

**SUBMITTAL TO THE BOARD OF SUPERVISORS
COUNTY OF RIVERSIDE, STATE OF CALIFORNIA**

356



FROM: Waste Management Department

SUBMITTAL DATE:
March 23, 2012

SUBJECT: Approval of Contract Documents for the Construction of a Liner System within the Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill

RECOMMENDED MOTION: That the Board of Supervisors:

1. Approve the Contract Documents for the Liner System Construction within the Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill; and
2. Authorize the General Manager-Chief Engineer of the Riverside County Waste Management Department to advertise for bids.

BACKGROUND: In order to maintain regional disposal capacity for Riverside County, a 23-acre lateral expansion (referred to as Phase 2, Stage 4) is required at the Lamb Canyon Landfill. It is estimated that the remaining capacity within the current disposal area will be consumed by the middle of 2013. This project is the final expansion within the current permitted disposal area, and is estimated to provide fifteen (15) additional years of landfill space. (continued)

Hans W. Kernkamp, General Manager-Chief Engineer

FINANCIAL DATA	Current F.Y. Total Cost:	\$ 9,170,000	In Current Year Budget:	Yes
	Current F.Y. Net County Cost:	\$ N/A	Budget Adjustment:	No
	Annual Net County Cost:	\$ N/A	For Fiscal Year:	11/12

SOURCE OF FUNDS: Waste Management Department Enterprise Funds	Positions To Be Deleted Per A-30	<input type="checkbox"/>
	Requires 4/5 Vote	<input type="checkbox"/>

C.E.O. RECOMMENDATION: APPROVE
BY:
Alex Gann

County Executive Office Signature

MINUTES OF THE BOARD OF SUPERVISORS

On motion of Supervisor Tavaglione, seconded by Supervisor Stone and duly carried, IT WAS ORDERED that the above matter is approved as recommended.

Ayes: Buster, Tavaglione, Stone and Benoit
Nays: None
Absent: Ashley
Date: April 10, 2012
xc: Waste

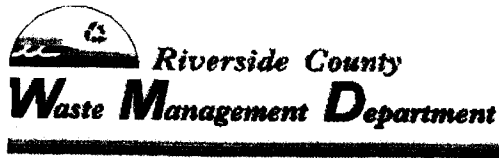
Kecia Harper-Ihem
Clerk of the Board
By:
Deputy

Prev. Agn. Ref.: _____ **District:** 5/5 **Agenda Number:** 12.1

FORM APPROVED COUNTY COUNSEL BY: NEAL R. KIPNIS DATE: 3/27/12
Departmental Concurrence
Policy Policy
Consent Consent
Dept't Recomm.: Per Exec. Ofc.:

A composite liner system must be constructed within the Phase 2, Stage 4 expansion area in order to comply with the requirements of the applicable State and Federal Regulations and the Waste Discharge Requirements issued by the California Regional Water Quality Control Board, Santa Ana Region.

The Engineer's estimate for this project is \$11,500,000. Project construction is expected to commence during the current fiscal year (FY11/12), and will continue until completion during the next fiscal year (FY12/13). Therefore, a portion of the estimated project cost was budgeted in the current fiscal year, and the balance in the proposed FY12/13 budget. Funds are available in Fund 40200, Department ID - 4500100000.



CONTRACT DOCUMENTS

FOR

LINER SYSTEM CONSTRUCTION

PHASE 2, STAGE 4

AT THE

LAMB CANYON SANITARY LANDFILL

APRIL 2012

FORM APPROVED COUNTY COUNSEL
BY: *Neal R. Kipnis* DATE: 3/27/12

RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT

12.1

APR 10 2012

TABLE OF CONTENTS

NOTICE TO CONTRACTORS.....	II
INSTRUCTIONS TO BIDDERS.....	IV
CONTRACTOR'S PROPOSAL.....	VIII
LIST OF SUBCONTRACTORS.....	XIII
STATEMENT OF LICENSURE.....	XIV
AFFIDAVIT FOR INDIVIDUAL CONTRACTORS.....	XV
AFFIDAVIT FOR JOINT VENTURE OR COPARTNERSHIP CONTRACTOR.....	XVI
AFFIDAVIT FOR CORPORATE CONTRACTOR.....	XVII
BID BOND.....	XVIII
AGREEMENT.....	XIX
PERFORMANCE BOND.....	XXV
PAYMENT BOND.....	XXVI

GENERAL PROVISIONS

SPECIAL PROVISIONS

APPENDICES

APPENDIX A -	CONSTRUCTION QUALITY ASSURANCE/QUALITY CONTROL PLAN (QA/QC PLAN)
APPENDIX B -	STORM WATER POLLUTION PREVENTION PLAN, SWPPP (COPY OF SWPPP IS INCLUDED ON THE ENCLOSED COMPACT DISC)
APPENDIX C -	STORM WATER POLLUTION PREVENTION & HAZARDOUS MATERIAL MANAGEMENT INSPECTION FORMS
APPENDIX D -	ENVIRONMENTALLY RESTRICTED AREAS & CLEAN WATER ACT PERMITS
APPENDIX E -	SCAQMD FORM 403-N & RULE 403 DUST CONTROL REQUIREMENT TABLES 2 AND 3
APPENDIX F -	EXISTING 10,000-GALLON LEACHATE TANK - MANUFACTURE INSTRUCTIONS & SHOP DRAWINGS
APPENDIX G -	OPTIONAL OFFSITE DIRT HAUL CONDITIONS
APPENDIX H -	PROJECT DRAWINGS (REDUCED SIZE - 11 X 17)

PROJECT DRAWINGS (FULL SIZE)

NOTICE TO CONTRACTORS

The Riverside County Waste Management Department, hereinafter called "County," invites sealed bids for

Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill

Contract Documents may be examined at the County's office at 14310 Frederick Street, Moreno Valley, California, and may be obtained upon payment to the County of \$50 per set, received at the County's office and \$65 per set if mailed by U.S. mail (mailing cost does not apply when using recipient's mailing account number). No refund will be made.

Some of the construction drawings may also be available in a compact disc (CD) in a digital Microstation (.dgn) format. The compact disc may be obtained upon payment to the County of \$10 per CD, received at the County office. No refund will be made. This digital data was created using Microstation software; and will be made available only in the Microstation (.dgn) format. This digital data is to be used at the Contractor's own discretion. The County is not responsible for the manner in which the Contractor chooses to use the digital data. The County is not responsible for how this digital data might be converted by the Contractor to another format. The Contractor is solely responsible for its use of this digital data.

Each proposal must be accompanied by a certified or cashier's check or bid bond equal to ten percent (10%) of the amount bid, payable to the County of Riverside as a guarantee that the Contractor will, if awarded the contract, execute a satisfactory contract and furnish the required bonds and provide the required certificates of insurance.

Proposals must be placed in a sealed envelope clearly marked "Contractor's Proposal". Proposals must be in accordance with the instructions and filed with the County by 11:00 am on Monday, May 14, 2012 at 14310 Frederick Street, Moreno Valley, CA 92553 which time and place are fixed for the public opening of bids. A mandatory pre-bid site review will be conducted at the landfill on Tuesday, May 1, 2012, at 10:00 am. The Lamb Canyon Sanitary Landfill site address is 16411 Lamb Canyon Road, Beaumont, CA 92223.

General prevailing rate of per diem wages and general prevailing rate of per diem wages for holiday and overtime work, including employer payments for health and welfare, pension, vacation, apprentices and similar purposes for each craft, classification or type of workman needed for execution of contracts under the jurisdiction of the County have been obtained by the County from the Director of Industrial Relations of the State of California for the area where the work is to be done. These are on file at the County's office, and will be made available to any interested person upon request.

Contractors submitting proposals for this project shall have a Class A Contractors license from the State of California in order to be considered eligible for the contract award.

BIDDER QUALIFICATIONS:

A bidder must satisfy the following requirements to bid on this project:

1. The Contractor and its geosynthetics lining subcontractor shall have successfully installed at liquid/solid waste containment facilities a minimum of two (2) million square feet of GCL materials, and a minimum of four (4) million square feet each of HDPE lining materials and geotextile material. These materials are further specified in the Special Provisions.
2. The aforementioned qualification requirements shall also apply to either the Contractor's superintendent or its geosynthetics lining subcontractor's superintendent.
3. The manufacturer(s) of each type of geosynthetic material specified in these Contract Documents shall have successfully manufactured ten (10) million square feet each of GCL material, HDPE lining material, and geotextile material, of which at least eight (8) million square feet of each type shall have been successfully installed at liquid/solid waste containment facilities.
4. The Contractor or its subcontractor shall be experienced in constructing corrugated high density polyethylene (HDPE) pipe systems (storm drain and/or sewer), and shall demonstrate the successful completion of at least five (5) piping projects of similar scope and value involving corrugated HDPE pipes within the last five (5) year period. Corrugated HDPE pipe subcontractor shall have a valid Class A and/or Class C34 Contractor license from the State of California.

SUBMITTAL REQUIREMENTS:

With the submittal of the Proposal, the Contractor shall submit for approval by the County documented evidence of satisfaction of all of the Bidder Qualifications listed above, including the name and experience of the superintendent and senior installation personnel that will be responsible for the installation of each type of geosynthetic. As part of this submittal, a project reference list shall be provided indicating at a minimum, the name, address, and phone number of the project owner and owner's representative, the location of the project, the amount of material installed, and completion date.

Dated: April 10, 2012

RIVERSIDE COUNTY
WASTE MANAGEMENT DEPARTMENT



Hans W. Kernkamp, General Manager - Chief Engineer

INSTRUCTIONS TO BIDDERS

QUANTITIES: The amount of work to be done or materials to be furnished by the Contractor as stated in the proposal (except for lump sum items) are only estimates and are not to be taken as an expressed or implied statement that the actual amount of work or materials will correspond to the estimate. The County reserves the right to increase or decrease or to entirely eliminate certain items from the work or materials if found desirable or expedient. The Contractor will be allowed no claims for anticipated profits, loss of profits or for any damages of any sort because of any difference between the estimated and the actual amounts of work done, or materials furnished or used in the completed project. The Contractor is cautioned against unbalancing of its bid by including its overhead into one or two items only when there are a number of items on the schedule. The overhead and indirect charges should be prorated on all items in the schedule.

DISCREPANCIES AND OMISSIONS: Discrepancies, omissions, ambiguities, or requirements likely to cause disputes shall be immediately brought to the attention of the County. When appropriate, Addenda will be issued by the County. No communication by anyone except by an Addendum affects the meaning or requirements of the Contract Documents. If at any time (before or after submittal of its bid) the Contractor is of the opinion that there is or may be a discrepancy or inconsistency in the plans, drawings, specifications or other Contract Documents, it shall immediately report this in writing to the County and shall not proceed with any related work until ordered so to do.

WITHDRAWAL OF PROPOSALS: Any proposal may be withdrawn at any time prior to the hour fixed in the Notice to Contractors for the opening of proposals, provided that a request in writing, executed by the bidder or its duly authorized representative, for the withdrawal of such proposal, is filed with the County. The withdrawal of a proposal shall not prejudice the right of a bidder to file a new proposal.

AGREEMENT OF FIGURES: If the unit prices and the total amounts named by the bidder in the proposal do not agree, the unit prices alone will be considered as representing the bidder's intention.

INVALID PROPOSALS: Proposals submitted by fax or e-mail and those which fail to reach the place fixed for opening of proposals prior to the date and hour set for opening same will not be considered.

INSPECTION OF SITE AND UNDERSTANDING OF CONTRACT PROVISIONS: Prior to submission of a bid, bidders must have examined the site and fully acquainted themselves with all conditions affecting the work. Information derived from maps, plans or specifications, or from the County, will not relieve the successful bidder from properly carrying out all the terms of the written contract. By the submittal of a proposal, the bidder will be held to have personally examined the site and the drawings, to have carefully read all of the specifications and other Contract Documents, and to have satisfied itself as to its ability to meet all the difficulties attending the execution of the work. The bidder agrees that if it is awarded the contract it will make no claim against the County based on ignorance or misunderstanding of the contract provisions; and

that the bidder fully understands the payment method for the work.

QUALIFICATIONS OF BIDDERS: No proposal will be accepted from a Contractor who is not licensed under laws of California, as evidenced by the submittal of the Statement of Licensure. No award will be made to any bidder who cannot give satisfactory assurance to the County as to its ability to carry out the contract, both from its financial standing and by reason of its previous experience as a Contractor on work of the nature contemplated in the contract.

VENDOR REGISTRATION: Contractors must be registered with the County in order to be considered eligible for the Contract award. To register, Contractors may utilize "Vendor Self-Registration" web site at <http://www.purchasing.co.riverside.ca.us> and complete the on-line registration form.

Information needed in order to register:

1. User name (This person will be responsible for original registration and any future change.)
2. User Password
3. Company information including:
 - a. All Addresses (Corporate, Remit to, Sales, etc)
 - b. Company type (Corporation, partnership, sole proprietorship, etc)
 - c. Tax Identification Number (or social security number for individuals)
 - d. Status (women, minority, Disabled Veteran owned, etc)
 - e. Qualification as a local Riverside County business
 - f. Banking Information for future electronic payment processes
4. Contact Information including:
 - a. Names
 - b. Titles/Positions
 - c. Contact Numbers (Phone, Fax, Cell phone, etc)
 - d. E-Mail address for future correspondences
5. List of items/services you wish to provide to the County.

PROPOSAL FORMS: Attention of all bidders is called to the proposal affidavit forms attached hereto and bidders are cautioned that all proposals submitted must be accompanied by the proper affidavit, properly executed. Proposals must be made on the form furnished by the County.

REJECTION OF PROPOSALS CONTAINING ALTERATIONS, ERASURES OR IRREGULARITIES: Proposals may be rejected if they show any alterations of form, additions not called for, conditional proposals, incomplete proposals, erasures, or irregularities of any kind. Erasures or interlineations in the proposal must be explained or noted over the signature of the bidder.

PUBLIC OPENING OF PROPOSALS: Proposals will be opened and read publicly at the time and place indicated in the Notice to Contractors. Bidders or their authorized agents are invited to be present.

DISQUALIFICATION OF BIDDERS: More than one proposal from an individual, a firm or partnership, a corporation or an association under the same or different names will not be considered. Reasonable ground for believing that any bidder is interested in more than one proposal for the work contemplated will cause the rejection of all proposals in which such bidder is interested. If there is any reason for believing that collusion exists among the bidders, none of the participants in such collusion will be considered in awarding the contract. Proposals in which the prices appear to be unbalanced may be rejected.

ADDENDA: County reserves the right to issue Addenda to the Contract Documents at any time prior to the time set to open bids. Each potential bidder shall leave with the County its name, address, and fax number for the purpose of receiving Addenda. To be considered, a Contractor's proposal must list and take into account all issued Addenda.

AWARD OF CONTRACT: The County reserves the right to reject any and all proposals or to waive technical defects as the best interests of the County may require. Prior to award of the contract, and if requested by County, the Contractor agrees to meet with the County to review the details and calculations of the Contractor's proposal and the Contractor's understanding of any aspect of the work. The award of the Contract, if it be awarded, will be to the lowest responsible and qualified bidder. The award, if made, will be made within approximately fourteen (14) to thirty (30) days after the opening of the proposals.

BIDDER'S CHECK OR BOND: Each proposal must be accompanied by a certified or cashier's check, or by a bid bond only on the form supplied by the County, drawn in favor of the County in an amount not less than ten percent (10%) of the total bid. This check or bond shall be given as a guarantee that the bidder, if awarded the contract, will execute and deliver the Agreement, the required Payment and Performance Bonds, and the required certificates of insurance in accordance with the bid accepted by the County. In default of execution of the Agreement upon award and/or delivery of said Payment and Performance Bonds and certificates of insurance, such Bid Bond or check shall be held subject to payment to the County for the difference in money between the amount of the contract with another party to perform the work, together with the cost to the County of redrafting, redrawing and publishing documents and papers necessary to obtain new bids on said work. The check or bond shall, in addition, be held subject to all other actual damages suffered by the County. The check or bond will be returned upon the close of the period mentioned in these instructions below and to the successful bidder upon execution of the Agreement. **NO BONDS WILL BE ACCEPTED UNLESS SUBMITTED ON THE FORM SUPPLIED BY THE COUNTY.**

FORFEITURE FOR FAILURE TO POST SECURITY AND EXECUTE AGREEMENT: In the event the bidder, to whom an award is made, fails or refuses to post the required bonds and provide the required certificates of insurance and fails to return executed copies of the Agreement within five (5) calendar days after the prescribed forms are presented to it for signature, the County may declare the bidder's bid deposit or bond forfeited as damages caused by the failure of the bidder to post such security and execute such copies of the Agreement and may award the work to the next lowest responsible bidder, or may call for new bids.

RETURN OF PROPOSAL GUARANTEES: Within ten (10) business days after the award of the contract, the County will return the proposal guarantees accompanying those proposals that are not considered in making the award. All other proposal guarantees will be held until the contract has been fully executed and the required bonds and certificates of insurance have been provided, after which they will be returned to the respective bidders whose proposal they accompany.

CONTRACT BONDS: The Contractor shall furnish two (2) surety bonds in duplicate, one as a security for the faithful performance of the contract in the amount equal to one hundred percent (100%) of the contract price, and one as security for the payment of all persons performing labor and furnishing materials in connection with the contract in an amount equal to one hundred percent (100%) of the contract price. All bonds must be submitted on forms provided by the County. Bonds submitted in any other form will not be accepted. Should any surety on the Payment Bond or Performance Bond be deemed unsatisfactory by the County, Contractor shall upon notice promptly substitute new bonds satisfactory to the County. All bonds must be issued by sureties which are licensed by the State of California to issue such bonds.

SUBLETTING AND SUBCONTRACTING: Bidders are required, pursuant to the Subletting and Subcontracting Fair Practices Act (commencing with Section 4100 of the Public Contract Code), to list in their proposal the name and location of place of business of each subcontractor who will perform work or labor or render services in or about the construction of the work or improvement or a subcontractor who specially fabricates and installs a portion of the work or improvement, in excess of one-half (½) of one percent (1%) of the prime Contractor's total bid. Failure to list a subcontractor for a portion of the work means that the prime contractor will do that portion of the work.

"OREQUAL": Pursuant to Division 2, Chapter 3, Article 5, commencing at Section 3400 of the Public Contract Code, all specifications shall be deemed to include the words "or equal," provided, however, that permissible exceptions or other requirements shall be specifically noted in the specifications. Any "equal" proposed by the Contractor must be described in the Contractor's Proposal.

ANTI-DISCRIMINATION: It is the policy of the County that, in connection with all work performed under this Contract, there be no discrimination against any prospective or active employee engaged in the work because of race, color, ancestry, national origin, religious creed, sex, age, marital status, or sexual preference. The Contractor agrees to comply with applicable Federal and California laws including, but not limited to, the California Fair Employment Practice Act, beginning with Labor Code Section 1410, and Labor Code Section 1735. In addition, the Contractor agrees to require like compliance by any subcontractors employed on the work.

CONTRACTOR'S PROPOSAL

TO THE BOARD OF SUPERVISORS OF THE COUNTY OF RIVERSIDE:

The undersigned hereby declares:

(a) That the only persons or parties interested in this proposal as principals are the following:

(If the Contractor is a corporation, give the name of the corporation and the name of its president, secretary, treasurer, and manager. If a copartnership, give the name under which the copartnership does business, and the names and addresses of all copartners. If an individual, state the name and address under which the contract is to be drawn.)

(b) That this proposal is made without collusion with any other person, firm or corporation.

(c) That the Contractor has carefully examined the location of the proposed work, and has familiarized itself with all of the physical, climatic or other conditions related to the work.

(d) That the Contractor has carefully examined all of the specifications, plans, and other Contract Documents, and makes this proposal in accordance therewith.

(e) That, if this proposal is accepted, the Contractor will enter into a written contract with the County of Riverside.

(f) That the Contractor proposes to enter into such contract and to accept in full payment for the work actually done the prices shown in the attached schedule. It is understood that the quantities listed (except for those shown as "Final" or "Lump Sum (L.S.)") are but estimates only and final payment will be based on actual quantities whatever they may be, subject to such adjustments and alterations as elsewhere provided for in the Contract Documents.

Accompanying this proposal is a certified or cashier's check or bid bond payable to the order of the County of Riverside in the sum of

_____ Dollars (\$_____).

**THE REQUIRED REFERENCES AND OTHER REQUIRED DOCUMENTS MUST BE
ATTACHED TO THIS PROPOSAL**

Contractor bids as follows for Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill, located in Beaumont, Riverside County, California:

ITEM NO.	ITEM OF WORK	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Mobilization & Demobilization	L.S.	1		
2	Storm Water Pollution Prevention & Hazardous Materials Management	L.S.	1		
3	Supply and Install Fiber Roll BMP's	L.F.	25,000		
4	Remove and Dispose or Salvage Miscellaneous Structures	L.S.	1		
5	Earthwork (Excavation, Over-excavation & Stockpiling)	C.Y.	1,560,000		
6	Engineered Fill @ 90% Relative Compaction	C.Y.	280,800		
7	Engineered Fill @ 95% Relative Compaction	C.Y.	37,100		
8	Construct Low-Permeability Layer	S.F.	471,900		
9	Finished Subgrade Surface Preparation for Geosynthetics	S.F.	606,800		
10	Excavate & Backfill Anchor Trench	L.F.	7,460		
11	Furnish & Install GCL	S.F.	1,078,600		
12	Furnish & Install 80-mil HDPE Liner (single-side textured) on Side Slopes	S.F.	585,050		
13	Furnish & Install 80-mil HDPE Liner (double-side textured) on Side Slopes	S.F.	21,750		
14	Furnish & Install 60-mil HDPE Liner (double-side textured) on Canyon Floor	S.F.	943,800		
15	Furnish & Install 16 oz./sy Geotextile on Side Slopes	S.F.	606,800		
16	Furnish & Install 12 oz./sy Geotextile on Canyon Floor	S.F.	471,900		
17	Furnish & Install 8 oz./sy Geotextile on Canyon Floor	S.F.	471,900		
18	Furnish & Install 8-mil Protective Membrane on Side Slopes	S.F.	405,400		
19	Furnish & Install 20-mil LDPE Drainage Structure	S.F.	74,500		
20	Furnish & Install LCRS 1/2-inch Gravel Drainage Layer in the LCRS Trenches and on Canyon Floor	S.F.	471,900		

21	Furnish & Install LCRS 3" Solid HDPE Pipe	L.F.	475		
22	Furnish & Install LCRS 4" Solid HDPE Pipe	L.F.	760		
23	Furnish & Install LCRS 6" Solid HDPE Pipe	L.F.	540		
24	Furnish & Install LCRS 6" Slotted HDPE Pipe	L.F.	1,075		
25	Furnish & Install 8" CMP Sleeve	L.F.	160		
26	Furnish, Install, and Maintain Temporary Leachate Storage System.	L.S.	1		
27	Structural Design of Leachate and Condensate Containment Facility Including Construction Details	L.S.	1		
28	Construct Leachate and Condensate Containment Facility	L.S.	1		
29	Furnish & Install Two New 10,000 Gallon Storage Tanks, Piping, Valves, and Related Accessories	EA.	2		
30	Relocate Existing 10,000 Gallon Leachate Tank and Related Accessories	L.S.	1		
31	Screen and Place 3"-minus Protective Soil Material on Canyon Floor	S.F.	471,900		
32	Screen and Place 1"-minus Protective Soil Material on Side Slopes and Benches	S.F.	174,100		
33	Construct Landfill Access Ramp	C.Y.	14,500		
34	Furnish & Install 12" Diameter HDPE Drainage Pipe	L.F.	320		
35	Furnish & Install 18" Diameter HDPE Drainage Pipe	L.F.	80		
36	Furnish & Install 24" Diameter HDPE Drainage Pipe	L.F.	120		
37	Furnish & Install 30" Diameter HDPE Drainage Pipe	L.F.	900		
38	Furnish & Install 36" Diameter HDPE Drainage Pipe	L.F.	480		
39	Furnish & Install 42" Diameter HDPE Drainage Pipe	L.F.	560		
40	Construct Asphalt Drainage Structures	S.F.	13,000		
41	Construct Shotcrete Drainage Structures	S.F.	36,200		
42	Construct Concrete Headwall Inlet.	EA.	2		
43	Furnish & Install 36" CMP Drop Inlet	EA.	9		

44	Construct Concrete Manhole Structures	EA.	5		
45	Furnish & Install Precast Trough Inlet	EA.	2		
46	Furnish & Install Metal Flume Down Drain	L.F.	580		
47	Furnish & Install Metal Flume Inlet	EA.	5		
48	Construct Concrete Energy Dissipater Impact Basin with Vertical Baffle Wall	EA.	1		
49	Construct Grouted Rip-Rap	S.F.	8,050		
50	Construct Concrete Strip Footing	L.F.	1,150		
51	Furnish & Install Chain Link Fencing and Coir Mat	L.F.	275		
52	Furnish & Install Gabion Baskets	EA.	30		
53	Construct Basin Outlet and Spillway Structure	L.S.	1		
54	Construct Asphalt Access Roadway, 3" Asphalt over 6" Class II Base	S.F.	1,775		
55	Construct Asphalt Access Roadway, 6" Asphalt over 12" Class II Base	S.F.	64,500		
56	Construct Roadway, 3" Class II Base over 6" Aggregate	S.F.	62,600		
57	Construct Roadway, 6" Class II Base over 12" Aggregate	S.F.	27,100		
58	Saw Cut, Remove and Replace 6" Asphalt Roadway Section at Various Locations	S.F.	5,000		
59	Asphalt Roadway Rehabilitation	S.F.	22,000		
60	Construct Asphalt Concrete Speed Bumps	L.F.	410		
61	Construct Thermoplastic Striping	L.S.	1		
62	Furnish & Install K-Rail Barriers	L.F.	500		
63	Furnish & Install 8-ftx10-ft Steel Rumble Racks	EA.	20		
64	Construct Earthen Berms	L.F.	5,200		

TOTAL COST \$ _____

Contractor acknowledges receipt of Addenda No. _____.

Name of Contractor: _____

Address: _____

Telephone: _____

Contractor's License No. and Classification: _____

Signature: _____

Name: _____

Title: _____

Dated: _____

LIST OF SUBCONTRACTORS

The name and the location of the place of business of each subcontractor who will perform work or labor or render service to the Prime Contractor in or about the construction of the work or improvement, or a subcontractor who specially fabricates and installs a portion of the work or improvement, in an amount in excess of one-half (½) of one percent (1%) of the Prime Contractor's total bid and the portion of the work which will be done by each such subcontractor is as follows:

Item No. (s). -

Name of Subcontractor -

Phone and Fax Numbers -

Address -

Item No. (s). -

Name of Subcontractor -

Phone and Fax Numbers -

Address -

Item No. (s). -

Name of Subcontractor -

Phone and Fax Numbers -

Address -

Item No. (s). -

Name of Subcontractor -

Phone and Fax Numbers -

Address -

Item No. (s). -

Name of Subcontractor -

Phone and Fax Numbers -

Address -

STATEMENT OF LICENSURE

Pursuant to California Public Contract Code (commencing with Section 3300), the undersigned does certify as follows:

1. That the pocket license/certificate of licensure I have presented to County as of this date is my own license, being State of California Contractors License No. _____;
2. That said Contractors License is current and valid; and
3. That said Contractors License is of a classification appropriate to the work to be undertaken for County, a Class _____ license.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Dated: _____

Signature: _____

Name: _____

Title: _____

AFFIDAVIT FOR INDIVIDUAL CONTRACTORS

STATE OF CALIFORNIA)

SS

COUNTY OF RIVERSIDE)

_____, being first duly sworn, deposes and says:

That he or she is the party making the foregoing proposal or bid; that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that 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 of that of any other bidder, or to secure any advantage against the Riverside County Waste Management Department or anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that 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, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Subscribed and sworn to before me

this _____ day of _____, 20_____.

Signature of officer administering oath

AFFIDAVIT FOR JOINT VENTURE OR COPARTNERSHIP CONTRACTOR

STATE OF CALIFORNIA)

SS

COUNTY OF RIVERSIDE)

_____, being first duly sworn, deposes and says:

That he or she is a member of the joint venture or copartnership firm designated as

which is the party making the foregoing proposal or bid; that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that 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 of that of any other bidder, or to secure any advantage against the Riverside County Waste Management Department or anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that 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, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

That he has been and is duly vested with authority to make and sign instruments for the joint venture or copartnership by

who constitute the other members of the joint venture or copartnership.

Subscribed and sworn to before me

this _____ day of _____, 20_____.

Signature of officer administering oath

AFFIDAVIT FOR CORPORATE CONTRACTOR

STATE OF CALIFORNIA)

SS

COUNTY OF RIVERSIDE)

_____, being first duly sworn, deposes and says:

That he or she is _____

of _____
a corporation which is the party making the foregoing proposal or bid; that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that 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 of that of any other bidder, or to secure any advantage against the Riverside County Waste Management Department or anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that 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, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Subscribed and sworn to before me

this _____ day of _____, 20_____.

Signature of officer administering oath

BID BOND

Recitals:

1. _____ (Contractor) has submitted its Contractor's Proposal to the County of Riverside, by and for the Waste Management Department, for the construction of the public work known as Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill, in accordance with a Notice to Contractors dated _____.

2. _____ a _____ corporation, hereafter called Surety, is the surety on this Bond.

Agreement: We, Contractor as principal and Surety as surety, jointly and severally agree and state as follows:

1. The amount of the obligation of this Bond is 10% of the amount of the Contractor's Proposal and inures to the benefit of County.

2. This Bond is exonerated by (1) County rejecting said Proposal or, in the alternate, (2) if said Proposal is accepted, Contractor executes the Agreement and furnishes the Bonds and certificates of insurance as agreed to in its Proposal, otherwise it remains in full force and effect for the recovery of loss, damage and expense of County resulting from failure of Contractor to act as agreed to in its Proposal.

3. Surety, for value received, stipulates and agrees that its obligations hereunder shall in no way be impaired or affected by any extension of time within which County may accept the Proposal and waives notice of any such extension.

4. This Bond is binding on our heirs, executors, administrators, successors and assigns.

Dated: _____

By: _____

By: _____

Title: _____

Title: _____

(Surety)

(Contractor)

NOTE: This Bond must be executed by both parties with corporate seal affixed. All signatures must be acknowledged by a notary (attach acknowledgments).

Each of the above-mentioned documents presently in existence are by this reference incorporated into this Agreement and each of these documents not now in existence are incorporated herein as of the time of their issuance.

3. Contract Price - Payment. Exhibit A is attached to and incorporated into this Agreement and states the basis for full payment to Contractor. Contractor represents that it fully understands the payment method for the work.

RIVERSIDE COUNTY WASTE
MANAGEMENT DEPARTMENT
14310 Frederick Street
Moreno Valley, CA 92553

By: _____
Hans W. Kernkamp
General Manager - Chief Engineer
COUNTY OF RIVERSIDE

By: _____
Chairman, Board of Supervisors

ATTEST:

By: _____
Kecia Harper-Ihem, Clerk of the Board

By: _____
Deputy

(Seal)

Contractor

By: _____

Name: _____

Title: _____

(If corporation, attach corporate seal)

EXHIBIT A

(To Agreement for the Riverside County Waste Management Department Project, Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill, located in
Beaumont, Riverside County, California.)

It is understood that the quantities listed (except for those shown as "Final" or "Lump Sum (L.S.)") are but estimates only and final payment will be based on actual quantities whatever they may be, subject to such adjustments and alterations as elsewhere provided for in the Contract Documents.

ITEM NO.	ITEM OF WORK	UNIT	QUANTITY	UNIT COST	TOTAL COST
1	Mobilization & Demobilization	L.S.	1		
2	Storm Water Pollution Prevention & Hazardous Materials Management	L.S.	1		
3	Supply and Install Fiber Roll BMP's	L.F.	25,000		
4	Remove and Dispose or Salvage Miscellaneous Structures	L.S.	1		
5	Earthwork (Excavation, Over-excavation & Stockpiling)	C.Y.	1,560,000		
6	Engineered Fill @ 90% Relative Compaction	C.Y.	280,800		
7	Engineered Fill @ 95% Relative Compaction	C.Y.	37,100		
8	Construct Low-Permeability Layer	S.F.	471,900		
9	Finished Subgrade Surface Preparation for Geosynthetics	S.F.	606,800		
10	Excavate & Backfill Anchor Trench	L.F.	7,460		
11	Furnish & Install GCL	S.F.	1,078,600		
12	Furnish & Install 80-mil HDPE Liner (single-side textured) on Side Slopes	S.F.	585,050		
13	Furnish & Install 80-mil HDPE Liner (double-side textured) on Side Slopes	S.F.	21,750		
14	Furnish & Install 60-mil HDPE Liner (double-side textured) on Canyon Floor	S.F.	943,800		
15	Furnish & Install 16 oz./sy Geotextile on Side Slopes	S.F.	606,800		
16	Furnish & Install 12 oz./sy Geotextile on Canyon Floor	S.F.	471,900		

17	Furnish & Install 8 oz./sy Geotextile on Canyon Floor	S.F.	471,900		
18	Furnish & Install 8-mil Protective Membrane on Side Slopes	S.F.	405,400		
19	Furnish & Install 20-mil LDPE Drainage Structure	S.F.	74,500		
20	Furnish & Install LCRS 1/2-inch Gravel Drainage Layer in the LCRS Trenches and on Canyon Floor	S.F.	471,900		
21	Furnish & Install LCRS 3" Solid HDPE Pipe	L.F.	475		
22	Furnish & Install LCRS 4" Solid HDPE Pipe	L.F.	760		
23	Furnish & Install LCRS 6" Solid HDPE Pipe	L.F.	540		
24	Furnish & Install LCRS 6" Slotted HDPE Pipe	L.F.	1,075		
25	Furnish & Install 8" CMP Sleeve	L.F.	160		
26	Furnish, Install, and Maintain Temporary Leachate Storage System.	L.S.	1		
27	Structural Design of Leachate and Condensate Containment Facility Including Construction Details	L.S.	1		
28	Construct Leachate and Condensate Containment Facility	L.S.	1		
29	Furnish & Install Two New 10,000 Gallon Storage Tanks, Piping, Valves, and Related Accessories	EA.	2		
30	Relocate Existing 10,000 Gallon Leachate Tank and Related Accessories	L.S.	1		
31	Screen and Place 3"-minus Protective Soil Material on Canyon Floor	S.F.	471,900		
32	Screen and Place 1"-minus Protective Soil Material on Side Slopes and Benches	S.F.	174,100		
33	Construct Landfill Access Ramp	C.Y.	14,500		
34	Furnish & Install 12" Diameter HDPE Drainage Pipe	L.F.	320		
35	Furnish & Install 18" Diameter HDPE Drainage Pipe	L.F.	80		
36	Furnish & Install 24" Diameter HDPE Drainage Pipe	L.F.	120		
37	Furnish & Install 30" Diameter HDPE Drainage Pipe	L.F.	900		
38	Furnish & Install 36" Diameter HDPE Drainage Pipe	L.F.	480		
39	Furnish & Install 42" Diameter HDPE Drainage Pipe	L.F.	560		

40	Construct Asphalt Drainage Structures	S.F.	13,000		
41	Construct Shotcrete Drainage Structures	S.F.	36,200		
42	Construct Concrete Headwall Inlet.	EA.	2		
43	Furnish & Install 36" CMP Drop Inlet	EA.	9		
44	Construct Concrete Manhole Structures	EA.	5		
45	Furnish & Install Precast Trough Inlet	EA.	2		
46	Furnish & Install Metal Flume Down Drain	L.F.	580		
47	Furnish & Install Metal Flume Inlet	EA.	5		
48	Construct Concrete Energy Dissipater Impact Basin with Vertical Baffle Wall	EA.	1		
49	Construct Grouted Rip-Rap	S.F.	8,050		
50	Construct Concrete Strip Footing	L.F.	1,150		
51	Furnish & Install Chain Link Fencing and Coir Mat	L.F.	275		
52	Furnish & Install Gabion Baskets	EA.	30		
53	Construct Basin Outlet and Spillway Structure	L.S.	1		
54	Construct Asphalt Access Roadway, 3" Asphalt over 6" Class II Base	S.F.	1,775		
55	Construct Asphalt Access Roadway, 6" Asphalt over 12" Class II Base	S.F.	64,500		
56	Construct Roadway, 3" Class II Base over 6" Aggregate	S.F.	62,600		
57	Construct Roadway, 6" Class II Base over 12" Aggregate	S.F.	27,100		
58	Saw Cut, Remove and Replace 6" Asphalt Roadway Section at Various Locations	S.F.	5,000		
59	Asphalt Roadway Rehabilitation	S.F.	22,000		
60	Construct Asphalt Concrete Speed Bumps	L.F.	410		

61	Construct Thermoplastic Striping	L.S.	1		
62	Furnish & Install K-Rail Barriers	L.F.	500		
63	Furnish & Install 8-ftx10-ft Steel Rumble Racks	EA.	20		
64	Construct Earthen Berms	L.F.	5,200		

TOTAL COST \$ _____

PERFORMANCE BOND

Recitals:

1. _____
(Contractor) has entered into an Agreement dated _____ with the COUNTY OF RIVERSIDE (County) for construction of the public work known as Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill (Project).

2. _____, a corporation (Surety), is the surety under this Bond.

Agreement: We, Contractor as principal, and Surety as surety, jointly and severally agree, state, and are bound unto County, as obligee, as follows:

1. The amount of the obligation of this Bond is 100% of the estimated contract price for the Project of \$ _____ and inures to the benefit of County.

2. This Bond is exonerated by Contractor doing all things to be kept and performed by it in strict conformance with the Contract Documents for the Project, otherwise it remains in full force and effect for the recovery of loss, damage and expense of County resulting from failure of Contractor to so act. All of said Contract Documents are incorporated herein.

3. This obligation is binding on our successors and assigns.

4. For value received, Surety stipulates and agrees that no change, time extension, prepayment to Contractor, alteration or addition to the terms and requirements of the Contract Documents or the work to be performed thereunder shall affect its obligations hereunder and waives notice as to such matters, except the total contract price cannot be increased by more than 25% without approval of Surety. (If the total contract price is inadvertently increased by more than 25% without approval of Surety, this performance bond will remain in effect for that portion of the contract existent prior to the 25% exceedance).

THIS BOND is executed as of _____.

By: _____

By: _____

Title: _____

Title: _____

(Surety)

(Contractor)

NOTE: This Bond must be executed by both parties with corporate seal affixed. All signatures must be acknowledged by a notary (attach acknowledgments)

PAYMENT BOND

(Public Work - Civil Code, Section 3247 et seq.)

The makers of this Bond are _____ as Principal and Contractor and _____ a corporation, authorized to issue surety bonds in California, as Surety, and this bond is issued in conjunction with that certain public works contract dated _____, between Principal and the COUNTY OF RIVERSIDE (County), a public entity, for \$ _____, the total amount payable. THE AMOUNT OF THIS BOND IS 100 PERCENT OF SAID SUM. Said contract is for the public work generally consisting of Liner System Construction within Phase 2, Stage 4 area at the Lamb Canyon Sanitary Landfill. The beneficiaries of this Bond are as is stated in Section 3248 of the Civil Code and Sections 3248, 3249, 3250 and 3252 of said Code. Without notice, Surety consents to extension of time for performance, change in requirements, amount of compensation, or prepayment under said contract.

Dated: _____

By: _____

By: _____

Title: _____

Title: _____

(Surety)

(Contractor)

NOTE: This Bond must be executed by both parties with corporate seal affixed. All signatures must be acknowledged by a notary (attach acknowledgments).



GENERAL PROVISIONS

FOR

**LINER SYSTEM CONSTRUCTION
PHASE 2, STAGE 4**

AT THE

LAMB CANYON SANITARY LANDFILL

APRIL 2012

RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT

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Table of Contents

1. SECTION 1 - DEFINITION OF TERMS	1-1
1.1. TERMS	1-1
1.2. SIMILARITY OF WORDS	1-2
2. SECTION 2 - SCOPE OF WORK	2-1
2.1. WORK TO BE DONE	2-1
2.2. CONSTRUCTION SCHEDULE.....	2-1
2.3. DRAWINGS AND SPECIFICATIONS ON THE WORK.....	2-1
2.4. ESTIMATE OF QUANTITIES.....	2-1
2.5. PROTESTS.....	2-1
2.6. ALTERATIONS	2-2
2.7. EXTRA WORK	2-2
2.7.1. <i>General</i>	2-2
2.7.2. <i>Procedure for Extra Work</i>	2-2
2.8. PAYMENT FOR EXTRA WORK	2-3
2.9. RIGHTS OF WAY	2-3
2.10. CLEANING UP	2-3
3. CONTROL OF THE WORK	3-1
3.1. AUTHORITY OF THE COUNTY	3-1
3.2. DETAIL DRAWINGS	3-1
3.3. CONFORMITY WITH PLANS AND ALL ALLOWABLE DEVIATIONS	3-1
3.4. INTERPRETATION OF PLANS AND SPECIFICATIONS.....	3-1
3.5. SUPERINTENDENCE	3-1
3.6. LINES AND GRADES.....	3-2
3.7. INSPECTION OF WORK	3-2
3.8. REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK	3-2
3.9. EQUIPMENT AND PLANT	3-2
3.10. FINAL INSPECTION	3-3
4. CONTROL OF MATERIAL.....	4-1
4.1. COUNTY FURNISHED MATERIALS	4-1
4.2. SOURCE OF SUPPLY AND QUALITY OF MATERIALS	4-1
4.3. SAMPLES AND TESTS.....	4-1
4.4. STORAGE OF MATERIALS	4-2
4.5. DEFECTIVE MATERIALS	4-2
4.6. ASSIGNMENT OF CLAIMS.....	4-2
5. LEGAL RELATIONS AND RESPONSIBILITY	5-1
5.1. LAWS TO BE OBSERVED	5-1
5.1.1. <i>Compliance with Applicable Law</i>	5-1
5.1.2. <i>Labor Code</i>	5-1
5.1.3. <i>Equal Employment Opportunity</i>	5-1

5.1.4.	<i>Registration of Contractors</i>	5-3
5.1.5.	<i>Accident Prevention</i>	5-3
5.2.	CONTRACTOR'S RESPONSIBILITY	5-3
5.3.	CONTRACTOR'S RESPONSIBILITY FOR WORK	5-3
5.4.	PROPERTY RIGHTS IN MATERIALS	5-4
5.5.	PERMITS AND LICENSES	5-4
5.6.	ROYALTIES AND PATENTS	5-4
5.7.	SANITARY PROVISIONS	5-4
5.8.	PUBLIC SAFETY	5-4
5.9.	USE OF EXPLOSIVES	5-4
5.10.	PROVISIONS FOR EMERGENCIES	5-4
5.11.	UNFORESEEN DIFFICULTIES	5-5
5.12.	ACCESS TO THE WORK	5-5
5.13.	GUARANTEE OF WORK	5-5
5.14.	SURETY OF GUARANTEE	5-6
5.15.	DAMAGES BY ACT OF GOD	5-6
6.	PROSECUTION AND PROGRESS	6-1
6.1.	PROGRESS OF THE WORK	6-1
6.2.	OVERTIME WORK AND WORK AT NIGHT	6-1
6.3.	SUBCONTRACTING	6-1
6.4.	CHARACTER OF WORKMEN	6-2
6.5.	TEMPORARY SUSPENSION OF THE WORK	6-2
6.6.	TIME FOR COMPLETION AND LIQUIDATED DAMAGES	6-2
6.7.	DELAYS AND EXTENSION OF TIME	6-3
6.8.	ASSIGNMENT	6-3
6.9.	TERMINATION OF CONTRACT	6-3
7.	PAYMENT	7-1
7.1.	SCOPE OF PAYMENTS	7-1
7.1.1.	<i>Measurement and Computation of Quantities</i>	7-1
7.1.2.	<i>Payment at Contract Prices</i>	7-1
7.2.	PAYMENT AND COMPENSATION FOR ALTERED QUANTITIES	7-1
7.3.	FORCE ACCOUNT PAYMENT	7-1
7.3.1.	<i>Work Performed by Contractor</i>	7-1
7.3.1.1.	Labor	7-2
7.3.1.1.1.	<i>Actual Wages</i>	7-2
7.3.1.1.2.	<i>Labor Surcharge</i>	7-2
7.3.1.1.3.	<i>Subsistence and Travel Allowance</i>	7-2
7.3.1.2.	Materials	7-2
7.3.1.3.	Equipment Rental	7-3
7.3.1.3.1.	<i>Equipment on the Work</i>	7-4
7.3.1.3.2.	<i>Equipment not on the Work</i>	7-4
7.3.2.	<i>Work Performed by Special Forces or Other Special Services</i>	7-5
7.3.3.	Records	7-6
7.3.4.	Payment	7-7
7.4.	ACCEPTANCE	7-7
7.5.	PARTIAL PAYMENTS	7-7

7.6.	DELAYED PAYMENTS.....	7-7
7.7.	FINAL PAYMENT	7-7
7.8.	CLAIMS RESOLUTION.....	7-8
7.8.1.	<i>Submission of Claims</i>	7-8
7.8.1.1.	Claims Under \$50,000.00	7-8
7.8.1.2.	Claims over \$50,000.00 but less than or equal to \$375,000.00.....	7-9
7.8.2.	<i>Meet and Confer</i>	7-9
7.8.3.	<i>Filing of Claims</i>	7-9
7.8.4.	<i>Mediation and Judicial Arbitration</i>	7-9
7.8.5.	<i>Location for Filing of Claims, Jurisdiction</i>	7-9
8.	GENERAL.....	8-1
8.1.	COOPERATION BETWEEN CONTRACTORS.....	8-1
8.2.	INSURANCE - HOLD HARMLESS.....	8-1
8.3.	PUBLIC UTILITIES	8-2
8.4.	PROTECTION OF EXISTING STREET FACILITIES	8-3
8.5.	DIVERSION AND CONTROL OF WATER	8-3
8.6.	DUST ABATEMENT.....	8-3
8.7.	PROJECT SIGNS	8-3
8.8.	EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK	8-3
9.	WATERING.....	9-1
9.1.	DESCRIPTION	9-1
10.	PUBLIC CONVENIENCE, TRAFFIC CONTROL AND DETOURS	10-1
10.1.	GENERAL	10-1
10.2.	SIGNS.....	10-1
10.3.	MATERIALS STORAGE.....	10-1

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1. SECTION 1 - DEFINITION OF TERMS

1.1. TERMS

Whenever in these specifications, or in any documents or instruments where these specifications govern, the following terms or pronouns in place of them are used, the intent and meaning shall be interpreted as follows:

- a) AGENCY: Whenever used in the Standard Specifications shall refer to County.
- b) BOARD OF SUPERVISORS: The Board of Supervisors of the County, also sometimes referred to as the Board.
- c) DEPARTMENT, COUNTY, OR OWNER: The County of Riverside, by and for the Waste Management Department.
- d) ENGINEER: The General Manager - Chief Engineer of the Riverside County Waste Management Department, acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties entrusted to them.
- e) LABORATORY: The laboratories authorized by the County to test materials and work involved in the contract.
- f) BIDDER: Any individual, firm or corporation submitting a proposal for the work contemplated, acting directly or through a duly authorized representative.
- g) CONTRACTOR: The person or persons, co-partnership or corporation, private or municipal, who have entered into the Agreement with the County; or his or their legal representatives.
- h) SUPERINTENDENT: The executive representative of the Contractor, present on the work at all times during progress, authorized to receive and execute instruction from the County.
- i) PLANS or PROJECT DRAWINGS: The official plans, profiles, typical cross sections, general cross sections, working drawings, and supplemental drawings, or exact reproductions thereof, approved by the County, which show the location, character, dimension and details of the work to be done, and which are to be considered a part of the Contract Documents.
- j) SPECIFICATIONS: The directions, provisions, and requirements contained in the Contract Documents as to the method and manner of performing the work or to the quantities and qualities of materials to be furnished under the contract.
- k) CONTRACT: The written Agreement covering the work.
- l) CONTRACT PRICE: Shall mean either the lump sum, unit price, or unit prices named in the Agreement, or the total of all payments under the contract at the lump sum, unit price, or unit prices, as the case may be.
- m) SURETY OR SURETIES: The bondsmen or party or parties, approved by the County, who may guarantee the fulfillment of the contract by bond, and whose signatures are attached to said bond.
- n) RIGHT OF WAY: The whole right of way which is reserved for and secured for use

in constructing the improvement.

- o) THE WORK: All the work specified in the Contract Documents.

1.2. SIMILARITY OF WORDS

Wherever in the specifications or upon the plans the words directed, required, permitted, ordered, designated, prescribed, or words of like import are used, it will be understood that the direction, requirements, permission, order, designation, or prescription of the County is intended, and similarly the words approved, acceptable, satisfactory, or works of like import, shall mean approved by, or acceptable to, or satisfactory to, the County, unless otherwise expressly stated.

2. SECTION 2 - SCOPE OF WORK

2.1. WORK TO BE DONE

The Contractor shall provide all labor, power, light, water, materials, equipment, tools, scaffolding, machinery, transportation, insurance, permits, bonds, temporary protection, watchmen, and superintendence necessary to construct and complete all work, and to furnish all materials included in the contract, except those furnished by the County as specifically stated in the Contract Documents.

The Contract Documents are complementary, and the work called for by any one shall be as binding as if called for by all.

2.2. CONSTRUCTION SCHEDULE

The Contractor shall submit to the County at least Monthly, or at such times as may be requested by the County, a schedule which shall show the order and dates in which the Contractor proposes to carry on the various parts of the work, including estimated completion dates. The County's receipt of such schedule(s) shall not indicate any concurrence by the County in the items or dates described in the schedule(s).

2.3. DRAWINGS AND SPECIFICATIONS ON THE WORK

The Contractor shall keep one copy of all drawings and specifications on the work, in good order, available to the County and its representatives.

2.4. ESTIMATE OF QUANTITIES

It is understood that the quantities listed (except for those shown as "Final" or "Lump Sum") are but estimates only and final payment will be based on actual quantities for the work whatever they may be, subject to such adjustments and alterations as elsewhere provided for in the Contract Documents. The County is not to be held responsible for the accuracy of the estimate of quantities. The Contractor shall judge for himself, after considering all circumstances and conditions, the costs and quantities of materials involved in the work.

The Contractor shall not at any time assert that there was any misunderstanding in regard to the nature of the work or the kind or amount of materials to be furnished for the work. The Contractor shall not ask, demand, sue for, or seek to recover compensation in excess of the costs or charges for the work as stated in the Agreement.

2.5. PROTESTS

If the Contractor considers any work demanded of it to be outside of the requirements of the contract, the Contractor shall immediately and before the start of such work state this in writing to the County. In such writing, the Contractor shall clearly and in detail state the basis of its protest. Except for such protests as are made of record in the manner herein specified, the records, rulings, instruction, or decisions of the County shall be final and conclusive. Written protest by the Contractor shall not in any way relieve the Contractor from proceeding with the work as directed by the County.

2.6. ALTERATIONS

The Contractor agrees that reasonable alterations and modifications may be made by the County and that this may be done without notice to the sureties on the Contractor's bonds. If such changes result in increased or decreased quantities under the items specified in the Agreement, the Contractor will be paid on the basis of actual quantities as measured by the County; and such changes shall not affect the unit prices bid by the Contractor.

2.7. EXTRA WORK

2.7.1. General

The County reserves and shall have the right to revise the details of the contemplated work, or to add work of a different character or function, and have the Contractor perform such revised or added work as "Extra Work", when such extra work is considered by the County to be appurtenant to the satisfactory completion of the project. "Extra Work" is defined as added work of a different character or function and for which no basis for payment is prescribed; or that work which is indeterminate at the time of advertising and is specifically designated as extra work. The signing of the contract by the Contractor will be deemed to be an agreement on his part to perform extra work, as and when ordered by the County. If required extra work results in delay to the work, the Contractor will be given an appropriate extension of time.

Should the total increase in cost due to extra work exceed ten (10) percent of the contract price in contracts where the contract price is under \$250,000, or exceed \$25,000 in contracts where the contract price is over \$250,000, approval of the Board of Supervisors to exceed these limitations must be obtained before such work is authorized to be done.

2.7.2. Procedure for Extra Work

Extra work may not be done by the Contractor without prior request and proper written approval by the County. Upon decision of the County to have extra work performed, the County will so inform the Contractor, acquainting it with the details of the new work. The Contractor shall thereupon present in writing a price for said work to the County, whose written approval shall be secured before work is started; except that the County may order the Contractor to proceed with extra work in advance of the submission of such prices provided that preliminary estimates show that the cost will not exceed \$1,000.

Prices for extra work shall be prepared by the Contractor on one or both of the following methods, as requested by the County, and submitted to the County for approval:

For a stated unit price or lump sum amount based upon current prevailing fair prices for materials, labor, plant, overhead and profit.

On a cost plus 15 percent basis (force account by the Contractor). The cost of all work done by the Contractor on a cost plus 15 percent basis will be computed in the manner described in Section 7, and the compensation thus provided shall be full payment to the Contractor related to the extra work.

Upon receipt of the Contractor's price, the County will make an analysis thereof and in its discretion adopt one of the following procedures:

Accept the Contractor's price for lump sum or unit price amount in the original or amended form and direct it to proceed with the work; or direct it to perform the work on a cost plus 15 percent basis.

Have the work performed by County's forces or by separate contract.

Direct the Contractor to proceed with the work and accept payment therefore in the amount as adjudicated later in a court of law.

The price agreed to by the Contractor for the extra work shall be full compensation to the Contractor for all labor, materials, equipment or other costs related to the extra work.

2.8. PAYMENT FOR EXTRA WORK

At the end of each month the Contractor shall make and deliver to the County a statement of the cost of the extra work completed during the current month, itemized and in a form satisfactory to the County. Payment for extra work shall be added to the monthly partial payment made in accordance with Section 7.5 of the General Provisions.

2.9. RIGHTS OF WAY

The County shall provide the rights of way as specifically described in the Contract Documents upon which the work under this contract is to be done, except that the Contractor shall provide land required for the erection of temporary construction facilities and storage of his material, together with right of access to same.

2.10. CLEANING UP

The Contractor shall, as directed by the County, remove from the County's right of way and from all public and private property, at its own expense, all temporary structures, rubbish and waste materials resulting from its operations.

3. CONTROL OF THE WORK

3.1. AUTHORITY OF THE COUNTY

The County shall have general supervision of the contract under authority of the Board of Supervisors. The County has the authority to stop the work whenever such stoppage may be necessary to ensure the proper execution of the contract. The County shall decide all questions which may arise as to the quality or acceptability of materials furnished, work performed, and rate or progress of the work; all questions which may arise as to the interpretation of the plans and specifications; all questions as to the acceptable fulfillment of the contract on the part of the Contractor; and all questions as to compensation. The County's determination and decision thereon shall be final and conclusive.

3.2. DETAIL DRAWINGS

The approved plans shall be supplemented by such working drawings as are necessary to control the work adequately. All authorized alterations affecting the requirement and information given on the approved plans shall be in writing. No changes shall be made to any plan or drawing after the same has been approved by the County, except by its written direction.

Approval by the County of the Contractor's working drawings (or other documents) does not relieve the Contractor of responsibility for accuracy of dimensions, details or other requirements of the Contract Documents. It is mutually agreed that the Contractor shall be responsible for agreement and conformity of his working drawings with the approved plans and specifications. Full compensation for furnishing all working drawings shall be considered as included in the prices paid for the various contract items of work, and no additional allowance will be made therefore.

3.3. CONFORMITY WITH PLANS AND ALL ALLOWABLE DEVIATIONS

Except as otherwise specifically stated in the Contract Documents, finished surfaces in all cases shall conform exactly with the elevations, lines, grades, cross-sections, and dimensions shown or described in the Contract Documents. Any deviations must be authorized in advance in writing by the County.

3.4. INTERPRETATION OF PLANS AND SPECIFICATIONS

Should it appear that the work to be done is not sufficiently detailed or explained in the Contract Documents, the Contractor must bring this to the County's attention in writing prior to submittal of the Contractor's Proposal.

In the event of any discrepancy between any drawings and the figures written thereon, the figures shall be taken as correct. The Contractor will not be allowed to take advantage of errors and omissions in the drawings and specifications. When errors or omissions are found, they shall immediately be brought to the attention of the other party in writing.

3.5. SUPERINTENDENCE

The Contractor shall keep on his work, continually during its progress, a competent Superintendent responsible for the construction of the work, as well as any necessary assistants. All such persons shall be acceptable to the County continuously throughout the duration of the

project. The Superintendent shall represent the Contractor in his absence and all directions given to him shall be as binding as if given to the Contractor.

3.6. LINES AND GRADES

The Contractor shall provide opportunities and facilities for setting points and making measurements as requested by the County or otherwise as reasonably required. The Contractor shall not proceed until it has made timely demand upon the County for, and has received from the County, such lines and grades as may be necessary as the work progresses. The work shall be done in strict conformity with such lines and grades.

The Contractor shall carefully preserve benchmarks, reference points and stakes, and in case of willful or careless destruction, the Contractor shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their loss or disturbance.

3.7. INSPECTION OF WORK

The County and its representatives shall at all times have access to the work and shall be furnished with every reasonable opportunity for ascertaining that the materials and workmanship are in accordance with the requirements of the Contract Documents. All work done and all materials furnished shall be subject to the County's inspection and approval.

The inspection of the work by any County representatives shall not relieve the Contractor of any of its obligations to fulfill the requirements of the Contract Documents. Defective work or unsuitable materials may be rejected, notwithstanding that such work or materials may have been previously overlooked by County representatives, accepted, or estimated for payment.

3.8. REMOVAL OF DEFECTIVE AND UNAUTHORIZED WORK

All work which has been rejected shall be remedied or removed and replaced by the Contractor in an acceptable manner; and no compensation will be allowed for such removal or replacement. Any work done beyond the lines and grades as described by the Contract Documents, or any extra work done without proper written authority, will be considered as unauthorized and will not be paid for. Work so done may be ordered removed at the Contractor's expense. Upon failure on the part of the Contractor to comply, the County shall have authority to cause defective or unauthorized work to be remedied, or removed and replaced, and to deduct the costs for this work from any monies due or to become due the Contractor.

3.9. EQUIPMENT AND PLANT

Equipment not suitable to produce the quality of work required will not be permitted to operate on the project. Plants shall be designed and constructed in accordance with general practice for such equipment and shall be of sufficient material to carry the work to completion within the time limit. The Contractor shall provide adequate and suitable equipment and plant to meet these requirements and, when ordered by the County, shall immediately remove unsuitable equipment from the work and discontinue the operation of unsatisfactory plants. No worn or obsolete equipment shall be used, and in no case shall the maker's rating of the capacity for any equipment be exceeded. All vehicles used to haul materials over existing highways shall be equipped with pneumatic tires.

3.10. FINAL INSPECTION

The County will not make the final inspection until all the work provided for and contemplated by the contract has been fully completed and the final clean up has been performed.

4. CONTROL OF MATERIAL

4.1. COUNTY FURNISHED MATERIALS

The Contractor shall furnish all materials required to complete the work, except those specified in the Contract Documents to be furnished by the County. Any materials furnished by the County will be delivered to the Contractor at the points specified in the Contract Documents. The Contractor will be held responsible for all materials so delivered to him, and deductions will be made from any monies due Contractor to make good any shortages and deficiencies, from any cause whatsoever, which may occur after such delivery, or for any demurrage charges due to delinquency in unloading.

4.2. SOURCE OF SUPPLY AND QUALITY OF MATERIALS

At the option of the County the source of supply of any materials shall be approved by the County before the delivery is started. Only materials conforming to the exact requirements of the Contract Documents and approved by the County shall be used in the work. All materials proposed for use may be inspected or tested by the County at any time during their preparation and use. If it is found that sources of supply which have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved material from other approved sources. No material which, after approval, subsequently becomes unfit for use shall be used in the work.

Wherever the name, or brand, or manufacturer of an item is specified, it is used as a measure of quality and utility or a standard. Except in those instances where the product is designated to match others presently in use, or as otherwise stated in the Contract Documents, specifications calling for a designated material, product, thing or service by specific brand or trade name shall be deemed to be followed by the words "or equal" so that the Contractor may propose in the Contractor's bid any equal material, product, thing or service. If the Contractor desires to use any other brand or manufacturer of equal quality or utility to that specified, he shall list definite particulars of that which it considers equivalent to the specified item in its bid. The County will then determine whether or not the proposed name brand or article is equal in quality and utility to that specified, and the County's determination in that regard shall be final and binding upon the Contractor.

4.3. SAMPLES AND TESTS

All tests of materials furnished by the Contractor shall be made by the County in accordance with commonly recognized standards of national organizations for this type of landfill project, and such special methods and tests as are in use at the County's approved laboratory or otherwise determined by the County to be needed. The County shall determine what testing is needed.

Field tests of materials will be made by the County or its representative when deemed necessary as determined by the County; and these tests shall be made in accordance with standard practices of the County or as otherwise needed.

The Contractor shall furnish samples of all materials as requested by the County without charge. No material shall be used until it has been approved by the County. Samples will be secured and tested whenever necessary as determined by the County to determine the quality of the material.

Promptly after the approval of the contract, the Contractor shall notify the County of the proposed sources of supply of all materials to be furnished by it, using a form which will be supplied by the County upon request.

Whenever reference is made to standard tests or requirements of the County, the American Society for Testing Materials, the American Railway Engineering Association or the American Association of State Highway Officials, the reference shall be construed to mean the standards that are in effect at the date the Agreement is signed with subsequent amendments, changes, or additions as thereafter adopted and published by the organization referred to.

None of the provisions stated in this section shall relieve the Contractor of its obligations as stated elsewhere in the Contract Documents.

4.4. STORAGE OF MATERIALS

Materials shall be so stored as to ensure the preservation of their quality and fitness for the work. When considered necessary by the County, they shall be placed on wooden platforms or other hard, clean surfaces and not on the ground. They shall be placed under cover when so directed by the County. Stored materials shall be so located as to facilitate prompt inspection.

4.5. DEFECTIVE MATERIALS

All materials not conforming to the exact requirements of the Contract Documents shall be considered as defective; and all such materials, whether in place or not, shall be rejected and shall be removed immediately from the site of the work. No rejected materials, the defects of which have been subsequently corrected, shall be used until approval in writing has been given by the County. Upon failure on the part of the Contractor to comply forthwith with any order of the County made under the provisions of this article, the County shall have authority to remove and replace defective material and to deduct the cost of removal and replacement from any monies due or to become due the Contractor.

4.6. ASSIGNMENT OF CLAIMS

In submitting a bid on this public works project, or any subcontractor agreeing to supply goods, services, or materials, and entering a contract pursuant thereto, the Contractor and/or subcontractors do offer and agree to assign to the County all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Section 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, services, or materials pursuant to the public works contract or the subcontract. This assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

5. LEGAL RELATIONS AND RESPONSIBILITY

5.1. LAWS TO BE OBSERVED

5.1.1. Compliance with Applicable Law

Reference to and/or incorporation into the Contract Documents of a particular law, statute, ordinance, rule or regulation is not, nor is it intended to be, a definitive statement of the law applicable to the Contract Documents and the accomplishment of the work. Contractor must keep informed as to all such applicable laws - Federal, State, County, Municipal - as they affect the conduct of the work and comply with such law, including, but not limited to, having requisite licenses, obtaining necessary permits, paying necessary fees and taxes, posting notices and installing, operating and maintaining safety precautions and facilities. It is likewise Contractor's responsibility to see to it that its subcontractors also fully comply with such applicable laws. Contractor shall protect and defend County, its officers, agents, employees and contractors against any claim or liability arising from or based upon any alleged violation of such applicable law.

5.1.2. Labor Code

The Contractor shall comply with all applicable requirements of the California Labor Code. Reference is made to Chapter 1, Part 7, Division 2 of the California Labor Code (commencing with Section 1720). By this reference said Chapter 1 is incorporated herein with like effect as if it were here set forth in full. The parties recognize that said Chapter 1 deals with, among other things, discrimination, penalties and forfeitures, their disposition and enforcement, wages, working hours and securing workers' compensation insurance and directly affect the method of prosecution of the work by Contractor and subject it under certain conditions to penalties and forfeitures. Execution of the Agreement by the parties constitutes their agreement to abide by said Chapter 1. Their stipulation as to all matters which they are required to stipulate to by the provisions of said Chapter 1, constitutes Contractor's certification that he is aware of the provisions of said Chapter 1 and will comply with them and further constitutes Contractor's certification as follows: "I am aware of the provisions of Section 3700 of the California Labor Code which requires every employer to be insured against liability for workers' compensation or to undertake self-insurance in accordance with the provisions of that Code, and I will comply with such provisions before commencing the performance of the work of this contract." Contractor and his subcontractors shall comply with the provisions of the Labor Code regarding apprentices. Contractor shall post at each job site during the course of the work a copy of County's "Determination of Prevailing Wage Rate". Copies of this Determination are available from County for this purpose.

5.1.3. Equal Employment Opportunity

The Contractor shall comply with all applicable non-discrimination and equal employment laws. The Contractor shall not discriminate in his recruiting, hiring, promotion, demotion or termination practices on the basis of race, religious creed, color, national origin, ancestry, sex, age or physical handicap in the performance of this contract and shall comply with the provisions of the California Fair Employment Practice Act (commencing with S1410 of the Labor Code), the Federal Civil Rights Act of 1964 (P.L.

88-352) and all amendments thereto, Executive Order No. 11246 (30 Federal Register 12319), as amended, and all administrative rules and regulations issued pursuant to said Acts and Order. See particularly 41 Code of Federal Regulation (CFR) Chapter 60.

Contractor shall require each of its subcontractors to comply with the preceding paragraph and shall include in each subcontract language similar to the preceding paragraph.

Contractor shall permit access to its records of employment, employment advertisement, application forms and other pertinent data and records (including but not limited to certified payroll information) by County and any state or federal agency having jurisdiction for the purpose of investigation to ascertain compliance with this Section.

County may assign an affirmative action representative to monitor Contractor and his subcontractor(s) conduct required by this section, including the right of entry to the construction site for the purpose of obtaining information from persons performing work on the project providing such inspection does not interfere with the progress of the work.

Elsewhere in the Contract Documents more specific requirements may be contained covering the same subject matter of this Section. If so, such more specific requirements prevail over this section in case of conflict.

Transactions of \$10,000 or under - Contracts and subcontracts not exceeding \$10,000 are exempt from the requirements of this section. No Contractor or subcontractor shall procure supplies and/or services in less than usual quantities to avoid applicability of this section. With respect to contract and subcontracts for indefinite quantities, this section applies unless the amount required in any one year under such contract will reasonably be expected not to exceed \$10,000.

Transactions in Excess of \$10,000, but less than \$50,000 - At County's request, Contractor shall certify that he has in effect an affirmative action plan and agrees to comply with all state and federal laws and regulations regarding Fair Employment Practices. Contractor shall maintain a written copy of his affirmative action plan and furnish County a copy of the Plan upon request. County may require Contractor to complete an Affirmative Action Compliance Report, on a form furnished by County, setting forth definite goals during the term of this contract.

Transactions of \$50,000 or more - If Contractor has 50 or more employees and a contract for \$50,000 or more, he shall develop and submit to County within 30 days after award, a written affirmative action compliance program providing in detail specific steps to guarantee equal employment opportunity. Contractor shall include in his affirmative action program a table of job classifications, which table shall include but need not be limited to job titles, duties and rates of pay.

Contractor shall in each subcontract let to do a portion of the work covered hereunder, where the subcontractor involved has 50 or more employees and the subcontract is for \$50,000 or more, impose in the subcontract the above requirements.

For the purpose of determining the number of employees, the average of the Contractor's or his subcontractor's employees from the 12 month period immediately prior to award, or the total number of employees contractor or its subcontractor will have when performing this contract, whichever is higher, shall be used.

Federally Assisted Construction - If this project is a federally assisted construction project, then the contract provisions contained 41 CFR S60-1.4(b) are incorporated herein and Contractor shall likewise incorporate said provisions in each subcontract entered into by Contractor to perform the work. Federally assisted construction is identified as such in the Notice Inviting Bids.

5.1.4. Registration of Contractors

In order to be considered, a prospective bidder must be licensed in accordance with Division 3, Chapter 9 (commencing with Section 7000) of the Business and Professions Code.

5.1.5. Accident Prevention

Particular attention shall be given to relevant Division of Industrial Safety Construction and Electrical Safety Orders. Said Orders are contained in Title 8 of the California Code of Regulations, Chapter 4, Subchapters 4 and 5. Specific attention shall be taken of the California Occupational Safety and Health Act of 1973 (commencing with Section 6300 of the Labor Code) and the Federal Occupational Safety and Health Act of 1970 (P.L. 91-596) and rules and regulations issued pursuant to said Acts. Specific reference is made to Article 6 of said Construction Safety Orders. Contractor shall submit to County, in advance of excavation a detailed plan showing the design of shoring, bracing, sloping of the sides of trenches, or other provisions to be made for protection of personnel during earthwork operations. In event the Contractor's plan does not conform to the shoring system requirement of Article 6, the contractor's proposed shoring design shall be prepared and signed by a civil or structural engineer registered in the State of California. The Contractor shall also impose these requirements on all subcontractors involved and enforce compliance therewith. The duties here set forth are nondelegable by Contractor.

5.2. CONTRACTOR'S RESPONSIBILITY

Contractor is under the absolute duty in fulfilling his contractual obligations hereunder to proceed, and cause his subcontractors to proceed, in a safe, workmanlike manner, with adequate safeguards for the protection of the public, the workmen and persons from time to time inspecting the work. If at any time Contractor finds any of his subcontractors are allowing work to proceed in an unsafe manner or contrary to the terms of the Contract Documents, Contractor shall immediately cause such action to stop and immediately take all action necessary to protect workmen, inspectors and the general public and cause the work to proceed in a safe manner or in accordance with the terms of the Contract Documents.

5.3. CONTRACTOR'S RESPONSIBILITY FOR WORK

Until the formal final acceptance of the completed work by the County, the Contractor shall have the charge and care of the work and shall bear the risk of injury or damage to any part of the work by the action of the weather or from any other cause, whether or not arising from the

execution of the work. The Contractor shall rebuild, repair, restore, and make good all injuries or damages to any portion of the work.

5.4. PROPERTY RIGHTS IN MATERIALS

Nothing in the contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the work or the soil. All such materials shall become the property of the County upon being so attached or affixed.

5.5. PERMITS AND LICENSES

The Contractor shall procure all permits and licenses (including but not limited to: National Pollution Discharge Elimination System (NPDES) and South Coast Air Quality Management District (AQMD) permit requirements), pay all charges and fees, and give all notices necessary and incident to prosecution of the work.

5.6. ROYALTIES AND PATENTS

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the work, and agrees to indemnify and save harmless the County and its duly authorized representatives, from all suits at law, or actions of every nature for, or on account of, the use of any patented materials, equipment, devices, or processes.

5.7. SANITARY PROVISIONS

Necessary conveniences, properly secluded from public observation, shall be provided by the Contractor where needed for the use of laborers on the work. Their location, construction and maintenance shall be subject to the approval of the County. The Contractor shall obey and enforce such sanitary regulations as may be prescribed by the State Department of Health or other authorities having jurisdiction.

5.8. PUBLIC SAFETY

The Contractor at its own expense shall furnish, erect, and maintain such fences, barriers, lights, and signs as are necessary to give adequate warning to the public at all times that the work is under construction; and the Contractor shall erect such warning and directional signs and employ such flagmen as are required and shall maintain same throughout the construction period. Full compensation for the work involved in carrying out the precautionary measures above specified shall be considered as included in the prices paid for the various contract items of work and no additional payment will be made therefore.

5.9. USE OF EXPLOSIVES

When the use of explosives is necessary for the prosecution of the work, the Contractor shall use the utmost care not to endanger life or property. All explosives shall be stored in accordance with the provisions of Division II Part I, Chapter 3, of the Health and Safety Code of the State of California and other applicable laws or regulations.

5.10. PROVISIONS FOR EMERGENCIES

Unusual conditions may arise on the work which will require that immediate and unusual provisions be made to protect the public from danger or loss or damage to life or property, and it

is part of the service required of the Contractor to make such provisions and to furnish such protection.

The Contractor shall use such foresight and shall take such steps and precautions as its operations make necessary to protect the public from danger or damage, or loss of life or property.

Whenever work is undertaken pursuant to this Section, Contractor shall promptly file with County a verified report setting forth the nature of the emergency and the action taken by the Contractor by reason of the emergency.

Whenever, in the opinion of the County, an emergency exists against which the Contractor has not taken sufficient precaution for the safety of the public or the protection of utilities or of adjacent structures or property which may be injured or damaged because of the Contractor's work; and, in the opinion of the County, immediate action shall be considered necessary in order to protect public or private, personal or real property interests, or prevent likely loss of human life or damage; then the County may provide suitable protection to said interests by causing such work to be done and material to be furnished as, in the opinion of the County, may seem reasonable and necessary. The cost and expense of all such emergency work shall be borne by the Contractor, and if he shall not pay said cost and expense upon presentation of the bills therefore, duly certified by the County, then said cost and expense will be paid by the County and shall thereafter be deducted from any amounts due or which may become due said Contractor. Failure of the County, however, to take such precautionary measures, shall not relieve the Contractor of its full responsibility for public safety.

5.11. UNFORESEEN DIFFICULTIES

The risk of all loss or damage, except as noted in Section 8.4, arising out of the work, or from any unforeseen obstructions or difficulties which may be encountered during the progress of the work, or from the action of the weather, or from encumbrances in the line of work, shall be the responsibility of the Contractor.

5.12. ACCESS TO THE WORK

Unless provided for in the Special Provisions, access to the work from existing roads shall be provided by the Contractor at its expense and maintained in a manner so as not to create a public nuisance. The County assumes no responsibility for the condition or maintenance of any existing road or structure thereon that may be used by the Contractor for performing the work or for traveling to and from the site of the work. No additional payment will be made to the Contractor for constructing any temporary road used for construction operations or for improving, repairing, or maintaining any existing road or structure thereon that may be used by the Contractor for performance of the work under these specifications. The cost of all work described in this paragraph shall be included in the prices bid in the schedule for other items of construction work.

5.13. GUARANTEE OF WORK

All work shall be guaranteed by Contractor for a period of two (2) years from the recordation of the Notice of Completion against any defects, including but not limited to those resulting from the use of inferior materials, equipment, or workmanship. Upon notice from County, Contractor

shall promptly remedy such defects at its expense, including payment to County of its expenses in connection with such defects; otherwise County shall proceed to remedy such defects and Contractor shall reimburse County for its expenses.

This guarantee is in addition to any specific guarantee(s) provided for elsewhere in the Contract Documents or provided by manufacturers or suppliers.

5.14. SURETY OF GUARANTEE

The performance of guarantee and conditions specified in Section 5.13., shall be secured by a surety bond which shall be delivered by the Contractor to the County prior to the date on which final payment is made to the Contractor. Said bond shall be in an approved form and executed by a surety company or companies satisfactory to the County, in the amount of 10 percent of the final contract price. Said bond shall remain in force for the duration of the guarantee period specified in Section 5.13. Instead of providing such a bond as described above, the Contractor may, at its option, provide for the performance bond furnished under the contract to remain in force for said amount until the expiration of said guarantee period; and the amount of said performance bond may be reduced to 10 percent of the final contract price beginning at the time of recordation of the Notice of Completion.

5.15. DAMAGES BY ACT OF GOD

If the construction of the project herein is damaged, which damage is determined to have been proximately caused by an act of God, in excess of 5% of the contract amount, provided that the work damaged is built in accordance with applicable building standards and the plans and specifications, then the County may, without prejudice to any other right or remedy, terminate the contract.

6. PROSECUTION AND PROGRESS

6.1. PROGRESS OF THE WORK

The Contractor shall begin the work within ten (10) calendar days after the date of receipt by Contractor of notice to proceed from the County and shall diligently and continuously prosecute the same to completion within the time limit provided in the Special Provisions.

6.2. OVERTIME WORK AND WORK AT NIGHT

The Contractor shall conduct the work on a five (5) day, forty (40) hour work week with no work on legal holidays (as further described in the Special Provisions). If the Contractor feels it is necessary to work more than the normal 40 hour work week, he will make a written request for permission from the County, outlining the reasons for such request. The decision of granting permission for overtime work shall be in the sole discretion of the County; and the decision of the County shall be final. If granted, a condition will be imposed requiring the Contractor to pay the County the cost incurred at overtime rates for additional inspection and engineering time required in connection with the overtime work.

When any work is performed at night, only such classes of work shall be done as can be properly inspected. Adequate light must be provided for the safety of the workers and for proper inspection.

6.3. SUBCONTRACTING

Reference is made to the Subletting and Subcontracting Fair Practice Act contained in the California Public Contract Code (commencing with Section 4100). By this reference, said Act is incorporated herein with like effect as if it were here set forth in full and the parties shall abide by its terms and substitution shall be only as allowed by that Act. County reserves the right to approve all subcontractors whether or not they are required to be listed in the Contractor's Proposal.

Contractor shall be responsible for the acts and omissions of its subcontractors and shall make certain that at all times its subcontractors comply with the terms of the Contract Documents and applicable law. Where a portion of the work which has been subcontracted by the Contractor is not being prosecuted in a manner satisfactory to the County, the subcontractor shall be removed immediately on the request of the County and shall not again be employed on the work.

The Contractor shall give its personal attention to the fulfillment of the contract and shall keep the work under its control. The Contractor shall perform with its own organization work of a value amounting to not less than 50 percent of the remainder obtained by subtracting from the total original contract value the sum of any item designated herein or in the Special Provisions as Specialty Items. The furnishing and placing of reinforcing steel, when placing is performed by the supplier, will be considered as a Specialty Item for this purpose; however, he shall be designated in the list of subcontractors. The value of the work subcontracted will be based on the contract item bid price, if any subdivision of a contract unit is subcontracted, the entire unit shall be considered as subcontracted.

6.4. CHARACTER OF WORKMEN

If any subcontractor or person employed by the Contractor shall fail or refuse to carry out the directions of the County or shall appear to the County to be incompetent or to act in a disorderly or improper manner, he/she shall be discharged immediately upon the request of the County and such person shall not again be employed on this work.

6.5. TEMPORARY SUSPENSION OF THE WORK

The County shall have the authority to suspend the work wholly or in part, for such period as the County may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as the County may deem necessary due to the failure on the part of the Contractor to properly perform the work. The Contractor shall immediately comply with the order of the County to suspend the work wholly or in part. The work shall be resumed when conditions are favorable or methods are corrected, as ordered or approved by the County.

6.6. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

The Contractor shall complete the work called for under the contract in all parts and requirements within the number of working days specified in the Special Provisions. Liquidated damages shall apply as stated in the Special Provisions.

A working day is hereby defined as any day (except Saturdays, Sundays, legal holidays, and days on which the Contractor is specifically required by the Special Provisions to suspend construction operations) on which the Contractor is not prevented by inclement weather or resulting conditions from proceeding with at least 60 percent of the normal labor and equipment force engaged in the controlling operation or operations for at least five hours.

The County will furnish the Contractor a weekly statement showing the number of working days charged to the contract for the preceding week, the number of working days specified for completion of the contract, and the number of working days remaining to complete the contract. The Contractor will be allowed one week in which to file a written protest setting forth in what respects the weekly statement is incorrect, otherwise the statement shall be deemed to have been accepted by the Contractor as correct.

The following holidays will be considered as legal holidays: New Year's Day; Martin Luther King Jr. Birthday, Lincoln's Birthday; Washington's Birthday (observed); Memorial Day; Independence Day; Labor Day; Columbus Day; Veteran's Day; Thanksgiving Day; Christmas; and such other days as are declared County holidays by ordinance passed by the Board of Supervisors. Please refer to specific holiday dates listed in the Special Provisions.

Contractor acknowledges that failure to perform in strict accordance with the Contract Documents and within the time limits specified in the Special Provisions will cause County to suffer special damages in addition to cost of completion of the work in accordance with the provisions of the Contract Documents. Such special damage could include, but is not limited to, lease and rental cost, additional salaries and overhead, interest during construction, attorney expense, additional engineering, inspection expense, cost of maintaining or constructing alternate facilities, and injury to the property of the County or others. Such special damage could also include penalties assessed against the County by other governmental agencies for failure to have

the project completed in a timely manner or as required by law. The County may withhold from any money due or that may become due the Contractor under the contract such amount as the County may elect to offset the damages incurred. Any withholding or failure to withhold shall not in any way limit recovery for damages actually incurred.

It is further agreed that in case the work called for under the contract is not finished and completed in all parts and requirements within the time specified, the County (in its sole discretion) shall have the right to extend the time for completion or not. If the County decides to extend the time limit for the completion of the contract, the County shall further have the right to charge to the Contractor and to deduct from the Contractor's payment all or any part of the actual cost of engineering, inspection, superintendence, and other related expenses caused by the Contractor's failure to complete the project as required. In such case, liquidated damages shall not apply as stated in the Special Provisions.

6.7. DELAYS AND EXTENSION OF TIME

If delays are caused by unforeseen causes beyond the control of either the Contractor or the County, such as war, strikes, fire, floods, or other action of the elements, such delays will entitle the Contractor to an equivalent extension of time for the completion of the contract but not damages or additional payments over the contract price. Furthermore, if the Contractor suffers any delay caused by the failure of the County to furnish the necessary right of way or materials agreed to be furnished by it, or by failure to supply necessary plans or instructions concerning the work to be done after written request therefore has been made, the Contractor shall be entitled to an extension of time equivalent to the time lost for any of the above-mentioned reasons but shall not be entitled to any damages for such delay.

6.8. ASSIGNMENT

The contract may be assigned only upon prior written consent of the County. Such written consent to sublet, assign or otherwise dispose of any portion of the contract, shall not be construed to relieve the Contractor of any responsibility for the fulfillment of the contract.

6.9. TERMINATION OF CONTRACT

If the Contractor fails to begin delivery of material and equipment or to commence work within the time specified herein, or to maintain the rates of delivery of materials, or to execute the work in the proper manner, written notice by the County may be served upon the Contractor demanding compliance with the contract. If the Contractor refuses or neglects to comply with such notice within five (5) working days after receipt of the notice, then the County may take possession of the work, together with all material and equipment thereon, and may complete the work itself in the manner the County determines to be appropriate. The cost of the completion of the work shall be charged against the Contractor and its surety and may be deducted from any money due to the Contractor; and if the sums due under the contract are insufficient, the Contractor and/or its surety shall pay to the County within five (5) working days after the completion of the work all of such cost in excess of the contract price.

7. PAYMENT

7.1. SCOPE OF PAYMENTS

The compensation described in the Agreement shall be complete and full payment to the Contractor for furnishing all materials, labor, tools, equipment and related items necessary to complete the work; and for all obligations imposed upon the Contractor pursuant to the Contract Documents. Neither the payment of any estimate nor of any retained percentage shall relieve the Contractor of any obligation to make good any defective work or material.

7.1.1. Measurement and Computation of Quantities

Unless otherwise stated, all items of the work to be paid for at a contract price per unit of measurement will be measured by the County in accordance with United States Standard Measures. A ton shall mean 2,000 pounds, avoirdupois. Except as otherwise expressly provided in the specifications, the methods of measurement and computation of quantities will be determined by the County.

The weights of metalwork, and other metal parts to be paid for by weight will be determined by the County on the basis of handbook weights, scale weights, or manufacturer's catalog weights, or in the absence of any of the foregoing, on the basis of estimated weights; provided, that weights of nonmetallic coatings will be excluded.

7.1.2. Payment at Contract Prices

The contract price for an item of the work shall include full compensation for all costs of that item, including the costs of any work, materials and equipment incidental to the item but not specifically shown or described in the Contract Documents.

The contract prices shall include full compensation for all costs of any work, materials, and equipment required by the Contract Documents, but not covered by a contract price or otherwise expressly made the subject of direct payment.

7.2. PAYMENT AND COMPENSATION FOR ALTERED QUANTITIES

When alterations in plans or quantities of work are ordered and performed, the Contractor agrees to accept payment in full at the contract unit price for the actual quantities of work done; and no additional payment will be made for anticipated profits.

7.3. FORCE ACCOUNT PAYMENT

When extra work is to be paid for on a force account basis, compensation will be determined as follows:

7.3.1. Work Performed by Contractor

The Contractor will be paid for labor, materials, and equipment rental as hereinafter provided, except where agreement has been reached to pay in accordance with Section 7.3.2. Only materials incorporated in the work will be paid for.

To the total computed as provided in Section 7.3.1.1, 7.3.1.2 and 7.3.1.3 will be added the following percentages:

Labor -- 24 percent
Materials -- 15 percent
Equipment Rental -- 15 percent

It is understood labor, materials, and equipment may be furnished by the Contractor or by the subcontractor or by others on behalf of the Contractor.

When extra work paid for on a force account basis is performed by forces other than the Contractor's organization, the Contractor shall reach agreement with such other forces as to the distribution of the payment made by the County for such work and no additional payment therefore will be made by the County.

7.3.1.1. Labor

The Contractor will be paid the cost of labor for the workmen (including foremen when authorized by the County), used in the actual and direct performance of the work. The cost of labor, whether the employer is the Contractor, subcontractor, or other forces, will be the sum of the following:

7.3.1.1.1. Actual Wages

The actual wages paid shall include any employer payments to or on behalf of the workmen for health and welfare, pension, vacation, and similar purposes.

7.3.1.1.2. Labor Surcharge

To the actual wages as defined in Section 7.3.1.1.1., will be added a labor surcharge set forth in the Special Provisions, which labor surcharge shall constitute full compensation for all payments imposed by State and Federal laws and for all other payments made to, or on behalf of, the workmen, other than actual wages as defined in Section 7.3.1.1.1 and subsistence and travel allowance as specified in Section 7.3.1.1.3.

7.3.1.1.3. Subsistence and Travel Allowance

Subsistence and travel allowance paid to such workmen as required by collective bargaining agreements.

7.3.1.2. Materials

The cost of materials incorporated in the work will be the cost to the purchaser, whether Contractor, subcontractor or other forces, from the supplier thereof, except as the following are applicable:

- (a) If a cash or trade discount by the actual supplier is offered or available to the purchaser, it shall be credited to the County notwithstanding the fact that such discount may not have been taken.

- (b) If the materials are procured by the purchaser by any method which is not a direct purchase from and a direct billing by the actual supplier to such purchaser, the cost of such materials shall be deemed to be the price paid to the actual supplier as determined by the County. No markup except for actual costs incurred in the handling of such materials will be permitted.
- (c) If the materials are obtained from a supply or source owned wholly or in part by the purchaser, payment therefore will not exceed the price paid by the purchaser for similar materials furnished from said source on contract items or on the current wholesale price for such materials delivered to the job site whichever price is lower.
- (d) If the cost of such materials is, in the opinion of the County, excessive, then the cost of such materials shall be deemed to be the lowest current wholesale price at which such materials are available in the quantities concerned delivered to the job site, less any discounts as provided in Section 7.3.1.2(a).
- (e) If the Contractor does not furnish satisfactory evidence of the cost of such materials from the actual supplier thereof, the cost shall then be determined in accordance with Section 7.3.1.2(d).

The County reserves the right to furnish such materials as it deems advisable, and the Contractor shall have no claims for costs and profit on such materials.

7.3.1.3. Equipment Rental

The Contractor will be paid for the use of equipment at the rental rates listed for such equipment in the Special Provisions regardless of ownership and any rental or other agreement, if such may exist, for the use of such equipment entered into by the Contractor. If it is deemed necessary by the County to use equipment not listed in the Special Provisions, a suitable rental rate for such equipment will be established by the County. The Contractor may furnish any cost data which might assist the County in the establishment of such rental rate.

The rental rates paid as above provided shall include the cost of fuel, oil, lubrication, supplies, necessary attachments, repairs and maintenance of any kind, depreciation, storage, insurance, and all incidentals.

Operators of rented equipment will be paid for as provided under Section 7.3.1.1

All equipment shall, in the opinion of the County, be in good working condition and suitable for the purpose for which the equipment is to be used.

Unless otherwise specified, manufacturer's ratings and manufacturer approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

Individual pieces of equipment or tools having a replacement value of \$25.00 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.

Rental time will not be allowed while equipment is inoperative due to breakdowns.

In computing the rental time of equipment, less than 30 minutes shall be considered ½ hour.

7.3.1.3.1. Equipment on the Work

The rental time to be paid for equipment on the work shall be the time the equipment is in operation on the extra work being performed, and in addition, shall include the time required to move the equipment to location of the extra work and return it to the original location or to another location requiring no more time than that required to return it to its original location, except that moving time will not be paid for if the equipment is used at the site of the extra work on other than such extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power, except that no payment will be made if the equipment is used at the site of the extra work on other than such extra work.

7.3.1.3.2. Equipment not on the Work

For the use of equipment moved in on the work and used exclusively for extra work paid for on a force account basis, the Contractor will be paid the rental rates listed in the Special Provisions or as agreed to as provided in Section 7.3.1.3 and for the cost of transporting the equipment to the location of the work and its return to its original locations, all in accordance with the following provisions:

- (i) The original location of the equipment to be hauled to the location of the work shall be agreed to by the County in advance.
- (ii) The County will pay the costs of loading and unloading such equipment.
- (iii) The cost of transporting equipment on low bed trailers shall not exceed the hourly rates charged by established haulers.
- (iv) The cost of transporting equipment shall not exceed the applicable minimum established rates of the Public Utilities Commission.
- (v) The rental period shall begin at the time the equipment is unloaded at the site of the extra work, shall include each day that the equipment is at the site of the extra work, excluding Saturdays, Sundays, and legal holidays unless the extra work is performed on such days, and shall terminate at the end of the day on which the County directs the Contractor to discontinue the use of such equipment. The rental time to be paid per day will be in accordance with the following:

Hours In	Hours to be Paid
0	4
0.5	4.25
1	4.5
1.5	4.75
2	5
2.5	5.25
3	5.5
3.5	5.75
4	6
4.5	6.25
5	6.5
5.5	6.75
6	7
6.5	7.25
7	7.75
8	8
Over 8	Hours in operation

When hourly rates are listed, less than 30 minutes of operation shall be considered to be ½ hour of operation.

When daily rates are listed, payment for ½ day will be made if the equipment is not used. If the equipment is used, payment will be made for one day.

The minimum rental time to be paid for the entire rental period on an hourly basis shall not be less than 8 hours or if on a daily basis shall not be less than one day.

- (i) Should the Contractor desire the return of the equipment to a location other than its original location, the County will pay the cost of transportation in accordance with the above provisions, provided such payment shall not exceed the cost of moving the equipment to the work.
- (ii) Payment for transporting, loading and unloading equipment, as above provided, will not be made if the equipment is used on the work in any other way than upon extra work paid for on a force account basis.

7.3.2. Work Performed by Special Forces or Other Special Services

When the County and the Contractor, by advance agreement, determine that a special service or an item of extra work cannot be performed by the forces of the Contractor or those of any of his subcontractors, such service or extra work item may be performed by a specialist. Invoices for such service or item of extra work on the basis of the current market price thereof may be accepted without complete itemization of labor, material, and equipment rental costs when it is impracticable and not in accordance with the established practice of the special service industry to provide such complete itemization.

In those instances wherein a Contractor is required to perform extra work necessitating a fabrication or machining process in a fabrication or machine shop facility away from the job site, the charges for that portion of the extra work performed in such facility may, by agreement, be accepted as a specialist billing.

To the specialist invoice price, less a credit to the County for any cash or trade discount offered or available, whether or not such discount may have been taken, will be added 15 percent in lieu of the percentages provided in Section 7.3.1.

7.3.3. Records

The Contractor shall maintain his records in such manner as to provide a clear distinction between the direct costs of extra work paid for on a force account basis and the costs of other operations.

The Contractor shall furnish the County (on a form provided by the County) report sheets in duplicate of each day's extra work paid for on a force account basis no later than the working day following the performance of said work. The daily report sheets shall itemize the materials used, and shall cover the direct costs of labor and the charges for equipment rental, whether furnished by the Contractor, subcontractor, or other forces, except for charges described in Section 7.3.2. The daily report sheets shall provide names or identifications and classifications of workmen, the hourly rate of pay and hours worked, and also the size, type and identification number of equipment, and hours operated.

Materials charges shall be substantiated by valid copies of vendor's invoices. Such invoices shall be submitted with the daily report sheets, or if not available, they shall be submitted with subsequent daily report sheets. Should said vendor's invoices not be submitted within 15 days after acceptance of the work, the County reserves the right to establish the cost of such materials at the lowest current wholesale prices at which said materials are available in the quantities concerned delivered to the location or the work, less any discounts provided in Section 7.3.1.2 (a).

Daily report sheets shall be signed by the Contractor or its authorized agent.

The County will compare its records with the daily report sheets furnished by the Contractor, make any necessary adjustments, and compile the costs of work paid for on a force account basis on daily extra work report forms furnished by the County. When these daily extra work reports are agreed upon and signed by both parties, they shall become the basis of payment for the work performed, but shall not preclude subsequent adjustment based on a later audit.

The Contractor's cost records pertaining to work paid for on a force account basis shall be open to inspection or audit by representatives of the County, during the life of the contract and for a period of not less than 18 months after the date of acceptance thereof, and the Contractor shall retain such records for that period. Where payment for materials or labor is based on the cost thereof to forces other than the Contractor, the Contractor expressly guarantees that the cost records of such other forces shall be open to inspection

and audit by representatives of the County on the same terms and conditions as the cost records of the Contractor. If an audit is to be commenced more than 60 days after the acceptance date of the contract, the Contractor will be given a reasonable notice of the time when such audit is to begin.

7.3.4. Payment

Payment as provided above in Sections 7.3.1 and 7.3.2 shall constitute full compensation to the Contractor for performance of work paid for on a force account basis and no additional compensation will be allowed therefore.

7.4. ACCEPTANCE

The work shall be inspected for final acceptance by the County promptly upon receipt of notice in writing from the Contractor that the completed work is ready for such inspection.

7.5. PARTIAL PAYMENTS

On or about the last day of each month, the County shall make an estimate in writing of the total amount of work done by the Contractor to the time of such estimate and the value thereof. The County shall retain 10 percent (10%) of such estimated value of the work or partial payment for the fulfillment of the contract by the Contractor. The County may, in its sole discretion, reduce the retention from 10% to 5% if, the project is more than 50% completed.

After deducting all previous payments and all sums to be kept or retained under the provisions of the contract or applicable law, the County shall make monthly progress payments to the Contractor. No such estimate or payment shall be required to be made when, in the judgment of the County, the work is not proceeding properly. No payment shall be required to be made by the County unless and until all required submittals have been delivered to the County, including but not limited to the following: certified payroll information (at a frequency specified in the Special Provisions, if project is a prevailing wage contract), construction schedule updates as listed in Section 2.2, and National Pollution Discharge and Elimination System permit requirements at frequencies as stated in Special Provisions.

In accordance with Public Contract Code Section 22300 and other applicable law, the Contractor may substitute securities for any monies withheld to ensure performance under the contract. Such substitution shall be made only upon a separate agreement between the County Board of Supervisors and the Contractor which contains terms and conditions in compliance with all laws applicable to monies withheld under the contract.

7.6. DELAYED PAYMENTS

All the monies due the Contractor under the contract will be paid by the Treasurer of the County of Riverside, prepared and approved as required by law; and it is understood that any delay in the preparation, approval and payment of these demands will not constitute a breach of the County's obligations.

7.7. FINAL PAYMENT

The County, after completion of the work, and submittal of any and all final documents or reports required by the Special Provisions, shall make a final estimate in writing to the County

Board of Supervisors of the amount of work done and the value of such work; and pursuant to order of the Board of Supervisors the County shall pay the sum found to be due after deducting therefrom all previous payments and all amounts to be kept and retained under the provisions of the contract or applicable law. All prior partial estimates and payments shall be subject to correction in the final estimate and payment. The withheld retention funds shall not be due and payable to the Contractor until the expiration of thirty-five (35) days after the date of approval by the Board of Supervisors and recordation of the notice of completion.

The Contractor agrees that no certificate given or payments made under the contract except the final payment and approval by the Board of Supervisors shall be conclusive evidence of the performance of the contract. No payment shall be construed to be an acceptance of any defective work or improper materials.

The Contractor agrees that payment of the final amount due under the contract will be withheld until the guarantee of work as required in Section 5.14 herein is accepted by the County in approved form.

The Contractor's agreement to the final payment shall release the County, including its officers, employees, agents and contractors, from any and all claims from the Contractor for further or additional compensation related to the work.

7.8. CLAIMS RESOLUTION

In accordance with Public Contract Code Section 20104 - 20104.8 and other applicable law, public works claims of \$375,000 or less which arise between the Contractor and the County shall be resolved following the statutory procedure unless the County has elected to resolve the dispute pursuant to Public Contract Code 10240 et seq.

7.8.1. Submission of Claims

All claims shall be submitted in writing and accompanied by substantiating documentation. Claims must be filed before processing of the final payment unless other notice requirements are provided in the contract. "Claim" means a separate demand by the claimant for (1) a time extension, (2) payment of money or damages arising from work done by or on behalf of the claimant and payment of which is not otherwise expressly provided for or the claimant is not otherwise entitled, or (3) an amount the payment of which is disputed by the County.

7.8.1.1. Claims Under \$50,000.00

The County shall respond in writing to the claim within 45 days of receipt of the claim, or, the County may request, in writing, within 30 days of receipt of the claim, any additional documentation supporting the claim or relating to defenses or claims the County may have. If additional information is needed thereafter, it shall be provided upon mutual agreement of the County and the claimant. The County's written response shall be submitted 15 days after receiving the additional documentation, or within the same period of time taken by the claimant to produce the additional information, whichever is greater.

7.8.1.2. Claims over \$50,000.00 but less than or equal to \$375,000.00

The County shall respond in writing within 60 days of receipt, or, may request in writing within 30 days of receipt of the claim, any additional documents supporting the claim or relating to defenses or claims the County may have against the claimant. If additional information is needed thereafter, it shall be provided pursuant to mutual agreement between the County and the claimant. The County's response shall be submitted within 30 days after receipt of the further documents, or within the same period of time taken by the claimant to produce the additional information or documents, whichever is greater.

7.8.2. Meet and Confer

If the claimant disputes the County's response, or if the County fails to respond within the statutory time period, the claimant may so notify the County within 15 days of the receipt of the response or the failure to respond, and demand an informal conference to meet and confer for settlement. Upon such demand, the County shall schedule a meet and confer conference within 30 days.

