR 11, perforated pipe for the Owner's use at the site. Deliver and unload in a location designated by the Resident Engineer. Store in accordance with Manufacturer's recommendations and cover with a tarp or tarps. Secure the tarp(s) from blowing.

END OF SECTION 15200

SECTION 15480 PVC PIPING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes providing and installing all polyvinyl chloride (PVC) piping for the leachate system as shown on the Construction Drawings, as specified herein, and as needed for a complete and proper installation including, but not necessarily limited to, the following:
 - 1. Leachate collection and removal system piping
 - 2. Leachate sump pump connections
 - 3. Lysimeter sump pump connections
 - 4. Leachate sounding Pipe

1.02 RELATED SECTIONS

- A. Section 02220 – Earthwork
- B. Section 03300 – Cast-in-Place Concrete
- C. Section 11000 – Equipment
- D. Section 15100 – Leachate Extraction

1.03 REFERENCES

- A. ASTM D1785 Standard Specifications for Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120
- B. ASTM D2466 Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
- C. ASTM D2564 Standard Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe Fittings
- D. ASTM D2467 Standard Specification for Socket -Type Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- E. ASTM D2464-13 Standard Specification for Threaded Polyvinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- F. ASTM D3915 Standard Specifications for Polyvinyl Chloride (PVC) and Related Plastic Pipe and Fittings Compounds
- G. ASTM F656 Standard Practice for Primers for Use in Solvent Cement Joints at Polyvinyl Chloride (PVC) Plastic Pipe Fittings
- H. ASTM D2855 Standard Practice for Making Solvent-Cemented Joints with Polyvinyl Chloride (PVC) Pipe and Fittings
- I. ASTM D2241 Standard Specification for Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
- J. ANSI B16.5 Steel Pipe Flanges, Flanged Valves, and Fittings

- K. ANSI B31.1 Safety Code for Pressure Piping
- L. California Department of Transportation, Standard Specifications and Plans, (2018).

1.04 SUBMITTALS

- A. The Contractor shall submit the following materials list, Manufacturer's Specifications, installation procedures and Shop Drawings to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before material shipment.
 - 1. Materials list of items proposed to be provided under this Section.
 - 2. Manufacturer's Specifications, catalog cuts, and other data needed to prove compliance with the specified requirements.
 - 3. Manufacturer's recommended installation procedures which, when approved by the Resident Engineer, will become the basis for accepting or rejecting actual installation procedures used on the work.
 - 4. Shop Drawings and other data as required indicating method of constructing, installing and supporting piping except where such details are fully shown on the Construction Drawings.
- B. Upon completion of this portion of the work, and as a condition of its acceptance, deliver to the Resident Engineer operation and maintenance manuals compiled in accordance with provisions of Section 01730, and as-constructed Record Drawings per Section 01720.

1.05 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers trained and experienced in the necessary crafts and familiar with the specified requirements and the methods needed for performance of the work of this Section.
- B. Regulatory Requirements:
 - 1. Without additional cost to the County, provide such other labor and materials as are required to complete the work of this Section in accordance with the requirements of governmental agencies having jurisdiction, regardless of whether such materials and associated labor are called for elsewhere in these Construction Documents.
 - 2. In addition to complying with the specified requirements, comply with pertinent regulations of governmental agencies having jurisdiction.
 - 3. In the event of conflict between or among specified requirements and pertinent regulations, the more stringent requirement will govern unless otherwise directed by the Resident Engineer.
- C. In addition to complying with the specified requirements, comply with the directions of the Resident Engineer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store all piping in accordance with the manufacturer's recommendations.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE:

- A. Provide Schedule 80 PVC pipe as indicated in the Construction Drawings complying with ASTM D 1785.
- B. PVC Fittings:
 - 1. Provide Schedule 80 PVC fittings complying with ASTM D 2467 for socket-type and ASTM D 2464-13 for threaded-type.
- C. PVC Flanges:
 - 1. Provide 150-pound, flat-face, socket-type Schedule 80 PVC flanges. Diameter and drilling of flanges shall comply with ANSI B16.5 for Class 150.
 - 2. Provide full-face, neoprene flange gaskets, 1/16-inch thick with “A” scale hardness of 45 to 60 durometer.
 - 3. Provide correct number and sizes of stainless-steel hexagon bolts, washers, and hexagon nuts.
- D. PVC Solvent Primer: Provide solvent primer as recommended by PVC product supplier and complying with ASTM F 656.
- E. PVC Solvent Cement: Provide medium-bodied solvent cement as recommended by PVC product supplier and complying with ASTM D 2564.

2.02 VALVES

- A. Provide shut-off valves, flow control valves, check valves and true union check valves as shown on the Construction Drawings.
- B. All valves shall be stainless steel

2.03 FLOW METERS AND SAMPLING PORTS

- A. Provide flow meters and sampling ports as shown on the Construction Drawings.
- B. Flow meters shall be Badger Meter - Recordall - Model # 170 - 2”.

2.04 PIPE SUPPORTS

- A. Provide the pipe supports as shown on the Construction Drawings, specified, and required to adequately support and secure all piping systems and to minimize stress to all equipment connections, pipe, valves, and fittings.
 - 1. Provide pipe supports fabricated from metal framing channel and fittings with electrogalvanized zinc or cadmium finish, as supplied by Unistrut, Superstrut, or approved equal.
 - 2. Pipe supports shall provide clearance between guides and the outside diameter of the pipes, to allow free sliding.
 - 3. All pipe supports, bolts, washers and nuts shall be hot dip galvanized or 300 series stainless steel.

2.05 NOT USED

2.06 PIPE TRENCH BACKFILL MATERIALS

- A. Provide trench backfill as specified in Section 02225 and as shown on the Construction Plans.

2.07 OTHER MATERIALS

- A. Provide all other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Resident Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which the work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected. Notify the Resident Engineer of such conditions and proposed corrective action before correcting unsatisfactory conditions.

3.02 PREPARATION

- A. Lay out the piping systems in careful coordination with the Construction Drawings, determining proper elevations and locations for all components of the system and using only the minimum number of fitting bends to produce a satisfactorily functioning system. In special cases and with the approval of the Resident Engineer, bends in piping shown on the Construction Drawings may be eliminated by gradual deflection of straight pipe runs.
- B. Follow the general layout shown on the Construction Drawings in all cases except where other work may interfere, or field conditions deviate from conditions shown in Construction Drawings.
- C. Obtain the approval of the Resident Engineer for the layout of all piping systems before and during pipe installation.

3.03 INSTALLATION

- A. General:
 - 1. Proceed as rapidly as other sitework activities will permit.
 - 2. Thoroughly clean piping materials before installation. Cap pipe openings to exclude rodents and dirt until final connections have been made.
 - 3. Cut pipe accurately, and work into place without springing or forcing.
 - 4. Provide sufficient expansion and contraction compensation, flexible couplings, and devices necessary for a flexible piping system, whether or not shown on the Construction Drawings.
- B. Equipment Access: Install piping, equipment, and accessories to permit access for maintenance. Relocate items as necessary to provide such access, and without additional cost to the County.

- C. Flange Connections: Install gaskets centered on flanges and tighten bolts to torque requirements recommended by flange and/or valve manufacturer. Replace flanges damaged by overtightening, at no cost to the County.
- D. Polyvinyl chloride (PVC) pipe and fitting:
 - 1. Inspect PVC pipe and fittings for cleanliness and damage prior to placing and joining. Remove and replace all damaged piping materials.
 - 2. Cut pipe square. Remove burrs, smooth, bevel, and wipe clean all cuts.
 - 3. Use factory threaded pipe, IPT standard, or thread pipe per manufacturer's recommended procedures.

3.04 PIPE SUPPORTS

- A. Space supports for horizontal pipes as shown on the Construction Drawings.
- B. Arrange pipe supports to prevent excessive pipe deflection, and to avoid excessive bending stress.
- C. Anchor pipe supports in concrete slabs or footings, or provide bumper blocks when installing over aggregate base, as shown on the Construction Drawings.
- D. All pipe supports, bolts, washers and nuts shall be hot dip galvanized or 300 series stainless steel. Cement anchors shall be stainless steel.

3.05 VALVES

- A. Locate and arrange valves to provide complete adjustment between fully open to fully closed position.
- B. Install valves in at least the following locations:
 - 1. On both sides of apparatus and equipment.
 - 2. For shutoff of branch mains.
 - 3. Where shown on the Construction Drawings.
- C. Locate valves for easy accessibility and maintenance.
- D. Install valves in closed position, with valve stems vertical.

3.06 TRENCHING AND BACKFILLING

- A. Contractor shall conform to all requirements for Trench and Site Safety.
- B. Perform excavation of every description and of whatever substances encountered to depth indicated or as otherwise shown and specified. Grade trench bottoms to suit required piping slopes. Grade as necessary to prevent surface water from flowing into trenches. Remove any water accumulating therein by pumping or other approved methods. Notify the Resident Engineer immediately of any continuous water flow into trench. Sheet and brace excavations as necessary to fully protect workmen and adjacent structures and permit proper installation of work. Under no circumstances lay pipe or install appurtenances in water, without approval of the Resident Engineer. The presence of ground water in soil or the necessity of sheeting or bracing of excavations shall not constitute a condition for which any increase may be made in contract price.

- C. Excavate trenches to the necessary width for proper laying of pipe. Backfill overdepths using methods and procedures specified for backfilling the lower portion of trenches. When wet or unstable material is encountered at bottom of trench, remove such material to depth required as directed by the Resident Engineer and backfill to proper grade with suitable approved material. Grade bottom of trench accurately to provide uniform bearing and support for each piping section at every point along its entire length. Remove stones and all other protrusions from trench bottom.
- D. Place bedding material to dimensions shown in drawings. Bedding material shall be carefully placed in bottom of trench, so as to ensure a uniform thickness below the pipe.
- E. Backfill pipe trenches with the backfill materials shown and specified and compact as shown and/or specified in accordance with Section 02225.
- F. After backfill installation is completed, remove unused excavated and backfill materials to areas designated by Resident Engineer.

3.07 PRESSURE TESTING

- A. Before pressure testing, the pipe should be flushed with clean water to remove dirt and debris and disconnected from systems equipment which would be damaged by test pressure. Replace equipment after testing. Systems may be tested in sections.
- B. Pressure tests shall be performed on the following piping systems and specified parameters:
 - 1. Leachate piping: Water, with a test pressure of 150 psi
- C. Conduct all pressure testing in accordance with the pipe manufacturer's recommendations and procedures. Test pressures shall be contained for a minimum of 1-hour, with no change in pressure, except that calculated due to temperature change.
- D. Locate and repair all leaks. Correct leaks by replacing faulty materials with new material.
- E. Repeat pressure testing until all piping systems pass. Perform additional pressure tests after repair of each system at no cost to the County.
- F. The Contractor will be responsible for notifying the Resident Engineer at least 48 hours in advance so that the Resident Engineer may be present during testing.

3.08 PROTECTION

- A. Protect all installations and materials from damage until final acceptance by the Resident Engineer.
- B. Prevent debris from entering into piping systems during installation.

3.09 PAINTING OF PVC PIPING

- A. PVC Piping exposed to sunlight shall be painted.: One coat of primer (3 mils dry film) and two coats of finish in accordance with manufacturer's recommendations. Use an exterior-grade water-based latex paint. Coordinate color selection with the Resident Engineer. Provide a one (1) gallon unopened container of paint to County.

END OF SECTION 15480

Division 16
Electrical

UNOFFICIAL

SECTION 16050 BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes providing and installing all electrical requirements, including obtaining all permits, for leachate extraction and transfer system as shown on the Construction Drawings, as specified herein, and as needed for a complete and operational installation.
- B. Any apparatus, appliance, material, or work not shown on the Construction Drawings, but mentioned in the Specifications, or vice versa, or accessories necessary to make the Work complete in all respects and ready for operation, even if not particularly specified, shall be furnished, and installed by the Contractor without additional expense to the County.
- C. The Construction Drawings are diagrammatic and do not show all offsets, bends, elbows, or other specific elements, which may be required for proper installation of the Work. Such accessories and routing will be provided to complete the Work at no additional cost to the County. The right is reserved to make any reasonable changes in outlets, lighting, or equipment locations, prior to rough-in, without any additional cost to the County.
- D. All work to comply with the current Electrical Service requirements of Southern California Edison. Link to SCE Manual:

<https://www.sce.com/regulatory/distribution-manuals>
- E. Electricians shall perform all aspects of electrical work, including conduit installation.

1.02 WORK INCLUDED:

- A. Those items included under this Section of Specifications shall include, but not necessarily be limited to, the following:
 - 1. Installation of conduits and wiring between the equipment and controls of the leachate collection sump pump(s), the leachate storage tank(s), and other equipment and controls.
 - 2. Control panel enclosures.
 - 3. Control station for the leachate collection pump control panel.