7.8.3. Filing of Claims

If following the meet and confer conference, the claim or any portion thereof remains in dispute, the claimant may file a claim pursuant to Government Code 900 et seq. and Government Code 910 et seq.

7.8.4. Mediation and Judicial Arbitration

If a civil action is filed to resolve any claim, the provisions of Public Contract Code 20104.4 shall be followed providing for nonbinding mediation and judicial arbitration.

7.8.5. Location for Filing of Claims, Jurisdiction

Any legal action related to the performance of the work or the terms of the Contract Documents shall be filed only in the Superior Court of the State of California located in Riverside, California.

8. GENERAL

8.1. COOPERATION BETWEEN CONTRACTORS

The Contractor shall fully cooperate and coordinate its work with all utility and public agency representatives engaged in construction, relocation, altering or otherwise rearranging any facilities interfering with the progress of the work, and with any other contractors working at or near the project site. Full compensation for any delay or inconvenience to the Contractor's operation due to such operations shall be considered included in the prices for the other items of work and no additional allowance will be made therefore.

8.2. INSURANCE - HOLD HARMLESS

Contractor shall not commence work under this contract until it has obtained the insurance required hereunder and satisfactory proof of said insurance has been submitted to County and has been approved as to form by County's Counsel.

Compensation Insurance - Contractor shall procure and maintain during the life of the contract Workers' Compensation Insurance as required by the State of California. Contractor shall further require each of its subcontractors to procure Workers' Compensation Insurance as required by the State while working on the project.

General Liability and Motor Vehicle Insurance - Contractor shall take out and maintain during the course of the work combined single limit liability insurance covering bodily injury and property damage insurance and blanket contractual coverage as to the work and obligations covered hereunder in an amount not less than \$1,000,000 per occurrence, \$2,000,000 aggregate, or the equivalent thereof. This policy shall name "County of Riverside and the Riverside County Waste Resources Management District and their elected or appointed officials, employees, and agents" as additional insureds, verbatim. This insurance must be modified by endorsement. This endorsement must include the following as additional insureds as respects to the work covered hereunder, "County of Riverside and the Riverside County Waste Resources Management District and their elected or appointed officials, employees, and agents", and any property owner identified in the Special Provisions where the work is conducted and any municipal corporation in which the work is to be accomplished. This insurance must not contain, as respects the work covered hereunder, any exclusions as to bodily injury or death or property damage arising out of blasting, explosion, or underground damage to wire, pipes, conduits, mains, sewers, tank tunnels or any similar property, i.e., the so-called "x c u" exclusions. The insurance certificate evidencing such insurance must affirmatively state that the insurance carrier(s) will give County thirty (30) days written notice prior to cancellation of the insurance or a reduction in coverage, must state that the "x c u" exclusions are waived or do not exist in the policy(s); and that the above stated entities are named as additional insureds.

In the alternate to naming the County of Riverside, any property owner identified in the Special Provisions where the work is conducted and any municipal corporation in which the work is to be accomplished, as additional insured, Contractor may take out and maintain during the course of the work and until acceptance by County, Owner's Protective Liability Insurance amount not less than \$1,000,000 per occurrence, \$2,000,000 aggregate covering the County of Riverside, any property owner identified in the Special Provisions where the work is conducted and any municipal corporation in which the work is to be accomplished.

The cost of this insurance shall be included in the prices bid for the various items of work and no additional compensation will be made therefore. All insurance must be provided by companies licensed to issue such insurance in the State of California.

Hold Harmless - Contractor shall hold the County, any property owner, and any municipal corporation in which the work is to be accomplished, together with the officers, agents, employees and contractors of each, free and harmless from any liability, damage, claim or action whatsoever (including but not limited to wrongful death) based or asserted upon any act or omission of Contractor, its officers, agents, employees or subcontractors, relating to or in any way connected with or arising from the accomplishment of the work; and Contractor agrees to protect and defend, including attorney fees and other expenses, each of the foregoing entities and persons in any legal action based or asserted upon any such acts or omissions.

8.3. PUBLIC UTILITIES

The locations of all pipelines, power lines, communication lines and other utility components known to County to exist within the limits of the work, are indicated on the drawings and may be the subject of a specific section in the Special Provisions. Size, location and characteristics of such utilities are based upon information made available to County, generally from the owner of the utility in question. The exactness of such information is not guaranteed but may be assumed to have been accomplished with reasonable accuracy.

In addition to the drawings and any such provision regarding utilities, Contractor is under a duty to take into account the location of service laterals or other appurtenances which can be inferred from the presence of facilities such as buildings, meter, junction boxes or similar items in or about the limits of the work.

Unless otherwise directed by the Contract Documents, all existing utilities, whether shown or described or not, shall be left in place and Contractor must conduct its operations so that such utilities are protected from damage at all times during the course of the work; and the work must be accomplished so as to give such utilities proper protection and support upon completion of the work by Contractor.

If during the course of the work, Contractor discovers underground utility components not indicated in the drawings or elsewhere in the Contract Documents, Contractor must immediately notify, in writing, the County and the utility company (public or private) involved, stating with exactness the condition found.

If Contractor encounters a utility not shown or described in the Contract Documents, Contractor shall cease all work which would disturb such utility and its support until given specific instructions as to how to proceed regarding such utility by County.

All work needed to protect existing utilities shown or described in the Contract Documents, or which can be reasonably inferred from the presence of other visible facilities, is to be done at Contractor's expense.

Contractor's cost of locating and repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating utility components and facilities not indicated in the

drawings or elsewhere in the Contract Documents, and for equipment on the project necessarily idled during such work shall be paid Contractor as Extra Work.

County may direct the Contractor to do such repair or relocation work as required. When such repair or relocation work is not elsewhere provided for in these Contract Documents, or reasonably inferred therefrom, Contractor shall be compensated for such work as Extra Work.

8.4. PROTECTION OF EXISTING STREET FACILITIES

The Contractor shall be responsible for the protection of existing signs, fences, concrete curbs, gutters and other facilities or structures. The Contractor shall be responsible to repair or replace any such items which are damaged.

Excavation within the street right of way shall be conducted in a manner to cause the least interruption to traffic. Where traffic must cross open trenches, the Contractor shall provide suitable bridges at street intersections and driveways. Hydrants under pressure, valve pipe covers, valve boxes, curb stop boxes, fire or police call boxes, or other utility controls shall be left unobstructed and accessible during construction.

8.5. DIVERSION AND CONTROL OF WATER

Unless otherwise provided in the Agreement, no separate or additional payment will be made for diversion or control of surface or groundwater. All costs incidental to maintaining dry working areas shall be the responsibility of the Contractor and shall be included in the unit prices paid for other items of work.

8.6. DUST ABATEMENT

During the performance of all work, the Contractor shall take the necessary precautions to avoid any loss or damage resulting from its operations that raise or produce dust. The Contractor will be required to have a positive and continuous method of dust control which is satisfactory to the County. The methods to be used for controlling dust in the construction area and along haul roads shall be approved by the County prior to starting any of the work. All costs incidental to dust control shall be included in the unit prices paid for other items of work.

8.7. PROJECT SIGNS

The Contractor shall erect a maximum of two project signs at the locations designated by the County. The signs will be furnished by the County. The signs shall be erected as soon as possible and within 15 days after date of Notice to Proceed. The signs are 4 feet by 8 feet in size, with two 4" x 4" x 12' posts. The sign posts shall be set 5.0 feet in good solid ground and the backfill carefully tamped into place.

8.8. EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK

The Contractor shall examine fully and carefully the site of the work, the plans, the specifications, and any other Contract Documents prior to submitting its bid. The submission of a bid shall be conclusive evidence that the Contractor has investigated the site and is satisfied as to the conditions and requirements of the work to be performed.

Where the County has made investigations of subsurface conditions in areas where work is to be performed, or in other areas, such investigations are made only for the purpose of study and design. Where such investigations have been made, bidders may, upon request, inspect the records of the County as to such investigations. The records of such investigations are not a part of the contract and are solely for the convenience of the bidders. It is expressly understood and agreed that the County assumes no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations thus made, the records thereof; or of the interpretations set forth therein or made by the County in its use thereof and there is no warranty or guarantee, either express or implied, that the conditions indicated by such investigations or records thereof are representative of those existing throughout such areas, or any part thereof, or that unlooked-for developments may not occur, or that materials other than, or in proportions different from those indicated, may not be encountered. No information derived from inspection of such records will in any way relieve the Contractor from its obligations under the Contract Documents.

9. WATERING

9.1. DESCRIPTION

This work shall include providing a water supply for all water required for the work. The application of the water shall be subject to the approval of the County at all times and shall be applied in the necessary amounts and at the necessary locations subject to the approval of the County.

At least one mobile unit of at least 1,000-gallon capacity for applying water shall be available on the project at all times.

Water for compacting embankment material and for dust control shall be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses with nozzles that will ensure a uniform application of water.

10. PUBLIC CONVENIENCE, TRAFFIC CONTROL AND DETOURS

10.1. GENERAL

The Contractor shall so conduct its operations as to offer the least possible obstruction and inconvenience to the public and it shall have under construction no greater length or amount of work than it can prosecute properly with due regard to the rights of the public.

Unless otherwise provided in the Special Provisions, all public traffic shall be permitted to pass through or near the work with as little inconvenience and delay as possible.

Spillage resulting from hauling operations along or across any public traveled way shall be removed immediately at the Contractor's expense.

Construction operations shall be conducted in such a manner as to cause as little inconvenience and annoyance as possible to abutting and nearby property owners.

Convenient access to driveways, houses and buildings along or near the work shall be maintained and temporary approaches to crossings or intersecting highways shall be provided and kept in good condition.

10.2. SIGNS

It shall be the responsibility of the Contractor to provide and maintain all traffic control, lights, barricades and signs, both on and off the site of work, subject to approval of the County; and all such devices shall be of a type approved by the County.

If, in any case, the County finds it necessary to replace, add to or erect said barricades, signs, or lights when the Contractor fails to do so, the Contractor shall be billed for all costs thereof.

10.3. MATERIALS STORAGE

Storing or stockpiling of excavated material, imported backfill material or construction materials on any street or highway will not be permitted except as approved in advance in writing by the County.



SPECIAL PROVISIONS

FOR

**LINER SYSTEM CONSTRUCTION
PHASE 2, STAGE 4**

**AT THE
LAMB CANYON SANITARY LANDFILL**

APRIL 2012

**RIVERSIDE COUNTY WASTE MANAGEMENT
DEPARTMENT**

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TABLE OF CONTENTS

SECTION 1 - GENERAL	1
1.1 INTRODUCTION	1
1.2 DEFINITION OF TERMS	2
1.3 SUMMARY OF WORK.....	5
1.4 REFERENCED SPECIFICATIONS AND DOCUMENTS	6
1.5 QUALITY ASSURANCE AND QUALITY CONTROL PLAN.....	6
1.6 PRECEDENCE OF CONTRACT DOCUMENTS	7
1.7 WORKING DAY DEFINITION.....	7
1.8 HOLIDAYS.....	7
1.9 TIME OF COMPLETION AND LIQUIDATED DAMAGES	7
1.10 SURVEY CONTROL OF WORK	9
1.11 TESTS AND INSPECTIONS.....	9
1.11.1 General.....	9
1.11.2 Earthwork Testing.....	10
1.11.3 Geosynthetic Testing.....	10
1.11.4 Pre-Approved Materials	10
1.12 LABOR SURCHARGE.....	11
1.13 EQUIPMENT RENTAL.....	11
1.14 CONSTRUCTION SCHEDULE.....	11
1.15 CONTRACTOR'S AND GEOSYNTHETIC MANUFACTURER'S QUALIFICATIONS	12
1.16 CONTRACTOR'S RESPONSIBILITIES.....	13
1.17 SITE SAFETY PLAN.....	14
1.18 ENVIRONMENTAL REQUIREMENTS.....	16
1.18.1 General Requirements	16
1.18.2 Seasonal Restriction	18
1.19 PERMITS.....	18
1.19.1 Notification to South Coast Air Quality Management District (SCAQMD) Under Rule 403, Fugitive Dust Control.....	18
1.19.2 State Water Quality Control Board's National Pollution Discharge and Elimination System (NPDES) Permit.....	19
1.20 DETAIL DRAWINGS AND SUBMITTALS	19
1.21 STORAGE OF MATERIALS	20
1.22 EQUIPMENT STAGING AREA.....	20
1.23 SUSPENSION AND RESUMPTION OF OPERATIONS.....	21
1.24 DIVERSION AND CONTROL OF WATER	21
1.25 DUST ABATEMENT.....	22
1.26 WATER SUPPLY	22
1.27 PROTECTION OF ADJACENT LANDFILL OPERATIONS.....	23
1.28 AS-BUILT PROJECT DRAWINGS.....	23
1.29 UNITS OF MEASUREMENT	23
SECTION 2 - MOBILIZATION AND DEMOBILIZATION	24
2.1 GENERAL	24
2.2 MATERIALS.....	24
2.3 EXECUTION.....	24
2.4 MEASUREMENT AND PAYMENT	25
SECTION 3 - STORM WATER POLLUTION PREVENTION & HAZARDOUS MATERIALS MANAGEMENT	26
3.1 GENERAL	26
3.1.1 References.....	26
3.2 SUBMITTALS	28
3.2.1 Storm Water Pollution Prevention Plan and Inspection Forms.....	28
3.2.2 Hazardous Materials Business Emergency Plan and Inspection Forms	28

3.2.3	Schedule of Values	29
3.3	EXECUTION	29
3.3.1	Storm Water Pollution Prevention	29
3.3.2	Hazardous Materials Management	30
3.4	MEASUREMENT AND PAYMENT	32
SECTION 4 - EARTHWORK.....		35
4.1	GENERAL	35
4.1.1	References	35
4.1.2	Quality Assurance/Quality Control	35
4.2	MATERIALS.....	36
4.3	EXECUTION.....	36
4.3.1	General Subgrade Preparation.....	36
4.3.2	Demolition and Disposal of Miscellaneous Structures	37
4.3.3	Excavation	37
4.3.4	Over-excavation.....	41
4.3.5	Engineered Fill	42
4.3.6	Landfill Access Ramp.....	43
4.3.7	Low-Permeability Layer	43
4.3.8	Earthen Berms	47
4.3.9	Protection of Groundwater Wells	47
4.4	MEASUREMENT AND PAYMENT	47
SECTION 5 - FINISHED SUBGRADE SURFACE PREPARATION FOR GEOSYNTHETICS.....		53
5.1	GENERAL	53
5.1.1	References.....	53
5.1.2	Quality Assurance/Quality Control	53
5.2	MATERIALS.....	53
5.3	EXECUTION.....	53
5.4	MEASUREMENT AND PAYMENT	54
SECTION 6 - ANCHOR TRENCH CONSTRUCTION.....		55
6.1	GENERAL	55
6.1.1	References.....	55
6.2	MATERIALS.....	55
6.3	EXECUTION.....	55
6.3.1	Excavation	55
6.3.2	Anchor Trench Requirements.....	56
6.3.3	Securing of FML, GCL, and Geotextile	56
6.3.4	Backfill and Compaction.....	56
6.4	MEASUREMENT AND PAYMENT	57
SECTION 7 - GEOSYNTHETIC CLAY LINER (GCL)		58
7.1	GENERAL	58
7.1.1	References.....	58
7.1.2	Submittals	59
7.1.3	QA/QC	60
7.1.4	Safety.....	61
7.1.5	Product Labeling	61
7.1.6	Packaging	61
7.1.7	Delivery, Storage and Handling	61
7.2	MATERIALS.....	62
7.3	EXECUTION.....	64
7.3.1	Inspection.....	64
7.3.2	Installation.....	64
7.3.3	Field Quality Control.....	66

7.4	MEASUREMENT AND PAYMENT	68
SECTION 8 - FLEXIBLE MEMBRANE LINER (FML).....		69
8.1	GENERAL	69
8.1.1	References.....	69
8.1.2	Submittals	71
8.1.3	QA/QC.....	72
8.1.4	Safety.....	73
8.1.5	Delivery, Storage and Handling	73
8.2	MATERIALS.....	74
8.2.1	FML Resin	74
8.2.2	FML Rolls.....	74
8.3	EXECUTION.....	81
8.3.1	Inspection.....	81
8.3.2	Installation.....	81
8.3.3	Field Quality Control.....	84
8.3.4	Anchor Trench Construction.....	87
8.4	MEASUREMENT AND PAYMENT	88
SECTION 9 - GEOTEXTILES.....		89
9.1	GENERAL	89
9.1.1	References.....	89
9.1.2	Submittals	90
9.1.3	QA/QC.....	91
9.1.4	Safety.....	91
9.1.5	Delivery, Storage and Handling	91
9.2	MATERIALS.....	92
9.3	EXECUTION.....	93
9.3.1	Inspection.....	93
9.3.2	Installation.....	93
9.3.3	Field Quality Control.....	95
9.4	MEASUREMENT AND PAYMENT	95
SECTION 10 - TEMPORARY PROTECTIVE MEMBRANE		97
10.1	GENERAL	97
10.1.1	References.....	97
10.1.2	Safety.....	97
10.1.3	Delivery, Storage and Handling	97
10.2	MATERIALS.....	98
10.3	EXECUTION.....	98
10.4	MEASUREMENT AND PAYMENT	99
SECTION 11 - LEACHATE COLLECTION AND REMOVAL SYSTEM.....		100
11.1	SUBMITTALS	100
11.2	MATERIALS.....	100
11.2.1	HDPE Pipes.....	100
11.2.2	HDPE Fittings	102
11.2.3	Flanges	102
11.2.4	Corrugated Metal Pipe (CMP) Casing.....	102
11.2.5	Concrete Pipe Encasement	102
11.2.6	Drainage Layer.....	102
11.3	EXECUTION.....	103
11.3.1	Leachate Collection System Pipe Placement	103
11.3.2	Removal of Existing Leachate Storage System & Installation of Temporary Leachate Storage System	104
11.3.3	Construction of Drainage Layer	105

11.3.4	Geotextile Placement	106
11.3.5	Inspection.....	106
11.4	MEASUREMENT AND PAYMENT	107
SECTION 12 - LEACHATE AND GAS CONDENSATE CONTAINMENT (LGCC) STRUCTURE		109
12.1	GENERAL	109
12.2	SUBMITTALS	109
12.2.1	Structural Analysis Report for LGCC.....	109
12.2.2	LGCC Reinforced Concrete, Structural Components and Accessories	111
12.2.3	HDPE Storage Tanks.....	111
12.2.4	Flow and Tank Level Monitoring System.....	112
12.3	MATERIALS.....	113
12.3.1	Reinforced Concrete	113
12.3.2	Roof Structure.....	113
12.3.3	HDPE Storage Tanks.....	117
12.3.4	Stairway.....	119
12.3.5	Concrete Epoxy Coating.....	119
12.3.6	Clamp-On Ultrasonic Flow Meters	120
12.3.7	Solar Panel Battery Charging System.....	120
12.3.8	Enclosures and Pipe/Conduit Supports	120
12.3.9	Electrical /Sensor Cabling and Conduit	120
12.4	EXECUTION.....	121
12.4.1	Construction of LGCC Reinforced Concrete Structure, Removable Roof, and Stairway Systems	121
12.4.2	HDPE Piping	121
12.4.3	Chain-Link Fencing.....	121
12.4.4	Reinstallation of Existing Tank and New Tanks Installation	121
12.4.5	Ultrasonic Flow Meter and Ultrasonic Tank Level Monitoring System	122
12.5	MEASUREMENT AND PAYMENT	122
12.5.1	Structural Analysis Report.....	122
12.5.2	Construct Leachate and Gas Condensate Containment Structure.....	122
12.5.3	New 10,000 Gallon Storage Tanks and Related Accessories.....	122
12.5.4	Construct Leachate and Gas Condensate Containment Structure.....	123
SECTION 13 - PROTECTIVE SOIL LAYER CONSTRUCTION.....		124
13.1	GENERAL	124
13.2	MATERIALS.....	124
13.3	EXECUTION.....	124
13.4	MEASUREMENT AND PAYMENT	125
SECTION 14 - ASPHALT STRUCTURES		127
14.1	GENERAL	127
14.2	SUBMITTALS	127
14.3	MATERIALS.....	127
14.4	EXECUTION.....	128
14.5	MEASUREMENT AND PAYMENT	130
SECTION 15 - REINFORCED CONCRETE STRUCTURES.....		132
15.1	GENERAL	132
15.1.1	Summary.....	132
15.1.2	References.....	132
15.1.3	Protection	133
15.2	SUBMITTALS	133
15.2.1	Structural Concrete and Shotcrete.....	133
15.2.2	Concrete Reinforcing Steel	134

15.2.3	Conduit and Pipe Penetrations	134
15.2.4	Concrete Curing Compounds	134
15.3	MATERIALS	134
15.3.1	Structural Concrete	134
15.3.2	Reinforced Shotcrete	135
15.3.3	Forms	136
15.3.4	Expansion Joints	136
15.3.5	Reinforcement	136
15.3.6	Patching	136
15.3.7	Curing Compound	136
15.3.8	Conduits	136
15.4	EXECUTION	137
15.4.1	Structural Concrete	137
15.4.2	Reinforced Shotcrete Drainage Structures	138
15.4.3	Sequencing and Scheduling	139
15.4.4	Forms	139
15.4.5	Expansion Joints and Control Joints	140
15.4.6	Reinforcement	140
15.4.7	Special Requirements	140
15.4.8	Conduits and Pipe Penetrations	140
15.4.9	Curing Compound	141
15.4.10	Concrete Finishes	141
15.4.11	Concrete Tolerances	141
15.4.12	Clean up	142
15.4.13	Defective Concrete	142
15.5	TESTING	142
15.6	MEASUREMENT AND PAYMENT	143
SECTION 16 - CLASS II AND CRUSHED AGGREGATE BASE		144
16.2	SUBMITTALS	144
16.3	MATERIALS	144
16.4	EXECUTION	144
16.5	MEASUREMENT AND PAYMENT	145
SECTION 17 - DRAINAGE STRUCTURES		146
17.1	GENERAL	146
17.2	20-MIL LINEAR LOW DENSITY POLYETHYLENE (LLDPE) DRAINAGE STRUCTURES	146
17.2.1	Submittals	146
17.2.2	Materials	146
17.2.3	Execution	147
17.2.4	Measurement and Payment	148
17.3	GROUTED RIP-RAP	149
17.3.1	Submittals	149
17.3.2	Materials	149
17.3.3	Execution	149
17.3.4	Measurement and Payment	150
17.4	CORRUGATED METAL FLUME INLETS AND DOWN DRAINS	151
17.4.1	Submittals	151
17.4.2	Materials	151
17.4.3	Execution	151
17.4.4	Measurement and Payment	151
17.5	CORRUGATED METAL PIPE (CMP) DROP INLET	153
17.5.1	Submittals	153
17.5.2	Materials	153
17.5.3	Execution	153
17.5.4	Measurement and Payment	154

17.6	BASIN STEEL PIPE RISERS	155
17.6.1	Materials	155
17.6.2	Execution	157
17.6.3	Measurement and Payment	157
17.7	POLYVINYL CHLORIDE (PVC) PIPE, FITTINGS, AND JOINT RESTRAINTS FOR BASIN OUTLETS.....	158
17.7.1	Submittals	158
17.7.2	Materials	158
17.7.3	Execution	159
17.7.4	Measurement and Payment.....	162
17.8	GABION BASKETS	163
17.8.1	Submittals	163
17.8.2	Materials	163
17.8.3	Execution	163
17.8.4	Measurement and Payment.....	164
17.9	TRASH RACKS.....	165
17.9.1	Submittals	165
17.9.2	Materials	165
17.9.3	Execution	165
17.9.4	Measurement and Payment.....	166
17.10	BASIN SKIMMER	167
17.10.1	Submittals	167
17.10.2	Materials	167
17.10.3	Execution	168
17.10.4	Measurement and Payment.....	168
17.11	COIR MAT	169
17.11.1	Submittals	169
17.11.2	Materials	169
17.11.3	Execution	169
17.11.4	Measurement and Payment.....	169

SECTION 18 - CORRUGATED AND SMOOTH-LINED HIGH DENSITY POLYETHYLENE (HDPE) DRAINAGE PIPE AND APPURTENANCES.....170

18.1	GENERAL	170
18.1.1	References	170
18.1.2	Safety.....	171
18.2	HDPE PIPE AND FITTINGS	171
18.2.1	Submittals	171
18.2.2	Materials	172
18.2.3	Execution	173
18.2.4	Measurement and Payment.....	179
18.3	MANHOLES	180
18.3.1	Submittals	180
18.3.2	Materials	180
18.3.3	Execution	181
18.3.4	Measurement and Payment.....	182
18.4	REINFORCED CONCRETE DRAINAGE TRENCH INLETS, BOXES, AND HEADWALLS.....	184
18.4.1	Submittals	184
18.4.2	Materials.....	184
18.4.3	Execution	185
18.4.4	Measurement and Payment.....	185
18.5	ENERGY DISSIPATOR IMPACT BASIN	186
18.5.1	Submittals	186
18.5.2	Materials.....	186
18.5.4	Measurement and Payment.....	186

SECTION 19 - MISCELLANEOUS ITEMS	187
19.1 GENERAL	187
19.2 FIBER ROLLS	187
19.2.1 Submittals	187
19.2.2 Materials.....	187
19.2.3 Execution	187
19.2.4 Measurement and Payment.....	188
19.3 RUMBLE RACKS	189
19.3.1 Submittals	189
19.3.2 Materials.....	189
19.3.3 Execution	189
19.3.4 Measurement and Payment.....	189
19.4 ECCENTRIC PLUG AND BALL VALVES.....	190
19.4.1 Submittals	190
19.4.2 Materials.....	190
19.4.3 Execution	190
19.4.4 Measurement and Payment.....	191
19.5 THERMOPLASTIC STRIPING	192
19.5.1 Submittals	192
19.5.2 Materials.....	192
19.5.3 Execution	193
19.5.4 Measurement and Payment.....	196
19.6 CHAIN LINK	197
19.6.1 Submittals	197
19.6.2 Materials.....	197
19.6.3 Execution	198
19.6.4 Measurement and Payment.....	199
19.7 K-RAIL BARRIERS.....	200
19.7.1 Submittals	200
19.7.2 Materials.....	200
19.7.3 Execution	200
19.7.4 Measurement and Payment.....	200

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**SPECIAL PROVISIONS
FOR THE
LINER SYSTEM CONSTRUCTION
PHASE 2, STAGE 4
AT THE
LAMB CANYON SANITARY LANDFILL**

SECTION 1 - GENERAL

1.1 INTRODUCTION

These Special Provisions are for the construction of a geosynthetic liner system at the Lamb Canyon Sanitary Landfill in Riverside County, California. This project is designated as "Liner System Construction within Phase 2, Stage 4 Area at the Lamb Canyon Sanitary Landfill" (Project).

The main items of work required by this Project shall include but are not limited to: construction of side-slope and canyon floor geosynthetics liner system, leachate collection and recovery system (LCRS) installation, structural design and construction of a leachate and condensate containment facility, earthwork (excavation of approximately 1.6 million cubic yards of native soil, stockpiling of this excavated material onsite or conducting an optional offsite dirt haul, and placement of 335,000 cubic yards of engineered fill). Other work items required by this project include, but are not limited to, screening and placement of protective soil material, construction of an asphalt roadway, rehabilitation of an existing asphalt roadway, construction of a surface drainage and erosion control system that consists of concrete, asphalt, and LDPE-lined drainage structures, HDPE Corrugated Storm Drain Pipe, metal flumes, grouted rip-rap, earthen diversion berms, fiber rolls, and construction of a basin; and the implementation of Storm Water Pollution Prevention Plan (SWPPP) and Hazardous Material Business Emergency Plan (HMBEP) throughout the entire duration of the project. All work to be implemented under this contract shall consist of furnishing equipment, superintendence, labor, skills, materials, and all other items necessary for the execution of the Project and shall conform to the Contract Documents for this Project.

The Contractor shall be aware that the Lamb Canyon landfill is an active landfill site. The Contractor's work relating to the project shall not impede or interrupt daily landfill operations. Full cooperation of the Contractor and its forces is required to assure safe working conditions. Therefore, it is necessary to emphasize that the County will have full authority to eject any of the Contractor's employees or subcontractors who do not immediately abide by the landfill site rules or the directions of the County.

1.2 DEFINITION OF TERMS

Bentonite

This term is defined as high-swelling clay material. More specifically, Sodium Bentonite.

Cubic Yard

Unless otherwise specified in these specifications, where the term cubic yard appears it shall mean bank (bulk) volume in the case of excavation; and compacted volume yielding the specified relative compaction, moisture content, and hydraulic conductivity, if required, in the case of engineered fill.

Drainage Layer

This term is defined as a layer of gravel material with a hydraulic conductivity equal to or greater than 0.1 cm/sec, designed to intercept leachate percolating through the landfill.

Flexible Membrane Lining (FML)

An essentially impermeable synthetic material used as an integral part of a lining system. It is sometimes referred to as a geomembrane sheet or panel.

Geosynthetics

Geosynthetics is a generic classification given to synthetic (man-made plastic and/or liner) materials that are used for geotechnical engineering applications. Materials included are: drainage mats, flexible membrane linings (FML), geotextiles, geonets, geogrids, geocomposites, geosynthetic clay liners (GCL) and geocells. For this project, Geosynthetics refers to FML, GCL, and geotextile.

Geosynthetic Clay Liner (GCL)

GCL is a factory-manufactured hydraulic barrier consisting of bentonite clay and supported by geotextiles which are held together by needling, stitching or adhesives.

Geosynthetic Quality Assurance Laboratory

The firm responsible for conducting tests such as conformance testing and testing of field seams for peel and shear on geosynthetic samples taken from the site. The laboratory shall be independent of the Owner, Manufacturer, Lining Contractor, and any party involved with the manufacture and/or installation of any of the Geosynthetics.

Geotextile

A permeable synthetic textile used as a filter or cushion layer against soil, rock, sand, gravel or any other similar materials, and forming an integral part of the lining system.

HDPE

HDPE is the high-density polyethylene material used in the manufacturing of piping and flexible membrane liners.

Leachate

This term is defined as liquid that has come in contact with or percolated through waste materials.

LLDPE

LLDPE is linear low-density polyethylene material (20-mil) used in the manufacturing of flexible membrane liners.

Leachate Collection and Removal System (LCRS)

LCRS is a system that collects and removes leachate. It also controls leachate head within the liner system during landfill operation.

Manufacturer

A manufacturer is the firm or firms responsible for the production of Geosynthetics or the maker, fabricator, or producer of a product and/or material.

Minimum Average Roll Value (MARV)

The minimum average roll value of a particular physical property of a material for 95 percent of all the material in the lot.

Moisture Content

This term is defined as the percentage of water contained in a soil, clay or bentonite mixture in relation to its dry weight, using ASTM D2216 or ASTM D4643.

Optimum Moisture Content (OMC)

This term is defined as the moisture content that corresponds to the maximum dry density, as determined by the specified laboratory Moisture Density Relationship Test, ASTM D1557.

Overlap

Where two adjacent geosynthetic panels contact, this term is defined as the shortest distance measured from the overlying edge of one panel to the underlying edge of the other.

Protective Soil Layer

This term is defined as a soil layer that overlies the drainage layer or geotextile and comes into direct contact with placed waste. This term is also referred to as the Operation Layer.

Relative Compaction

This term is defined as the ratio of field compacted dry density to the maximum dry density as determined by the Moisture Density Relationship Test, ASTM D1557.

Side-Slope Liner

This term is defined as geosynthetic clay liner (GCL), high-density polyethylene flexible membrane liner (HDPE-FML), and Geotextile, which creates part of the landfill lining system.

Sieve Sizes

These are defined as U.S. Standard sieve sizes.

Slope

Slope is described in terms of horizontal distance to vertical distance (H:V) where V is generally fixed as unity. It is also expressed as a percent (%) equal to the vertical distance divided by the horizontal distance, and multiplied by 100.

Subgrade

This term refers to native, engineered fill, or constructed stable base material, on which all construction elements of this project shall be placed.

Quality Assurance/Quality Control (QA/QC) Consultant

The QA/QC Consultant is the consultant contracted by the County responsible for the implementation of the construction QA/QC Plan. It may also mean a Senior QC Monitor temporarily designated by the QA/QC Consultant to act on its behalf at the site during operations. The QA/QC Consultant shall be responsible for review of all manufacturer/subcontractor certifications and documentation and for review of observation, sampling, and testing activities for construction.

Quality Assurance (QA) Monitors

The QA Monitors are the individuals working under the direction of the QA/QC Consultant. Such personnel include Field Engineers, Field Geologists, and Technicians.

Project Manager

The Project Manager is the designated representative of the County responsible for the project.

Resident Engineer

The Resident Engineer will serve as the Project Manager's on-site representative. All coordination, reporting, and issues related to non-compliance will be directed to the Project Manager through the Resident Engineer. In addition, the Resident Engineer will participate with the Project Manager and QA/QC Manager in all decisions related to design and QA/QC issues which arise during the course of construction.

Contractor's Surveyor

The Contractor's Surveyor is responsible to perform horizontal and vertical control of the actual construction, based on benchmarks established by County's Surveyor.

County's Surveyor

Surveyor representing the County shall establish reference benchmarks for construction. County's Surveyor shall also perform surveys to check line, grade, and calculate volumes, as required.

Temporary Protective Membrane

A relatively thin polyethylene sheet installed as a protective layer over side slope liner to protect against UV degradation.

1.3 SUMMARY OF WORK

The work to be performed by the contractor under this contract includes furnishing all labor, materials, vehicles, tools, equipment, power, and incidentals necessary for the construction of the Project. The items of work to be performed shall conform to all of the Contract Documents, including but not limited to the General Provisions, Project Drawings, Referenced Specifications and Documents, and these Special Provisions.

The major features of the work to be performed shall include, but are not limited to:

- A. Provide Project Survey
- B. Remove and dispose or salvage of existing structures including but not limited to, asphalt roadway, drainage structures, portions of LCRS, and other miscellaneous items.
- C. Erosion control and storm water protection (NPDES permit requirements)
- D. Hazardous materials controls and cleanup (HMBEP requirements)
- E. Earthwork (excavation, over-excavation, on-site stockpiling or optional off-site dirt haul, and placement of engineered fill as shown on the Project Drawings)
- F. Construction of a 12-inch thick low permeability layer, including screening of the on-site clay stockpile material to a 1-inch maximum particle size
- G. Fine grading the liner subgrade to the lines and grades shown on the Project Drawings and prepare the finished surface to receive Geosynthetics
- H. Installation of geosynthetic clay liner (GCL)
- I. Installation of high density polyethylene (HDPE) liner
- J. Construction of drainage layer
- K. Installation of geotextile fabric
- L. Construction of Leachate Collection and Removal System (LCRS),
- M. Structural design and construction of leachate and condensate containment facility
- N. Screening and placement of protective soil layer
- O. Installation of a temporary protective membrane on side slope liner
- P. Construction of surface drainage control system and paved access roads
- Q. Construction of underground storm drain system
- R. Rehabilitation of existing asphalt roadway

- S. Construction of a sedimentation basin including outlet piping, skimmer, and spillway structure.

1.4 REFERENCED SPECIFICATIONS AND DOCUMENTS

The following specifications and documents shall apply as specifically referenced in the Contract Documents:

Standard Specifications

The term Standard Specifications is a direct reference to the publication entitled "Standard Specifications for Public Works Construction" (2012 edition, and all subsequent amendments, supplements, and additions) written and promulgated by the Joint Cooperative Committee of the Southern California Chapter American Public Works Association and Southern California Departments Associated General Contractors of California. This publication is also known as the "Green book."

State Standard Specifications

The "State Standard Specifications" are the Standard Specifications of the State of California, Department of Transportation, 2010 edition.

ASTM Specifications

The latest revised specifications or tentative specifications of the American Society for Testing and Materials.

Standard Drawings

Unless otherwise noted on the Project Drawings, the Standard Drawings shall be those of the Riverside County Flood Control and Water Conservation District, the Riverside County Transportation Department and Standard Plans of the State Department of Transportation (Caltrans).

Plans or Project Drawings

The Plans or Drawings are the contract Project Drawings specifically prepared for this project.

1.5 QUALITY ASSURANCE AND QUALITY CONTROL PLAN

The Quality Assurance and Quality Control Plan (QA/QC Plan) for the Liner System Construction of Phase-2, Stage-4 at the Lamb Canyon Landfill, is provided as **Appendix A** to these contract documents. Payment for complying with all requirements of the QA/QC Plan shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.6 PRECEDENCE OF CONTRACT DOCUMENTS

In case of conflict between the Contract Documents, the following order of governing documents shall be followed (with the first listed document controlling):

- A. Permits from other agencies as may be required by law
- B. Quality Control/Quality Assurance Plan (QA/QC Plan)
- C. Special Provisions
- D. General Provisions
- E. Project Drawings (specific details supersede general plan)
- F. Standard Drawings
- G. Standard Specifications
- H. State Standard Specifications

1.7 WORKING DAY DEFINITION

Unless otherwise approved in writing by the County, the working day shall be as set forth in Section 6.6 of the General Provisions. The length of each working day shall be from 7:00 AM to 3:30 PM, including half hour for lunch break, Monday through Friday.

1.8 HOLIDAYS

The Contractor shall not be permitted to work on the following days designated by the County as holidays:

July 4, 2012	Independence Day
September 3, 2012	Labor Day
October 8, 2012	Columbus Day
November 12, 2012	Veteran's Day
November 22, 2012	Thanksgiving Day
November 23, 2012	Friday following Thanksgiving Day
December 24, 2012	Monday prior to Christmas Day
December 25, 2012	Christmas Day
December 31, 2012	Monday prior to New Year's Day
January 1, 2013	New Year's Day
January 21, 2013	Martin Luther King, Jr. Day
February 11, 2013	Lincoln's Day
February 18, 2013	Washington's Day
May 27, 2013	Memorial Day

1.9 TIME OF COMPLETION AND LIQUIDATED DAMAGES

The Contractor shall diligently and continuously prosecute the entire project to final completion before the expiration of one hundred eighty (180) working days from the date of the Contractor's receipt of the Notice to Proceed. In addition, in order to

minimize disruption to landfill traffic and operation, the Contractor shall complete all construction work required under Bid Item No.59 "Asphalt Roadway Rehabilitation", and Bid Item No.61 "Construct Thermoplastic Striping" within ten (10) consecutive working days. The roadway rehabilitation work, including striping, shall not commence until after all major material deliveries for this project have been completed. Material deliveries shall include, but are not limited to, all Geosynthetic liner materials, concrete, asphalt, base, pipes, tanks, rip rap stones, and k-rails. In addition, if the Contractor intends to export excavated material offsite, the offsite haul operation must be completed prior to starting the asphalt roadway rehabilitation work.

In case the work called for and all the conditions and requirements of the Contract Documents are not completed within the number of working days specified above, liquidated damages of Twenty Five Hundred Dollars (\$2,500) per day for each additional working day required to properly complete the work in excess of the allowed number of working days shall be paid by the Contractor to the County. The County may also deduct this amount from payments due to the Contractor. The liquidated damages assessments shall apply to both the final completion date of the project (180 working days) and also to the 10 consecutive working day requirement for the Asphalt Roadway Rehabilitation and Thermoplastic Striping.

The County may incur very significant financial damages if this project is not completed by the Contractor within this time limit, especially if the landfill reaches maximum allowed interim capacity and waste must be diverted to other landfill sites. The Contractor must be aware that this is a real possibility if the project is not completed by the Contractor within this time limit. For this reason, if the work continues beyond the initial 20 working days following the final completion date for the project (180 working days), then liquidated damages shall increase to **Five Thousand Dollars (\$5,000)** per day for each additional calendar day required to complete the work.

The Contractor shall suspend construction operations when, in the County's opinion, the conditions for such operations are unsatisfactory due to rain, wind, or any other reason that interferes with the Project work. The Contractor shall not be compensated monetarily for any such delays caused by the suspension of operations. Working days shall be charged as appropriate in accordance with the Contract Documents.

Whenever operations have been suspended, the effect of rain, wind, or other adverse conditions shall be assessed by the County before approval to resume construction is given. Equipment will not be allowed to travel on the landfill site until the ground has dried sufficiently to prevent excessive rutting and to allow the equipment to be operated satisfactorily. If rutting occurs, the Contractor shall re-level, scarify, and re-compact the materials to whatever depth is required to repair the damage in accordance with the appropriate specifications described herein or to pre-existing conditions at the Contractor's expense. If temporary access and internal haul roads need repair, the Contractor shall repair them as required at the Contractor's expense.

1.10 SURVEY CONTROL OF WORK

The County surveyors will establish external primary survey control points on firm ground outside the limits of the work to be used throughout the construction period for the Contractor's work. Survey control is shown on the Project Drawings. In addition, the County surveyors will make verification surveys as various stages of the work are completed and survey for preparation of pay quantities. The Contractor's surveyor is responsible for setting line and grade for the earthwork and any other related construction activities. The Contractor's surveyors are also responsible for ensuring that all construction conforms to the requirements of the Contract Documents, and for surveying for as-built Project Drawings as required in Section 1.28 of the Special Provisions.

The Contractor shall provide County representatives with access to the completed portions of the work before they are covered by subsequent construction to allow County representatives to verify that all construction conforms to the requirements of the Contract Documents. The Contractor shall therefore provide notice to the County **at least two (2) working days** prior to the time the respective areas will be ready for verification surveys, and **at least one (1) working day** for the survey work or any other inspection to be completed.

Major construction items requiring verification include but are not limited to:

- A. Project Subgrade
- B. Top of the low-permeability layer within the canyon floor area
- C. Location and extent of Geosynthetics
- D. Limits of drainage and protective soil layers
- E. Project alignments including but not limited to LCRS pipes and trenches
- F. Drainage structures
- G. Other miscellaneous surveys as deemed necessary by the County.

1.11 TESTS AND INSPECTIONS

1.11.1 GENERAL

The Contractor shall comply with requests by the County or QA/QC Consultant to alter the work sequence or uncover materials to facilitate testing, inspection, or observation, or for the collection of samples or data. The Contractor shall provide the County and QA/QC Consultant with safe and suitable access to the work area for testing, inspection, or observation. **The Contractor is required to submit all materials at least two (2) weeks before they are scheduled to be integrated into the project**, in order to give the County and QA/QC Consultant adequate time to review, test, and approve the materials.

It is understood that observation and testing of a material at the time of its incorporation into the work shall in no way be considered as a guarantee of continued

acceptance of material presumed to be similar to that upon which observations and tests have been made, and that observation and testing performed by the County and QA/QC Consultant shall not relieve the Contractor or its suppliers of the responsibility for quality control or to fully comply with the requirements of the Contract Documents.

1.11.2 EARTHWORK TESTING

Earthwork testing shall be performed by the QA/QC Consultant in accordance with the QA/QC Plan. If testing indicates that any area of a completed layer does not meet the specifications, the Contractor shall perform corrective action; followed by retesting of the same area by the QA/QC Consultant in accordance with the QA/QC Plan. The Contractor shall remove, re-work, and bring into compliance any area that the County or QA/QC Consultant consider to be unsatisfactory. The area shall be restored to the complete satisfaction of the County and QA/QC Consultant. The Contractor shall be solely responsible for any and all costs and delays associated with and resulting from any required re-working of a soil layer due to non-compliance. Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.11.3 GEOSYNTHETIC TESTING

Geosynthetic testing shall be performed by an independent testing laboratory in accordance with the QA/QC Plan. However, the Contractor shall be responsible for performing field testing on the Geosynthetics under the observation of the QA/QC Consultant. The Contractor's finished product shall meet or exceed all the required parameters and specifications listed in the Contract Documents. Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.11.4 PRE-APPROVED MATERIALS

Materials to be used in the work shall be subject to observation and testing by the County and the QA/QC Consultant, or by an agency or laboratory approved by the County. The Contractor shall furnish, without charge, any samples that may be requested or required for testing. The Contractor shall submit all materials two (2) weeks before they are scheduled to be integrated into the project, in order to give the County and QA/QC Consultant adequate time to review, test, and approve the materials.

Manufacturers' warranties, guarantees, instruction sheets, and parts lists that are furnished with materials used in construction shall be delivered to the County before the respective items are incorporated into the work. Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.12 LABOR SURCHARGE

Attention is directed to the provisions of Section 7.3.1.1.2. of the General Provisions. The labor surcharge percentage to be applied to the regular hourly wages paid as defined in Section 7.3.1.1. shall be thirteen percent (13%). The labor surcharge percentage to be applied to the overtime hourly wages paid as defined in Section 7.3.1.1. shall be twelve percent (12%).

1.13 EQUIPMENT RENTAL

Attention is directed to the provisions of Section 7.3.1.3, of the General Provisions. The equipment rental rates to be applied shall be the rates that are in effect at the time of the award of the contract, as published by the California Department of Transportation. A copy of said equipment rental rates is on file at the County office.

1.14 CONSTRUCTION SCHEDULE

Upon receipt of the Notice to Proceed, or at an earlier time if mutually agreed upon, the County shall arrange a pre-construction meeting to be attended by the County, the QA/QC Consultant, the Contractor's Project Manager and Project Superintendent, major subcontractors, the State of California Regional Water Quality Control Board, Santa Ana Region staff and other individuals involved in the execution of the work. During the pre-construction meeting the *Contractor shall be issued six (6) complete copies of the Contract Documents* (which includes six full-sized sets of Project Drawings and six half-sized sets of Project Drawings). The cost of any additional requested copies shall be deducted from payment to the Contractor.

Within **five (5) business days** of the award of contract by the Riverside County Board of Supervisors, or sooner, the Contractor shall prepare and submit to the County a construction schedule including but not limited to the following: task description, task start and end dates, percent completion, task relationships (predecessors and successors), work hours, and sequence of construction.

The construction schedule shall be prepared by using either Microsoft Office Project 2003 software (or a later version) or an equivalent computer application, and shall be updated by the Contractor bi-weekly and each time a change in work occurs that will delay a critical path item of the project. Each updated schedule shall be submitted to the County in two format, digitally and hard copy, for review and acceptance. The updated schedule shall show the actual progress of work and the work remaining. Progress payments will be withheld by the County if the Contractor fails to provide acceptable schedules as required.

The Contractor shall be responsible for the coordination and cooperation of all subcontractors, material suppliers, utilities, and any required testing agencies, so that all components are properly integrated into the construction, and so there are no resulting delays in the progress of the project. The Contractor shall be responsible for cooperating with all County and QA/QC Consultant staff. Payment for complying with this section

shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.15 CONTRACTOR'S AND GEOSYNTHETIC MANUFACTURER'S QUALIFICATIONS

The Contractor and its geosynthetics lining subcontractor shall have successfully installed at liquid/solid waste containment facilities a minimum of two (2) million square feet of GCL materials, and a minimum of four (4) million square feet each of HDPE lining materials and geotextile material. These qualification requirements shall also apply to either the Contractor's superintendent or its geosynthetics lining subcontractor's superintendent.

The Manufacturer(s) of each type of geosynthetic material specified in these Special Provisions shall have successfully manufactured ten (10) million square feet each of GCL material, HDPE lining material, and geotextile material, of which at least eight (8) million square feet of each type shall have been successfully installed in liquid/solid waste containment facilities.

The Contractor or its subcontractor shall be experienced in constructing corrugated high density polyethylene (HDPE) pipe systems (storm drain and/or sewer), and shall demonstrate the successful completion of at least five (5) piping projects of similar scope and value involving corrugated HDPE pipes within the last five (5) year period. Corrugated HDPE pipe subcontractor shall have a valid Class A and/or Class C34 Contractor license from the State of California.

With the submittal of the Bid Proposal, the Contractor shall submit for approval by the County documented evidence of satisfaction of all of the aforementioned qualifications.

The evidence must address manufacturing capabilities and the name and experience of the project superintendent and senior installation personnel that will be responsible for the installation of each type of geosynthetic. As part of this submittal, a project reference list shall be provided indicating, as a minimum, the name, address and phone number of the owner and the owner's representative, the location of the project, the amount of material installed and completion date.

The Contractor shall have, or be able to obtain, all the personnel, equipment, and materials necessary to perform the work specified in the scope of work, and be able to keep the needed equipment at the job site for the duration of the work. The bidder may meet these requirements by using subcontractors, or forming a partnership, joint venture, or other legal arrangement. If the qualifications are met by the formation of a partnership, joint venture or other legal arrangement; then each separate legal entity shall be required to sign the contract and accept joint and several liabilities. The Contractor, or the Contractor's personnel shall hold appropriate certificates, licenses, and permits necessary to perform the work described in the scope of work.

The Contractor shall present all licenses held, the certificate numbers, and in whose name the license is issued in his bid response. The Contractor shall demonstrate prior

experience in performing and completing earthwork construction projects in his bid response. Prior work performed by the Contractor shall include mass excavation, placement of fill, installation of pipelines, and fabrication of mechanical components. In the Contractor Proposal, the Contractor shall present specific projects, dates, locations, clients, project costs, a project summary description, and the Contractor's role in each project. The Contractor shall present a reference list of clients that includes a contact person and phone number. The Contractor shall also possess a Class A Contractor's License.

The Contractor shall demonstrate that his project manager, equipment operators, and other responsible individuals performing work on site have appropriate experience and capability. The Contractor shall present personal resumes that document education, training, work experience, and licenses and certificates held in his bid response.

1.16 CONTRACTOR'S RESPONSIBILITIES

The Contractor shall identify to the County, in writing, the name of the representative who shall have complete authority to act for this project. The Contractor shall also furnish to the County a telephone number where the Contractor or his representative may be contacted 24 hours a day. The Contractor shall examine the Contract Documents, and shall be aware of conditions at the site that may affect execution of the work. These conditions include, but are not limited to, the following:

- A. Applicable health and safety regulations. All activities shall be conducted in such a manner as to avoid hazards and injury or damage to any person or properties.
- B. Transportation and access conditions
- C. Availability of utilities
- D. Surface and subsurface conditions
- E. Location, availability, and condition of construction materials
- F. Climate
- G. On-site soil characteristics of soil to be used in construction, including but not limited to size and type variation, location of excavation and stockpile areas, etc.
- H. General construction conditions at the site
- I. Creation and implementation of Storm Water Pollution Prevention Plan to prevent erosion and control sediment from excavation areas (See Section 3 of these Special Provisions)
- J. Spill prevention, proper clean-up and disposal of contaminants, and handling/storage of hazardous materials delivered to or produced on-site from the Contractor's operation
- K. The Contractor shall assume full responsibility for any theft or vandalism occurring to the Contractor's equipment, tools, materials, supplies, and construction (prior to final acceptance of the entire project by the County), and shall take appropriate measures necessary to eliminate their occurrences.

- L. The Contractor shall maintain internal access roads utilized by the Contractor during the Project. The Contractor shall not use existing paved roadways or those used for daily landfill traffic.
- M. The Contractor shall adhere to the posted speed limits within the internal landfill site.
- N. The Contractor shall continuously develop and maintain a reasonably graded surface within the Project excavation and stockpiling areas in order to maintain positive drainage condition and prevent ponding.
- O. At the end of the project, the ground shall be smoothed and graded to drain by the Contractor as required by the Contract Documents and as directed by the County.
- P. The Contractor shall be aware that the County and its representatives will conduct periodic inspections, QA/QC testing, and perform geologic observation of the work area. The Contractor shall allow access to work areas as requested by the County or its representatives.
- Q. Prior to the start of work, or at any other time during the project as reasonably requested by the County, the Contractor shall meet with the County to understand all County operations in progress at the Lamb Canyon Landfill and the Contractor shall take these County concurrent operations into consideration in performance of the work.
- R. The Contractor is responsible for setting line and grade for the excavation work and any other related construction activities. The Contractor's excavation work shall commence from the top ridge and then downward along the side slopes. An electronic copy of the grading plan is available to the Contractor upon request in a MicroStation or AutoCAD format.

The Contractor should note that geologic mapping and soil investigation and testing were performed within the vicinity of the construction area. Soil reports and test results are available for review at the Riverside County Waste Management Department office. Review of these documents does not relieve the Contractor of the responsibility of evaluating their accuracy and pertinence.

Until County final acceptance of the entire project, the Contractor shall retain full responsibility for the work.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.17 SITE SAFETY PLAN

Within ten (10) working days of execution of the Agreement by both parties, and prior to delivering equipment to the construction site, the Contractor shall submit a Site Safety Plan to the County for review and acceptance. Acceptance of the Site Safety Plan does not release the Contractor of liability in the event of an accident or injury, nor does it place any liability on the County or any County employee. The Site Safety Plan must, at

a minimum, meet all the requirements of Federal and State regulations regarding all construction activities. The Contractor shall be solely responsible for adherence to the Site Safety Plan at all times.

It is the responsibility of the Contractor to confirm compliance with all relevant health and safety regulations. The Contractor shall take proper safety and health precautions to protect the work, the public, the QA/QC personnel, and County employees. The Contractor shall be responsible for providing all items necessary for health and safety, including but not limited to dust control, personal protective equipment, decontamination equipment if required, and collection and disposal of rinse waters, in accordance with applicable Federal and State regulations. The County will reserve the right to direct removal of any of the Contractor's employees or subcontractors who are not adhering to or meeting the requirements of the law and the Site Safety Plan or applicable regulations.

Where necessary, trenches, pits, and other excavations shall be properly sheathed and braced to furnish safe and acceptable working conditions. Any damage occurring from earth pressures, slides, cave-ins, or other causes due to failure to provide proper sheeting or bracing, or through other negligence or fault of the Contractor, shall be repaired at the Contractor's sole expense. The manner of bracing for excavations shall be as set forth in the rules, orders, and regulations of the Division of Industrial Safety of the State of California or OSHA; whichever is more restrictive. Reference is made to Section 5.1.5 "Accident Prevention" of the General Provisions, in which the Contractor is required to submit to the County a detailed plan showing the design of shoring, bracing, sloping of the sides of trenches, or other provisions to be made for the protection of personnel during earthwork operations in advance of any such operation.

In addition to the hazardous waste management requirements stated in Section 3 of these Special Provisions, the Site Safety Plan shall include procedures that address Contractor's response in the event of a spill. Any accidental spills or spills that are produced during routine equipment maintenance shall be cleaned up by removing all the contaminants and the contaminated soil, disposing of it at an approved facility, and replacing the removed contaminated soil volume with clean soil material. The Contractor must submit to the County all documentation showing proper containment and removal of any toxic materials or contaminated soil that the Contractor has introduced or produced on-site.

The Site Safety Plan shall also include a traffic control plan that addresses the procedures for approaching or crossing public access roads internal to the landfill during the Project. To minimize disruption to landfill traffic, the Contractor shall complete all construction work required in Bid Item No.59 "Asphalt Roadway Rehabilitation" and Bid Item 61 "Construct Thermoplastic Striping" within 10 consecutive working days. Prior to starting any construction activities relating to the asphalt roadway rehabilitation, the Contractor shall submit to the County for approval a specific traffic control plan that addresses the temporary traffic control measures to be implemented during construction. The traffic control plan shall be shown on a site map and shall include but not limited to delineation of the proposed haul routes, traffic direction, signs, lane closures, and traffic control devices. All planned signs, traffic control devices shall be industry standard and shall

conform to the Work Area Traffic Control Handbook (WATCH), latest edition, and the California Manual on Uniform Traffic Control Devices 2012 Edition (FHWA's MUTCD 2009 Edition as amended for use in California), also called the California MUTCD, by the State of California Department of Transportation, Temporary Traffic Control, latest edition. Signs and traffic control devices along public access or landfill operation routes shall be removed and stored or covered during periods of time when they are not needed (such as at the end of each working day, weekends, and any time when no construction work is being performed).

The Contractor shall be responsible for holding mandatory weekly safety meetings at the site. The Contractor shall notify the County of the time and place of all meetings and allow the County to participate. Meetings shall reiterate all safety measures to be taken and shall discuss any violations committed and preventive measures to avoid subsequent violations. The Contractor shall provide the County with a copy of the minutes and the attendance of the safety meetings.

The Contractor shall under no circumstances deviate from the Site Safety Plan requirements and shall be responsible for any violation of the rules and regulations in effect. The County shall issue an order to stop all work and the Contractor shall not be entitled to any extension of the time or any claim for damage or to any compensation for either the directive or the work suspension order.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.18 ENVIRONMENTAL REQUIREMENTS

1.18.1 GENERAL REQUIREMENTS

The Contractor shall at all times keep the site neat, tidy, and free of waste materials or rubbish resulting from work. Toxic materials, including oil, fuel oil, gasoline, coolant, fluid filters, and other contaminants, shall be transported off site and disposed of at an approved facility. Containers temporarily holding these toxic materials shall be covered and have no leaks, and shall be removed from the site as quickly as is reasonably possible in accordance with the Hazardous Materials Management requirements stated in Section 3 of these Special Provisions.

Any accidental spills or spills that are produced during routine equipment maintenance shall be cleaned up by removing all the contaminants and the contaminated soil, disposing of it at an approved facility, and replacing the removed contaminated soil volume with clean soil material. The Contractor shall also be responsible for any spills caused by any of its subcontractors. The Contractor shall comply with the requirements of the Lamb Canyon Spill Prevention Control and Countermeasure Plan (SPCCP) as outlined in Section 3 of these Special Provisions

and include spill response procedures in their Site Safety Plan and Hazardous Materials Business Emergency Plan (HMBEP) submittals.

1.18.1.1 Environmentally Restricted Areas

As shown in Appendix D, certain portions of the Lamb Canyon Landfill site have environmental restrictions due to biological concerns. The Contractor's work must avoid these environmentally-restricted areas. The following describes areas affected by environmental restrictions.

1.18.1.2 Identification of Environmentally Restricted Areas:

There are two (2) environmentally restricted areas which require special management during the construction phase of this project due to their sensitivity and/or close proximity to construction activity. Construction activities must take place a minimum of 25 feet outside these areas.

Sub-Area 1 encompasses the 207-acre Lamb Canyon Conservation Area located on the eastern portion of the landfill site (Refer to Appendix D).

Sub-Area 2 includes the following three drainages (Refer to Appendix D):

- i. *2-A*, Drainage A (all),
- ii. *2-B*, Drainage B (two northern arms), and
- iii. *2-C*, Drainage E (westernmost portion)

Impacts to streambed/riparian habitat in these restricted areas could result in project delays and/or associated liquidated damages, should the Regional Water Quality Control Board (RWQCB), the California Department of Fish and Game (CDFG), and/or the Army Corps of Engineers (ACOE) require the Contractor to file and process permit applications to meet regulatory requirements that could include acquisition of offsite streambed/riparian habitat and/or payment of fees. Avoidance of these wetland/riparian habitats is critical to the timely success of this project. Any costs resulting from these violations shall be borne by the Contractor. Copies of the regulatory permits for the Project are included in Appendix D. The ACOE Section 404 Permit/Waiver will be provided to the Contractor once available. The Contractor will be required to maintain copies of all regulatory permits on the Project site, as follows:

- i. CDFG 1602 Streambed Alteration Agreement;
- ii. RWQCB Section 401 Certification; and
- iii. ACOE Section 404 Permit/Waiver (in process; not included in Appendix D)

1.18.2 SEASONAL RESTRICTION

It should be further emphasized that streambed/riparian areas are often habitat for nesting birds. For this reason, if construction activity takes place in any streambed/drainage in the project construction area during the period from March 15 through September 15, the Contractor shall notify the Planning Division of the Riverside County Waste Management Department 10 days prior to the initiation of the construction activity to allow for survey/assessment of potential nesting bird activity. In compliance with the CDFG 1602 Streambed Alteration Agreement, if nesting birds are found to be present, a buffer area shall be placed around the feature (size dependent upon species) and no work shall occur within the buffer area, to include the streambed/drainage, during the breeding season (March 15 – September 15). The County shall be responsible for all costs associated with the survey/monitoring efforts, as well as determining the appropriate buffer area. Additional time will be granted to the Contractor if construction delays occur as a result of nesting bird seasonal restrictions.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.19 PERMITS

The Contractor shall obtain and comply with all required permits and licenses related to the work, pay all charges and fees, and give a copy of all required documents to the County prior to commencement of work. Required permits include but are not limited to:

1.19.1 NOTIFICATION TO SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) UNDER RULE 403, FUGITIVE DUST CONTROL

The Contractor is responsible for implementing the necessary mitigation measures to ensure compliance with regulatory thresholds relating to air quality including but not limited to SCAQMD Rule 403 Fugitive Dust Control Requirements. The County shall have the authority to immediately suspend all construction operations if, in the County's opinion, the Contractor fails to adequately provide for dust control.

The Contractor shall file Form 403-N with the SCAQMD for the construction operation under this contract. A blank copy of Form 403-N is included in Appendix E of the Contract Documents. The Contractor shall provide a copy of the filed Form 403-N for the project to the County prior to commencement of project construction.

In compliance with the requirement of Section (e)1(E) of Rule 403, as amended on June 3, 2005, the Contractor shall identify a SCAQMD-certified dust control supervisor on the project site, or available on-site within 30 minutes, during project work hours.

Payment for complying with this section shall be considered as included in the various items of the work, and no additional compensation shall be allowed.

1.19.2 STATE WATER QUALITY CONTROL BOARD'S NATIONAL POLLUTION DISCHARGE AND ELIMINATION SYSTEM (NPDES) PERMIT

The County complies with the State NPDES through regular inspections, monitoring, and implementation of best management practices as described in the Lamb Canyon Landfill Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall be responsible for compliance with the SWPPP, attached as Appendix B. In addition, after notification of award and prior to start of any work, the Contractor shall prepare and submit to the County project-specific Storm Water Pollution Prevention Plan (SWPPP) outlining procedures to reduce pollutants (directly or indirectly related to the Contractor's activities) in storm water runoff. This will be included as part of the County's NPDES Permit (Appendix B). Refer to Storm Water Pollution Prevention requirements stated in Section 3 of these Special Provisions.

Payment for complying with this section shall be considered as included in Bid Item No. 2 "Storm Water Pollution Prevention and Hazardous Materials Management", and no additional compensation shall be allowed.

1.20 DETAIL DRAWINGS AND SUBMITTALS

Unless specified otherwise in these Special Provisions, four (4) copies of all shop drawings and submittals of documentation and samples of materials shall be submitted by the Contractor to the County for review and approval, at least two (2) weeks prior to fabrication or installation of any work pertaining to them. However, additional time (beyond two weeks) may be required due to a large number of submittals at one time period in order to give the County and QA/QC Consultant adequate time to review, test, and approve the materials.

The review and approval of shop drawings, samples, submittals, specifications and descriptive literature submitted by the Contractor will be only for general conformance with design concept, and shall not be construed as:

- A. Permitting any deviation from the contract requirements
- B. Relieving the Contractor of the responsibility for any error in detail dimensions or otherwise that may exist in such submittals
- C. Constituting a blanket approval of dimensions, quantities or details of the material or equipment shown
- D. Approving deviations from additional details or instructions previously furnished by the County.

Such check or review shall not relieve the Contractor of the full responsibility of meeting all of the requirements of the Contract Documents.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.21 STORAGE OF MATERIALS

An area for the storage of the Contractor's materials is delineated on the Project Drawings. All imported materials shall be stored in the designated area, unless the Contractor obtains the County's written approval for an additional area. All imported materials to be used in construction shall be unloaded, stored, and handled in accordance with manufacturer and supplier recommendations to prevent damage to the material. When delivery of a material occurs, the Contractor shall promptly observe shipments to assure that the material complies with requirements, that quantities are correct, and that the material is undamaged. The Contractor shall take full responsibility for any delay caused by a supplier or manufacturer. The storage area shall be accessible to the County and QA/QC Consultant, so that they may observe, verify, and document the presence and condition of materials being stored.

The Contractor shall protect materials from sun, rain, mud, soil, and debris, and as stated in the QA/QC Plan. Care shall be taken to protect manufactured materials against damage from misuse, mishandling, or accident. The Contractor shall store materials and maintain construction operations within limits indicated by applicable laws, ordinances, and permits, and as outlined by the County. Care shall be exercised to avoid blocking roads, interfering with County operations, or presenting a hazard to County personnel and equipment, or to the public.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.22 EQUIPMENT STAGING AREA

An area for the storage of the Contractor's equipment is delineated on the Project Drawings. The storage area shall be accessible to the County and QA/QC Consultant so that they may verify the presence and condition of equipment being stored. The stored equipment shall be placed in accordance with the Project Drawings or as directed by the County. The Contractor shall confine equipment and maintain construction operations within limits indicated by applicable laws, ordinances, and permits, and as outlined by the County. The Contractor shall make certain that the storage of equipment in any area does not interfere with or otherwise disrupt County operations at the site. Care shall be exercised to avoid blocking roads, interfering with County operations, or presenting a hazard to County personnel and equipment, or to the public.

The maximum allowable time that a piece of equipment shall remain on site, in a condition that makes it incapable of performing its designed function, shall be four (4) working days. Any equipment needing further maintenance shall be moved off site for repairs, at the full expense of the Contractor. Equipment no longer needed for the job shall also be removed within four (4) working days of its last use.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.23 SUSPENSION AND RESUMPTION OF OPERATIONS

The Contractor shall suspend construction operations when, in the County's opinion, the conditions for such operations are unsatisfactory due to rain, wind, or any other reason. The Contractor shall not be compensated monetarily for any such delays caused by the suspension of operations. Working days shall be charged as appropriate in accordance with the Contract Documents.

Whenever operations have been suspended, the effect of rain, wind, or other adverse conditions shall be assessed by the County before approval to resume construction is given. Equipment will not be allowed to travel on fill materials until these materials have dried sufficiently to prevent excessive rutting and to allow the equipment to be operated satisfactorily. If rutting occurs, the Contractor shall re-level, scarify, and re-compact the materials to whatever depth is required to repair the damage in accordance with the appropriate specifications described herein at the Contractor's expense.

1.24 DIVERSION AND CONTROL OF WATER

It is anticipated that nuisance or other water, such as rainfall or surface water run-off, may be encountered within the construction site during the period of construction under this contract. The Contractor, by submitting a bid, will be held to have investigated the risks arising from such waters and to have made this bid in accordance therewith. The Contractor shall construct, and maintain all temporary diversion and protective works to divert run-off around the work areas and material storage areas, and to protect persons and property downstream of the work. The County may require the Contractor to implement additional protection measures. Excavation and stockpile areas shall be graded and properly maintained to provide adequate drainage at all times. The Contractor shall provide berms or other measures as necessary and/or required to prevent run-off from flowing onto completed areas and to avert erosion.

All nuisance or other water shall be disposed of at the Contractor's expense, in a manner that will not damage public or private property, create a nuisance or health menace, and comply with all applicable regulations. The Contractor shall furnish, install, and operate pumps, hoses, pipes, or other equipment of a sufficient capacity to keep all construction excavations free from water until the excavation is backfilled. Water, if odorless and uncontaminated, may be discharged in a manner approved by the County. When required by the County, a means of desilting the water before discharging it shall be provided.

Special measures will be required to protect the GCL placed or stored on site. Prior to delivery, the Contractor shall present to the County and QA/QC Consultant its method of protecting these materials. Work shall be suspended, as stated in Subsection 1.23, "Suspension and Resumption of Operations", of these Special Provisions, when the site is wet, muddy, or in any other condition that interferes with proper operation and construction procedures.

The County has a National Pollutant Discharge and Elimination System (NPDES) permit for storm water associated with industrial activity (under which construction activities are

covered) and has developed a Storm Water Pollution Prevention Plan (SWPPP) for the Lamb Canyon Sanitary Landfill. The Contractor shall prepare a SWPPP for their activities during the Project and submit an addendum to the site's SWPPP located in Appendix B, and as stated in Subsection 1.19 "Permits" and Section 3 "Storm Water Pollution Prevention and Hazardous Materials Management" of these Special Provisions. The Contractor shall comply with all the provisions of the site's SWPPP as described in Appendix B. The Contractor shall assist and cooperate with County personnel in fulfilling the provisions for construction monitoring requirements.

Payment for complying with this section relating to storm water shall be included in Bid Item No. 2 "Storm Water Pollution Prevention and Hazardous Materials Management".

1.25 DUST ABATEMENT

Dust control operations shall be performed by the Contractor at the time, location, and in the amount required and as often as necessary to prevent all excavations, stockpiling or fill works, demolition operations, or other activities from producing dust in amounts harmful to persons or causing a nuisance to persons living nearby or occupying buildings in the vicinity of the work. The Contractor is responsible for compliance with Rule 403 Fugitive Dust Regulations issued by the South Coast Air Quality Management District (SCAQMD) and any other applicable regulations.

Control of dust shall include but not be limited to: sprinkling of water, use of approved dust suppressants, modifications of operations or any other means acceptable to the County, the California Regional Water Quality Control Board (CRWQCB), the SCAQMD, and any agency having jurisdiction over the facility. The County shall have the authority to suspend all construction operations if, in the County's opinion, the Contractor fails to adequately provide for dust control.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.26 WATER SUPPLY

The Contractor shall make arrangements for obtaining a water supply for the project and provide all labor and equipment to collect, load, transport, apply, and dispose water as necessary for dust control, excavation, grading, and other project purposes. Water shall be clean and free from objectionable deleterious amounts of acids, alkalis, salts, or organic materials. The nearest fire hydrant is located near the intersection of Beaumont Avenue and First Street and is owned by the Beaumont-Cherry Valley Water District. If the Contractor wishes to draw water from this hydrant, the Contractor must first contact the appropriate governing agency to obtain written permission and pay the required costs. Any other source of water shall be approved by the County.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.27 PROTECTION OF ADJACENT LANDFILL OPERATIONS

The Lamb Canyon Landfill site is an active facility; thus, all construction work relating to this project shall not impede or interrupt daily landfill business and operations. The Contractor shall provide a temporary fence, gabion, or other structure acceptable to the County as necessary along the project grading limits or as otherwise directed by the County, to prevent debris, rocks and equipment from interfering with the access roads and landfill operations adjacent to the Contractor's work. In addition, the Contractor must obtain in advance the County's written approval for the locations and construction of temporary haul roads.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.28 AS-BUILT PROJECT DRAWINGS

The Contractor shall maintain a set of full-sized Project Drawings, including all addenda, change orders, and pertinent data related to the project, in the field office. The Contractor shall mark all changes and revisions made to the Project Drawings during construction by utilizing the records prepared by the Contractor's surveyors and onsite supervisory personnel as construction proceeds. Contractor shall correct the Project Drawings daily and review them with the County at weekly meetings or as requested by the County. Upon completion of the work, the Contractor shall deliver to the County the information contained in this progress set of Project Drawings as a condition of final acceptance of the work by the County.

Payment for complying with this section shall be considered as included in the various items of work, and no additional compensation shall be allowed.

1.29 UNITS OF MEASUREMENT

In lieu of Part 1, Section 9-1.4, "Units of Measurement", in the Standard Specifications, measurements shall be in accordance with U.S. Standard Measures. A pound is an avoirdupois. A ton is 2,000 pounds avoirdupois. The unit of liquid measure is the U.S. Gallon.

END OF SECTION 1

SECTION 2 - MOBILIZATION AND DEMOBILIZATION

2.1 GENERAL

This contract item shall consist of expenditures for all preparatory work and operations, including but not limited to: bond and insurance costs; those costs necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; and for all other work and operations which must be performed or costs incurred prior to beginning work on the various contract items on the project site as well as the related demobilization costs at the completion of the project. Demobilization shall include but not be limited to cleaning installations and the removal of temporary structures as required by the County. Throughout all phases of construction, including suspension of work and until final acceptance of the project, the Contractor shall keep the work areas clean and free of refuse generated as a result of the Contractor's operations. Any such refuse shall be disposed of in the designated disposal area or as directed by the County.

2.2 MATERIALS

The Contractor may elect to provide a temporary field office trailer, at their own expense, for their staff in accordance with the requirements of Part 1, Section 8 of the Standard Specifications. In this case, the Contractor shall place the field office at the designated contractor's staging area as shown on the Project Drawings or as otherwise approved by the County.

The Contractor shall provide adequate number of portable toilets for its staff within the project's staging area. These portable toilets shall be equipped with secondary containment structures and tie-downs shall be supplied so as to prevent the displacement of the portable toilets during high winds. All sanitary facilities shall include twice-per-week servicing.

The Contractor shall provide fire extinguishers and first-aid kits inside the field office or within the vicinity of their work area to provide adequate protection to all personnel anticipated to be onsite. A fire extinguisher shall also be maintained in the construction area at all times.

2.3 EXECUTION

- A. Upon receipt of the Notice to Proceed, the Contractor shall furnish, mobilize, and install such temporary works, materials, equipment, supplies, personnel, as necessary for the successful completion of the work. The Contractor shall also operate and maintain temporary works, equipment, throughout the duration of construction. All temporary works, such as sanitation facilities, shall fully comply with applicable rules and regulations of governing authorities.

- B. The Contractor shall remove and properly dispose of all refuse from the construction site. Material generated from demolition and new construction should be recycled or reused, on site as required by these Contract Documents, to

the fullest extent practical to comply with Mandatory Commercial Recycling (California Code of Regulations, Title 14, Division 7, Chapter 9.4, Article 2, Section 18835), beginning July 1, 2012. Estimated tonnages of recycled material shall be reported to the County. The County shall have the right to determine what materials are considered refuse, and to determine the manner and placement of their disposal. Any hydrocarbon-impacted soils found at the site as a result of the construction operation, such as equipment maintenance, shall be removed and properly disposed of at the Contractor's expense.

- C. The Contractor shall obtain all necessary permits and permission to utilize public roads for mobilization, demobilization, and access to the site. Access to the site is available through existing public roads during the hours stated in Section 1.7 of these Special Provisions.

2.4 MEASUREMENT AND PAYMENT

- A. The following schedule will be used to determine **measurement** of mobilization and demobilization and disbursement of the bid price (less retention) for mobilization and demobilization:

Percent of Contract Work Completed (\$ Expended/\$ total bid price)	Percent of Mobilization and Demobilization Considered to be Complete
More Than 5%	50%
More Than 25%	70%
More Than 50%	80%
More Than 75%	90%
Upon County's acceptance of work including complete demobilization	100%

- B. Payment of mobilization and demobilization shall be made at the contract lump sum price as stated in the Contractor's Proposal for **Bid Item No. 1 – "Mobilization and Demobilization"**. Payments shall constitute full compensation for all labor, material, equipment, and all other items necessary and incidental to completion of this item of work. The deletion of work or the addition of extra work shall not affect the price paid for mobilization and demobilization.

END OF SECTION 2

SECTION 3 - STORM WATER POLLUTION PREVENTION & HAZARDOUS MATERIALS MANAGEMENT

3.1 GENERAL

Contract Bid Item No. 2 – “Storm Water Pollution Prevention & Hazardous Materials Management” shall include furnishing all labor, supervision, tools, equipment, and materials necessary to comply with the various Federal, State, and County laws and regulations along with specific permit requirements related to the construction activities in this project. This work shall include, but is not limited to: preparation and implementation of a project-specific Storm Water Pollution Prevention Plan (SWPPP) and a Hazardous Materials Business Emergency Plan (HMBEP); regular review and updating of those plans, inspections and reporting; supply, installation and maintenance of SWPPP Best Management Practice (BMP) measures to prevent erosion and control sediment; construction and maintenance of secondary containment structures for hazardous materials storage; clean-up and proper removal of toxic materials or contaminated soil that the Contractor has introduced or produced on-site; and other items as described and required by the Contract Documents.

3.1.1 REFERENCES

Reference Codes, Regulations and Policies: The following codes, regulations and policies, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference. Additional reference information is provided as information to assist the Contractor with document preparation and registration requirements.

3.1.1.1 Storm Water Pollution Prevention

The 1972 amendments to the Federal Water Pollution Control Act (known as the Clean Water Act or CWA) provide the statutory basis for the National Pollutant Discharge and Elimination System (NPDES) permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the United States. Section 402 of the CWA specifically required the United States Environmental Protection Agency (EPA) to develop and implement the NPDES program.

The full text of the Clean Water Act reference and SWPPP preparation assistance is available from the following agency websites:

Agency Website	Reference	Website Address
EPA	Clean Water Act	http://www.epa.gov/npdes/pubs/cwatxt.txt
EPA	SWPPP Assistance	http://cfpub2.epa.gov/npdes/stormwater/swppp.cfm
Caltrans	SWPPP Assistance	http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm
California Stormwater Quality Association	SWPPP Assistance	http://www.cabmphandbooks.com/

3.1.1.2 Hazardous Materials Management

Title 40 of the Code of Federal Regulations (CFR) Part 112 establishes requirements for Oil Pollution Prevention. In accordance with this Regulation, the County has prepared a site specific Spill Prevention Control and Countermeasure Plan (SPCCP) for the Lamb Canyon Landfill. Contractor's requirements under this plan are outlined in Section 3.3.2 of these Special Provisions.

Title 19 Public Safety of the California Code of Regulations (CCR), along with the California Health and Safety Code (CH&SC), Chapter 6.95 establish the requirements for hazardous material release reporting, inventory, and response plans.

The County of Riverside has further adopted County Ordinance 651 "Requiring Disclosure of Hazardous Materials and the Formulation of Business Emergency Plans". The intent of this Ordinance is to impose additional and more stringent requirements on businesses that handle hazardous materials than those imposed by Chapter 6.95 of the CH&SC.

In addition to the above Codes and Regulations, the County of Riverside Department of Environmental Health offers forms and guidelines for preparing a HMBEP.

The full text of the above mentioned references and HMBEP preparation assistance is available from the following agency websites:

Agency Website	Reference	Website Address
e-CFR	CFR Title 40, Part 112 - Oil Pollution Prevention	http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr112_main_02.tpl
California EPA	CCR Title 19 – Public Safety & CH&SC Chapter 6.95	http://www.calepa.ca.gov/cupa/LawsRegs/
County of Riverside, Clerk of the Board	County Ordinance 651	http://www.clerkoftheboard.co.riverside.ca.us/ords/600/651.3.pdf
County of Riverside Department of Environmental Health	HMBEP preparation assistance, Certified Union Program Agency (CUPA) & Hazardous Waste Generator Forms	http://www.rivcoeh.org/opencms/rivcoeh/Forms_Guidelines/ http://www.rivcoeh.org/opencms/system/galleries/download/Environmental-Health/HMM/Annual_Bus_Plan_Review.pdf
Department of Toxic Substances Control (DTSC)	EPA ID Number	www.dtsc.ca.gov

3.2 SUBMITTALS

The Contractor shall submit the following items for County review and acceptance and adhere to their requirements. All submittals must be received and accepted by the County before the Contractor starts work:

3.2.1 STORM WATER POLLUTION PREVENTION PLAN AND INSPECTION FORMS

- a. **Storm Water Pollution Prevention Plan (SWPPP)** - After notification of award and prior to start of any work, the Contractor shall prepare and submit to the County a project-specific SWPPP, outlining procedures to reduce pollutants (directly or indirectly related to the Contractor's activities) in storm water runoff. The Contractor's SWPPP will be included as part of the County's NPDES Permit (Appendix B) as an attachment for the duration of the project.

- b. **Storm Water Pollution Prevention Inspection Forms** - The County SWPPP conditions require the Contractor to perform regular weekly SWPPP inspections along with additional inspections prior to and after storm events. A sample SWPPP inspection form is included in Appendix C. All completed inspection forms shall be submitted to the County on a weekly basis or on a daily basis during storm events.

Regular inspections may identify areas of the written SWPPP that require amendments. The Contractor shall revise and re-submit an updated SWPPP whenever warranted.

3.2.2 HAZARDOUS MATERIALS BUSINESS EMERGENCY PLAN AND INSPECTION FORMS

- a. **Hazardous Materials Business Emergency Plan (HMBEP)** - The Contractor shall prepare and submit a Hazardous Materials Business Emergency Plan (HMBEP) to the County prior to delivering toxic materials and/or producing contaminated soil on-site. The complete plan, as well as any additional permit applications, shall also be submitted by the Contractor directly to the County Department of Environmental Health in accordance with the referenced codes and regulations stated in Section 3.1.1.2 of these Special Provisions. The HMBEP plan shall be updated as needed to reflect current site conditions (i.e. changes in chemical inventory). Copies of all manifests for hazardous materials leaving the site for proper disposal shall be submitted to the County. The Contractor shall also be required to submit records on employee training related to oil spill prevention, containment and retrieval methods. Changes to the written HMBEP plan shall be submitted to the County whenever they occur.

- b. **Hazardous Materials Management Inspection Forms** - The Contractor will be required to conduct a weekly inspection of hazardous materials and waste storage areas. If the Contractor maintains any storage tanks in excess of 200 gallons on-site, they will be required to complete daily inspection reports for those tanks. Sample inspection reports are attached in Appendix C. Completed inspection forms shall be submitted to the County on a weekly basis or as otherwise requested by County staff.

3.2.3 SCHEDULE OF VALUES

After notification of award and prior to the start of any work, the Contractor shall prepare and submit a satisfactory Schedule of Values for all Storm Water Pollution Prevention & Hazardous Materials Management work. The Schedule of Values will establish unit prices for individual items of work and will form the basis for payment of contract work and will be used to establish payment for any extra work. An acceptable form for the Schedule of Values, representing the minimum level of detail required to quantify the scope of work is included in Section 3.4 of these Special Provisions.

3.3 EXECUTION

3.3.1 STORM WATER POLLUTION PREVENTION

The County complies with the State NPDES through regular inspections, monitoring and implementation of BMPs as described in the Lamb Canyon Landfill Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall be responsible for compliance with the County's site specific SWPPP, attached as Appendix B as well as the Contractor's own project specific SWPPP.

The Contractor shall utilize the references and guidelines stated in Section 3.1.1.1 of these Special Provisions to prepare and submit a SWPPP for the County's review and acceptance. The SWPPP shall include a BMP installation map of the project area utilizing the State of California Department of Transportation (Caltrans) standard BMP installation details. The Contractor's SWPPP should address these four major objectives.

- a. Identify all pollutant sources, including sources of erosion/sediment that may affect the quality of storm water discharges associated with construction activity (storm water discharges) from the construction site, and
- b. Identify non-storm water discharges, and
- c. Identify, construct, implement in accordance with a time schedule, and maintain Best Management Practices (BMPs) to reduce or eliminate erosion, sediment, and other pollutants in storm water discharges and

authorized non-storm water discharges from the construction site during construction, and

- d. Develop a schedule and map to include the sequencing of construction activities with the installation of BMPs in order to provide erosion and sediment control measures throughout the duration of project construction.

The Contractor shall perform a weekly inspection of the construction site to ensure that the SWPPP plan is being implemented and that the pollution prevention controls are effective for compliance with the permit. The Contractor's inspector shall document the inspection on the form provided in Appendix C and provide copies to the County on a weekly basis.

Inspections shall also be conducted by the Contractor and the County prior to anticipated storm events and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. These inspections shall also be documented as well as any corrective actions taken.

The Contractor shall provide continuous monitoring of the site for non-storm water discharges.

Any corrective actions found to be needed for compliance with the plan and permit requirements during any inspection shall be implemented by the Contractor immediately. If compliance is not possible or if the Contractor refuses to comply, the California Regional Water Quality Board will be notified.

3.3.2 HAZARDOUS MATERIALS MANAGEMENT

If a Contractor's work requires the on-site storage of petroleum products including but not limited to lubrication oils, antifreeze, greases or fuels, or if it is necessary for the contractor to store petroleum waste products on-site such as waste oil, oil filters, antifreeze, greases, contaminated soil, and waste fuel on-site the following actions must take place:

The Contractor shall prepare a Hazardous Materials Business Emergency Plan (HMBEP) for submittal to the County prior to performing any work. The plan and the associated "Business Activities", "Business Owner/Operator Identification" and "Hazardous Materials Inventory" forms shall be also submitted to the Department of Environmental Health for registration and issuance of a Facility ID Number.

The Contractor may additionally be required to apply for a permit as a hazardous waste generator from the County Department of Environmental Health, and an EPA ID number as required for by Codes and Regulations stated in Section 3.1 of these Special Provisions. The application for a Dept. of Environmental Health permit can be found at the website referenced in Section 3.1 of these Special Provisions. To obtain an EPA ID number, the Contractor should contact the Department of Toxic Substances Control (DTSC) Telephone Information Center at (800) 61-TOXIC or (800) 618-6942, to obtain information on EPA ID #'s. Applications are available at the DTSC website referenced in Section 3.2 of these Special Provisions.

The Contractor will be required to comply with the terms and conditions of Riverside County Ordinance 651 as referenced in Section 3.1 of these Special Provisions. These include but are not limited to:

- a. Immediate correction of unsafe conditions
- b. Maintain proper separation of hazardous materials from other potentially dangerous materials and from buildings.
- c. Restrict access by unauthorized persons
- d. Post warning and hazard identification signs in accordance with NFPA Standard 704 where applicable. Post appropriate signage at hazardous materials storage areas, entrances and exits.
- e. Label all containers and maintain labels in legible condition at all times. Label above ground storage tanks with the appropriate NFPA 704 when applicable. Correctly label all containers, barrels, etc containing hazardous materials and/or hazardous waste.
- f. Submit revised forms to the County prior to making changes to chemical inventory.
- g. Submit copies of all hazardous waste manifests to the County for all materials being properly disposed from the site.

The Contractor shall additionally be required to comply with the conditions of the County's site specific Spill Prevention, Control, and Countermeasure Plan (SPCCP), Section 10, "Contractor's Responsibility" which is outlined as follows:

- a. The Contractor's tanks or drums used to store the product or waste must comply with the Department's SPCCP requirements including but not limited to: secondary containment system, drainage control and periodic inspection.
- b. Secondary containment systems shall comply with the following minimum guidelines:
 - i. Methods of Containment – Recessed floors, raised sills, containment pallets, double-walled tanks, dikes, berms or walls.
 - ii. Capacity of Containment – Contain the entire volume of the largest container/ tank and the volume from a 24-hour rainfall as based on a 25-year storm frequency.
 - iii. Construction of Containment – Containment area shall be lined with compatible (impervious, chemical and puncture resistant) material and have no unsealed seams or gaps. No open or uncontrolled drains shall be located within the containment area. Floor of containment area shall be sloped to a recessed collection sump.

- c. Containment areas shall be sufficiently impervious to contain any discharge and be designed to prevent any drainage. Any accidental spills within the containment area shall be immediately cleaned up by removing the contaminants and properly disposing of them. When rain is forecasted, the containment area shall be covered to prevent rainfall accumulation. Any contained rainwater in the area must be inspected for contamination by County staff prior to being discharged by the Contractor. Any discharge that occurs must be observed and logged by County staff on a "Drainage Discharge Report Form" located in Appendix C.
- d. The Contractor shall conduct a daily inspection of their above ground storage tanks using the "Contractor's Daily Aboveground Storage Tank Inspection Form" located in Appendix C.
- e. The Contractor shall conduct a weekly inspection of their work area using the "Contractor's Weekly Inspection Form" located in Appendix C.
- f. The Contractor shall document all problems found during the inspection and provide immediate correction of problems.
- g. The Contractor shall document all corrections in writing and attach the documentation to the inspection form.
- h. The Contractor shall submit their completed forms (including daily inspections, weekly inspections, hazardous waste manifests and correction documentation) to the County on a weekly basis.

The complete site-specific SPCCP is located on-site and a copy of the plan is available for review at the County office.

3.4 MEASUREMENT AND PAYMENT

The Schedule of Values will establish unit prices for individual items of work and will be the basis for payment of contract work and will also be used to establish payment for any extra work. An acceptable form for the Schedule of Values, which represents the minimum level of detail required to quantify the scope of work is located at the end of this section. The Contractor's Schedule of Values MUST include at a minimum, Item No.1 "Prepare, Implement, and Maintain HMBEP Plan", Item No. 2 "Prepare, Implement, and Maintain SWPPP Plan", and Item No. 3 "Construct and Maintain Temporary Sedimentation Basin per Caltrans Detail SC-2". The Contractor shall have the option to add, delete, or modify any of the BMP measures, Schedule of Value Item No.s 4-7 of the sample schedule, on the submitted schedule to meet the requirements for items specified in the contractor's submitted SWPPP. The total cost for the items specified on the contractor's submitted Schedule of Values must match the lump sum bid price in the Contractor's proposal for **Bid Item No. 2 – "Storm Water Pollution Prevention and Hazardous Materials Management"** Unit prices shall be based on the costs associated with the preparation, supply, installation, and maintenance of the various items where applicable.

Payment for Schedule of Value Items No. 1 "Prepare, Implement, and Maintain HMBEP Plan" and No.2 "Prepare, Implement, and Maintain SWPPP Plan" shall be according to the following schedule (also refer to table below):

- A. Upon acceptance by the County of the written plan the Contractor will receive 20% of the lump sum bid item. After complete implementation of all initial field measures required by the plan and these Special Provisions, the Contractor will receive 30% of the lump sum bid item.
- B. Contractor will be paid the remaining 50% of the lump sum bid item in progress payments to be estimated based on the remaining number of working days in the contract. Any change to the number of working days will not result in an adjustment to the total lump sum price, as provided in the Schedule of Values.

WORK ITEM COMPLETED	PERCENTAGE OF SCHEDULE OF VALUES ITEM NO. 1 AND NO. 2 TO BE PAID
Acceptance by the County of the written plan	20%
Completed implementation of all initial field measures required by the plan and these Special Provisions.	30%
Ongoing review and updating of the written plan. Submittal of the required inspection and other documentation. Field compliance with the terms and conditions of the plan and these Special Provisions.	Remaining 50% to be paid in progress payments throughout project duration

Payment for the other SWPPP related items (BMPs) on the Schedule of Values shall be at the unit price as shown on the Schedule as they are installed. Payment shall be full compensation for the supply, installation and maintenance of each BMP measure. The Contractor shall submit a written plan/drawing showing the quantities and locations of the proposed BMP installations as part of the SWPPP and for the County's approval. Quantities of installed BMPs shall not exceed the quantity shown on the Schedule of Values without prior written authorization by the County. The Schedule of Values is NOT to be used as the basis for payment for the permanent fiber roll BMPs that are required in Stockpiles A, B, and C, and in disturbed cut/fill slopes outside the liner limits as shown on the Project Drawings. Those items shall be paid under Bid Item No. 3 "Supply and Install Fiber Rolls BMPs".

**Storm Water Pollution Prevention & Hazardous Materials Management
Schedule of Values (Sample)**

No.	Quantity	Units	Description	Unit Cost	Total Cost
1	1	Lump Sum	Prepare, Implement, and Maintain HMBEP Plan		
2	1	Lump Sum	Prepare, Implement, and Maintain SWPPP Plan		
3	1	Each	Construct and Maintain Temporary Sedimentation Basin per Caltrans Detail SC-2.		
4	Contractor to provide quantity	Linear Feet	Install and Maintain Gravel Bag Check Dam per Caltrans Detail SC-4		
5	Contractor to provide quantity	Linear Feet	Install and Maintain Fiber Roll per Caltrans Detail SC-5		
6	Contractor to provide quantity	Linear Feet	Install and Maintain Silt Fence per Caltrans Detail SC-1		
7	Contractor to provide quantity	Each	Install and Maintain Stabilized Construction Entrance/Exit per Caltrans Detail TC-1		
TOTAL (must equal lump sum bid amount for Bid Item No. 2 – “Storm Water Pollution Prevention & Hazardous Materials Management”) \$ _____					

END OF SECTION 3

SECTION 4 - EARTHWORK

4.1 GENERAL

The work in this section shall include furnishing all labor, supervision, tools, equipment, and materials necessary to complete and attain plan grades (and accomplish related work) upon which the geosynthetic liner system and appurtenant structures for this project will be installed. This work shall include, but is not limited to, clearing, grubbing, demolition and disposal of demolished materials, excavation, over-excavation, hauling material to stockpile, placement and compaction of engineered fill, construction of the low-permeability layer, construction of landfill access ramp, and construction of drainage diversion berms as shown on the Project Drawings and as required by the Contract Documents.

4.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

<i>D1557-00</i>	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
<i>D5084-00</i>	Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

4.1.2 QUALITY ASSURANCE/QUALITY CONTROL

All work shall be performed in accordance with the QA/QC Plan, under the ongoing observation of the County and QA/QC Consultant. The QA/QC Consultant shall verify that the engineered fill and the low-permeability layer have been moisture conditioned and compacted adequately in accordance with the QA/QC Plan (**Appendix A**). The verification will be conducted by field-testing as well as visual observation of the operation. It is the Contractor's responsibility to ensure that the required moisture content and density of all earthworks are achieved.

The Contractor shall supply labor and equipment for preparing test areas as requested by the QA/QC Consultant. When material has not been properly placed, moisture-conditioned, or compacted, as determined by observation or verification testing, such material shall be removed or reworked as necessary at the sole expense of the Contractor to obtain the required relative compaction and moisture content. When sand cone density tests, field permeability tests, or any other field tests are performed, no equipment shall be operated within the immediate vicinity of the test area or as requested by the QA/QC Consultant. This requirement is essential since the vibration produced by the construction equipment will adversely impact the testing results.

4.2 MATERIALS

The suitability of all earthen and manufactured materials shall be subject to the approval of the County and QA/QC Consultant. Fill materials shall not contain brush, roots, sod, or other deleterious or unsuitable materials. The maximum particle size for general engineered fill material shall be as follows:

- A. **Within the Liner System Footprint** – particle size within the upper two (2) feet of fill shall not exceed 3 inches. Particle size for fill placed below the upper two-foot layer shall not exceed 6 inches.
- B. **Outside the Liner System Footprint** – particle size shall not exceed 6 inches.

Organic material and particles greater than the specified size shall be deposited in a separate stockpile, as directed by the County and QA/QC Consultant. Where the engineered fill forms the subgrade for the liner, the subgrade shall be prepared in accordance with the requirements of Section 5.3 of these Special Provisions. The low-permeability soil material shall be obtained from the unprocessed clay stockpile located immediately north of Soil Stockpile B as shown on the Project Drawings.

4.3 EXECUTION

4.3.1 GENERAL SUBGRADE PREPARATION

All work areas within the grading limits shown on the Project Drawings shall be evaluated and approved by the County and QA/QC Consultant to verify satisfactory completion of clear and grub work (including demolition and removal of miscellaneous items as shown on the Project Drawings), penetration of the excavation into firm natural soils, and removal of all unsuitable materials. All unsuitable material found at the subgrade design elevations shall be excavated by the Contractor (under the directions of the QA/QC Consultant) and the area shall be backfilled to design elevations and grades with engineered fill in accordance with the requirements of subsection 4.3.5 and 4.3.6 of these Specifications.

Unless otherwise noted or required, areas where engineered fill is to be placed, or in other areas where unsuitable materials have been removed and where the surface is judged to be loose or otherwise unsuitable, the subgrade shall be prepared as follows:

- a. The upper 6 inches of in-situ material shall be ripped, moisture-conditioned, and re-compacted to a minimum relative compaction of 90 percent or 95% percent as required by the Contract Documents, at moisture content between optimum moisture content (OMC) and 2% above OMC in accordance with ASTM D1557 or as determined by the County and QA/QC Consultant.
- b. The compacted surface shall be scarified to provide a good bond between the foundation material and the subsequent fill material, as appropriate.

- c. Areas of hard or dense, natural soil identified by the County and QA/QC Consultant shall be left undisturbed.

4.3.2 DEMOLITION AND DISPOSAL OF MISCELLANEOUS STRUCTURES

- a. This work shall include furnishing all labor, supervision, tools, equipment, and materials to complete the demolition of existing drainage and other miscellaneous structures from within the project work area as required by the Contract Documents. The Contractor shall demolish and dispose of or salvage all items as called for on the Project Drawings and store the recovered material as directed by the County.
- b. This work includes but is not limited to: saw cutting, salvaging, and hauling, all asphalt material from existing drainage structures encountered within the Project work limits; removal, salvaging, and hauling of grouted rip rap stones; removal and salvaging all CMP pipes, drop inlet structures, metal flumes and appurtenances; removal and temporary storage of the existing 10,000-gallon leachate tank including all related accessories (ladder assembly, seismic tie-down, connections, etc); demolish and dispose of existing HDPE secondary containment structure for the leachate tank and any other miscellaneous items: remove, haul, and salvage existing leachate and condensate reinforced concrete foundation pad; remove and salvage all CMP pipes, drop inlets structures, metal flumes and appurtenances; cut and remove abandoned 10" diameter water well pipe backfilled with cement/Bentonite; abandon survey control markers; cut and cap gas probe pvc pipes 1' below surface and remove and salvage steel monument.
- c. All materials generated from demolition and removal operations shall be disposed of at the designated location as shown on the project drawings, or salvaged and stored as directed by the County for later use.

4.3.3 EXCAVATION

- a. This work may include ripping, breaking, and dozing of materials using standard earthmoving equipment up to and including CAT D-9 with single ripper type equipment. Based on a previous subsurface soil investigation, the material within limits of excavation has been determined to be rippable. In the event non-rippable material is encountered, the Contractor shall immediately notify the County and the QA/QC Consultant. Prior to the removal of non-rippable material, Contractor, County, and the QA/QC Consultant shall mutually decide upon the most acceptable method of removal for this material. This work shall be considered as extra work and therefore will be paid for in accordance with Section 2.7 of the General

Provisions entitled "Extra Work". This item shall also include keeping excavation areas neat and orderly, and completing the excavation to the satisfaction of the County and QA/QC Consultant. Liner construction operations in a given area shall not commence until the subgrade surface preparation has been completed by the Contractor, and has been approved by the County and QA/QC Consultant.

- b. Areas of excavation shall be graded to drain at all times, and necessary precautions shall be taken to control dust and erosion. The Contractor's access roads shall be maintained as necessary for Contractor, County, and QA/QC personnel, including landfill operation access. Unless specifically required by the Contract Documents, excavations shall not be carried below the design lines and grades shown on the plans or as otherwise recommended by the QA/QC Consultant and approved by the County in writing. Unauthorized over-excavation shall be immediately corrected by backfilling to grade with engineered fill (in accordance with Section 4.3.5 of the Special Provisions) at the Contractor's expense.
- c. Excavated material from within the project grading limits shall be used by the contractor as a source of material for executing the following work items and miscellaneous tasks: engineered fill, screening operation to produce protective soil material, supplying daily cover material for landfill operations, and any other miscellaneous tasks required by the Contract Documents or as directed by the County.
- d. In addition, it is anticipated that some clay material will be encountered during the excavation operation. As this clay material is encountered, the Contractor will be directed by the County and the QA/QC consultant to excavate, haul, and stockpile this clay material on the existing Clay Stockpile as shown on the Project Drawings or at a location mutually agreed upon by the Contractor and County. The County has already stockpiled approximately 28,000 cubic yards of unprocessed clay material at that location during previous excavation projects. This clay material is designated for use by the contractor during this project in order to produce low permeability material as further described in section 4.3.7 of these Special Provisions.
- e. Throughout the duration of the Project, the Contractor shall also be required to provide the County with excavated material for use as daily cover material in the County's landfill disposal areas, as shown on the Project Drawings. The total daily cover material quantity is estimated to be approximately between 500 to 800 cubic yards per day. The Contractor

will be required to transport the excavated material anywhere within the limits of the active landfill operations as directed by the County.

- f. All remaining quantity of excavated material shall be placed by the contractor in the three designated on-site soil stockpile areas (Soil Stockpiles A, B, and C) as shown on the Project Drawings. However, instead of stockpiling this excess excavation material on-site, the contractor shall have the option of exporting this remaining material of the total excavation quantity off-site. In this case, the Contractor shall be required to comply with the guidelines and conditions for the performance of the off-site dirt haul found in Appendix G.

- g. Should the contractor elect to stockpile the excess excavated material at the site, three (3) designated locations for stockpiling this material are made available for this purpose and are shown on the Project Drawings. These are referred to as the "Soil Stockpile A," "Soil Stockpile B," and the "Soil Stockpile C." Soil Stockpile A is located within the northeast portion of the project grading limits as shown on the Project Drawings; therefore, design subgrade in this area must be achieved and accepted by the County prior to commencing any stockpiling activities. The total design capacity for Soil Stockpile A is approximately 250,000 cubic yards. Soil Stockpile B is located along the westerly boundary of the project's grading limits as shown on the Project Drawings, and it will be established on an existing soil stockpile that was created during previous construction projects at this site. The total design capacity for Soil Stockpile B is approximately 500,000 cubic yards. The Contractor shall stockpile the excavated material within Stockpiles A and B and reach design grades at both stockpiles as indicated in the Project Drawings prior to beginning any stockpiling activities in Soil Stockpile C. Soil Stockpile C is located north of the project's grading limits as shown on the Project Drawings, and it will also be established on an existing stockpile that was created during previous construction projects at this site. The total design capacity for Soil Stockpile C is approximately 500,000 cubic yards.

- h. Surface drainage shall be maintained at all times in the stockpile areas, and the completed stockpile areas shall be graded as shown on the Project Drawings and as directed by the County. Final stockpile surfaces shall be finished by track walking and left in a uniformly graded condition. Surfaces of flat areas shall be finish-graded with a motor grader or approved equal. The Contractor shall construct drainage and erosion control facilities in accordance with the Project Drawings within the completed portions of the three stockpile areas, and as required by the Contract Documents, or as directed by the County.

- i. As indicated above, instead of stockpiling any excess excavated material on site, the Contractor shall have the option of exporting this excess material off-site under the condition that a maximum of 375 truck loads will be allowed per working day in standard bottom dump trucks. The County may decrease the permitted truck loads per working day if the County determines that the traffic levels are causing unsafe conditions or that they are having a negative impact on landfill operations. Offsite material haul operations can only be carried out from Monday through Friday between the hours of 7:00 am and 3:30 pm.

If the Contractor plans to export off-site, the County shall be notified of the anticipated quantity of material to be exported, in writing, at least 10 calendar days prior to the commencement of the material export. The Contractor shall be required to comply with the guidelines and conditions for the performance of the off-site dirt haul found in Appendix G. The Contractor shall be responsible for providing all construction management oversight for the material removal, including, but not limited to, dust control, street sweeping, traffic control, survey control, and sediment control related to material removal.

Measurement and payment to the Contractor for excavated material shall be based solely upon the method described in Section 4.4 of these Special Provisions. If material is transported off-site, the Contractor shall be required to track the amount of material removed from the site. For progress payment purposes only, the quantity of material hauled off-site by the Contractor shall be determined by using the truck load count method. One truck load shall be equal to 14.0 cubic yards of material for standard double trailer bottom dump trucks, regardless of the amount of material that each truck actually contains.

- j. Unsuitable excavated material, as identified by the QA/QC Consultant or the County, shall be placed in the designated stockpile area or hauled offsite, and shall not be used as engineered fill. The Contractor shall not be compensated for any earthwork activities which deviate from what is required by the Contract Documents. The Contractor shall be charged actual costs for construction testing and inspection due to any unauthorized haul road alteration.
- k. Side slopes shall be cut to an inclination not steeper than 1.5:1 (H:V) unless otherwise shown on the Project Drawings. The Contractor shall observe temporary and permanent excavations on a regular basis for signs of instability. Should signs of instability be noted, the Contractor shall notify the County and the QA/QC Consultant immediately, and shall undertake remedial measures as soon as practicable, subject to the

direction and approval of the County and the QA/QC Consultant. It shall be the Contractor's responsibility to remove all loose materials from the excavated slopes, and to maintain the slopes in a safe and stable condition at all times during the progress of the work and during any temporary closure of the work. Permanent cut slopes shall be left in a clean, safe, and stable condition upon completion of the work.

1. Where necessary, trenches, pits, and other excavations shall be properly sheathed and braced to furnish safe and acceptable working conditions. Any damage occurring from excessive earth pressures, slides, cave-ins, or other causes due to failure to provide proper sheathing or bracing, or through other negligence or fault of the Contractor, shall be repaired by the Contractor at its expense. The manner of bracing for excavations shall be as set forth in the rules, orders, and regulations of the Division of Industrial Safety of the State of California or OSHA; whichever is more restrictive.

4.3.4 OVER-EXCAVATION

Areas identified by the QA/QC Consultant during construction to require over-excavation shall be excavated to limits as determined by the County and/or the QA/QC Consultant. After excavation, the area shall be backfilled and compacted in accordance with Subsection 4.3.5. "Engineered Fill" to subgrade elevations in accordance with the Project Drawings. The excavation of these materials shall not, in quantity, include the material excavated for the convenience of the Contractor's operations. Prior to placing engineered fill material, the Contractor shall clear all stabilization, buttress, and key-way fill areas within the limits of over-excavation of loose slough materials. Prior to the placement of any engineered fill, the QA/QC Consultant must approve any areas cleared of loose slough material.

Measurements of any over-excavation and engineered fill quantity shall be based on comparison of the County-surveyed ultimate over-excavation surface (limited as determined by the County and/or the QA/QC Consultant) and the finished subgrade surface as shown on the Project Drawings. The Contractor, therefore, shall notify the County in writing a minimum two (2) days prior to the placement of the engineered fill within the over-excavated areas, and shall allow two (2) working days for the County to complete the necessary surveying work. Payment for any over-excavation quantity shall be made based on the unit price per cubic yard as stated in Bid Item No. 5 "Earthwork (Excavation, Over-excavation & Stockpiling)". Payment for placing of the corresponding engineered fill quantity shall be made based on the unit price per cubic yard as stated in Bid Item No. 6 or 7 "Engineered Fill @ 90% Relative Compaction" or Engineered Fill @ 95% Relative Compaction", respectively.

4.3.5 ENGINEERED FILL

- a. Under the direction of the QA/QC Consultant, only suitable material encountered within the excavation areas shall be utilized in the engineered fill areas, and all unsuitable material shall be removed and hauled to the soil stockpile area designated on the Project Drawings, or as otherwise directed by the County.

- b. Where compacted engineered fill is required, as shown on the Project Drawings or as directed by the County or QA/QC Consultant, on-site soil shall be placed and compacted in layers as specified herein. The Contractor shall spread soil evenly by mechanical equipment over the prepared subgrade. The Contractor shall place engineered fill material in lifts with an un-compacted thickness no greater than eight (8) inches. Each lift shall be spread evenly, thoroughly mixed, and compacted to obtain a near uniform condition in each layer. In areas of lift thickness greater than specified herein, the Contractor, prior to construction of additional lifts, must complete re-grading and compacting of the surface to the maximum specified lift thickness. The top of each previously compacted layer shall be scarified so that there is no lamination between layers.

- c. Engineered fill material within the landfill toe berm and basin embankment shall be compacted to a minimum of 95% relative compaction, based on the laboratory maximum dry density, determined by ASTM D1557 and shall be constructed to the lines and grades indicated on the Project Drawings or as directed by the County or QA/QC Consultant. The 95% compacted engineered fill shall properly keyed into undisturbed bedrock or firm material five (5) feet below subgrade elevations in accordance with the Contract Documents and as approved by the County and QA/QC Consultant. The remaining engineered fill shall be compacted to a minimum of 90% relative compaction, based on the laboratory maximum dry density, determined by ASTM D1557 at the specific locations shown on the Project Drawings. Engineered fill over cut slopes, or scarified natural steep slopes shall be properly keyed into undisturbed bedrock or firm material in accordance with the Contract Documents and as approved by the County and QA/QC Consultant.

- d. All general on-site soil material used for engineered fill shall have moisture content between OMC and 2% above OMC in accordance with ASTM D1557 or as determined by the QA/QC Consultant. Additional water may need to be added at any time during construction. The moisture content of the engineered fill materials prior to and during compaction shall be uniform throughout each layer of the material.

- e. When the moisture content of the fill material is below optimum, water shall be added until the moisture content is within the limits required to assure an adequate bonding and compaction of all fill material. When the moisture content of the fill material is above the specified limits, the fill material shall be aerated by plowing, discing, blading, or other satisfactory methods until the moisture content is acceptable. All plowing, tamping, blending, discing, or air drying of material is considered incidental to the work and no additional compensation will be allowed. Wetting of materials by rain or artificial means to an unacceptable moisture content will require mixing or air drying to return this material to the required moisture content. Complying with this requirement is considered incidental to the work and no additional compensation will be allowed.
- f. Surfaces of all slopes outside the geosynthetic liner limits shall be finished by track walking and left in a uniformly graded condition. Surfaces of flat areas shall be finish graded with a motor grader or approved equal.
- g. All surfaces within the geosynthetic liner limits shall be prepared in accordance with the requirements of Section 5 of these Special Provisions.

4.3.6 LANDFILL ACCESS RAMP

This work shall include furnishing all labor, supervision, tools, and equipment necessary to complete the work for constructing the landfill access ramp as required by the Contract Documents. Prior to construction of the landfill access ramp, the liner subgrade surface within the ramp's grading limits, as shown on the Project Drawings, shall be surveyed, certified, and accepted by the County or QA/QC Consultant. Prior to placing material for the landfill access ramp, two-foot wide strips of geotextile material spaced every 10 feet on center shall be placed directly over the certified liner system (on top of the protective soil layer) to indicate the top of the liner system.

The landfill access ramp shall also be prepared and comply with the applicable requirements of Section 4.3.5 "Engineered Fill." The material shall be compacted to a minimum of 90% relative compaction, based on the laboratory maximum dry density, determined by ASTM D1557 at the specific locations shown on the Project Drawings. The material shall also have moisture content between OMC and 2% above OMC in accordance with ASTM D1557 or as determined by the QA/QC Consultant.

4.3.7 LOW-PERMEABILITY LAYER

- a. This work shall include furnishing all labor, supervision, tools, and equipment necessary to complete the work for constructing the low permeability layer (LPL) as required by the Contract Documents. This work requires the Contractor to excavate and haul the existing material from the clay stockpile shown on the Project Drawings, to a screening

plant, screen and process this material to maximum 1-inch particle size (that is, particles no greater than 1-inch in size), and haul to the Phase 2, Stage 4 liner area in order to construct the LPL. This material will then be uniformly placed and uniformly moisture conditioned, and compacted. The LPL shall be constructed only on the canyon floor area within the liner limits as shown on the Project Drawings and shall be 12-inches thick with a saturated hydraulic conductivity (permeability) of 1×10^{-6} cm/sec or less, as verified by the ASTM D5084. Geosynthetic liner layers, followed by the installation of LCRS, will then be placed over the compacted LPL as shown in the Project Drawings and as directed by the County and QA/QC Consultant.

- b. The County has selectively stockpiled approximately 28,000 cubic yards of unprocessed clay material that is determined to be suitable for LPL in a stockpile as shown on the Drawings. In general, the Contractor shall be responsible for hauling the materials from the stockpile to a screening plant and screen, process, moisture condition, and cure the processed materials prior to using them for LPL construction. This screened material shall be used by the Contractor only for the construction of the LPL as required by the Contract Documents. The Contractor shall be responsible for maintaining and protecting the screened material stockpile, thus avoiding contamination with any other materials containing particle size larger than 1 inch, or any other potential source of contamination. The Contractor shall also be responsible for maintaining surface drainage at all times in the screened material stockpile area.
- c. A minimum of ten days prior to LPL placement, the Contractor shall submit for the County's and QA/QC Consultant's approval their screening and processing plan for LPL material. This plan shall include the type and production rates of screening plant, screen opening size, and support equipment for moisture conditioning, mixing, and breaking down any clods. During the Contractor's processing and screening operations, the QA/QC Consultant shall perform sampling and laboratory testing on the processed minus 1-inch material to determine its properties and its suitability for LPL construction. The cost of these tests will be borne by the County. Based on the results of these tests, the QA/QC Consultant will provide guidance regarding the range of moisture contents suitable to achieve the required hydraulic conductivity of 1.0×10^{-6} cm/sec or less. The Contractor shall moisture condition the screened pile as appropriate and allow the material to cure for a period of at least 24 hours prior to hauling it to the LPL placement area. The Contractor's screening and LPL placement schedule shall take the curing period into account.

- d. Prior to placement of any LPL material, the Contractor shall construct a test pad at least 100 feet long by 20 feet wide by 1 foot thick on portion of the canyon floor area within the liner limits to demonstrate to the County and QA/QC Consultant that the Contractor's procedures and equipment are adequate to meet the project requirements for the LPL. If the test pad is approved by the County and the QA/QC Consultant, the Contractor shall use the same procedures and equipment for placement and compaction of all LPL material. The Contractor shall not commence any construction activities related to the LPL without procedures and equipment specifically approved by the County and the QA/QC Consultant.
- e. Placement of the LPL material, including construction of the test pad, shall begin after the County has verified the constructed subgrade. The material shall be hauled from the screened stockpile and be uniformly spread on the prepared and scarified (to prevent lamination of the fill) subgrade surface to provide a loose lift thickness not exceeding eight inches (8"). Scarification shall be performed by construction equipment such as by dozer tracks or approved equal.
- f. Removal of oversize particles (greater than 1-inch size) shall be performed by the Contractor during this operation by methods and equipment approved by the County and QA/QC Consultant. Any clods of material greater than 1-inch size shall be broken down by suitable equipment.
- g. After spreading and oversize particle removal, the lift shall be moisture conditioned by a carefully controlled spray nozzle or processed by appropriate means to achieve uniform moisture conditioning. The moisture content shall be in the range of 2 to 4 percent over optimum as verified by ASTM D 1557 or as determined by the QA/QC Consultant and as approved by the County.
- h. Following moisture conditioning, the lift shall be compacted by a compaction method proposed by the Contractor and approved in advance by the County and QA/QC Consultant. The LPL material shall be compacted to a dry density of at least 95 percent of the maximum dry density determined by ASTM D1557.
- i. The QA/QC Consultant will perform gradation analysis, in-situ density tests, in-situ hydraulic conductivity tests and will recover representative tube samples for laboratory hydraulic conductivity tests. The QA/QC Consultant at the County's expense shall perform compaction testing and hydraulic conductivity testing. If some test samples have failed the

compaction tests and/or if the Contractor failed to follow proper procedures in achieving required compaction as specified in the Contract Documents, the failed areas shall be reworked by the Contractor at the direction of the QA/QC Consultant or the County at the Contractor's expense. The QA/QC Consultant shall perform the retest of areas, which have failed the specified tests. The cost of these retests shall be borne by the Contractor.

- j. After construction and compaction of the LPL specified in the Contract Documents, the finished surface shall be fine graded to the elevations shown on the Project Drawings. This finished surface shall be rolled with an approved steel drum roller to create a smooth and uniform surface free of rocks, debris, sharp objects or any other objects, which may damage the geosynthetic liner. No protrusions greater than 3/8 inch are allowed on the finished LPL surface. Furthermore, this finished surface shall be graded to eliminate potential for ponding. The finished top surface of the LPL shall be suitable for FML installation as specified in these Special Provisions.
- k. The surface of the LPL shall be covered with the 60-mil FML as soon as practicable to minimize development of desiccation cracks, saturation, or erosion damage. Any cracking, saturation, or erosion, which occurs prior to covering with the FML, shall be repaired at the direction of the QA/QC Consultant to the satisfaction of the County at the sole expense of the Contractor.
- l. The compacted LPL shall be maintained at moisture content between 2% and 4% above OMC and shall be prevented from drying or becoming saturated prior to placement of the 60-mil FML. Any drying, cracking, rutting, saturation, or unevenness shall be repaired and re-compacted to the satisfaction of the County and QA/QC Consultant at the sole expense of the Contractor.
- m. When the National Weather Forecast predicts rain for the local area, all exposed sections of the LPL shall be covered by the Contractor to prevent damage from excess moisture. Covering material shall consist of the required FML layer or a temporary synthetic protective cover approved by the County and QA/QC Consultant. The contractor shall repair any damage resulting from the application or removal of this cover by removing, reprocessing, and re-compacting the material to the satisfaction of the County and QA/QC Consultant. Costs associated with protection of the LPL, installation or removal of temporary cover materials or repair of the low-permeability subgrade layer due to damage of any kind shall be borne by the Contractor with no additional payment allowed.

4.3.8 EARTHEN BERMS

- a. The earthen berms shall be constructed at the locations and to the dimensions shown on the Project Drawings and as directed by the County. The earthen berms shall be constructed in accordance with the details included in the Project Drawings and other requirements of the Contract Documents.
- b. The earthen berms required in this project are intended to divert surface water run-off. All the berms shall be constructed of regular on site material obtained directly from the excavation area or from the soil stockpile area and be compacted to a minimum of 90% relative compaction. The construction material for earthen berms shall not contain brush, roots, sod, or other deleterious or unsuitable materials.
- c. The earthen diversion berms shall be constructed in accordance with the requirements of Section 4.3.5 "Engineered Fill" of these Special Provisions.

4.3.9 PROTECTION OF GROUNDWATER WELLS

All groundwater wells shall be protected in place during the entire project. The steel well monument and the well casing protective cap shall be in place during the entire project, to ensure no debris (including soil, grout and rock) enters a well during the project. If a well is damaged and/or the integrity of the well casing is compromised, or suspected to be compromised by the County at any time during the project, the Contractor shall notify the County immediately. The County will visually assess the condition of the well, and if necessary, collect water quality samples from the well. The County shall compare the water quality samples with historical well water quality data to assess potential damage and/or compromised integrity of the well. At the County's request, the Contractor shall video log the well to assess the integrity of the well and provide the video log to the County for review. If the video log reveals that the well is damaged and/or the County deems the well's integrity is compromised, the Contractor will repair and/or replace the well.

4.4 MEASUREMENT AND PAYMENT

- A. The last available ground topography contours for the site were generated from a combination of an aerial flight survey conducted on December 28, 2010, and a conventional ground survey method completed on January 10, 2012. Due to the ongoing landfill operations, this composite ground topography will not reflect the actual field conditions at the time of award of this contract. Because of this, all earthwork quantities in the "Contractor's Proposal" are only estimates which have been primarily determined by using the aforementioned composite ground topography. However, in order to generate an updated ground topography

contour map which will be used as the base map (or pre-construction ground) for this project, the County will conduct an aerial flight survey prior to the issuance of the Notice to Proceed. This survey will be used to generate an updated ground topography contour map (pre-construction ground contours) that will be used to determine the final pay quantities for all applicable bid items.

- B. Unless otherwise stated, the final measurement of all earthwork quantities for the various layers shall be calculated to the nearest cubic yard or the nearest square foot based only upon comparison of pre-construction and post-construction surfaces of the project work. These surfaces shall be established by a combination of conventional ground surveying done by the County and aerial flight surveys of the project work area. Unless otherwise stated, the surface for any layer which will be covered by subsequent layers shall be established by ground surveying. The surface for any layer which will not be covered shall be established by aerial flight survey. The Riverside County Flood Control and Water Conservation District shall conduct the aerial flight surveys at the County's request immediately following the completion of work. Final volumetric calculation of earthwork quantities for payment purposes shall then be performed by the County based upon the resulting Digital Terrain Models (DTM) using the grid volume method with a grid interval of five (5) feet by five (5) feet. It should be noted that different methods may be used by the County for determining quantities for progress payments. However, the earthwork quantities used for progress payments will be adjusted at the completion of the project based upon the final measurement method stated in this paragraph.
- C. Allowable deviation from design grades shown on the Project Drawings shall be ± 0.10 feet on all benches, canyon floor areas, and access roads within the project grading limits; and ± 0.25 feet for all remaining areas within the project grading limits. Limits for measurement of the excavations and fills shall be to the lines and grades as shown on the Project Drawings or as directed by the County and QA/QC Consultant. Notwithstanding this deviation, the minimum thickness of the LPL shall be no less than 1 foot.
- D. Payment for "*Remove and Dispose or Salvage Miscellaneous Structures*" shall be based upon lump sum as stated in the Contractor's Proposal, **Bid Item No. 4**, and shall be prorated in each progress payment in accordance with the following schedule:

Demolition Item	Percent Payment
1. Saw-cut and salvage all asphalt material from drainage structures encountered within the Project work limits and haul to the designated stockpile location as shown in the Project Drawings or as directed by the County.	25%
2. Remove and salvage grouted rip rap stones, and haul and haul to the designated stockpile location as shown in the Project Drawings or as directed by the County.	25%
3. Remove and salvage all CMP pipes, drop inlet structures, metal flumes, and appurtenances and haul to the designated stockpile location as shown in the Project Drawings or as directed by the County.	10%
4. Remove and temporary store the existing 10,000-gallon leachate tank including all related accessories. Demolish and dispose of the existing HDPE secondary containment structure for the leachate tank and any other miscellaneous items. Remove and salvage existing leachate and condensate reinforced concrete foundation pad and haul to the designated stockpile location as shown in the Project Drawings or as directed by the County.	25%
5. Remove and dispose of any plastic drainage channels, fiber rolls, hay bales, sandbags, and any other items found in the project work area as directed by the County.	10%
6. Cut and remove abandoned 10" Diameter water well pipe backfilled with cement/bentonite and remove pipe 1-foot below finished subgrade. Abandon survey control markers. Cut and cap gas probe pvc pipes 1' below surface and remove and salvage steel monument.	5%

The work covered by this bid item shall be in accordance with the Contract Documents and shall include but not be limited to: removal, salvaging and/or demolishing and disposal of materials encountered during construction within the project grading limits. Contractor shall dispose of and/or store all items specified in the Contract Documents to an on-site location as shown on the Project Drawings or as directed by the County representative in the field.

Payment shall constitute full compensation for all labor, materials, tools, equipment, and all other items necessary and incidental to completion of this item of work.

- E. The measurement of the final quantity for Bid Item No. 5 "Earthwork (Excavation, Over-excavation, & Stockpiling)" shall be based only on the total excavation quantity as determined by comparing the pre and post construction ground surfaces within the grading limits in the project. The pre-construction

ground surface shall be established by a combination of conventional ground survey and aerial flight survey, and the post-construction ground surface for this work shall be established by ground surveying. **Payment** for excavation of all materials and hauling and placing material into soil stockpile areas, hauling excess excavated material offsite as part of the optional off-site dirt haul operation, hauling excavated material to the landfill operation for daily cover, and any other work required to reach subgrade elevations shall be made based on the unit price per cubic yard for excavation, as stated in the Contractor's Proposal, Bid Item 5. If the contractor plans to remove material from the site, the County expects this will be included in the Contractor's per cubic yard bid price for Bid Item 5 Earthwork (excavation, over-excavation & stockpiling) as a credit to the County (that is, the Contractor's per cubic yard bid prices will be lower). In addition, compensation for clearing, grubbing, and protection of existing groundwater well or any other environmental monitoring structures within the project grading limits shall be considered as included in the contract unit price for **Bid Item No. 5**, as stated in the Contractor's Proposal. There shall be no additional payment specifically for clearing and grubbing, or for protection of any environmental monitoring structures within the project grading limits. Clearing and grubbing material shall be hauled to the designated stockpile area, as shown on the Project Drawings or as directed by the County.

- F. The measurement of the final quantity for Bid Item No. 6 "Engineered Fill @ 90% Relative Compaction" shall be based only on the total engineered fill quantity as determined by comparing the pre construction ground surface and the finished subgrade surface within the 90% compacted engineered fill grading limits as shown on the Project Drawings. The pre-construction ground surface shall be established by a combination of conventional ground survey and aerial flight survey, and the post-construction ground surface for this work shall be established by ground surveying at completion of the finished subgrade surface. **Payment** for the placement of engineered fill shall be made based on the unit price per cubic yard for engineered fill, as stated in the Contractor's Proposal, **Bid Item No. 6**.
- G. The measurement of the final quantity for Bid Item No. 7 "Engineered Fill @ 95% Relative Compaction" shall be based only on the total engineered fill quantity as determined by comparing the pre construction ground surface and the finished subgrade surface within the 95% compacted engineered fill grading limits as shown on the Project Drawings. The pre-construction ground surface shall be established by a combination of conventional ground survey and aerial flight survey, and the post-construction ground surface for this work shall be established by ground surveying at completion of the finished subgrade surface. **Payment** for the placement of engineered fill shall be made based on the unit price per cubic yard for engineered fill, as stated in the Contractor's Proposal, **Bid Item No. 7**.

- H. The measurement of the final quantity for Bid Item No. 33 "Construct Landfill Access Ramp" shall be based only on the total 90% compacted material placed as determined by comparing the County-surveyed certified protective soil ground surface and the finished landfill access road surface within the grading limits shown on the Project Drawings. **Payment** for the construction of the landfill access ramp shall be made based on the unit price per cubic yard for 90% compacted material placed, as stated in the Contractor's Proposal, **Bid Item No. 33**.
- I. The measurement of the final quantity for Bid Item No. 8 "Construct Low-Permeability Layer" shall be determined by measuring the floor surface area within the LPL limits as specified in the Contract Documents. Measurement shall be determined after the LPL has been installed, tested, and verified by the QA/QC Consultant to the satisfaction of the County. The final surface shall be verified by County based on conventional ground surveying method. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling methods. **Payment** for low-permeability layer, as required to reach plan subgrade elevations and prepare liner subgrade within the canyon floor area, shall be at the contract unit price per square feet as stated in **Bid Item No. 8** and shall constitute full compensation to the Contractor for all work related to the construction of low-permeability layer in the project including but not limited to: furnishing all labor, supervision, materials, tools, and equipment; excavating and hauling the existing material from the clay stockpile to a screening plant, screening, processing, moisture conditioning, segregating materials, curing, and temporary stockpiling the screened material; performing excavation of 1-inch screened stockpiled clay material, construction of the test pad, hauling, loading, discing, processing, moisture conditioning, removing oversize particles, compacting, grading, shaping, surveying, construction of temporary haul roads, and any other requirements by the Contract Documents for the construction of a low-permeability layer. **Payment** shall also constitute full compensation to the Contractor for subgrade preparation for the canyon floor liner system in accordance with the requirements of Section 5 - "Finished Subgrade Surface Preparation for Geosynthetics" of these Special Provisions. All other work required by the Contract Documents to complete the construction of the low-permeability layer shall be considered incidental to the work and will not be paid for separately.
- J. The measurements of the final quantity for Bid Item 64 "Construct Earthen Berms" shall be determined by the County based on field measurements of the axial length (linear feet) of 90% compacted earthen berms constructed at the locations and to the dimensions shown on the Project Drawings. **Payment** for the construction of earthen berms shall be at the contract unit price per linear foot as stated in the Contractor's Proposal, **Bid Item No. 64** and shall constitute full compensation to the Contractor for all work related to the construction of earthen

berms in the project including but not limited to: furnishing all labor, supervision, materials, tools, and equipment; excavating, hauling, loading, moisture conditioning, compacting, grading, shaping, surveying, construction of temporary haul roads, and any other requirements by the Contract Documents for the construction of earthen berms.

- K. No additional compensation will be allowed for removal, reprocessing, or re-compaction of material not meeting the requirement of the Contract Documents. No payment shall be made for excavation or fill outside the limits as shown on the Plans.

END OF SECTION 4

SECTION 5 - FINISHED SUBGRADE SURFACE PREPARATION FOR GEOSYNTHETICS

5.1 GENERAL

This section includes the work necessary to finish the surfaces of earth subgrade within the limits to receive geosynthetics liner materials on side slopes and benches. All costs associated with finished subgrade preparation for Geosynthetics shall be included in Bid Item 9, "Finished Subgrade Surface Preparation for Geosynthetics". The subgrade preparation for geosynthetics for bottom liner shall be in accordance with the requirements of Section 4.3.7 of the Special Provisions.

5.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

D6102-97 Standard Guide for Installation of Geosynthetic Clay Liner

5.1.2 QUALITY ASSURANCE/QUALITY CONTROL

All work shall be performed in accordance with the QA/QC Plan.

Prior to the start of work, the Contractor shall discuss with the County, at a minimum, the procedures, equipment and techniques to be used to prepare subgrade surfaces. The County shall have the authority to order an immediate stoppage of work because of non-standard preparation procedures, or for any condition which may result in a deficient earth subgrade surface to receive the geosynthetics.

5.2 MATERIALS

Materials shall comply with the applicable requirements of Section 4.2, "Materials" for on-site soils as required.

5.3 EXECUTION

- A. Prior to the start of preparation of the earth subgrade surface to receive the Geosynthetics on side slopes and benches, a site inspection shall be conducted by the Contractor, the County and QA/QC Consultant to verify surface conditions required to support the Geosynthetics. All areas receiving geosynthetic liner shall be smooth drum rolled prior to installation of geosynthetics.
- B. Before final rolling and compaction of the earth subgrade commences, it shall be free from abrupt breaks, sharp objects, survey or grade control stakes or nails, and other foreign materials that may inhibit proper placement of Geosynthetics on the subgrade. For areas not accessible to large compaction equipment, final smoothing of the earth subgrade surface shall be performed by approved

mechanical or hand tamping methods, as approved by the County and QA/QC Consultant.

- C. The surfaces of the completed earth subgrade shall be smooth, uniform and free from sudden changes in grade, surface voids and un-compacted areas. Final subgrade preparation shall not precede the geosynthetics installation by more than 48 hours, in order to minimize potential damage due to wind, rain and the actions of man and animals. The surface of the earth subgrade shall be prepared to the tolerances and conditions specified in the Contract Documents.
- D. The subgrade surfaces shall have a smooth finished surface and shall be prepared according to ASTM D6102. The surface shall not be pebbly or tracked and rutted by equipment and shall be free from pockets, holes, and discontinuities that in the judgment of the County and QA/QC Consultant could cause bridging and over stressing of the liner. In addition, all rocks or coarse particles projecting by more than 3/8-inch above the finished surface shall be buried or removed.
- E. The finished subgrade surface shall not be wet or in any condition which will impede proper installation of liner. Under no circumstances shall the Geosynthetics be placed over standing or running water on the subgrade. The Contractor shall be responsible for maintaining the integrity of the Geosynthetic liner throughout the duration of the project. Vehicles or personnel that may damage the subgrade or cause ruts shall be kept off the subgrade once the surface is constructed to the design elevations.

5.4 MEASUREMENT AND PAYMENT

The measurement of the final quantity for Bid Item No. 9 "Finished Subgrade Surface Preparation for Geosynthetics" shall be based on final square footage of ground surface after it has been prepared and tested to the satisfaction of the County and QA/QC Consultant. The area of the final ground surface shall be determined by the County based on conventional ground surveying method. Quantities shall be calculated to the nearest square foot. Limits of surface to be prepared are shown on the Project Drawings. No separate payment shall be made for finish subgrade preparation for the Low Permeability Layer on canyon floor area, the payment for this work shall be deemed to have been included under Bid Item No. 8 for the construction of the Low Permeability Layer. **Payment** for finished subgrade preparation shall be at the contract unit price per square foot as stated in **Bid Item No. 9** and shall constitute full compensation to the Contractor for all work related to finished subgrade preparation on side slopes and bench areas within the geosynthetic liner limits in the project including but not limited to: furnishing all labor, supervision, materials, tools, and equipment necessary to finish the surfaces of earth subgrade to receive geosynthetics in accordance with the Contract Documents.

END OF SECTION 5

SECTION 6 - ANCHOR TRENCH CONSTRUCTION

6.1 GENERAL

This work shall include furnishing all labor, supervision, tools, equipment, and materials necessary to complete the work of constructing anchor trench along bench and slope alignments in accordance with the Contract Documents and Project Drawings. This work includes but is not limited to the excavation of the anchor trench along the alignments shown on the Project Drawings to the depths and widths indicated in the design details prior to FML and/or GCL deployment; hauling and stockpiling the excavated material; screening material for trench backfill; and backfilling and compacting the anchor trench with the screened material as specified in Section 6.3.4 "Backfill and Compaction". All construction of the anchor trench shall conform to applicable requirements of the Standard Specifications and to the requirements of the Contract Documents.

6.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

D1557-00 Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort

6.2 MATERIALS

Backfill material for all anchor trenches shall have maximum particle size no greater than 3 inches. The Contractor shall screen material obtained directly from the project excavation area to produce the required trench backfill material. The soil used for the anchor trench backfill shall be free from organic or other unsuitable material. In general, backfill materials shall be prepared and comply with the applicable material requirements of Section 13.2.B, "Materials" for the protective soil layer for the canyon floor liner.

6.3 EXECUTION

6.3.1 EXCAVATION

The anchor trench shall be excavated to the line, depth and width shown on the Project Drawings, prior to geosynthetic liner system placement. Excavated material from anchor trenches shall be hauled to the designated stockpile areas or disposed of at a suitable location within the site under the direction of the County and without additional cost. The anchor trench shall be excavated a maximum of 200 feet ahead of liner placement to eliminate the potential damage (due to rain or wind or other cause) of an open trench. The QA/QC Consultant and the County shall verify that the anchor trench has been constructed according to Project Drawings. Temporary

diversion of storm water away from the anchor trench shall be provided by the Contractor to protect the open anchor trench from damage.

6.3.2 ANCHOR TRENCH REQUIREMENTS

Slightly rounded corners shall be provided in the trench where the FML, GCL, and geotextile enter the trench so as to avoid sharp bends in the FML, GCL, or geotextile. All sharp or protrusive objects, which could cause damage to the FML, GCL, or geotextile shall be removed from the trench in such a manner as to maintain the integrity of the trench. Areas of the trench which are damaged by the removal of unacceptable material from the trench, shall be repaired to the satisfaction of the County and QA/QC Consultant. This may require the reconstruction or widening of the trench at the sole discretion of the County. No loose soil shall be allowed to underlie the FML, GCL, and Geotextile. No water shall be impounded in the trench. Compliance with the requirements of this section is considered to be part of this item of work and no additional compensation shall be allowed for complying with this section.

6.3.3 SECURING OF FML, GCL, AND GEOTEXTILE

The Contractor shall use sand bags to secure the ends of the FML, GCL, and Geotextile panels in the anchor trench while the seaming takes place.

6.3.4 BACKFILL AND COMPACTION

- a. Only screened materials (3" maximum particle size) shall be used for anchor trench backfill as required in Section 6.2 of these specifications.
- b. Backfilling and compaction of the trench shall be done in such a manner that the FML, GCL, and Geotextile are completely seamed and approved by the QA/QC Consultant. The progression of anchor trench backfilling shall proceed in such a manner that no more than 100 lineal feet of anchor trench contains FML, GCL, and Geotextile panels which have been completely seamed and approved by the QA/QC Consultant but are not backfilled. At the end of each day, all FML, GCL, and Geotextile panels, which have been seamed, tested, and approved by the QA/QC Consultant, shall be backfilled. The final 100 lineal feet of trench backfilled at the end of each day need not be compacted until the following morning, unless work is not scheduled to be performed the following day (i.e. weekend day or holiday). In this instance, all panels of FML, GCL, and Geotextile in the trench, which have approved seams, shall be backfilled and compacted on the same day.
- c. Trench backfill material shall be placed in maximum eight-inch (8") thick loose lifts (as approved by the County and QA/QC Consultant) and compacted by hand operated light compaction equipment such as a vibratory compaction foot or other equipment as approved by the County and QA/QC Consultant. Light rubber-tired or other light compaction

equipment may be used to compact the upper 8 inches of the trench without causing damage to the synthetic liner system and as approved by the County and QA/QC Consultant.

- d. Compaction and required moisture content shall be in accordance with the requirements of Section 4.3.5, "Engineered Fill". A minimum of 90% relative compaction (ASTM D1557) is required. At no time shall construction equipment come into direct contact with the geosynthetic liner system. If damage occurs, it shall be repaired by the Contractor at its expense prior to the completion of backfilling.

6.4 MEASUREMENT AND PAYMENT

The measurement of the final quantity for Bid Item No. 10 "Excavate & Backfill Anchor Trench" shall be determined by the County in terms of linear feet along the centerline of anchor trenches. This work shall constitute full compensation to the Contractor for all work related to the construction of anchor trenches as required by the Contract Documents and shall include but is not limited to: excavation, stockpiling the excavated material, screening material for trench backfill, securing the ends of GCL, FML, Geotextile, and protective membrane panels, backfilling and compacting the anchor trench, and all other related work. **Payment** shall be made, at the unit price per actual linear feet of completed anchor trench as stated in the Contractor's Proposal, **Bid Item No. 10**. No additional payment will be allowed for any removal, replacement, re-compaction or any other repairs required to provide an anchor trench in compliance with the Contract Documents. All other work required to construct the anchor trench but not specifically described herein, shall be considered incidental to the work and will not be paid for separately.

END OF SECTION 6

SECTION 7 - GEOSYNTHETIC CLAY LINER (GCL)

7.1 GENERAL

This item of work shall include furnishing all labor, supervision, tools, equipment, and material necessary to complete the work of installing a geosynthetic clay liner (GCL). The GCL shall be installed on the canyon floor, the side slopes, and benches within the limits shown on the Project Drawings and as directed by the County.

All construction operations relating to the installation of the GCL shall conform to applicable requirements of the Standard Specifications, to the requirements of the Contract Documents and the manufacturer's recommendations. This process shall result in the installation of a continuous GCL that meets or exceeds the specified minimum average roll values in Section 7.2 of the Special Provisions.

7.1.1 REFERENCES

The following reference standards and specifications, including documents referenced therein, form part of this section:

American Society for Testing and Materials (ASTM):

- D 4632-96** Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- D4643-00** Standard Test Method for Determination of Water (Moisture) Content of Soil by the Microwave Oven Method.
- D5261-96** Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
- D5321-02** Standard Test Method for Determining the Coefficient of Soil and Geosynthetics or Geosynthetic and Geosynthetic Friction by the Direct Shear Method.
- D5887-99** Standard Test Method for Measurement of Index Flux through Saturated Geosynthetic Clay Liners Using Flexible Wall Permeameter.
- D5888-02** Standard Guide for Storage and Handling of GCL.
- D5889-97** Standard Practice for Quality Control of GCL.
- D5890-02** Standard Test Method for Swell Index of Clay Mineral Component of GCL.
- D5891-02** Standard Test Method for Fluid Loss of Clay Component of GCL.
- D5993-99** Standard Test Method for Measuring Mass per Unit Area of GCL.
- D6102-97** Standard Guide for Installation of Geosynthetic Clay Liner.
- D6241-99** Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.
- D6243-98** Standard Test Method for Determining the Internal and Interface Shear Resistance for Geosynthetic Clay Liner by the Direct Shear Method.

7.1.2 SUBMITTALS

- a. Prior to the start of work, the Contractor shall furnish the following:
 - i. The Contractor shall prepare and submit installation drawings (using AutoCAD or Microstation software application), description of installation procedures, and a schedule for performing/completing the work. Installation drawings shall **show a GCL sheet layout** with proposed size, number, position, and sequence of placing of all sheets and indicating the location of all field seams. Installation drawings shall also show complete detail and methods for anchoring the GCL at its perimeter.
 - ii. The Contractor shall submit six (6) representative samples of GCL material which has been made in conformance with these specifications. The samples shall be numbered and dated. Sample size shall be 4-inch x 4-inch.
 - iii. Complete material specifications, installation instructions, descriptive drawings, literature and field quality control plan.
 - iv. Method(s) for handling and storage of GCL material(s) prior to installation.

- b. Prior to shipment of the GCL material, the Contractor shall furnish the following:
 - i. GCL manufacturer's Quality Assurance/Quality Control (QA/QC) certifications to verify that the materials supplied for the project are in accordance with the requirements of these specifications. This will include the results of actual QC testing on the representative rolls from the project shipment. Those results shall include the results of index flux tests by ASTM D5887.
 - ii. The manufacturer shall submit a letter of intent to furnish manufacturer's warranty covering materials and workmanship of the GCL prorated for a period of not less than 20 years after the installation of the material. An executed original of the manufacturer's warranty shall be submitted 5 days after complete installation of the GCL material. The warranty shall warrant against manufacturing defects. The manufacturer's standard warranty shall also warrant against deterioration due to ozone, ultraviolet light or other normal weather aging. The warranty shall be limited to replacement of material only, and shall not cover installation of said material. It shall not cover damage due to vandalism, acts of animals, earthquakes and other acts of God.

iii. The Contractor shall furnish a written guarantee that the GCL installed is free of defects in material and workmanship. The guarantee for the GCL installed shall extend for a period of one (1) year following the final acceptance of the complete project. During the 11th month, a pre-guarantee expiration inspection of the exposed portions of the lining will be conducted to identify any necessary repair work covered by the guarantee. The Contractor shall agree to make any repairs or replacements found necessary by defects in material or workmanship which becomes evident within said guarantee period. The Contractor shall make repairs and/or replacements promptly upon receipt of written order from the County. If the Contractor fails to make repairs and/or replacements promptly, the County may do so, and the Contractor shall be liable to the County for the cost of such repairs and/or replacements.

c. Prior to installation of the GCL material, the Contractor shall submit the following:

- i. Complete description of installation procedures including seaming procedures for field seams and repairs. Seaming procedures shall conform to the latest procedures recommended by the GCL Manufacturer and these specifications.
- ii. Certification that the surface(s) on which the GCL will be placed is acceptable and in conformance with the recommendations of the GCL Manufacturer and these specifications. Installation of the GCL shall not commence until this certification is furnished to and approved by the County and QA/QC Consultant.
- iii. The Contractor shall allow at least two (2) weeks for GCL material conformance testing by QA/QC Consultant before the material is scheduled to be installed on the project.

7.1.3 QA/QC

All installation of the GCL shall be in accordance with the QA/QC plan (Appendix A), under the ongoing observation of the County and QA/QC Consultant. During the installation of the GCL, the County shall have the authority to order an immediate stoppage due to improper procedures or for any other reason, including but not limited to inclement weather, that, based on the County's and QA/QC Consultant's opinion, may result in a defective installation of the GCL.

Daily reports shall be submitted by the Contractor to the County prior to 11:00 a.m. documenting work accomplished the previous day including all personnel and equipment on site, quantities of material received, panels placed, seaming completed, tests performed, repairs made, weather conditions and other comments relative to the progress of the work.

7.1.4 SAFETY

Prior to installation of the GCL system, the Contractor shall instruct the workmen and the lining subcontractor's superintendent about safety procedures pursuant to local, State, and Federal requirements. The Contractor shall ensure that workers have and use safety gear and equipment required by local, State, and Federal requirements. The Contractor shall instruct the workmen relative to the difficulties and potential hazards involved in handling the GCL, including, but not limited to installation during periods of high winds, rain, extreme heat, breathing of fine dust during bentonite seaming, walking on steep slopes, and working with and around any crane or high-lift used to place the rolls of GCL.

The Contractor shall provide safety equipment pursuant to applicable local, State, and Federal requirements for its personnel, and facilitate access to work area for the County's personnel and QA/QC Consultant's representatives for testing and inspection. The County shall have the authority to order an immediate stoppage of work because of improper installation procedures, noncompliance with the QA/QC Plan, safety infractions or for any reason which may result in a defective or unsafe installation of the GCL.

7.1.5 PRODUCT LABELING

Prior to shipment, the GCL manufacturer shall affix a label to each roll identifying the following characteristics:

- a. Product identification information (manufacturer name and address, brand name, product code)
- b. Lot number and roll number.
- c. Roll length and width.
- d. Total roll weight.

7.1.6 PACKAGING

The GCL shall be wound around a cardboard core to facilitate handling. The core is not intended to support the roll for lifting but should be sufficiently strong to prevent collapse during transit. All rolls shall be labeled and bagged in watertight packaging that is resistant to photo degradation by ultraviolet (UV) light.

7.1.7 DELIVERY, STORAGE AND HANDLING

The Contractor shall assume responsibility for initial loading and shipping of the GCL, unloading, on-site handling, and storage. The Contractor shall ensure that the GCL rolls are transported on **flat bed trucks**. Unloading shall be performed **using fabric straps only**. These straps, as supplied by the Contractor, shall be ready for usage at the arrival of each shipment. If the Contractor elects to use a different type of truck or a different method of unloading, the Contractor shall in advance submit a written request outlining the type of trucks, equipments, and method detailing its plan for the County's review. The County will respond to the Contractor's request in

writing and the County's decision will be final. A visual inspection of each roll shall be made as it is unloaded to identify if any packaging has been damaged. Rolls with damaged packaging shall be marked and set aside for further inspection. The packaging shall be repaired prior to being placed in storage.

Prior to shipment and before unloading the GCL, the Contractor shall contact the manufacturer to ascertain the appropriateness of the proposed unloading methods and equipment to be utilized. Storage of the GCL rolls shall be the responsibility of the Contractor. The GCL shall not be stored directly on the ground. The storage area will be such that the GCL is protected from damage by water, mud, debris or ultraviolet light. Rolls of GCL material shall not be stacked higher than two rolls.

Rolls should be stored in accordance with the GCL manufacturer's recommendations and in a manner that prevents sliding or rolling from the stacks; and may be accomplished by the use of chock blocks or by use of the dunnage shipped between rolls. All stored GCL materials and the accessory bentonite must be covered with a water tight, ultraviolet light resistant plastic sheet or tarpaulin until installation. The Contractor's attention is directed to ASTM D 5888 "Standard Guide for Storage and Handling of GCL" in addition to the above requirements.

7.2 MATERIALS

GCL materials shall be certified by the manufacturer to comply with the material specifications as required by the Contract Documents. GCL shall be a new, high quality product designed and manufactured specifically for the purposes of this type of work. Its suitability and durability for this type of work shall have been adequately demonstrated by prior applications. The GCL rolls shall be shipped and stored in opaque and watertight wrappings.

The GCL installation shall be performed under the ongoing observation of the County and QA/QC Consultant, and according to the QA/QC Plan. The Contractor shall be responsible for detecting and repairing all damaged areas. A "lap" line and a "match" line shall be imprinted on both edges of the upper geotextile component of the GCL as a means for providing quality assurance of the overlap. Lines shall be printed in easily visible, non-toxic ink.

The Manufacturer's certification shall demonstrate that the GCL meets or exceeds the following minimum average roll values:

Property	Unit	Test Method	Value	QA/QC Conf. Testing (Y/N)
Bentonite* (For GCL)				
Fluid Loss	ml	ASTM D 5891	18(max.)	N
Swell Index	ml/2g	ASTM D 5890	24 (min.)	N
Moisture Content	%	ASTM D 4643	20 (max.)	N
Geotextiles as Part of GCL (Non-woven):				
Composition	Needle Punched/Slit Film (Polyethylene or Polypropylene)			
Mass/Unit Area	oz/sy	ASTM D 5261	6	N
GCL as Total				
Mass/Unit Area @ 0% moisture	Psf	ASTM D 5993	0.75 (min.)	Y
Moisture Content	%	ASTM D 4643	30(max.)	Y
Hydraulic Flux**	m ³ /m ² /sec	ASTM D 5887	1x10 ⁻⁸ (max.)	Y
Grab Strength	lbs	ASTM D 4632	150	Y
Grab Elongation	%	ASTM D 4632	10(min)	Y
Puncture Resistance	lbs	ASTM D 4833	65	N

*Bentonite used to fabricate the GCL shall be composed of at least 90% sodium montmorillonite

**At 5 psi confining pressure.

7.3 EXECUTION

7.3.1 INSPECTION

Prior to installation of the GCL on side slopes, a site inspection shall be conducted by the County, QA/QC Consultant and Contractor to verify measurements, subgrade compaction and surface conditions to support the GCL. The side slopes surface upon which the GCL is installed shall be prepared and compacted in accordance with the Contract Documents and the Project Drawings. All surfaces to be lined shall be smooth and free of construction stakes or nails, debris, material, roots and sticks, and sharp or angular rocks protruding more than 3/8-inch above finish grade. The level of compaction should be such that no rutting is caused by installation equipment or other construction vehicles.

Prior to installation of GCL on the canyon bottom above the 60-mil HDPE liner, the Contractor and QA/QC Consultant shall verify that all seaming, testing, and seam repairs have been completed and the bottom 60-mil HDPE liner has been accepted by the County and QA/QC Consultant.

Immediately prior to GCL deployment on side slopes, the subgrade shall be fine-graded to fill in all voids, cracks or erosion and then smooth-rolled to provide a suitable surface for the GCL installation. At completion of this activity, no sharp irregularities or abrupt elevation changes shall exist in the subgrade. Adequate drainage of the subgrade shall be provided and maintained until installation of the GCL is completed. The County will inspect the work daily to confirm that drainage is provided. The liner subcontractor shall certify to the QA/QC Consultant in writing its acceptance of the subgrade before GCL placement.

It shall be the Contractor's responsibility thereafter to inform the QA/QC Consultant or the County of any change in the condition of the subgrade that could cause the subgrade to be out of compliance with the requirements of the Contract Documents. During unwrapping of the GCL, the Contractor shall visually inspect all materials, particularly the surfaces of the geotextile portion of the GCL for imperfections and faulty areas. All such defective areas of the sheets shall be marked and repaired in accordance with approved methods.

7.3.2 INSTALLATION

a. General Requirements

The GCL installation shall be conducted in accordance with the approved panel layout installation drawings, the manufacturer's recommendations, and the Contract Documents. Any deviations must be approved in writing in advance by the County.

The minimum panel width in the anchor trench shall be three (3) feet. It is the responsibility of the Contractor to remove any panels that may be stressed due to the three (3) feet minimum requirement. The above requirement does not relieve the Contractor from its responsibility to maintain the integrity of the liner until final acceptance by the County.

b. GCL Deployment

The use of equipment capable of freely suspending the GCL roll is required. A spreader bar and core pipe are also required for supporting the roll and allowing it to unroll freely. The core bar and spreader bar shall not bend or flex excessively when a full roll is lifted.

The Contractor shall use suitable equipment to install the GCL on canyon floor above the 60-mil HDPE such that no damage is caused to HDPE. The Contractor shall remove and replace any HDPE panels damaged as a result of GCL installation.

If the GCL material consists of bentonite encapsulated between non-woven and slit-film woven geotextiles, then the GCL panels shall be placed with the non-woven geotextile facing down. The long dimension of all panels shall be oriented up and down the slope, and the ends of these panels shall be secured at the top in an anchor trench. On the side slopes, panels shall be placed from the highest elevation to the lowest within the area to be lined, to facilitate drainage in the event of precipitation. Cross-slope seaming of panels shall not be allowed. Panels shall be placed free of tension or stress yet without wrinkles or folds. It is not permissible to stretch the GCL in order to fit a designated area. Panels shall not be dragged across the subgrade into position except where necessary to obtain the correct overlap for adjacent panels. The GCL shall not be placed during rain or high winds.

The Contractor shall unwrap and install only as much GCL in one working day as can be covered with FML or other approved cover in case of emergency. **In no case shall the GCL be exposed at the end of the day.**

c. GCL Panel Seaming

All GCL seams shall be lap seams as shown on the approved installation panel layout drawings to ensure that a continuous seal is achieved between panels. Lapping the edges of GCL sheets a minimum of **12 inches on side slope liner**, and **6 inches on canyon floor liner** shall form the lap seam. The lap line and match lines printed on the panels shall be used to assist in obtaining this overlap. The edges of the GCL panels should be adjusted to smooth out any wrinkles, creases, or "fishmouths" in order to maximize contact with the underlying panel.

After the overlying panel is placed, its edge shall be pulled back to expose the overlap zone. Any soil or debris present in the overlap zone or entrapped in the geotextiles shall be removed. No horizontal seams shall be allowed on the slopes.

d. Damage Repair

Any damage in the form of cuts or tears in the GCL shall be identified by the Contractor and repaired by cutting a patch from unused GCL and placing it over the affected area. The damaged area should be free of all dirt and debris. A patch of GCL shall be cut to fit over the damaged area and to extend eighteen-inches (18") in all directions around it. An adhesive as recommended by the manufacturer shall be used to keep the patch in position during subsequent FML deployment and/or backfill operations.

e. Detail Work

Detail work, defined as the work necessary to seal the liner to pipe penetrations, walls, drainage structures, spillways, and other appurtenances, shall be performed as recommended by the GCL manufacturer and approved by the County in writing.

f. Placement of Overlying Materials

Precautions shall be taken to prevent damage to the GCL during deployment of the FML by restricting heavy equipment traffic. Unrolling the FML can be accomplished by the use of a crane from the bottom or a cable tethered from the top from a truck or other similar equipment.

During the installation of the textured FML over the GCL, a slip sheet (such as 20-mil smooth HDPE) shall first be placed over the GCL to allow the FML to slide into its proper position. This slip sheet shall be removed prior to FML welding. Any leading edge of panels left uncovered shall be protected at the end of the working day with a waterproof sheet which is adequately secured with sandbags or other ballast.

g. Anchor Trench Construction and Backfill

Reference is made to Section 6 of these Special Provisions for the construction and backfill of the anchor trench.

7.3.3 FIELD QUALITY CONTROL

a. General Requirements

Inspection and testing shall involve the observation of the installation of the GCL, including all seaming and patches, by the QA/QC Consultant. The QA/QC Consultant shall verify proper overlap of adjacent panels used to seal the seam. The Contractor shall make a visual inspection of the GCL panels, seams and anchors as the installation progresses as well as when the installation is complete. Defective areas shall be clearly marked and repaired. The County and QA/QC Consultant shall give final approval of repairs.

The Contractor shall retain responsibility for the integrity of the GCL until final acceptance by the County. The County shall accept the GCL when all of the following conditions have been met:

- i. Written certification letters and "as-built" record drawings including the panel numbers and location have been received from the Contractor and approved by the County..
- ii. Installation is completed.
- iii. Documentation of completed installation, including all submittals and reports, is complete.
- iv. Verification of adequacy of field seams and repairs is complete.
- v. The GCL and composite liner system has been installed/constructed in accordance with the Contract Documents.

During delivery of GCL material to the site, conformance samples shall be collected by the QA/QC Consultant for testing by an independent laboratory. Samples shall be taken across the entire width of the roll and shall not include the first three feet. Samples shall be 3 feet long by the roll width. The samples shall be marked with an arrow indicating the machine direction and the manufacturer's roll and lot identification number.

Conformance samples will be taken at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of tests. The County will pay for the cost of conformance tests except for retests of failed samples or conformance tests for lots less than 50,000 square feet, which will be borne by the Contractor.

The independent testing agency shall save all test samples including specimens tested until notified by the County regarding their disposal. All specimens that failed shall be returned immediately to the County for determination of corrective measures to be taken.

b. Material Acceptance Criteria (Interpretation of Conformance Test Results)

The minimum number of specimens tested per conformance sample for each tested GCL property will be determined in accordance with the respective ASTM Standard. The average value will be calculated from the specimen test values of

each conformance sample and compared to the values specified in Section 7.2 of the Special Provisions. A conformance sample that yields any tested property less than the specified value will be recorded as a failure and an additional two (2) rolls will be sampled from the same 100,000 square feet or lot and tested for the failed properties. If a second conformance sample fails, all rolls within the sampled 100,000 square feet or lot will be rejected for use on the project. If no additional conformance tests fail, only the roll which yielded a failure will be rejected from use on the project. The decision of the County shall be final.

7.4 MEASUREMENT AND PAYMENT

The measurement of the final quantity for Bid Item No. 11 "Furnish & Install GCL" shall be based on the final in-place square footage of ground covered by the GCL material after it has been installed, tested, and verified by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling methods. **Payment** shall be made, after verification and acceptance, at the unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 11**. No additional compensation shall be made for any GCL waste materials from trimming of panels, seam overlaps, patches, repairs or any material damaged during construction by negligence on the part of the Contractor in providing adequate protection for the material.

END OF SECTION 7

SECTION 8 - FLEXIBLE MEMBRANE LINER (FML)

8.1 GENERAL

This section covers the work necessary to furnish and install the Flexible Membrane Liner (FML) as described and required by the Contract Documents. The intent of these specifications is to provide a watertight lining system at the completion of the work.

The FML shall consist of the following three (3) types of High Density Polyethylene (HDPE) material:

- A. 60-mil double textured HDPE liner (used for bottom liner above and underneath GCL)
- B. 80-mil double textured HDPE liner (used for the side slope liner along the landfill toe berm as identified on Project Drawings)
- C. 80-mil single textured HDPE liner (used for side-slope liner above GCL)

Two (2) layers of 60-mil double textured HDPE shall be placed on the canyon floor as required by the Contract Documents. The first 60-mil layer shall be placed on top of the completed low permeability layer, and it will function as moisture barrier to protect the GCL from hydrating. The second 60-mil HDPE layer, which is a component of the composite liner system, shall be placed above the GCL layer on the canyon floor as shown on the Project Drawings. The 80-mil single textured HDPE shall be placed, as a component of the majority of the side-slope liner system above the GCL. The 80-mil double textured HDPE shall be placed, as a component of the composite liner system above the GCL, along the landfill toe berm side slope as shown on the Project Drawings. Sacrificial materials shall be taken from either the single or the double-sided textured material and as directed by the County and QA/QC Consultant.

The Contractor shall provide all labor, supervision, tools, equipment and materials necessary to install the flexible membrane lining system required by the Contract Documents.

8.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

- | | |
|-----------------|--|
| D413-82 | Standard Test Methods for Rubber Property Adhesion to Flexible Substrate |
| D638-87b | Standard Test Method for Tensile Properties of Plastics |
| D696-79 | Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics |

- D746-79** Standard Test Method for Brittleness Temperature and Elastomers by Impact
- D792-66** Standard Test Method for Specific Gravity and Density of Plastics by Displacement
- D882-81** Standard Test Methods for Tensile Properties of Thin Plastic Sheeting
- D1004-66** Standard Test Method for Initial Tear Resistance of Plastic Film and Sheeting
- D1149-81** Standard Test Method for Rubber Deterioration-Surface Ozone Cracking in a Chamber (Flat Specimens)
- D1204-84** Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature
- D1505-85** Standard Test Method for Density of Plastics by Density Gradient Technique
- D1603-76** Standard Test Method for Carbon Black in Olefin Plastics
- D1693-70** Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics
- D3083-7** Standard Specification for Flexible Poly (Vinyl Chloride) Plastic Sheeting for Pond, Canal and Reservoir Lining
- D4437-99** Standard Practice for Determining the Integrity of Field Seams Used in Joining Flexible Polymeric Sheet Geomembranes.
- D4545-99** Standard Practice for Determining the Integrity of Factory Seams used in Joining Manufactured Flexible Sheet Geomembrane
- D4833-00** Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products.
- D5596-94** Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics
- D5994-98** Standard Test Method for Measuring Core Thickness of Textured Geomembranes
- D5321-02** Standard Test Method for Determining the Coefficient of Soil and Geosynthetic or Geosynthetic and Geosynthetic Friction by Direct Shear Method.
- D5397-95** Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test
- D6243-98** Standard Test Method for Determining the Internal and Interface Shear Resistance for Geosynthetic Clay Liner by the Direct Shear Method

D6392-99

Determining the Integrity of Nonreinforced Geomembrane Seams
Produced Using Thermo-Fusion Methods

National Sanitation Foundation (NSF)

Standard 54-85 Flexible Membrane Liners

8.1.2 SUBMITTALS

- a. The Contractor shall submit in advance complete material specifications and descriptive literature for approval by the County. The Contractor shall also submit installation panel layout drawings, which show the layout of all FML sheets with proposed size, numbers, position, sequence of placing all sheets, and location of all field seams. The installation drawings shall also show complete details and methods for anchoring the FML at its perimeter and making field welds. The Contractor shall prepare these installation panel layout drawings by using either AutoCAD or Microstation software applications, and shall submit these drawings to the County in digital format (on a compact disc) as well as hard copies.
- b. The Contractor shall submit written certification by the FML manufacturer that the FML materials conform to the requirements of the Contract Documents; are similar and of same formulation as that for which certification is submitted; and have been demonstrated by actual usage to be satisfactory for the intended application.
- c. The Contractor shall submit **six (6)** 8-inch x 10-inch samples of FML material(s), **six (6)** three foot samples of rod used for extrusion welding, and **six (6)** samples of field welds which have been made in conformance with these Contract Documents (three each fusion and extrusion). The Contractor using the same materials, equipment and procedures specified for the FML shall fabricate the field seam samples. Sample width shall measure twelve-inches (12") plus weld width and sample length shall measure eighteen-inches (18"). The samples shall be numbered and dated. The Contractor shall submit a complete description of welding procedures for making field welds and repairs. The welding procedures shall conform to the latest procedures recommended by the FML Manufacturer and to these specifications.
- d. The Contractor shall submit for approval by the County a method of handling and storing FML material(s) prior to installation. The FML (sub)contractor shall install the FML only on surface(s) that it has formally been accepted by the QA/QC Consultant and the County and that a written "release" form was prepared and signed by all parties for the subject area. The purpose of this form is to ensure that the subgrade

surfaces meet all the requirements for liner installation as detailed in these specifications.

- e. The FML manufacturer shall submit a letter of intent to furnish a written lining material warranty on a prorated basis for a period of 20 years after the installation of material. An executed original of the manufacturer's warranty shall be submitted 5 days after complete installation of the FML material. The warranty shall protect against manufacturing defects; and the manufacturer warranty shall warrant against deterioration due to ozone, ultraviolet light, or other normal weather aging. The warranty shall be limited to replacement of material only and shall not cover installation of said material. It shall not cover damage due to vandalism, acts of animals, earthquakes, or acts of God.

- f. The Contractor shall furnish a written guarantee that the FML work constructed by him is free of defects in material and workmanship. The guarantee for the FML installed pursuant to these Contract Documents shall extend for a period of one (1) year following final acceptance of the entire project. During the 11th month of the warranty period, a pre-guarantee expiration inspection of the exposed portions of the FML material will be conducted to identify any necessary repair work covered by the guarantee. The Contractor shall agree to make any repairs or replacements found to be necessary by defects in material or workmanship, which become evident within this guarantee period. The Contractor shall make repairs and/or replacements promptly upon receipt of written order from the County. If the Contractor fails to make repairs and/or replacements promptly, the County may do so, and the Contractor shall be liable to the County for the cost of such repairs and/or replacements.

8.1.3 QA/QC

Prior to installation of FML material, the Contractor shall allow at least two (2) weeks for FML material conformance testing by QA/QC Consultant before the material is scheduled to be integrated into the project. The Quality Control Plan(s) to be implemented for the work by the FML manufacturer, the Contractor and the lining subcontractor shall be in accordance with the Contract Documents and the QA/QC Plan (Appendix A). The County shall have the authority to order an immediate stoppage of work because of improper installation procedures, noncompliance with the QA/QC Plan, safety infractions or for any reason which may result in a defective or unsafe installation of the FML.

Daily reports shall be submitted by the Contractor to the County prior to 11:00 a.m. documenting work accomplished the previous day including all personnel and equipment on site, quantities of material received, panels placed, seaming completed,

tests performed, repairs made, weather conditions and other comments relative to the progress of the work

8.1.4 SAFETY

Prior to installation of the FML, the Contractor shall instruct the workmen on the safety procedures pursuant to local, State, and Federal requirements. The Contractor shall ensure that workers have and use safety gear and equipment required by local, State and Federal requirements. The Contractor shall instruct the workmen relative to the difficulties and potential hazards involved in handling the FML, especially during periods of high winds. The Contractor shall provide safety equipment pursuant to applicable local, State, and Federal requirements for his personnel, the County personnel and QA/QC Consultant's representatives when working.

8.1.5 DELIVERY, STORAGE AND HANDLING

The FML shall be shipped, stored and handled in accordance with the manufacturer's recommendations and as in the Contract Documents. Contractor shall be completely responsible for shipping, storage and handling of all FML. The FML rolls shall be delivered to the site only after the County receives and approves the required submittals.

Contractor shall notify the County at least twenty-four (24) hours (one full work day) prior to scheduled delivery. No materials shall be unloaded except in the presence of the QA/QC Consultant's representative. The FML delivered to the site shall be inspected for damage and unloaded and stored with minimal handling. Damaged rolls shall be separated from undamaged rolls until proper disposition of material is determined by the County. The County will be the final authority on the determination of damage.

No hooks, tongs, or other sharp tools or instruments shall be used for handling the FML. Contractor shall use cloth chokers and spreader bars for loading and unloading and spreader bars and roll bars for deployment. The FML shall not be folded or dragged along the ground.

The FML shall be wound onto a minimum 6-inch heavy cardboard or plastic hollow core which is stable enough to support the roll without deflecting, buckling or otherwise falling during handling, storage, and transportation.

The FML shall be protected from storm water, soil, mud, dirt, debris, puncture, cutting, or other damaging or deleterious conditions. The FML rolls shall not be stored on wooden pallets and shall not be stacked more than three (3) rolls high.

Under no circumstances shall the installed FML be subjected to materials, sandbags, equipment or other items being dragged across its surface, nor shall workmen and others slide down slopes atop the FML. All damaged surfaces resulting from abuse

of any kind caused by the Contractor in performance of the work shall be repaired at the Contractor's expense.

8.2 MATERIALS

8.2.1 FML RESIN

Resin for the geomembrane shall be virgin, first quality high density polyethylene (HDPE) resin produced in North America and compounded and manufactured specifically for the purpose of producing HDPE geomembranes. There shall be no intermixing with other resin types. Reclaimed polymer shall not be added to the geomembrane resin.

HDPE resin shall meet the following minimum specifications:

Test	Test Method	Unit	Requirements
Density*	ASTM D1505	g/cc	0.94 minimum
Melt Flow Index	ASTM D1238 Condition E	g/10 min	<1.0

*Base resin density without carbon black added.

One set of tests shall be performed per batch of resin. At a minimum, the geomembrane manufacturer shall sample and test each compartment of each rail car or truck to ensure that product purity was maintained during shipment. Certified test results shall be submitted to and approved by the QA/QC Consultant at least five (5) working days prior to shipping geomembrane to the site.

8.2.2 FML ROLLS

The material shall be new FML, high quality product designed and manufactured specifically for the purpose of this project. Its suitability and durability for this type of work shall have been adequately demonstrated by prior applications. Labels on the rolls of HDPE material shall identify the thickness of the material, the length and width of the roll, and the manufacturer's run number. The textured surface of the HDPE shall be coextruded textured surface as manufactured by GSE or Polyflex, or approved equal. The textured HDPE lining material shall be certified in writing by the lining manufacturer to meet thickness and material specifications. The texturing of HDPE lining material shall be of the same type of polymer and formulation as that of the base sheet material. The surface texturing material shall be uniform and consistent, shall remain intact and shall be resistant to separation from the base sheet as a result of abrasion and contact with chemicals encountered in solid waste landfill applications. All work associated with the texturing process shall be performed by the manufacturer of the base sheet.

Extrusion resin used for extrusion welding associated with repairs or difficult welding shall be of the same HDPE material used in the supplied sheet. Physical properties shall be the same as in the HDPE sheets. The FML installation shall be performed under the ongoing observation of the County and QA/QC Consultant, and according to the QA/QC Plan. The Contractor shall be responsible for repairing all damaged

areas. The material shall have or exceed the following Minimum Average Roll Values (MARV):

Property	Unit	Test Method	Value		QA/QC Conformance Testing (Y/N)
			80-mil	60-mil	
Thickness MAV	mils	ASTM D 5994	80	60	Y
Minimum thickness (lowest individual for any of 10 values)	mils	ASTM D 5994	72	54	Y
Asperity Height	mils	GRI GM 12	15	15	Y
Density	g/cm ³	ASTM D1505	0.94 min.	0.94 min.	Y
Tensile Strength at Yield	ppi	ASTM D638 TYPE IV Specimen 2 ipm	168	126	Y
Elongation at Break	%	ASTM D638 TYPE IV Specimen 2 ipm	≥ 150	≥ 150	Y
Elongation at Yield	%	ASTM D638 TYPE IV Specimen 2 ipm	≥ 12	≥ 12	Y
Tear Resistance	lbs	ASTM D1004 Die C	56	42	N
Stress Crack Resistance	Hours	ASTM D5397	200	200	N
Carbon Black Content	%	ASTM D1603	2 to 3	2 to 3	Y
Puncture Resistance	lbs	ASTM D4833	120	90	Y
Carbon Black Dispersion ¹	Rating	ASTM D5596	see note 1	see note 1	Y

Note 1: Acceptance Criteria: The test result will be accepted if 8 or more specimens are in Category 1 and 2; and if 10 or more specimens are in category 1, 2 and 3; and if no specimens are in category 4 and 5.

Geomembrane Seam Testing Requirements (For Integrity of Field Seams):

Property	Unit	Test Method	Value		QA/QC Conformance Testing (Y/N)
			80-mil	60-mil	
Shear Seams	ppi	ASTM D 6392	160-ftb	120-ftb	Y
Peel Strength Fusion	ppi	ASTM D 6392	120-ftb	98-ftb	Y
Peel Strength Extrusion	ppi	ASTM D 6392	104-ftb	78-ftb	Y

Interface Shear Strength:

The Contractor shall submit a proof of successful direct shear testing program for approval by the County prior to shipment of any material (FML, GCL and Geotextile) to the job site. All testing shall be performed in accordance with procedures provided below and during the early stage of the earthwork. The testing shall be performed at SGI Testing Laboratory in Norcross, Georgia, or at any other accredited Geosynthetic Testing Laboratory subject to the approval by the QA/QC Consultant. A test report shall be submitted with complete testing results from the laboratory. The interface direct shear tests shall be conducted in accordance with ASTM D5321 and ASTM D6243. The Testing Laboratory will measure peak and large-displacement (i.e., at least 3.0 in. of displacement) shear strengths using a 12-in. square direct shear-testing box. The soil material for the interface shear testing shall be collected by QA/QC Consultant and provided to the Contractor for arranging its shipment to SGI Testing Laboratory. The QA/QC Consultant will provide the placement and compaction (recompacted density and moisture content) requirements for the soil material for the interface tests. The cost of this shear strength interface testing and shipment of the material to the testing laboratory shall be borne by the Contractor.

Four types of testing series shall be tested for the interface shear tests:

Test Series 1 – Bottom Liner

- Low permeability soil layer (LPL) – (upper shear box);
- 60-mil thick double textured HDPE geomembrane;
- Hydrated geosynthetic clay liner (GCL);
- 60-mil thick double textured HDPE geomembrane;
- 12-oz. cushion geotextile; and
- 1/2-inch Gravel (as LCRS drainage layer) – (lower shear box)

Test Series 2 – Bottom Liner

- Low permeability soil layer (LPL) – (upper shear box);

- 60-mil thick double textured HDPE geomembrane;
- Dry (unhydrated) geosynthetic clay liner (GCL);
- 60-mil thick double textured HDPE geomembrane
- 12-oz. cushion geotextile; and
- 1/2-inch Gravel (as LCRS drainage layer) – (lower shear box)

Test Series 3 – Side Slope Liner

- Subgrade soil – (upper shear box)
- Hydrated geosynthetic clay liner (GCL)
- 80-mil thick single-sided textured geomembrane (textured side against GCL);
- 16-oz. geotextile; and
- Protective cover soil – (lower shear box)

Test Series 4 – Side Slope Liner

- Subgrade soil – (upper shear box)
- Hydrated geosynthetic clay liner (GCL)
- 80-mil thick double-sided textured geomembrane;
- 16-oz. geotextile; and
- Protective cover soil – (lower shear box)

A series of tests shall consist of a set of three tests on samples from the same lots and manufactured specifically for this project. As described below, each of the three tests in each series shall be conducted at three different normal stresses.

Laboratory Testing Procedures for Test Series No. 1

For each of the three tests performed for Test Series No. 1, the LPL soil shall be compacted to a dry unit weight corresponding to 95 percent of modified Proctor compaction maximum density and 3-percentage points wet of optimum moisture. The QA/QC Consultant will provide the modified Proctor compaction curve to the Contractor. The soaking phase applies only to the GCL and may be conducted separately from the other components of the test using durations and normal stresses as shown in table below.

**Laboratory Interface Direct Shear Testing Program for Test Series No. 1
GCL Hydration and Consolidation Schedule**

Test No.	Soaking Phase		Consolidation Phase		Shearing Phase
	Normal Stress during Soaking (psi)	Soaking Time (hr)	Minimum Consolidation Time ¹ (hr)	Normal Stress during Consolidation and Shear (psi)	Displacement Rate (in./min)
1	10	48	24	25	0.04
2	10	48	24	75	0.04
3	10	48	24	150	0.04

¹ Vertical settlement versus time will be monitored during consolidation and the consolidation phase should be continued until t_{100} is reached as measured by the \sqrt{t} method (ASTM D2435)

The GCL should be soaked and consolidated using the durations and normal stresses provided in table above. Measurements shall be taken to not impede the ability of the GCL to drain during soaking. To accomplish this, place a "sacrificial" non-woven geotextile on the top and bottom of the GCL during soaking. Once soaking is completed, move the hydrated GCL (without the sacrificial geotextiles) to the shear box, place it on top of the compacted LPL, and 60-mil geomembrane, and then construct the rest of the sample. The side of the lower geomembrane that will be in contact with the LPL should be sprayed with a fine mist of tap water at a rate of 2 oz/yd². The shear box must be set up as quickly as possible after removing the GCL from the soaking device. The sample must be consolidated in the shear box under the prescribed normal stress for at least the prescribed duration and at least as long as it takes to reach t_{100} is reached as measured by the \sqrt{t} method (ASTM D2435). The Geosynthetic Testing Laboratory will report peak and large-displacement shear strengths for each of the respective tests.

Laboratory Testing Procedures for Test Series No. 2

For each of the three tests performed for Test Series No. 2, the LPL soil shall be compacted to a dry unit weight corresponding to 95 percent of modified Proctor compaction maximum density and 3-percentage points wet of optimum moisture. The QA/QC Consultant will provide the modified Proctor compaction curve to the Contractor.

The side of the lower geomembrane, which will be in contact with the LPL, should be sprayed with a fine mist of tap water at a rate of 2 oz/yd². The entire sample should then be constructed (i.e., LPL, lower geomembrane, GCL, upper geomembrane) and then consolidated according to the times provided in the table below.

Laboratory Interface Direct Shear Testing Program for Test Series No. 2

LPL Consolidation Schedule

Test No.	Soaking Phase		Consolidation Phase		Shearing Phase
	Normal Stress during Soaking (psi)	Soaking Time (hr)	Minimum Consolidation Time ¹ (hr)	Normal Stress during Consolidation and Shear (psi)	Displacement Rate (in./min)
1	N/A	N/A	24	25	0.04
2	N/A	N/A	24	75	0.04
3	N/A	N/A	24	150	0.04

¹ Vertical settlement versus time will be monitored during consolidation and the consolidation phase should be continued until t_{100} is reached as measured by the \sqrt{t} method (ASTM D2435)

The sample must be consolidated in the shear box under the prescribed normal stress for at least the prescribed duration and at least as long as it takes to reach t_{100} is reached as measured by the \sqrt{t} method (ASTM D2435). The Geosynthetic CQC Testing Laboratory will report peak and large-displacement shear strengths for each of the respective tests.

Laboratory Testing Procedures for Test Series No. 3 and 4

The test procedures for Series 3 and 4 are identical except that Series 3 tests include single-sided textured HDPE, with textured side in contact with GCL and Series 4 tests include double-sided textured HDPE.

The soaking phase applies only to the GCL and may be conducted separately from the other components of the test using the durations and normal stresses as shown in table below. The GCL should be soaked and consolidated using the durations and normal stresses provided in table below. Measurements shall be taken without impeding the ability of the GCL to drain during soaking and consolidation. To accomplish this, place a "sacrificial" non-woven geotextile on the top and bottom of the GCL during soaking and consolidation. Once soaking is completed, move the hydrated GCL (without the sacrificial geotextiles) to the shear box, and construct the rest of the sample. For Test Series 3, the textured side of the geomembrane should be placed in contact with the GCL. The shear box must be set up as quickly as possible after removing the GCL from the soaking device. The sample must be consolidated in the shear box under the prescribed normal stress for at least the prescribed duration and at least as long as it takes to reach t_{100} is reached as measured by the \sqrt{t} method (ASTM D2435). The Geosynthetic Testing Laboratory will report peak and large-displacement shear strengths for each of the respective tests.

Spray the side of the 80-mil thick geomembrane in contact with geotextile with a fine mist of tap water at a rate of 2 oz/yd². The sample should then be consolidated and sheared according to the information provided in table below.

**Laboratory Interface Direct Shear Testing Program for Test Series No. 3 and 4
GCL Hydration and Consolidation Schedule**

Test No.	Soaking Phase		Consolidation Phase		Shearing Phase
	Normal Stress during Soaking (psi)	Soaking Time (hr)	Minimum Consolidation Time ¹ (hr)	Normal Stress during Consolidation and Shear (psi)	Displacement Rate (in./min)
1	10	48	24	15	0.04
2	10	48	24	30	0.04
3	10	48	24	50	0.04

¹ Vertical settlement versus time will be monitored during consolidation and the consolidation phase should be continued until t100 is reached as measured by the \sqrt{t} method (ASTM D2435)

Required Minimum Shear Strength Envelopes

The required minimum shear strength envelopes for base (canyon floor) and side slope liners are provided in Tables below:

Liner System	Type of Shear Strength	Minimum Required Strength (in psi)		
		Testing Normal Stresses (psi)		
		25	75	150
Base Liner (1 and 2)*	Large-Displacement	8.1	18.7	34.7

*For calculating the large displacement shear strength of base liner, the results for dry and hydrated GCL will be averaged in accordance with the procedures described in Thiel et al. [2001]

Liner System	Type of Shear Strength	Minimum Required Strength (in psi)		
		Testing Normal Stresses (psi)		
		15	30	50
Side Slope Liner				
Test Series 3 - Smooth HDPE	Large-Displacement	2.5	4.6	7.4
Test Series 4 - Textured HDPE	Large-Displacement	6.7	11.0	16.7

The Geosynthetic Testing Laboratory will report peak and large-displacement shear strengths for each of the respective tests in terms of normal stress and measured peak

and large-displacement shear stresses. The QA/QC Consultant and the County will review the shear strengths obtained for confirmation of compliance with this section. Following approval of the test results, the Contractor will be allowed to proceed with the shipment of the geosynthetic materials. During the geosynthetics deployment phase, the QA/QC Consultant will collect two sets of geosynthetic material samples for performing conformance tests for interface shear for each of the Test Series 1 through 4. The Contractor shall assist the QA/QC Consultant in providing representative samples. The cost of the conformance testing shall be borne by the County.

8.3 EXECUTION

8.3.1 INSPECTION

Prior to installation of 60-mil HDPE on the canyon floor, a site inspection shall be conducted by the County, QA/QC Consultant and the Contractor to verify measurements and surface conditions to receive the FML. The FML (sub)contractor shall install the FML only on surface(s) that it has formally been accepted by the QA/QC Consultant and the County and that a written "release" form was prepared and signed by all parties for the subject area. The purpose of this form is to ensure that the subgrade surfaces meet all the requirements for liner installation as detailed in these specifications.

For the 60-mil HDPE on the canyon floor and 80-mil HDPE on the side slope installations, protection of the underlying GCL is required. Removal of all sharp or abrasive objects on top of the GCL and inspection of the GCL for punctures, tears or other unacceptable conditions is required prior to the placement of FML. Any defects in the underlying GCL shall be repaired to the satisfaction of the County and QA/QC Consultant prior to the placement of the FML. No vehicles shall be permitted to travel on the completed subgrade except for approved vehicles necessary to install the lining. Costs for any required repair of the GCL shall be borne by the contractor with no further compensation allowed.

Before the work begins, the Contractor and QA/QC Consultant shall inspect all FML materials for damage from transit. Materials that cannot be repaired shall be rejected, removed from the project site, and disposed of in accordance with federal, state, and local requirements at the Contractor's expense. Prior to transport of FML materials from the storage area for use and placement, the Contractor and QA/QC Consultant shall visually inspect all materials for imperfections and faulty areas. All such defective places shall be marked and repaired in accordance with approved methods and the QA/QC Plan.

8.3.2 INSTALLATION

The FML shall be installed as shown on the Project Drawings and the approved panel layout installation drawings. Sheets of FML shall be of such lengths and widths and shall be placed in such a manner as to reduce field welding to a minimum. All FML

panels over 25 square feet in area shall be designated with a panel number. The Contractor shall be responsible for assigning the number and shall locate the number marking near the middle of panels less than 50 feet in length and at both ends of panels over 50 feet in length. Panels less than 25 square feet in area shall be considered a patch and shall not require a number; these shall be used as seldom as possible. The minimum panel width in the anchor trench shall be three (3) feet. It is the responsibility of the Contractor to remove any panels that may be stressed due to the three (3) feet minimum requirement. The above requirement does not relieve the Contractor from its responsibility to maintain the integrity of the liner until final acceptance by the County.

The FML shall be attached at the top and bottom of the slopes, and other places in accordance with details shown on the Project Drawings and the approved panel layout installation drawings. The FML shall be anchored and sealed to structures, pipes and other types of penetrations in accordance with the details shown on the Project Drawings and the approved panel layout installation drawings.

All changes in approved panel layout installation plans and procedures must be approved by the County in writing in advance. Requests for field changes to the approved installation drawings, procedures, and schedules shall be submitted in writing to the County for review and comment. No changes shall be allowed prior to written approval by the County. The Contractor shall document changes on record drawings.

Extreme care shall be taken during installation of the FML to be certain no damage is done to the prepared supporting surfaces, or to any part of the installed GCL or to the FML texturing. Dragging of the FML material on any rough surfaces including, but not limited to, subgrade, compacted engineered fill grade, compacted low-permeability subgrade layer, or GCL shall not be permitted. Smoking shall not be permitted within 100 feet of the FML by anyone connected with the Contractor's work. No foot traffic shall be allowed on the FML except with approved smooth-sole shoes. No vehicular traffic shall be allowed on the FML. Vehicles used at the job site shall not exceed 15 mph and reckless driving is not allowed. Excessive speed and/or reckless driving may result in suspension or dismissal of the vehicle operator. All motor equipment using fuel shall have spark arrestors. No gasoline powered generators, gasoline cans, or solvent shall be placed directly on the FML. Under no circumstances shall the FML be used as a work area or to store tools and supplies. If needed, a tarpaulin of approved material shall be spread out as a work area.

During installation, the Contractor shall be responsible for protecting the FML against adverse effects of high winds such as uplift. Sand bags shall be used as required to hold the FML material in position during installation. Sand bags shall be sufficiently close-knit to preclude fines from working through the bottom, sides or seams. Paper bags, whether or not lined with plastic, will not be permitted. Burlap bags, if used, must be lined with plastic. Bags shall contain not less than 40, nor more than 60 pounds of sand having 100 percent passing a number 8 screen and shall be tied closed after filling, using only plastic ties. Metal or wire ties shall not be allowed. Bags that

are split, torn, or otherwise losing their contents shall be immediately removed from the work area and any spills immediately cleaned up.

The HDPE lining shall not be installed under adverse climatic conditions, unless the Contractor can demonstrate that its installation techniques adequately compensate for such adverse conditions and quality of workmanship is not compromised. Adverse climatic conditions occur when the air temperature measured 6 inches above the FML surface is less than 40°F or more than 104°F; when the relative humidity is more than 80 percent; when it is raining; or when there is frost on the ground; or during conditions of excessive winds. Installation of HDPE lining at high temperatures (greater than 104°F) may be performed if approved by the QA/QC Consultant and the County, but no field seaming shall be permitted at those temperatures.

HDPE field seams shall be lap seams formed by lapping the edges of HDPE sheets a minimum of 4 inches. The contact surfaces of the sheets shall be wiped clean to remove dirt, dust, moisture, and other foreign objects. For fillet weld seams, the edge of the FML shall be beveled and oxidation shall be cleaned from the surfaces to receive extrudate by disk grinding or equivalent not more than one hour before welding.

Lap seam intersections involving more than 3 FML layers of lining material shall be avoided, and all seam intersections shall be offset at least 2 feet. No horizontal intersections or seams shall be allowed on the slopes, and sheets of lining material on the slope shall extend down slope out onto the canyon floor as shown on the Project Drawings.

Field seams between sheets of FML shall be made using approved welding systems, equipment and techniques. Approved welding systems include fillet weld using extrudate, lap weld using extrudate (extrusion welds); and lap weld using either a single or double wedge welder (fusion welds for 60-mil & 80-mil). All wedge welders shall be specifically designed for and be compatible with the liner material and recommended by the FML manufacturer.

Any necessary repairs to the FML shall be made with the FML material itself, using approved welding systems, equipment and techniques. The patch size shall be 6 inches larger in all directions than the area to be patched. All corners shall be rounded with a 1-inch minimum radius. All seams of the FML shall be tightly bonded on completion of the work. Any FML surface showing injury due to scuffing and/or penetration by foreign objects or showing distress shall be replaced or repaired.

The Contractor shall mark adjacent to all welds and repairs, the seam number, date, time, equipment number, mated panel numbers and technician performing the welding. Cleanup within the work area shall be an ongoing responsibility of the Contractor. Particular care shall be taken to insure that no trash, tools, and other unwanted materials are trapped beneath the FML. Care should also be taken to

ensure that all scraps of lining material are removed from the work area prior to completion of the installation.

8.3.3 FIELD QUALITY CONTROL

a. General

Inspection and testing shall involve the observation of the installation of the FML, including the making and testing of field welds and patches. After initial welding of any seam, seam testing and repairs shall be completed within 3 working days.

Samples for conformance testing shall be taken by the Contractor from rolls of FML after delivery to the site. Samples shall be taken across the entire width of the roll and shall not include the first three feet. Samples shall be three feet long by the roll width. The samples shall be marked with the machine direction by an arrow and the manufacturer's roll and lot identification number. One sample per lot or one sample per 100,000 square feet of FML shall be taken, whichever results in the greater number of conformance tests. The cost of conformance tests shall be paid for by the County, except for retests of failed samples or conformance tests for lots of less than 50,000 square feet, which will be borne by the Contractor.

The delivery of FML in small quantities from different lots is discouraged. The Contractor shall absorb the cost for excessive conformance testing due to delivery of FML from different lots.

Conformance and destructive weld sample testing shall be conducted by an independent testing laboratory and paid for by the County. However, the laboratory cost of retesting work or material, which fails the first test, will be billed to the Contractor. The independent testing laboratory shall save all test samples including specimens tested until notified by the County relative to their disposal. All specimens which have failed under testing shall be returned immediately to the County for determination of corrective measures to be taken.

b. Material Acceptance Criteria and Corrective Measures

i. Conformance Testing

The minimum number of specimens tested per conformance sample for each tested FML property will be determined in accordance with the respective ASTM Standard. The average value will be calculated from the specimen test values of each conformance sample and compared to the values specified in Section 8.2 of the Specifications. A conformance sample that yields any tested property less than the specified value will be recorded as a failure and an additional two (2) rolls will be sampled from the same 100,000 square feet or lot and tested for the failed properties. If

a second conformance sample fails, all rolls within the sampled 100,000 square feet or lot will be rejected for use on the project. If no additional conformance tests fail, only the roll which yielded a failure will be rejected from use on the project. The decision of the County shall be final.

ii. Start Up Welds

Test welds shall be made to verify that adequate conditions exist for field seaming to proceed. Each welder shall produce a test seam at the beginning of each shift to determine the peel and tensile shear strength of the seam. The County and QA/QC Consultant may require a sample field seam be made at any time during seaming production to verify equipment/operator performance and seam integrity. In addition, if a seaming operation has been suspended for more than 30 minutes or if a breakdown of the welding equipment occurs, a test seam shall be produced prior to resumption of seaming operations. The Contractor shall continually arrange for one (1) extra welding setup (welder and all related equipment) per crew as a backup at all times in case of a breakdown. The welding equipment shall follow the same procedures for startup welds.

During the field welding operation, the Contractor shall make representative, non-destructive samples of field welds. These samples shall be made of the same HDPE sheet and fusion weld materials using the same installation procedures as the HDPE installation itself. Samples shall have a width of 12 inches plus the seam width and a length of 36 inches. A minimum of one sample per crew each morning and each afternoon shall be made. All field seams shall have a film-tearing bond in peel and shear as required herein under Subsection 8.2 "Materials" of these Special Provisions when tested.

iii. Destructive Testing of Field Seam Samples

During the field welding operation for 60-mil and 80-mil HDPE materials, the Contractor at locations selected by the QA/QC Consultant and the County shall remove destructive samples from field seams. No destructive samples will be required for the 60-mil double textured HDPE liner used for the bottom liner underneath the GCL, which functions as a moisture barrier to protect the GCL from hydrating. Repairs to the field seams shall be made in accordance with repair procedures specified in these specifications. Samples shall have a width of 12 inches plus the seam width and a length of 36 inches. A minimum of one sample per 500 feet of field seam shall be made. All field seams of the 60-mil (excluding the 60-mil underneath the GCL) and 80-mil HDPE material shall have the

minimum required film tearing bond in peel and shear when tested as specified in these Special Provisions.

All destructive field seam specimens tested by the independent testing laboratory (sets of five test specimens are performed) shall allow for one failure out of five tested, and the rest shall pass. If two specimens out of five fails, the entire sample shall be considered as a failure, and the field weld(s) performed by the same welding equipment between adjacent destructive samples on either side of the failed sample shall be considered to be not in conformance with the Specifications and corrective measures are to be followed.

Corrective measure shall include the following:

New test samples shall be taken 10 feet on both sides of the failed destructive sample and they shall be tested using the same procedures outlined above. If these new test samples PASS, the weld need only be capped between the two passing tests. If these new test samples FAIL, the iterative process of sampling as outlined above is repeated until passing test results are observed. In this case, the entire seam between the two successful test samples shall be capped. If capping a field seam is required, the Contractor shall use a cover strip of the same material (and from the same roll if available) and a minimum of 8 inches in width. The cap strip shall be extrusion welded and tested as required for extrusion welding. One additional destructive sample shall be taken from the extrusion welded cap strip.

The cost of all additional testing of destructive samples due to failure of the original sample to pass specifications shall be borne by the Contractor. The Contractor shall pay for any and all laboratory failures in addition to any and all passing lab tests resulting from laboratory field failures.

iv. **Nondestructive Testing of Field Seam Samples**

Non-destructive testing of field seam samples shall be performed for both the 80-mil and 60-mil HDPE seams. All field seams tested using nondestructive methods by the Contractor and observed by the QA/QC Consultant in the field shall pass. If any weld fails, the weld shall be considered not in conformance with the specifications and corrective measures shall be taken.

If the fillet extrusion weld or single hot-wedge fusion lap weld is used to weld seams, the Contractor shall test all seams and repairs in the HDPE lining by vacuum box. The vacuum box shall be an American Vacuum

Seam Tester, Series A100 as manufactured by American Parts and Service Company, Alhambra, California, or an approved equal. All vacuum box testing shall be done in the presence of the QA/QC Consultant. The area to be tested shall be cleaned of all dust, debris, dirt and other foreign matter. A soap solution shall be applied to the test area with a paint roller or spray bottle and a vacuum of 10 inches of Mercury (Hg) shall be induced and held as long as necessary to visually inspect and mark for repair any suspicious areas as evidenced by bubbles in the soap solution or failure of a vacuum to be formed.

In the case of the fillet extrusion weld, the Contractor may, in lieu of vacuum box testing, test all seams and repairs in the HDPE lining by using a high voltage spark detector, such as Tinker and Rasor Holiday Detector (Model AP-W) or approved equivalent. The setting of the detector shall be 20,000 volts. In order to conduct this test, all seams to be tested shall be provided with not less than a 24 gauge copper wire properly embedded in the seam and grounded. All wire installation and spark testing shall be done in the presence of the QA/QC Consultant. All defective areas shall be marked for repair.

If the double hot-wedge fusion weld is used, the Contractor shall test all seams in the HDPE lining by using the air pressure test. This test consists of inserting a needle with gauge in the air space between welds. Air shall be pumped into the air space to 30 psi and held for 5 minutes. If the pressure loss exceeds 4 psi during air pressure testing the outside weld edge (not free edge) shall be sprayed with a soap solution and visually examined for bubbles. If no bubbles appear, the problem is with the inside weld and the seam is acceptable. If any bubbles appear, the defect shall be repaired by extrusion welding and tested by vacuum box or spark detector. If pressure loss is not more than 4 psi, puncture the opposite end of the seam to release the air. If a blockage is present, locate and test seam on both sides of blockage. Extrusion welding shall seal all penetration holes created during testing.

If capping a field seam is required, the Contractor shall use a cover strip of the same material (and from the same roll, if available) and a minimum of eight-inches (8") in width. The cap strip shall be extrusion welded and tested as required for extrusion welding. One additional destructive sample shall be taken from the extrusion welded cap strip. The cost of all additional testing of nondestructive samples due to failure of the original sample to pass specifications shall be borne by the Contractor.

8.3.4 ANCHOR TRENCH CONSTRUCTION

Reference is made to Section 6 of these Special Provisions for details of the anchor trench construction.

8.4 MEASUREMENT AND PAYMENT

- A. The **measurement** of the final quantity for Bid Item No. 12 “Furnish & Install 80-mil HDPE Liner (single-side textured) on Side Slopes” shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the Project Drawings and after it has been installed and tested by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling method. **Payment** shall be made, after acceptance, at the contract unit price per square foot as stated in the Contractor’s Proposal, **Bid Item No.12**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of the FML as required by the Contract Documents. No additional compensation shall be given for waste material from trimming of rolls, seam overlaps, patches, or related items.
- B. The **measurement** of the final quantity for Bid Item No. 13 “Furnish & Install 80-mil HDPE Liner (double-side textured) on Side Slopes” shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the Project Drawings and after it has been installed and tested by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling method. **Payment** shall be made, after acceptance, at the contract unit price per square foot as stated in the Contractor’s Proposal, **Bid Item No.13**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of the FML as required by the Contract Documents. No additional compensation shall be given for waste material from trimming of rolls, seam overlaps, patches, or related items.
- C. The **measurement** of the final quantity for Bid Item No. 14 “Furnish & Install 60-mil HDPE Liner (double-side textured) on Canyon Floor” shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the Project Drawings and after it has been installed and tested by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling method. **Payment** shall be made, after acceptance, at the contract unit price per square foot as stated in the Contractor’s Proposal, **Bid Item No.14**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of the FML as required by the Contract Documents. No additional compensation shall be given for waste material from trimming of rolls, seam overlaps, patches, or related items.

END OF SECTION 8

SECTION 9 - GEOTEXTILES

9.1 GENERAL

This section covers the work necessary to furnish and install the geotextile fabrics. The intent of these specifications is to provide protection to the HDPE lining and to provide for transmissivity and filtration of liquids from above the drainage layer through to the leachate collection pipes.

In general, twelve (12) oz/sy geotextile is to be placed above the 60-mil HDPE bottom FML; eight (8) oz/sy geotextile is to be placed directly above the LCRS gravel layer above the bottom liner; and sixteen (16) oz/sy geotextile is to be placed above the FML on the side slopes and benches. The Contractor shall provide all labor, supervision, tools, equipment, and materials necessary to install the geotextiles as described in the Contract Documents.

9.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

D-1777-64	Standard Test Method for Measuring Thickness of Textile Materials
D-3776-85	Standard Test Method for Weight (Mass) per Unit area of Fabric
D-4354-99	Standard Test Method for Practice for Sampling of Geotextiles for Testing
D-4355-02	Standard Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Zenon-Arc Type Apparatus)
D-4491-99	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
D-4533-96	Standard Test Method for Trapezoid Testing Strength of Geotextiles
D-4632-96	Standard Test Method for Breaking Load and Elongation of Geotextiles (Grab Method)
D-4751-99	Standard Test Method for Determining Apparent Opening Size of a Geotextile
D-4833-00	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembrane, and Related Products.
D-4759-02	Standard Practice for Determining the Specification Conformance of Geosynthetics

- D-4873-02** Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls
- D6241-99** Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe

9.1.2 SUBMITTALS

- a. The Contractor shall submit in advance complete material specifications and descriptive literature for approval by the County. The Contractor shall also submit complete details and/or methods for anchoring the geotextile at its perimeter and making field sewn seams.
- b. The Contractor shall submit written certification by the geotextile manufacturer that the geotextile materials conform to the requirements of these specifications; are similar and of same formulation as that for which certification is submitted; and have been demonstrated by actual usage to be satisfactory for the intended application.
- c. The Contractor shall submit six (6) eight-inch (8") x ten-inch (10") samples of geotextile material(s), six (6) one-yard samples of thread, and six (6) samples of sewn field seams which have been made in conformance to these specifications. The Contractor using the same materials, equipment and procedures specified for the geotextile shall fabricate the field seam samples. Sample width shall measure twelve inches (12") plus seam width and sample length shall measure 18 inches. The samples shall be numbered and dated.
- d. The Contractor shall submit a complete description of sewing procedures for making field seams and repairs. The sewing procedures shall conform to the latest procedures recommended by the geotextile manufacturer and to these specifications. The Contractor shall submit for approval by the County a method(s) for handling and storage of geotextile material(s) prior to installation. The Contractor shall install the geotextile only on surface(s) that have been accepted by the QA/QC Consultant and with written certification furnished to the County that the surfaces meet the requirements for installation and these specifications.
- e. Daily reports shall be submitted by the Contractor to the County prior to 11:00 a.m. documenting work accomplished the previous day including all personnel and equipment on site, quantities of material received, panels placed, seaming completed, tests performed, repairs made, weather conditions and other comments relative to the progress of the work.

9.1.3 QA/QC

Prior to installation of geotextile, the Contractor shall allow two (2) weeks for geotextile material conformance testing to be completed by the QA/QC Consultant before the material is scheduled to be integrated into the project. The Quality Control Plan(s) to be implemented for the work by the manufacturer, the Contractor and/or the lining subcontractor shall be in accordance with the QA/QC Plan. The County shall have the authority to order an immediate stoppage of work because of improper installation procedures, noncompliance with the QA/QC Plan, safety infractions or for any reason, which may result in defective or unsafe installation of the geotextile.