4. Motor and liquid level control breakout box.
 5. Power and control wiring and connections.
 6. Branch circuit wiring, wiring devices, and connections to all equipment requiring electrical service.
 7. Motor controls.
 8. Liquid level switches and controllers for leachate pump.
 9. Equipment support/foundation.
 10. Service pole, disconnect, metering, and connection from local utility.
 11. All other incidentals materials and equipment required to provide a complete power service connection to the control panels.
 12. Installation of electrical conductors in trenches from electrical power supply to the pump control panel.
 13. Grounding.
 14. All required incidental work, such as excavating, trench backfilling, compaction and testing of backfill materials.
 15. All other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the Construction Drawings.
 16. Electrician for all testing and start-up assistance.
- B. It is the intent of the Construction Drawings and Specifications that electrical systems be complete and, except as otherwise noted, ready for operation.

1.03 RELATED SECTIONS

- A. Section 11000 - Equipment
- B. Section 16100 - Basic Electrical Materials and Methods
- C. Section 16500 - Lighting
- D. Section 16910 - Control Panel
- E. Section 16911 – Cellular Telemetry

1.04 REFERENCES

- A. Work and materials will conform to the latest rules of the National Electrical Code, regulations of the State Fire Marshal, and all applicable local and state codes. Nothing in these Specifications will be construed to permit work not conforming to the most stringent applicable codes.
- B. The current adopted editions of the following codes and reference standards will also apply.
 - 1. American National Standards Institute (ANSI)
 - 2. American Society for Testing and Materials (ASTM)
 - 3. California Electrical Code
 - 4. Certified Ballast Manufacturers (CBM)
 - 5. Insulated Power Cable Engineer Association (IPCEA)
 - 6. International Electrical Testing Association (NETA)
 - 7. National Electrical Code (NEC)
 - 8. National Electrical Manufacturers Association (NEMA)
 - 9. Underwriters Laboratories, Inc. (UL)
 - 10. Uniform Building Code (UBC)
 - 11. Uniform Fire Code (UFC)
 - 12. Uniform Mechanical Code (UMC)
 - 13. Electrical Service Requirements of Southern California Edison (SCE)

1.05 DEFINITIONS

- A. Refer to Section 01075 – Technical Specification Definitions

1.06 SEISMIC REQUIREMENTS

- A. All electrical equipment shall be designed, constructed, and installed in accordance with all applicable codes for the seismic requirements for the project site region. The Contractor shall perform any necessary calculations and/or determinations required to justify compliance with the seismic requirements.

1.07 SUBMITTALS

- A. Submittals shall consist of detailed shop drawings, specifications, catalog “cuts,” and data sheets containing physical and dimensioned information, performance data, electrical characteristics, materials used in fabrication and material finish, and shall be furnished by the Contractor in accordance with Section 01300 - Submittals. Include seismic data regarding installation and seismic-withstand certification for all electrical equipment weighing more than 500 pounds.
- B. The Contractor shall submit the following Manufacturer and product data to the Resident Engineer for review in accordance with Section 01300 – Submittals. The Contractor shall obtain the Resident Engineer’s acceptance of applicable submittals before material purchase or shipment.
 - 1. Leachate Control Sump Pump Control panel enclosures and panel station supports
 - 2. Control panel components (displays, relays, indicator lights, selector switches. etc.)
 - 3. Telemetry Equipment
 - 4. Motor Starters
 - 5. Level Controls
 - 6. Disconnect Switches
 - 7. Service Entrance Components

1.08 PERMITS

- A. Provide all necessary notices, obtain all permits and pay all government taxes, fees, and other costs in connection with this Work. Obtain all required certificates of inspection for work and deliver same to the County before final acceptance and final payment.

1.09 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workers who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Materials: Materials shall be new and shall be delivered to the Site in the original packaging.

- B. Wire and Cable: Deliver wire and cable to the Site in unbroken packages or reels.

PART 2 - PRODUCTS

2.01 NAMEPLATES

- A. Construction: Laminated phenolic plastic (white front and back), black core with lettering etched through outer covering; use 3/16-inch-high lettering at control stations, thermal overload switches, receptacles, switches, and similar devices, where nameplate is attached to device plate; use 1/4-inch-high lettering at all other locations, unless otherwise specified or detailed; engraving directly on device plates with black enamel-filled lettering is acceptable in lieu of separate plastic nameplates. Nameplates may also be of nonferrous metal, 0.03-inch-thick minimum, die stamped.
- B. Inscription: If detailed on the Construction Drawings, use inscription exactly as shown; otherwise, describe adequately function or use of equipment involved.
1. For Power Receptacles: Indicate voltage and phase (e.g., 120V, 1PH).
 2. For Motors: Make nameplate on motor of particular machine exactly the same as that for respective starter, disconnect switch, and push-button station (e.g., Fan RF-1).

2.02 FINISHES

- A. Factory Finish: Pull and junction boxes, panel board cabinets, equipment enclosure, and so on, factory finished as follows:
1. Surface-Mounted Boxes: One prime coat over galvanizing, one coat of light-gray-synthetic enamel or lacquer.
 2. Flush-Mounted Boxes: Galvanized only.
 3. Surface-Mounted Fronts: One prime coat, one coat of light-gray-synthetic enamel or lacquer.
 4. Flush-Mounted Fronts: Prime coat only.
- B. Equipment Enclosures: Transformer cases, high-voltage equipment including switchgear, special equipment enclosures, and other enclosures, shall be manufacturer's standard unless otherwise specified.
- C. Field Painting:

1. Unless otherwise specified herein and in other Sections of this Specification, or indicated on the Construction Drawings, all exterior-exposed metal (except electroplated steel, stainless steel, galvanized or anodized aluminum) shall be painted.
2. Paint all exposed ferrous metals that are not galvanized or factory finished. Use one coat of approved asphaltic aluminum paint over prime coat.
3. Where field painting of metals is required, metal to be painted shall be cleaned, pretreated, primed, and given two (2) finish coats of paint as follows:
 - a. Cleaning: Remove rust, scale, grease, oil dirt, preservative coatings, or other deleterious matter. Treat all bare and clean metal with primer pretreatment, before priming.
 - b. Primer:
 - 1) Steel and Iron (Not Galvanized): Red Base Primer or Basic Silico Chromate Primer.
 - 2) Aluminum: Zinc Chromate Primer.
 - 3) Galvanized Steel and Nonferrous Metals: Zinc Dust Oxide Primer. Apply second coat as soon as possible after priming to provide for proper bonding to primer coat.
 - c. Finish Coats: One coat of exterior synthetic enamel undercoated and one coat of industrial epoxy enamel, color to be light gray.
4. Do not paint the following:
 - a. Transformer cases.
 - b. Lighting fixtures and factory-finished fixture hangers and stems.
 - c. Switch and receptacle plates which have factory finish other than prime coat or galvanizing.
 - d. Panelboards, except as required or to “touch up” scratches.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 GROUNDING

- A. Install an insulated equipment grounding conductor in all branch circuit and feeder conduits and include the following:
 - 1. Connect structural steel and equipment skids to the ground system as indicated on the Construction Drawings.
 - 2. Provide lightning arrestor for system as recommended by submersible pump manufacturer.

3.03 TESTS

- A. The Resident Engineer reserves the right to inspect and test any portion of the equipment, materials, or both during the progress of its erection. The Contractor shall test all wiring and connections for continuity and grounds before connecting any fixtures or equipment.
- B. The Contractor shall test the entire system, as requested, in the presence of the Resident Engineer, when the work is completed to ensure that all portions are free from shorts or grounds. The Contractor shall provide all equipment necessary to conduct these tests.

3.04 CUTTING AND PATCHING

- A. No cutting of finished or structural work may be done without approval of the Resident Engineer. When necessary to have finished material or structural work cut, furnish necessary shop drawings to the Resident Engineer.

3.05 PROTECTION

- A. Protect and cover all equipment during construction and clean and touch up where necessary to remove scars and scratches on all factory-painted equipment. Nameplates bearing descriptive data shall be left clean and unpainted.

3.06 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Comply with pertinent provisions of Section 01730.

3.07 RECORD DRAWINGS

- A. Comply with pertinent provisions of Section 01300.

END OF SECTION 16050

UNOFFICIAL

SECTION 16100
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes basic electrical material and method requirements for constructing a complete workable electrical system as shown on the Construction Drawings and specified in this Section, including connection to existing overhead services provided by Southern California Edison.
- B. Related Sections:
 - 1. Section 11000 – Equipment
- C. Contractor to obtain all permits and pay all fees.
- D. Electricians shall perform all aspects of electrical work, including conduit installation.

1.02 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workman who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.
- B. Preparation, handling, and installation shall be in accordance with the manufacturer's written instructions and technical data particular to the product specified or approved.
- C. Coordinate and cooperate the installation with other trades.
- D. Work will conform to the National Electrical Contractors Association (NECA) Standard of Installation for general installation practice.

1.03 HAZARDOUS CLASSIFICATION – ALL UNDERGROUND CLASS 1, DIVISION 1 HAZARDOUS

- A. All above ground to within 18 inches above ground surface Class 1, Division 2 work in hazardous locations performed in strict accordance with NFPA 70 and NEC for the particular “class” and “division” of hazardous location involved.

PART 2 - PRODUCTS

2.01 LISTINGS

- A. Provide Underwriter's Laboratories (UL) listed and labeled equipment for all items for which UL carries a listing of labeling unless items are specifically exempted.

2.02 ACCEPTABLE MANUFACTURERS

- A. Furnish all materials shown on the Construction Drawings and described in this Section. Provide specification grade materials, brand new, and bearing the UL label.
- B. Product options and substitutions for specified materials in this Section shall be in accordance with Section 01630.
- C. Acceptable Equipment Manufacturers for
 - 1. Conduit and Conduit Fittings
 - a. AFC Cable Systems, Inc
 - b. Allied Tube & Conduit
 - c. Thomas and Betts
 - d. Carlon
 - e. Appleton
 - f. O.Z. Gedney
 - g. Crouse-Hinds
 - h. Engineering approved equivalent
 - 2. Wire and Cable (600V)
 - a. American Electric Cable Company
 - b. General Wire and Cable Corporation
 - c. Okonite Company
 - d. Rome Cable Corporation
 - e. Southwire

- f. Carol Cable Company
 - g. Royal Electric
 - h. Engineering approved equivalent
3. Solderless Lugs and Grounding Connections
- a. Burndy Engineering Company, Inc.
 - b. O.Z. Gedney Company, Inc.
 - c. Penn Union Electric Corporation
 - d. Thomas and Betts Company, Inc.
 - e. Ilisco
 - f. nVent Erico (CADWELD)
 - g. Engineering approved equivalent
4. Pull Boxes, Gutters, and Special Cabinets
- a. Square D Company
 - b. Hoffman
 - c. Engineering approved equivalent
5. Outlet Boxes
- a. Appleton Electric Company
 - b. Killark Electric Manufacturing Company
 - c. Carlon
 - d. Crouse-Hinds
 - e. Engineering approved equivalent
6. Wiring Devices
- a. Cooper Wiring Devices (A division of Cooper Industries)
 - b. Leviton

- c. Hubbel Incorporated
 - d. Pass and Seymour/Legrand.
 - e. Engineering approved equivalent
7. Conduit Racks, Hangers
- a. Kindorf
 - b. Super Street
 - c. Unistrut
 - d. O.Z. Gedney
 - e. Engineering approved equivalent
8. Fuses
- a. Bussman Manufacturing Company
 - b. Chase-Shawmut Company
9. Transformers
- a. Square D (Sorgel)
 - b. General Electric
 - c. Cutler Hammer
 - d. Engineering approved equivalent
10. Circuit Breakers
- a. Cutler Hammer
 - b. General Electric
 - c. Square D
 - d. Engineering approved equivalent

2.03 CONDUIT

A. General:

1. Each length of conduit shall bear the UL label.
2. Minimum acceptable conduit size is 3/4 inch. Use 1 inch minimum for below grade unless otherwise indicated on the Construction Drawings.

B. Rigid Steel Conduit:

1. Rigid Steel Conduit: Full weight, pipe size, finished inside and out by hot-dipped galvanizing, and made to American National Standards Institute (ANSI) and UL requirements.
2. Couplings: Electroplated, cast, malleable iron.
3. Insulating Bushings: Threaded polypropylene or thermosetting phenolic, rated 150 degrees Centigrade (°C) minimum.
4. Insulated Grounding Bushings: Threaded, cast malleable iron body, with insulated throat and steel “lay-in” ground lug with compression screw.
5. Insulated Metallic Bushings: Threaded, cast, malleable iron body with plastic insulated throat rated 105°C minimum.
6. Running threads are not acceptable.

C. Polyvinyl Chloride (PVC) Conduit:

1. Conduit: UL-listed, Schedule 40 PVC conduit manufactured to National Electrical Manufacturer’s Association (NEMA) TC-2. Other constructions are not acceptable.
2. Fittings: Provide couplings and connectors made by the same manufacturer as the conduit and joined with the recommended cement. Terminate PVC conduits with connectors or end bells.

D. PVC-Coated Rigid Conduit:

1. Conduit: Full weight, pipe size, finished inside and out by hot-dipped galvanizing, having an extruded 40-mil PVC jacket and a red urethane interior coating.
2. Fittings: Provide 40-mil PVC over-lapping pressure-sealing sleeves on couplings and conduit bodies to create tight, pressure-sealed joints. Interior surface shall have a red urethane coating.