9.1.4 SAFETY

Prior to installation of the geotextile, the Contractor shall instruct the workmen of the hazards of installation, such as handling sheets of geotextiles in high winds and on steep slopes; use of equipment; and walking on geotextile surfaces. Work gloves, safety glasses, hard hats, and smooth-soled shoes are minimum safety wear requirements.

9.1.5 DELIVERY, STORAGE AND HANDLING

Geotextile shall be shipped, stored and handled in accordance with ASTM D4873, the manufacturer's recommendations, and as specified herein. Contractor shall be completely responsible for shipping, storage and handling of all geotextile.

Geotextile shall be shipped and stored in opaque and watertight protective coverings. Contractor shall notify the County at least 24 hours prior to scheduled delivery. No materials shall be unloaded except in the presence of a QA/QC Monitor. Geotextile delivered to the site shall be inspected for damage and unloaded and stored with minimal handling. Contractor shall, upon material delivery, assist QA/QC Monitor in conducting inventory, handling and sampling of geotextile at no additional cost to the County.

No hooks, tongs, or other sharp tools or instruments shall be used for handling geotextile. Contractor shall use slings or a pole which extends at least 1 foot beyond each end to unload or handle geotextile. Geotextile shall not be dragged along the ground.

Geotextile shall be protected from ultraviolet light exposure, precipitation or other inundation, soil, mud, dirt, debris, puncture, cutting, or other damaging or deleterious conditions. Geotextile shall not be stored directly on the ground. Rolls of geotextile shall not be stacked higher than three (3) rolls.

Under no circumstances shall the installed geotextile be subjected to materials, sandbags, equipment or other items being dragged across its surface, nor shall workmen and others slide down slopes on top of the geotextile. All damaged surfaces

resulting from abuse of any kind caused by the Contractor in performance of the work shall be repaired at the Contractor's expense.

9.2 MATERIALS

The geotextile material shall be a new, high quality product designed and manufactured specifically for the purposes of this project. Its suitability and durability for this type of work shall have been adequately demonstrated by prior applications. The geotextile shall be 100 percent polyester or polypropylene, needle-punched, and non-woven. Geotextile rolls shall be shipped and stored in opaque and watertight wrappings. The geotextile fabric installation shall be performed under the ongoing observation of the County and QA/QC Consultant, and according to the Contract Documents. The Contractor shall be responsible for detecting and repairing all damaged areas.

The manufacturer's certification shall demonstrate that the geotextile meets or exceeds the following Minimum Average Roll Values MARV (in the weakest principal Direction):

Property	Unit	Test Method	Value 8 oz.	Value 12 oz.	Value 16 oz.	QA/QC Conform. Testing-Y/N
Mass per unit Area	oz/sy	ASTM D5261	8	12	16	Y
Apparent Opening Size	US Std. Sieve	ASTM D4751	70-140	-	70-140	Y
Permittivity	sec ⁻¹	ASTM D4491	0.7	-	0.7	Y
Puncture Resistance	lbs	ASTM D4833	95	120	170	Y
Static Puncture Strength	lbs	ASTM D6241	600	750	900	Y
Trapezoidal Tear Strength	lbs	ASTM D4533	75	115	145	Y
Grab Tensile/Elongation	lbs/%	ASTM D4632	175/50	300/50	320/50	Y
UV Resistance – 70% Strength Retained	hrs	ASTM D4355	NA	NA	500	N

9.3 EXECUTION

9.3.1 INSPECTION

The geotextile shall be installed only on surfaces for which the Contractor has furnished written certification to the County as being acceptable by the QA/QC Consultant for installation of the geotextile. Any problems in the completed layers underneath the geotextile shall be repaired to the satisfaction of the County and QA/QC Consultant prior to the placement of the geotextile.

Before work begins, the Contractor and QA/QC Consultant shall inspect all geotextiles for damage from transit. Materials that cannot be repaired shall be rejected, removed from the project site, and disposed of in accordance with federal, state, and local requirements at the Contractor's expense.

During unwrapping of geotextile materials for use and placement, the Contractor and QA/QC Consultant shall visually inspect all materials for imperfections and faulty areas. All defects shall be marked and repaired in accordance with approved methods.

9.3.2 INSTALLATION

The geotextile shall be installed as shown on the Project Drawings and approved installation drawings. Sheets of geotextile shall be of such lengths and widths and shall be placed in such a manner as to reduce field seaming to a minimum. The geotextile shall be placed in accordance with details shown on approved plans. The County and QA/QC Consultant must approve in advance all changes in approved installation plans and procedures.

Extreme care shall be taken during installation of the geotextile to be certain no damage is done to the prepared supporting surfaces. No foot traffic shall be allowed on the geotextile except with approved smooth-sole shoes. No vehicular traffic shall be allowed on the geotextile. Under no circumstances shall the geotextile be used as a work area or to store tools and supplies. If needed, a tarpaulin of approved material shall be spread out as a work area.

During installation, the Contractor shall be responsible for protecting the geotextile against adverse effects of high winds such as uplift. Sand bags shall be used as required to hold the geotextile material in position during installation. The sand bags shall be left in place to secure geotextile which is not covered with protective cover soil. Sand bags shall be sufficiently close-knit to preclude fines from working through the bottom, sides or seams. Paper bags, whether or not lined with plastic, will not be permitted. Burlap bags, if used, must be lined with plastic. Bags shall contain not less than 40, nor more than 60 pounds of sand having 100 percent passing a 3/8 inch screen and shall be tied closed after filling, using only plastic ties. Metal or wire ties shall not be allowed. Bags that are split, torn, or otherwise losing their

contents shall be immediately removed from the work area and any spills shall be cleaned up immediately.

Any necessary repairs to the geotextile shall be made with the geotextile material itself, using approved seaming methods, equipment and techniques. Heat bonding may be used for Geotextile seams for the floor liner or for repairs as shown on the Project Drawings and when in the opinion of the County and QA/QC Consultant, the seaming or repair area is too contaminated with dirt or the area to be seamed or repaired is not accessible by sewing machines. The patch size shall be 12 inches larger in all directions than the area to be patched. All corners shall be rounded. Should any tear exceed 10 percent of the roll width, the roll of geotextile shall be removed and replaced.

All seams of the geotextile shall be tightly seamed on completion of the work. Any geotextile surface showing injury due to penetration by foreign objects or showing distress shall be replaced or repaired. Geotextile field seams shall be made as follows:

Material	Seaming Requirement
8-oz on floor	Heat bond with minimum 3-inch overlap
12-oz on floor	Heat bond with minimum 3-inch overlap
16-oz on slopes and benches	Sewn as specified below

In the event the QA/QC Consultant or County determines that the Contractor has not demonstrated good quality workmanship and consistency with heat bonding, the Contractor shall immediately cease all heat bonding activities and seam all remaining geotextile by sewing.

The sewn seams shall be overlapped a minimum of three inches (3") as approved by the County and QA/QC Consultant. The sewn seams shall be formed by mating the edges of geotextile sheets and sewing with stitches located a minimum of three inches (3") from the mated edges (prayer seam). A two-thread, double-locked stitch with a minimum of four stitches per inch shall be used. The sewing thread shall be a strong nylon or polyester thread subject to approval of the County and QA/QC Consultant. All seams shall be continuously sewn. Spot sewing will not be allowed. No horizontal seams shall be allowed on the slopes. The geotextile shall be cut only with an approved geotextile cutter, and not torn or ripped to size.

All cleanup within the work area shall be an ongoing responsibility of the Contractor. Particular care shall be taken to insure that no trash, tools, and other unwanted materials are trapped beneath the geotextiles.

9.3.3 FIELD QUALITY CONTROL

a. General

Inspection and testing shall involve the observation of the installation of the geotextile, including the making of field sewn seams and patches. Samples for conformance testing shall be taken by the Contractor under direction of the QA/QC Consultant from rolls of geotextile after delivery. One sample per lot or one sample per 100,000 square feet of geotextile shall be taken, whichever results in the greater number, for conformance testing. The delivery of geotextile in quantities less than one lot is discouraged. The Contractor shall absorb the costs for excessive conformance testing on delivery of geotextile that is less than one lot. Samples shall be taken across the entire roll width and shall not include the first three feet (3'). Unless otherwise specified, samples shall be three feet (3') long by the roll width. The manufacturer's roll identification number shall be marked on the sample.

Sample testing shall be conducted by an independent testing laboratory paid for by the County. However, the laboratory cost of retesting work or materials that fail the first test will be billed to the Contractor. The independent testing laboratory shall save all test samples including specimens tested until notified by the County relative to their disposal. All specimens which have failed under testing shall be returned immediately to the County and QA/QC Consultant for determination of corrective measures to be taken.

b. Material Acceptance Criteria and Corrective Action

The minimum number of specimens tested per conformance sample for each tested geotextile property will be determined in accordance with the respective ASTM Standard. The average value will be calculated from the specimen test values of each conformance sample and compared to the values specified in Section 9.2 of the Specifications. A conformance sample that yields any tested property less than the specified value will be recorded as a failure and an additional two (2) rolls will be sampled from the same 100,000 square feet or lot and tested for the failed properties. If a second conformance sample fails, all rolls within the sampled 100,000 square feet or lot will be rejected for use on the project. If no additional conformance tests fail, only the roll which yielded a failure will be rejected from use on the project. The decision of the County shall be final.

9.4 MEASUREMENT AND PAYMENT

- A. The **measurement** of the final quantity for Bid Item No. 15 "Furnish & Install 16 oz./sy geotextile on Side Slopes" shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the project and after it has been installed, tested, and verified by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall

be calculated to the nearest square foot utilizing digital terrain modeling methods. **Payment** shall be made, after acceptance, at the unit price per square foot, as stated in the Contractor's Proposal, **Bid Item 15**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of geotextiles as required by the Contract Documents. No additional compensation shall be given for any geotextile waste materials (trimming of rolls, seam overlaps, patches, or related items).

B. The **measurement** of the final quantity for Bid Item No. 16 "Furnish & Install 12 oz./sy geotextile on Canyon Floor" shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the project and after it has been installed, tested, and verified by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling methods. **Payment** shall be made, after acceptance, at the unit price per square foot, as stated in the Contractor's Proposal, **Bid Item 16**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of geotextiles as required by the Contract Documents. No additional compensation shall be given for any geotextile waste materials (trimming of rolls, seam overlaps, patches, or related items).

C. The **measurement** of the final quantity for Bid Item No. 17 "Furnish & Install 8 oz./sy geotextile on Canyon Floor" shall be based on the final in-place square footage of ground covered with material placed within the limits specified in the project and after it has been installed, tested, and verified by the QA/QC Consultant to the satisfaction of the County. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling methods. **Payment** shall be made, after acceptance, at the unit price per square foot, as stated in the Contractor's Proposal, **Bid Item 17**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of geotextiles as required by the Contract Documents. No additional compensation shall be given for any geotextile waste materials (trimming of rolls, seam overlaps, patches, or related items).

END OF SECTION 9

SECTION 10 - TEMPORARY PROTECTIVE MEMBRANE

10.1 GENERAL

This section covers the work necessary to furnish and install protective membrane to protect portions of the side slope lined area from ultraviolet (UV) degradation. The remaining portions of the side slope lined area shall be covered with Protective Soil Layer as described in Section 13 of these Special Provisions and as shown on the Project Drawings.

The temporary protective membrane work includes the supply and installation of polyethylene cover sheets with reinforcing scrim over the existing side slope liner system as shown on the Project Drawings. The Contractor shall provide all labor, supervision, tools, equipment, and materials and anchorage necessary to install temporary protective membrane.

10.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced herein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

D751-06 Test Methods for Coated Fabrics

D2103-05 Specification for Polyethylene Film and Sheeting

D4533-04 Test Method for Trapezoid Tearing Strength of Geotextiles

D5261-092(2003) Test Method for Measuring Mass per Unit Area of Geotextiles

E96/E96M-05 Test Methods for Water Vapor Transmission of Materials

10.1.2 SAFETY

The Contractor shall instruct workmen of the hazards of installation such as handling the sheets of protective membrane in winds and on the slopes; use of equipment; and walking on the polyethylene liner surface. The Contractor shall ensure that workers have and use proper safety gear and equipment.

10.1.3 DELIVERY, STORAGE AND HANDLING

Protective membrane shall be shipped, stored and handled in accordance with the manufacturer's recommendations and as specified herein and as directed by the QA/QC Consultant. The material shall be delivered to the site only after the County and the QA/QC Consultant receive and approve the required submittals. Material shall be protected from damage or degradation.

10.2 MATERIALS

The liner material shall consist of an UV-stabilized, 8-mil, 3-ply, linear low-density polyethylene copolymer, with a nonwoven nylon yarn scrim. Material shall be black Duraskrim 8BV as manufactured by Raven Industries, Inc or approved equal. The manufacturer's certification shall demonstrate the cover material meets the following minimum average roll values:

Properties	Test Method	Specified Value
Thickness, Nominal	ASTM D2103	8 mil
Weight	ASTM D5261	40 lbs/1,000 sq ft
Grab Tensile	ASTM D751	70 lbf
Elongation at Break	ASTM D751	600%
Trapezoid Tear	ASTM D4533	55 lbf
Hydrostatic Resistance	ASTM D751	70 psi
Maximum Temperature	Use	180°F
Minimum Temperature	Use	-70°F
WVTR	ASTM E96	0.030
Perm Rating	ASTM E96	0.066

Prior to use of an alternative material, the Contractor shall submit for the County's approval the material specifications.

Manufacturer's Warranty: The Contractor shall deliver to the County the Manufacturer's Warranty for the material supplied.

Sandbags shall be Duraskrim 8BBR ultra violet resistance or approved equal. Ropes used to secure the sandbags shall be rated at 700 lb (ultra violet resistance twisted polypropylene rope or approved equal). Placement and type of anchor for the rope shall be approved by the County and the QA/QC Consultant prior to use.

10.3 EXECUTION

The Contractor shall take steps to prevent damage to the existing geosynthetic liner layers during the installation of the protective membrane. The Contractor shall predetermine the liner layout and shall submit to the County for approval prior to installation. All panels should be placed as straight as possible and all seams shall be tightly sewn on completion of work. No horizontal seams, pre-manufactured or field sewn, will be allowed. Before the sewing process begins, sandbags shall be ready for placement on the liner edges in the event of wind. Seams shall be overlapped and sewn a minimum of three (3) inches, and a maximum of six (6) inches, from the edges of seamed panels. A

two-thread, double-locked stitch shall be used. All seams shall be continuously sewn. Spot sewing will not be allowed. The protective membrane shall be cut only with an approved cutter, and not torn or ripped to size. The material shall not be pulled tight. Sufficient slack shall exist throughout the liner. A 5% allowance of excess material in both directions shall be incorporated into the liner for seasonal expansion/contraction. If possible, edge anchorage shall be delayed overnight to allow for preliminary shrinkage.

To avoid wind or other weather related damage, the membrane shall be properly secured and anchored as shown on the Project Drawings. The membrane shall be secured to the slope with sandbags and rope placed seven and a half feet (7.5) on center along the entire length of slopes and anchored at the top of slope as shown on the Project Drawings. The sandbags shall be installed at 5-foot intervals along each rope, and shall be filled with 1-in maximum particle size screened material. In addition, these vertical ropes with sand bags shall be connected together with horizontal ropes at 7.5-ft vertical interval as shown on the Project Drawings and as directed by the County.

When anchor trenches are required along the termination boundary of the protective membrane as shown on the Project Drawings, anchor trenches shall be constructed in accordance with the requirements of Section 6 of these Special Provisions.

No foot traffic shall be allowed on the membrane except with approved smooth-sole shoes. No vehicular traffic shall be allowed on the membrane. The completed membrane shall be free of holes, tears, and punctures. Repair, if necessary, shall require a patch extending 18 inches in all directions beyond the damaged area, secured with tape and anchored as necessary.

10.4 MEASUREMENT AND PAYMENT

The measurement of the final quantity for Bid Item No. 18 "Furnish and Install 8-mil Protective Membrane on Side Slopes" shall be based on the final in-place square footage of ground covered with protective membrane material placed within the limits specified in the Project Drawings and after it has been installed to the satisfaction of the County and the QA/QC Consultant. The area of the final surface shall be verified by the County based on conventional ground surveying. Quantity shall be calculated to the nearest square foot utilizing digital terrain modeling method. **Payment** shall be made, after acceptance, at the contract unit price per square foot as stated in the Contractor's Proposal, **Bid Item No.18**. Payment shall constitute full compensation to the Contractor for all work related to the furnishing and installation of the protective membrane material including but not limited to all anchor trench construction, ropes, sand bags, and any other material or other work required by the Contract Documents. Payment shall also constitute full compensation for furnishing all labor, supervision, materials, tools, and equipment necessary to install this protective membrane layer in accordance with the Contract Documents. No additional compensation shall be given for waste material from trimming of rolls, seam overlaps, or related items.

END OF SECTION 10

SECTION 11 - LEACHATE COLLECTION AND REMOVAL SYSTEM

This work shall include furnishing all labor, supervision, tools, equipment, and materials necessary to construct the entire leachate collection and removal system (LCRS as required by the Contract Documents, and as directed by the County and the QA/QC Consultant. This section covers the work necessary to construct the LCRS which consists of but is not limited to: the drainage layer; HDPE solid and slotted pipes; HDPE fittings; HDPE pipe boots; plug valves; ball valves; and various components and accessories. All work shall conform to applicable requirements of the Standard Specifications, to the relevant manufacturer's and supplier's specifications, and to the Contract Documents.

11.1 SUBMITTALS

The Contractor shall submit in advance complete material specifications and descriptive literature from the manufacturer for approval by the County

11.2 MATERIALS

11.2.1 HDPE PIPES

a. General

HDPE pipes shall be sized as shown on the Project Drawings and described in these specifications. Two-inch (2"), Three-inch (3"), Four-inch (4"), and six-inch (6") nominal diameter pipes shall have a design working pressure of 160 psi or greater at 73.4°F and an SDR of 11 or less.

If required, the pipes shall be slotted based on a schedule as shown on the Project Drawings. Pipe material shall be of ultra-high molecular weight, high-density polyethylene conforming to ASTM 3350 Cell Classification PE 345434C through 355434C, manufactured from PE 3408 resin.

The material shall exceed 1,500 hours on environmental stress crack resistance (ESCR) with no failures and no indication of stress crack initiation, as determined by ASTM D1693, Condition C. Certified laboratory test results documenting cell classification, melt flow index, and tensile strength of actual pipe to be used on the project shall be submitted to the County for approval prior to delivery.

Additional, nominal, engineering design specifications required are:

Property	Unit	Test Method	Value	QA/QC Conf. Testing (Y/N)
Elongation at Break	%	ASTM D638	600-900	N
Modules of Elasticity	psi	ASTM D882	>100,000	N
Impact Strength	N/A	ASTM D256	no break	N
Resin Density	Gm/cm ³	ASTM D1505/D792	0.95-0.96	N
Melt Index	gm/10 min	ASTM D1238*	0.11**	N
Hardness	shore "D"	ASTM D2240	62-65	N

* Perform test at 216 kg/190oC

** Average melt index value with a standard deviation of 0.01

b. Slot Design

Pipes shall be slotted in accordance with the patterns shown on the Project Drawings. The slots shall be cut before installation. All debris generated from the cutting operation shall be completely removed from the pipe prior to assembly and installation.

c. Defects and Labeling

The HDPE pipe shall be homogeneous throughout, and shall be free of visible cracks, holes, foreign inclusions, or other defects. Any pipe with nicks, scrapes, or gouges deeper than 5% of the nominal wall thickness shall be rejected. Pipe material shall be uniform in color, capacity, density, and other physical properties.

The following shall be continuously printed on the pipe:

- i. Name and trademark of the pipe manufacturer
- ii. Nominal pipe size
- iii. Standard dimension ratio (SDR)
- iv. The letters HDPE, followed by the hydrostatic design basis in 100's of psi
- v. Manufacturing standard reference (e.g. ASTM D-3035 or ASTM F-714)
- vi. A production code from which date and place of manufacture can be determined

11.2.2 HDPE FITTINGS

HDPE fittings shall be molded from polyethylene compound having a cell classification equal to or exceeding the compound used in the pipe or shall be manufactured using polyethylene compound having a cell classification equal to or exceeding the cell classification of the pipe as specified herein.

11.2.3 FLANGES

Unless otherwise noted on the Project Drawings, all flanged connections of polyethylene pipe shall utilize PE flange adapters with 316 stainless steel or ASTM A351 CF8M backing flanges.

11.2.4 CORRUGATED METAL PIPE (CMP) CASING

Corrugated metal pipe (CMP) and bands shall be fabricated and installed in accordance with the details and dimensions shown on the plans, shall conform to Part 2, Section 207-11 of the Standard Specifications. CMP and bands shall be zinc coated (galvanized), with a minimum thickness of 0.064 (16 gauge) as manufactured by Pacific Corrugated Pipe Company or approved equal. The CMP shall be 8-inch in diameter and encases the entire length of the LCRS 6" solid HDPE pipe within the toe berm embankment limits as shown on the Project Drawings.

11.2.5 CONCRETE PIPE ENCASEMENT

Concrete material used for encasing CMP sleeved for the HDPE pipe shall have a minimum compressive strength of 2500 psi. Contractor shall submit concrete mix design to the County for approval prior to starting this work.

11.2.6 DRAINAGE LAYER

The material for the drainage layer shall consist of washed gravel with a 1/2-inch maximum particle size. The Contractor shall submit certified results of sieve analysis and permeability on the proposed gravel material to the County for approval. Tests must have been completed within ninety (90) calendar days preceding the date of submittal and certified by an independent laboratory by a California registered Civil Engineer. The material to be used for the drainage layer shall consist of clean, hard, durable particles with a hydraulic conductivity of 0.1 cm/sec or greater as verified by the ASTM D2434 test method. The material shall meet the following gradation requirements as determined by sieve analysis (C136):

U.S. Standard Sieve	PERCENT PASSING BY WEIGHT
1/2 inch	100
3/8 inch	85-100
No. 4	0-30
No. 8	0-10
No. 200	0-1

Permeability 0.1 cm/sec or greater

11.3 EXECUTION

11.3.1 LEACHATE COLLECTION SYSTEM PIPE PLACEMENT

The leachate collection system components shall be placed to the lines and grades and at locations as shown on the Project Drawings and/or as directed by the County. The leachate collector pipe within the floor of the liner limits shall be slotted six inches (6) in diameter with an SDR of 11 or less. The leachate collector pipe within the landfill toe berm and outside the liner limit shall be solid six inches (6) in diameter with an SDR of 11 or less. The leachate cleanout pipe within the liner limits shall be solid four inches (4) in diameter with an SDR of 11 or less. The pipe for the future gas condensate line outside the liner limits shall be solid three inches (3) in diameter with an SDR of 11 or less.

Slotted pipes shall be joined by butt-fusion welding. The slotted pipe shall be laid at the location and to the elevations, as shown on the Project Drawings. Maximum acceptable tolerances for positioning of the pipe shall be 0.05 feet vertically and 0.5 feet horizontally. All pipes must be placed, however, to promote positive drainage along the entire length. Low areas where liquids may collect are not acceptable.

Pipes shall be installed in such a manner so as to provide for expansion and contraction, as recommended by the manufacturer. Pipes shall be fully supported on the base with no induced strain. Where there is evidence of induced pipe strain, the Contractor shall make the required pipe cuts and install angle fittings as necessary to eliminate the strain. The Contractor shall also remove and replace any fittings that induce either torque or strain to the pipe. Pipe backfill and encasement shall be completed as shown on the project drawings and in conformance with the provisions in Section 4.3.5 (for compacted engineered fill), and Section 15.4 (for concrete backfill).

HDPE pipe lengths, fittings, and flange connections to be joined by thermal butt-fusion shall be of the same type, grade, and class of HDPE compound, and shall be supplied from the same raw material supplier. Butt-fusion of pipes and fittings shall be performed in accordance with the pipe manufacturer's recommendations for

equipment and technique. Jointing can be performed inside or outside of the work area, at the Contractor's discretion.

Mechanical connections of the HDPE pipe to auxiliary equipment, such as valves and other piping systems, shall be through flange connections, consisting of the following:

- a. Fittings and stub ends for HDPE pipe with a minimum design pressure rating of 160 psi at 73.4 degrees F for 2", 3", 4", and 6" both designated with SDR 11
- b. An HDPE stub end thermally butt-fused to the ends of the pipe
- c. ASTM A240, Type 316 stainless steel bolts and backing flange, 150-pound, ANSI B16.5 Standard
- d. Bolts and nuts of sufficient length to show a minimum of three complete threads when the joint is made, tightened to the manufacturer's standard, and re-torque after four hours
- e. Buna-N Gaskets, unless otherwise specified

Before covering the pipes with drainage gravel, the pipe shall be surveyed by the Contractor's surveyors for the As-Built Plans and the County's surveyors for verification of alignment and proper drainage. Solid HDPE pipe shall be tested by the Contractor (Air Test) for any leaks as directed by the County or the QA/QC Consultant before covering the solid HDPE pipe.

Pipe and fittings shall be held firmly in position and protected from damage while drainage gravel is being placed. All pipe and fittings shall be kept clean during the progress of the work. Any pipe that becomes either partially or fully clogged or damaged before final acceptance, shall be cleaned, repaired, or replaced to the satisfaction of the County, by the Contractor, at the expense of the Contractor.

11.3.2 REMOVAL OF EXISTING LEACHATE STORAGE SYSTEM & INSTALLATION OF TEMPORARY LEACHATE STORAGE SYSTEM

The existing HDPE lined leachate secondary containment structure and reinforced concrete pad shall be demolished, removed, and disposed of as required by the Contract Documents and as directed by the County. This work is covered and paid for under Bid Item No. 4 "Remove and Dispose or Salvage Miscellaneous Structures". In addition, in order to facilitate the construction of Phase 2, Stage 4 project, the existing 10,000-gallon tank including all its connections and accessories shall be disconnected and relocated to the new Leachate and Condensate Containment Facility to be constructed under this contract as required by the Contract Documents.

The existing leachate pipe line which was installed during the previous liner expansion project (referred to as Phase 2, Stage 3 area) extends approximately 700 feet south of the existing liner termination, and ends at the existing 10,000-gallon

leachate tank. This portion of the existing leachate pipe is solid 4"-dia HDPE, and falls within the Phase 2, Stage 4 project area, thus, shall be removed and disposed of as directed by the County. This work is covered and paid for under Bid Item No. 4 "Remove and Dispose or Salvage Miscellaneous Structures".

In order to maintain serviceability and to limit disruption to the existing LCRS at the site, prior to disconnecting the existing 10,000-gallon tank and all its connections, the Contractor shall furnish and install a temporary 2,000-gallon leachate storage dual wall tank with secondary containment basin having storage capacity not less than 110% of the temporary tank capacity (i.e. the secondary containment basin shall have a minimum of 2,200 gallons capacity). This temporary leachate storage tank shall be connected to the LCRS 2", 4" and 6" HDPE pipes extending out of Phase 2, Stage 3 area, and shall be either gravity-fed or provided with an automated pump (with power source such as generator) to control the flow of leachate into the temporary tank. The Contractor shall prepare and submit to the County for approval a detailed plan for the temporary leachate storage system as described above. Once this system is approved by the County, and furnished and installed by the Contractor, this temporary system shall remain in service until the installation of the entire new LCRS for Phase 2, Stage 4 project is completed by the Contractor, and inspected and accepted by the County. The Contractor shall maintain and facilitate access to this temporary leachate storage system to allow for leachate removal and general inspection by County personnel at all times throughout the project duration.

11.3.3 CONSTRUCTION OF DRAINAGE LAYER

The Contractor shall submit a plan to the County showing the areas, sequence of work, and estimated schedule in which the construction of the drainage layer will occur. Drainage layer material shall not be placed on the geotextile until the installation, seaming, and testing of the 12 oz/sy geotextile is complete and is accepted by the County and QA/QC Consultant. Areas on which drainage material is to be placed shall conform to the construction details shown on the Project Drawings to permit placement of the full thickness indicated. Drainage material shall be spread uniformly on the base to the section, thickness, slope lines and grades indicated on the Project Drawings.

The method of placement of material shall be such that it will not cause segregation of particle sizes. The material shall be placed in a manner and with appropriate equipment such that damage does not occur to the underlying liner components. The Contractor shall sequence the material placement so that low-ground pressure spreading equipment (Caterpillar Model D-6 or smaller) does not operate on less than 9 inches thick drainage layer material placed above the geotextile. The Contractor shall place the material in the direction parallel to the geotextile seams. The method of drainage material placement shall be submitted to the County for approval. At no time shall trucks, or any other vehicle with concentrated wheel loads, be permitted to operate on less than 24 inches thick drainage layer material; or 12 inches thick protective soil layer over 9 inches thick drainage layer material.

Any damage or excessive wrinkles/folds in the geotextile in the opinion of the County and QA/QC Consultant, caused during placement of drainage material shall be repaired at the Contractor's expense before proceeding with further placement. The Contractor shall maintain the integrity of the drainage layer until it has been accepted by the County. Any material displaced by any action of the Contractor shall be replaced at the Contractor's expense to the lines and grades shown on the Project Drawings. No vehicles shall drive on uncovered geotextile.

11.3.4 GEOTEXTILE PLACEMENT

Geotextile discussed in this section of the Special Provisions shall be placed above the drainage layer. The 8 oz/sy geotextile shall be installed in accordance with Section 9 "Geotextiles" of these Special Provisions, except as modified herein. The geotextile shall be placed in the manner and at the locations shown on the Project Drawings and described in the QA/QC Plan, and as directed by the County and QA/QC Consultant. The geotextile shall be placed so as to minimize the number of joints. The fabric shall be laid smooth and free of tension, stress, folds, wrinkles, or creases. The roll length shall be maximized to provide the largest manageable sheet for the fewest field seams. The strips shall be laid smooth to provide a minimum width of three inches (3") for sewn seams.

During Geotextile installation sand bags shall be used as necessary, and as directed by the County and QA/QC Consultant to prevent uplift during excessive wind. The sand bags shall not have sharp edges or protrusions that may snag or cut the geotextile. Any portion of the geotextile showing damage from any cause shall be replaced or repaired with an additional piece of geotextile material, according to the procedures in the QA/QC Plan or as directed by the County and the QA/QC Consultant.

The geotextile shall be protected from contamination by surface water run-off at all times during construction. Machinery (other than seaming equipment and portable electric generators) shall not be operated directly on the geotextile. The geotextile shall be rejected immediately if it has defects, rips, holes, flaws, deterioration, or damage incurred during manufacture, transportation, or storage.

11.3.5 INSPECTION

All solid piping, fittings, and valves outside the liner limits shall be subject to a pressure test per ANSIB31.8 performed by the Contractor with a representative of the County present.

Extreme caution should be used when working around the pipe being pressure tested due to the high energy content of compressed air. Adequate protection and safety precautions must be used to protect the people and property.

The pipe network may be tested in sections or as an entire assembly at the contractor's option. The test pressure shall be equal to the maximum rated pressure of the weakest

part in the pipe system or 3 PSIG, whichever is lower. Contractor shall provide all temporary plugs, flanges or other sealing devices needed for the air testing. The County recommends conducting the pressure test before well assemblies are connected and also recommends butt fusing temporary HDPE caps on to connections. The system shall hold pressure for at least 2 hours with no more than a 0.2 PSIG loss in pressure. Should the pressure decrease, all joints shall be soap bubble tested to determine the source of the leak. Repairs shall be made and the system shall be retested. All cost associated with the testing shall be included in the bid price. No separate payment will be made.

No pipe installation will be accepted unless and until it meets the pressure test requirements.

The County or its designated representative shall witness all pressure testing and repair work that may be required.

11.4 MEASUREMENT AND PAYMENT

- A. **Measurement** for all components of the leachate collection and removal system (such as HDPE pipes, drainage material, geotextile, and other items) shall be based on the final in-place quantities of each type of material after it has been constructed and tested to the satisfaction of the County. The final quantities shall be verified and determined by the County's field measurements within the limits specified by the Contract Documents. The lines and grades of the final surfaces shall be verified by the County's topographic survey to assure compliance with the Contract Documents. Allowable deviation from design grades shown on the Project Drawings shall be ± 0.1 feet.
- B. **Measurement** and payment for the 8-oz/sy geotextile layer shall be determined as stated in Section 9.4 of these Special Provisions. **Payment** shall be made, after acceptance, at the unit price per square foot as stated in Bid Item No. 17 – "Furnish & Install 8 oz./sy Geotextile on Canyon Floor".
- C. **Payment** for the drainage layer shall be made, after acceptance, at the contract unit price per square feet of true surface area as stated in Bid Item No. 20 – "Furnish & Install LCRS 1/2- inch Gravel Drainage Layer in the LCRS Trenches and on Canyon Floor".
- D. **Payment** for the HDPE and CMP pipes for the main LCRS (including cleanouts), including trench excavation, backfill, pipe fittings, reducers/enlargers, connections, and traffic-rated boxes and valves shall be made, after acceptance, at the unit price per lineal feet as stated in Bid Item No. 21 – "Furnish & Install LCRS 3" Solid HDPE Pipe"; Bid Item No. 22 – "Furnish & Install LCRS 4" Solid HDPE Pipe"; Bid Item No. 23 – "Furnish & Install LCRS 6" Solid HDPE Pipe"; Bid Item

No. 24 – “Furnish & Install LCRS 6” Slotted HDPE Pipe”; and Bid Item No. 25 – “Furnish & Install 8” CMP Sleeve”.

- E. All costs associated with the installation of the three-inch (3”), four-inch (4”) and six-inch (6”) LCRS pipes (Slotted and Solid) and eight-inch CMP sleeve such as fittings, connections, pipe concrete encasement, HDPE pipe boots, and testing shall be included in Bid Items 21, 22, 23, 24, & 25. The Contractor shall also include the cost of the trench excavation, backfill, traffic-rated boxes, valves and pipe support as required by the Contract Documents for the installation of the LCRS pipes in the contract unit prices per lineal feet of Bid Items 21, 22, 23, 24, & 25.

- F. **Payment** for removing and salvaging the existing 10,000-gallon leachate tank including all related valves, fittings, various components and accessories; and the installation of the entire temporary leachate storage system (including but not limited to: 2000 gallon tank, secondary containment, automated pump, power source, fittings, hoses, and other necessary accessories); shall be made after this work has been completed and tested to the satisfaction of the County at the contract Lump Sum price as stated in Bid Item No. 26 – “Furnish, Install, and Maintain Temporary Leachate Storage System”.

- G. No additional compensation shall be allowed for the repair, reworking, removal or re-compaction of any material not meeting the requirements of the Contract Documents as determined by the County and QA/QC Consultant.

END OF SECTION 11

SECTION 12 - LEACHATE AND GAS CONDENSATE CONTAINMENT (LGCC) STRUCTURE

12.1 GENERAL

This work shall include furnishing all necessary labor, design, supervision, tools, equipment, and materials necessary to design and construct the Leachate and Gas Condensate Containment (LGCC) structure including but not limited to:

- A. Procure the services of a licensed structural engineer in the State of California to perform structural analysis and prepare design calculations, specifications and construction drawings for the reinforced concrete (foundation, walls and floor), removable roof system, and stairway components for the LGCC.
- B. Excavation, compaction, and preparation of subgrade for LGCC structure
- C. Construction of a reinforced concrete foundation for supporting three (3) 10,000-gallon HDPE tanks
- D. Construction of reinforced concrete retaining walls and floor slab
- E. Application of waterproof epoxy coating onto interior of LGCC
- F. Supply and install removable roof system
- G. Supply and install CAL-OSHA compliant galvanized stairway system
- H. Supply and install chain-link fence and walk gate to enclose the LGCC structure.
- I. Supply and install two (2) new 10,000-gallon HDPE tanks
- J. Relocation, modification, and installation of the existing 10,000-gallon HDPE tank and accessories
- K. Supply and install 2-inch, 3-inch, and 4-inch diameter HDPE pipes and appurtenances for leachate, gas condensate, and vent pipe systems.
- L. Supply and install three (3) ultrasonic tank level transmitters complete with conduits, cabling, remote display, enclosures and battery system.
- M. Supply and install one (1) 3-inch and one (1) 4-inch clamp-on ultrasonic flow meters complete with conduits, cabling, vault, remote displays, enclosures and battery system.
- N. Supply and install solar panel system to charge battery systems for ultrasonic tank level transmitters, flow meters, and remote displays.

12.2 SUBMITTALS

12.2.1 STRUCTURAL ANALYSIS REPORT FOR LGCC

a. Structural Analysis

The Contractor shall submit a report with that shall include structural design calculations and results of structural analysis for the construction of the LGCC. The report shall address project-specific loading for seismic and wind conditions at the Lamb Canyon Landfill in accordance with the

latest edition of building codes. This report shall be prepared, signed, and stamped by a California Registered Structural Engineer. Structural design calculations shall include, but not limited to:

- i. Site specific seismic and wind load calculations for the construction of the LGCC structure. Lamb Canyon is located in a high wind area and the LGCC should be designed to withstand wind speeds in excess of 100 mph.
- ii. Column, frame and endwall reactions
- iii. Stress analysis
- iv. Deflection analysis
- v. Foundation loads for each loading case
- vi. Reinforced concrete retaining wall analysis
- vii. Stairway system design

In addition, the report shall include a Letter of Certification confirming that the LGCC structure meets site loading conditions and building codes as required. The Contractor should note that geologic mapping and soil investigation and testing were performed within the vicinity of the LGCC location. Soil reports and test results are available for review at the Riverside County Waste Management Department office.

b. LGCC Construction Drawings

The structural report shall include a complete set of construction drawings (24" x 36") that shall include, but not limited to:

- i. Reinforced concrete tank foundation and floor plan complete with cross-sections and reinforcement details
- ii. Reinforced concrete wall complete with cross-sections and reinforcement details
- iii. Removable roof system including – Column size and locations, roof framing, cross-sections, roof panel layout, framing details, and removable column connection details. Roof system shall consist of removable framed roof panel sections to allow for easy removal of storage tanks.
- iv. Stairway system
- v. Anchor bolt setting plan and base plate details
- vi. Pipe and conduit penetration details
- vii. HDPE pipe support system
- viii. Accessory installation details

In addition, the following information shall be provided on the drawings: builder and contractor responsibilities, general notes, approval notes,

product certification, safety guidelines, LGCC description, LGCC loads, drawing index, legend for abbreviations and symbols, title block, revisions, designer name with address and contact information, Contractor name with address and contact information, Riverside County Waste Management Department name with & address and contact information, sheet numbers, and drawing scale if necessary. These drawings shall be signed and stamped by a California Registered Structural Engineer.

12.2.2 LGCC REINFORCED CONCRETE, STRUCTURAL COMPONENTS AND ACCESSORIES

The Contractor shall submit the manufacturer's product data, mill certificates, specifications, color samples, shop drawings and installation instructions for all components and hardware required to construct the LGCC structure (as specified by the Structural Analysis Report). Shop drawings for roof system shall show panel layout, trim installation, and panel attachment. Prior to ordering, Contractor shall submit roof panel manufacturer's standard color samples for County selection. Once color selection is made, Contractor shall submit a 12-inch long panel sample showing shape and color for final acceptance by the County. Reinforced concrete and reinforcing steel submittals shall be in accordance with Section 15 of these Special Provisions.

12.2.3 HDPE STORAGE TANKS

Drawings and Data: The manufacturer's shop drawings shall be approved by the engineer or contractor prior to the manufacturing of the tank(s). Contractor shall submit for review sufficient literature, detailed specifications, and drawings to show dimensions, materials used, design features, internal construction, weights and any other information required for review of storage tanks and accessories. Additional requirements for information to be included with submittals are specified below:

- a. Shop drawings for the tanks shall include as a minimum the following:
 - i. Service Conditions: Chemical environment and temperature.
 - ii. Statement that fabrication shall be in accordance with ASTM D 1998, where applicable.
 - iii. Sizing and description of the fittings and accessories for each tank that are to be supplied by the tank manufacturer.
 - iv. Layouts and assembly schedules for each tank identifying the location and elevation from the bottom of the tank for all inlet, outlet and other integrally molded connections and appurtenances supplied by the tank manufacturer.
- b. Resin - A copy of the resin data sheet from the resin manufacturer for the tank is to be supplied and the tank manufacturer is to certify that it will be the resin used in the manufacture of the tank.

- c. Wall thickness - Prior to the manufacture of the tank the designed wall thickness audit is to be supplied based upon 600 psi hoop stress (ASTM D 1998) @100 degrees F. (Note: See 9.1.2 for chemicals being stored above 100 degrees F)
- d. Tank restraint – The drawings and calculations for the system are to be supplied. Note: Wet stamped or site specific drawings and calculations are required.
- e. Technical Manuals: The tank manufacturers Guideline for Use & Installation is to be submitted for review.
- f. Manufacturer's warranty
- g. Manufacturer Qualifications: The manufacturer is to have rotationally molded tanks based upon ASTM D 1998 utilizing Type I and Type II resins for the last 10 years.
- h. Factory Test Report: Upon completion of the tank the manufacturer's inspection report is to be supplied for each tank.
 - i. Verification of wall thickness
 - ii. Impact test
 - iii. Gel test – (Type I resin only)
 - iv. Hydrostatic test
 - v. Verification of fitting placement
 - vi. Visual inspection
 - vii. Verification of materials

12.2.4 FLOW AND TANK LEVEL MONITORING SYSTEM

Contractor shall submit manufacturer data for ultrasonic flow meters, ultrasonic tank level transmitters, remote display (totalizer and data logger), batteries, solar panels, enclosures, conduits, cables, regulators, and all other materials required for monitoring system. For County review and acceptance, the Contractor shall prepare and submit shop drawings showing the installation of conduits/cables, enclosures, solar panels, meters, level transmitters, vaults and all other items required for the system. Upon completion of work, Contractor shall submit an Operations and Maintenance (O&M) Manual for the ultrasonic flow meters, tank level transmitters, remote displays, and solar panel charging system. O&M manual shall include the following:

- a. Manual Format – Provide three (3) hard copies bound in three ring binder with divider tabs for sections:
 - i. Table of Contents
 - ii. Text pages on 8.5"x11"
 - iii. Drawings to be reduced to 8.5"x11" or 11"x17" folded

- iv. Binder cover and title page shall include the Project Title, Contractor's and Subcontractor name.
 - v. Contractor to provide digital copy (PDF) on CD
- b. Content– Description of Unit and Component Parts:
- i. Complete nomenclature and commercial number of replacement parts
 - ii. Power and control diagrams. As-built of installed power and control system
 - iii. Manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and diagrams
 - iv. Engineering data
 - v. Warranty information
 - vi. Operating Procedures:
 - Start-up, routine, and normal operating instructions
 - Calibration and adjustment procedures
 - Manufacturer's printed operations instructions
 - Installation instructions
 - Operating and limiting conditions
 - Safety precautions
 - Guide to troubleshooting

12.3 MATERIALS

12.3.1 REINFORCED CONCRETE

Concrete design mix shall be as specified in the Contractor's submitted Structural Analysis Report for the LGCC.

12.3.2 ROOF STRUCTURE

The Contractor shall furnish and install structural framing members, roof panels, anchors, horizontal bracing, and other items required to construct the LGCC removable roof structure. These items shall be as specified in the final Structural Analysis Report as accepted by the County.

Unless otherwise specified in the final structural analysis report, the LGCC removable roof system components shall consist of, but not limited to, the following:

- a. General Framing
 - i. Structural steel members shall be sheared, formed, punched, welded and painted in the plant of the manufacturer.

- ii. All shop connections shall be welded in accordance with the AWS "Standard Code for Welding in Building Construction" and CWB "General Specifications for Welding of Steel Structures".
- iii. Steel for hot rolled shapes shall conform to the requirements of ASTM Specification A-36, with minimum yield of 36, 42, or 50 psi. The component manufacturer shall have on file certified mill test reports that verify that these requirements have been met.
- iv. All framing members shall be shop fabricated for field bolted assembly. The surfaces of the bolted connections shall be smooth and free from burrs and distortions.
- v. All framing members shall carry an easily visible identifying mark to aid the erector in the erection of the building.
- vi. All shop connections shall be fabricated in accordance with the requirements specified in the final structural analysis report. In addition, the Contractor shall submit to the County certificate of welder qualifications prior to fabrication and delivering material to the project site.
- vii. Field connections shall be bolted with high strength bolts and nuts (ASTM A325 or SAE J429 Grade 5).

b. Primary Structural Members

- i. Primary framing shall be Clear Span (CS) type rigid frames, with standard beam and post and beam endwall frame.
- ii. The primary structural members shall be rigid framing manufactured of solid web members having tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns.
- iii. All rigid frames shall be welded, built-up "I" sections. The columns and the rafters may be either uniform depth or tapered. Flanges shall be connected to webs by means of a continuous fillet weld on one side.
- iv. All endwall roof beams and end wall columns shall be cold-formed "C" sections, mill-rolled sections, or built-up "I" sections as specified in the final structural analysis report submitted by the Contractor and accepted by the County.
- v. All base plates, splice and flanges shall be shop fabricated to include bolt connections holes. Webs shall be shop fabricated to include bracing holes.
- vi. Connections for secondary structural (purlins and girts) shall be by means of welded clips or as specified in the final structural analysis report submitted by the Contractor and accepted by the County.

c. Secondary Structural Members

- i. Secondary structural framing shall distribute the loads to the primary structural system and shall include endwall columns and rafters, purlins, girts, eave struts, base support, headers, jambs, flange bracing, clips, and other miscellaneous structural framing. Spacing and locations shall be specified in the final structural analysis report submitted by the Contractor and accepted by the County.
- ii. Steel used for cold-formed members shall conform to the physical characteristics of ASTM A570 or ASTM A607.
- iii. Light gauge cold-formed sections shall be manufactured by precision roll or brake forming. All dimensions shall be true, and the formed member shall be free of fluting, buckling, or waviness.
- iv. Endwall rafters shall be manufactured from built-up sections of adequate size and thickness as specified in the final structural analysis report submitted by the Contractor and accepted by the County.
- v. Endwall columns shall consist of built-up sections or cold formed "C" sections of adequate size and thickness as specified in the final structural analysis report submitted by the Contractor and accepted by the County.
- vi. Purlins and girts shall be simple or continuous span, and be of adequate design and thickness as specified in the final structural analysis report submitted by the Contractor and accepted by the County. They shall be pre-punched at the factory to provide for field bolting to the rigid frames. Connection bolts shall install through the webs, not flanges.
- vii. Eave struts shall be of adequate design and thickness as specified in the final structural analysis report submitted by the Contractor and accepted by the County. The upper flange shall slope with the normal roof slope, and the web shall be vertical and free to receive the sidewall covering.
- viii. Base support shall consist of a continuous base angle, base "C", or Panel edge to which the base of the wall covering shall be attached. The base support shall be securely fastened into the concrete by the erector. This member shall be secured to the concrete slab with ram-sets, expansion bolts, or equivalent anchors as specified in the final structural analysis report submitted by the Contractor and accepted by the County.
- ix. Headers and jambs shall be precision roll-formed "C" sections of the same depth as the girts.
- x. Flange bracing shall consist of angle or tube members connected to the web of the purlin or girt and to the compression flange of the primary structural member.

d. Bracing

- i. Where applicable, horizontal load resisting bracing shall be accomplished by diagonal cable bracing, rod bracing, portal frames, and/or diaphragm action of the roof and wall covering.
- ii. All cables for diagonal bracing shall be fabricated from extra high strength Grade-7 wire Class A coating, left hand lay, galvanized steel strand, conforming to the provisions of ASTM A475. Adjustment shall be provided by an eyebolt assemble.
- iii. Diagonal bracing in the roof and sidewalls shall be used to remove longitudinal loads (wind, crane, etc.) from the structure. This bracing will be furnished to length and equipment with bevel washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors. If load requirements so dictate, bracing may be structural angle and/or pipe, bolted in place.
- iv. Rod bracing shall be fabricated from minimum 1/2" diameter steel rod conforming to the provisions of ASTM A36, or as specified in the final structural analysis.
- v. Portal frames shall be fabricated of built-up sections and conform to the same specifications as primary framing.
- vi. Flange bracing: The compression flange of all primary framing shall be braced laterally with angles connection to the webs of purlins or girts so that the flange compressive stress is within allowable limits for any combination of loading.

e. Framing Coating

- i. All structural framing members shall be prepared according to SSPC-SP2 and shall be epoxy coated using a prime coat of minimum dry film thickness or 10 mils; and final coat of 10 mils; for a total minimum dry film thickness of 20 mils. .Coating systems shall be manufactured by one of the following manufacturers or approved equal:

- Carboline System: Primer – Carboguard 891
Final – Carboguard 891
- Engard System: Primer – 480 H.S. Epoxy
Final – 480 H.S. Epoxy
- Tnemec System: Primer – 69 Hi-Build Epoxoline II
Final – 69 Hi-Build Epoxoline II

Prior to ordering epoxy, Contractor shall submit epoxy manufacturer's standard color samples for County selection.

f. Roof Panels

- i. Roof panels shall be manufactured using steel conforming to ASTM A792 Zincalume/Galvalume, minimum yield 50,000 psi, 24 gauge thickness. Roll-formed profile shall be "R" Panel configuration. Panels shall have 1 1/2" deep major ribs spaced at 7.2" on center. Each panel shall provide a net coverage width of 36". Panels shall be HR-36 as manufactured by AEP Span or approved equal.
- ii. Exterior side of panels shall be coated with a baked-on 0.15-0.20 mil dry-film-thickness (DFT) fluoropolymer corrosion resistant primer containing not less than 70% polyvinylidene fluoride (PVDF) and a baked-on 0.70-0.80 mil DFT finish coat with a specular gloss of 10-30% when tested in accordance with ASTM D523. Interior side of panels shall be coated with 0.15 mils DFT corrosion resistant primer and 0.35 mils DFT finish coat of off-white to light gray color of polyester paint. Exterior color to be selected from standard color selected by the County.
- iii. Panels shall be one piece from base to eave. Endlaps, if required, shall be 6" and occur at a roof framing member.

12.3.3 HDPE STORAGE TANKS

12.3.3.1 Tank Material

Tanks shall be molded from 100% virgin Type II high-density linear polyethylene (HDLPE) resin as manufactured by ExxonMobil Chemical, or resin of equal physical and chemical properties. Resin shall include a minimum of a U.V. 8 stabilizer as compounded by the resin manufacturer. Properties of HDLPE Type II tank material are shown in the table below:

PROPERTY	ASTM	VALUE
Density (Resin)	D1505	0.941-0.948 g/cc
Tensile (Yield Stress 2"/min)	D638	2950 PSI
Elongation at Break (2"/min)	D638	>1000%
ESCR (100% Igepal, Cond A, F50)	D1693	>1000 hours
ESCR (10% Igepal, Cond A, F50)	D1693	>1000 hours
Vicat Softening Degrees F. Temperature	D1525	235
Flexural Modulus	D790	129,000 PSI

New tanks shall have 10,500 gallon capacity vertical tanks molded natural white-colored HDLPE with specific gravity of 1.5 as manufactured by Synder Industries, Inc. or approved equal.

12.3.3.2 Tank Accessories

Contractor shall furnish and install the following accessories for all new tanks, along with furnishing and installing an ultrasonic tank level transmitter, stenciled calibration board, internal outlet piping and bulkhead fittings for the County's existing 10,000 gallon tank:

- i. **Ladder** – Tank shall have a fiberglass reinforced plastic (FRP) ladder with safety cage. Ladder and cage shall be designed and constructed to meet CAL-OSHA standards. Ladder shall be manufactured by Synder Industries, Inc. or approved equal.
- ii. **Ultrasonic Tank Level Transmitter** – Ultrasonic enclosure is to be all plastic with a NEMA Type 4X rating. The ultrasonic transducer is to have a 12-inch dead band and beam with a 20-foot range. The supply voltage shall be 24 VDC with a battery back-up system. Transmitter shall be connected to the top head of tank with 2-inch NPT bulkhead fitting. The remote display shall be installed in a NEMA Type 4X rated stainless steel enclosure in a location as shown on the Project Drawings. Ultrasonic tank level transmitter (7ML1201-1JE00), remote display (SITRANS RD200), and mounting kit shall be as manufactured by Siemens or approved equal.
- iii. **Seismic/Wind Restraints** - The tie down system shall be designed to withstand 150 MPH wind loads. Tie down systems must meet seismic requirements per IBC 2006 / CBC 2007 code with seismic loads $\leq .445g$ (Seismic Design Category "D" - $F_a=1.0$, $F_v=1.5$, $S_s=1.4$, $S_1=0.5$). Anchor bolts shall be provided by the contractor per the calculations and the base plates for the system. A registered engineer's wet stamped calculations and drawings are required. The tie down system shall be offered galvanized, 304 or 316 stainless steel. Mild steel parts shall be deburred and galvanized. Seismic/wind restraint system shall be as manufactured by Synder Industries, Inc. or approved equal.
- iv. **Sealed Top Manway** – Manway shall be 18-inch diameter and constructed of polyethylene material. Bolts shall be polyethylene and gaskets shall be closed cell , crosslinked polyethylene foam and Viton o-rings to seal the bolts. Manway shall be as manufactured by Synder Industries, Inc. or approved equal.

- v. **Float Level Gauge** – The float level gage shall be constructed of a guided float on the inside of the tank connected to a weight indicator on the exterior of the tank with a 1/4" rope. The weighted indicator shall move along inside a clear guide pipe and shall be equipped with a gallonage indicator board. The gallonage indicator board is made of PVC material and shall be attached to the clear guide pipe. The board shall be stenciled with one hundred gallon marks and labeled every five hundred gallons. The level gage shall be connected to the tank at an appropriate tank flat on the tank dome with a 3" threaded bulkhead fittings and held along the tank sidewall with appropriate 1" fittings and stand-off connections. The float level gage rigid components shall be constructed of PVC. The rope shall be constructed of polypropylene or other specified material. Gaskets shall be constructed of EPDM or Viton material. Float level gauge (Part No. 347267) and stenciled calibration board (Part No. 3471135) shall be as manufactured by Synder Industries, Inc. or approved equal.
- vi. **Internal Outlet Down Piping** – Contractor shall furnish and install internal outlet piping on new tanks and County's existing tank. Piping shall be supported internally at five (5) foot maximum intervals with support structures. Piping shall be solid HDPE with no joints and bulkhead fitting/gaskets shall be airtight.
- vii. **Bulkhead Fittings** – Contractor shall furnish and install fittings on new tanks and County's existing tank in the quantity and orientation to provide connections for all tank accessories and piping (inlet, outlet, and vent). Gaskets for fittings shall be airtight and constructed of EPDM or Viton.

12.3.4 STAIRWAY

Stairway components (stair treads, landings, railing, toekick, stringers, columns, base plates, and anchors) shall be in compliance with CAL-OSHA requirements and the design included as part of the Structural Analysis Report to be submitted by the Contractor. All stairway components shall be hot-dipped galvanized and shall be as manufactured by Lapeyre Stair, Inc. or approved equal.

12.3.5 CONCRETE EPOXY COATING

All concrete interior surfaces of the LGCC shall be sealed and waterproofed using a prime coat of minimum dry film thickness of 10 mils; and final coat of 10 mils; for a total minimum dry film thickness of 20 mils. Coating systems shall be manufactured by one of the following manufacturers or approved equal:

- Carboline System: Primer – Carboguard 891
Final – Carboguard 891

- Engard System: Primer – 480 H.S. Epoxy
 Final – 480 H.S. Epoxy

- Tnemec System: Primer – 69 Hi-Build Epoxoline II
 Final – 69 Hi-Build Epoxoline II

Prior to ordering epoxy, Contractor shall submit epoxy manufacturer's standard color samples for County selection.

12.3.6 CLAMP-ON ULTRASONIC FLOW METERS

Leachate (4-inch) and condensate (3-inch) flow meters shall be clamp-on ultrasonic type complete with pipe thickness gauge, data logger, flow totalizer, battery back-up, and remote display, Model FUS1010 as manufactured by Siemens or approved equal. Flow meters shall be installed in polymer concrete traffic rated vaults with logos as shown on the Project Drawings. Vaults and grade risers shall be manufactured by Armorcast or approved equal.

12.3.7 SOLAR PANEL BATTERY CHARGING SYSTEM

Solar panel system shall be used to charge batteries used to power ultrasonic flow meters, ultrasonic tank level transmitters, and remote displays. Solar panel supply voltage shall be 24 VDC and shall meet power requirements for flow meter/tank level monitoring instrumentation. System shall include solar panels, battery backup, and solar regulators as manufactured by Bentek Systems or approved equal.

12.3.8 ENCLOSURES AND PIPE/CONDUIT SUPPORTS

All enclosures shall be stainless steel NEMA Type 4X as manufactured by Cooper B-Line or approved equal. Plastic nameplates shall be provided for the enclosures and shall be NEMA ES-1, 3-ply, 1/16-inch thick, beveled and satin finished and shall be attached using rivets. Nameplates shall be laminated black plastic with 1/4-inch high white letters. Nameplate inscriptions shall identify enclosure contents.

Contractor shall provide galvanized metal channels, brackets, concrete anchors, fittings, clamps, hangars, saddles, and required hardware to support all conduit and equipment. Pipe and conduit supports shall be as manufactured by Cooper B-Line or approved equal.

12.3.9 ELECTRICAL /SENSOR CABLING AND CONDUIT

Exposed conduit for power and sensor cables for flow meters and tank level transmitters shall be rigid aluminum with a minimum size of 3/4-inch. Rigid steel conduit fittings wrapped with 33-mil tape shall be used for penetrations through reinforced concrete wall. PVC Schedule 40 or 80 minimum size 3/4-inch conduits shall be used for all underground applications.

Power cables shall be new, single-conductor, copper, not smaller than No. 12 AWG. Instrumentation cables shall be single twisted pair or multi-twisted pairs of stranded, 600 volt, copper cables with 15 mil polyvinyl chloride insulation over each conductor, overall aluminum-mylar tape shield, overall tinned copper drain wire and 45 mil minimum polyvinyl chloride jacket overall. Twisted pair cables that are required to be shielded, shall have aluminum-mylar tape shields and tinned copper drain wires over individual twisted pairs of cable. Single twisted pair cables shall be #16 AWG minimum. Cables shall be Okonite "Okoseal-N-Type TC", Belden, or approved equal.

12.4 EXECUTION

12.4.1 CONSTRUCTION OF LGCC REINFORCED CONCRETE STRUCTURE, REMOVABLE ROOF, AND STAIRWAY SYSTEMS

Construction of the reinforced concrete structure (foundation, floor, and walls), removable roof, and stairway systems shall be in accordance with the design details, specifications, and construction drawings included as part of the Structural Analysis Report (refer to Section 12.2.2). Unless otherwise specified in the Structural Analysis Report, reinforced concrete placement shall be in accordance with Section 15 of these Special Provisions.

12.4.2 HDPE PIPING

Fabrication and installation of HDPE piping within the LGCC shall be in accordance with Section 11 of these Special Provisions.

12.4.3 CHAIN-LINK FENCING

Construction of chain-link fencing and walk-gate for the LGCC shall be in accordance with Section 19.6 of these Special Provisions.

12.4.4 REINSTALLATION OF EXISTING TANK AND NEW TANKS INSTALLATION

The existing 10,000 gallon leachate storage tank shall be modified by the Contractor by furnishing and installing a new stenciled calibration board, internal outlet piping, ultrasonic tank level transmitter, bulkhead fittings for inlet, outlet, transmitter, and vent piping locations. Shop drawings for the existing tank are located under Appendix F in this Contract Documents, and the Contractor shall provide revised shop drawings showing the orientation of all accessories and proposed bulkhead fitting locations in relationship to the tank's new location within the LGCC. Once placed within the LGCC, Contractor shall re-install the existing tie-down restraints.

Once installed, the new and existing tanks and accessories shall be tested in accordance with the manufacturer recommendations, instructions, and shop drawings.

12.4.5 ULTRASONIC FLOW METER AND ULTRASONIC TANK LEVEL MONITORING SYSTEM

Contractor shall furnish and install ultrasonic flow meters, tank level transmitters, remote displays and appurtenances (batteries, conduit, cables, enclosures, solar panel, and all other items required for a complete working system) per Manufacturer's instructions and recommendations.

12.5 MEASUREMENT AND PAYMENT

12.5.1 STRUCTURAL ANALYSIS REPORT

Measurement and payment for the preparation and submittal of the Structural Analysis report shall be based upon the lump sum amount as stated in the Contractor's Proposal, Bid Item No. 27 –“Structural Design of Leachate and Condensate Containment Facility Including Construction Details”. Payments shall constitute full compensation (less retention) for all labor, material, design calculations, construction drawings, specifications, and structural analysis report, stamped by a qualified California Registered Structural Engineer and all other items necessary and incidental to completion of this item of work.

12.5.2 CONSTRUCT LEACHATE AND GAS CONDENSATE CONTAINMENT STRUCTURE

Measurement and payment for the construction of the reinforced concrete structure (tank foundation, floor, and walls); removable roof system; stairway system; chain-link fencing and walk-gate; interior surface concrete epoxy; concrete sump with grate; 2-inch, 3-inch, and 4-inch HDPE piping system from Sta. 0+00 to 0+55.74 (pipe, ball valves, vents, vaults, pipe supports, fittings, and pipe markers), ultrasonic flow meters and remote display (vaults, enclosures, battery, conduit and cable), and solar panel battery charging system shall be compensated based upon the lump sum amount as stated in the Contractor's Proposal, Bid Item No. 28 –“Construct Leachate and Condensate Containment Facility”. Payments shall constitute full compensation (less retention) for all labor, material, tools, equipment, and all other items necessary and incidental to completion of this item of work.

12.5.3 NEW 10,000 GALLON STORAGE TANKS AND RELATED ACCESSORIES

Measurement and Payment for new 10,000 gallon HDPE storage tanks and accessories including, but not limited to; design calculations, shop drawings, HDPE tank, FRP ladder with safety cage, float level gauge with calibration board, manway, bulkhead fittings, internal outlet piping, ultrasonic tank level transmitters and remote displays (conduit, cable, enclosures), and seismic/wind restraints, shall be made after County acceptance, installed at the locations and in conformance with the details shown of the Project Drawings and as required by the Contract Documents. Payment for tanks and all related works shall be based upon the contract unit price per each as

stated in the Contractor's proposal Bid Item No. 29 – "Furnish and Install Two New 10,000 Gallon Storage Tanks, Piping, Valves, and Related Accessories".

12.5.4 CONSTRUCT LEACHATE AND GAS CONDENSATE CONTAINMENT STRUCTURE

Measurement and payment for the removal, modification and relocation of the existing 10,000-gallon leachate tank including shop drawings, furnishing and installing installation of internal outlet down piping, stenciled calibration board, ultrasonic level transmitter, new bulkhead fittings, transportation, placement and reinstallation of tie-down restraints shall be compensated based upon the lump sum amount as stated in the Contractor's Proposal, Bid Item No. 30 – "Relocate Existing 10,000 Gallon Leachate Tank and Related Accessories". Payments shall constitute full compensation (less retention) for all labor, material, tools, equipment, and all other items necessary and incidental to completion of this item of work.

END OF SECTION 12

SECTION 13 - PROTECTIVE SOIL LAYER CONSTRUCTION

13.1 GENERAL

This work shall include furnishing all labor, supervision, tools, equipment, and materials necessary to complete the work of placing a 2-foot-thick protective soil layer as shown on the Project Drawings and as directed by the County. All construction operations related to the screening, stockpiling, placement, grading, and compacting the protective soil layer shall conform to the applicable requirements of the Standard Specifications and to the requirements of the Contract Documents.

13.2 MATERIALS

- A. The Contractor shall screen material obtained directly from the project excavation area to produce maximum 1-inch particle size (that is, particles no greater than 1-inch in size) material. This select material will then be placed within the liner limits on side slopes and on benches, as shown on the Project Drawings. This select material shall be carefully protected to avoid contamination with any other material containing particle size larger than 1 inch. The QA/QC Consultant shall continually monitor the screened material stockpile and material placement to ensure that the specified maximum particle size is not exceeded under any circumstances. The Contractor at its own expense shall be responsible for removing or reprocessing the screened material stockpile in the event any greater than maximum 1-inch material is found in that screened material.

- B. The Contractor shall also screen material obtained directly from the project excavation area to produce maximum 3-inch particle size (that is, particles no greater than 3-inch in size) material. This select material will then be placed within the liner limits on the 8 oz. Geotextile filter fabric located at the canyon floor area, as shown on the Project Drawings. This select material shall be carefully protected to avoid contamination with any other material containing particle size larger than 3-inch. The QA/QC Consultant shall continually monitor the screened material stockpile and material placement to ensure that the specified maximum particle size is not exceeded under any circumstances. The Contractor at its own expense shall be responsible for removing or reprocessing the screened material stockpile in the event any greater than maximum 3-inch material is found in that screened material.

13.3 EXECUTION

- A. The protective soil layer shall be placed in a method that prevents damage to the underlying liner. The material shall be placed in uniform lifts and the depth of each lift shall be what is required to achieve a thickness of at least 24 inches after grading and applying reasonable compaction efforts as directed by the County and the QA/QC Consultant and as specified on the Project Drawings. Wheeled equipment shall operate on no less than two feet (2') of protective soil cover.

- B. Only low ground pressure type compaction equipment shall be used, operating on no less than twelve inches (12") of soil cover above any geosynthetics. Unless otherwise specified on the Project Drawings, the protective soil layer on the benches shall be placed, graded, and compacted to 85% relative compaction. Compaction of the protective layer on the bottom and side slope areas shall be achieved by track walking, with at least one pass, over the entire surface. Additional track walking may be required when the QA/QC Consultant observes that adequate protection of the liner is not being met.
- C. The minimum thickness of the protective soil layer over the composite liner system shall be 2 feet thick. If damage occurs to the geotextile, FML, or GCL during the spreading or compaction operation, the protective soil layer material shall be removed from the damaged area and the damaged section shall be repaired as specified in the QA/QC Plan at no additional cost to the County.

13.4 MEASUREMENT AND PAYMENT

- A. The **measurement** of the final quantity for Bid Item No. 31 "Screen and Place 3"-minus Protective Soil Material on Canyon Floor" shall be measured in place, after proper moisture content and compaction have been applied, and finished grading is achieved in accordance with the project requirements. The **measurement** of the final quantity shall be calculated utilizing digital terrain modeling methods, to the nearest square foot of true surface area, based on survey measurements of ground after placement of the protective soil layer. **Payment** for the construction of the protective soil layer shall be at the contract unit price per square feet as stated in the Contractor's Proposal, **Bid Item No. 31**. **Payment** shall constitute full compensation to the Contractor for the work specified herein, and no additional compensation will be given for water supply or removal and re-compaction of material that does not meet the specifications described in this section. **Payment** shall also constitute full compensation for furnishing all labor, supervision, materials, tools, and equipment necessary to screen the material and construct the protective soil layer in accordance with the Contract Documents.
- B. The **measurement** of the final quantity for Bid Item No. 32 "Screen and Place 1"-minus Protective Soil Material on Side Slopes and Benches" shall be measured in place, after proper moisture content and compaction have been applied, and finished grading is achieved in accordance with the project requirements. The **measurement** of the final quantity shall be calculated utilizing digital terrain modeling methods, to the nearest square foot of true surface area, based on survey measurements of ground after placement of the protective soil layer. **Payment** for the construction of the protective soil layer shall be at the contract unit price per square feet as stated in the Contractor's Proposal, **Bid Item No. 32**. **Payment** shall constitute full compensation to the Contractor for the work specified herein, and no additional compensation will be given for water supply or removal and re-compaction of material that does not meet the specifications described in this section. **Payment** shall also constitute full compensation for furnishing all labor,

supervision, materials, tools, and equipment necessary to screen the material and construct the protective soil layer in accordance with the Contract Documents.

END OF SECTION 13

SECTION 14 - ASPHALT STRUCTURES

14.1 GENERAL

The work covered in this section shall consist of furnishing all necessary labor, materials, equipment, tools and supervision for the construction of Asphalt Concrete (A.C.) pavement which shall include, but is not limited to: access roads including the underlying aggregate base, drainage channels, ditches, down drains, transitions, inlet and outlet structures, and speed bumps. The work shall include subgrade preparation and installation of A.C. pavement to the specified lines and grades and at the locations shown on the Project Drawings and as required by the Contract Document and as directed by the County.

14.2 SUBMITTALS

- A. The Contractor shall submit Certificates of Compliance for bituminous materials used in asphalt concrete pavement and asphaltic emulsion mixes proposed for this project. The certificates shall be signed by the manufacturer of the materials and shall state that materials involved shall comply in all respects with the requirements of these specifications.
- B. The Contractor shall prepare and submit a mix design to the County for review and approval at least 48 hours prior to beginning placement of asphalt concrete pavement for each mix design incorporated for use in this project.
- C. The Contractor shall submit to the County gradation test reports before delivery of aggregate base materials to the project site. The Contractor shall obtain the County's approval of the aggregate base material and material source in advance of the use of such materials in the work.

14.3 MATERIALS

- A. Asphalt concrete pavement shall consist of hot mineral aggregate uniformly mixed with hot bituminous material.
- B. Asphalt paving material for Asphalt Drainage Structures shall be D1-PG 70-10, and shall conform to Part 2, Sections 203-6 and 400-4 of the Standard Specifications.
- C. A.C. pavement for access roads shall be C1 PG 70-10 and shall conform to Sections 203-6 and 400-4 of the Standard Specifications.

- D. Tack Coat: Tack Coat shall conform to Section 302-5.4, "Tack Coat" of the Standard Specifications and shall be PG 70-10 paving asphalt, or SS-1h emulsified asphalt applied at the rates as specified.
- E. Refer to Section 16 of these Special Provisions for the specifications of the roadways subbase materials including crushed aggregate base and class II base material.
- F. Geogrid material shall be Biaxial Geogrid BX1220 as manufactured by Tensar International or approved equal by the County.
- G. Wooden headers at edges of asphalt concrete pavement shall be 2"x4" redwood conforming to the requirements of Sections 57 and 58 of the Standard Specifications.

14.4 EXECUTION

- A. The Contractor shall arrange and conduct a pre-job paving meeting no later than 48 hours prior to the scheduled paving date. The General Contractor, the Paving Subcontractor and County personnel shall attend this meeting. Discussion topics shall include Contractor-proposed: paving machine and asphalt roller equipment spread, methodology for paving pass sequence, paving pass widths, longitudinal joint locations, and traffic control plan implementation and maintenance specific to each paving operation.
- B. Prior to repairing any damage structures for Bid Items No. 58 and 59 "Saw Cut and Replace Damaged AC" and "Asphalt Roadway Rehabilitation", County staff shall identify and mark the portions of asphalt roadway that need to be removed. The Contractor shall evenly saw cut the asphalt along the specific lines marked by County staff and as shown on the Project Drawings. The Contractor shall transport all generated asphalt and base material to the designated salvage material area as shown on the Project Drawings or as specified by the County. After the saw cutting operation is complete, the Contractor shall clean the surface of the remaining in-place asphalt to ensure an adequate bonding surface between the existing asphalt and new asphalt.
- C. The subgrade for all asphalt structures in this project, prepared either by excavation or engineered fill, shall conform to the locations and cross sections as shown on the Project Drawings or as directed by the County. Where the structures are in native cut, the upper six (6) inches of subgrade shall be compacted to a minimum of 90 percent (or as otherwise noted on the Project Drawings) of the maximum density as determined per ASTM D1557. This shall be achieved by scarifying the exposed surface to a depth of six (6) inches and re-compacting. For areas requiring engineered fill, the finished subgrade shall be firm and suitable for placement of asphalt pavement, and shall be compacted to a minimum of 90 percent (or as otherwise noted on the Project Drawings) of the maximum density within the upper one foot, as determined by ASTM D1557.

- D. Geogrid material shall be installed at the specific locations shown on the Project drawings. The geogrid shall be laid smooth without wrinkles or folds on the prepared subgrade in the direction of the construction traffic. Tension should be applied to the geogrid until at least 70 percent of the geogrid area is covered with base material. Adjacent geogrid rolls shall have a minimum 12-inch overlap. Base is to be placed in the direction in which the reinforcement was laid out, to aid in tensioning. Rubber-tired equipment is allowed to pass over bare geogrid at slow speeds (less than 10 mph) and without sudden braking. Track equipment should not be allowed onto uncovered geogrid. To avoid damaging the geogrid, a minimum of six (6) inches of base on top of the geogrid shall be placed before tracked equipment can be allowed on top of the geogrid.
- E. The Contractor shall install the aggregate base or class II base materials on a prepared and approved subgrade as required by the Contract Documents. The base materials shall consist of aggregate processed, deposited, spread, and compacted on a prepared surface. The base materials shall be compacted to a minimum of 90 percent (or as otherwise noted on the Project Drawings) of the maximum density as determined per ASTM D1557. Compacting and finishing shall be in accordance with Section 301-2.3, "Compacting" of the Standard Specifications. The contractor shall be solely responsible for protection of completed areas against detrimental effects. Recondition, reshape, and re-compact areas damaged by rainfall or other weather conditions.
- F. Prior to pavement application, surface preparation shall consist of cleaning the underlying course of foreign or objectionable matter with power blowers or brooms where necessary. A tack coat shall be applied to the areas receiving pavement in accordance with Section 302-5.4, "Tack Coat" of the Standard Specifications.
- G. Distribution and spreading shall conform to the requirements of Section 302-5.5, "Distribution and Spreading" of the Standard Specifications. All transitions and edges shall be feathered to conform to the existing surface and provide a smooth transition. The Contractor shall install 2"x4" wooden headers using 12"-2"x4" stakes set a maximum of 6-foot on center at all locations where the vertical edges of new asphalt pavement are not in contact with an existing pavement or permanent structures. Wooden headers shall remain in place upon completion of work.
- H. Where the specified total thickness of pavement is greater than 4-inches, the pavement shall be placed in a minimum of two (2) courses, or as directed by the County. Successive courses may be laid upon previously laid courses as soon as the previous course has cooled sufficiently to show no displacement under equipment or loaded material delivery trucks. Where two or more courses of pavement are to be placed, the entire thickness of pavement section MUST be placed during one paving operation. Base course paving shall not be opened to traffic (other than material delivery trucks) prior to placement of the successive pavement course(s).

- I. Rolling shall conform to the requirements of Section 302-5.6, "Rolling" of the Standard Specifications. Hand and mechanical tampers will not be permitted for compaction of road way section.
- J. The asphalt pavement for the speed bumps shall be placed on the new and existing paved asphalt access roads and shall conform to the cross sections and locations as shown on the Project Drawings or as directed by the County. Surface preparation shall consist of cleaning the underlying surface of foreign or objectionable matter where necessary. A tack coat shall be applied to the areas receiving pavement in accordance with Section 302-5.4, "Tack Coat" of the Standard Specifications.

14.5 MEASUREMENT AND PAYMENT

- A. The **measurement** of the final quantity for Bid Item No. 40 "Construct Asphalt Drainage Structures" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of these structures. **Payment** for asphalt drainage structures shall be at the contract unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 40**. Each and every Asphalt Concrete load ticket shall be delivered to the County by truck drivers at the point of delivery.
- B. The **measurement** of the final quantity for Bid Item No. 54 "Construct Asphalt Access Roadway, 3" Asphalt over 6" Class II Base" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of these structures. **Payment** for asphalt access roadway structures shall be at the contract unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 54** and shall include all subgrade surface preparation, and the supply and installation of the aggregate base material as specified and required by the Contract Documents.
- C. The **measurement** of the final quantity for Bid Item No. 55 "Construct Asphalt Access Roadway, 6" Asphalt over 12" Class II Base" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of these structures. **Payment** for asphalt access roadway structures shall be at the contract unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 55** and shall include all subgrade surface preparation, and the supply and installation of the class II base material as specified and required by the Contract Documents.
- D. The **measurement** of the final quantity for Bid Item No. 58 "Saw Cut, Remove, and Replace 6" Asphalt Roadway Section at various Locations" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of these structures. **Payment** for saw cutting,

removing, and replacing asphalt structures shall be at the contract unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 58** and shall include saw cutting and removal of existing asphalt, subgrade surface preparation, and the supply and installation of asphalt material as specified and required by the Contract Documents.

- E. The **measurement** of the final quantity for Bid Item No. 59 "Asphalt Roadway Rehabilitation" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of these structures. **Payment** for asphalt roadway rehabilitation shall be at the contract unit price per square foot, as stated in the Contractor's Proposal, **Bid Item No. 59** and shall include saw cutting and removal of existing asphalt and base material, subgrade surface preparation, installation of Geogrid material, and the supply and installation of asphalt and class II base material as specified and required by the Contract Documents.
- F. The **measurement** of the final quantity for Bid item No. 60 "Construct Asphalt Concrete Speed Bumps" shall be based on the pertinent details required by the Contract Documents as verified by the County through field measurements of the axial length (linear feet) along the centerline of the asphalt speed bumps. **Payment** for all Asphalt Speed bumps shall be at the contract unit price per linear foot as stated in the Contractor's Proposal, **Bid Item No. 60**.
- G. **Payment** quantities for all Asphalt Structures shall be based upon the specified limits and dimensions on the Project Drawings, adjusted by the amount of any change ordered by the County. Payment for all Asphalt Structures shall include subgrade preparation as specified in the Contract Documents and indicated in the Project Drawings. No payment will be made for any asphalt placed outside the specified limits and dimensions unless otherwise ordered in writing by the County. Payment shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work related to and involved in constructing the Asphalt Structures completed in place.

END OF SECTION 14

SECTION 15 - REINFORCED CONCRETE STRUCTURES

15.1 GENERAL

15.1.1 SUMMARY

The work covered by this section shall consist of furnishing all necessary labor, materials, tools, equipment, facilities, transportation, services, coordination, supervision, and all other items necessary for the construction of reinforced concrete structures to the elevations, lines and grades, and at the locations shown on the Project Drawings or as directed by the County including but not limited to:

- a. Supply, bend, and install all reinforcing steel.
- b. Supply and install all metal anchors and bolts.
- c. Supply and install conduit pipe penetrations and other accessories to be installed in concrete work as required and inspected prior to being embedded in concrete.
- d. Supply and install cast-in-place concrete form work including, but not limited to:
 - i. Design, construction, and safety of formwork
 - ii. Supply and install required formwork ready for pouring of concrete
 - iii. Dismantle and dispose formwork
- e. Supply, install, and finish structural concrete
- f. Supply, install, and finish air-placed concrete (shotcrete)
- g. Supply and apply concrete curing compounds

15.1.2 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Society for Testing Materials (ASTM)

A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
C33	Standard Specification for Concrete Aggregates
C94	Standard Specification for Ready Mixed Concrete
C131	Standard Test Method for Resistance to Degradation of Small Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

<i>C150</i>	Standard Specification for Portland Cement
<i>D1557</i>	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
<i>D1751</i>	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction

15.1.3 PROTECTION

All finished concrete work shall be barricaded to pedestrian traffic for three (3) days. Barricades shall be placed immediately after concrete finishing. Contractor shall supply, place, and remove all barricades. All exposed surfaces of concrete shall be protected from damage due to temperature, elements, and construction operations. The Contractor shall be responsible for any damage to new construction and replacement or repair of the work shall be made without added cost to the County. Contractor shall not be permitted to start installation of the HDPE storage tanks or roof system on the Leachate and Gas Condensate Containment Facility until the compressive strength test results have become available and show the specified design strength has been achieved.

15.2 SUBMITTALS

15.2.1 STRUCTURAL CONCRETE AND SHOTCRETE

- a. Mix design and certifications

The Contractor shall submit a mix design and certifications to the County for review and acceptance at least two (2) weeks prior to beginning placement of concrete for each mix design incorporated for use in this project.
- b. Concrete delivery load tickets

Each and every concrete load ticket shall be delivered to the County by truck drivers at the point of delivery. The mix plant shall supply delivery ticket for each batch of concrete. The Contractor shall submit delivery tickets to the County. Delivery tickets shall show following: .

 - i. Name of ready-mix batch plant
 - ii. Serial number
 - iii. Date and truck number
 - iv. Name of Contractor
 - v. Name and location of job
 - vi. Specific classes or designation of concrete in conformance with that required in job specification
 - vii. Amount of concrete
 - viii. Time loaded

- ix. Type, name, and amount of admixtures used
- x. Amount and type of cement
- xi. Total water content
- xii. Water added by receiver of concrete with his or her signature initials

15.2.2 CONCRETE REINFORCING STEEL

- a. Shop Drawing
Contractor shall submit shop drawings detailing reinforcement placement to the County for review and approval prior to commencement of work.
- b. Mill Certificate
The Contractor shall provide mill certificates to the County for approval prior to delivery of material to the job site.

15.2.3 CONDUIT AND PIPE PENETRATIONS

The Contractor shall submit the manufacturer's product data for conduit, pipe, stub-ups, wall seals, fittings, plugs and bends.

15.2.4 CONCRETE CURING COMPOUNDS

The Contractor shall submit the manufacturer's product data and installation instructions.

15.3 MATERIALS

15.3.1 STRUCTURAL CONCRETE

Concrete materials shall be of primary quality and of domestic manufacture and shall conform to Section 201, "Concrete, Mortar and Related Materials" requirements of the Standard Specifications.

- a. Portland Cement
Portland cement shall conform to ASTM-C150-89, "Specification for Portland Cement" requirements, Type II and Type V for foundations and shall also meet the requirements of Section 201-1.2.1, "Portland Cement" of the standard specifications.
- b. Coarse Aggregate
Concrete coarse aggregate shall conform to ASTM-C33-86, "Specification for Concrete Aggregates" requirements, and also meet the requirements of Section 201-1.2.2, "Aggregates" of the standard specifications, or nonconforming aggregate which by test or actual service produces concrete of required strength and conforms to local governing codes. Aggregates shall be uniformly graded and conform to ASTM C-131 Test Grading C.

- c. Fine Aggregates
Fine aggregates shall conform to ASTM-C33-86, "Specification for Concrete Aggregates" requirements, and also meet the requirements of Section 200-1.5.3, "Sand for Portland Cement Concrete" of the Standard Specifications.
- d. Admixtures
The Contractor shall not use calcium chloride or fly ash and related materials. The County does not require admixtures; however, if the Contractor proposes admixtures, they shall conform to SIKA Chemical Corp.'s "Plastiment", or approved equal, and shall be applied in accordance with manufacturer's directions and also conform to Section 201-1.2.4, "Chemical Admixtures" requirements of the standard specifications. Any Admixture proposal shall be approved by the County. Upon review of any proposed admixture, the County may accept or reject any proposal.
- e. Water
Water shall be clean, clear, and free from strong acid, alkali, oil or organic matter and conform to Section 201-1.2.3, "Water" of the standard specifications.
- f. Compressive Strength
Unless otherwise specified in the submitted Structural Analysis Report for the LGCC, concrete mix classification shall be Class 560-C-3250 and shall be placed in conformance with Part 3, Section 303-1 of the Standard Specifications.

15.3.2 REINFORCED SHOTCRETE

Shotcrete materials shall be of primary quality and of domestic manufacture and shall conform to Section 201, "Concrete, Mortar and Related Materials" requirements of the Standard Specifications.

- a. Portland cement, fine aggregates, admixtures, and water shall be in accordance with Section 15.3.1 of this specification.
- b. Compressive Strength
Concrete mix classification shall be Class 650-D-3250 and shall be air-placed in conformance with Part 3, Section 303-2, Method B (Shotcrete) of the Standard Specifications.
- c. Shotcrete shall consist of concrete or mortar pneumatically applied onto surface. Shotcrete shall be applied by the wet-mix (shotcrete) process and the Contractor, subject to County approval, may have the option to cast-in-place structural concrete in accordance with this specification in lieu of shotcrete. The substitution of shotcrete for cast-in-place structural concrete will not warrant additional compensation.

- d. Welded wire mesh reinforcement shall be as specified on the Project Drawings and shall conform to Part 2, Section 201-2.2 of the Standard Specifications.

15.3.3 FORMS

Forms shall be in accordance with sub-section 303-1.3 and 303-1.4 of the Standard Specifications and as specified below:

- a. Wood shall be "construction grade" Douglas fir.
- b. Plywood for forming of concrete, which is exposed, shall be Plyform. All plywood used for forming shall be at least 5/8 -inch thick and edge sealed.
- c. Forming material shall be compatible with concrete finish requirements. .

15.3.4 EXPANSION JOINTS

Expansion joint filler shall conform to ASTM-D1751 (Pre-molded joint filler) requirements and shall also conform to Section 201-3, "Expansion Joint Filler and Joint Sealants" requirements of the Standard Specifications.

15.3.5 REINFORCEMENT

Reinforcing steel shall conform to ASTM A615 requirements and also conform to Section 201-2.2.1, "Reinforcing Steel" requirements of the Standard Specifications. Reinforcing steel shall be Grade 60 and have identification inscriptions and also conform to ASTM A 615-89, "Specification for Deformed & Plain Billet-Steel Bars for Concrete Reinforcement" requirements. Reinforcing steel shall be free of rust, scale, or other bond-reducing coatings.

15.3.6 PATCHING

If patching is necessary and approved by the County, a bonding agent such as Weld-Crete as manufactured by Larsen Products, or approved equal, shall be used.

15.3.7 CURING COMPOUND

Concrete curing compound shall be Type 1-D – Clear or translucent with fugitive dye and shall conform to Section 201-4.1, "Membrane Curing Compounds" requirements of the Standard Specifications.

15.3.8 CONDUITS

Stub-ups and sweeps/bends shall be galvanized rigid steel wrapped with 33 mil tape. Plugs (Appleton, Crouse-Hinds, or equal) shall be recessed type and installed at open ends of conduits. Schedule 40 PVC conduit and fittings shall be as manufactured by Carlon or approved equal. Galvanized rigid steel fittings shall be as manufactured by Republic, Allied, or approved equal.

15.4 EXECUTION

All reinforced concrete work shall be installed in accordance with the following sections.

15.4.1 STRUCTURAL CONCRETE

a. Reinforcement Steel

Placement of reinforcing steel shall conform to Section 303-1.7 of the Standard Specifications.

b. Mix Design

The Contractor assumes responsibility for the design mix and guarantees the specified ultimate strength as indicated or specified herein. The concrete quality, proportions, consistency, etc., is subject to the approval of County, and no changes shall be made without prior written approval. The proportions of aggregate to cement shall provide a dense mixture which will readily work into all corners of the forms and around all reinforcements without any segregation of the materials, cause excess free water to collect on the surface, or cause excessive bleeding of the forms.

The recommended practices of the American Concrete Institute (ACI) shall be followed in all applicable procedures. Concrete, minimum 28-day ultimate strength shall be as specified in these Special Provisions or as specified by the design engineer and ready-mixed concrete shall conform to ASTM-C94. The maximum slump shall not exceed (4") four inches for footings, slabs on grade.

c. Mixing and Transporting

Concrete mixing shall conform to Section 201-1.4, "Mixing" requirements of the Standard Specifications.

Mixer shall be an approved AGC Type or ready-mix equipment conforming to requirements of ASTM C 94-89b, "Specification for Ready-Mixed Concrete". All materials shall be accurately and separately weighted and mixing shall continue until the distribution of material is uniform and the mass of concrete is homogeneous.

Transit Mixers shall conform to Section 201-1.4.3, "Transit Mixers" requirements of the Standard Specifications.

The concrete mix shall avoid use of excessive water. Two and one-half (2 1/2) gallons of water per cubic yard, shall be withheld from the mix at the plant, and all or a portion may be added to the mix at the job site as directed by the County. The concrete shall be mixed at least 5 minutes after such water is added and not less than 3 minutes of this time shall be immediately prior to the discharge of the batch. Total mixing time after adding original water shall be at least 15 minutes. If water is added by the transporter or on the job, the specified slump shall not be exceeded.

Each and every concrete load ticket shall be delivered to the County by truck drivers at the point of delivery.

- d. **Conveying and Placing**
Concrete shall be conveyed, deposited, and consolidated as required by Section 303-1.8 "Placing Concrete" of the Standard Specifications. Concrete which is not placed within 90 minutes after the introduction of cement and water, and concrete which has stood for 30 minutes after leaving the mixer, shall not be used.
- e. **Concrete Washout Area**
The Contractor shall provide a temporary concrete washout area at a location approved by the County within the project limits. In addition, any miscellaneous concrete debris shall be cleaned up by the Contractor and deposited in the designated temporary concrete washout area. The concrete washout area shall conform to BMP detail WM-8, "Concrete Waste Management" in accordance with California Stormwater Quality Association (CASQA) standards.

15.4.2 REINFORCED SHOTCRETE DRAINAGE STRUCTURES

- a. The subgrade for Reinforced Shotcrete Drainage Structures shall be prepared either by excavating or filling, and shall conform to lines, grades, and cross sections and be located as shown on the Project Drawings. Where the structures are in native cut, the upper six (6) inches of subgrade shall be compacted to a minimum of 90% (or as otherwise noted on the Project Drawings) of the maximum density as determined per ASTM D1557. This shall be achieved by scarifying the exposed surface to a depth of six (6) inches and re-compacting it as required by the Specifications. For areas requiring Engineered Fill the finished subgrade shall be firm and unyielding and suitable for placement of Reinforced Shotcrete Drainage Structures, and shall be compacted to a minimum of 90% (or as otherwise noted on the Project Drawings) of the maximum density as determined per ASTM D1557. Clearing, grubbing and excavation for the Reinforced Shotcrete Drainage Structures shall comply with the provisions of sub-section 300-7 of the Standard Specifications.
- b. Forms and ground wires for Reinforced Shotcrete Drainage Structures shall be installed in accordance with sub-section 303-2.7 of the Standard Specifications. Ground wires shall be placed at approximately 5-foot intervals.
- c. Welded wire mesh shall be spliced not less than two meshes. Mortar blocks with wire ties, or other means acceptable to the County shall be used to secure the reinforcement firmly in the position shown on the Project Drawings.
- d. Concrete transportation and mixing shall comply with Section 15.4.1 of this specification.

- e. Concrete placement for Reinforced Shotcrete Drainage Structures shall be in accordance with Part 3, Section 303-2.1 of the Standard Specifications. Nozzle shall be directed in such a manner as to result in minimum rebound of the shotcrete. The velocity of the material as it leaves the nozzle shall be maintained uniform and at a rate determined for the given job conditions.
- f. Materials that have been mixed for more than 90 minutes shall not be used.
- g. Weakened plane joints for downdrains shall be installed perpendicular to the water flow direction at ten (10) foot intervals along the water flow direction and as directed by the County. Weakened plane joints for platforms shall be installed in two perpendicular directions at ten (10) foot intervals and as directed by the County. Depth of joints shall be one (1) inch.
- h. After the shotcrete has been placed as nearly as practicable to the required depth, the surface shall be checked with a straightedge, and any low spots or depressions shall be brought to grade by placing additional shotcrete in such a manner that the finished surface will be reasonably smooth and uniform for the type of work involved. Loose areas of shotcrete shall be removed and replaced by the Contractor at the Contractor's expense.
- i. Curing compound in accordance with Section 15.3.7 of this specification shall be applied.
- j. The County may elect to take concrete test cylinders on each day that concrete installation work occurs or as deemed necessary by the County. Cylinder breaks will be performed at the direction of the County to ensure that in-place materials meet full design strength.

15.4.3 SEQUENCING AND SCHEDULING

The Contractor shall allow County to verify locations, grades, subgrade preparation, installation of embedded concrete components, and shall notify the County at least two (2) working days prior to the placement of concrete.

15.4.4 FORMS

Forms shall be constructed in accordance with Section 303-1.3, "Forms" and Section 303-1.4, "Removal of Forms" requirements of the Standard Specifications, the Project Drawing shapes, lines, dimensions and tolerances, and these special provisions.

Prior to pouring, concrete form work shall be inspected for, but not limited to various embedded structural concrete components:

- a. formwork locations, lines, and grades
- b. reinforcing steel
- c. metal building anchors and bolts

- d. conduits and other accessories to be installed in concrete work as required prior to being embedded by concrete pouring.

Forms shall be placed firm and sufficiently tight to prevent leakage.

The Contractor shall make proper form adjustments before, during, and after concreting to meet the project requirements.

If temperature is below 50 degrees Fahrenheit or if concrete depends on the forms for structural support, the Contractor shall leave forms intact for sufficient period for concrete to reach adequate strength.

15.4.5 EXPANSION JOINTS AND CONTROL JOINTS

Placement of expansion joints shall be as directed and determined by layouts of slab markings noted on the design drawings and as required in Section 201-3, "Expansion Joint Filler and Joint Sealants" of the Standard Specifications. Expansion joint material shall be Poly Foam, or approved equal. Expansion joints shall be recessed one-quarter inch from finish surface and sealed with a bead of grey Thiokol sealant or equal. Silica sand to match concrete color shall then be tamped into Thiokol bead.

Control joints and other edges shall be formed in fresh concrete using a clean edging or jointing tool to provide a smooth uniform finish.

15.4.6 REINFORCEMENT

Reinforcing steel installation shall conform to Section 303-1.7, "Placing Reinforcement" requirements of the Standard Specifications, according to latest edition of ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures," as shown on the design drawings as submitted by the Contractor and approved by the County.

15.4.7 SPECIAL REQUIREMENTS

- a. Slabs
Dusting with cement is not permitted.
For continuous pours, saw cut groove one inch deep at 20 foot spaced grid before shrinkage occurs.
- b. Anchor bolts and plates
The Contractor shall grout solidly and shall leave no voids.

15.4.8 CONDUITS AND PIPE PENETRATIONS

Conduits and pipe penetrations shall be installed 6-inches apart horizontally and located as shown on the Project Drawings or as otherwise directed by the County. Contractor shall provide wall seal to completely seal area around conduits and pipes that passes through the reinforced concrete wall. HDPE pipes and conduits shall be

sleeved with galvanized rigid steel conduit wrapped with 33 mil tape. Plugs (Appleton, Crouse-Hinds, or equal) shall be recessed type and installed at open ends of conduits.

15.4.9 CURING COMPOUND

All concrete shall be cured after the completion of the specified finishing operations and as soon as the condition of the concrete will permit without damaging the concrete. All exposed surfaces of concrete shall be protected from premature drying and freshly placed concrete shall be protected against wash by rain.

All exposed surface of concrete shall be cured by application of curing compound as required by Section 201-4.1, "Membrane Curing Compound" of the Standard Specifications and the manufacturer's recommendations and application instructions.

15.4.10 CONCRETE FINISHES

Surface Finishes shall conform to Section 303-1.9, "Surface Finishes" requirements of the Standard Specification, these special provisions, or as otherwise requested by the County:

- a. Rough
Top of buried footings
- b. Rubbed Finish
Exposed foundation walls:
After removing forms, remove joints, marks, bellies, projections, loose materials, and cut back metal ties from surfaces to be exposed.
Fill up voids with cement mortar, 1:2 mix, and rub exposed surface with carborundum to smooth, even surface.
- c. Steel Trowel Finishes
Interior flatwork:
Float and steel trowel interior slabs after concrete has set enough to avoid bringing water and fines to surface.
If power troweling is used, get approval of finish from County.

15.4.11 CONCRETE TOLERANCES

ACI Standards shall govern concrete work except where specified differently.

- a. Variation from Plumb
0 to 10 feet - 1/4" maximum
20 feet or more - 3/8" maximum
- b. Variation in Thickness

1/4" to 1/2" standard

c. Variation in Grade

0 to 10 feet – 1/4" standard, 1/8" for floor slabs
10 to 20 feet – 3/8" standard, 1/4" for floor slabs
40 feet or more – 3/4" standard, 3/8" for floor slabs

d. Variation in Plan

0 to 20 feet – 1/2"
40 feet or more – 3/4" standard, 1/2" for footings

e. Variation in Eccentricity

2% for footings

f. Variation in Openings

Size – plus 1/8"
Location – 1/4"

15.4.12 CLEAN UP

Upon completion of all concrete work and before final acceptance, Contractor shall remove all tools, surplus materials, apparatus, debris, etc., from the site and the site shall be left in a clean, neat, and acceptable condition to the County. Hardened concrete material accumulated in the designated washout area for this project shall be disposed of by the Contractor at the Lamb Canyon Landfill site as directed by the County.

15.4.13 DEFECTIVE CONCRETE

Concrete that is not in accordance with these specifications, out of line, level, or plumb; showing structural cracks, rock pockets, voids, spalls, honeycombing, exposed reinforcing or other damaged surfaces shall be considered as defective concrete. Non repairable defective concrete shall be removed and replaced at the Contractor's expense.

All fines and irregularities shall be removed from exposed concrete surfaces while the concrete is still green. Where patching is required and approved by the County, all loose and uniform concrete shall be removed prior to patching.

15.5 TESTING

As deemed necessary by the County, sets of four (4) test cylinders of concrete being placed will be cast by the County and/or Material Testing Firm and tested for compressive strength at a certified testing laboratory. One of the test cylinders shall be tested at 7 days for 70 percent of project-specified design strength. The remaining three

cylinders will be tested after 14 days, 21 days and 28 days (for full strength) respectively. Contractor shall not be permitted to start installation of the HDPE storage tanks or the roof system of the Leachate and Condensate Containment Facility until the compressive strength test results have become available and show the specified design strength has been achieved.

15.6 MEASUREMENT AND PAYMENT

- A. Measurement for all components of the concrete construction shall be based on the final in-place quantities of each type of material after it has been constructed and tested to the satisfaction of the County. The final quantities shall be verified and determined by the County's field measurements within the limits specified by the Contract Documents.
- B. **Measurement and Payment** for Reinforced Concrete Foundation, Floor, and Walls for the Leachate and Gas Condensate Containment Facility, including, but not limited to; overexcavation, subgrade preparation, formwork, concrete, reinforcing steel, pipe and conduit penetrations, finishing, and curing compound shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 28 – "Construct Leachate and Condensate Containment Facility".
- C. **Measurement and Payment** for Reinforced Shotcrete Drainage Structures for the surface drain system, including, but not limited to; subgrade preparation, overexcavation, formwork, reinforcing steel, grounding wires, shotcrete, finishing, and curing compound shall be made after County acceptance, at the unit price per square foot (true area including slope surface area) lineal feet as stated in the Contractor's proposal Bid Item No. 41 – "Construct Shotcrete Drainage Structures".
- D. **Measurement and Payment** for Reinforced Concrete Strip Footings for the surface drain system, including, but not limited to; excavation, overexcavation, subgrade preparation, formwork, concrete, reinforcing steel, steel sleeves for fence posts, steel caps, finishing, and curing compound shall be made after County acceptance, at the unit price per linear foot as stated in the Contractor's proposal Bid Item No. 50 – "Construct Concrete Strip Footing".
- E. **Measurement and Payment** for Concrete Basin Spillway and Outlet Transition Channel Structure for the surface drain system, including, but not limited to; excavation, overexcavation, subgrade preparation, formwork, concrete, reinforcing steel, finishing, and curing compound shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

END OF SECTION 15

SECTION 16 - CLASS II AND CRUSHED AGGREGATE BASE

16.1 GENERAL

The work covered by this Section shall consist of furnishing all necessary labor, materials, equipment, tools, and supervision for the construction and installation of Class II and Crushed Aggregate Base material. The work shall include subgrade preparation and construction of the Class II and Crushed Aggregate Base at the locations shown on the Project Drawings or as directed by the County.

16.2 SUBMITTALS

- A. The Contractor shall submit Certificates of Compliance for class II and aggregate base materials used in this project. The certificates shall be signed by the manufacturer of the materials and shall state that materials involved shall comply in all respects with the requirements of these specifications.
- B. The Contractor shall submit to the County gradation test reports before delivery of aggregate base materials to the project site. The Contractor shall obtain the County's approval of the aggregate base material and material source in advance of the use of such materials in the work.

16.3 MATERIALS

- A. Material for the Class II Aggregate Base shall conform to the following gradation:

Sieve Size	Percentage Passing Sieve
1 inch	100
No. 4	35-60
No. 30	10-30
No. 200	2-9

Material for the Crushed Aggregate Base shall consist entirely of crushed rock greater than 3 inches in size but smaller than 6 inches.

16.4 EXECUTION

- A. Subgrade preparation and base placement operations (adding water, spreading and compacting) shall be performed in accordance to Section 26 of the State Standard Specifications.
- B. Subgrade for Class II and Crushed Aggregate Base shall be compacted to a minimum of 90 percent relative compaction (or as otherwise noted on the Project Drawings) as determined by ASTM D1557.

16.5 MEASUREMENT AND PAYMENT

- A. **Measurement and Payment** for 3-inch Thick Class II Base over 6-inch Thick Aggregate Base roadway, including, but not limited to; overexcavation, subgrade preparation, supply and place 3-inch thick Class II Base, supply and place 6-inch thick Crushed Aggregate Base, compaction, and finish grading shall be made after County acceptance, at the unit price per square foot (true area including slope surface area) as stated in the Contractor's proposal Bid Item No. 56 – "Construct Roadway, 3" Class II Base over 6" Aggregate".
- B. **Measurement and Payment** for 6-inch Thick Class II Base over 12-inch Thick Aggregate Base roadway, including, but not limited to; overexcavation, subgrade preparation, supply and place 6-inch thick Class II Base, supply and place 12-inch thick Crushed Aggregate Base, compaction, and finish grading shall be made after County acceptance, at the unit price per square foot (true area including slope surface area) as stated in the Contractor's proposal Bid Item No. 57 – "Construct Roadway, 6" Class II Base over 12" Aggregate".

END OF SECTION 16

SECTION 17 - DRAINAGE STRUCTURES

17.1 GENERAL

The work covered by this section shall consist of furnishing all necessary labor, materials, equipment, tools and supervision for the construction of drainage structures at the locations indicated on the Project Drawings or as directed by the County.

17.2 20-MIL LINEAR LOW DENSITY POLYETHYLENE (LLDPE) DRAINAGE STRUCTURES

17.2.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, engineered drawings, material specifications and manufacturer's application instructions for all materials to the County for approval. The Contractor shall submit written certification by the LLDPE Manufacturer that the LLDPE material conforms to the requirements of the Contract Documents.

17.2.2 MATERIALS

Membrane drain shall consist of a very flexible, linear low-density polyethylene (LLDPE). Membrane shall contain a minimum carbon black content of two (2) percent and manufactured from virgin resins, containing no plasticizers. The material shall have or exceed the following Minimum Average Roll Values (MARV):

PROPERTY	TEST METHOD	UNITS	MIMUMUM ROLL AVERAGES	TYPICAL ROLL AVERAGES
Thickness	ASTM D5199	Mils	20	21
Density	ASTM D1505	g/cm ³	.939 max	.939 max
1" strip tensile	ASTM D638	Lbf.	76	104
Tensile elongation	ASTM D638	%	800	875
Hydrostatic Resistance	ASTM D751	psi.	118	122
Puncture Resistance	ASTM D4833	Lbf.	30	44
Tear Resistance	ASTM D1004	Lbf.	11	14
Carbon Black	ASTM D1603	%	2.0	2.5
Bonded Seam Strength	ASTM D4545*	Lbf/inch	40	45
Seam Peel Adhesion	ASTM D4545*	Lbf/inch	30	36

Seam testing performed at 12" per minute

Membrane shall be free from holes, pin holes, bubbles, blisters, excessive gels, undispersed resins and/or carbon black, or other contaminants. Membrane shall be supplied in panels which shall be of size to provide no field seams parallel to the flow direction of the drainage channels. Factory seams shall be thermal sealed with a minimum seam width of 1 ½ inch. Labels on panels shall identify the thickness, length, width, lot, panel numbers, and name of manufacturer. Membrane shall be Rufco 2000B as manufactured by Raven Industries or approved equal.

17.2.3 EXECUTION

17.2.3.1 Storage and Handling

The membrane panels shall be accordion folded and rolled on a cardboard core. Rolled panels shall be wrapped in a protective layer for shipment. Membrane shall be shipped, stored and handled in accordance with the manufacturer's recommendations and as in the Contract Documents. Contractor shall be completely responsible for shipping, storage and handling of all membrane. The membrane shall be delivered to the site only after the County receives and approves the required submittals.

The membrane delivered to the site shall be inspected for damage and unloaded and stored with minimal handling. Damaged rolls shall be separated from undamaged rolls until proper disposition of material is determined by the County. The County will be the final authority on the determination of damage. No hooks, tongs, or other sharp tools or instruments shall be used for handling the membrane. Contractor shall use cloth chokers and spreader bars for loading and unloading and spreader bars and roll bars for deployment. The membrane shall not be dragged along the ground.

The membrane shall be protected from storm water, sun, soil, mud, dirt, debris, puncture, cutting, or other damaging or deleterious conditions.

All damaged surfaces resulting from abuse of any kind caused by the Contractor in performance of the work shall be repaired at the Contractor's expense.

17.2.3.2 Installation

- i. The subgrade for LLDPE Drainage Structures shall conform to the locations and cross sections as shown on the Project Drawings or as directed by the County. The upper six (6) inches of subgrade shall be compacted to a minimum of 90 percent (or as otherwise noted on the Project Drawings) of the maximum density as determined per ASTM D1557. This shall be achieved by scarifying the exposed surface to a depth of six (6) inches and re-compacting.

- ii. Seams perpendicular to the flow directions shall be lap fusion welded using single or double wedge welder to create a watertight seal. Edges overlapping protective membrane shall be fusion welded or other method approved by the County to provide a watertight connection. Field seams parallel to the direction of flow in the drainage channel are not allowed.
- iii. Contractor shall secure edges of the membrane drains in trenches as shown in details on the Project Drawings. Unsecure edges are not allowed.

17.2.4 MEASUREMENT AND PAYMENT

The **measurement** of the final quantity for Bid Item No. 19 "Furnish and Install 20-mil LDPE Drainage Structure" shall be determined by the County based on field measurements of the square footage (true area including slope surface area) of drainage structure constructed at the locations and to the dimensions shown on the Project Drawings. **Payment** for the construction of 20 mil LDPE drainage structure shall be at the contract unit price per square foot as stated in the Contractor's Proposal, **Bid Item No. 19. Payment** quantities for all LDPE drainage structure shall be based upon the specified limits and dimensions on the Project Drawings, adjusted by the amount of any change ordered by the County. Payment for all LDPE drainage structures shall include, but not limited to, subgrade preparation, supply and install 20-mil LLDPE, fusion welding field seams, and anchor trenches, as specified in the Contract Documents and indicated in the Project Drawings. No payment will be made for any 20 mil LDPE material placed outside the specified limits and dimensions unless otherwise ordered in writing by the County. Payment shall include full compensation for furnishing all labor, material, tools, equipment, and incidentals, and for doing all the work related to and involved in constructing the LDPE drainage structures completed in place.

17.3 GROUTED RIP-RAP

17.3.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit rock supplier gradation results and ready-mix grout supplier mix design to the County for approval.

17.3.2 MATERIALS

- a. Stone shall be approved durable broken stone quarry run, and of such quality that it will not disintegrate on exposure to water or weathering and free from structural fractures and defects, and shall not contain shale, unsound sandstone, or other materials which will readily disintegrate.
- b. The rip rap shall be composed of a well-graded mixture of rocks. The gradation of rocks shall conform with the Table 200-1.6(A) of the Standard Specifications as follows:

Rock Size	500lb. (225 kg) Class	375lb. (170 kg) Class	Light (90 kg) Class	Facing (35 kg) Class
500 lbs.	50%- 100%	10%-50%	0-5%	-

- c. Unless otherwise indicated, the minimum thickness of the rip rap stones shall be eighteen (18) inches. Neither breadth nor thickness of any stone shall be less than one-third of its length. The rock shall be sized so as to permit its interlocking.
- d. When grouting is required, ready-mixed grout shall conform to Section 202-1.5.2 of the Standard Specifications.

17.3.3 EXECUTION

- a. The subgrade for rip rap lining shall be prepared by either cutting or filling to the lines, grades and cross sections shown on the Project Drawings or as directed by the County. The subgrade shall be prepared to the specified grades, compacted to 90% relative compaction (or as otherwise noted on the Project Drawings), contain no loose material, and be subject to the approval of the County.

- b. The rip rap stones shall be placed to the full thickness as shown on the Project Drawings in a single operation. In placing the riprap stones, the Contractor shall take adequate precautions to avoid displacement of underlying bedding material. The Contractor may move and place individual stones as necessary to obtain a reasonably well-graded distribution. The finish riprap lining shall be free of pockets of small stones or clusters of larger rocks and shall be approved by the County.

- c. The construction method of the grouted rip rap structures shall be performed in accordance to Section 72-5 of the State Standard Specifications, Method B placement.

17.3.4 MEASUREMENT AND PAYMENT

The **measurement** of the final quantity for Bid Item No. 49 "Construct Grouted Rip-Rap" shall be determined by the County by measuring the surface area within the limits specified in the Contract Documents. Measurement shall be determined after the Grouted Rip-Rap structures have been installed, tested, and verified by the County. The final surface shall be verified by the County based on conventional ground surveying method. Quantity shall be calculated to the nearest square foot of the true rip rap surface area utilizing digital terrain modeling methods. **Payment** for all Grouted Rip-Rap structures shall be at the contract unit price per square feet as stated in the Contractor's Proposal, **Bid Item No. 49** and shall constitute full compensation to the Contractor for all work related to the construction of Grouted rip-rap structures in the project including but not limited to: furnishing all labor, materials, tools, equipment, subgrade preparation, and incidentals, and for doing all the work involved in constructing grouted Rip-rap structures, complete in place, as shown on the Project Drawings or as directed by the County. Payment for all Grouted Rip Rap structures shall include subgrade preparation as specified in the Contract Documents and indicated in the Project Drawings.

17.4 CORRUGATED METAL FLUME INLETS AND DOWN DRAINS

17.4.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, engineered drawings, material specifications and manufacturer's application instructions for all materials to the County for approval.

17.4.2 MATERIALS

- a. Metal flumes and inlets shall be fabricated in accordance with the details and dimensions shown on the plans, except that minor variations may be accepted at the discretion of the County to permit the use of manufacturer's standard jigs and templates in the fabrication. Flumes and inlets shall be galvanized corrugated metal, with a minimum thickness of 0.064" (16 gauge) as manufactured by Pacific Corrugated Pipe Company or approved equal.
- b. Pipe stakes and bracket hardware shall be hot-dip galvanized, after fabrication.

17.4.3 EXECUTION

Entrance tapers and tapered inlets shall be installed in such a manner as to function properly and efficiently. They shall be so placed as to prevent water from percolating under or around them. The metal flume pieces shall be securely anchored to the slope of the ground with an anchor assembly as shown on the Project Drawings. Flume inlet sections shall be embedded in AC pads, berms and dikes as shown on the Project Drawings.

17.4.4 MEASUREMENT AND PAYMENT

- a. The **measurement** of the final quantity for Bid Item No. 46 "Furnish and Install Metal Flume Down Drain" shall be determined by the County by measurements of the completed in-place axial length (linear feet) of metal flume down drains installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for all metal flume down drains and related work shall be at the contract unit price per linear foot of completed in place length as stated in the Contractor's Proposal, **Bid Item No. 46** and no additional compensation will be allowed. Payments shall constitute full compensation to the Contractor for all work related to the construction of metal flume down drains in the project including but not limited to: furnishing all labor, materials, tools, equipment, subgrade preparation, pipe anchors, fasteners, hardware, connections and incidentals as

specified in the Contract Documents and indicated in the Project Drawings.

- b. The **measurement** of the final quantity for Bid Item No. 47 "Furnish and Install Metal Flume Inlet" shall be determined by the County based upon the specified number of units installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for all metal flume inlets and related work shall be at the contract unit price for each individual inlet installed as stated in the Contractor's Proposal, **Bid Item No. 47** and no additional compensation will be allowed. Payments shall constitute full compensation to the Contractor for all work related to the construction of metal flume inlets in the project including but not limited to: furnishing all labor, materials, tools, equipment, subgrade preparation, pipe anchors, starter section (entrance taper), fasteners, hardware, connections and incidentals as specified in the Contract Documents and indicated in the Project Drawings. AC pads for anchoring flume inlets shall be compensated under Bid Item No. 40 "Construct Asphalt Drainage Structures".

17.5 CORRUGATED METAL PIPE (CMP) DROP INLET

17.5.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, engineered drawings, material specifications and manufacturer's application instructions for all materials to the County for approval.

17.5.2 MATERIALS

- a. Corrugated metal pipe (CMP) shall be manufactured in accordance with ASTM A796. 36-inch diameter CMP shall have a minimum wall thickness of 0.109" and have 2-2/3 inch x 1/2 inch corrugations. Frame, grate, and hardware shall be hot-dipped galvanized and be in accordance with Riverside County Flood Control and Water Conservation District (RCFC & WCD) Standard Drawing CB 108. CMP, frame, and grate shall be as manufactured by Pacific Corrugated Pipe Company or approved equal.
- b. Concrete for CMP inlet base and HDPE outlet pipe encasement shall be per Section 15.3.1 of these Special Provisions and shall include Type IIA portland cement.

17.5.3 EXECUTION

- a. CMP inlet pipe sections shall be set plumb. Open grate, frame, and inlet openings shall be installed in accordance with RCFC & WCD Standard Drawing CB108. Contractor shall cut opening for 12" HDPE outlet pipe in CMP inlet. Annular space between CMP opening and 12" HDPE shall be grouted with non-shrink grout and 12" HDPE pipe shall be concrete encased a minimum length of 1-foot from CMP inlet. Precautions shall be taken to ensure that the entire inlet and connection with 12" HDPE pipe outlet is watertight.
- b. Inlet bases shall be placed reinforced concrete and shaped as shown on the Project Drawings. Base shall be broom finished to provide a non-skid surface. Inlet bases shall include No. 4 steel reinforcing bars placed at twelve (12) inches on center each way. Concrete may be placed against undisturbed soil provided wall thickness requirements are met; otherwise forms shall be required.
- c. 4" thick shotcrete or asphalt basin shall be installed around the CMP inlet as shown on the Project Drawings and in accordance with Section 14 (for

Asphalt Concrete) or Section 15 (for Shotcrete) of these Special Provisions.

17.5.4 MEASUREMENT AND PAYMENT

The **measurement** of the final quantity for Bid Item No. 43 "Furnish and Install 36" CMP Drop Inlet" shall be determined by the County based upon the specified number of units installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for all CMP inlets and related work shall be at the contract unit price for each individual inlet installed as stated in the Contractor's Proposal, **Bid Item No. 43** and no additional compensation will be allowed. Payments shall constitute full compensation to the Contractor for all work related to the construction of CMP inlets in the project including but not limited to: furnishing all labor, materials, tools, equipment, subgrade preparation, CMP, grate, frames, concrete base, concrete pipe encasement, opening fabrication, fasteners, hardware, connections and incidentals as specified in the Contract Documents and indicated in the Project Drawings. Asphalt Concrete for CMP inlets shall be compensated under Bid Item No. 40 "Construct Asphalt Drainage Structures". Shotcrete for CMP inlets shall be compensated under Bid Item No. 41 "Construct Shotcrete Drainage Structures".

17.6 BASIN STEEL PIPE RISERS

17.6.1 MATERIALS

- a. Steel pipe risers shall be manufactured in accordance with American Water Works Association (AWWA) C200, C205, and ASTM A234. Minimum steel cylinder plate thickness along with lining and coating schedule for pipe diameters are specified as follows:

Nominal Pipe Diameter	Min. Cylinder Plate Thickness	Coating and Lining
8"	0.1046"	Cement Mortar Lined and Coated
18"	0.1160"	Epoxy Lined and Coated
36"	0.1684"	Cement Mortar Lined and Coated
42"	0.1954"	Cement Mortar Lined and Epoxy Coated

- b. Steel pipe risers shall be as manufactured by Ameron, Continental Pipe Manufacturing, Mid America Pipe, Northwest Pipe Company, Rosco Moss or approved equal. 18" riser pipe shall be perforated as shown on the Project Drawings by the pipe manufacturer. The connection of the 36" steel pipe to the 42" pipe riser and installation of bulkhead to 42" riser shall be fabricated by the pipe manufacturer using double-pass full welds. Contractor shall submit shop drawings for all pipe risers for County review and approval. Pipe fabrication shall not proceed until the County has approved the submittals.
- c. Pipe risers shall be installed with steel flanges drilled per ANSI Class 125 and conform to AWWA specifications for standard (Class D) steel hub flanges, except as noted. Flanges shall not have raised faces. Flanges shall be full faced and have spiral or concentric serrations over the entire flange face of approximately 32 serrations per inch, approximately 1/64" deep. Flanges shall be manufactured of steel plate conforming to ASTM A36. Flanges shall be provided with full face gaskets. Bolts and nuts shall be in accordance with SAE J429 Grade 5 or ASTM A449. Each

fitting shall have a minimum of four (4) zinc cap anodes. Flanges and bolts shall be of the following dimensions:

Nominal Pipe Diameter	Flange		Gasket Outside Diameter	Bolts			Bolt Hole Diameter	Bolt Circle Diameter
	Outside Diameter	Thickness		Number Required	Diameter	Length		
8"	13-1/2"	11/16"	11"	8	3/4"	3"	7/8"	11-3/4"
18"	25"	1-1/16"	21-5/8"	16	1-1/8"	4-1/2"	1-1/4"	22-3/4"
36"	46"	1-5/8"	46"	32	1-1/2"	6"	1-5/8"	42-3/4"
42"	53"	1-3/4"	53"	36	1-1/2"	6-1/2"	1-5/8"	49-1/2"

- d. As specified, steel pipe risers shall be cement mortar lined and/or coated in accordance with AWWA C205. Cement mortar shall be one type of cement, either Type II or Type V. Coating shall be a minimum 3/4" thick. Cement mortar lining and coatings shall be applied by the pipe manufacturer.
- e. As specified, steel pipe shall be epoxy lined and/or coated using a prime coat of minimum dry film thickness or 10 mils; and final coat of 10 mils; for a total minimum dry film thickness of 20 mils. Lining and coating systems shall be manufactured by one of the following manufacturers or approved equal:
- Carboline System: Primer – Carboguard 891
Final – Carboguard 891
 - Engard System: Primer – 480 H.S. Epoxy
Final – 480 H.S. Epoxy
 - Tnemec System: Primer – 69 Hi-Build Epoxoline II
Final – 69 Hi-Build Epoxoline II

Prior to ordering epoxy, Contractor shall submit epoxy manufacturer's standard color samples for County selection.

17.6.2 EXECUTION

17.6.2.1 Installation

- i. The subgrade for the base of riser pipes shall be compacted to 95% relative compaction, contain no loose material, and be subject to the approval of the County.
- ii. Steel pipe riser bases shall be concrete encased a minimum of 2' thickness around the following connections:
 - 42" steel pipe riser to 36" steel pipe
 - 18" steel pipe riser to 18" x 8" reducing 90-degree bend
- iii. When possible, all pipe welds shall be fabricated by the pipe manufacturer. If field welds are deemed necessary, they shall be double-pass full welds.

17.6.2.2 Inspection and Testing

All welded joints shall be tested by soap and compressed air method. The Contractor shall subject each joint to a soap test by forcing compressed air, at approximately 40 pounds pressure per square inch, into each joint and while the joint is under pressure, every portions of welded seam forming a part of the joint shall be swabbed with a heavy soap solution or an approved commercial bubble producing leak test fluid and shall be carefully examined for leakage. The Contractor shall repair any defects disclosed by the test by chipping out and rewelding the chipped section, after which the same test shall again be applied. The Contractor shall provide all apparatus and materials for making the tests, shall drill, and tap the necessary holes and shall plug weld the holes after testing. Certified hydrostatic test results performed on pre-fabricated pipe risers from the pipe manufacturer may be submitted in lieu of the soap and compressed air test.

17.6.3 MEASUREMENT AND PAYMENT

Measurement and Payment for Basin Steel Pipe Risers for the outlet piping of the drainage basin, including, but not limited to; subgrade preparation, shop drawings, steel pipe, flanges, welding, pipe manufacturer fabrication, lining, coating, concrete encasement, and testing shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

17.7 POLYVINYL CHLORIDE (PVC) PIPE, FITTINGS, AND JOINT RESTRAINTS FOR BASIN OUTLETS

17.7.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, engineered drawings, material specifications and manufacturer's application instructions for all pipe, fittings, joint restraints, and coating materials to the County for approval.

17.7.2 MATERIALS

- a. PVC pipe shall be extruded from 12454 A or B compound providing a hydrostatic design basis (HDB) of 4000 psi in accordance to American Water Works Association (AWWA) C-900 (pipe 4-inch to 12-inch diameter) and C-905 (pipe 14-inch to 36-inch diameter). AWWA C-900 PVC pipe shall be class 150 and AWWA C-905 PVC pipe shall be rate at 235 psi (DR-18). Pipe shall have cast iron outside diameter sizes. PVC pipe shall be as manufactured by JM Eagle or approved equal.
- b. Fittings for PVC pipe shall be flanged and bolted mechanical or push-on joint ductile iron or gray iron fittings and shall conform to ANSI/AWWA C110/A21.10 or C153/A21.53, and ANSI/AWWA C111/A21.11. All fittings shall be cement mortar lined and tar (seal) coated in accordance with ANSI/AWWA C104/A21.4. Fittings shall be as manufactured by Sigma Corporation, Star Pipe, Tyler Pipe, Union Foundry, or approved equal.
- c. Restrained joints shall be provided by a clamping ring and an additional ring designed to seat on the bell end of the pipe. The rings shall be connected with T-Head bolts or rods. Restraining devices shall provide full (360 degree) support around the circumference of the pipe. No point loading shall be permitted. Restraint of mechanical joint fittings shall be provided by a clamping ring installed on the PVC pipe and connected to the mechanical joint fitting with T-Head bolts or rods. Restraining devices shall meet or exceed the requirements of ASTM F-1674 or UNI-Bell B-13 "Recommended Standard Performance Specification for Joint Restrainers for Use with PVC Pipe." Restraining devices shall be UNI-Flange Series 1300 or 1350, or approved equal.
- d. All buried steel parts shall be sand blasted in accordance with coating manufacturer's technical data sheet for "submerged" service and coated with a two coat epoxy. Epoxy shall be Tnemac Series 66 or approved equal. All ductile iron or gray iron fittings shall be polyethylene encased

at time of installation. Polyethylene encasement and installation shall be in accordance with ANSI/AWWA C105. All bolts and tie rod materials shall be either high strength cast iron containing a minimum of 0.5% copper or high-strength, low alloy steel, as specified in AWWA C-111 for buried mechanical joints.

17.7.3 EXECUTION

17.7.3.1 Installation

- i. Each section of pipe shall be lowered into the trench in a manner that will prevent damage to the pipe, coating, or joints and shall be carefully bedded to provide continuous bearing and prevent uneven settlement. The inside of the pipe shall be clean and free from foreign material of any kind before being installed.
- ii. For PVC pipe with mechanical joints, the gasket shall be placed in the groove of the bell. Lubricate the spigot lead of the pipe, keeping it clean and free of dirt or sand and then insert the spigot end into the bell and force into position per manufacturer's recommendations.
- iii. Trenches shall be excavated in such a manner as to ensure that trench sidewalls will be stable under all working conditions. Trench walls shall be sloped and/or supported in conformance with CAL-OSHA standards. All excavations shall be barricaded in conformance with Cal/OSHA standards. Prior to excavation, Contractor shall acquire and submit an exemption letter or trenching permit from CAL-OSHA and comply with Labor Code Section 6705, Excavation Plans for Worker Protection. If shoring/bracing is proposed, the Contractor's design and installation of shoring/bracing shall be in compliance with CAL-OSHA standards. Shoring, sheeting, or trench shields shall be utilized in such a manner as to minimize disturbance of the backfill material beneath the pipe crown. Trench sheeting that extends below the crown should either be left permanently in place or consist of adequately supported steel sheets one (1) inch thick or less which can be extracted with minimal disturbance to the pipe embedment. Where movable trench shields are used, the following steps shall be followed unless an alternate technique that does not disturb the pipe embedment can be demonstrated:
 - Excavation of the trench below the elevation of the pipe crown shall be done from inside of the trench shield to prevent the accumulation of loose or sloughed material along the outside of the shield. Excavation of the trench ahead of the shield at an elevation below the pipe crown is not permitted unless approved by the County.

- After laying the pipe in the trench, bedding and pipe embedment shall be placed in lifts and the shield must be lifted in steps. As the shield is lifted, embedment material shall be shoveled under the shield so as to fill all voids left by the removal of the shield.
- iv. All pipes shall be laid in a bed prepared by hand work, dug true to line and grade, to provide a true and firm bearing for the pipe throughout its entire length, and not by blocking or wedging. Backfill material placed under the pipe haunches shall be thoroughly shovel sliced along the length of the pipe. Unless otherwise specified, native soil material excavated from the site may be used to backfill trench. All backfill materials shall be placed in six (6) inch loose lifts and compacted to a minimum 95% standard proctor density. Bedding and backfill materials shall be compacted by mechanical means, including, vibratory plates and/or impact tampers. Pipe shall not be subject to a roller or wheel loads until a minimum of four (4) feet of backfill has been placed over the top of the pipe.
- v. As shown on the Project Drawings, concrete pipe anchors shall be installed at each PVC pipe joint. Concrete for pipe anchors and pipe embedment/encasement shall be Class 560-C-3250 concrete with Type II cement as specified by Section 15 of these Special Provisions. Two 1" PVC pipe weep holes shall be installed in each concrete anchor as shown on the Project Drawings.
- vi. All underground pipe fittings, joint restraints, mechanical joints, and valves shall be polyethylene encased at the time of installation. Polyethylene encasement and installation shall be in accordance with ANSI/AWWA C105/A21.5.
- vii. Pipe shall be laid and assembled in strict conformance with the manufacturer's requirements.
- viii. Pipe shall be laid to alignment and grade shown on the Project Drawings. Alignment shall be obtained by plumbing and measuring from a tightly stretched wire or line running parallel with the flow line grade and supported over the centerline of the pipe by batterboards or bars accurately placed and firmly fastened in place across the trench. Alternate use of commercial LASER grade setting systems in lieu of string lines are acceptable provided the following conditions and requirements are met:
- The Contractor shall have the responsibility of providing an instrument operator who is qualified and trained in the

operation of the LASER and said operator must adhere to the provisions of the State of California Construction Safety Orders issued by the Division of Industrial Safety. Attention is particularly directed to Section 1516, and 1800 through 1801, of said Orders for applicable requirements.

- All LASER control points shall be established bench marks or construction off-set stakes identified on cut sheets and set in the field for the work. LASER set up points shall be on these control points or on points set directly from them by instrument.

Horizontal pipe alignment shall not deviate from that shown on the Project Drawings by more than two (2) inches over 20 feet of pipe. Pipe invert elevations shall be laid to grade within a tolerance of 0.02', or 0.05' cumulative deviation from elevations set at 100' stations.

After each length of pipe has been laid to line and grade, it shall be jointed to the preceding section as hereinafter specified, and after said jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations.

- ix. Before each length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. At all times when the work of installing pipe is not in progress, all openings into the pipe and the ends of the pipe in the trench shall be tightly closed to prevent entrance of animals and foreign materials.
- x. The Contractor shall take all necessary precautions to prevent the pipe from floating due to placing concrete embedment or water entering the trench from any source, shall assume full responsibility for any damage due to this cause and shall at his own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

17.7.3.2 Inspection and Testing

- i. The Contractor shall perform video camera (CCTV) inspection of all PVC pipelines installed in accordance with Section 18.2.3.3 of these Special Provisions. CCTV inspection shall be performed a minimum of thirty (30) days after backfill compaction has been completed.
- ii. The County, at its discretion and Contractor's expense, will in the 11th month of the warranty period have the pipe video inspected for defects and will require the Contractor to make any necessary repairs or replacements.

17.7.4 MEASUREMENT AND PAYMENT

Measurement and Payment for PVC Pipe for the outlet piping of the drainage basin, including, but not limited to; trench excavation, subgrade preparation, PVC pipe, fittings, joint restraints, concrete encasement, concrete pipe anchors, zinc caps, polyethylene encasement, backfill, and video inspection shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

17.8 GABION BASKETS

17.8.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, engineered drawings, material specifications and manufacturer's application instructions for all materials to the County for approval. Contractor shall submit certified results of sieve analysis for the proposed rock material.

17.8.2 MATERIALS

- a. Gabion baskets shall be a minimum of 11 gauge (0.118 in.) galvanized steel wire, fabricated into hexagonal triple-twist mesh openings no larger than 3" x 3". Baskets shall be 3' high x 3' wide x 6' in length. Seldge/spiral binder wire running through all edges shall be a minimum of 9 gauge (0.148 in.) galvanized steel wire.
- b. Lacing, tie, and connecting wire shall be a minimum 13 ½ gauge (0.087 in.) galvanized steel wire.
- c. All gabion basket wire shall conform to ASTM A510, grade number 1006 through 1020. Wire shall have a minimum tensile strength of 60,000 psi and a class 3 coating conforming to ASTM A641. Galvanized coating shall be applied by the hot-dip process in accordance with ASTM A385 and A386.
- d. Gabion baskets shall be manufactured with all components mechanically connected at the production facility
- e. Rock material to fill gabion baskets shall be Crushed Aggregate Base consisting entirely of crushed rock greater than 3 inches in size but smaller than 6 inches.

17.8.3 EXECUTION

- a. Gabion baskets shall be placed on concrete strip footings as shown on the Project Drawings. Gabions shall be securely tied to each adjoining basket with lacing wire along the vertical reinforced edges and the top selvedges/spiral binder. Gabion baskets shall be installed in accordance with the California Department of Transportation (Caltrans) Standard Drawings D100A and D100B.

- b. The gabion baskets shall be carefully filled with rock, by either hand or machine placement to ensure alignment, avoid bulges, and provide a compact mass with a minimum of voids. Machine placement may have to be supplemented with hand work to ensure a neat, compact, square appearance. Cells in rows shall be filled in stages such that the depth of rock placed in any cell does not exceed the depth in an adjoining cell by more than one (1) foot. The Contractor shall place rocks sizes 5 -6 inches in diameter around the perimeter inside the gabion baskets, whereas rocks sizes 3 to 4-inches shall be placed in the core of the gabion baskets. If 3 -4 inches rocks are showing on the visible faces of the gabion baskets, the Contractor shall rod them into the core of the gabion baskets.

17.8.4 MEASUREMENT AND PAYMENT

The **measurement** of the final quantity for Bid Item No. 52 "Furnish and Install Gabion Baskets" shall be determined by the County based upon the specified number of units installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for all gabion baskets and related work shall be at the contract unit price for each individual 3'x3'x6' basket installed as stated in the Contractor's Proposal, **Bid Item No. 52** and no additional compensation will be allowed. Payments shall constitute full compensation to the Contractor for all work related to the construction of gabion baskets in the project including but not limited to: furnishing all labor, materials, tools, equipment, galvanized wire baskets, lacing wire, rock, fasteners, hardware, connections and incidentals as specified in the Contract Documents and indicated in the Project Drawings.

17.9 TRASH RACKS

17.9.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, shop drawings, material specifications and manufacturer's application instructions for all materials to the County for approval.

17.9.2 MATERIALS

- a. All steel bars forming conical trash racks for pipe risers shall be smooth round bars conforming to ASTM A36. Baffle and top plates for conical trash racks shall conform to ASTM A36. Bolts, washers, and nuts used to attach trash racks to pipe risers shall be stainless steel Type 304 per ASTM F593.
- b. Trash racks for concrete headwall inlets shall be removable, hinged, and inclined in conformance with Standard Drawing 361-2 of the latest edition of the Standard Specifications for Public Works Construction (SSPWC). Racks shall be as manufactured by Long Beach Iron Works, Alhambra Foundry, or approved equal.
- c. After fabrication, all trash rack components shall be hot-dipped galvanized in conformance with ASTM A123.

17.9.3 EXECUTION

- a. Shop drawings for each different type and size of trash rack shall be submitted to the County for approval prior to the start of fabrication. Contractor shall field verify dimensions prior to fabrication.
- b. Fabrication of conical trash racks shall conform to the requirements of American Institute of Steel Construction. Fabrication of inclined trash racks shall conform to the requirements of Standard Drawing 361-2 of the SSPWC.
- c. Trash racks shall be bolted to riser pipes and headwalls inlets to allow for removal.

17.9.4 MEASUREMENT AND PAYMENT

- a. **Measurement and Payment** for the Two (2) Conical Trash Racks for the 42-inch and 18-inch outlet riser piping of the drainage basin, including, but not limited to; shop drawings, steel, fabrication, galvanized coating, connection, and hardware shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

- b. **Measurement and Payment** for the Two (2) Inclined Trash Rack Grates for the 42-inch HDPE concrete headwall unit and 30-inch HDPE concrete headwall unit, including, but not limited to; shop drawings, steel, fabrication, galvanized coating, connection, and hardware shall be made after County acceptance, included in the each unit price stated in the Contractor's proposal Bid Item No. 42 – "Construct Concrete Headwall Inlet".

17.10 BASIN SKIMMER

17.10.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit manufacturer product data sheet, engineered drawings, material specifications and assembly recommendations for all materials to the County for approval. Upon completion of work, Contractor shall submit an Operations and Maintenance (O&M) Manual for the skimmer. O&M manual shall include the following:

- a. Manual Format – Provide three (3) hard copies bound in three ring binder with divider tabs for sections:
 - i. Table of Contents
 - ii. Text pages on 8.5"x11"
 - iii. Drawings to be reduced to 8.5"x11" or 11"x17" folded
 - iv. Binder cover and title page shall include the Project Title, Contractor's and Subcontractor name.
 - v. Contractor to provide digital copy (PDF) on CD

- b. Content– Description of Unit and Component Parts:
 - i. Complete nomenclature and commercial number of replacement parts
 - ii. Manufacturer's parts list, illustrations, detailed assembly drawings showing each part with part numbers and diagrams
 - iii. Engineering data
 - iv. Warranty information
 - v. Operating Procedures:
 - Manufacturer's printed operations instructions
 - Installation instructions
 - Operating and limiting conditions
 - Safety precautions
 - Guide to troubleshooting

17.10.2 MATERIALS

- a. Basin skimmer shall be 8" Faircloth Skimmer as manufactured by J.W. Faircloth & Son, Inc. or approved equal.

- b. Fittings to connect flexible 6-inch skimmer hose to 8-inch outlet piping shall be in accordance with Section 17.7.1 of this specification. Pipe, glue, hoses, couplings shall be per manufacturer's recommendations.

17.10.3 EXECUTION

- a. Shop drawings for the skimmer shall be submitted to the County for approval prior to ordering materials.
- b. Contractor shall furnish and assemble skimmer in strict conformance with manufacturer's instructions.
- c. Contractor shall furnish all pipe, fittings, fence posts, stakes, rope and all other appurtenances required to install the skimmer as shown on the Project Drawings and in strict conformance with manufacturer's installation manual.

17.10.4 MEASUREMENT AND PAYMENT

Measurement and Payment for the Basin Skimmer for the outlet piping of the drainage basin, including, but not limited to; shop drawings, 8" skimmer, pipe, fittings, fence post, couplings, hose, connections, and incidentals shall be made after County acceptance, included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

17.11 COIR MAT

17.11.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval.

17.11.2 MATERIALS

- a. Coir fiber mat shall include a biodegradable netting of fabric consisting of materials such as coconut fiber, wheat straw, wood and jute materials. Mats shall be 3.28 feet wide and come in rolls approximately 80 feet long. Mat net opening shall be 0.3" x 0.45". Coir mats shall be Control Mat 90 as manufactured by Granite Environmental or approved equal.
- b. Wire ties connecting fiber mats to chain link fence shall be a minimum 13 ½ gauge (0.087 in.) galvanized steel wire.

17.11.3 EXECUTION

Mat shall be used as baffle walls with the drainage basin. Contractor shall install mats on the upstream side of chain-link fence as shown on the Project Drawings. Wire ties connecting the mats to the fence shall be installed every three (3) feet top and bottom. Mat seams shall have a minimum overlap of one (1) foot. Chain link fencing shall be installed in accordance with Section 19.6 of these Special Provisions.

17.11.4 MEASUREMENT AND PAYMENT

Measurement and Payment for Coir Mats including, but not limited to; furnishing all labor, material, tools, equipment, coir mats, and incidentals shall be made after County acceptance, included in the linear foot price stated in the Contractor's proposal Bid Item No. 51 – "Furnish and Install Chain Link Fencing and Coir Mat".

END OF SECTION 17

SECTION 18 - CORRUGATED AND SMOOTH-LINED HIGH DENSITY POLYETHYLENE (HDPE) DRAINAGE PIPE AND APPURTENANCES

18.1 GENERAL

The work covered by this section shall consist of all labor, materials, equipment, tools and supervision necessary to furnish and install 12-inch to 42-inch diameter high density polyethylene (HDPE) corrugated and smooth-lined pipe storm drain system. The pipes shall be of the sizes, type, and dimensions shown on the Project Drawings, and contained in this specification. The pipe system shall include, but not limited to: manholes, fittings, couplings, adapters, inlets, headwalls, energy dissipaters, testing and all other appurtenances as may be required to complete an operable storm drain system.

18.1.1 REFERENCES

Reference Standards and Specifications: The following standards and specifications, including documents referenced therein, form part of these Special Provisions and are incorporated herein by reference.

American Association of State Highway and Transportation Officials (AASHTO)

M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
M294	Standard Specification for Corrugated Polyethylene Pipe (12 to 60-inch diameter)

American Society for Testing Materials (ASTM)

A36	Standard Specification for Carbon Structural Steel
A536	Standard Specification for Ductile Iron Castings
C150	Standard Specification for Portland Cement
C478	Standard Specification for Precast Reinforced Concrete Manhole Sections
C858	Underground Precast Concrete Utility Structures
C1244	Standard Test Method for Concrete Sewer Manholes by Negative Air Pressure (Vacuum) Test Prior to Backfill
D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
D3350	Standard Specification for Polyethylene Plastic Pipe and Fittings Materials

- F477** Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- F1417** Standard Practice for Installation Acceptance of Plastic Non-Pressure Sewer Lines using Low-Pressure Air
- F2306** Standard Specification for 12 to 60 inch Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications
- F2487** Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density Polyethylene Pipelines
- F2648** Standard Specification for 2 to 60 inch Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications

18.1.2 SAFETY

The Contractor shall be familiar and comply with all applicable state, county and municipal rules and regulations pertaining to sanitation, fire protection and safety, and all provisions of the Contract Documents. Prior to pipeline installation, the Contractor shall instruct the workmen on the safety procedures pursuant to local, State, and Federal requirements. The Contractor shall ensure that workers have and use safety gear and equipment in accordance with local, State, and Federal requirements. No person shall enter a pipe that has not been checked for hazardous gases and oxygen concentration. Contractor shall comply and enforce all CAL-OSHA confined space requirements.

18.2 HDPE PIPE AND FITTINGS

18.2.1 SUBMITTALS

The Contractor shall submit in advance complete material specifications and descriptive literature for approval by the County.

The Contractor shall submit written certification by the pipe manufacturer that the pipe materials conform to the requirements of the Contract Documents; are similar and of same formulation as that for which certification is submitted; and have been demonstrated by actual usage to be satisfactory for the intended application.

The Contractor shall submit for approval by the County a method of handling and storing pipe material(s) prior to installation. The pipeline (sub)contractor shall install the pipe only on surface(s) that it has formally accepted from the Contractor by submitting a written "release" form. This form shall be furnished to and is subject to approval by the County to ensure that the surfaces meet all the requirements for installation as detailed in these specifications.

The Contractor shall submit either an exemption letter or trenching permit from the California Division of Industrial Safety, State of California (CAL-OSHA).

The Contractor shall furnish a written guarantee that the pipe system work constructed by him is free of defects in material and workmanship. The guarantee for the pipe system installed pursuant to these Contract Documents shall extend for a period of one (1) year following the recording of the Notice of Acceptance for the entire project. The Contractor shall agree to make any repairs or replacements found to be necessary by defects in material or workmanship, which become evident within this guarantee period. The Contractor shall make repairs and/or replacements promptly upon receipt of written order from the County. If the Contractor fails to make repairs and/or replacements promptly, the County may do so, and the Contractor shall be liable to the County for the cost of such repairs and/or replacements.

18.2.2 MATERIALS

- a. HDPE pipe shall be smooth interior wall with annular exterior corrugations that meet or exceed ASTM F2648 (virgin and recycled compounds) or ASTM F2306 and AASHTO M294 Type S (virgin compound), or the latest version thereof. Material for pipe production shall be either an engineered compound of virgin and recycled HDPE or 100% virgin HDPE conforming to the minimum requirements of cell classification 435400C, as defined in the latest version of ASTM D3350, except that carbon black content shall not exceed 4%. If 100% virgin pipe material is used, the material shall comply with the notched constant ligament-stress (NCLS) test as specified in Sections 9.5 and 5.1 of AASHTO M294 and ASTM F2306 respectively. Minimum pipe stiffness at five (5) percent deflection shall be as described in ASTM F2306 when tested in accordance with ASTM D2412.
- b. Pipe joints shall consist of integral bell and spigot with watertight gaskets according to the requirements of ASTM D3212 and ASTM F477. Gaskets shall be installed by the pipe manufacturer and covered with a removable, protective wrap to ensure the gasket is free from debris. A joint lubricant from the manufacturer shall be used on the gasket and bell during assembly. Pipes shall have a reinforced bell with a polymer composite band and tolerance device installed by manufacturer. Bell shall span over a minimum of three (3) spigot corrugations.
- c. Fittings shall conform to AASHTO M252, AASHTO M294 or ASTM F 2306. All fitting joints shall consist of integral bell and spigot with watertight rubber gaskets. Bell and spigot connections shall utilize a spun-on or welded bell and valley or saddle gasket meeting the watertight joint

performance requirements of AASHTO M252, AASHTO M294, ASTM F 2306, and ASTM D3212. Gaskets shall meet requirements of ASTM F477

18.2.3 EXECUTION

18.2.3.1 Storage and Handling

- i. During storage and installation caution shall be exercised to avoid compression, damage, or deformation to the pipe. If pipe is to be exposed to direct sunlight for more than 14 days, pipe must be covered with an opaque material while permitting adequate air circulation above and around the pipe to prevent excessive heat accumulation.
- ii. If pipe is strung along the trench prior to installation, string only pipe to be used within a 24-hour period; all pipe is to be laid on a flat surface. The interior, as well as all seating surfaces of pipe, fittings, and other accessories shall be kept free from dirt and foreign matter. Gaskets shall be protected excessive exposure to heat, direct sunlight, oil, and grease. Contractor shall not drag or strike pipe while transporting.
- iii. Pipe, fittings, and accessories shall be carefully inspected before and after installation and those determined to be defective shall be rejected. Pipe and fittings shall be free from fins and burrs. Before being placed in position, pipe, fittings, and accessories shall be cleaned and shall be maintained in a clean condition. Proper equipment shall be provided for lowering sections of pipe into trenches. Under no circumstances shall pipe, fittings, or any other material be dropped or dumped into trenches.

18.2.3.2 Installation

- i. Installation of pipe shall start at the downstream end of each section and proceed upgrade. Bell end of pipe shall be laid upgrade.
- ii. Trenches shall be excavated in such a manner as to ensure that trench sidewalls will be stable under all working conditions. Trench walls shall be sloped and/or supported in conformance with CAL-OSHA standards. All excavations shall be barricaded in conformance with Cal/OSHA standards. Prior to excavation, Contractor shall acquire and submit an exemption letter or trenching permit from CAL-OSHA and comply with Labor Code Section 6705, Excavation Plans for Worker Protection. If shoring/bracing is proposed, the Contractor's design and installation of shoring/bracing shall be in compliance with CAL-OSHA standards. Shoring, sheeting, or trench shields shall be utilized in such a manner as to minimize disturbance of the backfill material beneath the pipe crown. Trench sheeting that extends below the crown should either be left

permanently in place or consist of adequately supported steel sheets one (1) inch thick or less which can be extracted with minimal disturbance to the pipe embedment. Where movable trench shields are used, the following steps shall be followed unless an alternate technique that does not disturb the pipe embedment can be demonstrated:

- Excavation of the trench below the elevation of the pipe crown shall be done from inside of the trench shield to prevent the accumulation of loose or sloughed material along the outside of the shield. Excavation of the trench ahead of the shield at an elevation below the pipe crown is not permitted unless approved by the County.
 - After laying the pipe in the trench, bedding and pipe embedment shall be place in lifts and the shield must be lifted in steps. As the shield is lifted, embedment material shall be shoveled under the shield so as to fill all voids left by the removal of the shield.
- iii. Pipe shall be laid in trench with any elongation oriented vertically. For pipe sizes larger than 36 inches in diameter, struts must be provided and installed per Manufacturer's recommendations. However, the struts shall not cause more than 1-1/2% vertical elongation, in no case will horizontal elongation be permitted. Trench details; including width, foundation overexcavation, bedding, pipe embedment, and trench backfill details are shown on the Project Drawings. All pipes shall be laid in a bed prepared by hand work, dug true to line and grade, to provide a true and firm bearing for the pipe throughout its entire length, and not by blocking or wedging. Backfill material placed under the pipe haunches shall be thoroughly shovel sliced along the length of the pipe. Unless otherwise specified, native soil material excavated from the site may be used to backfill trench. All backfill materials shall be placed in six (6) inch loose lifts and compacted to a minimum 90% standard proctor density. Bedding and backfill materials shall be compacted by mechanical means, including, vibratory plates and/or impact tampers. Pipe shall not be subject to a roller or wheel loads until a minimum of two (2) feet of backfill has been placed over the top of the pipe. Where concrete pipe embedment/encasement is specified on the Project Drawings, Class 560-C-3250 concrete as specified by the latest edition of the Standard Specifications for Public Works Construction shall be used.
- iv. Pipe shall be laid and assembled in strict conformance with the manufacturer's requirements.

- v. Joints shall be installed such that the connection of pipe sections will form a continuous line free from irregularities in the flow line. All joints shall be watertight (10.8 psi) per laboratory test ASTM D3212 and utilize bell and spigot design with a gasket meeting ASTM F477. Pipe connections to concrete structures shall include a combination of smooth exterior wall cylinder adapter and installation of water-stop at mid-wall of structure, and opening shall be filled with Type IIA cement mortar. Water-stop shall be installed per pipe Manufacturer's recommendations to ensure watertight connection to concrete structures.
- vi. Pipe shall be laid to alignment and grade shown on the Project Drawings. Alignment shall be obtained by plumbing and measuring from a tightly stretched wire or line running parallel with the flow line grade and supported over the centerline of the pipe by batterboards or bars accurately placed and firmly fastened in place across the trench. Alternate use of commercial LASER grade setting systems in lieu of string lines are acceptable provided the following conditions and requirements are met:
- The Contractor shall have the responsibility of providing an instrument operator who is qualified and trained in the operation of the LASER and said operator must adhere to the provisions of the State of California Construction Safety Orders issued by the Division of Industrial Safety. Attention is particularly directed to Section 1516, and 1800 through 1801, of said Orders for applicable requirements.
 - All LASER control points shall be established bench marks or construction off-set stakes identified on cut sheets and set in the field for the work. LASER set up points shall be on these control points or on points set directly from them by instrument.

Horizontal pipe alignment shall not deviate from that shown on the Project Drawings by more than two (2) inches over 20 feet of pipe. Pipe invert elevations shall be laid to grade within a tolerance of 0.02', or 0.05' cumulative deviation from elevations set at 100' stations.

After each length of pipe has been laid to line and grade, it shall be jointed to the preceding section as hereinafter specified, and after said jointing procedure has commenced, there shall be no movement of the pipe whatsoever in subsequent operations.

- vii. Before each length of pipe is placed, the interior of the preceding pipe shall be carefully cleaned of all dirt and debris. At all times when the work of installing pipe is not in progress, all openings into the pipe and the

ends of the pipe in the trench shall be tightly closed to prevent entrance of animals and foreign materials.

- viii. The Contractor shall take all necessary precautions to prevent the pipe from floating due to placing concrete embedment or water entering the trench from any source, shall assume full responsibility for any damage due to this cause and shall at his own expense restore and replace the pipe to its specified condition and grade if it is displaced due to floating.

18.2.3.3 Inspection and Testing

- i. The Contractor shall perform video camera (CCTV) inspection, mandrel/deflection testing, and air pressure or water exfiltration testing for 100% of the pipelines installed, mainlines and laterals. CCTV inspection and mandrel testing shall be performed a minimum of thirty (30) days after backfill compaction has been completed.
- ii. Contractor shall submit CCTV inspection color videos on Compact Disc (CD) or Digital Video Disc (DVD) of high quality and clarity. Videos shall be clearly labeled with project name and reference station locations of inspection. The Contractor's camera operator shall provide an audio description to clearly identify the segment being televised. Beginning and ending structures shall be called out using the stationing and lateral references as shown on the Project Drawings. Televising will begin at the center of the upstream manhole and will run continuously to the center of the downstream manhole. The center of the upstream manhole shall be set at 0 feet and the video shall show the complete footage of each segment, manhole to manhole. Any breaks or discontinuities in the video recording will result in the video being rejected and a new and complete video will need to be submitted. The Contractor shall identify on video and on a written log, each feature observed. Any special features shall be identified by station, left or right. The Contractor's camera operator shall pause the camera at each feature such that it will be clearly visible on the screen for review, and pan/tilt/rotate the camera head to obtain a clear view of the entire circumference of the pipe. Each pipe joint shall be scanned 360 degrees. Contractor's camera shall be specifically designed and constructed for pipeline inspection. Lighting and camera quality shall be suitable to provide clear, in focus picture of the entire periphery of the pipeline and have an adjustable focal distance range from 6" to infinity. The County shall be notified in one (1) week in advance when the video inspection is to take place, and the video and written logs shall be submitted to the County within one (1) week of completion. At the Contractor's expense, reinstallation or replacement of the pipe will be required if video inspection reveals:

- Sags/ standing water of one (1) inch or greater exist.
 - Any penetration of pipe or displaced joint is discovered during video inspection
- iii. Contractor shall use a rigid mandrel, approved by the County, with a circular cross-section having a diameter of at least 95% of the nominal inside pipe diameter. Mandrel shall be non-adjustable, odd-number legs (9 minimum), fabricated of steel, fitted with pull rings on the ends, stamped or engraved with mandrel diameter, nominal size, and pipe material specification. Contractor shall pull mandrel through the pipe by hand from manhole to manhole using 3/8" minimum pull ropes. At the Contractor's expense, reinstallation or replacement of the pipe will be required if pipe deflection is greater than 5%.
- iv. Pipes shall be tested by either water exfiltration or by air pressure in accordance with ASTM F2487 for water and ASTM F1417 for air as follows:

Low Pressure Air Test – After backfilling has been completed, the air test shall be conducted by the Contractor between two consecutive manholes in accordance with ASTM F1417. All pipe inlets, laterals, and outlets shall be plugged with suitable test plugs. One of the plugs used at a manhole shall be tapped and equipped for an air inlet connection for filling the pipe section from an air compressor. Air shall be supplied slowly to the test section until the internal pressure reaches four (4) pounds per square inch (psi). At least two (2) minutes shall be allowed for the air pressure to stabilize. When the pressure has stabilized and is at or above 3.5 psi, the air supply shall be disconnected and timing shall begin. Timing shall continue until the air pressure has dropped 1.0 psi. If the time elapsed before the pressure drops 1.0 psi is greater than the specified minimum holding time, the section shall be considered to have passed the test. The minimum holding time is calculated as follows:

$$\text{Holding Time (minutes)} = 0.00037 \times D^2 \times L/Q$$

Where D = Pipe Diameter (inches)

L = Length of Pipe Tested (feet)

Q = Allowable Air Loss (ft³/min.) from the following table:

Nominal Pipe Size, in.	Q Allowable Air Loss (ft ³ /min.)	Minimum Holding Time per 100 ft.
6	2	40 seconds
8	2	1 minute and 12 seconds
10	2.5	1 minute and 29 seconds
12	3	1 minute and 47 seconds
15	4	2 minutes and 6 seconds
18	5	2 minutes and 24 seconds
21	5.5	3 minutes
24	6	3 minutes and 33 seconds
27	6.5	4 minutes and 9 seconds
30	7	4 minutes and 45 seconds
33	7.5	5 minutes and 22 seconds
36	8	6 minutes
42	9	7 minutes and 15 seconds

If the time is less than the specified minimum holding time, the section shall be considered to have failed and must be repaired or replaced by the Contractor.

Exfiltration Test – After backfilling has been completed, the exfiltration test shall be conducted by the Contractor between two consecutive manholes in accordance with ASTM F2487. The inlets of the upstream and downstream manholes shall be sealed with watertight plugs or bulkheads, and the pipe section along with the upstream manhole shall be filled with water until the elevation of the water in the upstream manhole is two (2) feet higher than the top of the pipe section, including all laterals, at the highest point of the pipe section being tested. The Contractor shall clearly mark the test water level in the upstream manhole. The entire length of the pipe section to be tested shall be filled and maintained full of water for a period of at least twenty-four (24) hours prior to the start of the test. If the water level in the upstream manhole drops during this twenty-four (24) hour period, the level shall be raised to the test level mark prior to the start of the test. Exfiltration will be determined by measuring the amount of water required to maintain the marked water level for a period of one (1) hour from the start of the test. The allowable leakage of 50 gallons per inch diameter per mile of pipe per 24 hours is based on a maximum difference in elevation of eight (8) feet between the water level in the upstream manhole and the invert of the pipe being tested in the lower manhole. If this difference in elevation exceeds eight (8)

feet, the allowable leakage shall be increased by five (5) percent for each one (1) foot in excess of eight (8) feet. If the amount of exfiltration exceeds the specified allowable leakage, the section shall be considered to have failed and must be repaired or replaced by the Contractor.

- v. Isolation of defects by air pressure or exfiltration testing shall be determined by the Contractor and reinstallation or replacement of pipe shall be at the Contractor's expense. Pipe shall be retested by the Contractor after reinstallation or replacement until a satisfactory result is obtained.
- vi. The County, at its discretion and Contractor's expense, will in the 11th month of the warranty period have the pipe deflections monitored and any deflections greater than 7.5% of the nominal inside diameter will require the Contractor to make any necessary repairs or replacements to adjust the deflection to less than 7.5%.

18.2.4 MEASUREMENT AND PAYMENT

Measurement and Payment for the HDPE pipes for the storm drain system, including, but not limited to; trench excavation, subgrade preparation, overexcavation, backfill, bedding materials, HDPE pipe boots, concrete encasement, pipe fittings, gaskets, waterstop, smooth exterior cylinder wall adapters, reducers/enlargers, concrete collars, connections, video inspection and testing (mandrel and low pressure air or exfiltration) shall be made after County acceptance, at the unit price per lineal feet as stated in the Contractor's proposal Bid Item No. 34 – "Furnish & Install 12" Diameter HDPE Drainage Pipe"; Bid Item No. 35 – "Furnish & Install 18" Diameter HDPE Drainage Pipe"; Bid Item No. 36 – "Furnish & Install 24" Diameter HDPE Drainage Pipe"; Bid Item No. 37 – "Furnish & Install 30" Diameter HDPE Drainage Pipe"; Bid Item No. 38 – "Furnish & Install 36" Diameter HDPE Drainage Pipe"; and Bid Item No. 39 – "Furnish & Install 42" Diameter HDPE Drainage Pipe".

No additional compensation shall be allowed for the repair, reworking, retesting removal or replacement of any material not meeting the requirements of the Contract Documents as determined by the County.

18.3 MANHOLES

18.3.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit manufacturer product data sheets, shop drawings, and material specifications for precast concrete manhole sections, frames, covers, grout, and waterstop to the County for approval. Submittals for cast-in-place concrete and reinforcing steel bars shall be in accordance with Section 15.2 of these Special Provisions.

18.3.2 MATERIALS

- a. All manholes shall be precast unless specified as cast-in-place on the Project Drawings. If a cast-in-place manhole is specified, but a precast manhole can be constructed per specifications, the precast manhole shall be installed. The substitution of manhole types (precast/cast-in-place) will not warrant additional compensation.
- b. Precast manhole barrels, risers, cones, flat tops, and grade rings shall conform to ASTM C478 with the additional requirement that the cement used shall be Type IIA per ASTM C150. Precast manhole materials shall be as manufactured by Jensen Precast or approved equal. Manholes shall be constructed without steps. Mark date of manufacture and trademark of manufacturer shall be clearly labeled on precast units.
- c. Concrete for cast-in-place manhole bases and pipe encasement shall be Class 560-C-3250 concrete as specified by the latest edition of the Standard Specifications for Public Works Construction per Section 15 of these Special Provisions. Rebar for manhole bases shall conform to Section 15 of these Special Provisions. Portland cement mortar for joints shall conform to ASTM C150 Type IIA. Standard precast manhole sections shall be used above the cast-in-place base to bring the manhole to grade. Ductile iron manhole frames and cover sets shall be manufactured in accordance with ASTM A536, Class 60 and be able to withstand H2O loading requirements. The bearing surfaces of the frames and covers shall be machined and the covers shall seat firmly into the frame without rocking. The frames and covers shall be thoroughly cleaned, inspected, and dipped with two coats of commercial quality asphaltum paint. All manhole covers shall be cast with the words "STORM DRAIN" in the center with letters approximately three (3) inches in height. Manhole frames and covers shall be as manufactured by Alhambra Foundry, Long Beach Iron Works, or approved equal.
- d. Manufacturer information, mill certificates, concrete mix design, and shop drawings shall be submitted to the County for approval of the following items: manhole precast sections, rebar, concrete, waterstop, frames, and covers.

18.3.3 EXECUTION

18.3.3.1 Installation

- i. Manhole bases shall be placed reinforced concrete as shown on the Project Drawings and shall be shaped with metal forms to provide channels corresponding in size and shape to manhole inlets, laterals, and outlets. Channels shall be smooth and accurately shaped, and shall vary uniformly in size and shape from inlet to outlet for pipe size transitions. Benching shall be broom finished to provide a non-skid surface. Unless specified otherwise on the Project Drawings, cast-in-place manhole bases shall be eight (8) inches thick with No. 4 steel reinforcing bars placed at twelve (12) inches on center each way. Concrete may be placed against undisturbed soil provided wall thickness requirements are met; otherwise forms shall be required.
- ii. Precast manhole sections shall be set plumb, in accordance with Manufacturer's recommendations, and securely bonded together with a minimum thickness of 3/8-inch, Type IIA portland cement mortar per ASTM C150. All joint surfaces shall be thoroughly cleaned prior to placing mortar. The inside and outside of the joints, lift holes, or any penetration of the interior surface shall be plastered with mortar and the inside brushed with a wet brush. Precautions shall be taken to ensure that the entire joint space is filled with mortar and is watertight.
- iii. Cone or concentric flat top sections shall be installed on the top riser section or manhole base, on which shall be place one or more grade rings as needed, to form the base for the ductile-iron manhole frame and cover.
- iv. Concrete collars shall be placed around perimeter of manhole frame and consist of concrete in conformance with Section 15 of these Special Provisions. A 4' x 4' x 4" thick asphalt concrete pad shall be placed around the concrete collar. Asphalt concrete shall be placed in conformance with Section 14 of these Special Provisions.

18.3.3.2 Inspection and Testing

The Contractor shall test all manholes for leakage after assembly of the manhole and installation of pipes entering or exiting the manhole, but prior to backfill. The Contractor shall correct any excess leakage, and repair any damage to the manhole and its appurtenances at the Contractor's own expense. Contractor shall test for leakage using either one of the following two methods:

- i. Manhole Vacuum Test – Testing shall be performed by the Contractor in accordance with ASTM C1244. All manhole piping inlets and outlets shall be tightly sealed with plugs and care shall be taken to securely brace

the plugs from being drawn into the manhole. The test head shall be placed at the inside of the top of the cone or concentric flat top and the seal inflated in accordance with the manufacturer recommendations. A vacuum of ten (10) inches of mercury shall be drawn, the valve on the vacuum line of the test shall be closed, and the vacuum pump shut off. Once the valve is closed, the time shall be measured for the vacuum to drop to nine (9) inches of mercury. The manhole shall pass if the time is greater than sixty (60) seconds. If a manhole fails a test, the Contractor shall make necessary repairs and re-test until a satisfactory test is obtained.

- ii. Manhole Water Exfiltration Test – Contractor shall plug all manhole piping inlets and outlets and observe plugs for a minimum period of two (2) hours to ensure there is no leakage into the manhole. If no leakage is observed, Contractor shall fill the manhole with water to within four (4) inches of the top of the cover frame. Allow the manhole to soak from minimum of four (4) hours to maximum of twenty-four (24) hours. After the soak period, adjust water level inside manhole to be within four (4) inches of the top of the cover frame. Measure the water level from the top of the cover frame and after one (1) hour has elapsed. Permissible loss of water in the one (1) hour test time is 0.025 gallons per manhole diameter foot, per foot of manhole depth. For a four (4) foot diameter manhole, this quantity converts to a maximum permissible drop in the water level 0.05 inches per foot of manhole depth or 0.5 inches for a ten (1) foot deep manhole. If a manhole fails a test, the Contractor shall make necessary repairs and re-test until a satisfactory test is obtained.

If a manhole fails to pass the vacuum or exfiltration test, the Contractor shall locate the leak, if necessary by disassembly of the manhole. The Contractor shall check the gaskets and replace them if necessary. The Contractor may elect to waterproof the interior of the manhole by applying a coating of grout or a waterproofing material approved by the County. If the Contractor repairs or replaces the manhole, the manhole shall be re-tested until it passes.

18.3.4 MEASUREMENT AND PAYMENT

Measurement and Payment for Concrete Manholes for the storm drain system including, but not limited to; concrete base, precast sections, cones, waterproofing joints, water stop, concrete encasement, connections, concrete collars, testing (vacuum or exfiltration), frames, and covers, shall be made after County acceptance, at the unit price for each unit installed at the locations and in conformance with the details shown of the Project Drawings and as required by the Contract Documents. Payment for manholes and all related works shall be based upon the contract unit price per each as stated in the Contractor's proposal Bid Item No. 44 – "Construct Concrete Manhole Structures". Measurement and payment for 4'x4'x4" thick asphalt concrete pad around perimeter of the manhole shall be based upon the contract unit

price per square foot as stated in the Contractor's proposal Bid Item No. 40 – “Construct Asphalt Drainage Structures”.

No additional compensation shall be allowed for the repair, reworking, retesting removal or replacement of any material not meeting the requirements of the Contract Documents as determined by the County.

18.4 REINFORCED CONCRETE DRAINAGE TRENCH INLETS, BOXES, AND HEADWALLS

18.4.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit manufacturer product data sheets, shop drawings, and material specifications for precast trench inlets, boxes, headwalls, frames, and grates to the County for approval. Submittals for cast-in-place concrete shall be in accordance with Section 15.2 of these Special Provisions. Submittals for headwall inlet trash grates shall be in accordance with Section 17.9 of these Special Provisions.

18.4.2 MATERIALS

- a. All inlet trenches, boxes, and headwall units shall be precast unless specified as cast-in-place on the Project Drawings. If a cast-in-place trench inlet, box, or headwall is specified, but a precast unit can be substituted per specifications, the precast unit shall be installed. The substitution of cast-in-place units for precast will not warrant additional compensation.
- b. Precast inlet trench, box, and headwall units shall conform to ASTM C478 with the additional requirement that the cement used shall be Type IIA per ASTM C150. Frames and grates shall withstand H20 loading requirements and be hot-dip galvanized steel. Precast inlet trenches, boxes, headwalls, frames, and grates shall be as manufactured by Jensen Precast or approved equal. Box sections shall be constructed without steps. Mark date of manufacture and trademark of manufacturer shall be clearly labeled on precast units.
- c. Concrete for cast-in-place units shall be Class 560-C-3250 concrete as specified by the latest edition of the Standard Specifications for Public Works Construction per Section 15 of these Special Provisions. Rebar for units bases shall conform to Section 15 of these Special Provisions. Portland cement mortar for joints shall conform to ASTM C150 Type IIA.
- d. Manufacturer information, mill certificates, concrete mix design, and shop drawings shall be submitted to the County for approval of the following items: inlet trench and box precast sections, rebar, concrete, waterstop, frames, and grates.

18.4.3 EXECUTION

18.4.3.1 Installation

- i. Precast sections shall be set plumb, in accordance with Manufacturer's recommendations, and securely bonded together with a minimum thickness of 3/8-inch, Type IIA portland cement mortar per ASTM C150. All joint surfaces shall be thoroughly cleaned prior to placing mortar. The inside and outside of the joints, lift holes, or any penetration of the interior surface shall be plastered with mortar and the inside brushed with a wet brush. Precautions shall be taken to ensure that the entire joint space is filled with mortar and is watertight.
- ii. Concrete collars shall be placed around perimeter of the inlet trenches and box sections and consist of concrete in conformance with Section 15 of these Special Provisions.
- iii. Cast-in-place headwall units shall be constructed in conformance with Section 15 of these Special Provisions.

18.4.4 MEASUREMENT AND PAYMENT

- a. **Measurement and Payment** for Concrete Headwalls for the storm drain system including, but not limited to; excavation, subgrade preparation, formwork, concrete, rebar, water stop, concrete encasement, trash racks/grates, connections and waterproofing joints, shall be made after County acceptance, at the unit price for each unit installed at the locations and in conformance with the details shown of the Project Drawings and as required by the Contract Documents. Payment for headwalls and all related works shall be based upon the contract unit price per each as stated in the Contractor's proposal Bid Item No. 42 – "Construct Concrete Headwall Inlet".
- b. **Measurement and Payment** for Precast Trench Inlets for the storm drain system shall include, but not limited to; furnishing all labor, materials, tools, equipment, and incidentals for precast trench inlet and boxes, galvanized steel frame and grates, connections, water stop, concrete coring, hardware, trench floor mortar, concrete collars, concrete encasement, waterproofing joints, and all other appurtenances, shall be made after County acceptance, at the unit price for each unit installed at the locations and in conformance with the details shown of the Project Drawings and as required by the Contract Documents. Payment for trench inlets and all related works shall be based upon the contract unit price per each as stated in the Contractor's proposal Bid Item No. 45 – "Furnish and Install Precast Trough Inlet".

18.5 ENERGY DISSIPATOR IMPACT BASIN

18.5.1 SUBMITTALS

Refer to Section 15.2 of these Special Provisions for concrete and reinforcing bar submittals. The Contractor shall submit mill certificates for baffle wall armor plate.

18.5.2 MATERIALS

- a. Concrete for cast-in-place basin shall be Class 560-C-3250 concrete as specified by the latest edition of the Standard Specifications for Public Works Construction per Section 15 of these Special Provisions with the addition of Type IIA cement per ASTM C150. Reinforcing steel bars for the basin shall conform to Section 15 of these Special Provisions. Armor-plated baffle wall shall consist of ¼" thick steel plate per ASTM A36. Portland cement mortar for joints shall conform to ASTM C150 Type IIA.
- b. Manufacturer information, mill certificates, concrete mix design, and shop drawings shall be submitted to the County for approval of the following items: rebar, concrete, waterstop, and armor-plated baffle.

18.5.3 EXECUTION

Cast-in-place basin unit shall be constructed in conformance with Section 15 of these Special Provisions.

18.5.4 MEASUREMENT AND PAYMENT

Measurement and Payment for Concrete Energy Dissipater Impact Basin for the storm drain system including, but not limited to; excavation, subgrade preparation, formwork, concrete, rebar, water stop, steel armor-plate, connections, concrete encasement, and waterproofing joints, shall be made after County acceptance, at the contract price per each unit as stated in the Contractor's proposal Bid Item No. 48 – "Construct Concrete Energy Dissipater Impact Basin with Vertical Baffle Wall".

END OF SECTION 18

SECTION 19 - MISCELLANEOUS ITEMS

19.1 GENERAL

The work covered by this section shall consist of furnishing all necessary labor, materials, equipment, tools and supervision for the construction of the following miscellaneous items at the locations indicated on the Project Drawings or as directed by the County.

19.2 FIBER ROLLS

19.2.1 SUBMITTALS

The Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval.

19.2.2 MATERIALS

- a. Fiber roll shall be a manufactured roll of rice or wheat straw, wood excelsior, or coconut fiber encapsulated within a photodegradable plastic or biodegradable jute, sisal, or coir fiber netting. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the roll. Rolls shall be between 0.6 feet and 1 foot in diameter. Rolls between 0.6 feet and 0.8 feet in diameter shall have a minimum weight of 1.17lb/ft and a minimum length of 18 feet. Rolls between 0.8 feet and 1 foot in diameter shall have a minimum weight of 3.3lb/ft and a minimum length of 9 feet.
- b. Wood stakes shall be a minimum of 3/4" x 3/4" x 24" in size and shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended.

19.2.3 EXECUTION

Fiber rolls shall be installed as follows:

- a. Furrows shall be constructed to a depth between 2" and 4", and to a sufficient width to hold the fiber roll. Stakes shall be installed 2 feet apart along the length of the fiber rolls and stopped at 1 foot from each end of the rolls. Stakes shall be driven to a maximum of 2" above, or flush with the top of the rolls.

- b. Unless otherwise specified on the Project Drawings, fiber rolls shall be placed 15 feet apart along the slope for slope inclination (vertical:horizontal) of 1:2 and steeper, 20 feet apart along the slope for slope inclination between 1:2 and 1:4, 25 feet apart along the slope for slope inclination between 1:4 and 1:10, and a maximum of 50 feet apart along the slope for slope inclination of 1:10 and flatter.
- c. The bedding area for the fiber rolls shall be cleared of obstructions including rocks, clods and debris greater than 1" in diameter before installation.
- d. Fiber rolls shall be installed approximately parallel to the slope contour. Sand bags chevrons shall be placed as shown on the project drawings.
- e. Fiber rolls shall be installed before application of other erosion control or soil stabilization materials in the same area.

19.2.4 MEASUREMENT AND PAYMENT

The **measurements** of the final quantity for **Bid Item 3 "Supply and Install Fiber Roll BMPs"** shall be determined by the County based on field measurements of the axial length (linear feet) of fiber rolls installed at the locations and to the dimensions shown on the Project Drawings. Joining and overlapping of rolls will not be measured, and the roll will be measured as a single installed roll. **Payment** for the fiber rolls shall be at the contract unit price per linear foot as stated in the Contractor's Proposal, **Bid Item No. 3** and shall constitute full compensation to the Contractor for all work related to the supply and installation of fiber rolls in the project including but not limited to: furnishing all labor, supervision, materials, tools, and equipment; excavating, hauling, loading, stake anchors, sand bags chevrons, and any other requirements by the Contract Documents for the supply and installation of fiber rolls.

19.3 RUMBLE RACKS

19.3.1 SUBMITTALS

Prior to delivery, the Contractor shall submit manufacturer's specifications, material information, and fabrication shop drawings for the rumble rack sections.

19.3.2 MATERIALS

The required 8-ft x 10-ft Rumble Rack sections shall be prefabricated steel panels, and shall be pressed or shop welded, with a slot or hooked section to facilitate coupling at the ends of the panels.

19.3.3 EXECUTION

- a. Rumble racks shall be supplied and installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents or as directed by the County.
- b. Rumble racks installation shall be performed in accordance with the details included in the Project Drawings.
- c. Prior to installing the rumble rack panels and underlying class II base material, the ground surface shall be cleared of all debris to ensure uniform contact with the ground surface.

19.3.4 MEASUREMENT AND PAYMENT

The **measurement** of final quantities for Bid Item No. 63 "Furnish & Install 8-ft x10-ft Steel Rumble Racks" shall be determined by the County based upon the specified number of units installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for Rumble Racks and all related work shall be based upon the contract unit price per each as stated in the Contractor's Proposal, **Bid Item No. 63**; and no additional compensation will be allowed. Payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in supplying and installing Rumble Racks completed in place.

19.4 ECCENTRIC PLUG AND BALL VALVES

19.4.1 SUBMITTALS

The Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval. Submittal shall include a complete set of engineering drawings of valve and gear operator installation.

19.4.2 MATERIALS

- a. Plug valves shall be of the non-lubricated eccentric type with the port area 100% of the standard pipe area. Valves 6-inch and larger shall be equipped with gear operators, lubricated and sealed to prevent entry of dirt and water into the operator. Valves shall be flanged conforming to 125-lb standard. All shaft bearings shall be furnished with permanently – lubricated bearing surfaces. The operator shall clearly indicate valve position. All valves shall be epoxy-coated in the water passages. Valve bodies shall be epoxy-coated ductile iron. Plug facing shall be T304 or T316 stainless steel. Valve packing shall be PTFE. Valves and operators shall be as manufactured by DeZurik Corporation or approved equal.
- b. Ball valves shall be non-lubricated and be capable of sealing in either flow direction. Valves shall be flanged conforming to 125-lb standard. Valve stems and ball shall T316 or T304 stainless steel. Valve bodies shall be epoxy-coated ductile iron with PTFE seats and stem packing. Ball valves shall be 6Q series as manufactured by Apollo Valves or approved equal.
- c. All bolts shall be either high strength cast iron containing a minimum of 0.5% copper or high-strength, low alloy steel, as specified in AWWA C-111 for buried mechanical joints.
- d. Underground valves shall be installed in polymer concrete traffic rated vaults with logos as shown on the Project Drawings. Vaults and grade risers shall be manufactured by Armorcast or approved equal.

19.4.3 EXECUTION

- a. Prior to the delivery of the valves and vaults, the Contractor shall submit to the County for approval the manufacture's specifications including a complete set of engineering drawings and material information for valves, operators, bolts, and vaults.
- b. Valves shall be installed plumb, with the stems vertical. All underground valves shall be installed in polymer concrete vaults, solid bottom or open bottom with 2' thick layer of ½" gravel, with sufficient number of vault sections or grade risers to bring the vault 3-inches above finished grade.
- c. Bolts and nuts shall be protected using zinc caps as specified in Section 17.7 of these Special Provisions. Underground valve bodies shall be

wrapped with Protecto-Wrap No. 200 or 300 Coal Tar Resin tape, or approved equal.

19.4.4 MEASUREMENT AND PAYMENT

- a. **Measurement and Payment for all Ball Valves** for the leachate and gas condensate containment facility, including, but not limited to; shop drawings, material specifications, valves, flanges, gaskets, fittings, bolts, nuts, connections, and incidentals shall be made after County acceptance, and included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 28 – "Construct Leachate and Condensate Containment Facility".
- b. **Measurement and Payment for 6-inch Plug Valves** for the LCRS piping, including, but not limited to; shop drawings, material specifications, valves, geared valve operator, vaults, lids, grade risers, flanges, gaskets, fittings, bolts, nuts, connections, and incidentals shall be made after County acceptance, and included in the linear foot price stated in the Contractor's proposal Bid Item No. 23 – "Furnish and Install LCRS 6" Solid HDPE Pipe".
- c. **Measurement and Payment for 8-inch Plug Valves** for the basin outlet piping, including, but not limited to; shop drawings, material specifications, valves, geared valve operator, vaults, lids, grade risers, flanges, gaskets, fittings, bolts, nuts, connections, and incidentals shall be made after County acceptance, and included in the Lump Sum price stated in the Contractor's proposal Bid Item No. 53 – "Construct Basin Outlet and Spillway Structure".

19.5 THERMOPLASTIC STRIPING

19.5.1 SUBMITTALS

The Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval. Contractor shall submit a work phasing plan and traffic control plan for County review and approval, if Contractor proposes to perform work during landfill business hours.

19.5.2 MATERIALS

- a. Thermoplastic traffic stripes and pavement marking materials shall conform to the State of California Department of Transportation Specification for Thermoplastic Traffic Striping Material, Alkyd Resin Binder (PTH-02ALKYD), Hydrocarbon Resin Binder (PTH-02HYDRO), or Sprayable Thermoplastic Traffic Striping Material (PTH-02SPRAY).
- b. Raised pavement markers shall conform to Section 85, "Pavement Markers" of the latest edition of the State of California Department of Transportation Standard Specifications, Part 3 "Markings" of the Cal MUTCD, and these Contract Documents.
- c. Thermoplastic traffic stripes and raised pavement markers, where applicable, shall conform to the most current approved pre-qualified and tested signing and delineation materials and products list maintained by the California Department of Transportation.
- d. Glass beads material shall conform to State Specification 8010-004 (Type II), and be applied in accordance with Section 84 of the latest edition of the State of California Department of Transportation Standard Specifications.
- e. Standard set type epoxy adhesive shall conform to the provisions in Section 95-2.05 "Standard Set Epoxy Adhesive for Pavement Markers" of the latest edition of the State of California Department of Transportation Standard Specifications.

Rapid set type epoxy adhesive shall conform to the provisions in Section 95-2.04 "Rapid Set Epoxy Adhesive for Pavement Markers" of the latest edition of the State of California Department of Transportation Standard Specifications.

Hot melt bituminous adhesive shall conform to Section 85-1.055 "Adhesives" of the latest edition of the State of California Department of Transportation Standard Specifications.

19.5.3 EXECUTION

- a. Striping shall conform to Section 84 - "Traffic Stripes and Pavement Markings" of the Caltrans Standard, Part 3 "Markings" of the Cal MUTCD, and these Contract Documents.
- b. In order to ensure proper surface preparation and striping application, all **phases of work for striping shall only take place when the landfill site is closed after 4:30 PM and before the site opens the next day at 6:00 AM.**
- c. Where applicable, existing traffic stripes and pavement markings shall be **removed by grinding, sand-blasting, or other alternative methods approved by the County in writing and shall result in the least possible damage to the pavement** with depressions not exceeding 1/8-inch. If the removal of striping causes a depression of 1/8-inch or greater in the pavement surface, the Contractor shall fill and seal coat the damaged area per Section 37 "Bituminous Seals" and Section 39 "Asphalt Concrete" of the latest edition of the State of California Department of Transportation Standard Specifications. Pavement marking shall be removed in a rectangular area in such a manner that the old marking cannot be seen or identified. The minimum dimensions of the rectangle shall be the height and width of the pavement marking.
- d. Contractor is advised that the public access road for the landfill receives substantial dirt tracking over all entrance and exit lanes. Cleaning methods such as sweeping, blowing with compressed air, and rinsing with water have proven in the past to be insufficient and therefore will not be allowed as the only means of surface preparation in this project. The pavement shall be cleaned by grinding, scarifying, sand-blasting, or a combination of these or other methods as deemed necessary to obtain an acceptably clean surface by County staff. Thoroughly cleaned surfaces to be marked, must be approved by the County in writing before application of the new thermoplastic striping.
- e. Residue resulting from removal operations shall be removed from pavement surfaces by sweeping or vacuuming before the residue is blown by the action of traffic or wind, migrates across lanes or shoulders, or enters into drainage facilities. Where grinding or sand-blasting is used, the residue, including dust shall be removed immediately after contact between the grinding or sand-blasting material and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the grinding or sand-blasting operation. Any alternative

methods proposed by the Contractor shall be approved by the County in writing before proceeding with the work.

- f. In areas where the new striping will be NOT be installed at the same locations and alignments of the existing striping, the existing surface which is to receive the new thermoplastic material shall be thoroughly cleaned to remove, dust, dirt, and other granular surface deposits.
- g. All work necessary to establish alignment and layout for stripes and pavement markers shall be performed by the Contractor with any device or method that will not damage the pavement or conflict with other control devices.
- h. New striping and pavement markings shall be applied to the prepared asphalt surface after cleaning and prior to the opening of the roadway to landfill traffic. Any areas exposed to landfill traffic after surface preparation and cleaning shall be subject to inspection by the County and may require additional cleaning prior to application of striping.
- i. The Contractor shall not apply coatings during rain, when humidity is above 50 percent, or when the temperature is less than 50°F, unless otherwise allowed by manufacturer's instructions and approved by the County.
- j. A primer/sealer, of the type recommended by the manufacturer of the thermoplastic material, shall be applied to all asphaltic surfaces. The primer/sealer shall be applied immediately in advance of, and concurrent with, the application of the thermoplastic material or in accordance with the manufacturers' recommendations. The primer/sealer shall be applied at the application rate recommended by the manufacturer and shall not be thinned.
- k. Pre-heaters with mixers having 360 degree rotation shall be used to preheat the material
- l. The thermoplastic material shall be applied to the pavement at a temperature between 400° F and 425° F, unless a different temperature is recommended by the manufacturer.
- m. The thermoplastic material shall be applied by either spray or extrusion methods in a single uniform layer.

- n. Stencils shall be used when applying thermoplastic material for pavement markings.
- o. The pavement surface to which the thermoplastic material is applied shall be completely coated by the material and the voids of the pavement surface shall be filled.
- p. Thermoplastic material for traffic stripes shall be applied at a minimum thickness of 0.060 inch. Thermoplastic material for pavement legends and markings shall be applied at a thickness of 0.100-inch to 0.150-inch. Glass beads shall be applied immediately to the surface of the molten thermoplastic material at a rate of not less than 8 pounds per 100 square feet. The amount of glass beads applied shall be measured by stabbing the glass bead tank with a calibrated rod.
- q. The Contractor shall take precautionary measures to prevent spills or fire hazards. Drips, overspray, improper markings and paint and thermoplastic material tracked in by traffic shall be immediately removed from the pavement surface by methods approved by the County. All this removal work shall be at the Contractor's expense.
- r. Traffic stripes, raised pavement markers, and pavement markings shall conform to the dimensions and details shown on the corresponding Cal MUTCD detail.
- s. Completed stripes shall have clean and well defined edges without running or deformation, shall be uniform, shall be straight on tangent alignment and shall be on a true arc on curved alignments. The widths of the completed stripes shall not deviate more than $\frac{1}{4}$ inch on tangent or more than $\frac{1}{2}$ inch on curves as determined by the County representative in the field. Broken stripes shall also conform to the following requirements:
 - i. The lengths of the gaps and individual stripes that form broken traffic stripes shall not deviate more than 1 inch from their standard lengths.
 - ii. The lengths of the gaps and individual stripes shall be of such uniformity throughout the entire length of each broken traffic stripe that a normal striping machine will be able to repeat the pattern and superimpose additional stripes upon the traffic stripe being applied.

Completed pavement markings shall have clean and well-defined edges without running or deformation and shall conform to dimensions shown on the referenced details, except that minor variations may be accepted by the County representative in the field.

19.5.4 MEASUREMENT AND PAYMENT

Measurement and Payment for all Thermoplastic Striping for the access roadway rehabilitation including, but not limited to; existing striping removals, surface preparation, sandblasting, grinding, traffic control, after hours work, thermoplastic striping, and incidentals, shall be made after County acceptance, at the contract Lump Sum price as stated in the Contractor's proposal Bid Item No. 61 – "Construct Thermoplastic Striping".

19.6 CHAIN LINK

19.6.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval.

19.6.2 MATERIALS

- a. Posts, braces, and rails shall be new galvanized pipe manufactured in accordance with ASTM A120 and shall be of the following sizes and weights:

Post Location	Nominal Diameter of Post	Approximate Outside Diameter	Pipe Weight
End, Corner, and Walk Gate Posts	2-1/2"	2-7/8"	Standard
Line Posts	1-1/2"	1-7/8"	Standard
Braces, rails, and gate frames	1-1/4"	1-5/8"	Standard
Concrete Strip Footing Sleeves	Inside Diameter equal to +1/8" Outside Diameter of Fence Post (3" I.D. for End Posts) (2" I.D. for Line Posts)		Minimum 10 gauge

Braces shall be fitted with clamps on each end, one clamp to fit gate posts and the other clamp to fit standard line posts.

Changes in alignment of more than 30 degrees shall be considered as corners, and corner posts and braces shall be installed.

- b. Chain link fabric shall be No. 11 AWG gauge galvanized steel wire woven in a 2" mesh, manufactured in accordance with the requirements of ASTM A392. The fabric shall have a zinc coating, Class 1, by hot-dip galvanizing after weaving.
- c. Concrete strip footing pipe sleeves shall be ASTM A36 steel pipe, 24" long and +1/8" diameter of fence post specified for installation. Pipe shall have a welded cap on one end and be lined with a two coat epoxy, Tnemac

Series 66 or approved equal. Pipe sleeves that will not be receiving fence posts shall be capped at both ends.

- d. All tension wire shall be No. 7 AWG gauge galvanized, hard drawn, steel spring wire.
- e. All tie wire shall be No. 9 AWG gauge galvanized steel wire manufactured in accordance with the requirements of ASTM A112.
- f. Truss rods shall be made from 3/8" diameter galvanized steel rod, with drop forged turnbuckles, and galvanized in accordance with ASTM A153.
- g. All hardware, hinges, clamps, fasteners, bolts, nuts, turnbuckles, fittings, post caps, stretcher bars, and other ferrous material not previously covered in these specifications, shall be manufactured of steel and shall be galvanized in accordance with ASTM A153.
- h. Walk gates shall be four (4) feet wide. Gate frames shall be cross trussed with 3/8" steel truss rods equipped with drop forged turnbuckles. The corners of gate frames shall be fastened together and reinforced with a malleable iron fitting designed for the purpose or welded securely. Surplus welding material shall be removed prior to galvanizing. Chain link fabric shall be the same type as specified for the fence and shall be fastened to the frame by the use of stretcher bars, clamps, and tie wire as specified for the fence, and suitable tension connectors spaced at approximately 1' intervals. Gates shall be hung by hinges not less than three (3) inches in width so designed as to securely clamp to the gate post and permit the gate to swing back against the fence. Hinges shall be of high malleable iron of the ball and socket type which will permit the gate to swing back against the fence. The lower hinges of the gate shall support the entire vertical load of the gates as well as provide for the resultant horizontal reaction. Each gate shall be outfitted with approved latches and provisions for padlocking. Latches, hasps and bolts shall be accessible from either side of the gate.
- i. Concrete for fence posts shall be Structural Concrete as specified in Section 15.3.1 of these Special Provisions. A galvanized steel base plate and concrete anchor bolts shall be used to secure fences posts to concrete walls as shown on the Project Drawings.

19.6.3 EXECUTION

- a. Posts shall be spaced not more than ten (10) feet center to center of posts. Posts shall be set in a vertical position and carefully aligned. End, corner, and gate posts shall be braced to the nearest line post.
- b. Chain link fabric shall be stretched taut and securely fastened to the posts, the top rails, and/or tension wires. The fabric shall be fastened to end, corner, and gate posts with 3/16" by 5/8" steel stretcher bars and not less than 1/8" by 1" steel stretcher bar bands spaced one (1) foot apart and

fastened to line posts, rails, and tension wires with tie wires or metal bands spaced approximately 14" on line posts and 18" on rails and tension wires. Bottom tension wires and fabric shall be stretched straight from post to post.

19.6.4 MEASUREMENT AND PAYMENT

Measurement and Payment for the Chain Link Fence and Coir Mats for the basin baffle walls, including, but not limited to; furnishing all labor, material, tools, equipment, coir mats, chain link fence, steel pipe sleeves, posts, gates, hardware and incidentals shall be made after County acceptance, included in the linear foot price stated in the Contractor's proposal Bid Item No. 51 – "Furnish and Install Chain Link Fencing and Coir Mat". Concrete foundation for chain link fence shall be compensated for under Bid Item No. 50 – "Construct Concrete Strip Footing".

19.7 K-RAIL BARRIERS

19.7.1 SUBMITTALS

Prior to delivery of materials, the Contractor shall submit product data sheet, and manufacturer's application instructions for all materials to the County for approval.

19.7.2 MATERIALS

- a. K-Rail Barriers shall consist of interconnected new precast concrete barrier units, and shall be supplied and installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents.
- b. K-rail barrier shall conform to the provisions in Section 12-3.08 of the State Standard Specifications.

19.7.3 EXECUTION

- a. K-rail barriers shall be installed in accordance with detail T3 of the State Standard Plans.
- b. The Contractor shall set the k-rail barrier on firm, stable surface as required by the Contract Documents in order to provide a uniform bearing throughout the entire length of the railing.
- c. Abutting ends of precast concrete units (k-rail barrier) shall be placed and maintained in alignment without substantial offset to each other. The precast concrete units shall be positioned straight on tangent alignment and on a true arc on curved alignment.
- d. The completed k-rail barrier units shall present a smooth uniform appearance in their final position, conforming closely to the horizontal and vertical lines shown on the Project Drawings and as directed by the County.

19.7.4 MEASUREMENT AND PAYMENT

The **measurement** of the final quantity for Bid Item No. 62 "Furnish & Install K-Rail Barriers" shall be determined by the County based on the field measurements of the in-place length of completed k-rail barriers installed at the locations and in conformance with the details shown on the Project Drawings and as required by the Contract Documents. **Payment** for K-rail barriers and all related work shall be based upon the unit price per linear feet of completed in place length as stated in the Contractor's Proposal, **Bid Item No. 62**; and no additional compensation will be allowed. Payments shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in supplying and installing K-rail barriers completed in place.

END OF SECTION 19

APPENDIX "A"

**CONSTRUCTION QUALITY ASSURANCE / QUALITY CONTROL PLAN
(QA/QC Plan)**

**FOR
LINER SYSTEM CONSTRUCTION
PHASE 2 STAGE 4**

**AT THE
LAMB CANYON SANITARY LANDFILL**

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TABLE OF CONTENTS

SECTION 1 - GENERAL	1
1.1. Introduction.....	1
1.2. Summary of Work	1
1.3. Responsible Parties	2
1.4. Project Organization	3
1.4.1. Landfill Owner/Operator	3
1.4.2. Contractor	3
1.4.3. Project Manager	3
1.4.4. Resident Engineer	3
1.4.5. QA/QC Consultant.....	4
1.4.6. QA/QC Manager	5
1.4.7. QA/QC Monitors	6
1.4.8. Surveying	7
1.4.8.1. Contractor's Surveyors	7
1.4.8.2. County Surveyors	7
1.4.9. Meetings.....	7
1.4.9.1. Pre-Construction Meeting.....	8
1.4.9.2. Weekly Progress Meetings	8
1.4.9.3. Quality Resolution Meeting.....	9
1.4.10. Documentation and Record Keeping.....	10
1.4.10.1. General.....	10
1.4.10.2. Daily Reports	10
1.4.10.3. Weekly Progress Reports.....	11
1.4.10.4. Photographs	11
1.4.10.5. Design and Specification Revisions	12
1.4.10.6. As-Built Plans	12
1.4.10.7. Final Construction Report.....	12
SECTION 2 - EARTHWORK.....	13
2.1. Engineered Fill Construction.....	13
2.1.1. General.....	13
2.1.2. Testing & Observation.....	15
2.2. Low-Permeability Layer	16
2.2.1. General.....	16
2.2.2. Material Properties Testing.....	17
2.2.3. Acceptance Criteria.....	18
2.2.3.1. Moisture Content and Density	18
2.2.3.2. Hydraulic Conductivity.....	18

2.3. County Acceptance	18
SECTION 3 - GEOSYNTHETIC CLAY LINER (GCL)	19
3.1. General.....	19
3.2. GCL Manufacturing.....	19
3.3. GCL Delivery	20
3.3.1. Transportation And Handling	20
3.3.2. Storage	21
3.4. GCL Conformance Testing.....	21
3.4.1. Tests	21
3.4.2. Sampling Procedures	21
3.4.3. Test Results.....	21
3.5. GCL Installation	22
3.5.1. Surface Preparation.....	22
3.5.2. Placement.....	22
3.5.3. Repairs	24
3.6. County Acceptance	24
SECTION 4 - FLEXIBLE MEMBRANE LINER (FML).....	25
4.1. FML Manufacturing.....	25
4.2. FML Delivery	26
4.2.1. Transportation and Handling	26
4.2.2. Storage	27
4.3. FML Conformance Testing.....	27
4.3.1. Tests	27
4.3.2. Sampling Procedures	27
4.3.3. Test Results.....	27
4.4. FML Installation	28
4.4.1. Earthwork.....	28
4.4.2. FML Placement.....	29
4.4.3. Field Seaming	30
4.5. FML Construction Testing	32
4.5.1. Nondestructive Seam Testing	32
4.5.2. Destructive Seam Testing	33
4.5.2.1. General.....	33
4.5.2.2. Sampling Procedures	33

4.5.2.3. Size of Samples.....	34
4.5.2.4. Field Testing	35
4.5.3. Laboratory Testing.....	35
4.6. Defects and Repairs	36
4.6.1. Identification	36
4.6.2. Repair Procedures	36
4.7. Seam Test Summary	36
4.8. Wrinkles.....	37
4.9. County Acceptance	37
SECTION 5 - GEOTEXTILES	38
5.1. Manufacturing	38
5.2. Delivery	39
5.2.1. Transportation and Handling	39
5.2.2. Geotextile Storage.....	39
5.3. Geotextile Conformance Testing	40
5.3.1. Tests	40
5.3.2. Sampling Procedures	40
5.3.3. Test Results.....	40
5.4. Geotextile Installation.....	40
5.4.1. Surface Preparation.....	40
5.4.2. Geotextile Placement	41
5.5. County Acceptance	42
SECTION 6 - LEACHATE COLLECTION AND REMOVAL SYSTEM.....	44
6.1. LCRS Construction	44
6.1.1. Piping & Leachate Storage Tank.....	44
6.1.2. Construction Material	44
6.1.3. County Acceptance	44
6.2. Drainage Layer Construction	45
6.2.1. General.....	45
6.2.2. Material Properties Testing.....	45
6.2.3. In-Place Properties Testing.....	45
6.2.4. County Acceptance.....	45

SECTION 7 - PROTECTIVE SOIL LAYER 46

SECTION 8 - ASPHALT STRUCTURES..... 48

SECTION 9 - REINFORCED CONCRETE STRUCTURES 49

SECTION 10 - PROTECTIVE MEMBRANE..... 50

10.1. Manufacturing 50

10.2. Conformance Testing 50

10.3. Protective Membrane Installation..... 50

SECTION 1 - GENERAL

1.1. INTRODUCTION

The Construction QA/QC Plan has been prepared to meet the following objectives:

- A. Provide quality control procedures and a quality assurance program, which will demonstrate that the Phase 2, Stage 4 expansion design is properly implemented by performing monitoring and testing during construction.
- B. Provide a mechanism that allows the evaluation of design changes that occur during construction.
- C. Prepare and maintain documentation that can demonstrate the design has been implemented and the performance requirements have been met.
- D. Serve as a reference source for personnel performing and monitoring the construction activities.
- E. Establish lines of communication and responsibilities of all project personnel.

A *Quality Assurance* (QA) program consists of continuously overseeing the project to confirm that observations and testing procedures are being implemented by qualified personnel as planned; that procedures are in compliance with applicable regulations, standards, and project specifications and drawings; and that all work, including the final product, is appropriately documented, filed, and made readily available for review.

A *Quality Control* (QC) program consists of selected tests and observations during construction that assist the Contractor in producing the required quality product. Owing to the similarity of ultimate objective, QA and QC functions for construction projects are typically combined to become the Quality Assurance/Quality Control (QA/QC) Plan. This QA/QC Plan should be used in conjunction with the Plans and Specifications for the construction of Phase 2, Stage 4 expansion at the Lamb Canyon Sanitary Landfill in Riverside County, California.

The Contractor must be aware that QA/QC influences the Contractor's daily operations and can affect the Contractor's progress and profitability; the Contractor should therefore prepare its bid accordingly.

An independent testing laboratory will be responsible for conducting QA tests on geosynthetic samples, such as conformance testing and testing of field seams for peel and shear, and QA tests on low-permeability layer. The laboratory shall be independent of the County, Manufacturer, Lining Subcontractor, or any party involved with the manufacturing or installation of any of the geosynthetics. The QA/QC tests must be conducted using a California-certified independent testing laboratory for soil property analyses and tests.

1.2. SUMMARY OF WORK

The liner system proposed for Phase 2, Stage 4 expansion at the Lamb Canyon Sanitary Landfill consists of individual components, including a low-permeable layer, a geosynthetic

clay liner (GCL), flexible membrane liners (FML), geotextiles, a leachate collection and removal system (LCRS), a protective soil layer, a protective membrane layer, and a surface drainage system. The LCRS includes drainage layer, geotextile filter fabric, and leachate conveying pipes. This document details the type, procedure, and frequency of the QA/QC tests to be performed during construction of the earthwork, geosynthetic liner system, LCRS, and installation of the drainage structures.

Each of the above-mentioned subsystem (component) functions as an integral part of the overall liner expansion system, and consequently must become a finished product during construction. Thus, construction of the entire project will be performed in phases, with each portion completed prior to construction of successive or overlying portions. For this reason, it is necessary to conduct an ongoing QA/QC program during construction to verify a quality end product. Nevertheless, it is the Contractor's responsibility to complete the project in accordance with the Contract Documents; and nothing stated in this document or any testing, inspection or observation by the County or the QA/QC Consultant shall in any way relieve the Contractor of its obligations to properly construct the project in accordance with all of the Contract Documents.

This project is formatted to meet strict Federal and State Code requirements for expansions of landfills as administered by the Regional Water Quality Control Board (RWQCB). RWQCB staff must approve any design and specification revisions.

1.3. RESPONSIBLE PARTIES

The responsible parties for this expansion project at the Lamb Canyon Sanitary Landfill are identified below:

Landfill Owner/Operator:

Riverside County, Waste Management Department
14310 Frederick Street
Moreno Valley, California 92553
Phone: (951) 486-3200
Representative: Mr. Hans Kernkamp, P.E.