E. Liquid-Tight PVC Flexible Conduit:

1. Conduit: Spiral-wound galvanized steel strip with an extruded PVC jacket; UL-listed Type UA/LA.
2. Fittings: Cast, malleable iron dip or mechanically galvanized finish, with insulated throats.

F. Wireway System:

1. Provide Joint Industry Conference (JIC) lay-in type wireway, without knockouts, manufactured to UL 870 standards.
2. Use slip-in type connectors that allow lay-in of all conductors.
3. Use fittings and accessories, made by the same wireway manufacturer, that are UL labeled in accordance with UL 870 standards.
4. Wireway Finish: Factory-applied gray epoxy enamel, applied to both inside and outside surfaces, over a corrosion-resistant phosphate primer.

G. Substitutions:

1. Other wiring systems may be used only as specifically approved by the Resident Engineer in accordance with Section 01630.

2.04 WIRE AND CABLE

A. General:

1. All wire and cable shall be new and bear the UL label.
2. Use stranded copper wire.
3. Provide 600 volt (V)-rated wire and cable for the secondary power distribution system. Typically, use type THWN/THHN above grade. If any portion of the circuit passes below grade, use type XHHW-2.
4. Minimum Conductor Sizes:
 - a. Power and Lighting Branch Circuits: No. 12 American Wire Gauge (AWG)
 - b. Signal and Control Circuits over 100 V: No. 14 AWG.
 - c. Low Voltage (50V or less): No. 16 or specified cables.

5. All wires associated with the transducers shall be shielded transducer cable and be installed in its own conduit and junction box.

B. Color Coding:

1. Identify conductors as to phase connections by means of color-impregnated insulation or approved color-marking tape as follows:

	120/240	480Y/277
A Phase	Black	Brown
B Phase	Red	Orange
C Phase	Blue	Yellow
Neutral	White	White w/Black Stripe
Ground	Green	Green

2. Motor Power Conductors: Black

3. Field Wiring, Motor Control Conductors:

Start	Blue
Stop	Red
Common	Yellow
Misc. Control	Orange

4. Control Panel Conductors:

Line, load, and control circuits at line voltage	Black
AC control circuit at less than line voltage	Red
DC control circuit	Blue
Interlock control circuits supplied from an external power source	Yellow
AC common	White
DC common	Gray
Ground	Green

5. Wire Delta - Connected Secondary High-Leg: Orange

2.05 INSTRUMENT CABLE

A. General:

1. Provide UL-approved cable for Class 2 or 3 power-limited circuits.
2. Use stranded shielded cable having a drain wire.
3. Rated 600VAC, 90°C dry/75°C wet, single pair/triad instrument cable.
4. Minimum Conductor Sizes: Individual cables shall be No. 16 AWG.
5. All cable shall be new and have the UL label marked on the jacket.

B. Color Coding:

1. Identify conductors regarding polarity connections by color-impregnated insulation or approved color-marking tape positive as white and negative as black.

2.06 WIRING DEVICES

- A. Receptacles: Provide devices designed for extra-hard use in industrial applications and UL-listed specification grade. Use 20 amp (A), 125V-rated devices. Furnish other special receptacles as otherwise noted or detailed on the Construction Drawings.
- B. Switches: Provide devices designed for extra-hard use in industrial applications and UL-listed specification grade. Use 20A, 120-277V-rated devices.
- C. Ground Fault Circuit Interrupters (GFCI): Provide 20A, 120V devices conforming to NEMA 5-20R and UL-listed. Use feed-through type device having 5 mA trip threshold and trip time of 0.025 seconds.
- D. Device Color: Use ivory for normal power; black for normal-power-dedicated circuits; and red for stand-by or emergency power systems.

2.07 DEVICE COVERS

- A. Use galvanized sheet metal or raised covers for plant, process, or unfinished areas. Device plates shall completely cover outlet opening. Sectional device plates are not acceptable.
- B. Provide a laminated plastic engraved label, indicating circuit number, on each device cover. Use white letters on black background for normal power and black letters on red background for stand-by or emergency power systems. Attach plastic label to cover plate using an epoxy adhesive. Dymo labeling will not be acceptable.

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- C. Provide die-cast aluminum covers, with spring door and gasket, for outdoor areas.

2.08 BOXES AND FITTINGS

- A. Cast Device Boxes: Provide FS/FD Feraloy with zinc-electroplate finish. Provide Feraloy covers and neoprene gaskets.

2.09 WIRE CONNECTIONS

- A. Wire Joints:

1. Join wires in sizes from No. 18 to No. 8 AWG conductor, insulation rated 105°C or less, with electrical spring connectors of three-part construction incorporating a non-restricted, zinc-coated steel spring enclosed in a steel shell having an outer jacket of vinyl plastic with a flexible insulating skirt. Self-stripping pigtail and top connectors are not acceptable.
2. Join wire sizes No. 6 and larger with solid copper split-bolt connectors torqued to the proper value and taped, or with properly insulated copper compression connectors installed according to the manufacturer's instructions.
3. Wire Connections Made on Platforms, Conveyor Systems, and Other Vibrations Equipment: Nylon, self-insulated crimp on wire joints; T&B Series RC & RP.
4. Motor Leads: Join wires using 3M-series 5300 pigtail or in-line splicing kit.
5. Conductors Subject to Moisture: Use 3M Scotchcast-series 82-BFI splicing kit for power and series; 72-N splicing kit for signal or control conductors.

- B. Splicing and Insulating Tape (600V and below): For general-purpose electrical tape, use black 7-millimeter vinyl tape, ultraviolet-proof and suitable for temperatures from minus 18°C to 105°C.

- C. Labeling Wires:

1. Branch Circuits: All wires in main J-boxes shall have circuit number tags. Use self-adhesive white tapes with black numbers.
2. Control Conductors: White PVC-shrink sleeve marker with printed (black) wire number (e.g., M560-10).

2.10 MOTOR CONTROLLERS

- A. Starters:

1. Magnetic Starters: Furnish full-voltage individual starter as shown on the Contract Drawings. Use minimum NEMA Size 1 unless otherwise shown. Equip overload relays with temperature-compensated bimetal heaters. Use Class 10 type heaters for submersible pump applications or as recommended by the pump manufacturer. Provide a NEMA 4 enclosure as specified on the Construction Drawings.

2.11 ELECTRICAL SUPPORTING DEVICES

- A. Concrete and Masonry Fasteners:
 1. Concrete: Hilti HSL stainless steel expansion anchors for 1/2 inch and larger bolts; Hilti stainless steel sleeve anchor for 3/8 inch and smaller bolts.
 2. Masonry Block: Hilti stainless steel sleeve anchors.
- B. Conduit Straps: Hot-dip galvanized, cast, malleable iron, one-hold-type strap with cast clamp-backs and spacers as required.
- C. Construction Channel: 1-1/2 inch by 1-1/2 inch 12-gauge hot-dipped galvanized or "Galv-Krom" finished steel channel with 17/32-inch-diameter bolt holes, 1-1/2 inch on center.
- D. Hanger Rods: Threaded hot-rolled steel; electroplated or cadmium plated; 3/8 inch minimum diameter; 1/2 inch diameter, conduit sizes 2-1/2 to 3-1/2 inches; 5/8 inch diameter, larger conduits.
- E. Fasteners: Wood screws for fastening to wood; machine screws for fastening to steel; toggle bolts or "molly" bolts for fastening to hollow concrete block (1/4 inch or smaller), gypsum board, or plaster walls; expansion anchors for attachments to cast-in-place or precast concrete.

2.12 IDENTIFYING DEVICES

- A. Nameplates: Provide engraved laminated nameplates, 1-inch by 3-1/2-inch minimum, machine screw retained, for permanent identification of all panelboards, motor starters, and cabinet-enclosed apparatus. Color shall be white with black letters. Panelboard numbers shall be inside the panel door. Refer to Section 16050 for nameplate construction and letter sizes.
- B. Wire and Terminal Markers: Provide self-adhering, preprinted cloth or vinyl wire markers for general branch circuit systems. Use shrink-sleeve markers for control and instrument systems.

2.13 CONCRETE VAULTS, SPLICE BOXES, AND HANDHOLES

- A. Provide precast boxes with pulling inserts, counting channels, knockouts and extensions as shown on the drawings.
- B. Utility power and telephone company pull and splice boxes: Comply to utility company precast box size and construction standards; provide their specified box accessories and grounding devices or products.
- C. Provide spring-assisted (to open) galvanized steel diamond plate covers that identify box service; (e.g., ELECTRIC POWER, LIGHTING, TELEPHONE), or as otherwise noted on the drawings. Furnish covers and locking latch designed for their location loading requirements: (e.g., full traffic, light vehicular traffic, or pedestrian traffic).
- D. Furnish 6-inch-diameter (minimum) sump for boxes having a concrete base (or floor).
- E. Provide a minimum 10-foot slack of all conductors on a neat loop in pull boxes designated for future use.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 CONDUIT INSTALLATION

- A. Applications:
 - 1. Rigid Steel Conduit: Exterior above grade power and lighting branch circuits; interior power and lighting branch circuit in machine or process operations areas.
 - 2. Liquid-Tight Flexible Metallic Conduit: In damp and wet locations, in other locations for connections to all pump motors, solenoid valves, transformers, vibrating equipment, and similar devices.
 - 3. PVC Conduits: Except as required by the Utility, schedule 40 PVC may be used underground. Minimum earthfill cover shall be 24 inches. Multiple

PVC conduits will be installed using approved spacers at intervals not exceeding five (5) feet.

4. PVC-Coated Rigid Steel Conduit: Exterior power and lighting branch circuits in direct contact with earth, concrete, constant moisture or subject to damage from corrosives (Schedule 40 PVC preferred for underground and in-slab wiring).

B. General:

1. Route concealed conduits as directly as possible and provide large radii bends. Rigidly secure conduit in position by means of approved clamps.
2. Plan conduit routing before installation and coordinate with other construction. Install conduits so they do not prevent removal, nor block access to mechanical or electrical equipment.
3. Install exposed conduits straight and true with reference to the adjacent work.
4. Support vertical conduit runs.
5. Running threads and threadless couplings are not acceptable for rigid steel conduit. Where necessary for connecting rigid conduit, use UL-listed couplings or unions.
6. Long Runs of Conduit: Provide pull boxes every 200 feet minimum.
7. Provide a 100-pound tensile strength polyethylene pulling rope in empty conduits.
8. Install an insulated copper green grounding conductor in all control, branch circuit and feeder raceways.
9. Seal all conduits during construction with conduit plugs or “pennies” set under bushings.
10. Install seal-off fitting on all raceways that enter an enclosure from a below-grade location.
11. PVC Schedule 40 Slab Penetrations: Use PVC-coated rigid steel conduit or rigid steel conduit wrapped with rugged pressure-sensitive 20-mil PVC tape (Scotchwrap 51) for all slab penetrations or below-above grade transitions. Apply one coat of Scotchwrap pipe primer before taping the pipe.
12. Conduit joints shall be painted with Crouse-Hinds STL thread lubricant.

13. Conduit Installation for Machine or Process Operations Areas. Use FORM 7 conduits or FS/FD boxes, with cover and gasket, for all conductor pull outlets.
14. Install expansion couplings where any conduit crosses a separation or expansion joint.
15. Rigid Conduit Terminations: Use conduit hubs for outdoor locations.
16. Bond all metal conduits at free-standing enclosures to the ground bus using grounding bushings.

C. Underground Raceways:

1. Provide a minimum raceway slope of 3 inches, each 100 feet away from outdoor switchgear, and toward handholes or other electrical drainage points.
2. Stagger conduit joints by rows and layers to provide maximum raceway bank strength. Identify conduits, using their assigned conduit numbers or circuit designation, at handholes or other termination points.
3. During construction, protect partially completed conduits from mud, sand, dirt, or other debris by using plugs.
4. After an underground raceway bank is completed, with CQA Monitor and/or Resident Engineer present, pull a testing mandrel, not less than 12 inches long and having a diameter of $\frac{1}{4}$ inch less than conduit diameter, through each conduit. Install a 150-pound pull rope in each conduit and leave at least 3 feet of slack at each end.
5. Provide no less than a 6-inch clearance from a conduit or raceway bank to each side, and 3-inch clearance to the trench bottom. Clean debris or loose dirt from trench bottom and provide a 3-inch sand base.
6. Provide a 4-mil thick, 6-inch wide red polyethylene marking tape with foil laminate installed 12 inches below ground at all raceways or conduits in all underground installations. Tape to have "CAUTION – ELECTRIC LINE BURIED BELOW" printed continuously. Panduit, Motivator, 3M or equivalent.

3.03 WIRING AND CABLE INSTALLATION

A. General:

1. Install conductors after conduit system is completed. Care will be taken in pulling conductors such that insulation is not damaged. Use UL-approved wire pulling lubricants as needed.
2. With CQA Monitor and/or Resident Engineer present, install and test all cables in accordance with the manufacturer's requirements and warranty.
3. With CQA Monitor and/or Resident Engineer present, the Contractor shall swab out below-grade raceways before pulling conductors or cables.
4. Use 10 AWG, minimum conductor size, for branch circuit homeruns greater than 100 feet.