Project Manager:

Riverside County, Waste Management Department
14310 Frederick Street
Moreno Valley, California 92553
Phone: (951) 486-3200
Representative: Mr. Fouad A. Mina, P.E.

Resident Engineer:

Riverside County, Waste Management Department

14310 Frederick Street
Moreno Valley, California 92553
Phone: (951) 486-3200
Representative: Eduardo Castellanos, P.E.

QA/QC Consultant
Geosyntec Consultants
2100 Main Street, Suite 150
Huntington Beach, CA 92648
Phone: (714) 969-0800
Representative: Neven Matasovic, Ph.D, P.E., G.E.

1.4. PROJECT ORGANIZATION

The principal functions of the responsible parties for this expansion project, including the construction contractor and the QA/QC team, are presented below:

1.4.1. Landfill Owner/Operator

The Owner is the Riverside County Waste Management Department (County) or an authorized County official. Work shall always be subject to approval by the County.

1.4.2. Contractor

The Contractor is the firm or its representatives responsible for the construction activities. Responsibilities of the Contractor include but are not limited to the following:

- Assign duties and supervise the construction crew.
- Manage the day-to-day execution of construction activities in accordance with the Contract Documents and the provisions of this plan.
- Conform to federal, state, and local safety regulations pertinent to the construction work.
- Notify the QA/QC Consultant when materials are received on site so that the receiving monitoring can be performed.
- Immediately report to the County in writing any unexpected field conditions.
- Complete construction records required by this plan.

1.4.3. Project Manager

The Project Manager shall be the person working on behalf of the County having ultimate authority on the project (unless County Board or General Manager-Chief Engineer approval is required). The Project Manager will be responsible for reviewing all design and QA/QC issues that may arise during construction. The approval of the Project Manager will be required prior to any design and/or QA/QC changes.

1.4.4. Resident Engineer

The Resident Engineer serves as the Project Manager's on-site representative. All coordination, reporting, and issues related to non-compliance will be directed to the Project Manager through the Resident Engineer. In addition, the Resident Engineer will participate with the Project Manager and QA/QC Manager in all decisions related to design and QA/QC issues that arise during the course of construction.

1.4.5. QA/QC Consultant

QA/QC Consultant is a party independent from the Owner, Contractor, and the product manufacturers. The QA/QC Consultant shall have authority for QA/QC activities only and shall maintain continuous communication with the Project Manager and Resident Engineer regarding QA/QC activities. The QA/QC Consultant organization will consist of a QA/QC Manager and QA/QC Monitors. The QA/QC Manager has overall responsibility for reviewing and approving QA/QC activities and is responsible for daily direction of QA/QC Monitors and testing laboratories. The QA/QC Monitors conduct observation, sampling, testing and documentation as required by this document and as directed by the QA/QC Manager. This work shall always be subject to consultation with and/or approval from the County.

The work to be done by the QA/QC Consultant as stated in the QA/QC Plan, or any of the other Contract Documents, shall not in any way relieve the Contractor of its own obligations or responsibilities under the Contract Documents.

Along with County staff, the QA/QC Consultant is responsible for observing, inspecting, testing, and documenting activities related to the QA/QC Plan during construction. The role of the QA/QC Consultant is critical to successful control and demonstration of construction procedures and required documentation. Their responsibilities include but are not limited to the following:

- Perform materials receiving, monitoring, and obtain required samples of incoming materials for testing.
- Perform construction monitoring and in situ tests as specified and at the frequencies required.
- Collect samples in the field for subsequent testing by on-site or off-site laboratories.
- Report non-conformance, as appropriate, to the Contractor's representatives, if correction can be made during the normal course of work.
- Report non-conformance to the County, if correction cannot be readily achieved to the satisfaction of the QA/QC Consultant, so that resolution can be accomplished by the County.
- Report to the County any activities which are adverse to overall quality and any non-conformance which are recurring, even though resolution is readily achievable.
- Document non-conformance.
- Document the construction monitoring and testing activities and prepare the as-built report.

1.4.6. QA/QC Manager

The QA/QC manager must be a registered civil engineer or certified engineering geologist as stated in Title 27 California Code of Regulations (CCR) §20324. The QA/QC Manager shall serve as the QA/QC Consultant's on-site representative. All QA/QC functions shall be under his direct authority. All coordination, reporting, and issues related to noncompliance will be directed to the QA/QC Manager. In addition, the QA/QC Manager will communicate directly with the Project Manager in all decisions related to potential design and construction changes and any problems that arise during the course of construction.

The QA/QC Manager will be responsible for overall review of observation, sampling, and testing activities for all earthworks and geosynthetic liner including the LCRS work. Specific duties will include the following:

- Review and have knowledge of all Contract Documents.
- Review of all Contractor submittals and design changes.
- Implementation of the QA/QC Plan, including assigning and managing all QA/QC personnel, reviewing all field reports, and providing engineering review of all QA/QC-related issues.
- Serving as the on-site representative of the QA/QC Consultant.
- All QA/QC Monitors will be familiar with the site and the QA/QC requirements for the project.
- Attendance at all QA/QC-related meetings, including pre-construction, progress, and special meetings, as required.
- Participate in the preparation of the As-Built Plans.
- Coordination of all field-testing, sampling, and laboratory testing, and shipping samples to laboratories.
- Review of the results of field and laboratory testing, and the preparation of appropriate recommendations.
- Review of all QA/QC Monitors' daily reports and logs.
- QA/QC Manager is responsible for observations of on-site activities and/or conditions that could jeopardize the quality or function of the construction, and reporting these to the County and QA/QC Consultant.
- Observation and evaluation of all cut slopes that may be impacted by geologic conditions.
- Confirmation of the quality and engineering characteristics of the subgrade or engineered fill used to support compacted engineered fill.
- Confirmation that the constructed earthworks, geosynthetics, and LCRS conform to the requirements of the Contract Documents.
- Preparation of a weekly summary of QA/QC activities.
- QA/QC Manager is responsible to designate a Senior QA/QC Monitor to act on his behalf at the site during his absence and while operations are ongoing.
- Preparation of the final as-built report on the construction of the project.

1.4.7. QA/QC Monitors

The duties of the QA/QC Monitors include monitoring, testing, logging, and documenting all construction operations. The operations to be monitored include (but are not necessarily limited to) the following:

- Material delivery.
- Unloading and on-site transport and storage.
- All placement operations.
- All joining and seaming operations.
- Conditions of sheets as placed.
- Selection of samples for conformance testing by the independent testing laboratory.
- Marking of samples for conformance testing.
- Repair operations.
- Identification of problems or unusual conditions by reference to the surveyor coordinates.

The QA/QC Monitors shall observe and document all earthwork operations to provide a basis for giving an opinion that construction is carried out in conformance with the Contract Documents. Their duties will include (but are not necessarily limited to) the following tasks:

- Verification of preparation and condition of soil subgrade, including over excavation and replacement with engineered fill.
- Verification that engineered fill is derived from approved sources.
- Visual confirmations that the physical soil properties are consistent with the Contract Documents.
- Identification of deleterious materials or other deficiencies in soil quality and taking action to prevent such materials from being incorporated within compacted engineered fill or permeable layers of the project.
- Monitoring of lift thickness of compacted earthen materials.
- Verifications that proper moisture conditioning and mixing are performed to achieve uniformity of material and compaction requirements.
- Verifications that all oversize material is removed from the native soil or the permeable materials using rock-rakes or screens, and that all clods are broken down to maximum sizes in accordance with the Contract Documents.
- Monitoring construction of the protective soil layer during the contract duration.
- Observation of uniformity and coverage of compaction equipment, especially at edges and turnaround areas.
- Observation of the engineered fill at the beginning of each day, and establishment of requirements for wetting, drying, and/or processing prior to placing additional materials.
- Recover samples for laboratory testing.
- Undertaking of field density tests at the minimum frequencies noted herein, or at any time that a deficiency is suspected.

- Confirmation that the field density and grain size of all compacted engineered fill are in conformance with the Contract Documents and this QA/QC Plan, which will include retests of any previously failed areas.

1.4.8. Surveying

1.4.8.1. Contractor's Surveyors

The responsibilities of the Contractor's Surveyor include the following functions:

- Protection of all primary control points set by the County; any required replacement of these points, due to Contractor negligence, shall be at the Contractor's expense.
- Provision of elevation checks to assure that slopes, elevations, grades, and alignments adhere to the Contract Documents.
- Strict control of the line and grade of subgrade during earthwork operations.
- Perform regular field surveys to provide control, verification, and documentation of the required thickness of various soil layers as shown in the Contract Documents.
- Establishment of secondary control points within the area of work for monitoring of construction progress.
- Completion of As-Built Plan(s) of the constructed surfaces and pipe placements prior to construction of the subsequent layers.
- Placement of cut/fill stakes on slopes, stakes at all pad-slope and slope-bench transitions, and stakes on the perimeters of the earthwork layers.
- Provision for horizontal and vertical location of reference points for geotechnical field testing and sampling.
- Remove all stakes and properly repair all resulting holes in the completed earthwork layers.
- Completion of As-built surveying for the project finished grades.
- Responsibility to immediately report in writing to the Resident Engineer any errors, discrepancies, or omissions that could lead to inaccurate control point placement and seek interpretation or correction prior to proceeding with that portion of work.

1.4.8.2. County Surveyors

The responsibilities of the County Surveyor include the following functions:

- Establishment of primary control points on firm ground, outside the limits of the work, to be used throughout the construction period.
- Verification of the Contractor's work as the County deems appropriate.
- Performance of periodic field surveys to provide a basis for progress payments and for evaluating and documenting that the thicknesses and limits of the earthen layers are consistent with the Contract Documents.

1.4.9. Meetings

Communication between project participants is crucial and includes the exchange of information that allows required reporting and work to proceed. Communications in the form of construction documents, monitoring results, test results, and daily logs must be timely so that reviews and evaluation of construction activities can take place.

In order to assure a high degree of quality during construction, close coordination between County, QA/QC Consultant, Contractor, and subcontractor(s) is essential. To assist in achieving this objective, the following meetings will be held:

1.4.9.1. Pre-Construction Meeting

Before construction begins, a pre-construction meeting will be held and led by the Project Manager. Attendance at the meeting should include: the County's Resident Engineer, QA/QC Consultant, the Contractor's project manager and other representatives such as superintendents and foremen. Representatives of the regulatory agencies may be invited to attend the meeting. Meeting notes shall be prepared by the County and maintained in the on-site records system. Subcontractor personnel shall attend the meeting as appropriate to their scope of work.

Specific items to be considered at this meeting include but are not necessarily limited to the following:

- Distribute relevant documents to all parties.
- Review of the responsibilities of each party.
- Review of lines of authority and communication.
- Review of work area security and safety protocol.
- Review of methods for documenting and reporting, distributing and filing documents and reports, and processing of shop drawing submittals.
- Review of proposed methods of construction.
- Review procedure for change orders.
- Review procedure for applications for progress payments and processing.
- Establish procedures for correcting and documenting construction deficiencies.
- Review project schedule.
- Review work areas, stockpile areas, storage areas, access roads, haul roads, and related items.
- Establish specific date and time for weekly progress meetings

The County will document the meeting, and minutes will be distributed to all parties and to the RWQCB. Additions or corrections to minutes shall be submitted within five working days of receipt.

1.4.9.2. Weekly Progress Meetings

A progress meeting shall be held each week. All parties involved shall agree upon the time and date of the meeting during the pre-construction meeting. At a minimum, the Project Manager, Resident Engineer, the QA/QC Consultant, and the Contractor shall attend these meetings. The purpose of the meetings shall be the following:

- ❑ The previous week's activities and progress will be reviewed. The Contractor shall submit a written report signed by a representative of the Contractor which shall include, but not be limited to, the number of people and major pieces of equipment under his employment, including subcontractors, work accomplished by them, weather conditions, and accidents in the previous week.
- ❑ Test data will be reviewed.
- ❑ Quantities and percentages that indicate the progress of work to date will be discussed and agreed upon. The County's estimate, if different than the Contractor's estimate, shall govern partial payments.
- ❑ Scheduled work activities for the next two weeks shall be discussed. The Contractor shall submit a chart for the schedule of work during this period.
- ❑ Contractor and subcontractor personnel, equipment, and assignments for the next week will be discussed. The Contractor shall submit a written report signed by a representative of the Contractor, that shall include, but not be limited to, the number of people and major pieces of equipment anticipated under his employment, including subcontractors, and their anticipated accomplishments for the next week.
- ❑ Portions of the QA/QC Plan that will be pertinent in the next week shall be discussed.
- ❑ Expected Contractor submittals for upcoming work shall be reviewed.
- ❑ Problems shall be discussed. The Contractor shall submit a written report, signed by a representative of the Contractor, that shall include, but not be limited to, a description of problem areas (recent, current, and anticipated), any resulting delays and their impact, and an explanation of corrective actions taken or proposed. The Resident Engineer shall document the meetings, and minutes shall be distributed to all parties. Additions or corrections to the minutes shall be submitted within five working days of receipt.

1.4.9.3. Quality Resolution Meeting

The County, Contractor, and the QA/QC Consultant may request a special meeting to discuss activities that adversely affect construction quality and to provide resolution. It is intended that these meetings may be called to discuss quality problems which cannot be readily resolved and/or which are ongoing or recurring.

The meeting should:

- ❑ Define and discuss the quality-related problem.
- ❑ Review possible solutions.
- ❑ Implement a plan to resolve the quality-related problem.
- ❑ Establish whether change orders are required.

The Resident Engineer will document the meeting and minutes will be distributed to all parties. Additions or corrections to minutes shall be submitted within five working days of receipt.

1.4.10. Documentation and Record Keeping

To provide evidence of satisfactory work performance, all construction stages of future expansions at Lamb Canyon Sanitary Landfill shall be documented. Information shall be recorded on standardized forms or in a bound field logbook.

1.4.10.1. General

The QA/QC Plan requires thorough monitoring and documentation of all construction activities. Therefore, the QA/QC Consultant shall document that all QA/QC requirements have been addressed and satisfied. To provide evidence of satisfactory work performance, all stages of construction shall be documented.

Documentation shall also consist of daily reports, construction problem reports, photographs, design and specification revisions, weekly progress reports, and a final report of the as-built product, supplemented by documentation from all material manufacturers and suppliers. The documentation is to include copies of manufacturer and supplier specification sheets, certification sheets, shop drawings, transportation tickets, and any other pertinent documents. The information shall be recorded on standardized forms and in a bound field logbook.

1.4.10.2. Daily Reports

The purpose of daily record keeping is to record construction activities, including results of continuous visual observations, laboratory/field test data, repairs, problems, and solutions. The daily record keeping will include a daily field activity log and a daily test summary report, as discussed below.

The daily record keeping shall include a daily field observation report, a daily test summary report, a summary of daily meetings with the Contractor and subcontractors, when applicable, observation and data reports, and construction problem reports.

Daily reports by the Contractor and the QA/QC Consultant must be submitted to the County no later than 10:00 AM of the following working day. This is required to meet RWQCB daily report submittal no later than 12:00 PM.

1.4.10.2.1. Daily Field Observation Reports

The QA/QC Monitor(s) shall keep a daily field observation report of project activities.

1.4.10.2.2. Daily Test Summary Report

A daily Test Summary Report of the field and laboratory tests for the QA/QC of the earthwork, geosynthetics, and the LCRS will be prepared under the direction of the QA/QC Manager. The Daily Test Summary Report will include:

- Locations and results of all field and laboratory tests with comments regarding their pass and/or fail status.
- Results of all retests for failed tests with remarks showing the corrective action before the retest. If retest also shows rejection, final corrective action shall be noted.

1.4.10.2.3. Summary of Daily Meetings

The summary of the daily meetings with the Contractor and subcontractor(s), when applicable, shall include the following:

- Date.
- Project name and location.
- Names of parties attending.
- Scheduled activities.
- Items discussed.
- Signatures.

1.4.10.2.4. Construction Problem Reports

These reports identify and document construction problems and solutions. They are intended to document problems involving significant rework, and are not intended to document problems that are easily corrected, unless the problems are recurring. Each report shall include:

- A detailed description of the problem.
- The location and cause of the problem.
- How the problem was identified.
- A solution to the problem.
- Personnel involved.
- Signatures of the QA/QC Manager, Resident Engineer, and Contractor, as appropriate.

The results of equipment calibration, laboratory analysis, daily field activity logs, daily test summaries, and internal memoranda can be used as portions of the nonconformance report.

1.4.10.3. Weekly Progress Reports

The Resident Engineer shall prepare a weekly progress report. This weekly progress report shall summarize the work activities, deficiencies, and corrective actions implemented. It shall also summarize the QA/QC test results.

1.4.10.4. Photographs

The QA/QC Monitor shall prepare a photographic record as part of the construction control activities.

1.4.10.5. Design and Specification Revisions

If revision to the Contract Documents is required during construction, the QA/QC Consultant shall immediately notify the Project Manager. Revisions to the Contract Documents shall become official only after written approval by the County.

1.4.10.6. As-Built Plans

As the work is completed, the Contractor shall prepare final As-Built Plans and the QA/QC Consultant shall prepare a report. The As-Built Plans and the report shall be submitted by the Contractor and the QA/QC Consultant, respectively, to the County.

In preparation for compiling the final As-Built Plans, interim as-built plans shall be updated daily by the Contractor under the direction of the QA/QC Consultant and the Resident Engineer, and by utilizing the records prepared by the Contractor's Surveyors. The As-Built Plans shall be to scale and show the location and elevation, where applicable, of all materials used in construction.

The final report by the QA/QC Consultant shall include a summary of field and laboratory test results; and photographs showing and narrative describing typical construction conditions and procedures used throughout the entire duration of the project.

1.4.10.7. Final Construction Report

At completion of the work, the QA/QC Consultant shall submit a final construction report to the County. The QA/QC consultant is expected to submit final construction report within one week of construction completion in order not to delay the final approval of the project by the RWQCB.

END OF SECTION

SECTION 2 - EARTHWORK

2.1. ENGINEERED FILL CONSTRUCTION

2.1.1. General

The following earthwork requirements are the minimum requirements applicable to the Contractor's earthwork operations used in the construction of this project. The Contractor must strictly comply with these requirements.

- a. All materials used or placed to construct the required earthwork in the project must meet or exceed the criteria indicated in this QA/QC Plan and the other Contract Documents. The Contractor shall be solely responsible for the completion of all earthwork in strict accordance with all requirements.
- b. Unless otherwise stated in the Contract Documents, equipment used in the excavation, transport, processing, installation and compaction of all materials used in construction of the earthwork part in this project shall be standard of practice grading machinery of known specifications suitable for performing this type of landfill expansion work in a timely, proper, and efficient manner.
- c. All clearing, grubbing, stripping and site preparation for the project shall be accomplished to the satisfaction of the QA/QC Consultant and the County.
- d. All material considered by the QA/QC Consultant to be unsuitable shall be removed and stored as directed by the County. All materials incorporated as part of compacted engineered fill must be inspected and the QA/QC Consultant must observe placement.
- e. Engineered fill shall be placed to achieve final design grades and elevations, and to establish subgrade for geosynthetic liner and surface drainage structures. Generally, on-site soil obtained from within project grading limits may be used for the construction of the compacted engineered fill. Processing may be needed to bring on-site soils into compliance with the project specifications. QC procedures for these materials will include visual verification prior to their use that the materials do not include organic matter, oversize particles, or other deleterious or unsuitable materials. Engineered fill shall meet the following particle size requirements:
 - Within the Liner System Footprint – particle size within the upper two (2) feet of fill shall not exceed 3 inches. Particle size for fill placed below the upper two-foot layer shall not exceed 6 inches. The particle protrusion height within the finished surface shall not exceed 3/8 inch.

- **Outside the Liner System Footprint** – particle size shall not exceed 6 inches.
- f. The ground surface to receive engineered fill shall be prepared to the satisfaction of the QA/QC Consultant and the County; and the engineered fill shall be prepared, placed, spread, mixed, watered and compacted in strict accordance with this QA/QC Plan, Special Provisions, and the other Contract Documents.
- g. Prior to the start of engineered fill work, the existing soils on the ground surface shall be scarified, disced or bladed to a depth of six (6) inches until the soils are uniform and free from uneven features which may prevent uniform compaction. The scarified ground surface shall then be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D1557 (95 percent of the maximum dry density for subgrade at the following locations: 1) the toe berm at the southerly limit of liner area, and 2) basin embankment at the southerly limit of the project). If the scarified depth is greater than 12 inches, the excess shall be removed and placed in lifts of six to eight inches in thickness. Prior to placement of engineered fill, the ground surface to receive engineered fill shall be inspected and approved by the County and QA/QC Consultant.
- h. Suitable and sufficient hauling, processing, grading and compaction equipment shall be continuously utilized to handle the amount of engineered fill being generated and placed. Excavation or hauling equipment shall be shut down temporarily in order to allow time for proper preparation, placement, and/or compaction of engineered fill material. Sufficient moisture conditioning equipment shall be provided by the Contractor with due consideration to the type of engineered fill material, rate of placement, and time of year.
- i. Engineered fill material shall be moisture conditioned to 0 to 2 percent above Optimum Moisture Content (or as determined by the QA/QC Consultant) and compacted to a minimum of 90 percent of the maximum dry density, as determined by ASTM D1557 (95 percent of the maximum dry density for fill material used to construct the toe berm and the basin embankment).
- j. The Contractor shall place engineered fill material only in thin lifts with an uncompacted thickness of no greater than eight (8) inches. Each layer shall be spread evenly, thoroughly mixed, and compacted to obtain a near uniform condition in each layer. In areas of excess lift thickness, the Contractor prior to construction of additional lifts must complete re-grading of the surface to the maximum lift thickness.
- k. As determined by the QA/QC Consultant, engineered fill over natural slopes shall be properly keyed into rock or firm material. All transitions shall be stripped of all loose soils prior to placing engineered fill. The engineered fill shall be keyed into the subgrade a minimum of five (5) feet deep at the toe of all engineered fill slopes.

1. Where work is interrupted by heavy rains, engineered fill operations shall not be resumed until observations and field tests by the QA/QC Consultant or County indicate in-place fills and/or materials intended for placement are within the limits specified in the Contract Documents.

2.1.2. Testing & Observation

Construction of all earthworks shall be performed strictly in accordance with the Contract Documents and the QA/QC Plan. Construction shall be continuously observed, routinely sampled, and tested by the QA/QC Consultant to confirm compliance with all applicable requirements.

The testing frequency stated in the following table is a minimum. Additional tests will be conducted by the QA/QC Consultant to retest previously failed areas and at any time that, in the opinion of the QA/QC Consultant, additional testing is required and/or a deficiency is suspected. At the discretion of the QA/QC Consultant, retest of previously failed areas will be performed after sufficient re-working of such areas, to warrant a retest, has been performed by the Contractor. Following re-working of a previously failed area, the QA/QC Consultant will perform retest to verify that the requirements of the Contract Documents are satisfied.

Material properties testing of the soils used as engineered fill shall consist of laboratory moisture-density tests in accordance with ASTM D1557. This test shall be conducted when the material changes, based on visual observation of the soils, and/or based on in-place density test results of the compacted fill.

Laboratory and field-testing of engineered fill material shall be performed at the frequency specified in the following table:

TEST	TEST DESIGNATION	TEST FREQUENCY	Project Minimum Value
Field Testing			
In-place moisture/density (nuclear)	ASTM D2922 and ASTM D3017	Every 1000 cubic yards; a minimum of two per day	90% or 95% per project requirement of Maximum Dry Density and from 0% to 2% above OMC
In-place density and moisture content (sand cone)	ASTM D1556 and ASTM D4643	Every 5,000 cubic yards; a minimum of one per day	90% or 95% per project requirement of Maximum Dry Density and from 0% to 2% above OMC
Visual Soil Classification	ASTM D2488	Continuous	---

Laboratory Testing				
Moisture Relationship	Density	ASTM D1557	One every 15,000 cubic yards; or change of Material	---

2.2. LOW-PERMEABILITY LAYER

2.2.1. General

- a. The construction of the 12-inch-thick low-permeability layer shall be performed in accordance with all of the Contract Documents. The construction of this layer shall be observed and tested by the QA/QC Consultant for conformance with the physical parameters described in the Contract Documents.
- b. Samples of the low-permeability layer shall be taken and tested by the QA/QC Consultant, after screening and processing by the Contractor, in order to verify that material properties are in conformance with the specifications.
- c. The QA/QC Consultant shall observe the processing and compaction operations for the low-permeability layer. Construction testing by the QA/QC Consultant for evaluating the in-place condition of the constructed layer shall be carried out as individual sections are completed. **The frequency of tests presented is considered as the minimum.** Additional tests shall be taken and documented by the QA/QC Consultant for retests and at any time that a deficiency is suspected.
- d. The Contractor shall supply labor and equipment for preparing test areas as requested by the QA/QC Consultant. When material has not been properly processed, moisture-conditioned, or compacted, as determined by observation or verification testing, such material shall be removed or reworked as necessary to obtain the required relative compaction and moisture content, at the sole expense of the Contractor.
- e. All sampling holes used by the QA/QC Consultant for testing, sampling, or observation shall be backfilled by the Contractor with compacted minus 1-inch LPL material. The backfill shall be hand-tamped in 4-inch maximum compacted lifts.
- f. It is the Contractor's responsibility to ensure that proper and uniform moisture content, adequate processing and relative compaction of the entire low-permeability layer is achieved. Verification testing performed by the QA/QC Consultant does not relieve the Contractor of his responsibility to ensure uniform moisture content, processing and relative compaction of the entire low-permeability layer.

2.2.2. Material Properties Testing

The following tests shall be performed to verify the physical properties of the materials used in the low-permeability layer. The minimum frequency of testing is indicated in the following table. The tests shall be performed by an Independent Testing Laboratory, on samples recovered in the field by the QA/QC Consultant.

**TABLE
TEST FREQUENCY FOR LPL MATERIAL**

Test	ASTM Designation	Project Minimum Value	Sampling Frequency	Test Frequency	ASTM Placement and Compaction
Visual Soil Classification	ASTM D2488	---	Continuous	Continuous	Continuous
Particle Size Analysis (with Hydrometer)	ASTM D422	---	1 per 5,000 cu. yds.	5	1 per 2,500 cu. yds. or per material change
Atterberg Limits	ASTM D4318	---	1 per 5,000 cu. yds.	5	1 per 2,500 cu. yds. or per material change
Moisture-Density Relationship	ASTM D1557	---	1 per 5,000 cu. yds.	2	1 per 5,000 cu. yds. or per material change
In-Place Moisture Content (following moisture conditioning)	ASTM D4643 (microwave)	2% to 4% above OMC	1 per 1,000 cu. yds., minimum 2 per day	---	---
In-Place Moisture and Density (Nuclear)	ASTM D2922 ASTM D3017	95% of Maximum Dry Density and from 2% to 4% above OMC	---	10	1 per 500 cu. yds., minimum 2 per day
In-Place Moisture and Density (Sand Cone)	ASTM D1556 ASTM D4643	95% of Maximum Dry Density and from 2% to 4% above OMC	---	5	1 per 5,000 cu. yds., minimum 1 per day
Field Hydraulic Conductivity	BAT™ Test	$\leq 1 \times 10^{-6}$ cm/sec	---	5	1 per 2,500 cu. yds.
Laboratory Hydraulic	ASTM D5084	$\leq 1 \times 10^{-6}$ cm/sec	1 per 5,000 cu. yds.	5	1 per 2,500 cu. yds.

Conductivity					
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When the field tests are performed, no equipment shall be operated close to the test location that could adversely impact the test results.

2.2.3. Acceptance Criteria

2.2.3.1. Moisture Content and Density

If initial test results indicate a density less than the specified percent of maximum dry density (ASTM D1557) or moisture content outside of the specified limits, the area shall be reworked or the material removed. The reworked area must be retested by the QA/QC Consultant to confirm that it meets the density and moisture content requirements.

2.2.3.2. Hydraulic Conductivity

The QA/QC Consultant may require additional hydraulic conductivity tests in areas where the QA/QC Consultant suspects that the low-permeability layer does not meet the specified hydraulic conductivity. Each portion tested for laboratory hydraulic conductivity will also be tested for field hydraulic conductivity using the BAT™ test close to the laboratory test sample location. BAT™ tests shall be used as an indicator of whether an area will pass the laboratory tests. In no case shall BAT™ testing of areas be used for final acceptance. If the hydraulic conductivity exceeds 1×10^{-6} cm/sec as defined by ASTM D5084, the area represented by the test will be considered inadequate, and the material will be removed or reprocessed and re-compacted. Acceptance of the reprocessed area will be based on the results of the retest for laboratory permeability.

2.3. COUNTY ACCEPTANCE

The Contractor shall retain full responsibility for all earthwork until formal final acceptance by the County. Conditions for formal final earthwork acceptance (by the County) shall include but not be limited to the following:

- A. The construction of the entire liner expansion system is properly finished and summarized in writing by the QA/QC Consultant.
- B. All required laboratory tests have been completed and summarized in writing by the QA/QC Consultant.
- C. All record drawings to be used in the drafting of the final As-Built Plans have been completed.
- D. All documentation concerning the earthwork is received from the QA/QC Consultant and Contractor and is approved by the County.

END OF SECTION

SECTION 3 - GEOSYNTHETIC CLAY LINER (GCL)

3.1. GENERAL

Prior to shipment of the GCL material, the Contractor shall provide the County and/or the QA/QC Consultant with the GCL manufacturer's QA/QC certifications for each shipment of GCL. The certification shall be signed by a responsible party employed by the manufacturer such as the Production Manager or Technical Service Manager. The QA/QC certifications shall include:

- A. GCL lot and roll numbers (with corresponding shipping information).
- B. Certificates of analysis for the bentonite used in GCL production.
- C. Manufacturer's test data for raw materials used in GCL production.
- D. Manufacturer's test data for finished GCL product.

The County and the QA/QC Consultant will arrange for a meeting with the Contractor prior to the installation of the GCL. Topics for review/discussion shall include, as a minimum, Project Drawings and specifications, approved submittals, and training and qualifications for lining (sub) Contractor's personnel.

The manufacturer shall provide technical supervision and assistance as necessary during the installation of the GCL material. After the installation of the material, the Contractor shall submit to the County written certification that the GCL was installed in accordance with the GCL manufacturer's recommendations, project specifications and drawings and approved submittals.

3.2. GCL MANUFACTURING

The Contractor shall provide the County and the QA/QC Consultant with the following Manufacturer's literature:

- A. Materials' specification sheet listing all specified properties measured using test methods indicated in the Special Provisions and other Contract Documents
- B. The sampling procedure and results of testing
- C. A certification that property values given in the materials specification sheet are guaranteed by the Geosynthetics Manufacturer

The QA/QC Consultant shall verify the following:

- A. The property values certified by the Geosynthetic Clay Liner (GCL) manufacturer meet

all of the specifications

- B. The measurements of properties by the Geosynthetic Clay Liner (GCL) manufacturer are properly documented and the test methods used are acceptable
- C. Verify that the quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it
- D. Review the quality control certificates and verify that the certified roll properties meet the specifications.

3.3. GCL DELIVERY

3.3.1. Transportation and Handling

Transportation of the Geosynthetic Clay Liner (GCL) and all handling on-site is the responsibility of the Contractor.

The QA/QC Monitor shall verify the following:

- a. The Geosynthetic Clay Liner (GCL) has been protected from ultraviolet light exposure, precipitation, or any other damaging conditions
- b. Equipment used to unload the rolls does not damage the Geosynthetic Clay Liner (GCL)
- c. Care is used to unload the rolls
- d. All required documentation has been received

Upon delivery at the site, the Geosynthetics Subcontractor and QA/QC Monitor shall conduct a surface observation of all rolls for defects and for damage. This observation shall be conducted without unrolling rolls unless defects or damages are found or suspected. The QA/QC Manager shall advise the County if any rolls, or portions thereof, should be rejected and removed from the site because they have severe flaws.

Any damaged rolls shall be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the County. All rolls that do not have proper Geosynthetic Clay Liner (GCL) manufacturer's documentation shall also be stored at a separate location until all documentation have been received and approved. The QA/QC Monitors shall maintain a log on the Geosynthetic Clay Liner (GCL) received.

3.3.2. Storage

The Contractor and Geosynthetics Subcontractor shall be responsible for the storage of Geosynthetic Clay Liner (GCL) on-site. Storage space should be protected by the Contractor and Geosynthetics Subcontractor from theft, vandalism and damage from vehicles, or from other sources.

The Geosynthetic Clay Liner (GCL) shall be protected from ultraviolet light exposure and from contamination by surface run-off and precipitation. Any Geosynthetic Clay Liner (GCL) so contaminated shall not be used in the construction.

The QA/QC Monitors shall verify that the materials shall not be stored directly on the ground, and that storage of the Geosynthetic Clay Liner (GCL) ensures adequate protection against damage from actions of man, weather, animals, and other sources.

3.4. GCL CONFORMANCE TESTING

3.4.1. Tests

Upon delivery of the rolls of Geosynthetic Clay Liner (GCL), the QA/QC Manager shall verify that samples are removed and forwarded to the Independent Testing Laboratory for testing to ensure conformance to project specifications.

As a minimum, tests to determine the field characteristics shall be performed on the Geosynthetic Clay Liner (GCL) in accordance with the project specifications.

3.4.2. Sampling Procedures

Samples shall be taken by the Geosynthetics Subcontractor in the presence of the QA/QC Monitor.

Samples shall be taken at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of samples.

3.4.3. Test Results

The QA/QC Manager shall document all conformance test results from Independent Testing Laboratory, and shall report any non-conformance to the Contractor and Geosynthetics Subcontractor.

For GCL rolls rejected and replaced with new rolls from a different lot, the Contractor shall be responsible for all costs associated with retesting.

3.5. GCL INSTALLATION

3.5.1. Surface Preparation

The Contractor shall be responsible for preparing the supporting subgrade according to the Special Provisions and as needed by the Geosynthetics Subcontractor.

Prior to installation, the Contractor, Geosynthetics Subcontractor, Resident Engineer, and QA/QC Monitors shall verify that:

- a. All lines and grades have been verified by a qualified surveyor
- b. The supporting surface does not contain stones or other sharp objects that could damage the Geosynthetic Clay Liner (GCL)
- c. No soft areas are present that could result in damage to the Geosynthetic Clay Liner (GCL)
- d. All construction stakes and hubs have been removed and the resulting holes have been properly filled
- e. The Geosynthetics Subcontractor has certified in writing that the surface on which the Geosynthetic Clay Liner (GCL) shall be installed is acceptable

The certificate of acceptance shall be given by the Geosynthetics Subcontractor to the Resident Engineer prior to commencement of Geosynthetic Clay Liner (GCL) installation. The QA/QC Monitor shall have a copy of this certificate before installation of Geosynthetic Clay Liner (GCL) commences in any given area. The subject area shall also be observed by the QA/QC Monitor. The QA/QC Monitor shall have the authority to reject an area even after it has been accepted by the Geosynthetics Subcontractor.

At any time before, during, or after the supporting surface has been accepted, it shall be the Geosynthetics Subcontractor's responsibility to indicate to the QA/QC Monitor any change in the supporting surface condition that may require repair work. The QA/QC Monitor shall also make observations to identify such conditions.

3.5.2. Placement

Field Panel Identification: The Geosynthetics Subcontractor shall provide for County and QA/QC Consultant approval, a Geosynthetic Clay Liner (GCL) panel layout plan before any placement occurs, and it shall be updated daily as the job proceeds. A field panel (sheet) is an area of Geosynthetic Clay Liner (GCL) that is to be placed in the field, such as a roll or a portion of roll cut in the field. The Geosynthetics Subcontractor shall give each field panel an identification code that shall be agreed to and used by the QA/QC Monitors, Resident Engineer, and the Geosynthetics Subcontractor. The QA/QC Monitors shall establish a chart showing correspondence between roll numbers, certification reports, and panel identification

code. The field panel identification code shall be used for all QC records and for the final As-Built Plans.

Field Panel Placement: The QA/QC Monitors shall record the identification code, location, and date of installation of each field panel.

During panel placement, the QA/QC Monitor shall:

- a. Verify that field panels are installed at the location indicated in the layout plan, as approved or modified by the County
- b. Verify that the surface beneath the Geosynthetic Clay Liner (GCL) has not deteriorated since previous acceptance
- c. Verify that the method used to unroll the panels does not cause folds in the Geosynthetic Clay Liner (GCL) and does not damage the supporting surface
- d. Verify that there are no stones, construction debris, or other items beneath the Geosynthetic Clay Liner (GCL) that could cause damage
- e. Observe and document the Geosynthetic Clay Liner (GCL) as it is placed and record all defects; all repairs are to be made in accordance with the Specifications
- f. Verify that equipment used does not damage the Geosynthetic Clay Liner (GCL) or supporting surface by handling, traffic, leakage of hydrocarbons, or by any other means
- g. Verify that people working during installation of Geosynthetic Clay Liner (GCL) do not smoke, wear shoes that could damage the Geosynthetic Clay Liner (GCL), or engage in activities that could damage the Geosynthetic Clay Liner (GCL)
- h. Verify that the Geosynthetic Clay Liner (GCL)s is properly anchored to prevent movement by the wind, and record the procedure used (Securing pins are unacceptable)
- i. Verify that the adjacent panels of Geosynthetic Clay Liner (GCL) are overlapped a minimum of twelve-inches (12") on side slopes and six-inches (6") on canyon floor area.
- j. Verify that the direct contact with the GCL is minimized when placing the Geosynthetic Clay Liner (GCL); i.e., the GCL is protected by suitable materials as approved by the Resident Engineer in areas where excessive traffic may be expected
- k. Verify that the Geosynthetic Clay Liner (GCL) is cut only with an approved

Geosynthetic Clay Liner (GCL) cutter, and is not torn or ripped

The QA/QC Monitors shall inform the Geosynthetics Subcontractor, the QA/QC Manager, and the Resident Engineer if the above conditions are not met. The QA/QC Monitor shall observe and document the condition of each panel after placement. The QA/QC Monitors shall advise the QA/QC Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked, and their removal from the work area shall be recorded by the QA/QC Monitors. A Geosynthetic Clay Liner (GCL) panel replacement log shall be maintained by the QA/QC Monitors.

3.5.3. Repairs

Each repaired area shall be documented and located by the QA/QC Monitor for the final As-Built Plans.

3.6. COUNTY ACCEPTANCE

The Contractor shall retain all ownership and responsibility for the Geosynthetic Clay Liner (GCL) until acceptance by County. The Geosynthetic Clay Liner (GCL) shall be accepted by the County when:

- A. The installation is finished and summarized in writing by the QA/QC Consultant
- B. All construction and materials mentioned in this section have been completed and tested, as appropriate, and summarized in writing by the QA/QC Consultant
- C. All required manufacturer's and supplier's documentation have been received and summarized in writing by the QA/QC Consultant
- D. All record drawings to be used in the drafting of the final As-Built Plans have been completed and summarized in writing by the QA/QC Consultant
- E. The GCL is permanently covered
- F. All above documentation and any additional documentation concerning the items mentioned in this section are received from the QA/QC Consultant and Contractor, and are approved by the County.

END OF SECTION

SECTION 4 - FLEXIBLE MEMBRANE LINER (FML)

4.1. FML MANUFACTURING

The Contractor shall provide the County and/or QA/QC Consultant with the FML manufacturer's QA/QC certifications for each shipment of FML. The certification shall be signed by a responsible party employed by the manufacturer such as the Production Manager, or Technical Services Manager. The QA/QC certifications shall include:

- A. FML lot and roll numbers (with corresponding shipping information)
- B. Manufacturer's test data for the FML product, including all test data for all conformance specifications required by the project specification.

The manufacturer shall provide on-site technical supervision and assistance as necessary during the installation of the FML material. The FML manufacturer and the Contractor, as applicable to each, shall submit for approval by the County the written certification that the FML was installed in accordance with the FML manufacturer's recommendations, project specifications, drawings and approved submittals.

The Contractor shall make arrangements with the FML manufacturer, if requested by the County and/or QA/QC Consultant, to allow the County and/or QA/QC Consultant to visit the manufacturing facility during manufacture of the FML material(s) for this project to observe manufacturing methods and quality control of manufactured materials.

The County and the QA/QC Consultant will arrange for a pre-installation meeting with the FML installation Contractor prior to the installation of the FML. Topics for review/discussion shall include, as a minimum, Project Drawings and specifications, approved submittals, training and qualification procedures for the lining (sub) Contractor's personnel, and demonstration of making field weld(s).

Prior to installation of the FML, a site inspection shall be conducted by the QA/QC Manager and the Contractor to verify measurements and surface conditions to receive the FML.

The Contractor shall provide the County with the following manufacturer's literature:

- A. Materials' specification sheet including all specified properties measured using test methods indicated in the specifications, or equivalent
- B. The sampling procedure and results of testing
- C. A certification that property values given in the materials specification sheet are guaranteed by the FML manufacturer

The QA/QC Consultant shall verify that:

- A. The property values certified by the manufacturer meet all of the project specifications
- B. The actual test results performed at the manufacturer's Quality Control Laboratory meet all of the project specifications

Prior to shipment, the FML manufacturer shall provide the County and the QA/QC Consultant with a quality control certificate for each roll of FML. The quality control certificate shall be signed by a responsible person employed by the manufacturer. The quality control certificate shall include:

- A. Lot and roll numbers and identification
- B. Sampling procedures and results of quality control tests; at a minimum, results shall be given for thickness, density, carbon black content, and tensile characteristics, evaluated in accordance with the methods indicated in the specifications or by equivalent methods approved by the QA/QC Consultant and the County

The QA/QC Consultant shall:

- A. Verify that the quality control certificates have been provided at the specified frequency for all rolls and that each certificate identifies the rolls related to it
- B. Review the quality control certificates and verify that the certified Minimum Average Roll Values (MARV) meet the project specifications.

4.2. FML DELIVERY

4.2.1. Transportation and Handling

Transportation of the FML is and all handling on site is the responsibility of the Contractor.

The QA/QC Consultant shall verify the following items:

- a. Handling equipment used on the site is adequate and does not pose any risk of damage to the FML
- b. The Geosynthetics Subcontractor's personnel handle the FML with care
- c. All documentation required by the Specifications has been received

Upon delivery at the site, the Geosynthetics Subcontractor and the QA/QC Monitor shall conduct a surface observation of all the rolls for defects and for damage. This shall be conducted without unrolling the rolls unless defects or damages are found or suspected. The QA/QC Consultant shall report to the County the rolls, or portions thereof, that should be rejected and removed from the site because they have severe flaws.

Any damaged rolls shall be rejected and removed from the site or stored at a location, separate from accepted rolls, that is designated by the County. All rolls that do not have proper manufacturer's documentation shall also be stored at a separate location until all documentation has been received and approved. An updated log on the FML received shall be maintained by the QA/QC Monitors.

4.2.2. Storage

The Contractor and Geosynthetics Subcontractor shall be responsible for the storage of the FML on site. The County shall provide storage space in one or several locations such that on-site transportation and handling are minimized. Storage space should be protected by the Contractor and Geosynthetics Subcontractor from theft, vandalism, damage from vehicles, or other harm. The QA/QC Monitors shall verify that the materials shall not be stored directly on the ground, and that storage of the FML ensures adequate protection against damage from actions of man, weather, animals, and other sources.

4.3. FML CONFORMANCE TESTING

4.3.1. Tests

Upon delivery of the rolls of FML, the QA/QC Manager shall ensure that samples are removed and forwarded to the independent testing laboratory for testing to ensure conformance to the project specifications.

As a minimum, tests to determine the field characteristics shall be performed on the Flexible Membrane Liner (FML) in accordance with the project specifications.

For each Liner System 1, 2, 3, and 4, interface shear strength conformance test shall be performed in accordance with the requirements set forth in Section 8 of the Special Provisions. Where optional procedures are noted in the test method, the requirements of the Special Provisions shall prevail.

4.3.2. Sampling Procedures

Unless otherwise specified, samples shall be taken at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of tests.

4.3.3. Test Results

The QA/QC Manager shall document all conformance-testing results from Independent Testing Laboratory and shall report any non-conformance to the Contractor and Geosynthetics sub-contractor.

For FML rolls rejected and replaced with new rolls from a different lot, the Contractor shall be responsible for all costs associated with retesting of new rolls.

4.4. FML INSTALLATION

4.4.1. Earthwork

Surface Preparation: The Contractor shall be responsible for preparing the supporting subgrade according to Special Provisions and as needed by the Geosynthetics Subcontractor.

Prior to the FML installation, the Contractor, Geosynthetics Subcontractor installer, Resident Engineer, and QA/QC Monitor shall verify that:

- a. All lines and grades have been checked by survey
- b. The subgrade for the lower FML layer for the bottom floor liner system has been prepared in accordance with the Special Provisions and the Geosynthetics Subcontractor's requirements
- c. The surface has been rolled and compacted to be free of surface irregularities, loose soil, and protrusions, and a geotextile, if specified, has been installed
- d. The supporting surface does not contain stones that could damage the FML
- e. There are no soft areas that could result in FML damage
- f. All construction stakes and hubs have been removed, and any holes properly filled
- g. The Geosynthetic Subcontractor has certified in writing that the surface on which the FML will be installed is acceptable

The certificate of acceptance shall be given by the Geosynthetics Subcontractor to the County prior to commencement of FML installation in the area under consideration. The QA/QC Monitors shall have a copy of this certificate before installation of FML commences in any given area. The subject area will also be observed by the QA/QC Monitors. The QA/QC Monitor shall have the authority to reject an area even after it has been accepted by the Geosynthetics Subcontractor.

After the supporting surface has been accepted by the Geosynthetics Subcontractor, it shall be the Geosynthetics Subcontractor's responsibility to indicate to the QA/QC Monitor any change in the supporting surface condition that may require repair work. If the QA/QC Monitor concurs with the Geosynthetics Subcontractor, then the QA/QC Monitor shall coordinate the repair of the supporting surface. At any time before, during or after the FML installation, the QA/QC Monitor shall indicate locations that may not provide adequate support to the FML to the Resident Engineer.

Anchor Trench: Care shall be taken when backfilling the trenches to prevent any damage to the geosynthetics. The QA/QC Monitors shall observe the backfilling operation and advise the QA/QC Manager of any problems.

4.4.2. FML Placement

Field Panel Identification: The QA/QC Monitors shall establish a chart showing correspondence between roll numbers, certification reports, and panel identification code. The field panel identification code shall be used for all QC records and for the final As-Built Plans.

Field Panel Placement: The QA/QC Monitors shall record the identification code, location, and date of installation of each field panel.

During panel placement, the QA/QC Monitors shall:

- a. Verify that field panels are installed at the location indicated in the layout plan, as approved or modified by the County
- b. Observe the panel surface as it is deployed and record all panel defects and disposition of the defects; all repairs are to be made in accordance with the specifications
- c. Observe that equipment used does not damage the FML by handling, trafficking, leaking hydrocarbons, or by any other means
- d. Verify that the surface beneath the FML has not deteriorated since previous acceptance by the Geosynthetics Subcontractor
- e. Verify there are no stones, construction debris, or other items beneath the FML that could cause damage
- f. Observe that the FML is not dragged across an unprepared surface; if the FML is dragged across an unprepared surface, it shall be inspected for texture damage and scratches and repaired or rejected as necessary
- g. Verify that the method used to unroll the panels does not cause scratches or harmful wrinkles in the FML and does not damage the supporting soil
- h. Record weather conditions including temperature, wind, and humidity; the FML shall not be deployed in the presence of excessive moisture, such as fog, dew, or mist; or in high winds and extreme temperatures, as determined by Contractor and approved by the County
- i. Verify that people working during the installation of FML do not smoke, wear shoes that could damage the FML, or engage in activities that could damage the

FML

- j. Verify that the method used to deploy the panel eliminates wrinkles and that the panels are anchored to prevent movement by wind
- k. Verify that direct contact with the FML is limited to the lowest practicable level; i.e., the FML is protected by geotextiles, extra FML, or other suitable materials in areas where traffic may be expected

The QA/QC Monitors shall inform the Geosynthetics Subcontractor, and the QA/QC Manager, if the above conditions are not met.

The QA/QC Monitors shall observe each panel for damage after placement and prior to seaming. The QA/QC Monitors shall advise the QA/QC Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked, and the QA/QC Monitors shall record their removal from the work area. The QA/QC Monitors will maintain an updated FML panel replacement log.

4.4.3. Field Seaming

The Geosynthetics Subcontractor shall update the layout plan daily as the job proceeds. Prior to seaming, each welding and seaming apparatus shall be tested in accordance with the specifications to determine if the equipment is functioning properly. The QA/QC Monitors shall observe all trial welding operations and record the results. If at any time the QA/QC Monitor observes an operator or seaming apparatus not functioning properly, a test shall be performed on a trial weld. If there are significant changes in temperature, humidity, wind speed or if there is an operational shut down, the trial weld test shall be repeated. Laboratory tests may be carried out at the discretion of the QA/QC Monitors to verify field test results.

During seaming operations the QA/QC Monitors shall verify that:

- a. The Geosynthetics Subcontractor has the number of seamers and spare parts agreed to in the pre-construction meeting
- b. Equipment used for seaming will not damage the FML
- c. The extrusion welder is purged prior to beginning a seam until all the heat-degraded extrudate is removed (extrusion welding only)
- d. Seam grinding has been completed less than one hour before seam welding (extrusion welding only)
- e. The ambient temperature measured 6 inches above the FML surface is between 40 and 104 degrees Fahrenheit and relative humidity is less than 80%

- f. The end of old welds more than 5 minutes old are ground to expose new material before restarting a weld (extrusion welding only)
- g. The weld is free of dust and other debris
- h. For intersecting T seams, the first seam is ground to a smooth incline prior to welding
- i. The seams are overlapped a minimum of 4 inches
- j. No solvents or adhesives or free moisture are present in the seam area
- k. The procedure used to temporarily hold the panels together does not damage the panels and does not preclude QA testing
- l. The panels are being seamed in accordance with the Project Drawings and Specifications or the manufacturers' instructions, using approved proper equipment with gauges giving applicable temperatures
- m. The electric generator is placed on a smooth base such that no damage occurs to the FML
- n. A smooth insulating plate or fabric is placed beneath the hot welding apparatus after usage
- o. The welded FML is protected from damage in heavily trafficked areas

The QA/QC Monitors shall log all appropriate temperatures and conditions, and shall log and report to the QA/QC Manager any instances of noncompliance.

Trial Seam Samples: Samples of trial seams are not removed from installed seams, but are made along side the seaming work area by the Geosynthetics Subcontractor using the same FML sheet and the same installation procedures as for the FML installation itself. As such, they are **nondestructive samples**. Trial seams shall be made on fragment pieces of FML to verify that seaming conditions are adequate. Such trial seams shall be made at the beginning of each seaming period; which will include the start of day, mid-day, and any time equipment is shut down or seaming operation is suspended more than ½ hour for each seaming equipment used that day. Also, each seamer shall make at least one trial seam each day. Trial seams shall be made under the same conditions as actual seams.

The trial seam sample shall be at least 3 feet long. Trial seam sample width shall be 1 foot plus a seam-width, after seaming with the seam centered lengthwise. The seam overlap shall be as per the specifications.

Two specimens, each 1-inch wide, from opposite ends of the trial seam, shall be cut from the trial seam sample by the Geosynthetics Subcontractor. The Subcontractor using a field

tensiometer shall test the specimens respectively in shear and peel. They shall not fail in the seam, and shall satisfy peel and tensile strength requirements. If a specimen fails, the seaming equipment and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful trial welds are achieved. After completing a successful trial nondestructive sample, the Subcontractor shall cut a 2-foot square remnant from the sample and mark the welder number, date, time, ambient temperature, welder temperature, and speed, and shall submit it to the QA/QC Monitor, who will assign an identification number and enter the information on the nondestructive sample form. The QA/QC Monitors shall document the results of field tests carried out on trial seams.

General Seaming Procedure: Unless otherwise specified, the general seaming procedure to be used by the Geosynthetics Subcontractor shall be as follows:

"Fishmouths" or wrinkles at seam overlaps shall be cut along the ridge of the wrinkle in order to achieve a flat overlap. The cut "fishmouths" or wrinkles shall be seamed, and any portion where the overlap is inadequate shall then be patched with an oval or round patch of the same FML extending a minimum of 6 inches beyond the cut in all directions. All corners of the patch shall be rounded with a one-inch minimum radius.

Panel seaming shall extend the full width of all panels, including material placed in the anchor trench.

Panels shall be planned to eliminate the need for cross seams. All intersecting T seams shall be offset at least two feet, and shall be extrusion-welded where they intersect.

The QA/QC Monitors shall verify that the above seaming procedures are followed, and shall inform the QA/QC Manager if they are not.

4.5. FML CONSTRUCTION TESTING

4.5.1. Nondestructive Seam Testing

The Geosynthetics Subcontractor shall perform nondestructive testing on all field seams over their full length using a vacuum test unit, or a spark detector, as applicable. All testing shall be conducted in the presence of the QA/QC Monitor. The area to be tested shall be cleaned of all dust, debris, dirt, and other foreign matter. **The purpose of nondestructive tests is to check the continuity of seams; they do not provide information on seam strength.** Continuity testing shall be carried out as the seaming work progresses, not at the completion of all field seaming. The equipment shall be used for its applicable purpose in accordance with the equipment manufacturer's instructions. Defective and questionable sections shall be clearly marked and repaired as necessary.

For the nondestructive seam testing, the QA/QC Monitor shall:

- a. Observe and record all continuity testing and field testing of trial seams
- b. Record the location of seam and panel number, date, time, equipment number, QA/QC Monitor, test number, technician's name, weld, sheet and ambient temperatures, and results of all testing
- c. Mark the failed areas with a waterproof marker compatible with the lining and inform the Contractor, and Geosynthetics Subcontractor of any required repairs
- d. Verify that all testing is completed in accordance with the Specifications
- e. Verify that all repairs are completed and tested in accordance with the specifications

4.5.2. Destructive Seam Testing

4.5.2.1. General

Destructive seam tests shall be performed at selected locations on the side slope FML liner and the upper FML of the bottom floor liner. No destructive testing will be performed on the lower FML of the bottom floor liner that acts as a moisture barrier. **The purpose of these tests is to evaluate seam strength.** Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming.

Destructive sampling involves samples removed from the installed field seams by the Geosynthetics Subcontractor. Test locations shall be determined at the discretion of the QA/QC Monitors, and the Subcontractor shall not be informed in advance of the locations where the seam samples will be made or will be removed. A minimum of one destructive sample per 500 feet of field seam shall be made. This is a minimum frequency for the entire installation. Frequency of samples may be increased based on performance and as determined by the QA/QC Manager.

Additional samples may be removed if the QA/QC Monitor suspects a seam may not meet project specification requirements.

4.5.2.2. Sampling Procedures

Samples shall be made or removed by the Geosynthetic Subcontractor at locations selected by the QA/QC Monitors as the seaming operation progresses. The QA/QC Monitor shall:

- a. Observe the making or removal of samples

- b. Mark each sample with an identifying number that contains the seam number; for nondestructive samples, the seam number welded just prior to making a sample will be marked on the sample; for destructive samples, record sample location on the panel layout drawing and enter the information on a log form
- c. Record the sample location, weather conditions, and reason sample was made or taken, such as random sample, visual appearance, or the result of a previous failure
- d. Mark sample identifying number on FML adjacent to the location where sample was taken

All holes in the FML resulting from destructive seam sampling shall be immediately repaired in accordance with repair procedures described herein. The continuity of the new seams in the repaired area shall be tested according to procedures described herein.

4.5.2.3. Size of Samples

The samples shall have a length of 38 inches and a width of 12 inches plus seam width. Two different types of destructive samples shall be made from this large sample. The first type is two small samples for field-testing. Each of these samples shall be one inch in length with a width of 12 inches plus seam width and shall be taken at opposite ends of the sample. The seam shall be centered parallel to the length.

The second type is the sample designated for laboratory testing that is the portion of seam located between the two small field test samples. The sample for laboratory testing shall be 36 inches long with a width of 12 inches plus seam width. The seam shall be centered parallel to the length. If the field tests on the two 1-inch-long samples pass, the samples for laboratory testing shall be cut into three equal parts and be distributed as follows:

- a. One part to the independent testing laboratory for testing
- b. One part to the geosynthetics subcontractor
- c. One part to the County for archive storage

4.5.2.4. Field Testing

The two 1-inch-wide samples shall be tested in the field for peel adhesion and bonded seam strength (shear) by the Geosynthetics Subcontractor, and shall not fail in the seam, but shall have a film tearing bond. If one or both of the samples fails in either peel or shear, the Geosynthetics Subcontractor can, at his discretion, reconstruct or cap strip the seam between passed test locations, or takes another test sample ten feet from the point of the failed test and repeat this procedure. If the second test passes, the Geosynthetics Subcontractor can either reconstruct or cap strip the seam between the two passed test locations. If subsequent tests fail, the length of seam between passed tests shall be capped as required in the specifications.

Repeated failures indicate that either the seaming equipment or the operator is not performing properly and appropriate action shall be taken.

All specimens of a field weld sample tested by the Contractor in the field shall pass. If any specimen fails, the entire sample shall be considered as a failure, and the field weld shall be rejected. In this event, the field seams(s) shall be rejected as being not in conformance with the specifications, and corrective measures shall be implemented.

4.5.3. Laboratory Testing

Once the field tests have passed, a sample will be recovered from between passing field sample locations for testing by the independent testing laboratory. Destructive test samples will be packaged and shipped to the laboratory on the same day the sample is made or removed by the QA/QC Monitors in a manner that will not damage the test sample. The County will be responsible for storing the archive samples.

All destructive field seam specimens tested by the independent testing laboratory (sets of five test specimens are performed) shall allow for one failure out of five tested and the rest shall pass. If two specimens out of five fails, the entire sample shall be considered as a failure, and the field weld(s) performed by the same welding equipment between adjacent destructive samples on either side of the failed sample shall be considered to not be in conformance with the Specifications.

New test samples shall be taken 10 feet on both sides of the failed destructive sample and they shall be tested using the same procedures outlined above. If these new test samples PASS, the weld need only be reconstructed or capped between the 2 passing tests. If either of these new test samples FAIL, the iterative process of sampling as outlined above is repeated until passing test results are observed. In this case, the entire seam between the two successful test samples shall be capped or reconstructed. If capping a field seam is required, the Contractor shall use a cover strip of the same material (and from the same roll if available) and a minimum of 8" in width. The cap strip shall be extrusion welded and tested as required for extrusion welding. In cases involving more than 50 feet of reconstructed or capped seam, the cap-strip seam shall also be tested. In no case shall field-testing of installed seams be used for final acceptance.

Testing shall include peel adhesion and bonded seam strength (shear) (ASTM D4545). At least five specimens each shall be tested for peel and shear. Minimum test values shall be in accordance with the project specifications. The independent testing laboratory shall provide test results within 24 hours after receipt of samples for testing. Certified test results shall be provided within five days. The QA/QC Monitor shall document all test results and shall immediately notify the Geosynthetics Subcontractor in the event of a failed test.

4.6. DEFECTS AND REPAIRS

4.6.1. Identification

All seams and non-seam areas of the FML shall be examined by the QA/QC Monitors for identification of defects, holes, blisters, un-dispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the FML helps to detect defects, the surface of the FML shall be clean at the time of examination. The Geosynthetics Subcontractor shall clean the FML surface if the amount of dust or mud inhibits examination.

Each suspect location both in seam and non-seam areas shall be tested using the methods described herein, as appropriate. Each location that fails nondestructive testing shall be marked by the QA/QC Monitor, and then repaired and retested by the Geosynthetics Subcontractor. Work shall not proceed with any materials that will cover locations that have been repaired until laboratory test results with passing values have been obtained.

4.6.2. Repair Procedures

Any portion of the FML with a flaw or that fails a nondestructive or destructive test shall be repaired in accordance with the Specifications. The QA/QC Monitor shall locate and describe all repairs on the appropriate forms. Repair procedures include the following:

- a. Patching: used to repair large holes, tears, large panel defects, and destructive sample locations that are less than 25 square feet in total area
- b. Extrusion: used to repair small defects in the panels and seams
- c. Capping: used to repair failed welds or to cover seams where welds cannot be nondestructively tested
- d. Removal: used to replace areas with large defects where the preceding methods are not appropriate; also used to remove excess material, such as wrinkles, from the installed FML

4.7. SEAM TEST SUMMARY

The QA/QC Manager shall summarize documentation of all nondestructive and destructive seam-testing results, including repairs.

4.8. WRINKLES

Temperature changes or creep may cause wrinkles to develop in the FML. Any wrinkles that can fold over during placement of overlying materials (geotextile, drainage gravel, and protective cover soil) will be repaired either by cutting out excess material, or, if possible, allowing the FML to contract due to temperature reduction. In no case shall material be placed over the FML that could result in the FML folding. All folded FML shall be removed. No material shall be placed in areas where FML is not in contact with the supporting subgrade or GCL.

4.9. COUNTY ACCEPTANCE

The Contractor shall retain all ownership and responsibility for the FML until acceptance by County. The FML shall be accepted by the County when:

- A. The installation of the FML, other geosynthetic materials, drainage layer, and protective cover is finished and summarized in writing by the QA/QC Manager
- B. All seams have been observed, tested, and summarized in writing by the QA/QC Manager
- C. All required laboratory tests have been completed and summarized in writing by the QA/QC Manager
- D. All required Geosynthetics Subcontractor supplied documentation has been received and summarized in writing by the QA/QC Manager
- E. All record drawings to be used in the preparation of the final As-Built Plans have been completed and summarized in writing by the QA/QC Manager
- F. All above documentation and any additional documentation concerning the FML is received from the QA/QC Manager and Contractor, and is approved by the County.

END OF SECTION

SECTION 5 - GEOTEXTILES

The Quality Control Plan to be implemented for the work by the Geotextile manufacturer, the Contractor and/or the geosynthetics subcontractor shall be in accordance with this QA/QC Plan.

The County and the QA/QC Consultant will arrange for a pre-installation meeting with the Contractor prior to installation of the geotextile. Topics for review/discussion shall include, as a minimum, project plans and specification, QA/QC procedures, approved submittals, and a demonstration of a sewn field seam using the same materials, equipment and procedures specified for the geotextile.

5.1. MANUFACTURING

The Geotextile manufacturer shall provide the QA/QC Manager with the following manufacturer's literature:

- A. A materials specification sheet including all specified properties measured using test methods indicated in the specifications, or the equivalent
- B. The sampling procedure and results of testing
- C. A certification that property values given in the materials specification sheet are guaranteed by the Geosynthetics manufacturer

The QA/QC Manager shall verify in writing that:

- A. The property values certified by the Geotextile manufacturer meet all of the project specifications
- B. The measurements of properties by the Geotextile Manufacturer are properly documented and the test methods used are acceptable

Prior to shipment, the Geotextile manufacturer shall provide the QA/QC Manager with a quality control certificate for each roll of geotextile. A responsible person employed by the Geotextile manufacturer shall sign the quality control certificate. The quality control certificate shall include:

- A. Lot and roll numbers and identification
- B. Sampling procedures and results of quality control tests evaluated in accordance with the methods indicated in the Special Provisions or by equivalent methods approved by the QA/QC Consultant

The QA/QC Consultant shall do the following:

- A. Verify that the quality control certificates have been provided at the specified frequency for all rolls, and that each certificate identifies the rolls related to it
- B. Review the quality control certificates and verify that the certified roll properties meet all project specifications

5.2. DELIVERY

5.2.1. Transportation and Handling

Transportation of the geotextile and all handling on-site is the responsibility of the Contractor.

The QA/QC Monitor shall verify the following:

- a. The geotextile has been protected from ultraviolet light exposure, precipitation, or any other damaging conditions
- b. Equipment used to unload the rolls will not damage the geotextile
- c. Care is used to unload the rolls
- d. All required documentation has been received

Upon delivery at the site, the Geosynthetics Subcontractor and QA/QC Monitors shall conduct a surface observation of rolls for defects and for damage. This observation shall be conducted without unrolling rolls unless defects or damages are found or suspected. The QA/QC Manager shall report to the County if any rolls, or portions thereof, should be rejected and removed from the site because they have severe flaws.

Any damaged rolls shall be rejected and removed from the site or stored at a location, separate from accepted rolls, designated by the Resident Engineer. All rolls that do not have proper Geotextile Manufacturer's documentation shall also be stored at a separate location until all documentation has been received and approved. The QA/QC Monitors shall maintain an updated log on the Geotextile received.

5.2.2. Geotextile Storage

The Contractor and Geosynthetics Subcontractor shall be responsible for the storage of geotextile on-site. The Contractor and Geosynthetics Subcontractor should protect storage space from theft, vandalism, damage from vehicles, or other harm.

The geotextile shall be protected from ultraviolet light exposure and from contamination by surface run-off. Any geotextile so contaminated shall not be used in the construction.

The QA/QC Monitors shall verify that the materials shall not be stored directly on the ground, and that storage of the Geotextile ensures adequate protection against damage from actions of man, weather, animals, and other sources.

5.3. GEOTEXTILE CONFORMANCE TESTING

5.3.1. Tests

Upon delivery of the rolls of geotextile, the QA/AC Manager shall verify that samples are removed and forwarded to the Independent Testing Laboratory for testing to verify conformance to project specifications.

As a minimum, tests to determine the field characteristics shall be in accordance with project specifications.

5.3.2. Sampling Procedures

Unless otherwise specified, samples shall be taken at a rate of one per lot or one per 100,000 square feet, whichever results in the greater number of samples.

5.3.3. Test Results

The QA/QC Manager shall document all conformance test results from Independent Testing Laboratory and shall report any non-conformance to the Contractor and Geosynthetics Sub contractor. For geotextile rolls rejected and replaced with new rolls from a different lot, the Contractor shall be responsible for all costs associated with retesting of new rolls.

5.4. GEOTEXTILE INSTALLATION

5.4.1. Surface Preparation

Prior to installation of geotextile on bottom floor area (over the FML and over the LCRS gravel layer), the Contractor, Geosynthetics Subcontractor, Resident Engineer, and QA/QC Monitors shall verify that:

- a. All lines and grades have been verified by a qualified surveyor
- b. All testing and repairs have been completed and accepted by the QA/QC Consultant
- c. The supporting surface does not contain any oversize particles or other sharp objects that could damage the geotextile

- d. All construction stakes and hubs have been removed and the resulting holes have been properly filled
- e. The Geosynthetics Subcontractor has certified in writing that the surface on which the geotextile shall be installed is acceptable

Prior to installing cushion geotextile on the bottom FML and on the side slopes, the Contractor, Geosynthetics Subcontractor, and QA/QC Monitor shall verify that all installation of FML seaming and repairs has been completed and documented.

The Geosynthetics Subcontractor shall give the certificate of acceptance to the Quality Assurance Manager prior to commencement of geotextile installation for each uncovered portion of FML. The QA/QC Monitors shall have a copy of this certificate before installation of geotextile commences in any given area. The QA/QC Monitors shall also observe the subject area. The QA/QC Monitor shall have the authority to reject an area even after the Geosynthetics Subcontractor has accepted it.

At any time before, during, or after the supporting surface has been accepted, it shall be the Geosynthetics Subcontractor's responsibility to indicate to the County any change in the supporting soil condition that may require repair work. The QA/QC Monitor shall also make observations to identify such conditions.

5.4.2. Geotextile Placement

The QA/QC Monitors shall establish a chart showing correspondence between roll numbers, certification reports, and panel identification code. The field panel identification code shall be used for all QC records and for the As-Built Plans.

Field Panel Placement: The QA/QC Monitors shall record the identification code, location, and date of installation of each field panel.

During panel placement, the QA/QC Monitor shall:

- a. Verify that field panels are installed at the location indicated in the layout plan, as approved or modified by the County
- b. Verify that the surface beneath the geotextile has not deteriorated since previous acceptance
- c. Verify that the method used to unroll the panels does not cause folds in the geotextile and does not damage the supporting surface
- d. Verify that there are no stones, construction debris, or other items beneath the geotextile that could cause damage

- e. Observe and document the geotextile as it is placed and record all defects; all repairs are to be made in accordance with the Specifications
- f. Verify that equipment used does not damage the geotextile or supporting surface by handling, traffic, leakage of hydrocarbons, or by other means
- g. Verify that people working during installation of geotextile do not smoke, wear shoes that could damage the geotextile or liner, or engage in activities that could damage the geotextile or liner
- h. Verify that the geotextiles are properly anchored to prevent movement by the wind, and record the procedure used (Securing pins are unacceptable)
- i. Verify that the adjacent panels of geotextile are overlapped a minimum of 6 inches and properly sewn or welded as required by the Specifications
- j. Verify that the geotextile is cut only with an approved geotextile cutter, and is not torn or ripped

The QA/QC Monitors shall inform the Geosynthetics Subcontractor, the QA/QC Manager, and the Resident Engineer if the above conditions are not met. The QA/QC Monitors shall observe and document the condition of each panel after placement. The QA/QC Monitors shall advise the QA/QC Manager which panels, or portions of panels, should be rejected, repaired, or accepted. Damaged panels or portions of damaged panels that have been rejected shall be marked, and the QA/QC Monitors shall record their removal from the work area. The QA/QC Monitors shall maintain a geotextile panel replacement log.

5.5. COUNTY ACCEPTANCE

The Contractor shall retain all ownership and responsibility for the geotextile until acceptance by the County. The geotextile shall be accepted by the County when:

- A. The installation is finished and summarized in writing by the QA/QC Manager
- B. All construction and materials mentioned in this section have been completed and tested, as appropriate, and summarized in writing by the QA/QC Manager
- C. All required manufacturer's and supplier's documentation has been received and summarized in writing by the QA/QC Manager
- D. All record drawings to be used in the preparation of the final As-Built Plans have been completed and summarized in writing by the QA/QC Manager
- E. All above documentation and any additional documentation concerning the items mentioned in this section is received from the QA/QC Manager and Contractor, and is

approved by the County.

END OF SECTION

SECTION 6 - LEACHATE COLLECTION AND REMOVAL SYSTEM

6.1. LCRS CONSTRUCTION

6.1.1. Piping & Leachate Storage Tank

Piping and leachate tank installations shall be observed and documented by the QA/QC Monitor to verify that the installations are performed in accordance with manufacturer's recommendations and with the requirements of the Contract Documents; and that the grades and locations are consistent with the Contract Documents.

Prior to beginning this construction, the Contractor shall submit to the County descriptive literature about the fusion equipment to be used, and shall submit certification from the pipe installer that the jointing technicians are qualified and experienced in heat fusion joining of specified pipe in accordance with Title 49 CFR 192.285. A minimum of two test joints shall be fused and cut from each pipe size and each SDR prior to beginning of joining that piping system. The test joints shall be visually observed and documented by the QA/QC Monitor and the County in accordance with Title 49 CFR 192.285.

6.1.2. Construction Material

The HDPE pipe and all other construction material suppliers shall provide certification to the County that the delivered materials comply with the pertinent project specifications.

6.1.3. County Acceptance

The Contractor shall retain all ownership and responsibility for the above-mentioned items until final acceptance by the County. The above-mentioned items shall be accepted by the County when:

- a. The installation is finished and approved in writing by the QA/QC Manager
- b. All construction and materials related to this section have been completed and tested appropriately, and approved in writing by the QA/QC Manager
- c. All required manufacturer's and supplier's documentation have been received and approved in writing by the QA/QC Manager
- d. All record drawings to be used in the drafting of the final As-Built Plans have been completed and approved in writing by the QA/QC Manager
- e. All above documentation and any additional documentation concerning the items mentioned in this section have been received from the QA/QC Manager and Contractor, and have been approved by the County.

6.2. DRAINAGE LAYER CONSTRUCTION

6.2.1. General

Drainage gravel shall be placed in accordance with the requirements of all Contract Documents and shall be observed and tested by the QA/QC Consultant. Tests shall be performed at an independent laboratory.

6.2.2. Material Properties Testing

The suppliers of LCRS drainage gravel shall provide laboratory test results showing compliance with material specifications provided in the Contract Documents. In addition, minimum testing by the QA/QC Consultant shall consist of at least two particle-size analyses (C136) and two constant head permeability (ASTM D2434) to be performed on in-plant samples before the material source is approved. In addition, during placement at least one gradation test by C136 and one permeability test by ASTM D2434 per 2,000 cubic yards shall be performed on the in-place drainage gravel.

6.2.3. In-Place Properties Testing

The QA/QC Consultant shall observe Contractor's placement operation of LCRS materials. Judgment of density will be based on visual observation of the construction activities and equipment utilized to perform this work

6.2.4. County Acceptance

The LCRS material not complying with the project specified gradations or permeability shall be rejected. The Contractor shall retain all ownership and responsibility for the drainage layer until final acceptance by the County. The drainage layer shall be accepted by the County when:

- a. The installation is finished and approved in writing by the QA/QC Manager
- b. All required laboratory tests have been completed and approved in writing by the QA/QC Manager
- c. All record drawings to be used in the drafting of the final As-Built Plan have been completed and approved in writing by the QA/QC Manager
- d. All above documentation and any additional documentation (geotextile and pipe conformance documentation) concerning the drainage layer have been received from the QA/QC Manager and Contractor, and have been approved by the County.

END OF SECTION

SECTION 7 - PROTECTIVE SOIL LAYER

The QA/QC procedures indicated in this section are only intended to assure that the preparation and installation of the materials for the protective soil layer are done in such a manner as to assure that the completed underlying geosynthetic layers are not damaged. Protective soil layer shall be prepared and installed in accordance with the requirements of the Contract Documents.

Important points for QC of materials in contact with geosynthetics include the following:

- A. Placement of soils, sand, or other types of earth cover on top of the geotextile shall not be performed until all testing has been performed and accepted, and the liner materials have been surveyed for "as-built" drawings.
- B. Placement shall be performed in a manner to eliminate wrinkles. Equipment operators shall be briefed on method of placement relative to thermal expansion and contraction of the FML.
- C. Soil material placed on top of the geotextile should be stockpiled and pushed off the stockpile to create a cascading effect of the cover material on top of the geosynthetics; or otherwise, be placed with a front-end loader.
- D. Drainage layer and soil from the Protective Soil Layer shall be installed in such a manner that the geosynthetics are not folded or wrinkled by the advancing placement and grading and compaction activities. When placing materials over geosynthetics, materials shall be placed in the direction from the overlying geosynthetics to the underlying geosynthetics.
- E. Equipment used for placing soil shall not be driven directly on the geosynthetics. Track-mounted equipment with low ground pressure treads, or low-pressure tires, no larger than a Caterpillar Model D-6 or equivalent, shall be used for spreading. In no case shall equipment be allowed to operate on less than 12 inches of cover over geosynthetic material. The Contractor shall avoid sharp turns, sudden starts or stops, spinning and digging of tracks, or any other operation that could damage the landfill lining system. At no time shall trucks, or any other vehicle with concentrated wheel loads, be permitted to operate on less than 12 inches of compacted cover material placed above the geosynthetics.
- F. Gradation of the side slope protective soil layer shall be tested by the QA/QC Consultant every 1,000 cubic yards to verify that the material does not contain any oversize particles greater than 1 inch.
- G. Gradation of the bottom floor protective soil layer shall be tested by the QA/QC Consultant every 5,000 cubic yards to verify that the material does not contain any oversize particles greater than 3 inch.

- H. Gradation of the required screened material stockpile shall be tested by the QA/QC Consultant every 2,500 cubic yards to verify that the material does not contain any oversize particles greater than 1 inch.

The QA/QC Monitors shall document if any of the above conditions are not fulfilled and inform the QA/QC Manager and the County of them.

END OF SECTION

SECTION 8 - ASPHALT STRUCTURES

The following asphalt pavement requirements are the minimum requirements applicable to asphalt pavement work for this project. The Contractor must strictly comply with these requirements and all other pertinent requirements of the Contract Documents.

- A. Delivery of material to the job site shall not commence until required project submittals (certificate of compliance, asphalt mix, gradation test report for aggregate base materials, etc.) have been reviewed and approved by the County.
- B. Placement of aggregate base material (where required by the Contract Documents) shall not commence until the subgrade has been examined and tested for compaction by the QA/QC Consultant, and released by the County for the placement of the subsequent layer.
- C. Placement of asphalt pavement shall not commence until the subgrade has been examined and tested for compaction by the QA/QC Consultant, and released by the County.

END OF SECTION

SECTION 9 - REINFORCED CONCRETE STRUCTURES

The QA procedure is intended to assure the final product will achieve, at a minimum, the specified design strength and performance.

The following concrete requirements are the minimum requirements applicable to concrete construction for this project. The Contractor must strictly comply with these requirements and all other pertinent requirements of the Contract Documents.

- A. Placement of concrete shall not commence until required mix designs have been reviewed and approved by the County.
- B. As deemed necessary by the County, sets of three (3) test cylinders of concrete being placed will be cast and tested by the County or the QA/QC consultant. One of the test cylinders will be tested after 7 days for 70 percent of project-specified design strength. The remaining two cylinders will be tested after 14 days and 28 days (for full strength) respectively.

END OF SECTION

SECTION 10 - PROTECTIVE MEMBRANE

10.1. MANUFACTURING

The Contractor shall provide the County and the QA/QC Manager with the following manufacturer's literature from the membrane manufacturer:

- A. A materials specification sheet including all specified properties measured using test methods indicated in the specifications, or the equivalent
- B. The sampling procedure and results of testing
- C. A certification that property values given in the materials specification sheet are guaranteed by the Geosynthetic's manufacturer

The QA/QC Manager shall verify in writing that:

- A. The property values certified by the manufacturer meet all of the project specifications
- B. The measurements of properties by the manufacturer are properly documented and the test methods used are acceptable

Prior to shipment, the Contractor shall provide the County and the QA/QC Manager with a quality control certificate from the manufacturer for the protective membrane. A responsible person employed by the membrane manufacturer shall sign the quality control certificate.

10.2. CONFORMANCE TESTING

No conformance testing on protective membrane shall be required unless determined by the QA/QC Manager based on the review of the manufacturer's data. If conformance tests for some test properties are found necessary, the geosynthetics subcontractor shall arrange for cutting the conformance test samples in the presence of a QA/QC Monitor.

10.3. PROTECTIVE MEMBRANE INSTALLATION

The QA/QC Monitors shall record the location, and date of installation of protective membrane panels.

During protective membrane placement, the QA/QC Monitor shall verify that:

- A. Field panels are installed at the location indicated in the layout plan, as approved or modified by the County
- B. The geotextile underneath has not deteriorated since previous acceptance

- C. All testing and repairs of the underlying geotextile have been completed and the QA/QC Consultant has accepted the geotextile installation
- D. The final seams are properly sewn and the specified minimum overlap between the seamed panels is maintained.
- E. The membrane is properly secured and anchored in the anchor trench at the top and by plywood and sand bags at the toe.
- F. The sand bags and ropes for ballasting are properly installed as shown on the installation plan approved by the County and QA/QC Consultant.
- G. All repairs as directed in the field are completed in the presence of a QA/QC Monitor.

END OF SECTION

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APPENDIX "B"

**Storm Water Pollution Prevention Plan
(SWPPP)**

**(Copy of SWPPP is Included on the Enclosed Compact
Disc)**

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APPENDIX "C"

**Storm Water Pollution Prevention and Hazardous
Materials Management Inspection Forms**

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Storm Water Pollution Prevention & Hazardous Materials Management Construction Site Inspection Checklist

GENERAL INFORMATION			
Project Name	Earthwork Excavation for Future Site Improvements at Lamb Canyon Sanitary Landfill		
Contractor			
Inspector's Name			
Inspector's Title			
Signature			
Date of Inspection			
Inspection Type (Check Applicable)	<input type="checkbox"/> Prior to forecast rain		<input type="checkbox"/> After a rain event
	<input type="checkbox"/> 24-hr intervals during extended rain		<input type="checkbox"/> Other _____
Season (Check Applicable)	<input type="checkbox"/> Rainy		<input type="checkbox"/> Non-Rainy
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (inches)

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Temporary Linear Sediment Barriers				
Are temporary linear sediment barriers properly installed in accordance with the details, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Are fiber rolls installed and maintained on required slopes in accordance with the details, functional and maintained?				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected with either Type 1, 2 or 3 inlet protection?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Desilting Basins				
Are basins maintained to provide the required retention/detention?				

OTHER REQUIREMENTS				
Requirement	Yes	No	N/A	Corrective Action
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 50 ft from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Are points of ingress/egress to public/private roads inspected, swept, and vacuumed daily?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Is rock at Temporary Construction Entrance(s) 12-inches or more in thickness?				
Does sediment need to be removed from the rock, or does the rock need to be replaced?				
For Type 2 Construction Entrance, does sediment need to be removed from ribbed plates?				
Dewatering Operations				
Is dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses, and protected from run-on and runoff?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				

Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 50 ft from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas within the construction limits of the project site collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Illicit Connection/Illegal Discharge Detection and Reporting				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
Discharge Points				
Are discharge points and discharge flows free from noticeable pollutants?				
Are discharge points free of any significant erosion or sediment transport?				
WPCP/SWPPP Update				
Do the WPCP/SWPPP, Project Schedule/Water Pollution Control Schedule and WPCDs adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the WPCDs installed in the proper location(s) and according to the details for the plan?				
General				
Are there any other potential water pollution control concerns at the site?				

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Riverside County Waste Management Department Contractor's Weekly Inspection Form

Contractor Company Name: _____ Inspection Date: _____

Contractor Inspector's Name: _____

Contractor Inspector's Signature: _____

Badlands Blythe Lamb Canyon Mecca II Oasis Headquarters Other: _____

Contractor Hazardous Materials and Waste Storage

Contractor Haz Mat/Waste Storage YES NO N/A

- Are the contractor's hazardous materials stored on site for less than 30 days?
- Has the contractor provided HMBEP information for inclusion in the site Hazardous Materials binder?
- Has the contractor submitted the HMBEP Certification Form to the local CUPA and provided a copy to the Department for inclusion in the site Hazardous Materials binder?
- Has the contractor added inventory sheets for each hazardous material and waste on site in to their Business Emergency Plan?
- Has the contractor submitted maps to the Department showing the location(s) of hazardous material and waste on site?
- Has the contractor provided a training sign-in sheet to the Department for their staff for the complete HMBEP (the Department's HMBEP with the contractor's information included)?

Contractor New Oil Storage Area

- Are all tanks/drums in use stored in secondary containment?
- Are containment dikes, berms, and liners for the tank or drum in satisfactory condition?
- Are containment areas free of standing water or oil?
- Are containment areas free of weeds & debris?
- Are valves used for emptying containment structure secured in the "closed" position?
- Are the New Oil tank fill-valves and drum bungs closed when not in use?
- Are valves free of leakage and in good condition?
- Are there bungs on all drums?
- Are empty drums marked "Empty" and returned to the vendor?
- Are funnels, catch pans, and equipment stored correctly?
- Are all tank gauges/dip sticks operational?
- Are tank placards in place, legible and free of dirt?
- Are drums labeled with proper information and accumulation dates?
- Are NFPA and warning signs posted and in good condition?
- Is the New Oil Storage Area clean?
- Are the grounds around tanks & transfer areas free of leakage?
- Does it appear that spills and absorbent are cleaned up immediately?

Contractor Used Oil Storage Area

- Was the Used Oil Storage Area/tanks locked and secured?
- Are all tanks/drums and containers stored in secondary containment?
- Are containment dikes, berms, and liners for the tank or drum in satisfactory condition?
- Is the containment area free of standing water and oil?
- Are containment areas free of weeds & debris?

Riverside County Waste Management Department Contractor's Weekly Inspection Form

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| Are valves used for emptying containment structure secured in the "closed" position? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the Used Oil tank fill-valves closed and secured when not in use? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are valves free of leakage and in good condition? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are there bungs on all drums? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are funnels, catch pans, and equipment stored correctly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are all tank gauges/dip sticks operational? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the Used Oil Filters drained and stored in correct drum? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are tank placards in place, legible and free of dirt? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are drums labeled with proper information and accumulation dates? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are NFPA and Warning signs posted and in good condition? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the Used Oil tank intact (no signs of leaking)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the Used Oil Storage Area clean? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are the grounds around tanks & transfer areas free of leakage? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Does it appear that spills and absorbent are cleaned up immediately? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| If used oil is stored in tanks, is the current daily inspection form for the tanks being completed daily and located near the used oil storage area? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Has a copy of the last week's Daily Above Ground Storage Tank Inspection Form been placed in the site Hazardous Materials binder in the Fee Building? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Contractor Fueling Area

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| Is the fuel tank intact (not leaking)? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the emergency shut-off switch unobstructed? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are valves used for emptying containment structure secured in the "closed" position? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the spill kit in "ready" mode? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| If diesel is stored in tanks, is the current Daily Above Ground Storage Tank Inspection Form for the tanks being completed daily and located near the used oil storage area? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the Fire Extinguisher available, unobstructed, charged, and current? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Date of last fire extinguisher inspection: _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are NFPA and Warning signs posted and in good condition? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Contractor Heavy Equipment Servicing and Storage Areas

- | | | | |
|--|--------------------------|--------------------------|--------------------------|
| Does it appear that spills and absorbent are cleaned up immediately? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Does equipment show signs of excessive fluid leaking? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are equipment lead acid batteries stored on containment pallets and covered? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are compressed gas cylinders stored and secured properly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are oily/greasy equipment parts stored and covered properly? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Are oily rags stored in properly labeled flammable rag containers? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is the area clean and tidy? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Explain any "NO" or "N/A" responses from above: _____

DO NOT WRITE BELOW THIS LINE – OFFICE USE ONLY

Reviewed By: _____ Date: _____

Riverside County Waste Management Department Daily Above Ground Storage Tank Inspection Form

This inspection form shall be completed by Operations Personnel on a daily basis. The original copy of the completed form shall be placed in the site Hazardous Materials binder where the SPCC plan is located. Any problems found during the inspections shall be reported to the Projects Supervisor.

Badlands Blythe Lamb Canyon Mecca II Oasis Headquarters Other: _____

	Mon.		Tues.		Wed.		Thurs.		Fri.		Sat.		Sun.	
	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
Waste Oil Storage Tank Inspection														
Is there any corrosion or signs of leakage on or around the waste oil tank?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there liquid in the secondary containment structure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there erosion or signs of release from the secondary containment structure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fuel Storage Tank Inspection														
Is there any corrosion or signs of leakage on or around the fuel tank?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there liquid in the secondary containment structure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there erosion or signs of release from the secondary containment structure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Inspected By:														
Inspection Date:														
Explain any "YES" responses from above:														

DO NOT WRITE BELOW THIS LINE – OFFICE USE ONLY

Reviewed By: _____

Date: _____

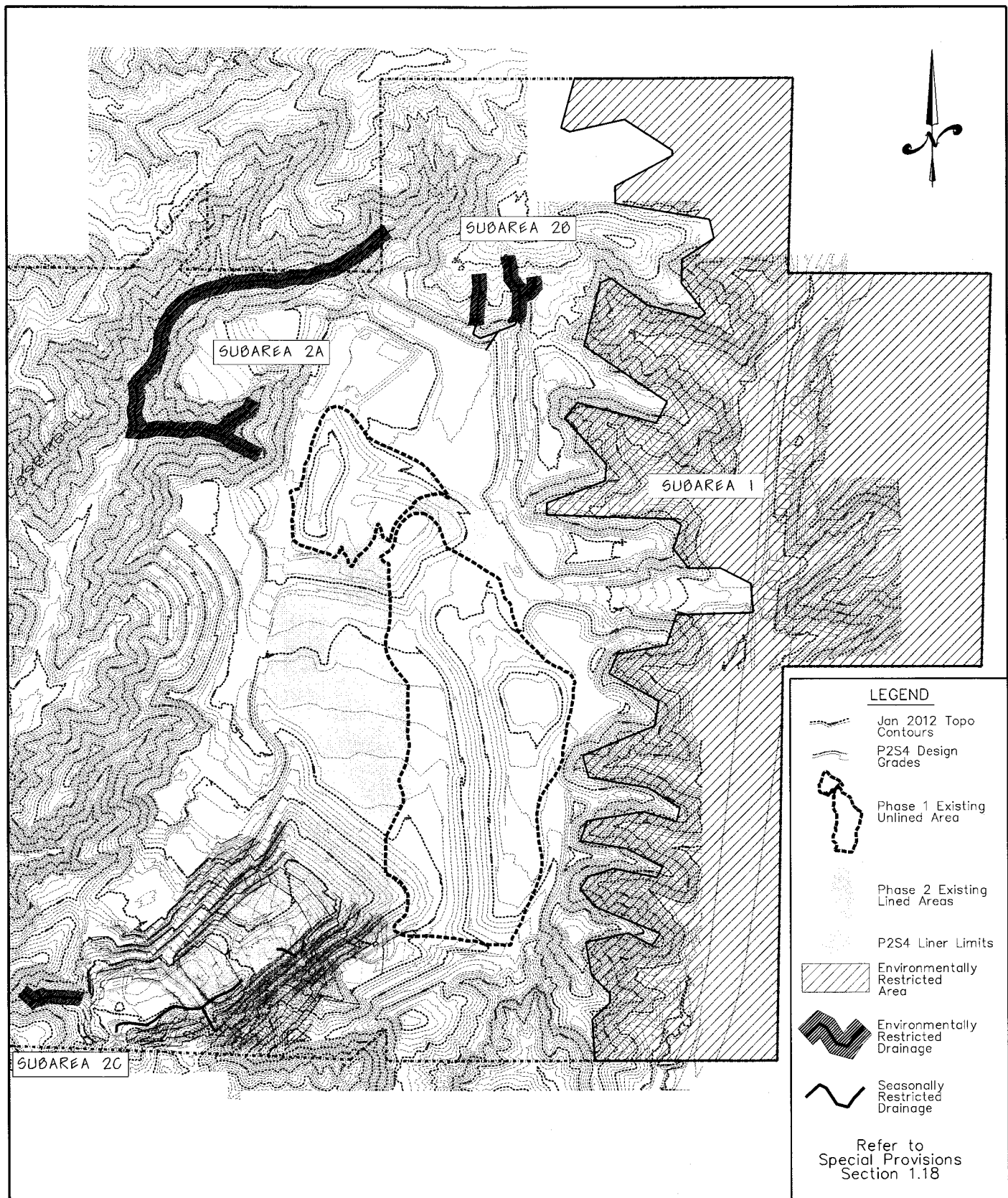
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APPENDIX "D"

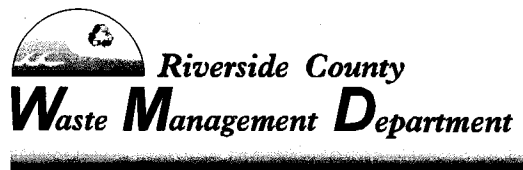
**Environmentally Restricted Areas and Clean Water Act
Permits**

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LEGEND

-  Jan 2012 Topo Contours
 -  P2S4 Design Grades
 -  Phase 1 Existing Unlined Area
 -  Phase 2 Existing Lined Areas
 -  P2S4 Liner Limits
 -  Environmentally Restricted Area
 -  Environmentally Restricted Drainage
 -  Seasonally Restricted Drainage
- Refer to Special Provisions Section 1.18



Lamb Canyon Sanitary Landfill
Environmentally Restricted Areas
 Exhibit 1

File Directory: T:\sites\lamb\Expansion\Ph2_S1g4\BidDocs\Specs\envron.dgn Date: March 2012
 Photo Date: Jan 2010 Scale: 1"=900'

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CDFG 1602 Streambed Alteration Agreement

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CALIFORNIA DEPARTMENT OF FISH AND GAME
INLAND DESERTS REGION
3602 INLAND EMPIRE BLVD., SUITE C-220
ONTARIO, CA 91764



STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2010-0177-R6 (REVISION 1)

RIVERSIDE COUNTY WASTE MANAGEMENT DEPARTMENT
COMPLETION OF PHASE 2 DEVELOPMENT AT THE LAMB CANYON LANDFILL

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and the Riverside County Waste Management Department (Permittee), represented by Mr. Hans Kernkamp.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, the Permittee notified DFG on December 29, 2010, that the Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, DFG has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, the Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, the Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located within an unnamed stream (referred to as Drainage F) within Laborde Canyon, tributary to the San Jacinto River, located at 16411 Lamb Canyon Road, three miles south of Highway 60 between the cities of Beaumont and San Jacinto, County of Riverside, State of California; Latitude: 33.8833 N, Longitude: 116.9911 W.

PROJECT DESCRIPTION

The project is limited to the completion of previous work permitted under Streambed Alteration Agreement No. 1600-2004-0100-R6 (2004 Agreement) for the Phase II, Stage 2 expansion of Lamb Canyon Landfill's southwestern edge. Previous authorized impacts included partial or complete fill of six unnamed streams (referred to as Drainages B, C, D, E, F, and H) within the boundaries of the landfill, impacting 1.174

acres of vegetated ephemeral streambed. Of the previously authorized impacts, 1.120 acres have been completed including 0.825 acres within Drainages C and D in 2005 and 0.296 acres within Drainages B, E, F, and H after the expiration of the 2004 Agreement in August 2006. The remaining proposed impacts under this Agreement include 0.054 acres from the 2004 Agreement as well as the fill of 0.16 acres of newly reestablished jurisdictional waters within Drainage F, for a total of 0.214 acres of permanent impacts.

PROJECT IMPACTS

Existing native fish and wildlife resources the project could potentially substantially adversely affect include: AMPHIBIANS – western spadefoot (*Spea hammondi*); BIRDS – American crow (*Corvus brachyrhynchos*), American kestrel (*Falco sparverius*), Bell's sage sparrow (*Amphispiza belli belli*), burrowing owl (*Athene cunicularia*), cactus wren (*Campylorhynchus brunneicapillus*), coastal rufous-crowned sparrow (*Aimophila ruficeps*), common raven (*Corvus corax*), Cooper's hawk (*Accipiter cooperii*), ferruginous hawk (*Buteo regalis*), loggerhead shrike (*Lanius ludovicianus*), mourning dove (*Zenaidura macroura*), red-shouldered hawk (*Buteo lineatus*), red-tailed hawk (*Buteo jamaicensis*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), tricolored blackbird (*Agelaius tricolor*), western wood peewee (*Contopus sordidulus*); MAMMALS – Dulzura pocket mouse (*Chaetodipus californicus femoralis*), Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), San Bernardino kangaroo rat (*Dipodomys merriami parvus*), San Diego black-tailed jackrabbit (*Lepus californicus bennettii*), San Diego desert woodrat (*Neotoma lepida intermedia*), southern grasshopper mouse (*Onychomys torridus ramona*), Stephen's kangaroo rat (*Dipodomys stephensi*); REPTILES – Belding's orange-throated whiptail (*Aspidoscelis hyperythrus beldingi*), coastal western whiptail (*Aspidoscelis tigris stejnegeri*), Northern red-diamond rattlesnake (*Crotalus ruber ruber*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), side-blotched lizard (*Uta stansburiana*), western fence lizard (*Sceloporus occidentalis*); PLANTS – chaparral sand-verbena (*Abronia villosa aurita*), Coulter's goldfields (*Lasthenia glabrata coulteri*), Jaeger's milk-vetch (*Astragalus pachypus jaegeri*), Mud Nama (*Nama stenocarpum*), Parish's brittle scale (*Atriplex parishii*), Parry's spineflower (*Chorizanthe parryi parryi*), Plummer's mariposa lily (*Calochortus plummerae*), San Jacinto Valley crown scale (*Atriplex coronata notatior*), slender-horned spineflower (*Dodecahema leptoceras*), smooth tarplant (*Centromadia pungens laevis*), south coast salt scale (*Atriplex pacifica*), thread-leaved brodiaea (*Brodiaea filifolia*), Yucaipa onion (*Allium marvinii*); and all other fish and wildlife resources in the project vicinity.

The adverse effects the project could have on the fish and wildlife resources identified above include the disturbance to and/or alteration of nesting and foraging habitat and wildlife corridors. The construction of the project will impact a total of 1,450 linear feet (approximately 0.214 acres) of vegetated ephemeral streambed. If any additional unanticipated impacts occur to riparian habitat and/or streambed during project

activities, the Permittee shall submit an application for an amendment to this Agreement prior to impacting any additional jurisdictional areas.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

The Permittee shall meet each administrative requirement described below.

- 1.1 Documentation at Project Site. The Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times to present to DFG personnel, or personnel from another state, federal, or local agency upon request.
- 1.2 Providing Agreement to Persons at Project Site. The Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of the Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.
- 1.3 Notification of Conflicting Provisions. The Permittee shall notify DFG if the Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, DFG shall contact the Permittee to resolve any conflict.
- 1.4 Project Site Entry. The Permittee agrees that DFG personnel may enter the project site with Permittee escort only during landfill hours of operation to verify compliance with the Agreement.
- 1.5 Compliance with the MSHCP and Take of Listed Species. The issuance of this Agreement does not authorize the take of any state and/or federally listed threatened, endangered, or fully protected species. Additionally, it does not infer that the project is consistent with the Western Riverside Multiple Species Habitat Conservation Plan (MSHCP) or that the project is a Biologically Equivalent or Superior Preservation Alternative. If modifications to the project are necessary to meet MSHCP requirements because the project is found during the MSHCP review process to be inconsistent with the MSHCP and/or the Western Riverside County Regional Conservation Authority (RCA) and/or Wildlife Agencies (DFG and/or U.S. Fish and Wildlife Service) do not agree the project is a Biologically Equivalent or Superior Preservation Alternative, then a request for an amendment to this Agreement will be required.

- 1.6 Take of Nesting Birds. Sections 3503, 3503.5, and 3513 of the FGC prohibit take of all birds and their active nests, including raptors and other migratory non-game birds (as listed under the Migratory Bird Treaty Act).

2. **Avoidance and Minimization Measures**

To avoid or minimize adverse impacts to the fish and wildlife resources identified above, the Permittee shall implement each measure listed below.

- 2.1 Biological Monitor. A qualified biologist shall be onsite to monitor all activities that result in the clearing or grading of sensitive habitat as well as grading, excavation, and/or other ground-disturbing activities in jurisdictional areas. The Permittee shall flag the limits of grading and the jurisdictional areas, perform necessary surveys, and take photographs during the construction process, as required by this Agreement. The biological monitor is required to halt construction activities if threatened or endangered species are identified and notify the appropriate agencies immediately.
- 2.2 Lighting Impacts. No lighting shall be allowed to impact jurisdictional areas, and the lighting and fencing for infrastructure adjacent to jurisdictional areas shall be designed or reviewed by a qualified biologist to allow wildlife to move within the open space and conserved areas without hindrance.
- 2.3 Nesting Bird Surveys. The Permittee shall not remove vegetation from jurisdictional areas within the project site from March 15 to September 15 to avoid impacts to nesting birds. If project construction cannot be avoided during the period of March 15 through September 15, the Permittee shall have a qualified biologist survey all potential nesting vegetation within jurisdictional areas of the project site for nesting birds, prior to commencing project activities (including construction and/or site preparation). Surveys shall be conducted once a day for five days at the appropriate time of day during the breeding season and surveys shall end no more than three days prior to vegetation removal and/or disturbance. Documentation of surveys and findings shall be submitted to DFG for review and concurrence prior to conducting project activities. If no nesting birds were observed and concurrence was received from DFG, project activities may begin. If an active bird nest is located, the nest site shall be fenced a minimum of 200 feet (500 feet for Least Bell's vireo, Southwestern willow flycatcher, and/or raptors) in all directions, and this area shall not be disturbed until after September 15 and until the nest becomes inactive. If threatened or endangered species are observed in the area, no work shall occur during the breeding season (March 15 through September 15) to avoid direct or indirect (noise) take of listed species.
- 2.4 Burrowing Owl. Prior to the initiation of any project activities in jurisdictional areas, Permittee shall conduct a burrowing owl habitat assessment. The assessment shall be conducted by a biologist knowledgeable of burrowing owl habitat, ecology,

and field identification of the species and burrowing owl sign. The assessment shall consist of walking the project site to identify the presence of burrowing owl habitat. Burrowing owls use a variety of natural and modified habitats for nesting and foraging that is typically characterized by low growing vegetation. Burrowing owl habitat includes, but is not limited to: native and nonnative grassland, interstitial grassland with shrub lands, shrub lands with low density shrub cover, golf courses, drainage ditches, earthen berms, unpaved airfields, pastureland, dairies, fallow fields, and agricultural use areas. Burrowing owls typically use burrows made from fossorial (adapted for burrowing or digging) mammals such as ground squirrels or badgers, and often manmade structures such as earthen berms; cement culverts; cement, asphalt, rock, or wood debris piles; or openings beneath cement or asphalt pavement. A report summarizing the results of the habitat assessment shall be submitted to DFG within 30 days following the completion of the assessment. Please note that burrowing owl habitat assessments dated more than one year prior to the construction start date will not be accepted by DFG. If no suitable habitat is found on-site (i.e., if the site is completely covered in chaparral habitat, cement, or asphalt), no additional surveys are necessary. If suitable habitat is found onsite, burrowing owl surveys must be conducted during the breeding season of March 1 through August 31 in accordance with the attached *Burrowing Owl Survey Instructions* to determine the use of the site by burrowing owls. If burrowing owls are found onsite, the Permittee shall comply with the MSHCP and submit the survey results and MSHCP compliance documents to DFG Inland Deserts Region, 3602 Inland Empire Blvd, Suite C-220, Ontario, CA 91764, **Attn: Ms. Kimberly Freeburn-Marquez**, at least five days prior to commencing project activities pursuant to this Agreement. **Please reference SAA# 1600-2010-0177-R6.**

Additionally, if burrowing owl surveys or passive relocation of owls is not conducted over other portions of your project site including areas outside of State jurisdictional areas, the project proponent risks being in violation of the FCG and other laws that protect the owl. The burrowing owl is protected under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (50 C.F.R. Section 10.13) and Sections 3503, 3503.5 and 3513 of the FGC, which prohibit take of all birds and their active nests including raptors. Therefore, it is the responsibility of the project proponent to ensure compliance with these laws for the entire project site. DFG recommends focused surveys be conducted over all potential suitable habitat within the entire project site (even areas outside State jurisdiction pursuant to Section 1600) and to relocate following the 1993 Burrowing Owl Consortium Protocol Guidelines to ensure there are not violations of other laws.

- 2.5 Nonnative plant species. DFG recommends the use of native plants to the greatest extent feasible in the landscaped areas adjacent to and/or near mitigation/open space areas and within or adjacent to stream channels. The Permittee shall not plant, seed, or otherwise introduce invasive nonnative plant

species to the landscaped areas adjacent to and/or near mitigation/open space areas and within or adjacent to stream channels (minimum 100 foot setback from open space areas and 150 foot setback from stream channels and wetland/riparian mitigation sites). Invasive nonnative plant species not to be used include those species listed on the "California Invasive Plant Inventory, February 2006" and the "February 2007 Inventory Update", (which are updates to Lists A & B of the California Exotic Pest Plant Council's list of "Exotic Pest Plants of Greatest Ecological Concern in California as of October 1999"). This list includes: pepper trees, pampas grass, fountain grass, ice plant, myoporum, black locust, capeweed, tree of heaven, periwinkle, bush lupine, sweet alyssum, English ivy, French broom, Scotch broom, Spanish broom, and pepperweed. A copy of the complete list can be obtained by contacting the California Invasive Plant Council by phone at (510) 843-3902, at their website at www.cal-ipc.org, or by email at info@cal-ipc.org.

- 2.6 Pollution and Litter. The Permittee shall comply with all litter and pollution laws. All contractors, subcontractors, and employees shall also obey these laws and it shall be the responsibility of the Permittee to ensure compliance.
- 2.6.1 The Permittee shall not allow water containing mud, silt, or other pollutants from grading, aggregate washing, or other activities to enter a lake, streambed, or flowing stream or be placed in locations that may be subjected to high storm flows.
- 2.6.2 Spoil sites shall not be located within a lake, streambed, or flowing stream or locations that may be subjected to high storm flows, where spoil shall be washed back into a lake, streambed, or flowing stream where it will impact streambed habitat and aquatic or riparian vegetation.
- 2.6.3 Raw cement/concrete or washings thereof, asphalt, paint, or other coating material, oil or other petroleum products, or any other substances which could be hazardous to fish and wildlife resources resulting from project related activities shall be prevented from contaminating the soil and/or entering the waters of the State. These materials, placed within or where they may enter a lake, streambed, or flowing stream by the Permittee or any party working under contract or with the permission of the Permittee, shall be removed immediately.
- 2.6.4 No broken concrete, cement, debris, soil, silt, sand, bark, slash, sawdust, rubbish, or washings thereof, oil or petroleum products, or other organic or earthen material from any construction or associated activity of whatever nature shall be allowed to enter into or be placed where it may be washed by rainfall or runoff into waters of the State. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any lake, streambed, or flowing stream.

- 2.6.5 No equipment maintenance shall be done within or near any lake, streambed, or flowing stream where petroleum products or other pollutants from the equipment may enter these areas under any flow.

3. Mitigation Measures

To mitigate for adverse impacts to the fish and wildlife resources identified above that cannot be avoided or minimized, the Permittee shall implement each measure listed below.

- 3.1 Habitat Enhancement/Restoration – Onsite. The Permittee shall enhance and restore 1.07 acres of riparian habitat within the Lamb Canyon Conservation Area (LCCA). Enhancement/restoration activities shall include the removal of nonnative plant species and the installation of native riparian and riparian-upland transitional plant species where appropriate.
- 3.2 Plant Palette. All plant species installed within the riparian enhancement/restoration site shall include only **local California native** container plants, cuttings, and/or seed mix, and shall be typical of the existing riparian and riparian-upland transitional native plant species present within the LCCA. DFG recommends that plant material be installed between October 1 and April 30 to maximize the benefits of the winter rainy season.
- 3.3 Success Criteria for Mitigation Site. The riparian enhancement/restoration site shall meet all of the requirements below:
- 3.3.1 All planting shall have a minimum of 80% survival the first year and 100% survival thereafter and shall attain 80% cover after 3 years and 90% cover after 5 years. If the survival and cover requirements have not been met, the Permittee is responsible for replacement planting to achieve these requirements. Replacement plants shall be monitored with the same survival and growth requirements for 5 years after planting. Natural recruitment of native plants may be used to supplement replacement plants.
- 3.3.2 The enhancement/restoration site shall not contain more than 5 percent nonnative plant species for DFG to deem the site successful. All plant species with rates of dispersal and establishment listed as “High” or “Moderate” on the California Invasive Plant Inventory shall have documented absence, or have been removed from the site for at least three years for DFG to deem the site successful. Nonnative plant removal shall be conducted throughout the 5-year monitoring and maintenance period.

- 3.3.3 Irrigation of the enhancement/restoration site may only be used to help the plants become established during the first two years following planting. Watering/irrigation of the sites shall be discontinued at least two years prior to completion of the monitoring period for the site to be deemed successful by DFG.
- 3.4 Conservation of Mitigation Site and LCCA. Consistent with the 2004 Agreement, the Permittee shall convey a conservation easement over the 207.1-acre LCCA to the Western Riverside County Regional Conservation Authority (RCA) as proposed in the June 2004 *Riverside County Waste Management Department Lamb Canyon Landfill Expansion Project Conceptual Habitat and Hydrology Mitigation Monitoring Plan*, to protect fish and wildlife resources, in perpetuity. The conservation easement shall be recorded within six (6) months of signature to this Agreement, or as extended by DFG. The Permittee shall be responsible for all costs in recording and funding the conservation easement. The Permittee shall provide sufficient funds to the RCA to manage the LCCA in perpetuity. An executed copy of the conservation easement shall be provided to DFG within six (6) months of signature to this Agreement.
- 3.5 Protection of LCCA. To protect the LCCA, the Permittee shall place appropriate fencing and signage around the perimeter of the LCCA. Except for uses appropriate to a habitat conservation area as approved by DFG, the public shall not have access to the LCCA, and no activities shall be permitted within the LCCA, except maintenance of habitat, including the removal of nonnative plants, trash, and debris, and the installation of native plant materials.
- 3.6 Mitigation under 2004 Agreement. The Permittee shall complete all mitigation measures required under the 2004 Agreement, consisting of the enhancement of 4.192 acres of riparian habitat within the LCCA, and the recording of the conservation easement over the LCCA and protection of the LCCA as described in Conditions 3.4 and 3.5 above.

4. Reporting Measures

The Permittee shall meet each reporting requirement described below.

- 4.1 Mitigation Plan. No later than 60 days after signature to this Agreement and prior to the initiation of any project activities in jurisdictional areas, the Permittee shall submit to DFG for review and approval a Mitigation Plan designed to meet the mitigation goals identified in Conditions 3.1 through 3.6 of this Agreement. At a minimum, the Mitigation Plan shall include the following information: (1) a plan for the implementation, maintenance, and monitoring of the 1.07-acre enhancement/restoration site, to include: (a) a description of the existing physical conditions of the site, including water resources and habitat types, and a map that identifies the location of the site; (b) a plan for the preparation of the site,

including the removal of nonnative plant species; (c) a California native plant palette; (d) a planting plan, including monitoring and maintenance measures and a timeline; (e) an irrigation plan; (f) procedures to ensure that nonnative plants are not introduced or allowed to sustain within the site and a nonnative plant removal plan; and (g) success standards and contingency measures; (2) a timeline for both the recording of the conservation easement over the 207.1-acre LCCA, and the installation of fencing and signage around the perimeter of the LCCA; and (3) a summary of the current status of the mitigation measures required under the 2004 Agreement, and a timeline to complete those measures. Monitoring and maintenance of the 1.07-acre enhancement/restoration site shall be conducted annually for a minimum of five years, or until DFG determines the site is successful.

- 4.2 Annual Reporting. An annual report shall be submitted to DFG for a minimum of five years following plant installation within the 1.07-acre enhancement/restoration site or until DFG deems the site is successful. At a minimum, this report shall include the following information: (1) a description of the enhancement/restoration activities conducted during the previous year, including: (a) site preparation, (b) plant installation and an overview of the planting effort, (c) the number by species of plants replaced or naturally recruited, and (d) when the activities were conducted; (2) current site conditions, including: (a) the percent survival, percent cover, and height of both tree and shrub species planted, and (b) the methods used to assess these parameters; and (3) information regarding nonnative plant removal, including: (a) the methods used for removal, (b) the amount removed and/or treated, (c) the frequency and timing of removal and treatment, (d) disposal specifics, and (e) a summary of the general successes and failures or failure of the nonnative removal plan. The report shall also include wildlife species observed at the restoration sites during monitoring surveys including sensitive species and/or listed species. Photos from designated photo stations shall be included. The first annual report is due to DFG **no later than April 30, 2012**.
- 4.3 2004 Mitigation Status Report. The Permittee shall submit a report to DFG bi-annually regarding the status of the mitigation measures required under the 2004 Agreement. Please reference both Agreement Nos. 1600-2004-0100-R6 and 1600-2010-0177-R6, on the status reports. The first and second status reports are due **no later than June 1, 2011 and January 1, 2012, respectively**.
- 4.4 Notification to CNDDDB. If any sensitive species are observed on or in proximity to the project site, or during project surveys, the Permittee shall submit California Natural Diversity Data Base (CNDDDB) forms and maps to the CNDDDB within five working days of the sightings, and provide the regional DFG office with copies of the CNDDDB forms and survey maps. The CNDDDB form is available online at: www.dfg.ca.gov/whdab/pdfs/natspec.pdf. **This information shall be mailed within five days to: DFG Natural Diversity Data Base, 1807 13th Street, Suite 202, Sacramento, CA 95814, Phone (916) 324-3812. A copy of this information**

shall also be mailed within five days to DFG Inland Deserts Region, 4665 Lampson Avenue, Suite J, Los Alamitos, CA 90720, **Attn: Streambed Team. Please reference SAA # 1600-2010-0177-R6.**

- 4.5 **Notification of Start and End of Construction.** The Permittee shall notify DFG, in writing, at least five (5) days prior to initiation of project activities in jurisdictional areas, and at least five (5) days prior to completion of project activities in jurisdictional areas. Notification shall be mailed to DFG Inland Deserts Region, 4665 Lampson Avenue, Suite J, Los Alamitos, CA 90720, **Attn: Streambed Team. Please reference SAA # 1600-2010-0177-R6.**

CONTACT INFORMATION

Any communication that the Permittee or DFG submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as the Permittee or DFG specifies by written notice to the other.

To Permittee:

Mr. Hans Kernkamp
Riverside County Waste Management Department
14310 Frederick Street
Moreno Valley, CA 92553
(951) 486-3205 (fax)

To DFG:

Ms. Kimberly Freeburn-Marquez
Department of Fish and Game
Inland Deserts Region
3602 Inland Empire Blvd., Suite C-220
Ontario, CA 91764
Notification #1600-2010-0177-R6
(909) 481-2945 (fax)
kfreeburn@dfg.ca.gov

LIABILITY

The Permittee shall be solely liable for any violations of the Agreement, whether committed by the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute DFG's endorsement of, or require the Permittee to proceed with the project. The decision to proceed with the project is the Permittee's alone.

SUSPENSION AND REVOCATION

DFG may suspend or revoke in its entirety the Agreement if it determines that the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before DFG suspends or revokes the Agreement, it shall provide the Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide the Permittee an opportunity to correct any deficiency before DFG suspends or revokes the Agreement, and include instructions to the Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused DFG to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes DFG from pursuing an enforcement action against the Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects DFG's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 et seq. (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes the Permittee or any person acting on behalf of the Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

DFG may amend the Agreement at any time during its term if DFG determines the amendment is necessary to protect an existing fish or wildlife resource.

The Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by DFG and the Permittee. To request an amendment, the Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by the Permittee in writing, as specified below, and thereafter DFG approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, the Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), the Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, the Permittee shall submit to DFG a completed DFG "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). DFG shall process the extension request in accordance with FGC 1605(b) through (e).

If the Permittee fails to submit a request to extend the Agreement prior to its expiration, the Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code, § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of DFG's signature, which shall be: 1) after the Permittee's signature; 2) after DFG complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at:
http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on **February 11, 2013**, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. The Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of the Permittee, the signatory hereby acknowledges that he or she is doing so on the Permittee's behalf and represents and warrants that he or she has the authority to legally bind the Permittee to the provisions herein.

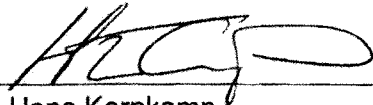
AUTHORIZATION

This Agreement authorizes only the project described herein. If the Permittee begins or completes a project different from the project the Agreement authorizes, the Permittee may be subject to civil or criminal prosecution for failing to notify DFG in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

**RIVERSIDE COUNTY WASTE MANAGEMENT
DEPARTMENT**



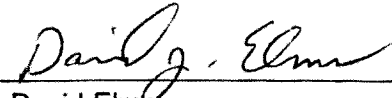
Hans Kernkamp

General Manager/Chief Engineer

3/1/11

Date

FOR DEPARTMENT OF FISH AND GAME



David Elms

Environmental Program Manager

3-7-2011

Date

Prepared by: Kimberly Freeburn-Marquez
Environmental Scientist

RWQCB Section 401 Certification

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California Regional Water Quality Control Board

Santa Ana Region



Terry Tamminen
Secretary for
Environmental
Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
(951) 782-4130 • Fax (951) 781-6288
<http://www.swrcb.ca.gov/rwqcb8>

Arnold Schwarzenegger
Governor

September 22, 2004

COUNTY OF RIVERSIDE
WASTE MANAGEMENT
04 SEP 23 PM 1:14

Mir Velten
Riverside County Waste Management Dept.
14310 Frederick Street
Moreno Valley, CA 92553

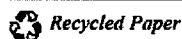
CLEAN WATER ACT SECTION 401 WATER QUALITY STANDARDS CERTIFICATION FOR THE PROPOSED LAMB CANYON LANDFILL EXPANSION, (ACOE REFERENCE NUMBER NOT AVAILABLE)

Dear Ms. Velten:

On June 30, 2004, we received your application for water quality standards certification pursuant to the Clean Water Act Section 401 (application), submitted for the proposed expansion of Lamb Canyon Landfill. Additional requested materials were received via facsimile on August 19, 2004. This letter responds to your request for certification that the proposed project, described in your application and summarized below, will comply with State water quality standards outlined in the Water Quality Control Plan for the Santa Ana River Basin (1995):

Project description:	Discharges of fill to various ephemeral drainages in association with the expansion of the existing Lamb Canyon Landfill from a footprint of 137.8 acres to 144.6 acres, to occur until site closure in 2023. The project is located in Sections 21, 28 and 29 of T3S R1W, San Bernardino Baseline and Meridian at 33.87 deg. N/117.0 deg. W.
Receiving water:	Six ephemeral riparian drainages, tributary to the San Jacinto River and Lake Elsinore
Fill area:	0.667 acres (6,350 linear feet)
Dredge volume:	N/A
Federal permit:	U.S. Army Corps of Engineers Individual Permit

California Environmental Protection Agency



September 22, 2004

You have proposed to mitigate water quality impacts as described in your application. The proposed mitigation is summarized below:

Onsite Water Quality Standards Mitigation Proposed:

- Implementation of the project will occur in accordance with appropriate waste discharge requirements expected to be in effect throughout the life of the project. Currently, Lamb Canyon Landfill operates under Regional Board Order No. 81-127, amended by Regional Board Order No. 01-18, and a monitoring and reporting plan included in Regional Board Order No. 98-99-02.
- The applicant proposes to mitigate water quality impacts through the preservation, in perpetuity, of 2.643 acres of waters of the U.S. within a managed 207.1 acre Lamb Canyon Conservation Area (LCCA) adjacent to the landfill site.
- The applicant proposes to avoid 3.226 acres of waters of the U.S. adjacent to the proposed project and enhance up to 0.5 acres of waters of the U.S. through the removal of invasive species within an ephemeral drainage within the LCCA, identified as drainage G in the application.

Offsite Water Quality Standards Mitigation Proposed:

- No offsite water quality mitigation is proposed.

Should the proposed project impact state- or federally-listed endangered species or their habitat, implementation of measures identified in consultation with U.S. Fish and Wildlife Service and the California Department of Fish and Game will ensure those impacts are mitigated to an acceptable level. Appropriate Best Management Practices will be implemented to reduce the project's implementation-related impacts to Waters of the State according to Regional Board Order No. 81-127, as supplemented by Regional Board Order No. 98-99-02 and amended by Regional Board Order No. 01-18, and subsequent waste discharge requirements, supplements, or amendments thereto.

You have submitted an application for coverage under an individual permit from the U.S. Army Corps of Engineers in compliance with Section 404 of the Clean Water Act. You have applied for a Streambed Alteration Agreement with the California Department of Fish and Game. The project is proceeding under a Mitigated Negative Declaration adopted on July 21, 2003.

This 401 Certification is contingent upon the execution of the following conditions:

- 1) The applicants shall implement their mitigation plan for impacts to waters of the U.S. within the LCCA as described in their application. The mitigation shall be conducted so as to assure the restoration and perpetual preservation of the mitigation sites within the LCCA to prevent direct or indirect degradation of beneficial uses resulting from authorized or unauthorized activities.
- 2) The applicants shall carry out the enhancement of approximately 0.5 acres of waters of the U.S. within drainage G, as identified in their application, through the removal of invasive plant species and follow-on maintenance as needed. The initial removal of invasive plant species shall occur no later than December 16, 2004.

September 22, 2004

Under California Water Code, Section 1058, and Pursuant to 23 CCR §3860, the following shall be included as conditions of all water quality standards certification actions:

- (a) Every certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to Section §13330 of the Water Code and Article 6 (commencing with Section 3867) of this Chapter.
- (b) Certification is not intended and shall not be construed to apply to any activity involving a hydroelectric facility and requiring a FERC license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to Subsection §3855(b) of this Chapter and that application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.
- (c) Certification is conditioned upon total payment of any fee required under this Chapter and owed by the applicant.

Although we anticipate no further regulatory involvement, if the above stated conditions are changed, any of the criteria or conditions as previously described are not met, or new information becomes available that indicates a water quality problem, we may formulate Waste Discharge Requirements.

In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under state law. For purposes of Section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification.

In response to a suspected violation of any condition of this certification, the Regional Board may require the holder of any permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the Regional Board deems appropriate. The burden, including costs, of the reports shall be reasonable in relation to the need for the reports and the benefits to be obtained from the reports.

In response to any violation of the conditions of this certification, the Regional Board may add to or modify the conditions of this certification as appropriate to ensure compliance. Pursuant to California Code of Regulations Section 3857, we will take no further action on your application. Please notify our office five (5) days before construction begins on this project.

This letter constitutes a Water Quality Standards Certification. I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards

Riverside County Waste Management Dept. - 4 -
Lamb Canyon Landfill Expansion

September 22, 2004

of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received State Water Quality Certification" which requires compliance with all conditions of this Water Quality Standards Certification. Order No. 2003-0017-DWQ is available at www.swrcb.ca.gov/resdec/wqorders/2003/wqo/wqo2003-0017.pdf.

Should there be any questions, please contact Adam Fischer at (951) 320-6363, or Mark Adelson at (951) 782-3234.

Sincerely,



Gerard J. Thibeault
Executive Officer

cc: U. S. EPA, Supervisor of the Wetlands Regulatory Office – Tim Vendlinski (WTR-8)
U. S. Army Corps of Engineers, Los Angeles Office – Deanna Cummings
U. S. Fish and Wildlife Service
State Water Resources Control Board, OCC – Jorge Leon
State Water Resources Control Board, DWQ-Water Quality Certification Unit – Oscar Balaguer, Chief
California Department of Fish and Game, Chino Hills – Jeff Brandt

APPENDIX "E"

**SCAQMD Form 403-N & Rule 403 Dust Control
Requirement Tables 2 & 3**

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Table 2
DUST CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Earth-moving (except construction cutting and filling areas, and mining operations)	<p>(1a) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR</p> <p>(1a-1) For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.</p>
Earth-moving: Construction fill areas:	<p>(1b) Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.</p>

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Earth-moving: Construction cut areas and mining operations:	(1c) Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b) Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c) Apply chemical stabilizers within five working days of grading completion; OR (2d) Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a) Apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR (3b) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (3c) Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR (3d) Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS
Unpaved Roads	<p>(4a) Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR</p> <p>(4b) Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR</p> <p>(4c) Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.</p>
Open storage piles	<p>(5a) Apply chemical stabilizers; OR</p> <p>(5b) Apply water to at least 80 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR</p> <p>(5c) Install temporary coverings; OR</p> <p>(5d) Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile. This option may only be used at aggregate-related plants or at cement manufacturing facilities.</p>
All Categories	<p>(6a) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.</p>

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TABLE 3
CONTINGENCY CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

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RULE 403 - LARGE OPERATION NOTIFICATION
SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
 21865 Copley Drive, Diamond Bar, CA 91765

Is this plan being submitted to comply with the requirements of a Notice to Comply or Notice of Violation? **YES/NO**
 Notice Number _____ Please attach copy

Qualifying Criteria:

- Does this operation contain more than 50 acres of disturbed surface area as of the date of submittal? **YES/NO**
 Please indicate the size of the project _____.
- Will the earth moving operation exceed a daily earth moving or throughput volume of 5,000 cubic yards three times during the most recent 365-day period from the date grading begins? **YES/NO**

Please Print or Type

Contractor/ Consultant/ Owner: (Circle one of the above)		Phone Number:	
Address:	City:	State:	Zip:
Project Name:			
Nature of Business: <input type="checkbox"/> Construction/Demolition <input type="checkbox"/> Sand & Gravel/Mining Operations <input type="checkbox"/> Cement Manufacturing			
Name of Responsible Person of Organization:			
Title:		Phone Number:	
Environmental Observer:		Phone Number:	
Date Attended Dust Class:		ID Number:	
Project Address: (Attach location map)	City:	State:	Zip:
Name of Property Owner: (If different than above)			
Anticipated Start Date:		Anticipated Completion Date:	
Telephone Number:			
Emergency Phone Number:			
In accordance with subparagraph (f) (1) (a) of Rule 403, I will ensure that the actions specified in tables 1 and 2 will be implemented on-site for each applicable fugitive dust source type within the property lines. Further, I hereby certify that all information contained herein is true and correct.			
SIGNATURE OF RESPONSIBLE MEMBER OF ORGANIZATION	TITLE	DATE	

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APPENDIX "F"

**Existing 10,000-Gallon Leachate Tank- Manufacture
Instructions & Shop Drawings**

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PAUL DURAND, P.E., S.E.
19966 MUIRKIRK DRIVE
NORTHRIDGE, CA. 91326
818-360-0778 PHONE & FAX

SNYDER INDUSTRIES
4700 FREMONT STREET
LINCOLN, NEBRASKA

SEISMIC TIE DOWNS FOR
GROUND SUPPORTED TANKS

STRUCTURAL CALCULATIONS



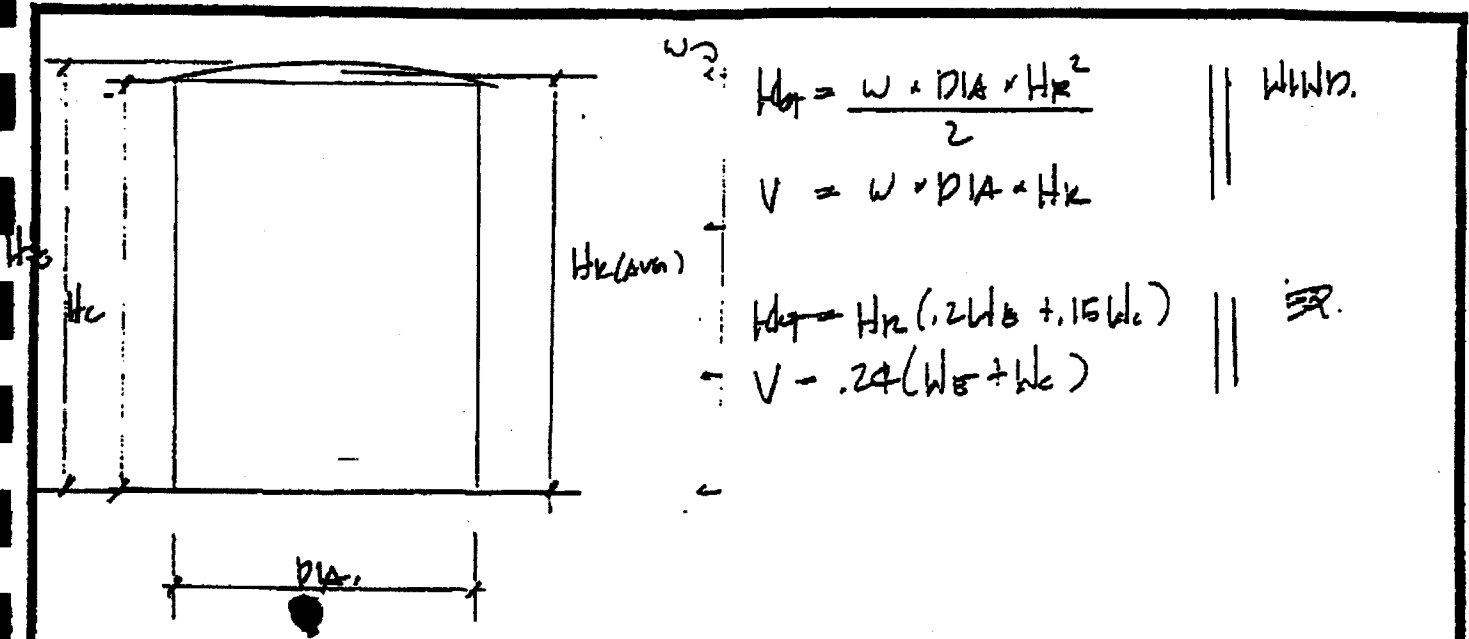
TABLE OF CONTENTS

	PAGE
SHEAR & OVERTURNING	1
TIE-DOWN CABLE	2
BASE CONNECTORS	3
BOLT VALUES	8
TANK BEARING	9
S.S. ANCHORS	12
S.S. CONNECTOR SCHEDULE	13
WORKSHEET: GAMMA = 1.5	14
WORKSHEET: GAMMA = 1.9	15

PAUL DURAND, P.E., S.E.

TITLE: SHEAR & OVERTURNING

SHEET 1 OF 15
DATE: _____



$$\text{UPLIFT (FULL)} = \frac{1.273 Hgt}{b^2} - \frac{Wc + Wc}{\pi D} \quad \text{PER LF CIRCUMFERENCE.}$$

$$\text{UPLIFT (EMPTY)} = \frac{1.273 Hgt}{b^2} - \frac{Wc}{\pi D} \quad da$$

$$\text{CABLE TENSION} = \text{UPLIFT} \times \text{TRIS. CIRCUMF.}$$

SHEAR & OVERTURNING

TITLE: _____ SHEET 1 OF 15

PAUL DURAND, P.E., S.E.

TITLE: TIE DOWN CABLE

SHEET 2 OF 15
DATE: _____

USE 7x19 TYPE 302 S.S. CABLE.

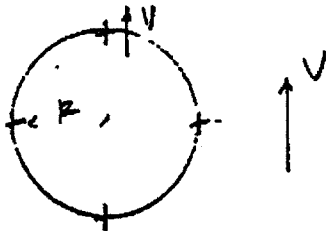
SIZE	BREAKING STRENGTH	# CABLES / TO	P.S.	CAPACITY
1/4"	6.8 ^k	2	(1-.25)4.32	6.8 x 2 = .75 = 1.33 1/2 = 6.78
3/8"	12.0 ^k	2	6	12.0
1/2"	21.6 ^k	2	6	21.56

PAUL DURAND, P.E., S.E.

TITLE: BASE CONNECTORS

SHEET 3 OF 15
DATE: _____

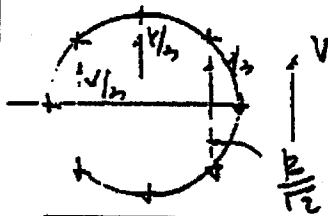
CASE I - 4 INSERTS



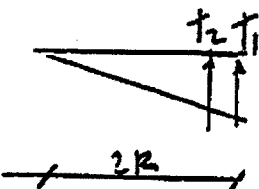
$$\boxed{\text{MAX SHEAR} = V. \text{ CENTRAS}}$$

$$T = \frac{H_{tot}}{2R} = \frac{.5H_{tot}}{R}$$

CASE II - 8 INSERTS



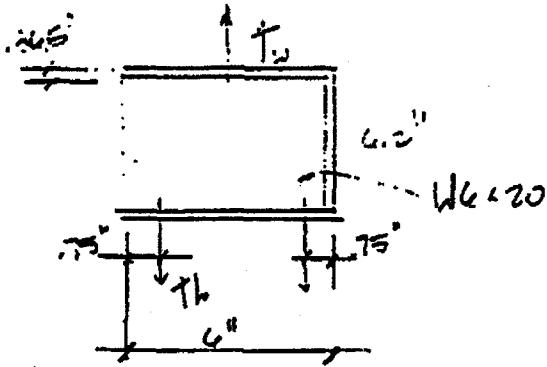
$$\boxed{\text{MAX SHEAR} = \frac{\sqrt{2}V}{3} = .47V}$$



PAUL DURAND, P.E., S.E.

TITLE: INSERT-TENSION
A2678

SHEET 4 OF 15
DATE: _____



$$T_u = T/2$$

$$T_b = T/4$$

6.15
6.0"
1.37"
BENDING WIDTH.
(TOP VIEW)

UPPER R

$$M = T_u \left(\frac{3.0}{2} - \frac{.26}{2} \right) = \frac{1}{6} P_0 L^2$$

$$T_{H(MAX)} = \frac{6.15 \times 27 \times 1.33 \times .305^2}{1.37 \times 6} = 3.53$$

T_{MAX} = 7.16 k
CONTROLS

LOWER R (w/ PRINTING ACTION)

$$\delta = (1 - .8425/3) = .729$$

$\phi = 1$ CONSERVATIVE

$$a = 3/4 + 3/3 = 1.125$$

$$b' = 1.37 - 3/8 = .945$$

$$B_c = \frac{.305^2 \times 3 \times 30 \times 1.33}{6} (1.125 + .729 \times 1) (1.125 + .945) = 5.98 k$$

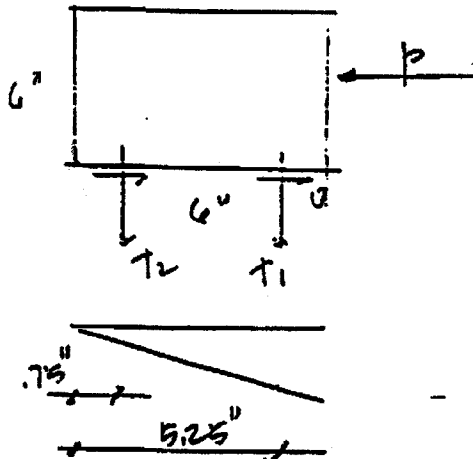
$$B_c \times .945 < 6.125$$

$$T_{MAX} = 23.95 k$$

PAUL DURAND, P.E., S.E.

TITLE: INSERT-SHEAR
A2678

SHEET 5 OF 15
DATE: _____



$$0 = \frac{P}{4}$$

$$\frac{T_2}{T_1} = \frac{.75}{5.25} = .143$$

$$P_{TOT} = P \times 3 = 2T_1 \times 5.25 + 2T_2 \times .75$$

$$3P = 10.7145 T_1$$

$$T_1 = .28 P$$

$$P_{SHEAR} = .305 \times (6 - 2 \times 13/6) \times .4 \times 36 \times 1.33 = 30.1 \text{ k} \text{ MAX CONTROLS}$$

UNITY:

$$\left(\frac{P_2}{P_1}\right)^{5/3} + \left(\frac{L}{V_2}\right)^{5/3} \leq 1$$

$$\left(\frac{.28P}{15.1 \times 1.33}\right)^{5/3} + \left(\frac{.25P}{11.1 \times 1.33}\right)^{5/3} \leq 1$$

$$8.39 \times 10^{-4} P^{5/3} + 11.17 \times 10^{-4} P^{5/3}$$

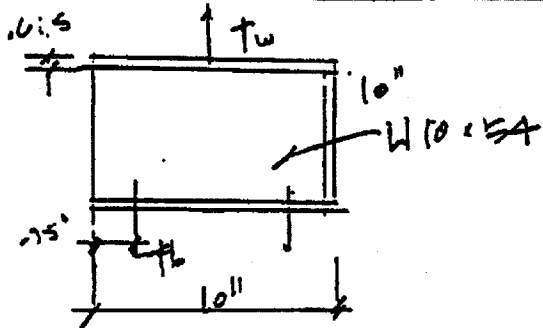
$$P^{5/3} \leq 497.5$$

$$P \leq 41.5 \text{ k}$$

PAUL DURAND, P.E., S.E.

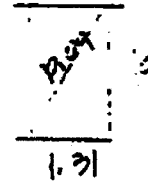
TITLE: INSERT-SHEAR
A2679

SHEET 6 OF 15
DATE: _____



$$T_H = t/2$$

$$T_b = t/4$$



UPPER FL

$$I = T_H \times \left(\frac{3.0}{2} - \frac{.375}{2} \right) = \frac{b P_b b^2}{6}$$

$$T_H (MAX) = \frac{10,000 \times 27 \times 1.33 \times .615^2}{1.31 \times 6} = 17,432$$

T_{MAX}	$= 34,864$
-----------	------------

LOWER FL

$$\delta = |-.8125/5| = .8375$$

$$\alpha = 1$$

$$a' = 3/4 + 3/8 = 1.125$$

$$b' = 1.31 - 3/8 = .935$$

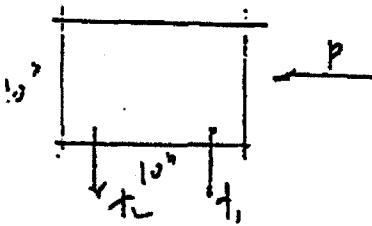
$$B_c = \frac{.615^2 \times 5 \times 30 \times 1.33 (1.125 + .8375 \times 1 (1.125 + .935))}{8 \times .935 \times 1.125} = 30,672$$

$$T_{MAX} = 122,722$$

PAUL DURAND, P.E., S.E.

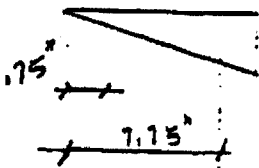
TITLE: INSERT-SHEAR
A2679

SHEET 7 OF 15
DATE: _____



$$U = \frac{P}{4}$$

$$\frac{t_2}{t_1} = \frac{.75}{7.75} = .097$$



$$M_y = P \times 5 = 2t_1 \times 17.75 + 2t_2 \times .75$$

$$5P = 15.65 t_1$$

$$t_1 = .32 P$$

$$V_{SHEAR} = .615 \times (10 - 2 \times 13/16) \times .4 \times 36 \times 1.33 = 93.64 \text{ kips MAX}$$

TITLE: INSERT-SHEAR
A2679

SHEET 7 OF 15

PAUL DURAND, P.E., S.E.

TITLE: BOLT VALUES

SHEET 8 OF 15
DATE: _____

HVA Allowable Bond Strength and Steel Strength for HAS Rods and HFA Inserts²

Anchor Diameter (in.)	Embed. Depth (in.)	Adhesive Capsule(s) Required	HEA Tensile Bond Strength (lbs)				Steel Strength (lbs)									
			2000 psi Conc.	3000 psi Conc.	4000 psi Conc.	6000 psi Conc.	HAS Std.		HAS Super (SAE 4140)		HAS SS (304 SS)		HFA ⁷			
							Tensile	Shear	Tensile	Shear	Tensile	Shear	Tensile	Shear		
3/8	3 1/2	1 - 3/8 x 3 1/2	2010	2210	2420	2930										
	5 1/2	2 - 3/8 x 3 1/2	3010	3320	3630	4250	1560	1070	3250	1900	2800	1850	2880	1820		
	7	2 - 3/8 x 3 1/2	4010	4425	4840	5685										
1/2	4 1/2	1 - 1/2 x 4 1/2	2660	2980	3330	3990										
	6 3/4	1 - 1/2 x 4 1/2 & 1 - 3/8 x 3 1/2	4000	4480	4990	5980	2840	2090	5320	3270	4730	3600	3690	2635		
	8 3/4	2 - 1/2 x 4 1/2	5330	5990	6650	7970										
5/8	5	1 - 5/8 x 5	4120	4590	5070	6020										
	7 1/2	1 - 5/8 x 5 & 1 - 1/2 x 4 1/2	6190	6990	7900	9030	4520	3000	9420	5632	7530	5050	47295	5065		
	10	2 - 5/8 x 5	8240	9190	10140	12040										
3/4	6 3/4	1 - 3/4 x 6 3/4	5750	6410	7280	8770										
	10	1 - 3/4 x 6 3/4 & 1 - 1/2 x 4 1/2	8630	9750	10890	13150	6680	4800	13920	7680	9480	7270	9750	7315		
	13 3/4	2 - 3/4 x 6 3/4	11510	13020	14620	17530										
7/8	6 3/4	1 - 7/8 x 6 3/4	6770	7680	8650	10320										
	10	2 - 3/4 x 6 3/4	10190	11490	12820	15490	9240	6350	19250	10780	2	2	2	2		
	13 3/4	2 - 7/8 x 6 3/4	13540	15320	17090	20890										
1	8 3/4	1 - 1 x 8 3/4	9540	10960	12290	14930										
	12 3/4	1 - 1 x 8 3/4 & 1 - 3/4 x 6 3/4	14460	16480	18430	22390	12120	7630	25250	13780	2	2	2	2		
	16 3/4	2 - 1 x 8 3/4	19280	21930	24570	29860										
1 1/4	12	1 - 1 1/4 x 12	20510	23220	25940	31370										
	15	1 - 1 1/4 x 12 & 1 - 1 x 8 3/4	24935	27535	30140	36340	19380	13070	40375	21530	2	2	2	2		
	18	1 - 1 1/4 x 12 & 2 - 1 x 8 3/4	29360	31850	34340	39310										

1. Allowable tensile load for anchor rods is based upon allowable stress = .33 Fu (ultimate tensile strength) acting upon the tensile stress area of the rods. Reference AISC Steel Manual Section 1.5
2. Use lower value of either bond or steel strength for tensile load.
3. 7/8-1 1/4 HAS SS only available through special order, no test data available.
4. HEA adhesive capsule will not fill the drilled hole completely.
5. Standard HFA's not available in these thread sizes, contact Specials for availability.
6. Values obtained using a SAE Grade 5 bolt.
7. Values obtained from test case.



BOLT VALUES FOR 4 FASTENERS (1.33 INCREASE ALLOWED)

1/2	4 1/4 E141930	15007	16107	17107	21494	17396
3/4	6 3/8 E141930	22433	23633	25570	27064	26698
1/2	8 1/2 E141930	21867	21867	21867	21867	17396
3/4	10 E141930	61870	61870	61870	61870	28800

* LINEAR INTERP.

TITLE: BOLT VALUES

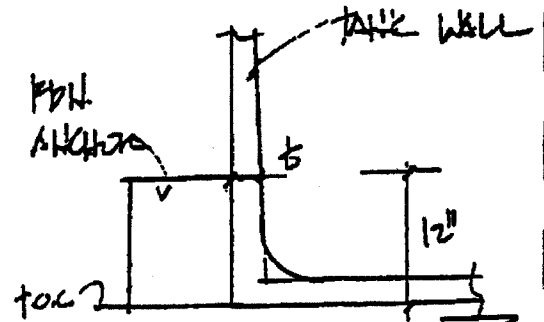
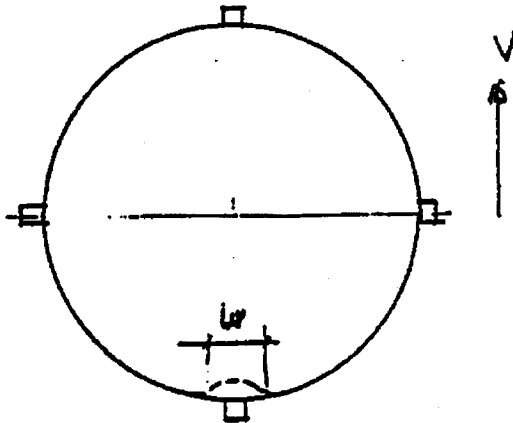
SHEET 8 OF 15

PAUL DURAND, P.E., S.E.

TITLE: TANK BEARING

SHEET 9 OF 15

DATE: _____



$$V_{MAX} = 800 + 1.33 \times 4W \times b$$

$E = 26,000,000 \text{ psi}$
 $E = 26,000 \text{ ksi}$
 $E = 12,000 \text{ ksi}$
 $E = 76,000 \text{ ksi}$
 $E = 200 \text{ ksi}$
 $f_v = 4 \times f_y = 800 \text{ psi}$

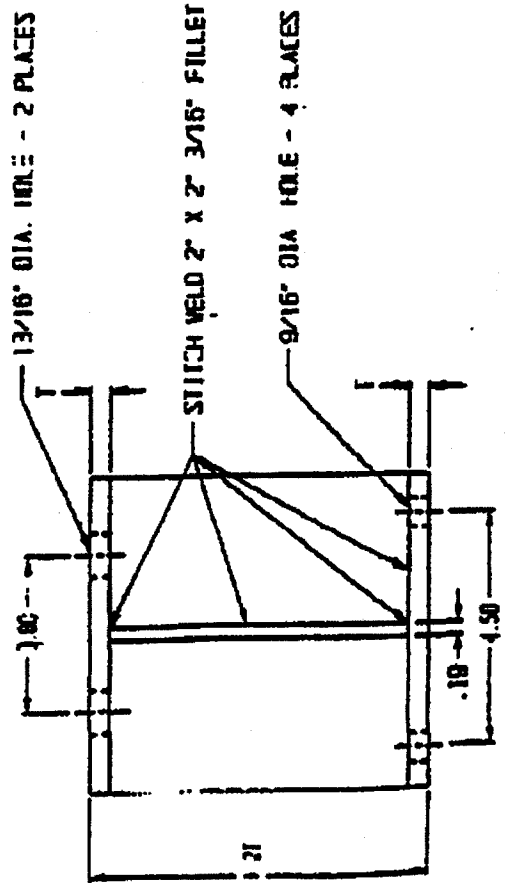
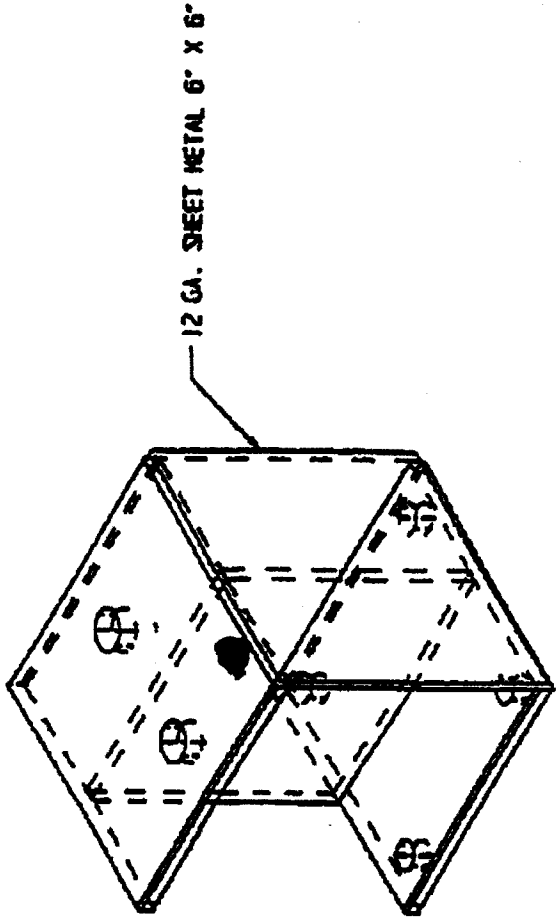
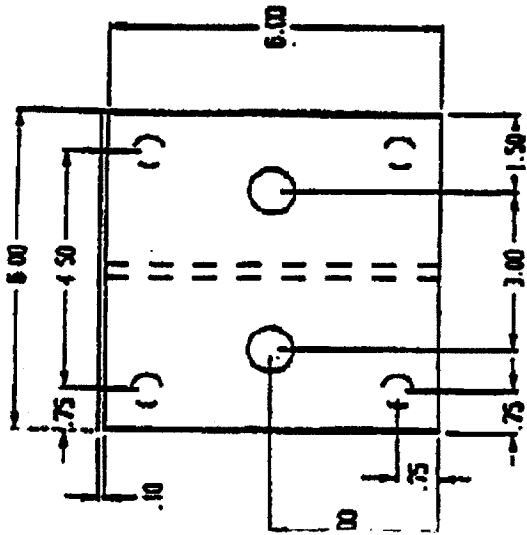
SMALL ANCHOR $w = 6"$

$$V_{MAX} = \frac{25,84}{33.20} b \text{ (k)}$$

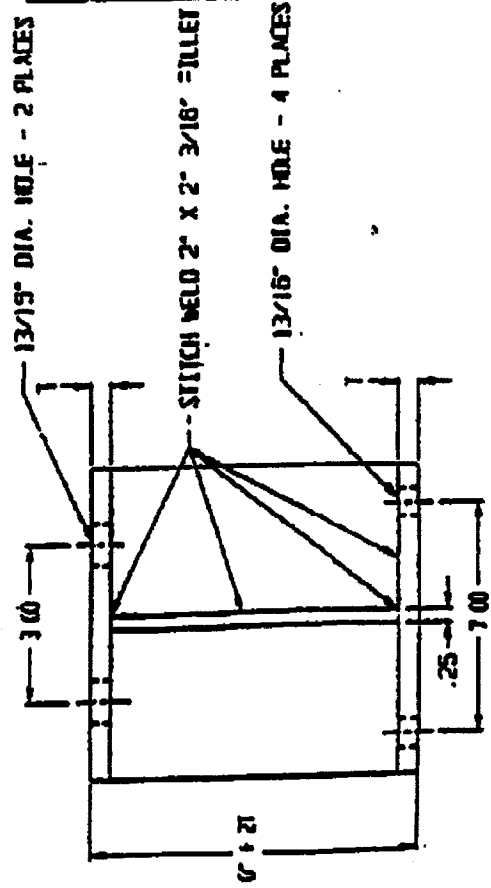
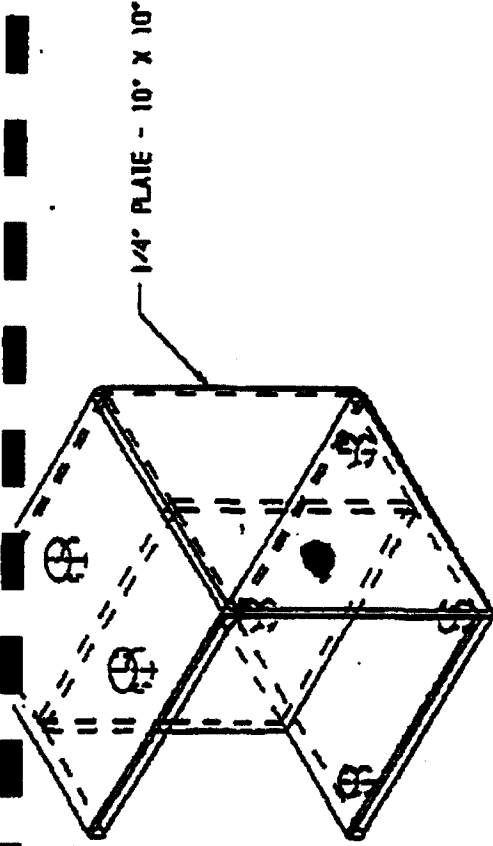
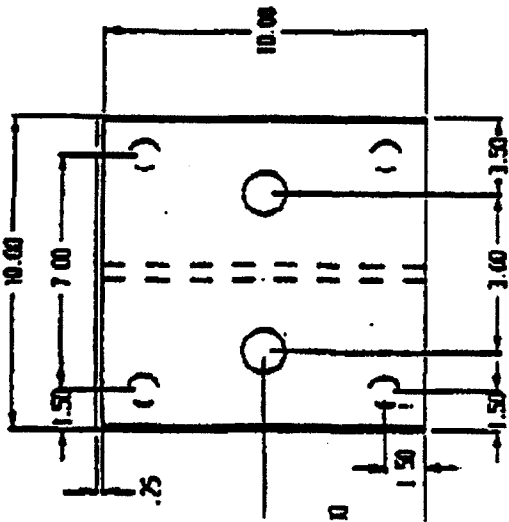
LARGER ANCHOR $w = 10"$

$$V_{MAX} = \frac{42,166}{55.33} b \text{ (k)}$$

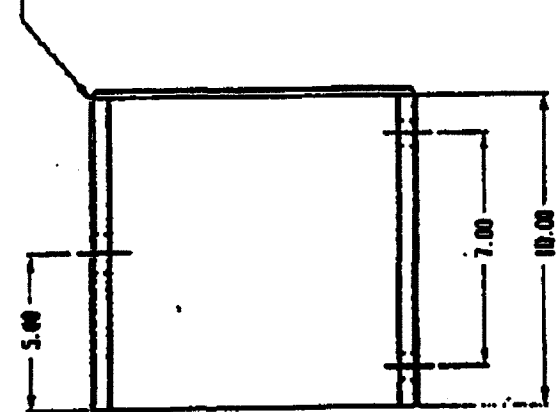
COMPUTER PROGRAM TO
SELECT FOR SA. SIZE +
s.



WELD CONTINUOUS 3/16" FILLET AND DEVEL EDGE
 NOTE: DEBURR ALL CUT EDGES AS NECESSARY

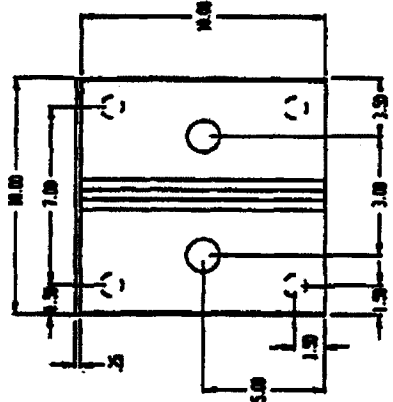
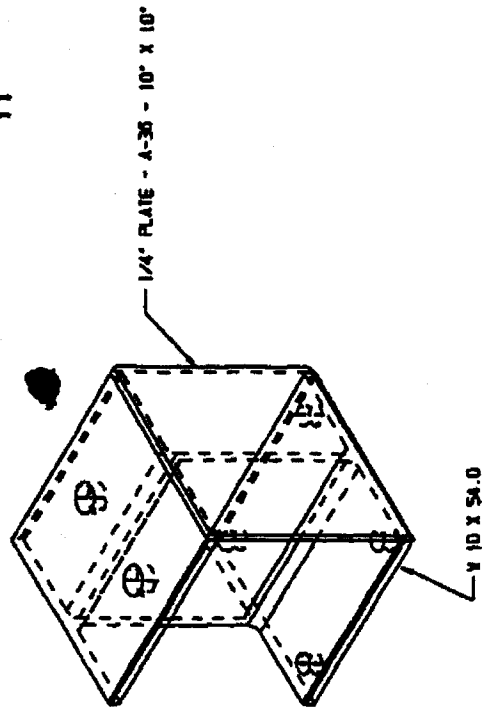
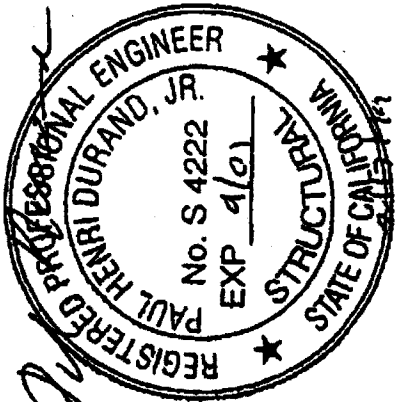


WELD CONTINUOUS 3/16" F-LET AND BEVEL EDGE
NOTE: DEBURR ALL CUT EDGES AS NECESSARY

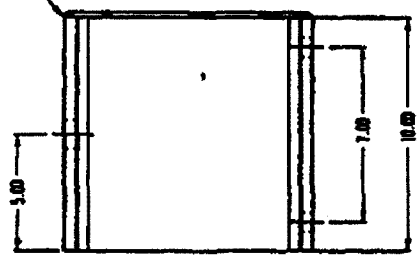


MATERIAL: STAINLESS STEEL TYPE 304

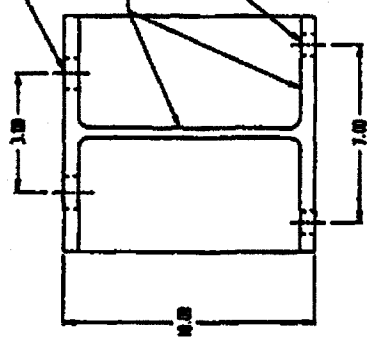
REVISIONS	DESCRIPTION	DATE	BY



NOTE: WELD CONTINUOUS 3/16" FILLET AND BEVEL EDGE
CEBORR ALL CUT EDGES AS NECESSARY
PAINT WITH BLACK CHLORINATED RUBBER
ENAMEL PAINT - FOUR SEASONS /3002



13/16" DIA. HOLE - 2 PLACES
STITCH WELD 2" X 2" 3/16" FILLET
13/16" DIA. HOLE - 4 PLACES



SNYDER INDUSTRIES, INC.
LINCOLN, NE 68504 PHONE: (402) 487-5221 FAX: (402) 487-3247
SCALE: NPS APPROVED BY: D. D. THAM
DATE: 8/10/92 REVISED TO: 9/15/92

TANK ANCHOR BASE PLATE (LARGE) - SII #339236

FACT. NO.: 1/1-1/32 ANGULAR NO.: 1/1-1/32
DEC. NO.: 3/1-06 3/1-06 3/1-06

DRAWING NUMBER
A-2679

PAUL DURAND, P.E., S.E.

TITLE: S.S. ANCHORS

SHEET 12 OF 15
DATE: _____

SMALL ANCHOR

<u>R. THICKNESS</u>	<u>T (ALLOW)</u>	<u>V (ALLOW)</u>
3/16"	1.85 ^k	15.27 ^k
1/4"	3.26 ^k	20.37 ^k
3/8"	7.35 ^k	20.55 ^k
1/2"	13.06 ^k	42.72 ^k

WHEELS:

$$V = 6 \left(6 - 2 \times \frac{13}{16} \right) \times .4 \times .35 \times 1.33 = 81.46 \text{ } t$$

$$T = \frac{6.15 \times .75 \times .35 \times 1.33 \times t^2}{1.37 \times 6} = 62.28 \text{ } t^2$$

LARGE ANCHOR

1/4"	5.60 ^k	38.44 ^k
3/8"	12.61 ^k	58.48 ^k
1/2"	22.41 ^k	78.0 ^k

WHEELS:

$$V = 6 \left(10 - 2 \times \frac{13}{16} \right) \times .4 \times .35 \times 1.33 = 155.9 \text{ } t$$

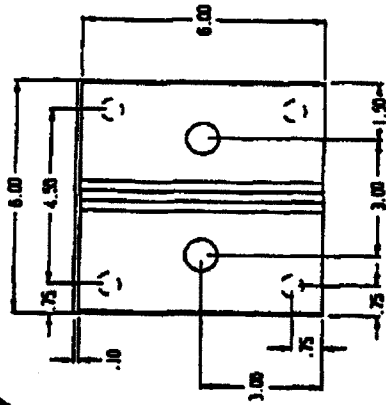
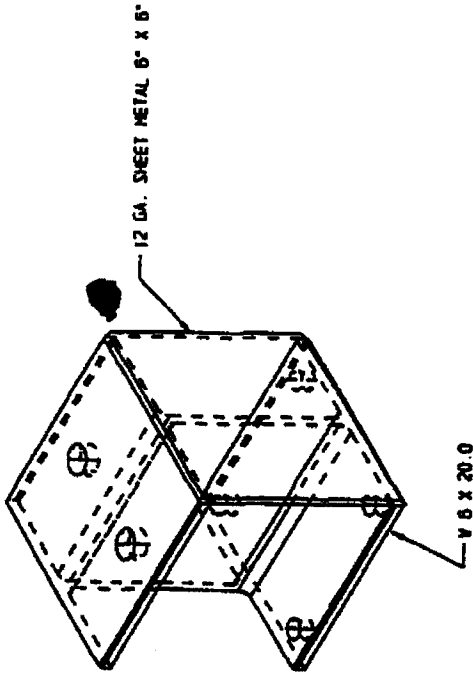
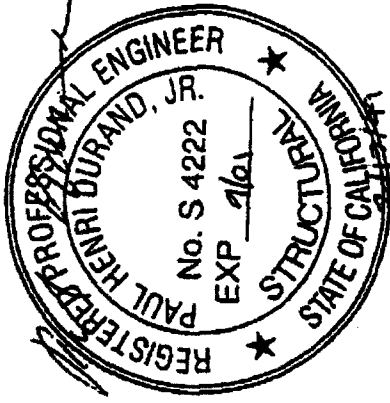
$$T = \frac{10.04 \times .75 \times .35 \times 1.33 \times t^2}{1.31 \times 6} = 89.64 \text{ } t^2$$

TITLE: S.S. ANCHORS

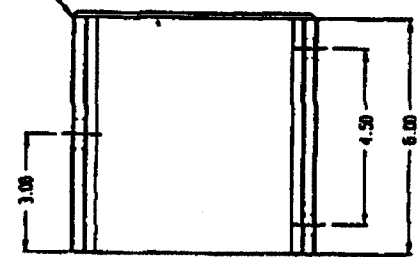
SHEET 12 OF 15

TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.5 SPECIFIC GRAVITY ANCHOR REQUIRED	1.5 SPECIFIC GRAVITY THICKNESS SPECIFIED	1.9 SPECIFIC GRAVITY ANCHOR REQUIRED	1.9 SPECIFIC GRAVITY THICKNESS SPECIFIED
375	45	8-3370	3/16"	8-3370	3/16"
550	48	8-3370	3/16"	8-3370	3/16"
550	64	8-3370	3/16"	8-3370	3/16"
850	48	8-3370	3/16"	8-3370	3/16"
1100	64	8-3370	3/16"	8-3370	3/16"
1100	86	8-3370	3/16"	8-3370	3/16"
1225	86	8-3370	3/16"	8-3370	3/16"
1500	86	8-3370	3/16"	8-3370	3/16"
1550	64	8-3370	3/16"	8-3370	3/16"
1650	86	8-3370	3/16"	8-3370	1/4"
2000	90	8-3370	1/4"	8-3370	1/4"
2500	90	8-3370	1/4"	8-3370	3/8"
3000	90	8-3370	3/8"	8-3370	3/8"
3000	102	8-3370	3/8"	8-3370	3/8"
3400	90	8-3370	3/8"	8-3371	1/4"
3900	90	8-3370	3/8"	8-3371	1/4"
4400	90	8-3371	1/4"	8-3371	1/4"
4500	102	8-3371	1/4"	8-3371	1/4"
4900	90	8-3371	3/8"	8-3371	3/8"
5100	102	8-3371	1/4"	8-3371	3/8"
5500	90	8-3371	3/8"	8-3371	3/8"
5500	120	8-3371	1/4"	8-3371	3/8"
5600	142	8-3371	1/4"	8-3371	3/8"
6000	90	8-3371	1/2"	8-3371	1/2"
6000	102	8-3371	3/8"	8-3371	3/8"
6200	102	8-3371	3/8"	8-3371	3/8"
6500	120	8-3371	3/8"	8-3371	3/8"
7000	142	8-3371	3/8"	8-3371	1/2"
7500	102	8-3371	3/8"	8-3371	1/2"
8500	120	8-3371	3/8"	8-3371	1/2"
8750	142	8-3371	1/2"	8-3371	1/2"
9500	120	8-3371	1/2"	8-3371	1/2"
10500	142	8-3371	1/2"	8-3371	1/2"
12500	142	8-3371	1/2"	8-3371	1/2"
15000	142	8-3371	1/2"	8-3371	1/2"

**STAINLESS STEEL
CONNECTOR
SCHEDULE**



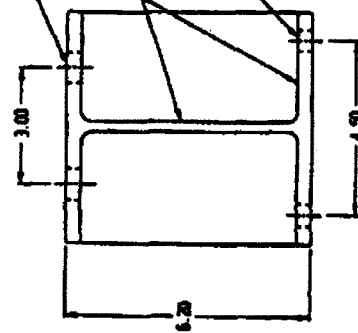
WELD CONTINUOUS 3/16" FILLET AND BEVEL EDGE
 NOTE: DEBUR ALL CUT EDGES AS NECESSARY
 PAINT WITH BLACK GALVANNEAL RUBBER
 ENAMEL PAINT - FOUR SEASONS 73602



1 3/16" DIA. HOLE - 2 PLACES

STITCH WELD 2" X 2" 3/16" FILLET

9/16" DIA. HOLE - 4 PLACES



SNYDER INDUSTRIES INC.
 LINCOLN NE 68504

SCALE: 1/8" = 1" APPROVED BY: DRAWN BY: D. DUNN
 DATE: 7/10/52 REVISED BY: 9/1/52

TANK ANCHOR BASE PLATE (SMALL) - SII 133235

UNLESS OTHERWISE SPECIFIED
 FRACTIONAL: 1/8" - 1/32" ANGULAR: 5° - 10°
 TOLERANCE: ± .005

DRAWING NUMBER
 A-2578

PAUL DURAND, P.E., S.E.

TITLE: GROUND-SUPPORTED TANKS

SHEET 15 OF 15
DATE:

BRIDGE INDUSTRIES, GROUND-SUPPORTED TANKS
TANK DESIGN
GAMMA: 1.9

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TITLE: GAMMA: 1.9

SHEET 15 OF 15

PAUL DURAND, P.E., S.E.

TITLE: GROUND-SUPPORTED TANKS

SHEET 14 OF 15
DATE:

BY: PAUL DURAND, P.E., S.E.

DATE: 12/15/2011

PROJECT: GROUND-SUPPORTED TANKS

SCALE: AS SHOWN

REVISIONS:

NO. 1: 12/15/2011

NO. 2: 12/15/2011

NO. 3: 12/15/2011

NO. 4: 12/15/2011

NO. 5: 12/15/2011

NO. 6: 12/15/2011

NO. 7: 12/15/2011

NO. 8: 12/15/2011

NO. 9: 12/15/2011

NO. 10: 12/15/2011

NO. 11: 12/15/2011

NO. 12: 12/15/2011

NO. 13: 12/15/2011

NO. 14: 12/15/2011

NO. 15: 12/15/2011

NO. 16: 12/15/2011

NO. 17: 12/15/2011

NO. 18: 12/15/2011

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NO. 61: 12/15/2011

NO. 62: 12/15/2011

NO. 63: 12/15/2011

NO. 64: 12/15/2011

NO. 65: 12/15/2011

TITLE: GAMMA: 1.5

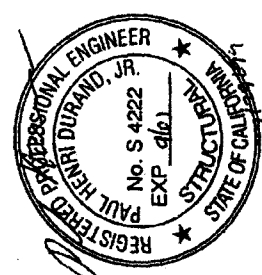
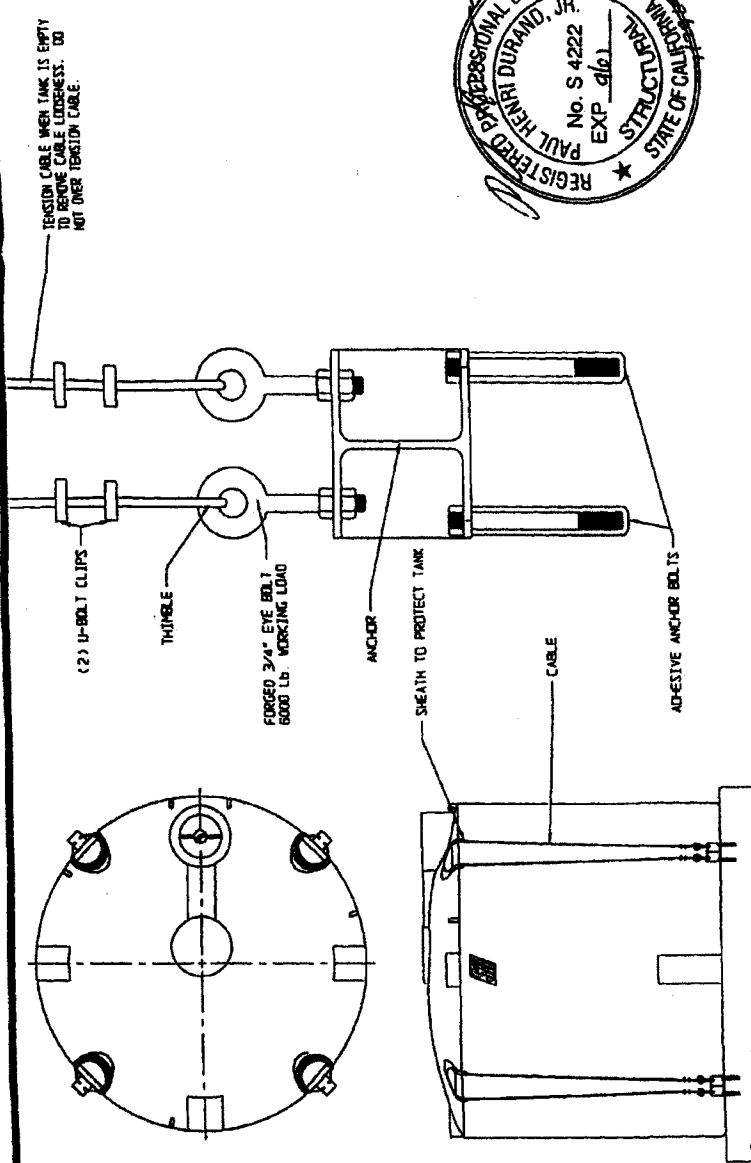
SHEET 14 OF 15

WIND DESIGN
 UBC SECTION 2316
 110 MPH WIND
 EXPOSURE Cat. II (FLAT, 0-20 FT.)
 CYLINDRICAL SHAPE C_f = 0.8
 DESIGN PRESSURE: 34 PSF
 SEISMIC DESIGN:
 UBC SECTION 2381(b) ZONE 4, HAZARDOUS, ON GRADE
 P_z = 21 C_p = 1.4 X 1.5 X 2/3 = 75 W_o = 0.8
 F_v = 24 I_p MAXIMUM PER APT 650 STANDARDS

GENERAL:
 1. ALL DESIGN WORK IS BASED ON THE CURRENT EDITION OF THE UNIFORM BUILDING CODE.
 2. ALL CONSTRUCTION MUST MEET LOCAL BUILDING CODE REQUIREMENTS AND BE APPROVED BY THE CONSTRUCTION SITE ENGINEER.
 3. THESE GUIDELINES HAVE BEEN PROVIDED TO SPECIFY THE RESTRAINT RECOMMENDATIONS FOR SNYDER INDUSTRY BULK STORAGE TANKS.
 CONCRETE MATERIAL:
 1. CONCRETE SHALL ATTAIN A MINIMUM ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF F_c = 3000 PSI.
 CONCRETE REINFORCEMENT:
 1. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 40 (FY 40,000 PSI.) AND/OR WELDED FABRIC 6" MINIMUM.
 2. LAP ALL BARS A MINIMUM OF 40 BAR DIAMETERS. LAP WIRE FABRIC 6" MINIMUM.
 3. MINIMUM COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS:
 - 3" FOR CONCRETE DEPOSITED DIRECTLY AGAINST EARTH.
 - 2" FOR CONCRETE DEPOSITED IN FORMS.
 4. CONSTRUCTION SITE ENGINEER SHOULD BE COMPLETED BY THE STRUCTURAL STEEL ENGINEER BASED ON SPECIFIC APPLICATION.

STRUCTURAL STEEL:
 1. ALL STRUCTURAL STEEL COMPONENTS SHALL BE NEW AND OF BASIC OPEN HEARTH PROCESS STEEL CONFORMING TO ALL APPLICABLE REQUIREMENTS OF ASTM A36 (STRUCTURAL STEEL FOR BRIDGES AND BUILDINGS - F_y = 36,000 PSI.).
 2. ALL ARC WELDING ELECTRODES SHALL CONFORM TO ASTM A233 FOR STEEL ARC WELDING ELECTRODES. ELECTRODES SHALL BE AS RECOMMENDED BY THE MANUFACTURER FOR THE POSITIONS AND OTHER CONDITIONS OF ACTUAL USE. WELDING SHALL CONFORM TO REQUIREMENTS OF AMERICAN WELDING SOCIETY AWS D1.1.
 3. ALL SHARP EDGES AND CORNERS SHALL BE ROUNDED ON ALL STRUCTURAL STEEL COMPONENTS.
 4. CABLES TO BE 7X19 STRANDED CORE CONSTRUCTION SIZED PER CHART. MATERIAL TO BE SPECIFIED BY CUSTOMER ORDER (MINIMUM BREAKING STRENGTH EQUAL TO OR GREATER THAN 304 S3 RATING).
 5. ANCHOR BOLTS TO BE HILTI ADHESIVE ANCHORS, MODEL HVA WITH SIZE AND MATERIAL AS SPECIFIED PER SPECIFICATION CHART. ALL 1/2" DIA. HVA ANCHORS TO HAVE 4-1/4" EMBEDMENT. ALL 3/4" DIA. HVA ANCHORS TO HAVE 6-5/8" EMBEDMENT. ALL OTHER FASTENER MATERIALS MUST CORRESPOND TO THE TYPE OF ANCHOR SELECTED.

SNYDER INDUSTRIES INC.
 LINCOLN, NE 68504
 DRAWN BY: D.A.D.
 REVISIONS: 07/19/98
 SCALE: NONE
 DATE: 8/18/92
 S.I.I. TANK RESTRAINT APPLICATION RECOMMENDATIONS
 FOR S.I.I. 45" - 90" DIAMETER VERTICAL STORAGE TANKS
 DRAWING NO. 8-26866, PAGE 1 OF 1



TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.5 SPECIFIC GRAVITY FLUID				1.9 SPECIFIC GRAVITY FLUID			
		ANCHOR QUANTITY	ANCHOR MATERIAL	CABLE DIA. (INCHES)	ANCHOR REQUIRED	ANCHOR QUANTITY	ANCHOR MATERIAL	CABLE DIA. (INCHES)	ANCHOR REQUIRED
375	45	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
550	48	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
550	54	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
650	48	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1100	64	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1100	66	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1225	66	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1500	66	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1550	64	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
1650	66	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
2000	90	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
2500	90	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678
3000	90	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HVA STANDARDS	1/4"	A-2678

WIND DESIGN:
 UBC SECTION 2316
 110 MPH WIND
 EXPOSURE (e) 22 (OPEN, FLAT, 0-20 FT.)
 CYLINDRICAL SHAPE Co = 8
 DESIGN PRESSURE: 24 PSF
 SEISMIC DESIGN (2306b) ZONE 4, HAZARDOUS, ON GRADE
 UBC SECTION 2306b
 Pp = 21 Gp Wp = 4 X 1.5 X 2 / 28 X 75 Wp = 30
 Fp = 24 Wp MAXIMUM PER API 650 STANDARDS

GENERAL:
 1. ALL DESIGN WORK IS BASED ON THE CURRENT EDITION OF THE UNIFORM BUILDING CODE.
 2. ALL CONSTRUCTION MUST MEET LOCAL BUILDING CODE REQUIREMENTS AND BE APPROVED BY THE CONSTRUCTION SITE ENGINEER.
 3. THESE GUIDELINES HAVE BEEN PROVIDED TO SPECIFY THE RESTRAINT RECOMMENDATIONS FOR SNYDER INDUSTRY BULK STORAGE TANKS.

CONCRETE MATERIAL:
 1. CONCRETE SHALL ATTAIN A MINIMUM ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF Fc = 3000 PSI.

CONCRETE REINFORCEMENT:
 1. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 40 (FY 40,000 PSI.) AND/OR WELDED WIRE FABRIC PER ASTM A185.
 2. LAP ALL BARS A MINIMUM OF 40 BAR DIAMETERS. LAP WIRE FABRIC 6" MINIMUM.
 3. MINIMUM COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS:
 - 2" FOR CONCRETE DEPOSITED IN FORMS.
 - 3" FOR CONCRETE DEPOSITED AGAINST EARTH.

4. CONCRETE PAD DESIGN SHOULD BE COMPLETED BY THE CONSTRUCTION SITE ENGINEER BASED ON SPECIFIC APPLICATION. STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL COMPONENTS SHALL BE NEW AND OF BASIC OPEN HEARTH PROCESS STEEL CONFORMING TO ALL APPLICABLE REQUIREMENTS OF ASTM A36 (STRUCTURAL STEEL FOR BRIGES AND BUILDINGS - Fy = 36,000 PSI.).
 2. ALL ARC WELDING ELECTRODES SHALL CONFORM TO ASTM A233 FOR STEEL ARC WELDING ELECTRODES. ELECTRODES SHALL BE AS RECOMMENDED BY THE MANUFACTURER FOR THE POSITIONS AND OTHER CONDITIONS OF ACTUAL USE. WELDING SHALL CONFORM TO REQUIREMENTS OF AMERICAN WELDING SOCIETY AWS D121.
 3. ALL SHARP EDGES AND CORNERS SHALL BE REMOVED ON ALL STRUCTURAL STEEL COMPONENTS.

4. CABLES TO BE 7X19 STRANDED CORE CONSTRUCTION SIZED PER CHART. MATERIAL TO BE SPECIFIED BY CUSTOMER ORDER (MINIMUM BREAKING STRENGTH EQUAL TO OR GREATER THAN 304 SS RATING). ANCHOR BOLTS TO BE HULTI ADHESIVE ANCHORS, MODEL HVA WITH SIZE AND MATERIAL AS SPECIFIED PER SPECIFICATION CHART. ALL 1/2" DIA. HVA ANCHORS TO HAVE 4-1/4" EMBEDMENT. ALL 3/4" DIA. HVA ANCHORS TO HAVE 6-5/8" EMBEDMENT. ALL OTHER FASTENER MATERIALS MUST CORRESPOND TO THE TYPE OF ANCHOR SELECTED.

SNYDER INDUSTRIES INC.

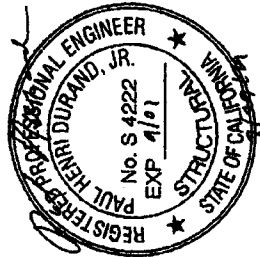
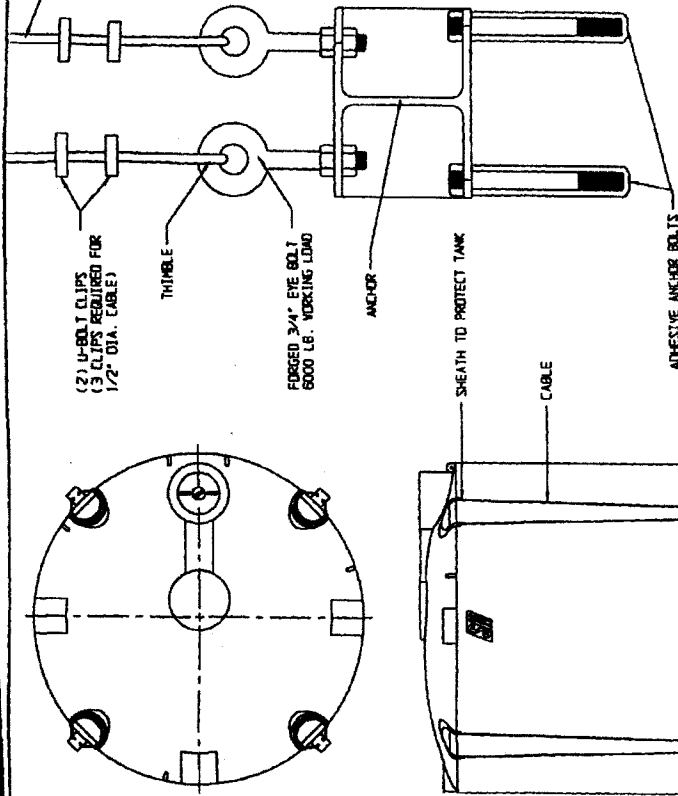
LINCOLN, NE 68504

SCALE: NONE
 DATE: 8/18/92
 APPROVED BY: [Signature]
 DRAWN BY: D.A.D.
 REVISED: 07/19/99

S.I.I. TANK RESTRAINT APPLICATION RECOMMENDATIONS FOR
 3000 - 6000 GALLON VERTICAL STORAGE TANKS

DRAWING NO. B-26878, PAGE 1 OF 1

TENSION CABLE WHEN TANK IS EMPTY TO REMOVE CABLE TENSION. DO NOT OVER TENSION CABLE.



TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.5 SPECIFIC GRAVITY FLUID				1.9 SPECIFIC GRAVITY FLUID			
		ANCHOR REQUIRED	QUANTITY	ANCHOR BOLT MATERIAL	CABLE DIA. (INCHES)	ANCHOR REQUIRED	QUANTITY	ANCHOR BOLT MATERIAL	CABLE DIA. (INCHES)
3000	102	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"
3400	90	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"
3800	90	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"
4400	90	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"
4500	102	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"	A-2678	4 EA.	4 EA. 1/2" DIA. HAS STANDARD	1/4"
4900	90	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"
5100	102	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"
5500	90	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"
5900	120	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"
5900	142	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"
6000	90	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/2"
6000	102	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"

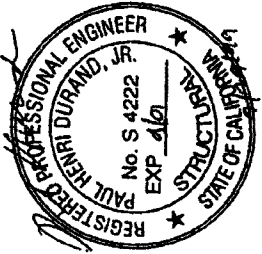
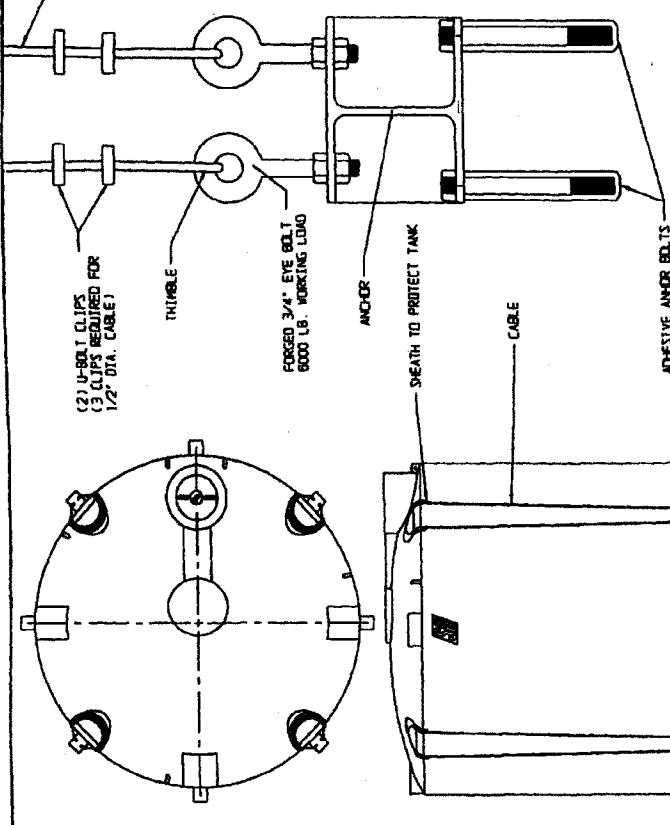
WIND DESIGN:
 UBC SECTION 2310
 110 MPH WIND
 EXPOSURE C-1, 20 (OPEN, FLAT, 0-20 FT.)
 CYLINDRICAL SHAPE C_s = 8
 DESIGN PRESSURE: 34 PSF
 SEISMIC DESIGN:
 UBC SECTION 2306(b) ZONE 4, HAZARDOUS, DN GRADE
 F_a = 21 G_p W_p = 4.1 S_a / 2.3 R_w = 75 W_p
 F_p = 3 W_p

GENERAL:
 1. ALL DESIGN WORK IS BASED ON THE CURRENT EDITION OF THE UNIFORM BUILDING CODE.
 2. ALL CONSTRUCTION MUST BE APPROVED BY THE CONSTRUCTION SITE ENGINEER.
 3. THESE GUIDELINES HAVE BEEN PROVIDED TO SPECIFY THE RESTRAINT RECOMMENDATIONS FOR SNYDER INDUSTRIES BULK STORAGE TANKS.
 CONCRETE MATERIAL:
 1. CONCRETE SHALL ATTAIN A MINIMUM ULTIMATE 28 DAY COMPRESSIVE STRENGTH OF F_c = 3000 PSI.
 CONCRETE REINFORCEMENT:
 1. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 40 (FY 40,000 PSI.) AND/OR WELDED WIRE FABRIC PER ASTM A185.
 2. LAP ALL BARS A MINIMUM OF 40 BAR DIAMETERS. LAP WIRE FABRIC 6" MINIMUM.
 3. MINIMUM COVER FOR REINFORCING BARS SHALL BE AS FOLLOWS:
 - 3" FOR CONCRETE DEPOSITED IN FORMS.
 - 2" FOR CONCRETE DEPOSITED IN FORMS.
 4. CONSTRUCTION SITE ENGINEER BASED ON SPECIFIC APPLICATION. STRUCTURAL STEEL:
 1. ALL STRUCTURAL STEEL COMPONENTS SHALL BE A572 OR A575 BASIC OPEN HEARTH PROCESS STEEL CONFORMING TO ALL APPLICABLE REQUIREMENTS OF ASTM A36 (STRUCTURAL STEEL FOR BRIDGES AND BUILDINGS - F_y = 36,000 PSI.).
 2. ALL ARC WELDING ELECTRODES SHALL CONFORM TO ASTM A233 FOR STEEL, ARC WELDING ELECTRODES. ELECTRODES SHALL BE AS RECOMMENDED BY THE MANUFACTURER FOR THE POSITIONS AND OTHER CONDITIONS OF ACTUAL USE. WELDING SHALL CONFORM TO REQUIREMENTS OF AMERICAN WELDING SOCIETY AWS D12.1.
 3. ALL SHARP EDGES AND CORNERS SHALL BE REMOVED ON ALL STRUCTURAL STEEL COMPONENTS.
 4. CABLES TO BE 7X19 STRANDED CORE CONSTRUCTION SIZED PER CHART. MATERIAL STRENGTH EQUAL TO OR GREATER THAN 304 SS RATING). ANCHOR BOLTS TO BE MILITARY ADHESIVE ANCHORS, MODEL NYA WITH 1/2" DIA. NYA ANCHORS TO HAVE 4-1/4" EMBEDMENT. ALL 3/4" DIA. NYA ANCHORS TO HAVE 6-5/8" EMBEDMENT. ALL OTHER FASTENER MATERIALS MUST CORRESPOND TO THE TYPE OF ANCHOR SELECTED.

SNYDER INDUSTRIES INC.
 LINCOLN, NE 68504
 SCALE: NONE
 DATE: 8/20/92
 APPROVED BY: [Signature]
 DRAWN BY: O.A.D.
 REVISED: 07/19/98
S.I.I. TANK RESTRAINT APPLICATION RECOMMENDATIONS
 102" - 142" DIAMETER VST UP TO 16,500 1.9 SP. G.

DRAWING NO. 8-26688B, PAGE 1 OF 1

TENSION CABLE WHEN TANK IS EMPTY TO REMOVE CABLE LOOSENESS. DO NOT OVER TENSION CABLE.

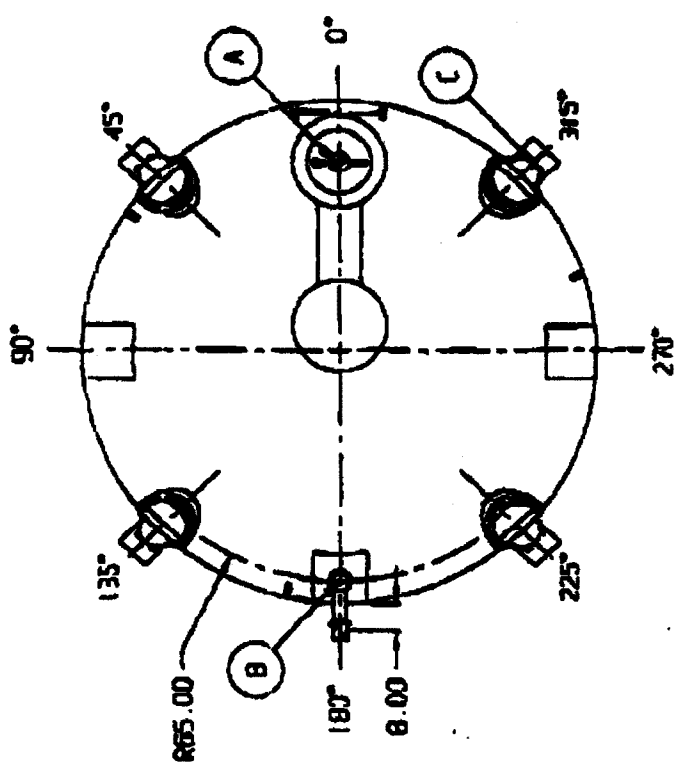
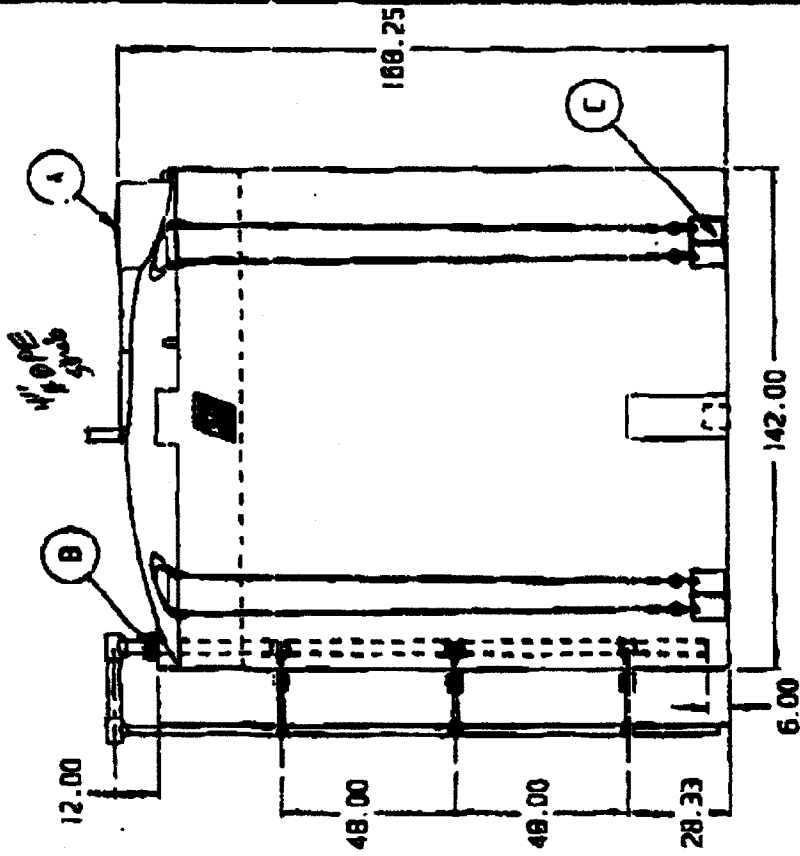


TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.5 SPECIFIC GRAVITY FLUID				1.9 SPECIFIC GRAVITY FLUID			
		ANCHOR REQUIRED	ANCHOR QUANTITY	ANCHOR MATERIAL	CABLE DIA. (INCHES)	ANCHOR REQUIRED	ANCHOR QUANTITY	ANCHOR MATERIAL	CABLE DIA. (INCHES)
5100	102	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
5200	102	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
5500	120	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
6500	120	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
5800	142	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
7000	142	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
8750	142	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	4 EA.	4 EA. 3/4" DIA. HAS SUPER	1/4"
10500	142	A-2679	4 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"
12500	142	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"
15000	142	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	1/4"
16500	142	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"	A-2679	8 EA.	4 EA. 3/4" DIA. HAS STANDARD	3/8"

SNYDER INDUSTRIES INC.

MC LAUGHLIN ENG.
P.O. #0132 - A

HIP - RIVERSIDE
P.O. #01208236



APPROVED _____ DATE _____
 SIGNATURE _____
 COMMENTS NOT VALID UNLESS APPROVED

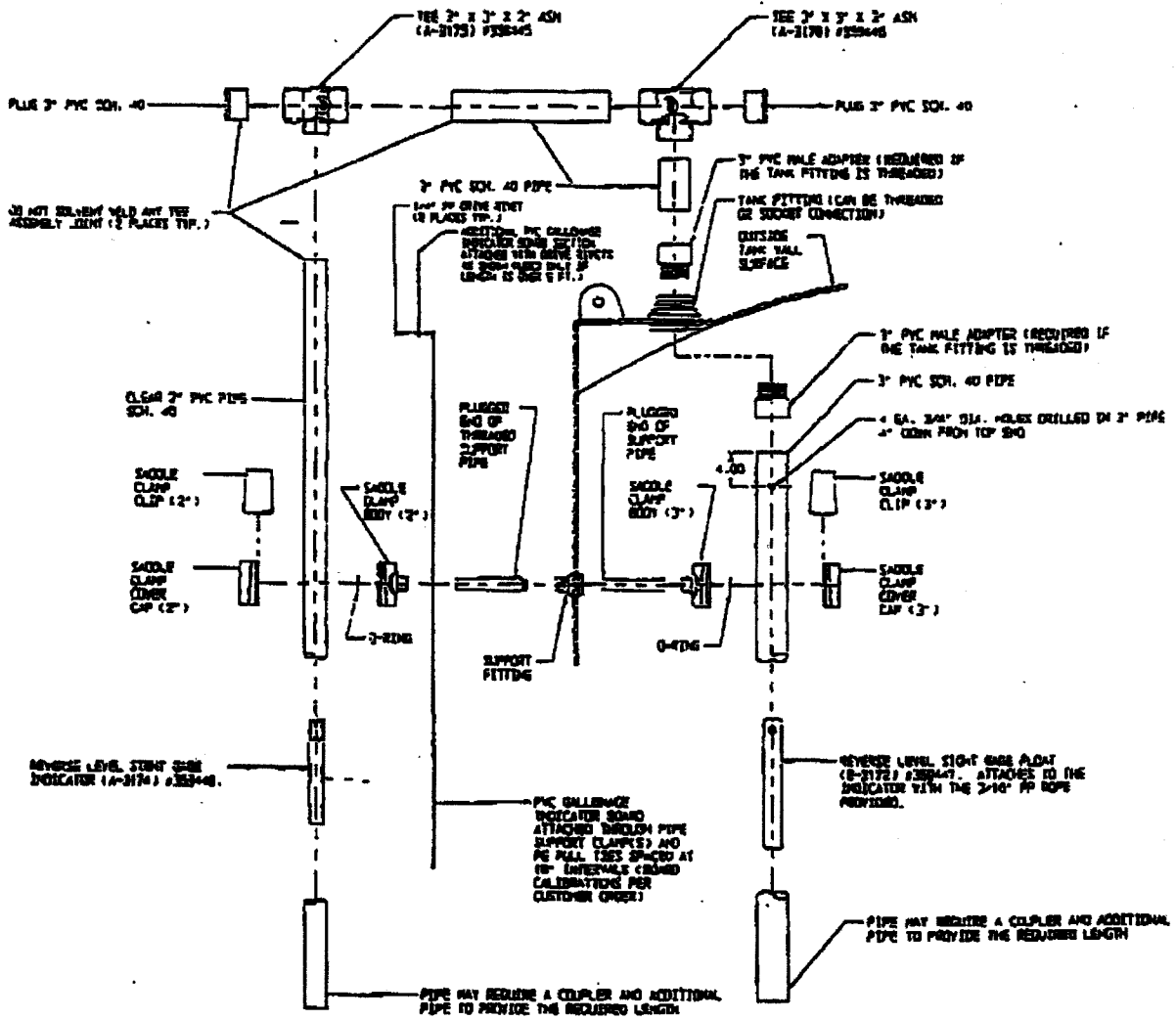
(UNVERTED) 4236

- A. 18" PE THREADED VENTED MANWAY W/15" ACCESS (P/N 343012)
- B. 3" PVC THREADED BY FIG W/EPDM GASKETS, REVERSE ACTION FLOAT LEVEL GALLONAGE INDICATOR & FLOAT GAUGE EXTENSION ASSY (P/Ns 342018, 347267, 347268)
- C. SEISMIC CABLE TIE DOWN SYSTEM (P/N 347329) - 4 PLCS. 90° TYPICAL
- D. FRP LADDER ATTACHMENT (P/N 347387) - NOT SHOWN

ALL DIMENSIONS IN INCHES
 PART # TANK: 530434
 MFR/NATURAL
 1.5 SPGR
 REF: 7408
 07/18/81

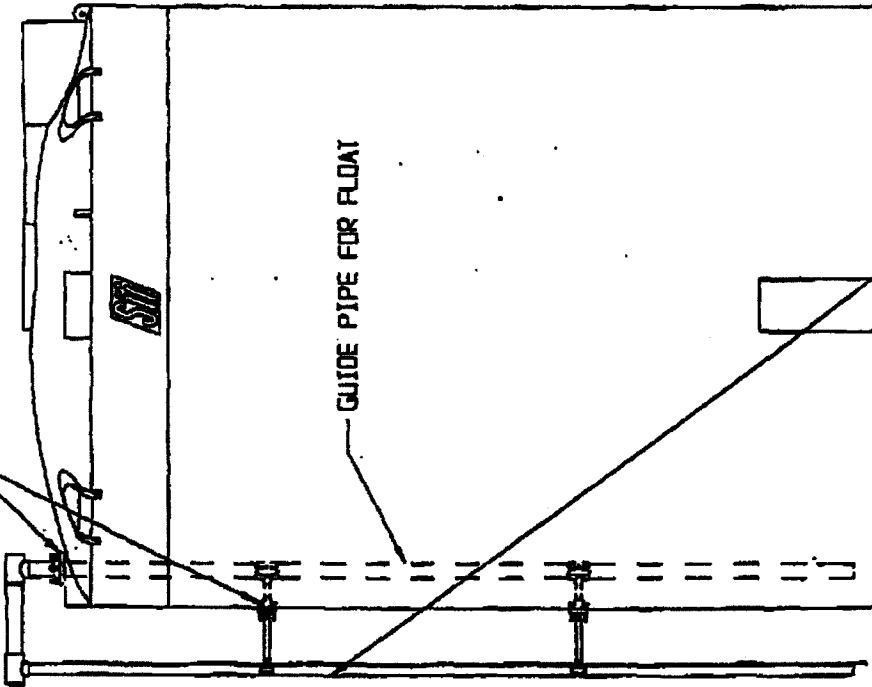
ALL FITTINGS ARE INSTALLED THEN REMOVED AND REPACKAGED IN ORDER TO ELIMINATE DAMAGE IN SHIPMENT

10,500 GALLON FLAT BOTTOM TANK



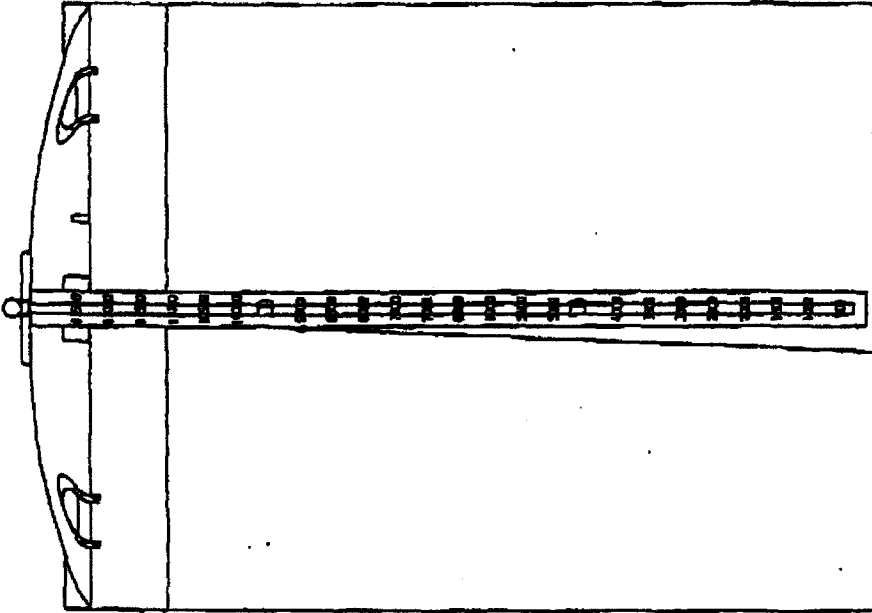
SNYDER INDUSTRIES INC.