B. Splicing and Terminating:

1. All aspects of splicing and terminating will be in accordance with the manufacturer's published procedures.
2. All splices in outlet boxes with connectors, as specified herein, will be made with separate tails of correct color. Provide at least 6 inches of tails packed in box after splice is made.
3. Neatly bundle and clamp all wire and cable in panels, control centers, and equipment enclosures.

C. Identification:

1. Identify branch circuit conductors with vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each circuit with the corresponding circuit number at the panelboard.
2. Identify size No. 6 and larger using phase color markers and identification tags.
3. Provide vinyl marker tape for all terminal strips.

D. Connections to Circuit Breakers, Switches, and Terminal Strips, Stranded Copper Conductors:

1. No. 12 through 8 AWG: Terminate using locking-tongue style, compression-type lugs, or by connectors supplied by the manufacturer.

- E. Joints in Wires in Dry Locations, Copper Conductors:
 - 1. No. 8 AWG and Smaller: Use cap or twist-on, spring-type solderless connectors. Self-stripping tap connectors shall not be acceptable.
 - 2. No. 6 AWG and Larger: Use split-bolt connectors or compression sleeves. Insulate joints with rubber tape and protected with half-lapped layers of vinyl-plastic electrical tape. Insulation may also be provided by UL-listed pre-manufactured components such as heat-shrink or cold-shrink devices.
- F. Joints in Wires in Moist Locations, Copper Conductors: Secure as specified above, then encapsulated in epoxy (Scotchcast or approved equal).
- G. Grounding:
 - 1. Permanent Ground Enclosures of Equipment, Raceways, and Fixtures: Install a copper-insulated green equipment grounding conductor in all branch circuit and feeder raceways. Equipment ground shall originate at panelboard ground bus and be bonded to all outlet boxes and electrical equipment enclosures. Connect receptacle ground terminals to the equipment grounding conductor by an insulated copper conductor.
 - 2. Panelboards Having Multiple-Ground Buses: Buses are to be bonded together by using 6 AWG (minimum) conductor; using panelboard interior support structure as a bonding medium is not acceptable.
- H. Signal Wiring:
 - 1. Identify wire used for alarm and control signal applications at both ends and referenced to appropriate Record Drawings. Refer to Section 01720 for additional information.
 - 2. Identify control wiring in accordance with record control diagrams.

3.04 CONCRETE VAULTS, SPLICE BOXES, AND HANDHOLES

- A. Do not locate boxes in roadways unless specifically approved by the Resident Engineer.
- B. Make all precast joints walls, risers, and conduit entrances watertight using cement grout or sealant. Use cement grout consisting of two parts sand and one part cement and sufficient water to form a plastic slurry. Apply in a manner to insure filling of all joint voids and conduit entrances.
- C. Excavation and bedding: Excavation must allow for overall assembled height of boxes plus added height of risers and bedding material consisting of 6-inch

compacted sand or gravel. Provide a minimum 4-inch clearance around the box exterior walls.

- D. Setting: Assemble boxes by lowering each section into the excavation. Lower, set and level base sections in place. The seal surfaces between sections must be cleaned and have gaskets in place before placing next section. Excavation hole must not contain water when setting the box.
- E. Backfilling: Provide compactable material such as pea gravel or sand. Not acceptable to use material such as saturated soil or material containing large rocks or chunks. Backfill after box completely installed and compact progressively from the bottom to the top surface.

3.05 ELECTRICAL TESTING

A. General:

1. Provide all materials, supplies, tools, equipment, labor, and services required to perform all tests as specified in this Section.
2. Submit test reports for approval by the Resident Engineer.
3. Correct all deficiencies revealed by tests. Replace at Contractor's cost, all materials and equipment found faulty.
4. Contractor shall furnish the services of an independent electrical testing firm acceptable to the Resident Engineer to conduct all testing. All testing will be done with CQA Monitor and/or Resident Engineer present. Contractor may perform low-voltage wire and cable meggering.
5. Maintain a written record of all tests showing date, personnel making test, equipment or material tested, tests performed, manufacturer and serial number of testing equipment and results.
6. Contractor shall be responsible for any damage to equipment or material due to improper test procedures or test apparatus handling, and shall replace, at his cost, or restore to original condition any damaged equipment or material.
7. It is the intent of these tests to assure that all electrical equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design specifications.
8. The tests and inspections will determine the suitability for energization.

9. The InterNational Electrical Testing Association (NETA) guidelines are to be used for the testing procedures and acceptance tests values of results.

B. Work Included:

1. Test all wire, cable, equipment, and systems installed or connected under electrical contract to assure proper installation, setting, connection, and functioning in accordance with the Construction Drawings, Specifications, and the manufacturer's recommendations. The intent is that field testing be extensive and complete as specified, to provide assurance of correct installation and operation of equipment.
2. Perform all tests and inspections recommended by the equipment manufacturer, whether required by these Specifications or not, unless specifically waived by the Resident Engineer.
3. Tests shall include, but are not limited to, the following:
 - a. All Wiring: Free of shorts, unintentional, and grounds.
 - b. Molded Case Breakers, 150A and Larger: Time and instantaneous tripping, physical condition, contact resistance, insulation resistance.
 - c. Power Circuit Breakers: Calibration to time/current curves, physical condition, contact resistance, insulation resistance.
 - d. Grounding System: Ground resistance (impedance), ground integrity.
 - e. High voltage cable.
 - f. Motor Controls: Proper overload sensing, insulation resistance.
 - g. Ground Fault System: Neutral free of improper grounds, pick-up, coordination, zone interlocking. Submit certified test report to the Resident Engineer.
 - h. Protective Relays: Pick-up, timing, insulation resistance, physical condition.
 - i. Switchboards, Panelboards, Bus Ducts, etc.: Insulation resistance, physical condition, proper torque on connections.
 - j. Feeder Cables and Motor-Branch Power Conductors: Insulation resistance.

k. Motors: Proper rotation, insulation resistance.

C. Minimum Acceptable Test Results:

1. Ground System: The main ground electrode system resistance to ground no greater than 5 ohms.
2. Electrical Apparatus and Systems Insulation Resistance:

Maximum Voltage Rating of Equipment	Minimum Test Voltage D.C.	Minimum Insulation Resistance in Megohms
250	500	25
600	1,000	100
5,000	2,500	1,000
8,000	2,500	2,000
15,000	2,500	5,000
25,000	5,000	20,000

3. Low Voltage Cables (600V maximum):

Maximum Voltage Rating of Equipment	Minimum Test Voltage D.C.	Minimum Insulation Resistance in Megohms
300	500	2
600	1,000	2

3.06 PROTECTION

- A. General: Conduits, junction boxes, outlet boxes, and other openings shall be kept closed to prevent entry of foreign matter. Cover fixtures, equipment, and apparatus for protection against dirt, paint, water, chemical or mechanical damage, before and during the construction period. Restore damaged fixtures, apparatus, or equipment to original condition prior to final acceptance, including restoration of damaged shop coats of paint at no additional cost to the County. Protect brightly finished surfaces and similar items during construction. No rust or damage will be permitted.

3.07 WORKMANSHIP

A. General:

1. Preparation, handling, and installation shall be in accordance with the manufacturer's written instructions and technical data particular to the product specified or approved.
2. Coordinate and cooperate the installation with other trades.
3. Work will conform to the National Electrical Contractors Association Standard of Installation for general installation practice.

END OF SECTION 16100

UNOFFICIAL

SECTION 16500 LIGHTING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes providing and installing light-emitting diode (LED) lighting fixtures including concrete footings and associated ballasts and lamps, as indicated on the Construction Drawings, as specified herein, and as needed to construct a complete operational security lighting system.

1.02 RELATED SECTIONS

- A. SECTION 03300 – Cast-in-Place Concrete
- B. Section 16050 – Basic Electrical Requirements
- C. Section 16100 – Basic Electrical Materials and Methods

1.03 PREFERENCES

- A. Illuminating Engineering Society (IES) Standard 90A Energy Conservation in New Building Design.

1.04 SUBMITTALS

- A. The Contractor shall submit the following Manufacturer data to the Resident Engineer for review in accordance with Section 01300 – Submittals a minimum of fifteen (15) days prior to material shipment. The Contractor shall obtain the Resident Engineer's acceptance of applicable submittals before material shipment.
 - 1. Catalog cuts of all lighting fixtures including construction details, photometric data, and Electrical Testing Laboratories (ETL) and Independent Testing Laboratories (ITL) test reports.
 - 2. Catalog cuts of lamps and lenses.

1.05 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workmen who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver all material to the site in the original packaging.

1.07 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color rendering index.
- C. Fixture: See "Luminaire."
- D. Lumen: Measured output of lamp and luminaire, or both.
- E. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Furnish all materials indicated on the Construction Drawings and in this Section. Provide specification grade materials that are brand new and bear the UL label.
- B. Product options and substitutions for specified materials in the Section shall be in accordance with Section 01630.

2.02 LUMINAIRE REQUIREMENTS

- A. All fixtures shall be listed by UL.
 - 1. LED type fixture. Comply with UL 1598
 - 2. Listed for wet locations.
 - 3. Lamp base comply with ANSI C81.61
 - 4. Bulb shape complying with ANSI C79.1
- B. CRI of minimum 70. CCT of 3000K to 4000K.
- C. L70 Lamp life of 35,000 hours.
- D. Internal driver.

- E. Operating voltage 120 VAC.
- F. Construction: One-piece aluminum assembly; silicon-rubber gasketing; tempered glass lens; stainless steel latch press; corrosion-resistant and approved for marine locations.
- G. Obtain luminaires from single source and of a single manufacturer.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Verify all mounting details and coordinate fixture trim and accessories before ordering fixtures.
- B. Furnish and install all light fixtures as indicated on the Construction Drawings as new and connect to wiring system.
- C. Furnish and install lamps in all fixtures as indicated on the Construction Drawings.
- D. Clean all fixtures and lenses prior to final acceptance of the Work by the County.
- E. Provide the concrete pole bases as required by the fixture vendor. The detail shown on the Construction Drawings is for reference only.

END OF SECTION 16500

SECTION 16910 CONTROL PANELS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section includes supplying and installing the electrical controls and wiring required for control panel fabrication and installation including supports and concrete fittings, as shown on the Construction Drawings, or specified herein, and as needed for a complete and operational system.

1.02 RELATED SECTIONS:

- A Section 01730 – Installation, Operation, and Maintenance Instructions
- B Section 03300 – Cast-in-Place Concrete
- C Section 11000 - Equipment
- D Section 16010 - Basic Electrical Requirements
- E Section 16100 - Basic Electrical Materials and Methods
- F Section 16500 – Lighting
- G Section 16911 – Cellular Telemetry

1.03 SUBMITTALS

- A. Submittals for the Leachate Collection Sump Pump Control panel enclosures and panel station supports are specified in Section 01300.

1.04 QUALITY ASSURANCE

- A. Use adequate numbers of skilled workman who are trained and experienced in the necessary crafts and who are familiar with the specified requirements and the methods needed for performance of the work of this Section.

PART 2 - PRODUCTS

2.01 DELIVERY, STORAGE AND HANDLING

- A. Comply with the pertinent provisions of Section 01600.

2.02 ACCEPTABLE MANUFACTURERS

- A. Furnish all materials indicated on the Construction Drawings and in this Section. Provide industrial grade materials that are brand new and bear the UL label.
- B. Product options and substitutions for specified materials in this Section shall be in accordance with Section 01630.
- C. Acceptable Equipment Manufacturers for:
 - 1. Enclosures
 - a. Hoffman
 - b. Weigman
 - c. Hammond
 - d. Engineering approved equivalent
 - 2. Motor Control
 - a. Square D
 - b. Furnas
 - c. Allen-Bradley
 - d. Cutler-Hammer
 - e. General Electric
 - f. Engineering approved equivalent
 - 3. Control Devices
 - a. Square D
 - b. Furnas
 - c. Allen-Bradley
 - d. Cutler-Hammer
 - e. General Electric
 - f. Engineering approved equivalent
 - 4. Terminal Blocks
 - a. Phoenix
 - b. Weidmuller
 - c. Engineering approved equivalent

2.02 ENCLOSURES

- A. General: Enclosures shall be designed to house electrical and electronic controls, instruments, and components, and shall provide protection from dust, dirt, oil, and water.
- B. Enclosures in wet or damp areas shall be NEMA 4 or Hoffman Bulletin A-4.
- C. Enclosures in corrosive areas shall be NEMA 4 Fiberglass.

2.03 NAMEPLATES

- A. Nameplates will be laminated plastic; identify the control panel, control device, or instrument designation; and use 1/4-inch-high, black letters on white background, unless otherwise specified or detailed.
- B. Provide control or instrument switches with an escutcheon plate that clearly identifies each operation position.

2.04 CONTROL DEVICES

- A. General: NEMA 4 panel-mounted control devices shall be used in outdoor or other wet areas.
- B. Control relays shall be heavy duty, machine tool, industrial-type relays, with 10A-rated contacts and at least one normally open/normally closed (NO/NC) convertible spare contact.
- C. Indicating lights shall be transformer type or LED, heavy-duty oil-tight units rated at 120V.
- D. Selector switches and pushbuttons shall be heavy-duty oil-tight units and shall have the specified momentary or maintained 10A, 120V contacts.
- E. Control switches will be UL-listed and HP-rated cam-actuated selector switches with a 20A, 600V continuous current rating, Electroswitch Series PR20 or equivalent.
- F. Time totalizers will be synchronous motor-driven, non-reset, six-digit-wheels, including a 1/10 digit on hours and minutes, rated NEMA 4 for damp or wet areas.

2.05 TERMINAL BLOCKS

- A. General: Terminal blocks shall be NEMA rated, DIN-Rail type, molded out of polyamide or melamine plastic; metal parts will be stainless steel, cadmium, or zinc

plated to inhibit corrosion; temperature service range shall be minus 40°C to 75°C. Provide screw-clamp terminals.

- B. Terminals for 120V or less circuit shall be 30A (minimum), 600V rated terminals.
- C. Terminals for 208V to 480V circuits shall be 55A (minimum), 600V rated terminals.

2.06 WIRE MARKING

- A. General: White heat-shrink wire marker sleeves with black printed wire identification numbers shall be provided.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

- A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Notify the County and the Resident Engineer of such conditions and proposed corrective actions before correcting unsatisfactory conditions. Do not proceed until unsatisfactory conditions are corrected.

3.02 CONTROL PANEL INSTALLATION

- A. General
 - 1. Two coats of rust-inhibiting, light gray epoxy enamel paint shall be applied to control panel enclosures, excluding NEMA 4X. Paint shall be applied after device holes have been punched or cut out.
 - 2. Wire groups shall be bundled using wire PAN-TYs or spiral wraps. Wire bundles shall be secured to the panel using machine screws. Provide plastic wiring duct for back panel wire bundles.
 - 3. A barrier shall be provided to separate line voltage from low (24V or less) voltage systems. Isolate 480V terminals from control terminals.
 - 4. Relay and other components shall be secured to the panel using machine screws. Self-tapping screws will not be acceptable.
 - 5. Laminated plastic nameplates identifying control devices or components inside the enclosure shall be attached to the back panel using machine screws.

6. The panel fabricator shall operationally check the control panels, including the programmable control system, before shipment to the Site or installation as part of the packaged equipment.
7. Control wire sizes, types, and color coding shall be installed in accordance with Section 16100.

B. Record Documents:

1. Comply with the pertinent provisions of Section 01720.
2. Control panel shall be equipped with final record schematic and wiring diagrams or programmable controller program printout, ladder diagram type.
3. Record documents shall be stored in a heavy-duty clear plastic envelope and secured to the interior back panel or door of the control panel.

END OF SECTION 16910

SECTION 16911 CELLULAR TELEMETRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes control panels for use with control for industrial machinery and process equipment:
 - 1. Radio telemetry equipment.
 - 2. Configuration and testing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of telemetry device and each type of related control panel component. Include weights, dimensions, features, and cellular card information.
- B. Shop Drawings: For each telemetry device, manufacturer's approval and production drawings. Include schematic and connection wiring diagrams, identification labeling, conduit entry locations and sizes, mounting arrangements, and details.
- C. Cellular Plan: For each telemetry device. Provide basic rate structure.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Manufacturer's Record Drawings. Any drawings created shall be provided in both hard copy and electronic formats (CD or DVD).
 - 2. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.

1.5 QUALITY ASSURANCE / QUALITY CONTROL

- A. Source Limitations: Obtain components of a single type from single source from single manufacturer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Condition: All materials furnished or incorporated in the fabrication of the control panels shall be new and unused, of a quality and type suitable to the intended use and produced by a leading manufacturer as part of a standard product line. Items scheduled for discontinuance or obsolescence shall not be used.
- D. The telemanager shall be installed in accordance with NFPA 70, recommendations of the manufacturer, and as shown.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store in climate-controlled environment.
- B. Product Selection for Restricted Space: Drawings indicate maximum space available on back of control panel support rack.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace telemanagers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL

- A. The cellular telemanager shall be as shown in the construction drawings.
- B. The cellular telemanager shall be factory assembled with all supplementary components and shipped to the jobsite as a single unit.
- C. The available voltage is 120 VAC single-phase.
- D. The rated operating temperature range shall be at least -10 to 50 degrees Centigrade.

2.2 CELLULAR TELEMANAGER

- A. The design basis product is a RACO Manufacturing and Engineering Co. model "Catalyst" with "Cellularm" cellular phone transceiver. Provide this model or an engineering approved equivalent.

B. Capabilities.

1. Minimum of four digital inputs
2. Continuous monitoring of all inputs including power and telephone connection
3. Capable of dialing at least 20 destinations for alarm reporting
4. Capable of receiving incoming calls for checking primary power and channel status
5. Capable of recording voice messages for alarm reporting and generic default speech messages
6. Capable of alarm reporting via user programmable text messages
7. Capable of remote alarm acknowledgement
8. Have integral surge protection
9. Be equipped with at least 10-hour battery backup

C. Enclosure.

1. Wall-mounted box or cabinet unless otherwise indicated. NEMA 250, Type 4 (Type 4X fiberglass in corrosive areas) unless otherwise indicated to comply with environmental conditions at installed location.
2. Finish color shall be the manufacturer's standard, unless otherwise indicated. Damaged surfaces shall be repaired and refinished using original type finish.

D. Conductors: See Section 16910 "Control Panels" for conductor coloration and identification.

PART 3 - EXECUTION

3.1 LOCATION

- A. Telemanagers shall be located as indicated on the drawings.

3.2 TELEMANAGER CONFIGURATION

- A. Configure/program the telemanager to monitor the following items:

Leachate Storage Tank High Level	Relay input
Leachate Containment High Level	Relay input
Leachate Sump High Level	Relay input
Lysimeter Sump High Level	Relay input

- B. Configure/program warning messages associated with each monitored point.
- C. Configure/program the warning call list (including phone numbers, voice messages, and text messages).

- D. Cellular configuration: Connect to wireless provider and configure/program the system to communicate over that system.

3.3 CELLULAR PROVIDER

- A. Provide complete cellular plan to accompany the cellular telemanager.
 - 1. Turn over plan to site operations at end of construction/testing period.

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Inspect telemanager wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - 2. All wiring shall be checked for continuity to ensure proper markings and to verify the integrity of each conductor. A continuity checklist or marked schematics shall be used for this test.
 - 3. All wiring shall be checked for loose connections (electrical and mechanical) and to see that contacts and working parts are correctly aligned and free from dust and foreign matter. This shall be done before any operational tests are performed.
 - 4. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- B. Telemanagers and/or associated components will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 OPERATIONS MANUAL

- A. Provide a complete operations manual for the unit. This manual must provide information relative to individual components as well as the integration of these components into the unit. Also, the manual must include any software code and instructions for setup and instructions for making programming changes. The manual must be submitted for approval.

END OF SECTION 16911

COUNTY OF TULARE
STATE OF CALIFORNIA

BID PROPOSAL (BID) TO THE BOARD OF SUPERVISORS

FOR CONSTRUCTING: WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION

Name of Bidder _____

Telephone Number _____

Business Mailing Address _____

Place of Business _____

TO THE BOARD OF SUPERVISORS OF THE COUNTY OF TULARE:

The undersigned, as bidder, declares that the only persons or parties interested in this Bid as principals are those named herein, that this Bid is made without collusion with any other person, firm or corporation; that the bidder has carefully examined the location of the proposed work and the annexed proposed form of contract; and the bidder proposes and agrees if this Bid is accepted, that the bidder will contract with the County of Tulare, in the form of the copy of the contract annexed hereto, to provide all necessary machinery, tools, apparatus and other means of construction, and to do all the work and furnish all the material specified in the contract, in the manner and time therein prescribed, and according to the requirements of the Engineer as therein set forth, and the bidder will take in full payment therefore the following unit prices, to wit:

TULARE COUNTY SOLID WASTE DEPARTMENT**WOODVILLE LANDFILL UNIT II PHASE 1 COSTRUCTION; COUNTY OF TULARE, STATE OF CALIFORNIA**

Item No.	Items with Unit Price Written in Words	Unit of Measure	Estimated Quantity	Unit Price	Amount
1	Mobilization at _____ _____ per lump sum.	LS	1		
2	Stormwater Pollution Prevention Plan	LS	1		
3	Excavation at _____ _____ per cubic yard.	CY	894,600		
4	Earthfill at _____ _____ per cubic yard.	CY	39,205		
5	Subgrade Preparation Layer at _____ _____ per cubic yard.	CY	53,625		
6	Geosynthetic Clay Liner at _____ _____ per square foot.	SF	1,496,040		
7	Geomembrane at _____ _____ per square foot.	SF	1,496,040		
8	Drainage Geocomposite at _____ _____ per square foot.	SF	1,496,040		
9	Anchor Trench at _____ _____ per linear foot.	LF	4,810		

Item No.	Items with Unit Price Written in Words	Unit of Measure	Estimated Quantity	Unit Price	Amount
10	Leachate Collection and Removal System at _____ per each lump sum.	Each	2		
11	Operations Layer Fill and Cell Access Road at _____ per cubic yard.	CY	110,410		
12	18-inch Corrugated Metal Pipe and appurtenances _____ per linear foot.	LF	95		
13	30-inch Reinforced Concrete Pipe and appurtenances _____ per linear foot.	LF	90		
14	36-inch Reinforced Concrete Pipe and appurtenances _____ per linear foot.	LF	90		
15	42-inch Reinforced Concrete Pipe and appurtenances _____ per linear foot.	LF	380		
16	Drainage Channels at _____ per linear foot.	LF	3,050		
17	V-Ditch on Unit I at _____ per linear foot.	LF	1,500		
18	12" Aggregate Base Access Road at _____ per square foot.	SF	197,890		

Item No.	Items with Unit Price Written in Words	Unit of Measure	Estimated Quantity	Unit Price	Amount
19	HMAC Entrance Road Overlay at _____ _____per ton.	Tons	1,084		
20	Leachate Extraction and Storage System at_ _____per each lump sum.	Each	2		
21	Concrete Secondary Containment at_____ _____ per lump sum each.	Each	2		
22	Electric Service to utility meter at _____per Lump Sum	LS	1		
23	Site Electric - extension of power conduit and cables to 3 control panel locations and all power and transducer cables and conduits to riser break out boxes (3) at _____per Lump Sum	LS	1		
24	Barbed wired fence remove and replace at _____per linear foot.	LF	1,700		
25	Vegetation and ECM at_____ _____ per acre.	Acre	29.5		
26	Geoelectric Leak Location Survey at ____ _____ per lump sum.	LS	1		
27	Perforated 6-inch SDR 11, HDPE pipe at _____per linear foot.	LF	3,600		
28	8-inch steel guard posts at _____per each.	Each	41		

TOTAL (In words and numbers) _____

In case of a discrepancy between words and figures, the words prevail. In case of a discrepancy between unit prices and total set forth for a unit basis item, the unit price prevails, except as provided in (a) or (b), as follows:

- (a) If the amount set forth as a unit price is unreadable or otherwise unclear, or is omitted, or is the same as the amount of the entry in the item total column, then the amount set forth in the item total column for the item prevails and is divided by the estimated quantity for the item and the price thus obtained is the unit price;
- (b) (Decimal Errors) If the product of the entered unit and the estimated quantity is exactly off by a factor of ten, one hundred, etc., or one-tenth, or one-hundredth, etc. from the entered total, the discrepancy will be resolved by using the entered unit price or item total, whichever most closely approximates percentagewise the unit price or item total in the County's estimate of cost.

If both the unit price and the item total are unreadable or otherwise unclear, or are omitted, the bid may be deemed non-responsive. Likewise if the item total for a lump sum item is unreadable or otherwise unclear, or is omitted, the bid may be deemed non-responsive unless the project being bid has only a single item and a clear, readable total bid is provided.

Symbols such as commas and dollar signs will be ignored and have no mathematical significance in establishing any unit price or item total or lump sums. Written unit prices, item totals and lump sums will be interpreted according to the number of digits and, if applicable, decimal placements. Cents symbols also have no significance in establishing any unit price or item total since all such figures are assumed to be expressed in dollars and/or decimal fractions of a dollar. Bids on lump sum items are item totals only; if any unit price for a lump sum item is included in a bid and it differs from the item total, the item total shall prevail.

The foregoing provisions for the resolution of specific discrepancies cannot be so comprehensive as to cover every omission, inconsistency, error or other irregularity which may occur in a bid. **Any situation not specifically provided for will be determined in the discretion of the Board of Supervisors, and such discretion will be exercised in the manner deemed by the Board of Supervisors to best carry out its duty to award only to the lowest responsive, responsible bidder. The decision of the Board of Supervisors respecting the amount of a bid, or the existence or treatment of a discrepancy in a bid is final.**

If this Bid is accepted and the undersigned is awarded the Contract, given notice of the award and presented with the Contract for signature as provided in the Special Provisions, and fails to sign and deliver the Contract to the Clerk of the Board of Supervisors, within the time and manner required under the Special Provisions, together with all required insurance certificates, bonds, powers of attorney, certificate of authority, insurance rating, financial statements, proofs of licensing, and any other documents required by the Special Provisions to be filed with the signed Contract, then the Board of Supervisors may, in its sole discretion, determine that the bidder has abandoned its bid, whereupon the Board's acceptance of this Bid is deemed frustrated, and such bid security as may accompany this Bid shall become due and owing to the County of Tulare as liquidated damages.

Accompanying this Bid is a _____ for

\$_____. (Insert the words "Cash", "Cashier's Check", "Certified Check" or "Bidders Bond", as the case may be, and an amount equal to at least ten percent (10%) of the total bid).

The undersigned understands that the Board of Supervisors retains the option to reject any or all bids.

Further, as part of the Bid, the Contractor provides the following information and representations:

ADDENDA CERTIFICATION STATEMENT

This Bid is submitted with respect to the changes in the contract documents included in Addendum

Number(s) _____.

Name of Contractor _____

Warning. If an addendum or addenda have been issued by the County and not noted as being received by the bidder, then this Bid will be rejected.

The above Addenda Certification Statement is part of the Bid. Signing the Bid on the signature portion thereof shall also constitute signature of this Addenda Certification Statement.

BIDDER DISQUALIFICATION QUESTIONNAIRE

In accordance with Public Contract Code Section 10162, the Bidder hereby completes, under penalty of perjury, the following questionnaire:

Has the bidder, or any officer of the bidder, or any employee who has a proprietary interest in the bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of law or a safety regulation?

Yes _____ No _____

If the answer is yes, explain the circumstances in the following space:

Note: The above Questionnaire and Statement are part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature under penalty of perjury of this Questionnaire and Statement.

PUBLIC CONTRACT CODE SECTION 9204 STATEMENT

AB 626, approved by the Governor of the State of California on September 29, 2016, created a new Public Contract Code section 9204, which specifies new procedural requirements for claims submitted by a contractor on any public works project.

The full text of the current legislation is set forth below:

§ 9204. Legislative findings and declarations regarding timely and complete payment of contractors for public works projects; claims process

(a) The Legislature finds and declares that it is in the best interests of the state and its citizens to ensure that all construction business performed on a public works project in the state that is complete and not in dispute is paid in full and in a timely manner.

(b) Notwithstanding any other law, including, but not limited to, Article 7.1 (commencing with Section 10240) of Chapter 1 of Part 2, Chapter 10 (commencing with Section 19100) of Part 2, and Article 1.5 (commencing with Section 20104) of Chapter 1 of Part 3, this section shall apply to any claim by a contractor in connection with a public works project.

(c) For purposes of this section:

(1) "Claim" means a separate demand by a contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

(A) A time extension, including, without limitation, for relief from damages or penalties for delay assessed by a public entity under a contract for a public works project.

(B) Payment by the public entity of money or damages arising from work done by, or on behalf of, the contractor pursuant to the contract for a public works project and payment for which is not otherwise expressly provided or to which the claimant is not otherwise entitled.

(C) Payment of an amount that is disputed by the public entity.

(2) "Contractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who has entered into a direct contract with a public entity for a public works project.

(3)(A) "Public entity" means, without limitation, except as provided in subparagraph (B), a state agency, department, office, division, bureau, board, or commission, the California State University, the University of California, a city, including a charter city, county, including a charter county, city and county, including a charter city and county, district, special district, public authority, political subdivision, public corporation, or nonprofit transit corporation wholly owned by a public agency and formed to carry out the purposes of the public agency.

(B) "Public entity" shall not include the following:

(i) The Department of Water Resources as to any project under the jurisdiction of that department.

(ii) The Department of Transportation as to any project under the jurisdiction of that department.

(iii) The Department of Parks and Recreation as to any project under the jurisdiction of that department.

(iv) The Department of Corrections and Rehabilitation with respect to any project under its jurisdiction pursuant to Chapter 11 (commencing with Section 7000) of Title 7 of Part 3 of the Penal Code.

(v) The Military Department as to any project under the jurisdiction of that department.

(vi) The Department of General Services as to all other projects.

(vii) The High-Speed Rail Authority.

(4) "Public works project" means the erection, construction, alteration, repair, or improvement of any public structure, building, road, or other public improvement of any kind.

(5) "Subcontractor" means any type of contractor within the meaning of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code who either is in direct contract with a contractor or is a lower tier subcontractor.

(d)(1)(A) Upon receipt of a claim pursuant to this section, the public entity to which the claim applies shall conduct a reasonable review of the claim and, within a period not to exceed 45 days, shall provide the claimant a written statement identifying what portion of the claim is disputed and what portion is undisputed. Upon receipt of a claim, a public entity and a contractor may, by mutual agreement, extend the time period provided in this subdivision.

(B) The claimant shall furnish reasonable documentation to support the claim.

(C) If the public entity needs approval from its governing body to provide the claimant a written statement identifying the disputed portion and the undisputed portion of the claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of a claim sent by registered mail or certified mail, return receipt requested, the public entity shall have up to three days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension, expires to provide the claimant a written statement identifying the disputed portion and the undisputed portion.

(D) Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. If the public entity fails to issue a written statement, paragraph (3) shall apply.

(2)(A) If the claimant disputes the public entity's written response, or if the public entity fails to respond to a claim issued pursuant to this section within the time prescribed, the claimant may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the public entity shall schedule a meet and confer conference within 30 days for settlement of the dispute.

(B) Within 10 business days following the conclusion of the meet and confer conference, if the claim or any portion of the claim remains in dispute, the public entity shall provide the claimant a written statement identifying the portion of the claim that remains in dispute and the portion that is undisputed. Any payment due on an undisputed portion of the claim shall be processed and made within 60 days after the public entity issues its written statement. Any disputed portion of the claim, as identified by the contractor in writing, shall be submitted to nonbinding mediation, with the public entity and the claimant sharing the associated costs equally. The public entity and claimant shall mutually agree to a mediator within 10 business days after the disputed portion of the claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the claim remaining in dispute shall be subject to applicable procedures outside this section.

(C) For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

(D) Unless otherwise agreed to by the public entity and the contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Section 20104.4 to mediate after litigation has been commenced.

(E) This section does not preclude a public entity from requiring arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program, if mediation under this section does not resolve the parties' dispute.

(3) Failure by the public entity to respond to a claim from a contractor within the time periods described in this subdivision or to otherwise meet the time requirements of this section shall result in the claim being deemed rejected in its entirety. A claim that is denied by reason of the public entity's failure to have responded to a claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the claim or the responsibility or qualifications of the claimant.

(4) Amounts not paid in a timely manner as required by this section shall bear interest at 7 percent per annum.

(5) If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a public entity because privity of contract does not exist, the contractor may present to the public entity a claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on their own behalf or on behalf of a lower tier subcontractor, that the contractor present a claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the claim be presented to the public entity shall furnish reasonable documentation to support the claim. Within 45 days of receipt of this written request, the contractor shall notify the subcontractor in writing as to whether the contractor presented the claim to the public entity and, if the original contractor did not present the claim, provide the subcontractor with a statement of the reasons for not having done so.

(e) The text of this section or a summary of it shall be set forth in the plans or specifications for any public works project that may give rise to a claim under this section.

(f) A waiver of the rights granted by this section is void and contrary to public policy, provided, however, that (1) upon receipt of a claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable; and (2) a public entity may prescribe reasonable change order, claim, and dispute resolution procedures and requirements in addition to the provisions of this section, so long as the contractual provisions do not conflict with or otherwise impair the timeframes and procedures set forth in this section.

(g) This section applies to contracts entered into on or after January 1, 2017.

(h) Nothing in this section shall impose liability upon a public entity that makes loans or grants available through a competitive application process, for the failure of an awardee to meet its contractual obligations.

(i) This section shall remain in effect only until January 1, 2027, and as of that date is repealed, unless a later enacted statute that is enacted before January 1, 2027, deletes or extends that date.

BIDDER DISQUALIFICATION ACKNOWLEDGMENT

In accordance with Public Contract Code section 10232, the Contractor hereby states under penalty of perjury that no more than one final unappealable finding of contempt of court by a federal court has been issued against the Contractor within the immediately preceding two-year period because of the Contractor's failure to comply with an order of a federal court which orders the Contractor to comply with an order of the National Labor Relations Board.

Note: The above Questionnaire and Statement are a part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature, under penalty of perjury, of this Questionnaire and Statement.

Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

BIDDER DISQUALIFICATION QUESTIONNAIRE

In conformance with Public Contract Code section 10285.1 (Chapter 376, Stats. 1985), the bidder hereby declares under penalty of perjury under the laws of the State of California that the bidder has ____, has not ____ been convicted within the preceding three years of any offenses referred to in that section, including any charge of fraud, bribery, collusion, conspiracy, or any other act in violation of any state or Federal antitrust law in connection with the bidding upon, award of, or performance of, any public works contract, as defined in Public Contract Code section 1101, with any public entity, as defined in Public Contract Code section 1100, including the Regents of the University of California or the Trustees of the California State University. The term "bidder" is understood to include any partner, member, officer, director, responsible managing officer, or responsible managing employee thereof, as referred to in Section 10285.1.

Note: The bidder must place a check mark after "has" or "has not" in one of the blank spaces provided. The above Statement is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Statement. Bidders are cautioned that making a false certification may subject the certifier to criminal prosecution.

NON-COLLUSION AFFIDAVIT

(Title 23 United States Code Section 112 and
Public Contract Code Section 7106)

NON-COLLUSION DECLARATION TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.

The bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation. The bid is genuine and not collusive or sham. The bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid. The bidder has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or to refrain from bidding. The bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or that of any other bidder. All statements contained in the bid are true. The bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid, and has not paid, and will not pay, any person or entity for such purpose.

Any person executing this declaration on behalf of a bidder that is a corporation, partnership, joint venture, limited liability company, limited liability partnership, or any other entity, hereby represents that he or she has full power to execute, and does execute, this declaration on behalf of the bidder.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and

correct and that this declaration is executed on _____ [date],

at _____ [city], _____ [state]

(Signature)

*(THE BIDDER'S EXECUTION ON THE SIGNATURE PORTION OF THIS BID
SHALL ALSO CONSTITUTE AN ENDORSEMENT AND EXECUTION OF
THOSE CERTIFICATIONS WHICH ARE A PART OF THIS BID)*

EQUAL EMPLOYMENT OPPORTUNITY CERTIFICATION

The bidder _____, proposed

subcontractor _____, hereby certifies that

he has _____, has not _____, participated in a previous contract or subcontract subject to the equal opportunity clauses, as required by Executive Orders 10925, 11114, or 11246, and that, where required, he has filed with the Joint Reporting Committee, the Director of the Office of Federal Contract Compliance, a Federal Government contracting or administering agency, or the former President's Committee on Equal Employment Opportunity, all reports due under the applicable filing requirements.

Note: The above certification is required by the Equal Employment Opportunity Regulations of the Secretary of Labor (41 CFR 60-1.7(b) (1)), and must be submitted by bidders and proposed subcontractors only in connection with contracts and subcontracts which are subject to the equal opportunity clause. Contracts and subcontracts which are exempt from the equal opportunity clause are set forth in 41 CFR 60-1.5. (Generally only contracts or subcontracts of \$10,000 or under are exempt.)

Currently, Standard Form 100 (EEO-1) is the only report required by the Executive Orders or their implementing regulations.

Proposed prime contractors and subcontractors who have participated in a previous contract or subcontract subject to the Executive Orders and have not filed the required reports should note that 41 CFR 60-1.7(b) (1) prevents the award of contracts and subcontracts unless such contractor submits a report covering the delinquent period or such other period specified by the Federal Highway Administration or by the Director, Office of Federal Contract Compliance, U.S. Department of Labor.

Signing this Bid on the signature portion thereof shall also constitute signing this certificate.

DEBARMENT AND SUSPENSION CERTIFICATION

TITLE 2, CODE OF FEDERAL REGULATIONS, PART 180

The bidder, under penalty of perjury, certifies that, except as noted below, he/she or any other person associated therewith in the capacity of owner, partner, director, officer, manager:

- is not currently under suspension, debarment, voluntary exclusion, or determination of ineligibility by any Federal agency;
- has not been suspended, debarred, voluntarily excluded or determined ineligible by any Federal agency within the past 3 years;
- does not have a proposed debarment pending; and
- has not been indicted, convicted, or had a civil judgment rendered against it by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past 3 years; and
- has not been suspended or debarred by Tulare County pursuant to Part V, Chapter 15 of the Tulare County Ordinance Code.

If there are any exceptions to this certification, insert the exceptions in the following space.

Exceptions will not necessarily result in denial of award, but will be considered in determining bidder responsibility. For any exception noted above, indicate below to whom it applies, initiating agency, and dates of action.

Notes: Providing false information may result in criminal prosecution or administrative sanctions. The above certification is part of the Bid. Signing this Bid on the signature portion thereof shall also constitute signature of this Certification.

SUBCONTRACTOR LIST

In accordance with the provisions of Section 2-1.10 of the Standard Specifications, Public Contract Code section 4104, and Labor Code section 1771 et seq., each bidder must list below the name and location of place of business of each subcontractor who will perform a portion of the contract work in an amount in excess of one-half of one percent of the total bid or ten thousand dollars (\$10,000), whichever is greater, as well as the subcontractor's Department of Industrial Relations' ("DIR") registration number, and State contractor's license number. In each instance, describe the nature and extent of the work to be sublet. On the Subcontractor List (next page), you must submit each subcontracted bid item number and corresponding percentage with your bid. **Failure to submit a properly completed Subcontractor List form may result in a nonresponsive bid.** Note: (1) pursuant to Public Contract Code section 4104(a)(2), an inadvertent error in listing the California contractor license number provided pursuant to this paragraph is not grounds for filing a bid protest or grounds for considering the bid non-responsive if the corrected contractor's license number is submitted to the County by the prime contractor within twenty-four (24) hours after the bid opening and provided the corrected contractor's license number corresponds to the submitted name and location for that subcontractor; (2) pursuant to Labor Code section 1771.1(c), an inadvertent error in listing a subcontractor who is not registered with the DIR in a Bid, is not grounds for filing a bid protest or grounds for considering the bid non-responsive, provided that any of the following apply:

(1) The subcontractor is registered prior to the bid opening.

(2) Within twenty-four (24) hours after the bid opening, the subcontractor is registered and has paid the penalty registration fee specified in subparagraph (E) of paragraph (2) of subdivision (a) of Labor Code section 1725.5.

The General Contractor to whom the contract is awarded will not be permitted, without the written consent of the Tulare County Director of the Resource Management Agency or designee, to substitute any person as subcontractor in place of the subcontractor designated in the original bid, or to permit any subcontract to be assigned or transferred, or to allow it to be performed by anyone other than the original subcontractor. Consent to the substitution of another person as subcontractor is only permitted in accordance with Public Contract Code section 4107.

The failure of the Contractor to specify a subcontractor for any portion of the contract work in excess of one-half of one percent of the total contract price is deemed to indicate that the Contractor intends to perform such portion himself. The subletting or subcontracting of work for which no subcontractor was designated in the original bid and which is in excess of one-half of one percent of the total contract price, will be allowed only in accordance with Public Contract Code section 4109.

<u>Subcontractor Information</u>				<u>Work Portion</u>		
<u>Name</u>	<u>Address</u>	<u>Lic. No.</u>	<u>DIR Registration No.</u>	<u>Bid Item No.</u>	<u>Description</u>	<u>% of Bid Item</u>
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
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				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		

<u>Subcontractor Information</u>				<u>Work Portion</u>		
<u>Name</u>	<u>Address</u>	<u>Lic. No.</u>	<u>DIR Registration No.</u>	<u>Bid Item No.</u>	<u>Description</u>	<u>% of Bid Item</u>
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
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				d)		
				a)		
				b)		
				c)		
				d)		
				a)		
				b)		
				c)		
				d)		

Further, as part of this Bid, the contractor agrees to the terms, and supplies the information required in the attached "Bidders Bond" or other security instruments (if such bond or instrument is required). Such Bond or instrument is considered part of the bid.

The names of all persons interested in the foregoing Bid as principals are as follows:

IMPORTANT NOTICE

If bidder or other interested person is a corporation, state legal name of corporation, also names of the president, vice-president, secretary, and treasurer thereof; if a co-partnership, state true name of firm, also names of all individual copartners composing firm; if bidder or other interested person is an individual, state first and last names in full.

Licensed in conformance with an act providing for the registration of Contractors,

License No. _____ Classification(s) _____

Federal Employer Identification Number By my signature on this bid I certify, under penalty of perjury under the laws of the State of California, that the foregoing questionnaire and statements of Public Contract Code sections 10162, 10232 and 10285.1 are true and correct and that the bidder has complied with the requirements of Section 8103 of the Fair Employment and Housing Commission Regulations (Chapter 5, Title 2 of the California Administrative Code). By my signature on this Bid, I further certify, under penalty of perjury under the laws of the State of California and the United States of America, that the Noncollusion Affidavit required by title 23 United States Code section 112 and Public Contract Code section 7106; and the title 2 Code of Federal Regulations part 180 Debarment and Suspension Certification, are true and correct.

Date: _____

Signature of bidder

NOTE: If bidder is a corporation, the legal name of the corporation is set forth above together with the signature of the officers authorized to sign contracts on behalf of the corporation; if bidder is a co-partnership, the true name of the partner or partners authorized to sign contracts on behalf of the co-partnership; and if bidder is an individual, his or her signature must be placed above. If signature is by an agent, other than an officer of the corporation or a member of a partnership, a Power of Attorney must be on file with the Board of Supervisors prior to opening bids or submitted with the bid; otherwise, the bid will be disregarded as non-responsive and unauthorized.

Business Address _____

Place of Business _____

Date: _____

COUNTY OF TULARE
STATE OF CALIFORNIA

BIDDER'S BOND

KNOW ALL MEN BY THESE PRESENT:

That we _____

_____, AS PRINCIPAL, and

_____ as SURETY,

are held and firmly bound unto the County of Tulare, hereinafter called the Obligee, in the sum of TEN PERCENT (10%) OF THE TOTAL AMOUNT OF THE BID of the Principal above named, submitted by said Principal to the Board of Supervisors, County of Tulare, for the work described below, for the payment of which sum in lawful money of the United States, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents. In no case shall the liability of the surety hereunder exceed the sum of \$ _____

THE CONDITION OF THIS OBLIGATION IS SUCH, that whereas the Principal has submitted the above-mentioned bid to the Board of Supervisors, County of Tulare, for certain construction specifically described as follows, for which bids are to be opened at Visalia, California, on _____, _____, for construction of WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION.

NOW, THEREFORE, if the aforesaid Principal is awarded the Contract, given the required notice of award and presented with the Contract for signature and, within the time and manner required under the Special Provisions, executes and files it with the Clerk of the Board of Supervisors in the prescribed form and in accordance with the bid, together with all insurance certificates, bonds, powers of attorney, certificates of authority and financial statements, proofs of licensing, and any other documents required by the Special Provisions to be filed with the executed Contract, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorney's fee to be fixed by the Court.

IN WITNESS WHEREOF, we have hereunto set our hands and seals on this _____ day of

_____, _____.

_____(SEAL)

_____(SEAL)

_____(SEAL)

Principal

_____(SEAL)

_____(SEAL)

_____(SEAL)

Surety

Note - Signature of those executing for the surety must be properly acknowledged or notarized.

COUNTY OF TULARE
STATE OF CALIFORNIA

CONTRACT

THIS CONTRACT, entered into as of this _____ day of _____, by and between the COUNTY OF TULARE, a political subdivision of the State of California hereinafter referred to as "County", and _____, hereinafter referred to as "Contractor";

W I T N E S S E T H:

WHEREAS, County desires to carry out a project of constructing of WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION, (hereinafter referred to as the "Work") in Tulare County.

WHEREAS, Contractor currently holds a Class A license from the State of California and must maintain the license from contract award through Contract acceptance (Public Contract Code § 20103.5) and is willing and able to perform the Work on the terms and conditions set forth herein.

WHEREAS, County publicly opens and reads bids at the time and place shown on the *Notice to Bidders*.

WHEREAS, County has offered this project through the statutorily prescribed bidding process, and through such process awarded this Contract to the lowest responsible and responsive bidder.

WHEREAS, should bid rigging, bidder collusion, and other fraudulent activities occur, Contractor must call the U.S. Department of Transportation (DOT) toll-free hotline number (800) 424-9071. The service is available twenty-four (24) hours a day, seven (7) days a week and is confidential and anonymous. The hotline is part of the DOT's effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General.

NOW, THEREFORE, BE IT AGREED as follows:

ARTICLE I. For and in consideration of the terms, conditions and covenants hereinafter contained, Contractor will, at its own cost and expense, do all the work and furnish all the materials, except such work or material, if any, which the terms herein specifically provide will be furnished by County, necessary to construct and complete in good workmanlike and substantial manner and to the satisfaction of County's Director of Solid Waste or designee, for the WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION Project in Tulare County.

Contractor will furnish such work and material in accordance with the terms and conditions set forth in County's Special Provisions (hereinafter referred to as the "Special Provisions") issued for this contract and project, which Special Provisions are incorporated herein by reference as if set out in full. Further, Contractor will furnish such work and material in accordance with the Standard Specifications dated 2018 (hereinafter referred to as the "Standard Specifications") and the Standard Plans dated 2018 (hereinafter referred to as the "Standard Plans"), issued by the Department of Transportation of the State of California, and the project plans described below, which the accepted Bid Proposal (Bid) to the Board of Supervisors by the Contractor, including all statements, bonds, and certificates required to be submitted thereunder, Standard Specifications, Standard Plans, and project plans are incorporated herein by reference as if set out in full.

The project plans for this project were approved September 12, 2023 and are entitled:

PLANS FOR THE
WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION
COUNTY OF TULARE; STATE OF CALIFORNIA

ARTICLE II. Contractor agrees to receive and accept the following prices as full compensation from County, for furnishing all materials, for doing all the work contemplated and embraced in this Contract, for all costs, losses, or damages arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered in the prosecution of the work until its acceptance by the Board of Supervisors of the County of Tulare, and for all risks of every description connected with the work; also for all expenses incurred by or in consequence of the suspension or discontinuance of work and for well and faithfully completing the work, and the whole thereof in the manner and according to the Contract Documents as defined in Article XI, and the requirements of the Engineer under them, and in accordance with the bid of Contractor, the terms, conditions, and representations of which bid are incorporated herein by reference as if set out in full:

Item No.	Items with unit price written in words	Unit of Measure	Estimated Quantity	Unit Price	Amount
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(ITEMS IN CONTRACT WILL BE THE SAME AS THOSE IN THE BID)

ARTICLE III. Contractor will be licensed as required by law and will be in compliance with the regulations of the Contractors' State License Board. Contractor will possess a Class A license from Contract award through Contract acceptance (Public Contract Code §20103.5). Any questions concerning a contractor may be referred to the Registrar, Contractors' State License Board, 9835 Goethe Road, Sacramento, California. Mailing Address: P.O. Box 26000, Sacramento, California 95826. Contractor will also comply with the licensing requirements specified in the "Notice to Bidders" which is specifically incorporated herein by this reference as if set out in full.

ARTICLE IV. Contractor agrees to comply with the prevailing wage laws as set forth in Labor Code sections 1770-1780 unless an applicable federal labor law imposes a higher wage or stricter requirement, in which case the higher wage or stricter requirement will apply, and Contractor agrees to be responsible for the compliance by all subcontractors with Labor Code section 1776 in accordance with Public Contract Code section 6109, with respect to subcontractors which are ineligible to perform work on public works projects pursuant to Labor Code section 1777.1 or 1777.7:

1. The Contractor must not allow any such subcontractor to work on this project.
2. Contractor will repay to County any money paid to any such subcontractor allowed to work on this project.
3. Contractor will pay the wages of the workers of any such subcontractor allowed to work on this project.

The general prevailing wage rates and any applicable changes to these wage rates are available:

1. From the Department of Industrial Relations' website
2. On file at the Resource Management Agency Permit Center, 5961 South Mooney Boulevard, Visalia, CA 93277, which will be made available to any interested person on request.
3. From the County Public Works website (see link in the Notice to Bidder section).

Contractor must post the general prevailing wage rates at a prominent place at each job site in accordance to section 7-1.02K(2) of the Caltrans Standard Specifications and Labor Code section 1773.2.

ARTICLE V. County does hereby engage Contractor as an independent contractor to provide the materials and to do the work according to the terms and conditions herein contained and referred to, for the prices aforesaid, and hereby contracts to pay the same at the time, in the manner and upon the conditions in the Special Provisions which are a part of this contract.

ARTICLE VI. Contractor will neither sell, assign, transfer, convey or encumber this Contract or any right or interest therein or thereunder, or suffer or permit any such sale, assignment, transfer, conveyance or encumbrance to occur by operation of law, without the prior written consent of County.

ARTICLE VII. This Contract may only be amended or modified, as permitted by the Public Contract Code, by written consent to such amendment or modification by each party.

ARTICLE VIII. The termination provisions of the Standard Specifications are incorporated by reference.

ARTICLE IX. Any and all notices or other matters required or permitted by this Contract or by law to be served on, given to, or delivered to either party hereto shall be in writing and shall be deemed duly served, given or delivered when personally delivered to the party to whom addressed, or in lieu of such personal service, when deposited in the United States mail, certified return receipt requested, addressed as follows:

Engineer: Bryce Howard, Director
Tulare County Solid Waste Dept.
5955 South Mooney Boulevard
Visalia, CA 93277

Contractor: _____

ARTICLE X. Before approval of a Contract by County, Contractor must file with the Clerk of the Board of Supervisors evidence of insurance as set forth in 7-1.06 of the Special Conditions which outlines the minimum scope, specifications, and limits of insurance required under this Contract. Additional insured endorsements required as outlined below cannot be used to reduce limits available to County as an additional insured from Contractor's full policy limits. Insurance policies cannot be used to limit liability or to limit the indemnification provisions and requirements of this Contract or act in any way to reduce the policy coverage and limits available from the insurer(s). If Contractor fails to maintain or renew coverage, or to provide evidence of renewal, then County may consider that failure a material breach of this Contract. County may also withhold any payment otherwise due to Contractor for failure to provide evidence of renewal until Contractor provides such evidence.

ARTICLE XI. The Complete Contract between the parties consists of this Contract, Notice to Bidders, the Special Provisions, the 2018 Caltrans Standard Specifications, the project Plans, the 2018 Caltrans Standard Plans, the Technical Specifications, Construction Quality Assurance Plan, all Addenda, and the accepted Bid to the Board of Supervisors by the Contractor, including all statements, bonds, and certificates required to be submitted thereunder. Any prior agreements, promises, negotiations, or representations not expressly set forth in the Complete Contract are of no force or effect.

ARTICLE XII. Should there be any conflict between the terms of this Contract and the Bid of the Contractor, then this Contract shall control and nothing herein shall be considered as an acceptance of any conflicting terms.

ARTICLE XIII. In lieu of the attorney's notice of approval provided for in Section 8-1.04 of the Standard Specifications, the Engineer will deliver a written Notice to Proceed to the Contractor following execution of the Contract on behalf of the Board of Supervisors. Contractor will begin work within fifteen (15) calendar days from the date the Notice to Proceed is issued, in full compliance with said Section 8-1.04 of the Standard Specifications.

Complete all work within ONE HUNDRED NINETY (190) working days beginning on the fifteenth (15th) calendar day after the date shown on the Notice to Proceed. Contractor agrees to pay as liquidated damages and not as a penalty, the amount established pursuant to Section 8-1.10A of the Special Provisions, County and Contractor agree that if the Work is not completed within the Contract Time, then County's damages would be extremely difficult or impracticable to determine and that the amount specified is a reasonable estimate of the reasonable sum for such damages. Liquidated damages for all work is set at THREE THOUSAND DOLLARS (\$3,000) per day, for each and every calendar days' delay in finishing the work in excess of the number of working days

prescribed above. County may deduct any liquidated damages due from Contractor from any amounts otherwise due to Contractor under the Contract Documents. This provision does not limit any right or remedy of County in the event of any other default of Contractor other than failing to complete the Work within the Contract Time.

ARTICLE XIV. This Contract reflects the contributions of both parties and accordingly the provisions of Civil Code section 1654 do not apply to address and interpret any uncertainty.

ARTICLE XV. Unless specifically set forth, the parties to this Contract do not intend to provide any other party with any benefit or enforceable legal or equitable right or remedy.

ARTICLE XVI. This Contract shall be interpreted and governed under the laws of the State of California without reference to California conflicts of law principles. The parties agree that this contract is made in and will be performed in Tulare County, California.

ARTICLE XVII. The failure of either party to insist on strict compliance with any provision of this Contract is not considered a waiver of any right to do so, whether for that breach or any subsequent breach. The acceptance by either party of either performance or payment shall not be considered to be a waiver of any preceding breach of the Contract by the other party.

ARTICLE XVIII. The Recitals and the Exhibits to this Contract are fully incorporated into and are integral parts of this Contract.

ARTICLE XIX. This Contract is subject to all applicable laws and regulations. If any provision of this Contract is found by any court or other legal authority, or is agreed by the parties, to be in conflict with any code or regulation governing its subject, the conflicting provision shall be considered null and void. If the effect of nullifying any conflicting provision is such that a material benefit of the Contract to either party is lost, the Contract may be terminated at the option of the affected party. In all other cases the remainder of the Contract shall continue in full force and effect.

ARTICLE XX. Each party will execute any additional documents and perform any further acts which may be reasonably required to effect the purposes of this Contract.

ARTICLE XXI. If a dispute arises out of or relating to this Contract, or the breach thereof, and if said dispute cannot be settled through negotiation, the parties agree first to try in good faith to settle the dispute by non-binding mediation before resorting to litigation or some other dispute resolution procedure, unless the parties mutually agree otherwise. The mediator shall be mutually selected by the parties, but in case of disagreement, the mediator shall be selected by lot from among two nominations provided by each party. All costs and fees required by the mediator shall be split equally by the parties, otherwise each party shall bear its own costs of mediation. Contractor shall continue with its responsibilities under this Contract during any such dispute.

ARTICLE XXII. Contractor acknowledges that this Contract is subject to filing obligations pursuant to Unemployment Insurance Code section 1088.8. Accordingly, County has an obligation to file a report with the Employment Development Department, which report will include the Contractor's full name, social security number, address, the date this contract was executed, the total amount of the contract, the contract's expiration date or whether it is ongoing. Contractor agrees to cooperate with County to make such information available and to complete DE Form 542. Failure to provide the required information may, at County's option, prevent approval of this Contract, or be grounds for termination by County.

ARTICLE XXIII. This Contract represents the entire Contract between Contractor, and County as to its subject matter and no prior oral or written understanding shall be of any force or effect. No part of this Contract may be modified without the written consent of both parties.

ARTICLE XXIV. Contractor expressly understands and agrees that County is dependent upon certain Federal and/or State and/or local funding to pay the services provided in this Contract. If such Federal and/or State and/or local funding is discontinued and/or reduced, County has the right to terminate the Contract. In either event, County shall provide Contractor with at least thirty (30) days prior written notice of such termination.

ARTICLE XXV. Quality Assurance - The County uses a Quality Assurance Program (QAP) to ensure a material is produced to comply with the Contract. Contractor may examine the records and reports of tests the County and/or the Materials Testing Consultant performs, if available.

Schedule work to allow time for QAP review and compliance.

UNOFFICIAL

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hand the year and date first above written.

"County"

BOARD OF SUPERVISORS
COUNTY OF TULARE
STATE OF CALIFORNIA

By _____
Chair of the Board
of Supervisors

Attest: Jason T. Britt, County Administrative Officer/
Clerk of the Board of Supervisors

By _____
Deputy Clerk

Dated _____
APPROVED AS TO FORM,
County Counsel

By _____
Deputy County Counsel

Matter No. _____

"Contractor"

By _____

Title _____

By _____

Title _____

Pursuant to Corporations Code section 313, County policy requires that contracts with a corporation shall be signed by both (1) the chairman of the Board of Directors, the president or any vice-president (or another officer having general, operational responsibilities), and (2) the secretary, any assistant secretary, the chief financial officer, or any assistant treasurer (or another officer having recordkeeping or financial responsibilities), unless the contract is accompanied by a certified copy of a resolution of the corporation's Board of Directors authorizing the execution of the contract. Similarly, pursuant to California Corporations Code section 17703.01, County policy requires that contracts with a Limited Liability Company be signed by at least two managers, unless the contract is accompanied by a certified copy of the articles of organization stating that the LLC is managed by only one manager.

Licensed in accordance with an act
providing for the registration of contractors.

License No. _____

Federal Employer Identification

Number _____

STATUTORY PERFORMANCE BOND PURSUANT TO

California Public Contract Code
Section 20129

KNOW ALL MEN BY THESE PRESENTS:

That _____ (Hereinafter called the Principal), as Principal and _____, a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____, (hereinafter called the Surety), as Surety, are held and firmly bound unto the County of Tulare, (hereinafter called the Obligor) in the amount of _____ (\$ _____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written Contract with the Obligor, dated the ___th day of _____, _____ for construction of WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION which Contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THE OBLIGATION IS SUCH, that if said Principal shall faithfully perform and fulfill all the undertakings, covenants, terms, and conditions of said Contract during the original term of the Contract and any extension thereof, with or without notice to the Surety, and during the life of any guarantee required under the contract, and shall also perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any and all duly authorized extensions or modifications of said contract that may hereafter be made, notice of said extensions or modifications to the Surety being hereby waived; then the above obligation shall be void. Otherwise, said obligation shall remain in full force and effect.

Whenever Obligor declares Principal to be in default under the Contract, then the Surety will remedy the default pursuant to the Contract, or will promptly do one of the following, at the Obligor's option:

(1) Undertake through its agents or independent contractors reasonably acceptable to the Obligor, to complete the Project in accordance with all terms and conditions in the Contract, including without limitation, all obligations with respect to payments, warranties, guarantees, and liquidated damages, and with no requirement for a "take-over" or similar agreement"; or

(2) Permit the Obligor to complete the Project in any manner consistent with California law and reimburse the Obligor for all costs it incurs in completing the Project, and in correcting, repairing, or replacing any defects in materials, equipment or workmanship, which do not conform to the Contract.

Surety expressly agrees that the Obligor may reject any contractor or subcontractor that Surety may propose in fulfillment of its obligations in the event of default by the Principal. Surety will not utilize Principal in completing the Project or accept a bid from the Principal for completion of the Work if the Obligor, when declaring the Principal in default, notifies Surety of the Obligor's objection to Principal's further participation in the completion of the Project.

Surety's obligations hereunder are independent of the obligations of any other surety for the performance of the construction work on this Project, and suit may be brought against Surety and such other sureties, jointly and severally, or against any one or more of them, or against less than all of them without impairing the Obligor's rights against the others.

No right of action will accrue on this bond to or for the use of any person or corporation other than the Obligee or its successors or assigns. If Obligee sues upon this bond, then Surety will pay reasonable attorney's fees and costs incurred by the Obligee in such suit, irrespective of the amount of this bond.

Witness our hands this _____ day of _____, _____.

Principal Seal

By

Surety Seal

By

Agency of Record

Note: Bond surety must be admitted to transact surety insurance in the State of California.

UNOFFICIAL

STATUTORY PAYMENT BOND PURSUANT TO

California Civil Code
Sections 9550 through 9566

KNOW ALL MEN BY THESE PRESENTS:

That, _____ (hereinafter called the Principal), as Principal, and _____ a corporation organized and existing under the laws of the State of _____, with its principal office in the City of _____, (hereinafter called the Surety), as Surety, are held and firmly bound unto the County of Tulare (hereinafter called the Obligee), in the amount of _____ (\$ _____), for the payment whereof, the said Principal and Surety bind themselves, and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a certain written contract with the Obligee, dated the ___th day of _____, _____ for construction of WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION, to which contract is hereby referred to and made a part hereof as fully and to the same extent as if copied at length herein.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH that if said Principal, its heirs, executors, administrators, successors, or assigns, or subcontractor, shall fail to pay any person or persons named in Civil Code section 9100; or fail to pay for any materials, provisions, or other supplies, used in, upon, for, or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts due under the Unemployment Insurance Code, with respect to work or labor thereon of any kind; or shall fail to deduct, withhold, and pay over to the Employment Development Department, any amounts required to be deducted, withheld, and paid over by Unemployment Insurance Code section 13020 with respect to work and labor thereon of any kind, then said Surety will pay for the same, in an amount not exceeding the amount herein above set forth, and in the event suit is brought upon this bond, also will pay such reasonable attorneys' fees as shall be fixed by the court, awarded and taxed as provided in California Civil Code section 9550 et. seq.

This bond shall inure to the benefit of any person named in California Civil Code section 9100 giving such person or his/her assigns a right of action in any suit brought upon this bond.

It is further stipulated and agreed that the Surety of this bond shall not be exonerated or released from the obligation of the bond by any change, extension of time for performance, addition, alteration or modification in, to, or of any contract, plans, or specifications, or agreement pertaining or relating to any scheme or work of improvement herein above described; or pertaining or relating to the furnishing of labor, materials, or equipment therefor; nor by any change or modification of any terms of payment or extension of time for payment pertaining or relating to any scheme or work of improvement herein above described; nor by any rescission or attempted rescission of the contract, agreement or bond; nor by any conditions precedent or subsequent in the bond attempting to limit the right of recovery of claimants otherwise entitled to recover under any such contract or agreement or under the bond; nor by any fraud practiced by any person other than the claimant seeking to recover on the bond; and that this bond be construed most strongly against the Surety and in favor of all persons for whose benefit such bond is given; and under no circumstances shall the Surety be released from liability to those for whose benefit such bond has been given, by reason of any breach of contract between the Obligee and the Principal or on the part of any obligee named in such bond; that the sole condition of recovery shall be that the claimant is a person described in California Civil Code section 9100, and who has not been paid the full amount of his or her claim; and that the Surety does hereby waive notice of any such change, extension of time, addition, alteration or modification herein mentioned.

Witness our hands this _____ day of _____, _____.

Principal _____ Seal

By _____

Surety _____ Seal

By _____

Agency of Record _____

Agency Address _____

Note: Bond surety must be admitted to transact surety insurance in the State of California

UNOFFICIAL

STATE OF CALIFORNIA)
) SS
COUNTY OF TULARE)

Date _____

CONTRACTOR

UNOFFICIAL

CONSTRUCTION OF WOODVILLE LANDFILL UNIT II, PHASE 1 CONSTRUCTION

CONTRACT DOCUMENT CHECKLIST

The Contractor must deliver to the County with the Contract the following items:

1. The signed Contract (digital copy acceptable). The Contract must be signed by both the company president or vice president and the company secretary or treasurer (the two officers of the company cannot be the same person) with the Contractors State License Board number and Federal Employer Identification Number.
2. The Statutory Performance Bond Pursuant to California Public Contract Code section 20129 and the Statutory Payment Bond Pursuant to California Civil Code Sections 9550 through 9566 (forms included herein), with either County Clerk's certificates or copies of power of attorney.
3. Certification Concerning Workers' Compensation Insurance.
4. Certificate(s) of Insurance in compliance with the requirements of section 7-1.06 of the Special Provisions including general liability, automobile and workers' compensation (a sample form is included).
5. Evidence that the Contractor possesses a current, valid Contractors State License Board required to perform the work under this Contract. A copy of the Contractor's license is sufficient.