FITTINGS SHALL BE DETERMINED BY TANK DESIGN



GUIDE PIPE FOR FLOAT

2" CLEAR SCH. 40 PVC
PIPE FOR GUIDING INDICATOR



PVC SHEET WITH GALLONAGE STENCILED
AT 500 GALLON INTERVALS ATTACHED BEHIND
THE CLEAR PVC PIPE WITH NYLON PULL
TIE-LOCKS AND SUPPORTED WITH
DOWNPIPE BRACKETS

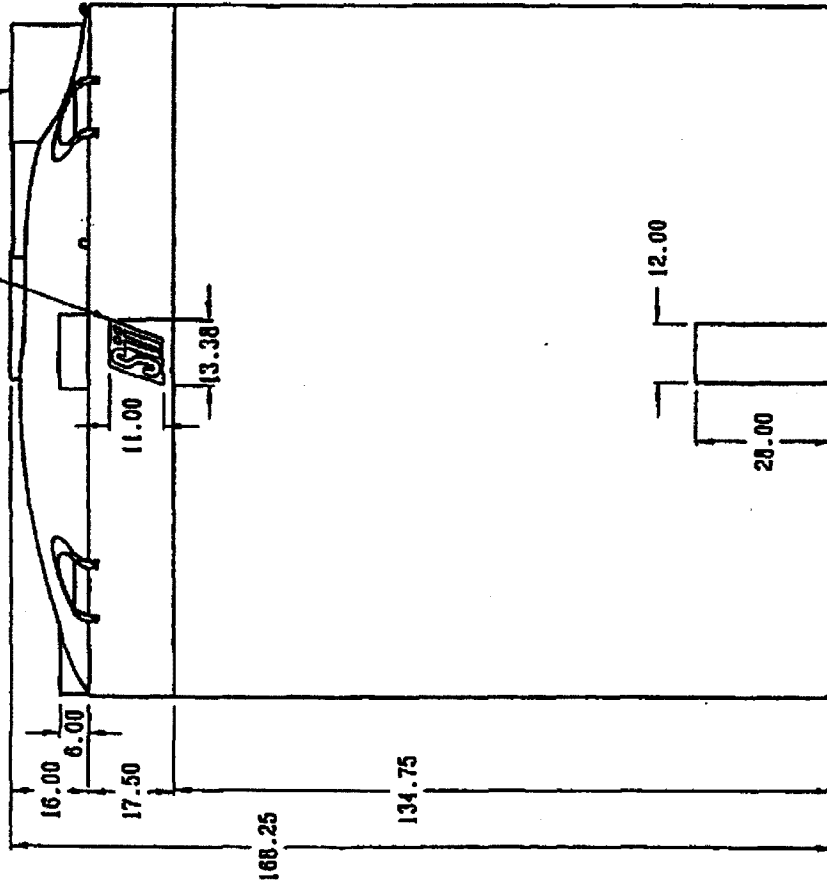
(All dimensions in inches)

PART #S TANK: 6360

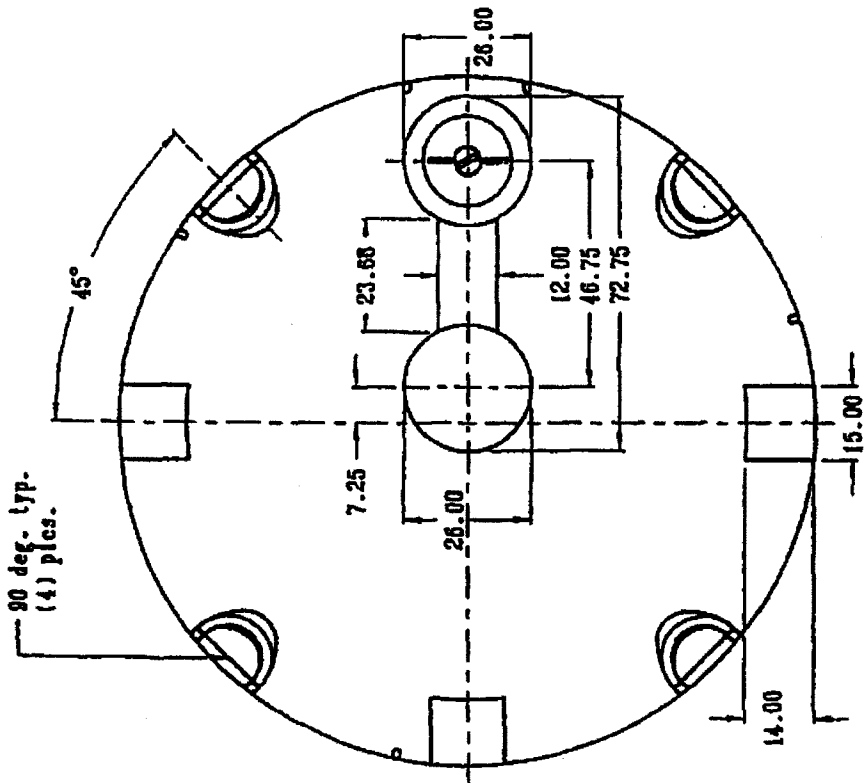
SNYDER INDUSTRIES INC.

18" manway
(15" opening)

logo 4 pics. 80 deg. typ.
2" above flange line



90 deg. typ.
(4) pics.



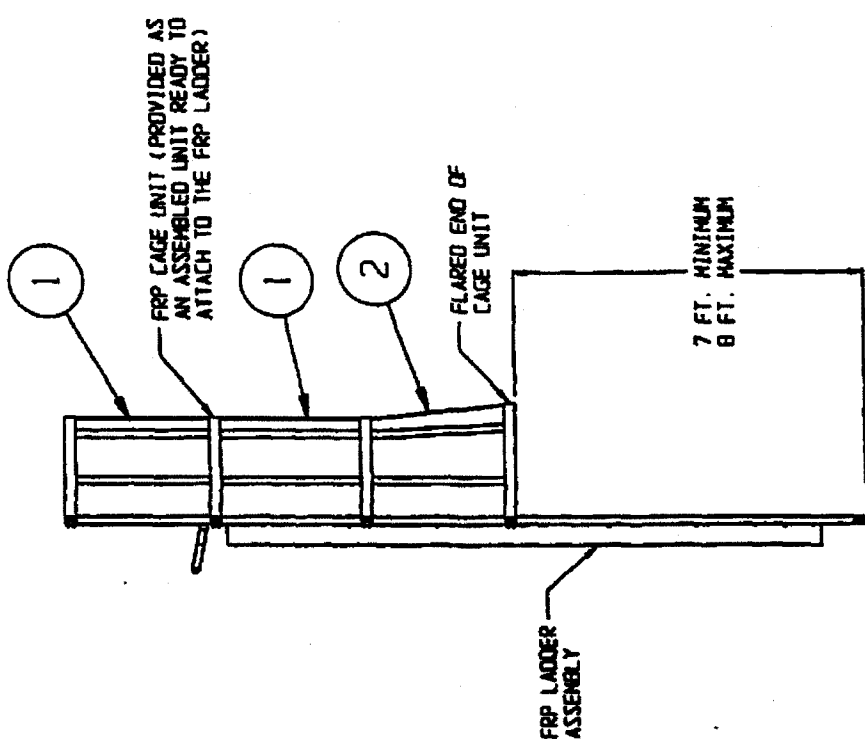
(all dimensions in inches)

PART #S

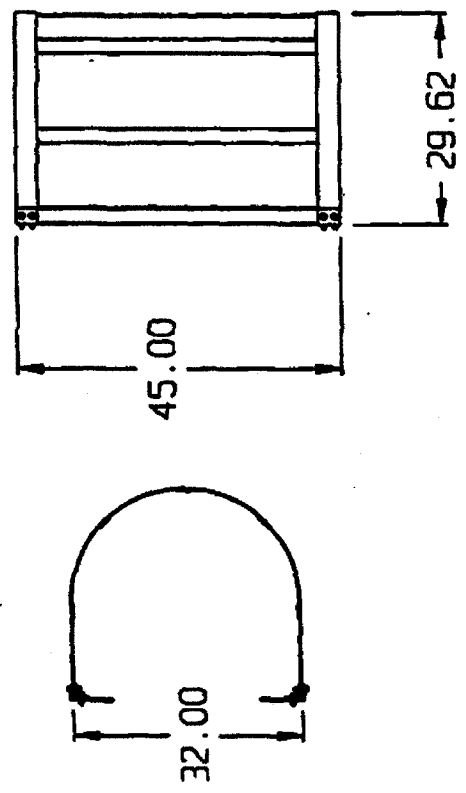
5330--

10500 GAL. FLAT BOTTOM TANK

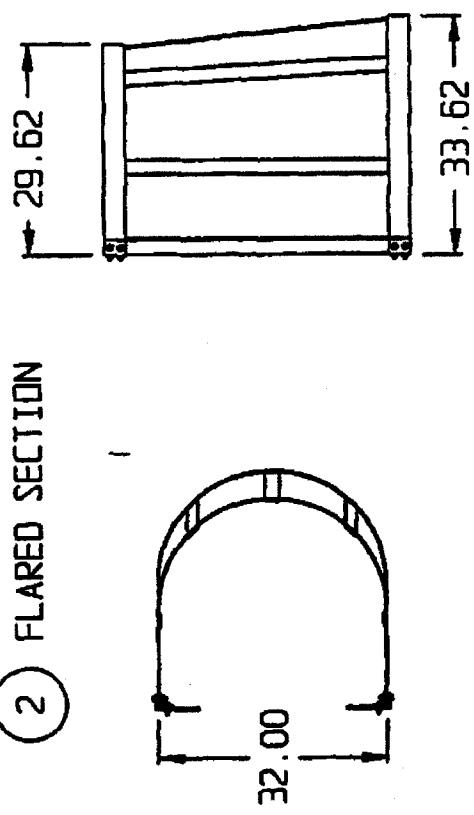
SNYDER INDUSTRIES INC.



1 STRAIGHT SECTION



2 FLARED SECTION



(all dimensions in inches)

PART # CAGE: 347

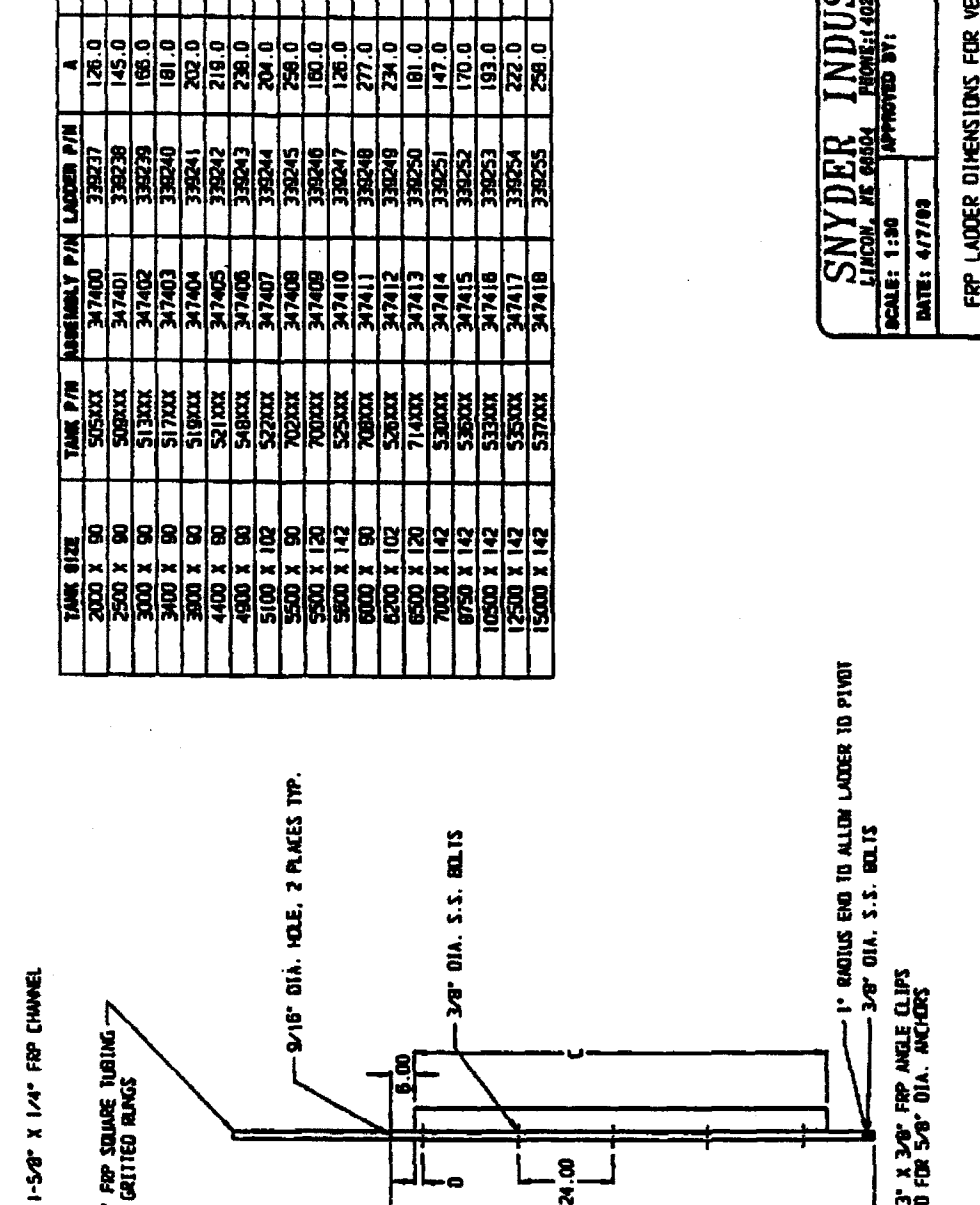
CAGE SECTIONS FOR FRP LADDER

REF#: 0000

05/08/95

REVISIONS		DATE	BY
0	DESCRIPTION		

TANK SIZE	TANK P/N	ASSEMBLY P/N	LADDER P/N	A	B	C	D	E
2000 X 90	505XXX	347400	392237	126.0	85.5	74.0	1	12
2500 X 90	508XXX	347401	392238	145.0	105.0	88.0	2	7
3000 X 90	513XXX	347402	392239	166.0	122.0	112.0	2	4
3400 X 90	517XXX	347403	392240	181.0	141.0	124.0	2	7
3800 X 90	519XXX	347404	392241	202.0	158.0	148.0	2	4
4400 X 90	521XXX	347405	392242	219.0	178.0	160.0	2	8
4800 X 90	548XXX	347406	392243	236.0	197.0	184.0	2	5
5100 X 102	522XXX	347407	392244	204.0	158.0	140.0	10	6
5500 X 90	702XXX	347408	392245	256.0	214.0	186.0	2	12
5500 X 120	700XXX	347409	392246	180.0	120.0	102.0	3	10
5800 X 142	525XXX	347410	392247	126.0	87.0	76.0	2	12
6000 X 90	708XXX	347411	392248	277.0	233.0	220.0	2	7
6200 X 102	526XXX	347412	392249	234.0	190.0	172.0	2	12
6500 X 120	714XXX	347413	392250	181.0	140.0	124.0	2	7
7000 X 142	530XXX	347414	392251	147.0	106.0	88.0	6	8
8750 X 142	536XXX	347415	392252	170.0	130.0	108.0	6	8
10500 X 142	533XXX	347416	392253	193.0	152.0	134.0	6	7
12500 X 142	535XXX	347417	392254	222.0	181.0	170.0	1	12
15000 X 142	537XXX	347418	392255	258.0	217.0	200.0	4	12

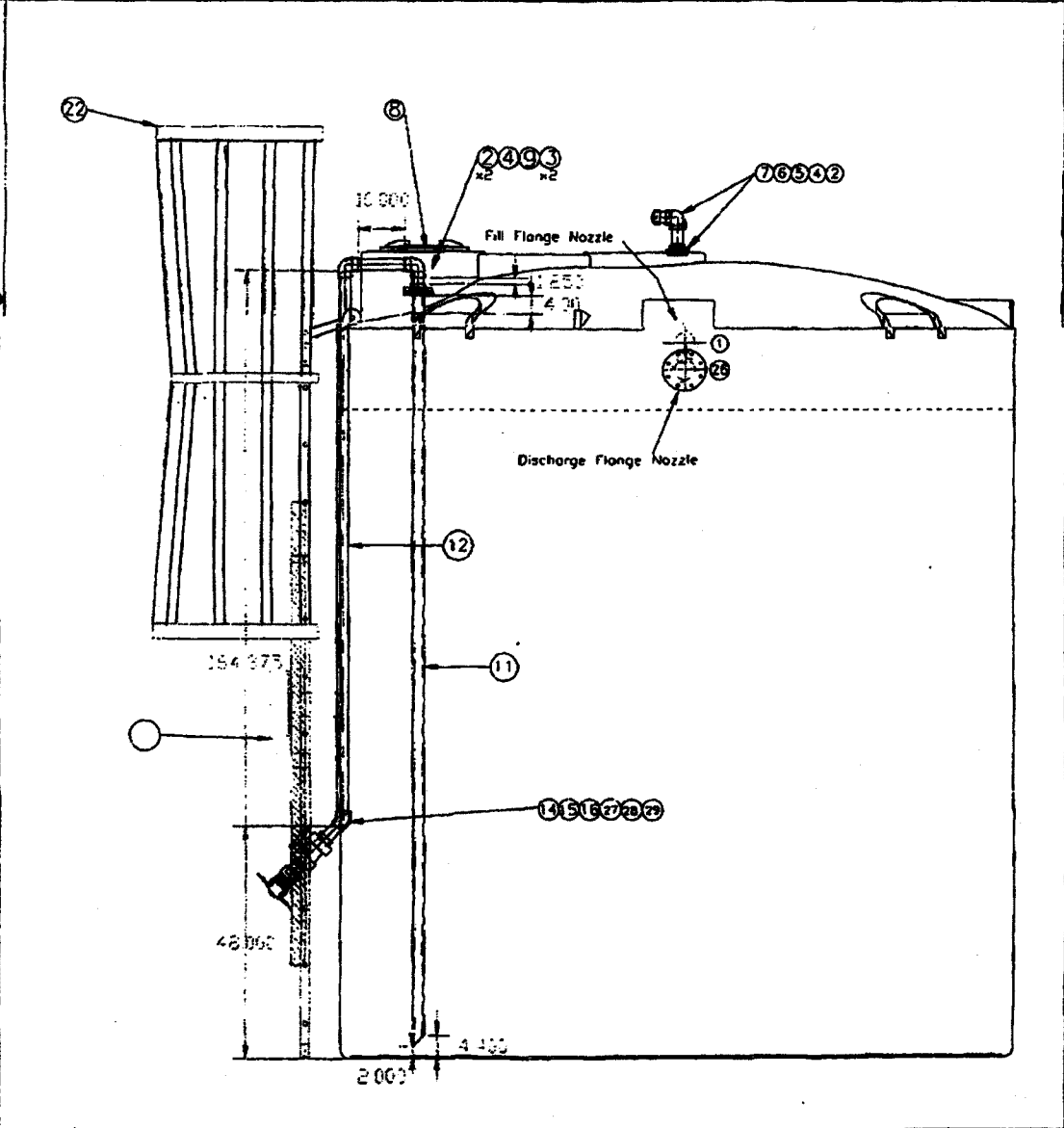


SNYDER INDUSTRIES INC.
 LINCOLN, NE 68504 PHONE: (402) 467-8821 FAX: (402) 467-3247
 SCALE: 1:30 APPROVED BY: _____ DRAWN BY: D.A.O.
 DATE: 6/7/89 REVISION _____

FRP LADDER DIMENSIONS FOR VERTICAL BULK STORAGE TANKS

MATERIAL: FRP (POLYESTER RESIN) AND 304 S.S. DRAWING NUMBER B-2885

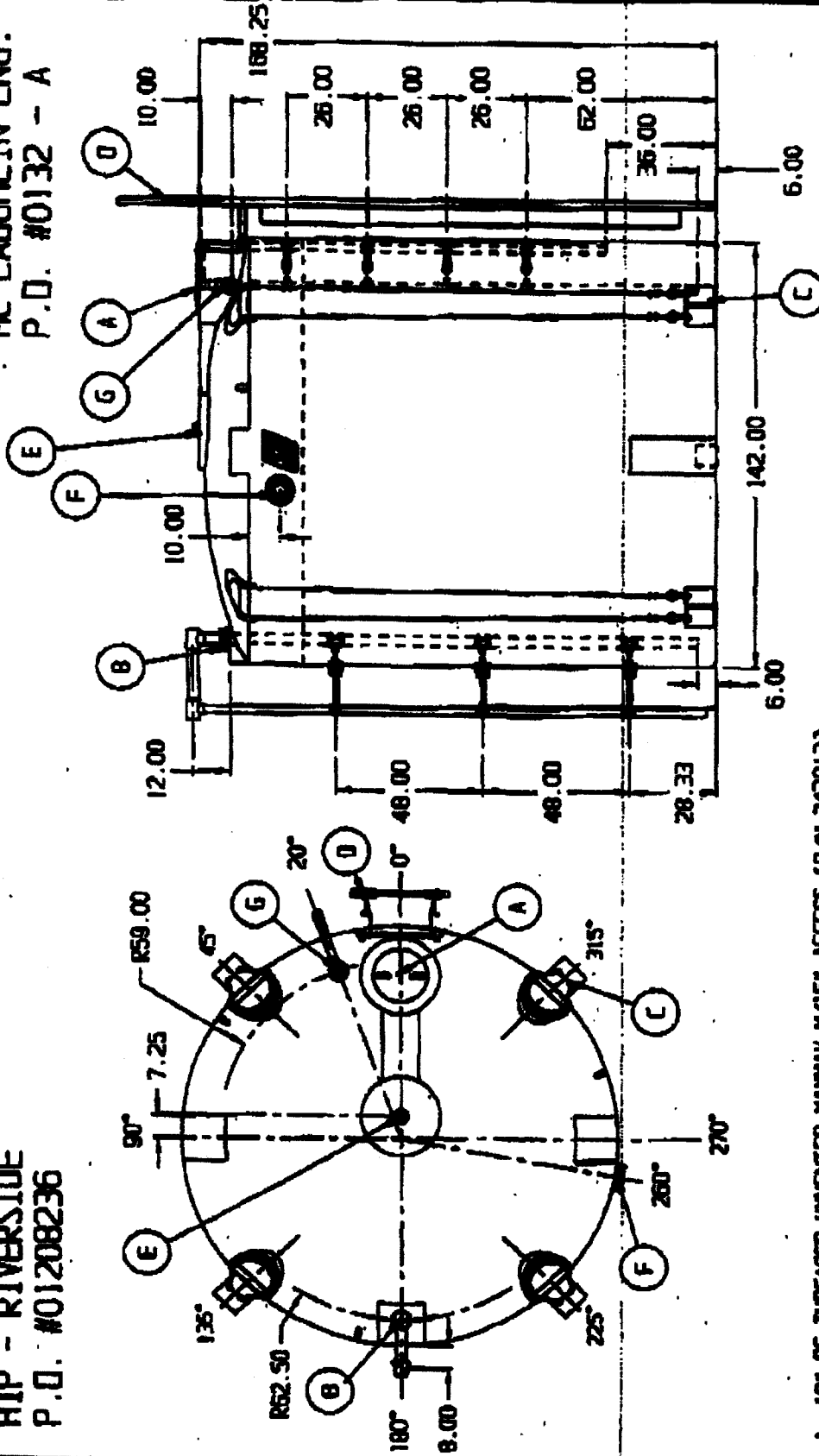
REV	DESCRIPTION	DATE	APPROVAL
30	1 4" Blind Flange for One Tank		
29	1 2.5" SXF Adaptor		
28	1 2.5" x 2" RED-Bushing (SPXS)		
27	1 Short SXMIPT S80 PVC Nipple		
26	1 4" Discharge Flange Nozzle, 6" Stub		
25	2 2" S80 PVC 90° Elbow w/ Pully		
24	1 142"x168" 10.5K Gal. VFBOT Tank		
22	1 194.25" FRP Hoop Ladder Assy.		
21	185 in PolyPropylene Rope		
20	1 Inverse Level Indicator		
19	1 Inverse Level Float Assy.		
18	1 2"x158.5" Clear PVC Pipe		
17	1 2" Peabody HC		
16	1 2.5" Al Camlak Male Dust Plug		
15	1 2.5" Al Camlak FOCxMIPT		
14	1 2" FXF True Union Ball Valve		
13	1 2" Sch 80 PVC 45° Elbow		
12	1 2"x11.75" S80 PVC Drop Line		
11	1 2"x156.75" S80 PVC Dip Tube		
10	1 2"x9" Sch 80 PVC Nipple		
9	1 2"x12" Sch 80 PVC Nipple		
8	1 16" Unvented Lid		
7	1 2" Compression Bulkhead Kit		
6	1 2" Sch 80 PVC Female Cap		
5	3 2"x5.0" Sch 80 PVC Nipple		
4	2 2"x3.25" Sch 80 PVC Nipple		
3	2 Flange Nozzle		
2	3 2" Sch 80 PVC 90° Elbow		
1	1 4" Fill Flange Nozzle, 6" Stub		
Item Qty Description			
13818 Arroyo Ave Gardena, CA 90248 Phone: (310) 321-1355 Fax: (310) 321-1351			
PEABODY			
Drawn by:	10.5K Gal VFBOT Tank w/ Ladder	Rev. no.	072799C B
Checked by:		Date:	07/27/99
Scale:		Scale:	AS SHOWN
Rev. no.	B	Date:	10/17/99
SCALE PAPER SCALE SHEET 1 OF 3			



SNYDER INDUSTRIES INC.

HIP - RIVERSIDE
P.D. #01208236

MC LAUGHLIN ENG.
P.D. #0132 - A



- A. 18" PE THREADED-UNVENTED HANWAY W/15" ACCESS (P/N 343013)
- B. 3" PVC THREADED BH FTG W/EPDM GASKETS, REVERSE ACTION FLOAT LEVEL GALLONAGE INDICATOR & FLOAT GAUGE EXTENSION ASSY (P/Ns 342016, 347267, 347268)
- C. SEISMIC CABLE TIE DOWN SYSTEM (P/N 347329) - 4 PLS. 90° TYPICAL
- D. FRP LADDER, OSHA COMPLIANT (P/N 347416)
- E. 2" PVC THREADED BH FTG W/EPDM GASKETS (P/N 342015)
- F. 4" PVC OBL FLANGED BOLTED FTG W/EPDM GASKETS & SS BOLTS (P/N 347225)
- G. 2" PVC THREADED BH S/A FTG W/EPDM GASKETS, 2" PVC EXTERNAL/INTERNAL DOWNPIPE ASSY W/VITON GASKETS, 14' OF 2" PVC PIPE & (3) 2" PVC SADDLE CLAMP ASSYS W/EPDM GASKETS (P/Ns 342084, 347817, 342050, 347808) - INTERNAL PIPE ENDS 6" ABOVE BOTTOM OF TANK

APPROVED: _____ DATE: _____
 DRAWING NOT VALID UNLESS APPROVED

(all dimensions in inches)

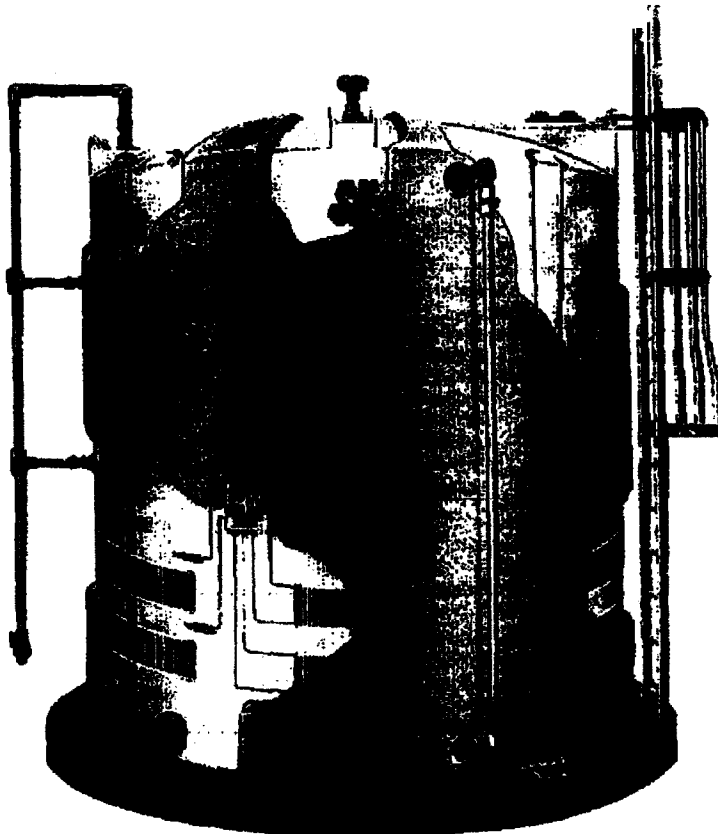
PART # TANK: S33043-1
 HDPE/NATURAL
 1.5 SPGR
 REF: 7409c

ALL FITTINGS ARE INSTALLED THEN REMOVED AND REPACKAGED IN ORDER TO ELIMINATE DAMAGE IN SHIPMENT

10,500 GALLON FLAT BOTTOM TANK

08/28/01

***GUIDELINES FOR
USE AND INSTALLATION***



PROVIDING INDUSTRY WITH TANK SOLUTIONS

***STI SNYDER-CROWN
INDUSTRIAL PRODUCTS***

4700 FREMONT STREET • P.O. BOX 4583 • LINCOLN, NE 68504-4583

TABLE OF CONTENTS

1. TANK LOADING, UNLOADING, AND POSITIONING
 - 1.1 HORIZONTAL TANKS
 - 1.2 SMALL VERTICAL TANKS (LESS THAN 2000 GALLON CAPACITY)
 - 1.3 LARGE VERTICAL TANKS (GREATER THAN OR EQUAL TO 2000 GALLONS)
 - 1.4 INSULATED TANKS
 - 1.5 CAPTOR CONTAINMENT TANKS (ADDITIONAL INSTRUCTIONS)
2. PRE-INSTALLATION NOTES
 - 2.1 TANK OPERATING CRITERIA
 - 2.2 FOUNDATIONS AND SUPPORTS
 - 2.3 TANK FITTINGS AND CONNECTIONS
 - 2.4 TESTING AND FINAL INSPECTION
 - 2.5 ACCESSORY PARTS
3. FITTINGS
 - 3.1 THREADED BULKHEAD FITTING
 - 3.2 SELF-ALIGNING THREADED BULKHEAD FITTING
 - 3.3 BOLTED FLANGE FITTING
 - 3.4 BOLTED STAINLESS STEEL FITTING
 - 3.5 SNYDER UNITIZED MOLDED OUTLET - (SUMO™)
 - 3.6 SIPHON TUBE FITTINGS
 - 3.7 UNIFIED FITTING OUTLET - (UFO™)
4. TANK ATTACHMENTS
 - 4.1 U-VENTS
 - 4.2 DOWN PIPES (TANK FITTING SUPPORTED)
 - 4.3 DOWN PIPES (WELDED BOSS SUPPORTED)
 - 4.4 DOWN PIPES (WELDED PE SUPPORTED)
 - 4.5 DOWN PIPES (INDEPENDENTLY SUPPORTED)
 - 4.6 FLEXIBLE SIGHT LEVEL GAGES
 - 4.7 REVERSE LEVEL SIGHT GAGE
 - 4.8 ULTRASONIC LEVEL INDICATOR
 - 4.9 LEAK DETECTOR UNIT (FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY)
 - 4.10 FLANGE ADAPTERS
5. TANK ACCESSORIES
 - 5.1 LATERAL RESTRAINT SYSTEM (FLAT BOTTOM TANKS)
 - 5.2 WIND/SEISMIC TANK RESTRAINT SYSTEM (FLAT BOTTOM TANKS)
 - 5.3 WIND/SEISMIC TANK RESTRAINT SYSTEM (CONE BOTTOM TANKS)
 - 5.4 STEEL LADDERS
 - 5.5 STEEL LADDER CAGES
 - 5.6 FRP LADDERS (UP TO 300" HEIGHT)
 - 5.7 FRP LADDER CAGES
 - 5.8 HORIZONTAL LEG TANK SKIDS
 - 5.9 EQUIPMENT PLATFORMS (48", 64", 86", 90", AND 142")
 - 5.10 EQUIPMENT PLATFORMS (102" AND 120")
 - 5.11 CONE BOTTOM TANK STANDS
 - 5.12 CONE BOTTOM TANK STAND EXTENSIONS
 - 5.13 HEATED TANKS
6. TANK MAINTENANCE
 - 6.1 TANK INSPECTION
7. SII PRODUCT POLICY STATEMENTS
 - 7.1 SII STANDARD LIMITED WARRANTY
 - 7.2 SII WARRANTY EXCEPTIONS
 - 7.3 RETURN MERCHANDISE/WARRANTY CLAIM PROCEDURE
 - 7.4 WARRANTY INFORMATION

WARNING: It is the installer's responsibility to follow all appropriate NFPA, OSHA, and governmental safety precautions. The following information has been provided as guidelines for tank use and installation. It does not address safety issues which may be present at specific tank installation sites. Use appropriate safety practices when handling any tank and/or using heavy equipment.

1. TANK LOADING, UNLOADING, AND POSITIONING

1.1 HORIZONTAL TANKS

- 1.1.1 Tanks shall be wrapped if ordered by the customer.
- 1.1.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).
- 1.1.3 Tanks should be loaded and unloaded from a horizontal position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.
- 1.1.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER** drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.
- 1.1.5 Upon arrival at the destination, the purchaser and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred or parts are missing, the purchaser should document this on the bill of lading, file a claim with the carrier, and notify the manufacturer prior to putting the tank into service.

1.2 SMALL VERTICAL TANKS (LESS THAN 2000 GALLON CAPACITY)

- 1.2.1 Tanks shall be wrapped if ordered by the customer.
- 1.2.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).
- 1.2.3 Tanks should be loaded and unloaded from a horizontal or vertical position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.
- 1.2.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER** drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.
- 1.2.5 Upon arrival at the destination, the purchaser and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred or parts are missing, the purchaser should document this on the bill of lading, file a claim with the carrier, and notify the manufacturer prior to putting the tank into service.

1.3 **LARGE VERTICAL TANKS (GREATER THAN OR EQUAL TO 2000 GALLONS)**

1.3.1 Tanks shall be wrapped if ordered by the customer.

1.3.2 Tanks should be moved, loaded, and unloaded in a horizontal position with a forklift with protected or rounded fork extensions, or with a crane with a spreader bar and 2 slings of appropriate size positioned on each tank as shown in Figure 1.1. **NEVER** drop a tank off of a truck onto the ground since this may damage the tank and void the tank warranty.

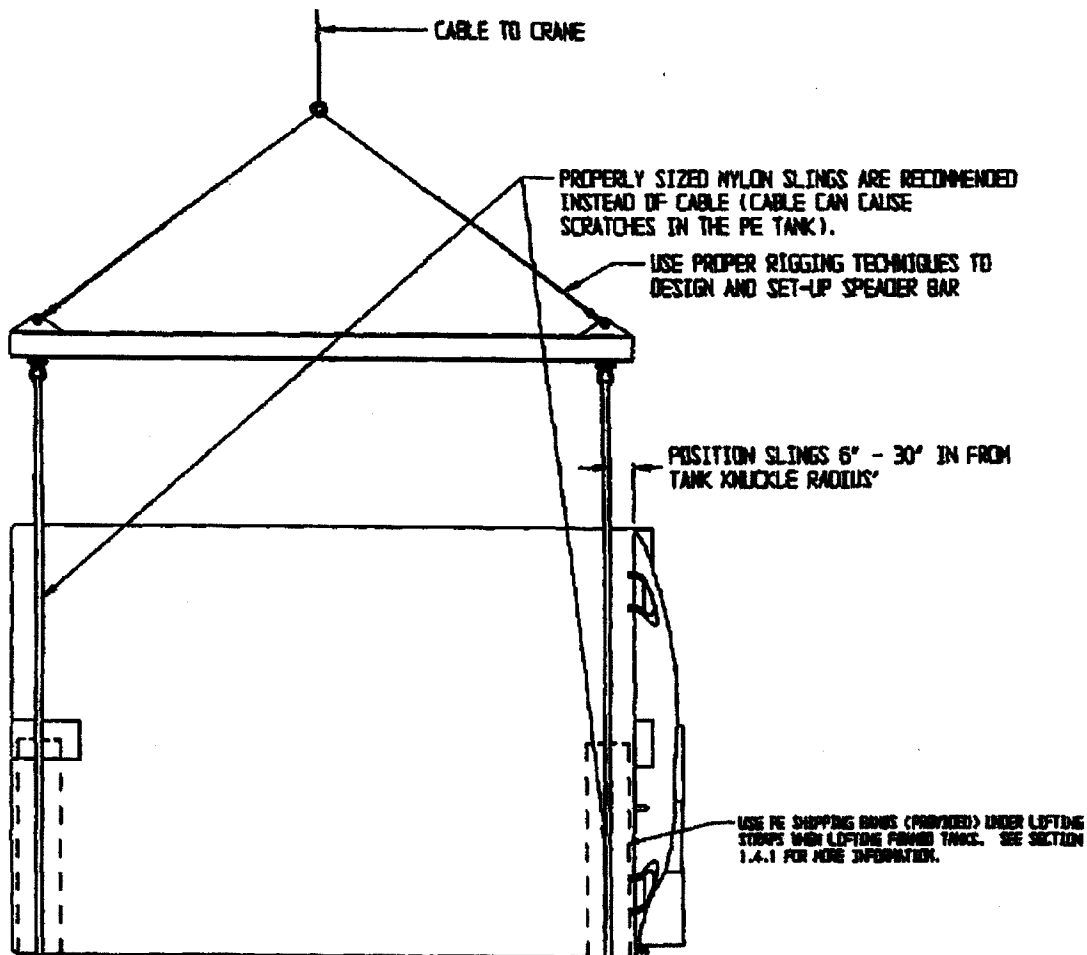


Figure 1.1

1.3.3 Tank lifting lugs are intended for moving the tank from a horizontal position to a vertical position from a firm surface. **Lifting lugs should not be used to load or unload tanks from trailers. This is a dangerous situation since the tank could roll off of the shifting trailer surface as the load is being moved.**

1.3.4 After the tank has been placed on a firm, level surface in a horizontal position, the lifting lugs may be used to erect the tank in a vertical position on an appropriate support pad. The tank should be lifted using a symmetrical arrangement of lugs to disperse the load evenly throughout the tank. To properly attach to the lifting lugs a straight clevis should be used with a minimum open throat distance of 1-1/2" and 1" diameter pins. A minimum of 4 lugs should be attached with equal length cables on all large vertical tank sizes except 142" diameter tanks. 142" diameter tanks require

3 lugs to be attached. All tanks should be positioned with 2 lugs closest to the ground prior to lifting the tank to the vertical position. Refer to Figure 1.2 for additional information.

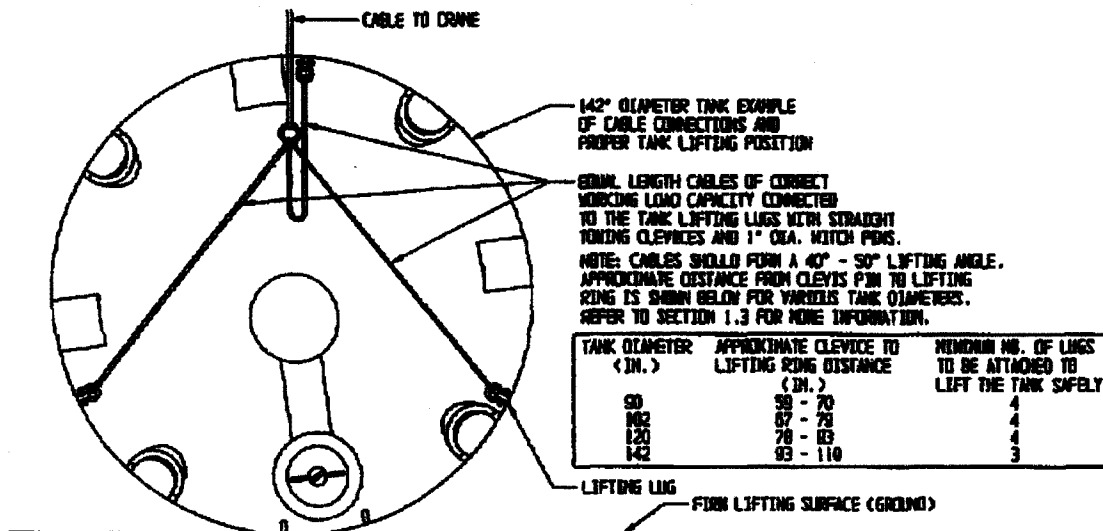


Figure 1.2

1.3.5 Upon arrival at the destination, the purchaser and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred or parts are missing, the purchaser should document this on the bill of lading, file a claim with the carrier, and notify the manufacturer prior to putting the tank into service.

1.4 INSULATED TANKS (ADDITIONAL INSTRUCTIONS)

1.4.1 Insulated tanks must be moved with devices that have large padded contact surfaces to prevent damage to the foam insulation. NEVER allow the tank to drop or roll on rough surfaces as this may damage the foam insulation. When transporting foam insulated tanks, use a 30" wide PE sheet 1/4" or more thick conforming to the curvature of the insulated tank as banding supports. This will assist in decreasing the stress on the foam caused by the banding straps.

1.5 CAPTOR CONTAINMENT TANKS (ADDITIONAL INSTRUCTIONS)

1.5.1 Captor containment tanks are shipped assembled (primary tank inside of containment tank) with a shipping cable assembly holding the two tanks together. Lift and position the tank as per previous instructions. Once the tank is in position, remove the shipping cables from the tank. Do not leave the shipping cables under the tank. Follow standard vertical tank restraining methods shown in section 5.2 to restrain the tank assembly for wind or seismic conditions.

2. PRE-INSTALLATION NOTES

2.1 TANK OPERATING CRITERIA

2.1.1 TEMPERATURE - All standard SII tanks are designed for a maximum continuous service temperature of 100° F. Service temperatures greater than 100° F reduce the strength of the tank. Applications with temperatures greater than 100° F require greater wall thickness to

accommodate this reduction in strength. Please consult factory for applications with service temperatures greater than 100° F.

- 2.1.2 **PRESSURE** - All standard SII tanks are designed for use at atmospheric pressure. Pressure or vacuum situations can cause excessive deformation or damage to the tanks. Please consult factory for applications which may develop pressure or vacuum situations.
- 2.1.3 **CHEMICAL COMPATIBILITY** - Suitability of the tank assembly (tank, fittings, gaskets, etc.) for storing a particular chemical must be confirmed by chemical data (this should have been done by the tank distributor or the end user prior to placing the tank order). However, changes to the tank (i.e. tank accessories, or the service of the tank) can occur. Please consult the factory with any questions.
- 2.1.4 **LOCATION REQUIREMENTS** - There may be location requirements which should be considered prior to placing the tank into service. Some items to consider are: secondary containment; locating the tank in a flood plain; locating a tank in an area where seismic or wind forces may be experienced; and heat from surrounding equipment. It is the responsibility of the end user to ensure that all location requirements have been taken into consideration. Check for all federal, state, and local regulations that may apply to the tank installation. A thorough evaluation of the proposed tank location prior to tank installation is recommended.
- 2.1.5 **TANK ENTRY PRECAUTIONS** - If entry into the tank is necessary, be sure to take all necessary precautions and follow all applicable regulations. Entry into a tank should be considered a "CONFINED SPACE ENTRY" with appropriate OSHA safety precautions required. There are many safety practices which should be considered depending on the specific conditions at the site. Please follow all local, state, and Federal rules and regulations.

2.2 FOUNDATIONS AND SUPPORTS

- 2.2.1 Vertical flat bottom tanks should be positioned on a concrete pad providing adequate support and a method to attach a tank restraint system (see Section 5 for restraint system pad placement criteria). Concrete pad design must be completed by the construction site engineer based on the specific application. A sand mound support can be placed under the tank bottom to promote tank drainage and extend tank life in certain applications. This is recommended for all tanks 10,000 gallons and larger. The sand should be a construction grade utility sand or finer. The tank and pad placement must be done to prevent any erosion of the sand from under the tank. Please refer to Figure 2.1. The sand mound must be very uniform without lumps or foreign objects. Per the chart in Figure 2.1, draw a circle on the tank pad and rake the sand uniformly with zero elevation at the circle perimeter and an elevation in the center per the chart in Figure 2.1. The chart recommendations are nominal dimensions. The best support is a sand mound that follows the normally convex shape of the tank bottom. If the tank bottom is not as convex as the dimensions shown for the sand mound in Figure 2.1, then follow the tank bottom. Adjust the sand mound shape/size so the tank has minimal contact with the sand when properly centered on the mound.
- 2.2.2 Vertical flat bottom tanks with SUMO fittings may require a notch in the concrete support pad just in front of the SUMO fitting for piping and piping accessories. The SUMO fitting has a $\pm 5^\circ$ tolerance for fitting projection off horizontal. Since the SUMO fitting comes out from the tank very near ground level, concrete support pads which project past the SUMO fitting may interfere with the SUMO and/or its piping accessories. SII recommends that the support pad be notched to provide adequate clearance for piping and tank expansion/contraction movement. Please refer to Figure 2.2.
- 2.2.3 Cone bottom or horizontal tanks require specifically designed support structures. Inadequate or improperly designed support structures may cause premature tank failure. Therefore, any support structure that is not of SII manufacture must be approved by SII in writing or **ALL WARRANTIES WILL BE VOIDED.**

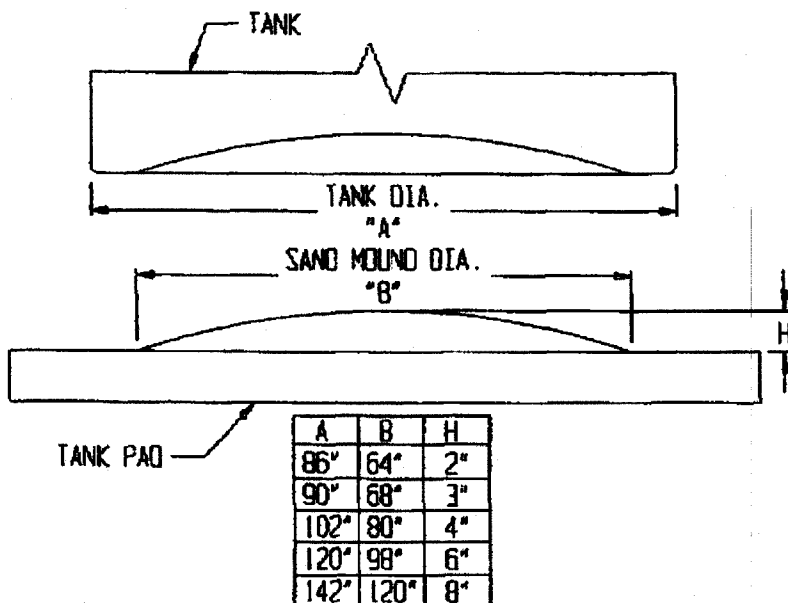
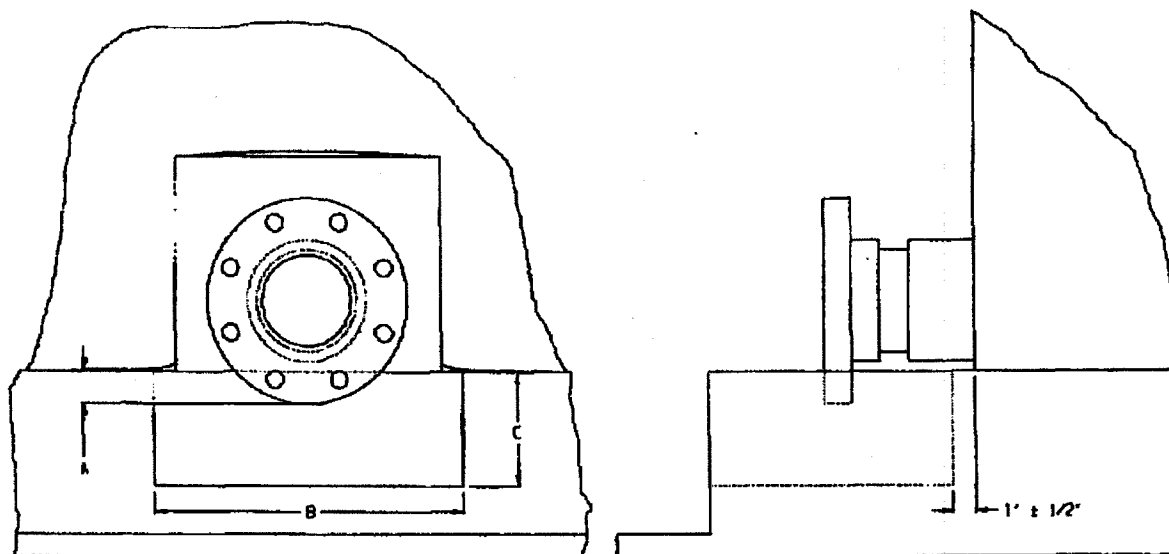


Figure 2.1



- NOTES:
1. TANK MUST BE FULLY SUPPORTED BY A SOLID PAD. (CONSULT A LOCAL CIVIL OR STRUCTURAL ENGINEER).
 2. ALL TANK OUTLETS MUST BE CONNECTED TO PIPING WITH FLEXIBLE CONNECTORS OR EXPANSION JOINTS CAPABLE OF 4X DIMENSIONAL MOVEMENT AS CLOSE TO TANK AS POSSIBLE (18" OR LESS). FLEXIBLE CONNECTION SHOULD BE DESIGNED FOR ±5° ANGULAR MOVEMENT DUE TO TANK EXPANSION/CONTRACTION.
 3. OTHER CONNECTION METHODS ARE AVAILABLE FOR SMD OUTLETS. (FLANGE ADAPTER SHOWN FOR EXAMPLE ONLY)
 4. DIMENSIONS "B" AND "C" ARE RECOMMENDED MINIMUM DIMENSIONS ONLY (NOT REQUIRED).

SIZE	DIM. "A"	DIM. "B"	DIM. "C"
2"	1.13'	10"	5"
3"	1.13'	12"	5"
4"	1.40'	14"	5"
6"	1.35'	15"	5"

Figure 2.2

2.3 TANK FITTINGS AND CONNECTIONS

- 2.3.1 Tank fittings are not typically left installed in the tank since road vibrations, temperature changes, and shipping damage may cause fitting damage and leaks. Customer job site fitting installation insures proper gasket compression and minimizes fitting damage potential. Some distributors sell or install their own tank fittings or accessories. **These fittings or accessories are not warranted by SII.**
- 2.3.2 All tank connections must have adequate provisions for tank expansion/contraction due to temperature and load changes. These provisions should allow 4% dimensional movement. Rigid piping must not be directly connected to tank outlets. SII strongly recommends using expansion joints for all tank connections. **The use of rigid piping or the failure to provide for the expansion of the tank will void all warranties.**
- 2.3.3 FITTING INSTALLATION GENERAL GUIDELINES - If fittings are to be customer drilled and installed, there are some general installation guidelines which may be helpful.
- 2.3.3.1 LOCATION - It is very important that fitting location be carefully considered prior to cutting any holes. SII recommends (fitting size dependent) a 6" minimum centerline height for fittings on tanks less than 3000 gallons with the fitting gasket at least 1-1/2" above or below the end of any tank knuckle radius. SII recommends (fitting size dependent) a 9" minimum centerline height for fittings on tanks 3000 gallons or larger with the fitting gasket at least 3" above or below the end of any tank knuckle radius. SII recommends locating all fittings so gasket seal areas do not go through any tank flange lines or any molded-in tank feature (i.e. gallonage markers, logos, ribs, edges of tank flats, etc.). SII does not recommend field cutting and installation of fittings on insulated tanks. Fittings must be located to avoid interference with tie-down devices and to allow for tightening of fittings nut(s). Mark all of the proposed fitting locations with a marker. Re-inspect all of the locations prior to cutting any holes.
- 2.3.3.2 TOOLS - It is very important to obtain the correct tools before attempting to install any tank fitting. Tools you will need for installing tank fittings properly include:
- *Marker for laying out holes
 - *Tape measure, straight edge, plum-bob (to align fittings meant to be aligned), etc.
 - *1/2" drill motor
 - *Hole saw sized to the O.D. of the fitting body if bulkhead style (see section 3.1, and 3.2).
 - *Hole saw sized to the I.D. of the fitting flange hole or the same size as the fitting's size if flange style (see section 3.3, and 3.5).
 - *Drills for any bolt holes (size +1/16" larger than the size of the bolts)
 - *Deburring tool (a drum sander and 150 - 220 grit sandpaper may also be used)
 - *Wrenches (adjustable, sockets, strap wrench, etc.)
- 2.3.3.3 PROCEDURE
1. Disassemble the fitting and use it as a final location check as noted in 2.3.3.1.
 2. With the center hole marked, cut the tank hole using the correct size hole saw (see 2.3.3.2).
 3. If the fitting is a flange style (see section 3.3 and 3.5) then mark one of the bolt holes using the outer flange. The bolt holes should be oriented so the bolt holes straddle the principal centerline of the tank. With the hole correctly located and marked, drill the bolt hole.
 4. Temporarily install one bolt and position the flange over the main fitting hole.
 5. Mark the bolt hole opposite the bolt hole already drilled and drill that bolt hole.
 6. Temporarily install another bolt and drill the remaining bolt holes using the flange as a guide.
 7. With all of the fitting's holes drilled, gently deburr the hole(s) with the deburring tool. Do not put any nicks or scratches into the tank. Sand any nicks or scratches out with sandpaper greater than 120 grit.
 8. Clean away any debris from the sealing surface of the tank.

9. For tanks greater than 1/2" thick, measure the tank wall thickness. If the wall thickness is not consistent within $\pm 1/32"$ around all of the fitting hole(s), some sanding on the inside of the tank wall will be necessary. This must be done carefully and as little as necessary. The purpose of the sanding is to make the wall thickness even, not to create a flat on the tank wall. The final finish sanding should be done with greater than 120 grit sand paper (preferably 220 grit).
10. With all of the fitting's hole(s) prepared, install the fitting using the instructions from the appropriate section (3.1, 3.2, 3.3, or 3.5). The inside tank wall surface must be clean and smooth at time of fitting installation.

2.4 TESTING AND FINAL INSPECTION

- 2.4.1 After all fittings are installed and all connections to the tank have been made, fill the tank with water and hold for at least 5 hours to identify any leaks. A record of the water pre-test must be submitted to SII to validate the tank warranty.

2.5 ACCESSORY PARTS

- 2.5.1 Various parts must be packaged separately to prevent damage during transportation. These parts are usually bagged or boxed to prevent loss or damage. Some parts may be shipped inside of the tank.

3. FITTINGS

NOTE: The following installation instructions assume the tank has been predrilled and prepared for fitting installation by the factory. See section 2.2 for general tank fitting information if a fitting is to be installed without a factory prepared location. Prior to installing fittings, check the sealing surface for debris and/or scratches which could cause leakage.

3.1 THREADED BULKHEAD FITTING

- 3.1.1 Remove the nut (C) from the fitting body (A) and gasket (B). See Figure 3.1 for part identification.

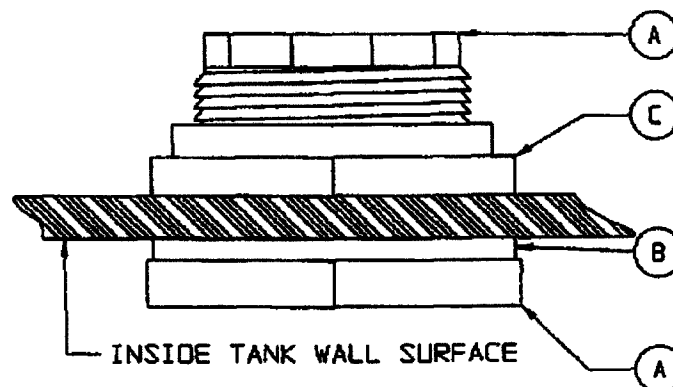


Figure 3.1

- 3.1.2 Working from inside the tank, slide the fitting body (A) through the hole in the tank. The gasket (B) should be between the fitting body flange and the inside tank wall. Install the nut (C) on the fitting threads protruding on the outside of the tank.

- 3.1.3 To obtain proper gasket compression for bulkhead fitting installation, tighten the fitting nut hand tight (check to see if it engages the tank wall). Tighten the nut an additional 3/4 turn for fittings less than 1 in., or 1/3 turn for fittings 1 in. or larger. A light lubricant, such as PAM cooking spray, is recommended to prevent thread seizing on bulkhead fittings. Inspect the gasket to make sure it is fully contacting the inner surface of the fitting body flange and the inside tank wall. Gasket compression should be between 25 - 50%. Recheck fitting tightness periodically.

3.2 SELF-ALIGNING THREADED BULKHEAD FITTING

- 3.2.1 Follow the same procedures as detailed under threaded bulkhead fitting installation steps 3.1.1 - 3.1.3.
- 3.2.2 Piping should be installed into the fitting ball with an appropriate thread sealant (i.e. Teflon® pipe sealant). Adjust the piping to the required angle (within the limits of the fitting). When the piping has been located as required, tighten the PVC ball retainer ring located on top of the PVC ball.

3.3 BOLTED FLANGE FITTING

- 3.3.1 The bolted flange fitting shall be constructed with 2 ea. 150 lb. flanges (C1 and C2), 2 ea. 150 lb. flange gaskets (D1 and D2), the correct number of full threaded bolts (A), bolt gaskets (B), flat washers (E), lock washers (F), and hex nuts (G) for the flange specified. NOTE: If the tank wall thickness is greater than or equal to 0.75", the inner flange (C1) and the inner flange gasket (D1) may be omitted in certain low stress applications only. Please consult factory prior to omitting any components or the tank warranty may be voided. Refer to Figure 3.2 for part identification.
- 3.3.2 Disassemble the fitting as shipped by removing the bolt's hex nuts, lock washers, flat washers, outer flange, and outer flange gasket. Locate the fitting hole on the inside of the tank and insert the bolts (still installed on the inner flange and gasket) through the drilled holes in the tank. Place the outer flange gasket over the bolts on the outside surface to the tank. Place the outer flange over the outer gasket and bolts. Install the flat washers, lock washers, and hex nuts on the bolts. Check to make sure the fitting assembly appears as shown in Figure 3.2.

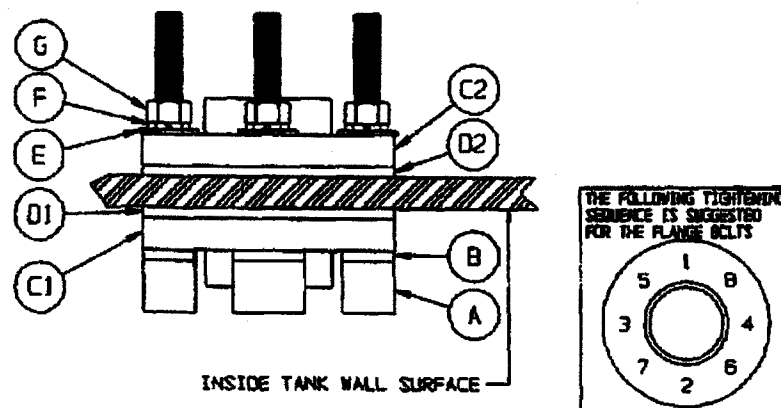


Figure 3.2

- 3.3.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gaskets engage the tank wall and the lock washers are compressed. Tighten each nut an additional 3 turns (2 turns if the inner flange and gasket are not utilized) using the same sequence (do not tighten more than 1 turn at a time). A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. Recheck fitting tightness periodically.

3.4 BOLTED STAINLESS STEEL FITTING

- 3.4.1 The bolted stainless steel fitting shall be constructed with 1 ea. inside flange with studs (A), 2 ea. fitting gaskets (B), 1 ea. outside flange (C), and the correct number of lock washers (D), and hex nuts (E) for the fitting specified. Refer to Figure 3.4 for part identification.

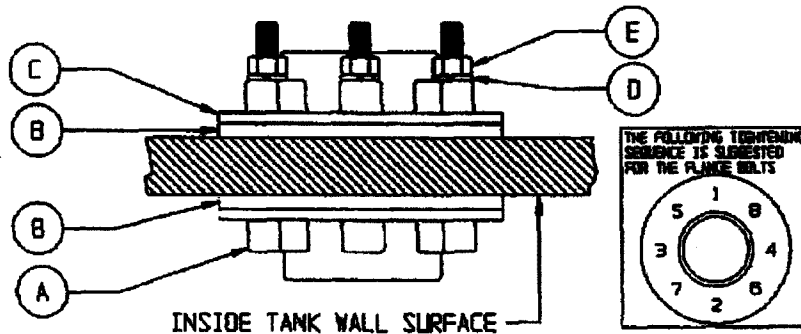


Figure 3.4

- 3.4.2 Disassemble the fitting as shipped by removing the hex nuts, lock washers, outside flange and outside flange gasket. Locate the fitting hole on the inside of the tank and insert the fitting's studs through the drilled holes in the tank. A gasket (B) should be between the inside fitting flange and the inside tank wall. Place the outside flange gasket and outside flange over the studs on the outside surface of the tank. Install the lock washers and hex nuts on the studs. Check to make sure the fitting assembly appears as shown in Figure 3.4.

- 3.4.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gasket engages the tank wall and the lock washers are compressed. Tighten each nut an additional 1-1/4 - 2 turns using the same sequence (do not tighten more than 1 turn at a time). Do not apply more than 15 ft. - lbs. of torque. A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. Recheck gasket tightness periodically.

3.5 SNYDER UNITIZED MOLDED OUTLET - (SUMO™) (PATENT NO. 5,374,026)

- 3.5.1 The SUMO fitting shall be constructed with 1 ea. smaller o-ring (A), 1 ea. larger o-ring (B), and 1 ea. SUMO adapter (C). Refer to Figure 3.5 for part identification. **NOTE - The tank is shipped with a shipping stabilizer installed in the SUMO outlet. NEVER move the container without the shipping stabilizer installed.**

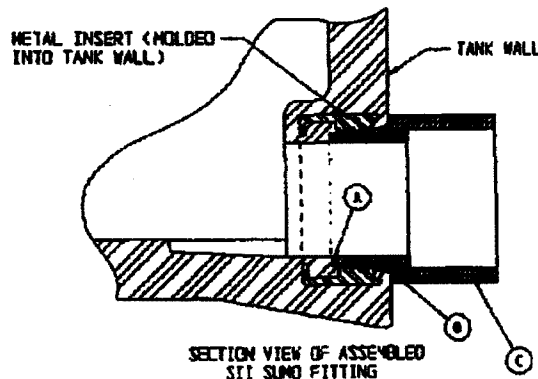


Figure 3.5

- 3.5.2 Once the tank has been properly placed on its foundation, remove the shipping stabilizer and clean away any dirt or debris from the SUMO outlet threads and o-ring seats. Use only a soft moist cloth. **NEVER USE A TOOL THAT COULD SCRATCH THE O-RING SEATS.**
- 3.5.3 Install the smaller o-ring inside the SUMO molded-in fitting. Make sure it is placed in the o-ring seat area evenly. Carefully stretch the larger o-ring enough to install it on the SUMO adapter. Only a SII SUMO adapter may be used. Use of a non-approved adapter may void warranty. The o-ring may be lubricated with a suitable lubricant such as water. Screw the adapter in until the step on the adapter is flush with the tank wall. Do not over-torque the adapter (25 ft. - lbs. of torque maximum). Figure 3.5 shows a sectional view of an assembled SUMO fitting.
- 3.5.4 Once the SUMO adapter is installed, other components may be attached to the adapter. A union or flange adapter with a flexible expansion joint should be installed as close to the tank as possible to allow for future disassembly. The SUMO fitting must have adequate clearance for any piping accessories and allow for a $\pm 5^\circ$ outlet angle change. Consult factory for pad and/or accessory clearance questions. A notch in the tank support pad may be necessary (see Figure 2.2).

3.6 SIPHON TUBE FITTINGS

- 3.6.1 Siphon tubes may be added to the fittings specified in sections 3.1, 3.3, 3.4, and 3.5. Siphon tubes shall be customer installed with the tank in a vertical position after fitting installation.
- 3.6.2 PVC and CPVC siphon tubes need to be solvent welded with the proper solvent cement into the socket of a previously installed fitting. Threaded siphon tubes need to be threaded in place with Teflon® pipe sealant applied to the threads prior to the fitting being installed.

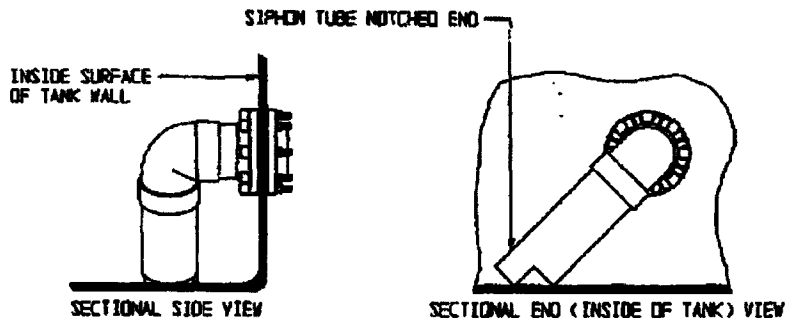
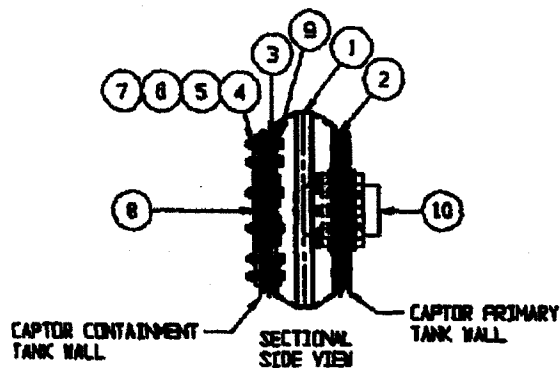


Figure 3.6

- 3.6.3 Siphon tubes should be located with the cut notch corner in close proximity of the floor of the tank for maximum drainage, and the siphon tube tilted to the side of the fitting. Refer to Figure 3.6 for proper placement of the siphon tube in the tank.
- 3.7 **UNIFIED FITTING OUTLET (UFO™) - FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY**
- 3.7.1 The Unified Fitting Outlet (UFO™) is a flexible outlet device that allows primary tanks to be equipped with sidewall fittings while maintaining a seal between the primary and containment tanks that moves with tank expansion/contraction. The UFO will allow 2 to 4 in. bolted fittings to be utilized while maintaining a flexible containment seal. This option is normally a factory installed option for use with a Captor containment tank assembly only. This option can be field installed. Consult factory for more details. The bolted fittings used with this option follows the same sealing/tightening criteria as detailed in sections 3.3 and 3.4. An example of this option (patent pending) is shown in Figure 3.7.



10	PROPER BOLTED FITTING ASSEMBLY	1
9	FLANGE 1PC. S.S. CAPTOR FITTING BOOT	1
8	FLANGE 2PC. S.S. CAPTOR FITTING BOOT	1
7	NUT HEX S.S.	12
6	WASHER LOCK S.S.	12
5	WASHER FLAT S.S.	24
4	BOLT S.S.	12
3	GASKET - CAPTOR BOOT 12 BOLT FLANGE	1
2	GASKET - BOLTED FITTING	1
1	FITTING BOOT - CAPTOR	1
ITEM	PART DESCRIPTION	QTY

Figure 3.7

4. TANK ATTACHMENTS

4.1 U-VENTS

- 4.1.1 Standard u-vents are constructed from PVC or CPVC and are provided with a loose male adapter. This allows the u-vent to be cut to the desired height. A threaded or solvent welded socket fitting can be used. U-vents can be purchased with an optional bug screen insert (CPVC and fiberglass materials) installed.
- 4.1.2 When installing the u-vent in a solvent weld socket fitting, solvent weld the u-vent with the proper solvent cement in the desired position into a previously installed fitting. If the u-vent is to be used in a threaded fitting, solvent weld the male adapter provided to the u-vent and install the u-vent assembly into a previously installed threaded fitting. Refer to Figure 4.1 for an exploded illustration of this assembly.

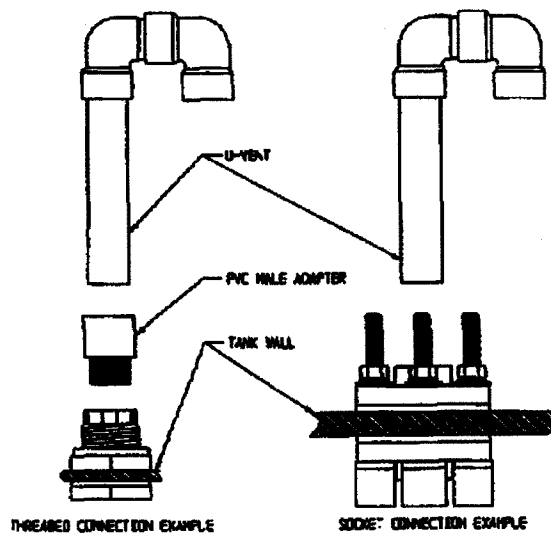


Figure 4.1

4.2 DOWN PIPES (TANK FITTING SUPPORTED) - EXTERNAL AND/OR INTERNAL

- 4.2.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. All down pipes shall be supported at 5 ft. maximum intervals with the support structures provided.
- 4.2.2 Assemble the piping loosely using Figure 4.2, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 4.2.
- 4.2.3 Assemble and install support structures as shown in Figure 4.2 (without the saddle clamp cover caps and clips). Make sure the support clamp orientation is correct (with the small width of the

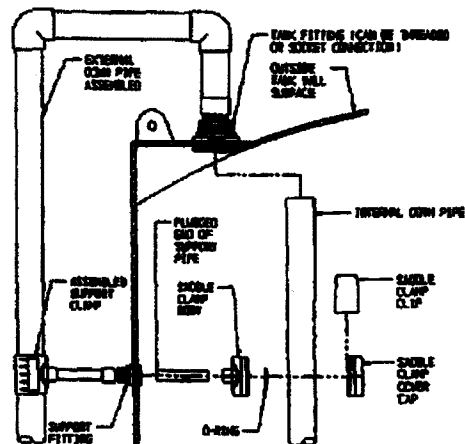


Figure 4.2

wedge toward the top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections with Teflon® pipe sealant and connect solvent weld sockets with solvent cement.

4.3 DOWN PIPES (WELDED BOSS SUPPORTED) - EXTERNAL AND/OR INTERNAL

- 4.3.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. All down pipes shall be supported at 5 ft. maximum intervals with the support structures provided.
- 4.3.2 Assemble the piping loosely using Figure 4.3, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 4.3.
- 4.3.3 Assemble and install support structures as shown in Figure 4.3 (without the saddle clamp cover caps and clips). Since the support fitting does not penetrate the tank wall, the threaded connection to the support fitting does not need pipe sealant. Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank). Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections (except the support fittings) with Teflon® pipe sealant and connect solvent weld sockets with solvent cement.

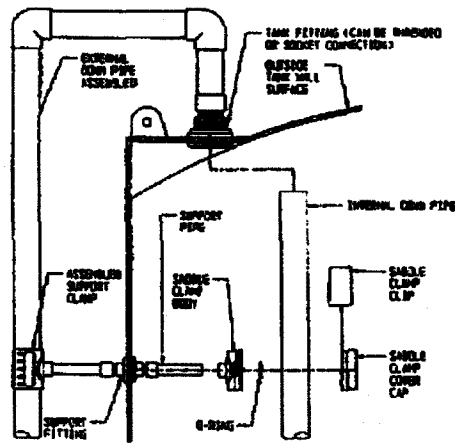


Figure 4.3

4.4 DOWN PIPES (WELDED PE SUPPORTED) - EXTERNAL AND/OR INTERNAL

- 4.4.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. All down pipes shall be supported at 5 ft. maximum intervals with the support structures provided.
- 4.4.2 Assemble the piping loosely using Figure 4.4, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. The piping should be inserted into the holes in the welded support structures prior to installing the fitting in the tank. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 4.4. Seal all threaded pipe connections with Teflon® pipe sealant and connect solvent weld sockets with the correct type of solvent cement.

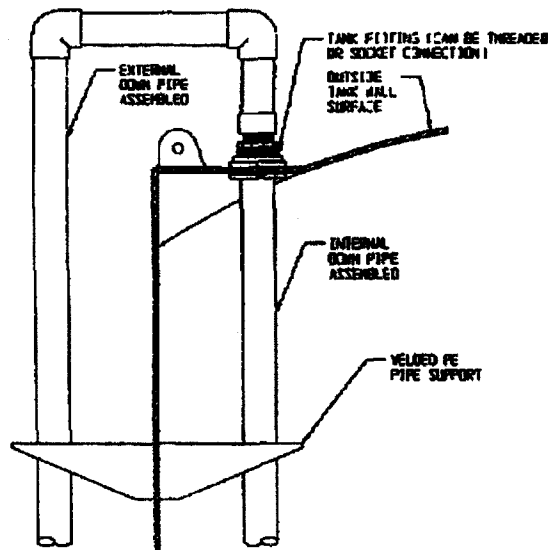


Figure 4.4

4.5 DOWN PIPE - INDEPENDENTLY SUPPORTED - (EXTERNAL ONLY)

- 4.5.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. All down pipes shall be supported at 42 in. maximum intervals with the support clamps provided.
- 4.5.2 Assemble the piping loosely using Figure 4.5, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. Mark the strut post base on the concrete when in proper position. Install 2 ea. 3/8" adhesive anchors and bolt base into position. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 4.5.
- 4.5.3 Assemble and install support structures as shown in Figure 4.5. Make sure the support clamps are spaced evenly. Locate the strut catchers and twist 90° to lock in place. Install the clamps to the strut catchers with the #10 screws provided. Clamps 3 in. and larger require 2 ea. strut catchers, #10 screws and #10 washers. The pipe will click into position in the clamps. Make sure all clamps have clicked to full engagement and are tight. Assemble and install piping as per the customer approval

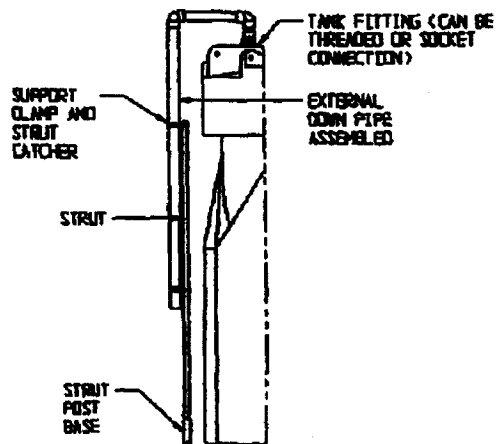


Figure 4.5

drawing. Seal all threaded pipe connections with Teflon® pipe sealant and connect solvent weld sockets with solvent cement.

4.6 FLEXIBLE SIGHT LEVEL GAGES

- 4.6.1 Sight level gage assemblies are shipped loose and have been cut to size to meet customer specifications. Sight gages may be ordered with either no valve, 1, 2, or 3 valves. Please refer to the customer approved drawing to determine the number of valves required.
- 4.6.2 Using the assembly drawings shown in Figure 4.6, verify that all parts are present and assemble the unit per the appropriate drawing. Seal all threaded pipe connections with Teflon® pipe sealant. Gallonage decals may be purchased as separate items and customer applied to the tank to assist in indication of tank gallonage. NOTE - Gallonage decals are not available for all tank sizes.

4.7 REVERSE LEVEL SIGHT GAGE

- 4.7.1 The component parts (except the rope) have been cut to meet SII and customer specifications. The sight gage shall be supported at 5 ft. maximum intervals to the liquid holding tank with the support structures provided.
- 4.7.2 Assemble the piping loosely using Figure 4.7, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to length. As soon as all parts have

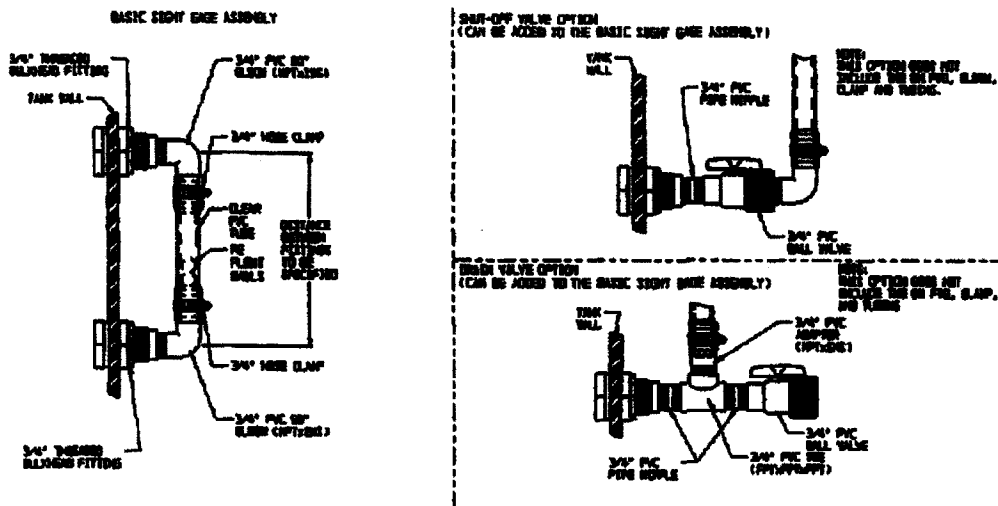


Figure 4.6

been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 4.7. **NOTE** - Do not use solvent weld cement on the outside joints indicated in Figure 4.7. SII recommends periodic inspection of the rollers in the tee assemblies and the rope to ensure proper operation of the gage. If it is a requirement to seal these joints, a silicone based caulking should be sufficient.

- 4.7.3 Assemble and install the support structures as shown in Figure 4.7 (without the saddle clamp cover caps and clips). Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Make sure that the indicator board has been installed over the outer pipe supports as shown in Figure 4.7. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections with Teflon® pipe sealant and connect solvent weld sockets with the correct solvent cement (except the joints as noted in Figure 4.7).
- 4.7.4 With the inner and outer tank pipes in place, connect the rope provided to the tank float (This is accomplished by threading the rope through the center hole in the float and out one of the side holes, double knotting the rope, cutting off any excess material and pulling the rope back so the knot holds under the center hole.) and lower it into the inner pipe as shown. Thread the rope through the tee assemblies and the connecting pipe as shown. At this point the float should be at the bottom of the tank, the tee assemblies and connecting pipe should be assembled and sitting off at an angle from the outer clear 2" PVC pipe. With the rope threaded through the outer tee assembly, attach the rope to the indicator in a position parallel with the zero mark on the indicator board. (This is accomplished by threading the rope through the center hole in the indicator, double knotting the rope, checking the indicator position, adjusting as necessary and cutting any excess material protruding from the bottom of the indicator.) Put the indicator into the outer clear 2" PVC pipe while swinging the tee assemblies and connecting pipe into position. With all piping and tee assemblies installed, install the 3" PVC pipe plugs. During the tank hydrotest and first operations of the tank, check the gage for proper level indication and adjust as necessary. **NOTE** - This is a gallonage indicator and is not intended as an accurate measuring device.

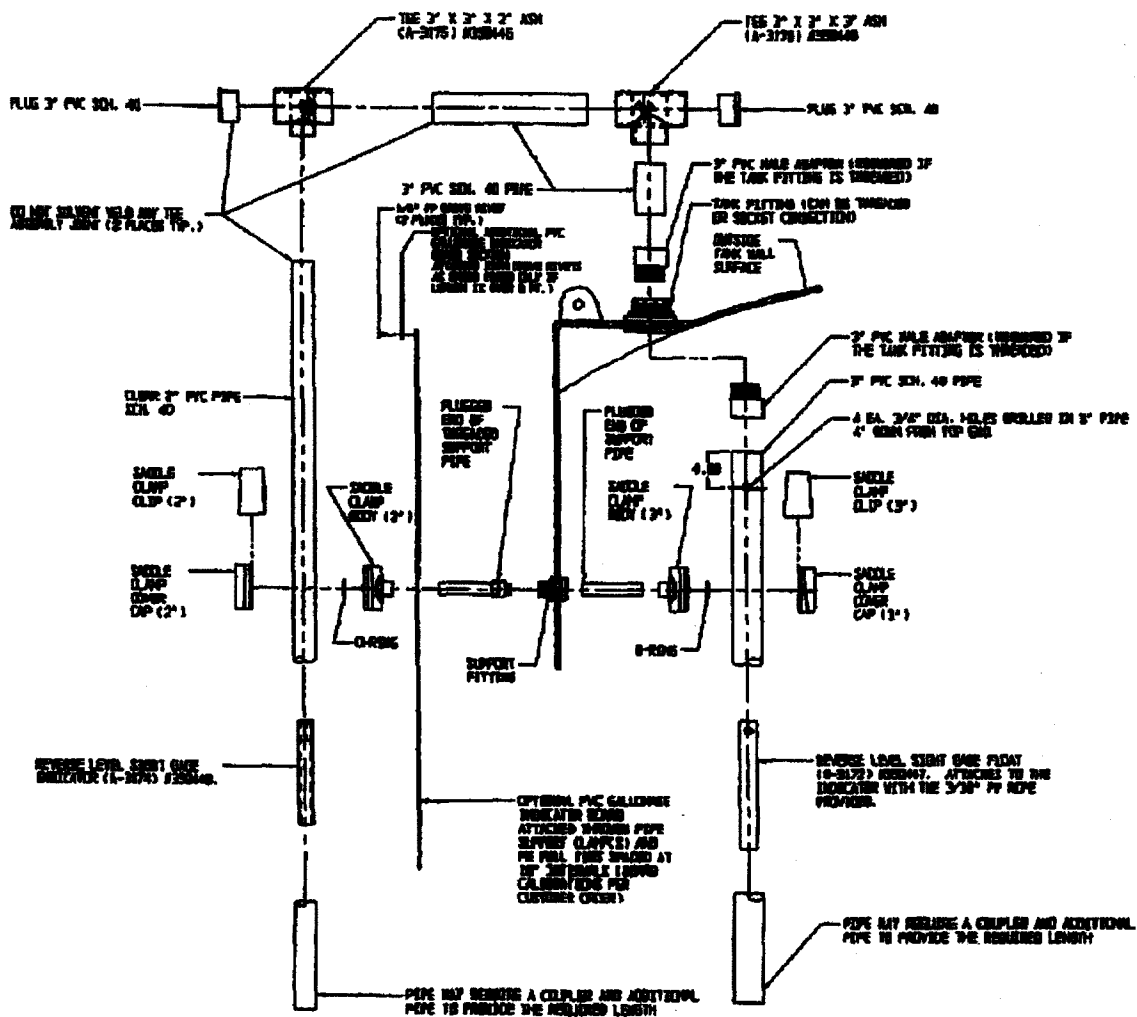


Figure 4.7

4.8 ULTRASONIC LEVEL INDICATOR

4.8.1 Install the PE bulkhead fitting per section 3.1 for sensors with male pipe threads. Install the sensor into the fitting with Teflon® pipe sealant. Remove the display unit box cover. Attach the display unit to the PE mounting plates provided on the tank with 4 ea. #10 S.S. Self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Attach the unit to 110 VAC and test unit. The display unit is preprogrammed for the tank ordered. The display will show hundreds of gallons (display x 100 = gallons). Refer to literature shipped with unit to answer any additional questions.

4.9 LEAK DETECTOR UNIT (FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY)

4.9.1 The leak detector unit consists of a proximity sensor, 2 in. FPT fitting connection, 2 in. bung plug, 3/4 in. strain relief, and an indicator box. Install the 3/4 in. strain relief into the 2 in. bung plug. Loosely install the proximity sensor cord into the strain relief with the sensor face to the inside of the plug assembly. Place the sensor in the interstitial space between the primary and secondary tanks approximately 1 in. above the tank bottom and securely tighten the strain relief to hold the sensor and

sensor cord into position. Remove the indicator box cover. Attach the indicator box to the PE mounting plates provided on the tank with the 2 ea. #10 S.S. self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Connect unit to 110 VAC per label in the box using strain relief provided or other acceptable methods and test the unit. The indicator box will show a green light when power is on and the sensor is not detecting a liquid. The light is a push to test light allowing the operator to test for power outage or malfunction. If the green light goes out there are two possibilities. The green light does not come on when the button is pushed. This would indicate a lack of power to the unit or the light bulb is burned out. If the green light comes on when pushed, then a possible leak condition is indicated.

4.10 FLANGE ADAPTERS

- 4.10.1 Standard flange adapters are constructed from PVC or CPVC and may be purchased for solvent weld socket fittings or threaded fittings. Flange adapters for threaded fittings are provided with loose male adapter to allow the customer to adjust adapter length and flange position to match the piping at the installation. Refer to Figure 4.10 for an illustration of a flange adapter.
- 4.10.2 When installing the flange adapter in a solvent weld socket fitting, cut the flange adapter to desired length and solvent weld the flange adapter with the proper solvent cement in the desired position in a previously installed fitting. If the flange adapter is to be used in a threaded fitting, install the male adapter into the fitting with Teflon® pipe sealant, cut the flange adapter to the desired length, and solvent weld the flange adapter to the male adapter in the desired position with the proper solvent cement.

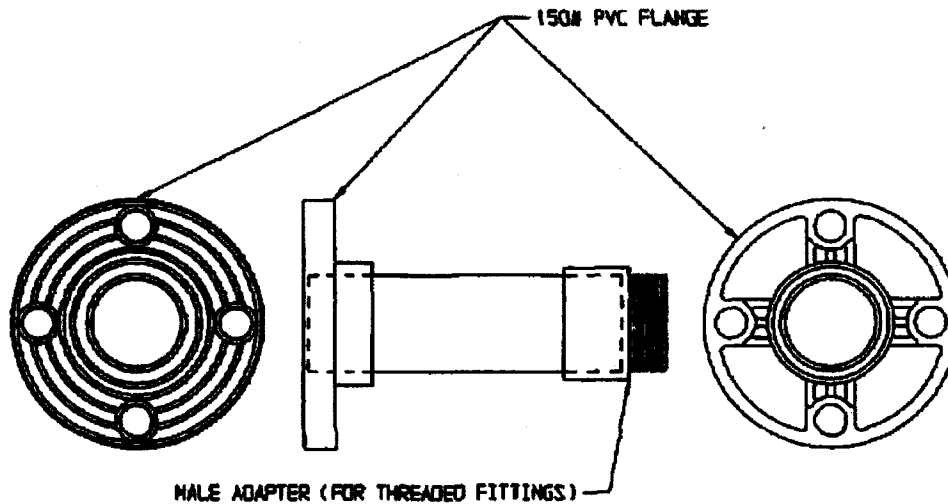


Figure 4.10

5. TANK ACCESSORIES

5.1 LATERAL RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

- 5.1.1 The lateral restraint system is designed for tank position restraint on a concrete pad inside of an enclosed building. It is not designed for wind or seismic restraint capabilities. Using the assembly drawing and table shown in Figure 5.1, verify that all parts are present.
- 5.1.2 Locate the tank on the concrete pad as desired. The pad required for the restraint system must be 18-3/4" larger in diameter than the tank diameter for proper application of 1/2" adhesive anchor bolts (assumes 6-3/8" edge distance required). Lay out the bands around the tank (alternate long bands

and short bands if both lengths are provided) with the studs and angle ends sticking out away from the tank. Fasten the bands together with the 3/8" - 16 x 4" hex head bolts as shown in the drawing. Raise the bands 17" and loosely install the anchor clips using the 1/2" - 13 hex nuts and 1/2" washers provided. Tighten the 3/8" - 16 x 4" hex head bolts to remove band looseness. Mark the slot locations of the anchor clips, remove the clips, and install the required number of 1/2" anchor bolts. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

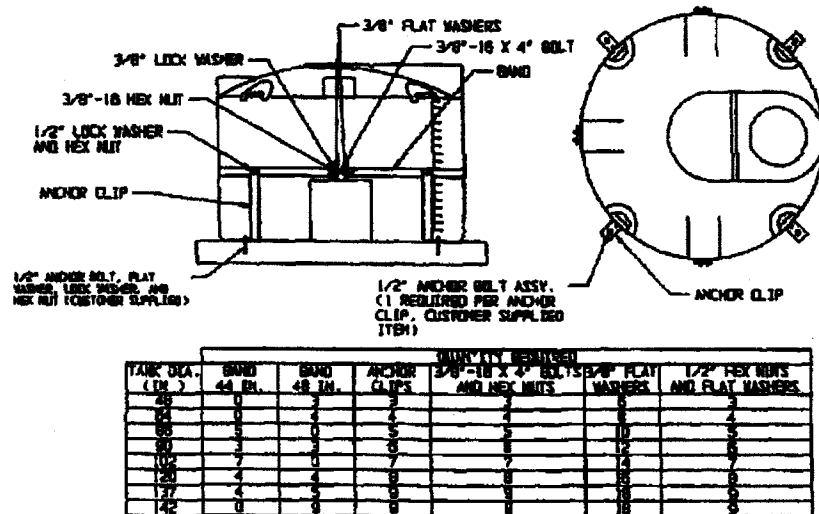


Figure 5.1

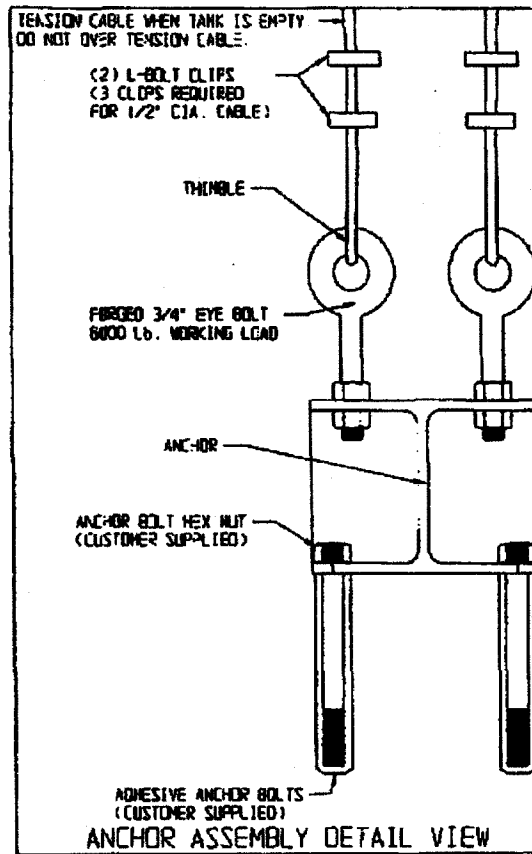
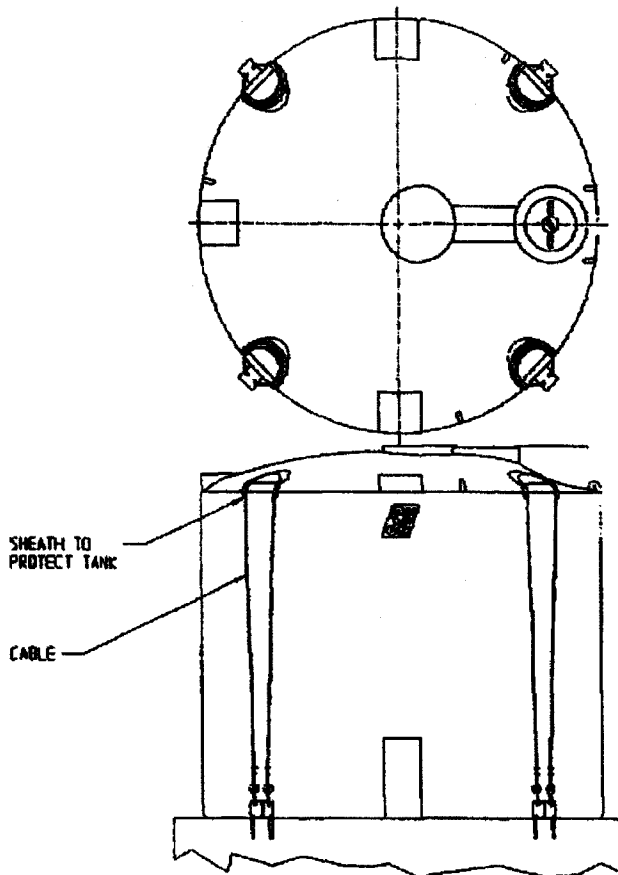
5.1.3 Replace the anchor clips and secure the clips to both bands and the concrete pad. Do not over tighten the bands to the tank. The band tension should only remove looseness and not cause any tank deflection.

5.2 WIND/SEISMIC TANK RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

5.2.1 The wind/seismic tank restraint system is designed for tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions. Using the assembly drawing and table shown in Figure 5.2, verify that all parts are present.

5.2.2 Locate the tank on the concrete pad as desired. Lay out all anchors required (4 or 8) equally spaced, (4 anchors must be directly below the tank tie down locations). Make sure all anchors are located next to the tank with the 2 ea. eye bolt holes of the anchor on top of the weldment and the plate face of the anchor weldment located next to the tank. Mark all the anchor bolt locations, remove the anchors and install the required Hilti adhesive model HVA anchor bolts as specified by the assembly drawing and the SII seismic restraint drawings B-2686A through B-2688A. These anchor bolts are not provided by the manufacturer and must be purchased by the customer.

5.2.3 Replace the anchors and secure the anchors to the concrete. Install the 3/4" eyebolts loosely as shown by the drawing. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - **DO NOT** re-tension the cables.



TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	FLUID SPECIFIC GRAVITY	ANCHOR BOLT SIZE	ANCHOR BOLT QUANTITY	CONCRETE AREA REQUIRED	
					SQUARE (SIDE LENGTH)	CIRCULAR (DIAMETER)
400	45	1.9	1/2"	18	96	35
550	48	1.9	1/2"	18	98	36
800	64	1.8	1/2"	18	99	44
850	48	1.9	1/2"	18	98	36
1200	64	1.9	1/2"	18	99	44
1300	86	1.9	1/2"	18	85	55
1500	84	1.9	1/2"	18	89	44
1650	86	1.9	1/2"	18	85	55
2000	90	1.9	1/2"	18	87	57
2500	90	1.9	1/2"	18	87	57
3000	90	1.9	1/2"	18	87	57
3000	102	1.9	1/2"	18	96	63
3000	90	1.9	1/2"	18	87	57
4400	90	1.9	1/2"	18	87	57
4400	120	1.9	1/2"	18	108	72
4500	102	1.9	1/2"	18	96	63
4900	90	1.9	3/4"	18	101	64
5500	90	1.9	3/4"	18	101	64
9500	120	1.9	3/4"	18	122	78
9800	142	1.9	3/4"	18	138	91
8000	102	1.9	3/4"	18	110	70
8200	120	1.9	3/4"	18	122	78
8500	120	1.9	3/4"	18	122	78

TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	FLUID SPECIFIC GRAVITY	ANCHOR BOLT SIZE	ANCHOR BOLT QUANTITY	CONCRETE AREA REQUIRED	
					SQUARE (SIDE LENGTH)	CIRCULAR (DIAMETER)
7000	142	1.9	3/4"	18	138	90
7500	102	1.9	3/4"	18	116	70
8500	120	1.9	3/4"	18	122	78
8750	142	1.9	3/4"	18	138	90
9500	120	1.5	3/4"	18	122	78
10500	142	1.5	3/4"	18	138	90
9500	120	1.9	3/4"	32	N/A	90
10500	142	1.9	3/4"	32	N/A	90
12300	147	1.9	3/4"	32	N/A	90
15000	142	1.9	3/4"	32	N/A	90
16500	142	1.9	3/4"	32	N/A	90
1100	CAPTOR	1.9	3/4"	18	75	94
1350	CAPTOR	1.9	3/4"	18	78	94
2000	CAPTOR	1.3	3/4"	18	102	120
2500	CAPTOR	1.3	3/4"	18	102	120
3000	CAPTOR	1.3	3/4"	18	102	120
3500	CAPTOR	1.3	3/4"	18	102	120
4000	CAPTOR	1.3	3/4"	18	102	120
4500	CAPTOR	1.3	3/4"	18	102	120
5000	CAPTOR	1.3	3/4"	18	102	120
5500	CAPTOR	1.3	3/4"	18	102	120
6500	CAPTOR	1.3	3/4"	18	120	138

* N/A IS NOT RECOMMENDED DUE TO LACK OF EFFICIENCY OF MATERIALS

Figure 5.2

5.3 WIND/SEISMIC TANK RESTRAINT SYSTEM (CONE BOTTOM TANKS)

5.3.1 The wind/seismic tank restraint system is designed for cone bottom tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions using a SII cone stand for proper tank support. Using the assembly drawing and table shown in Figure 5.3, verify that all parts are present.

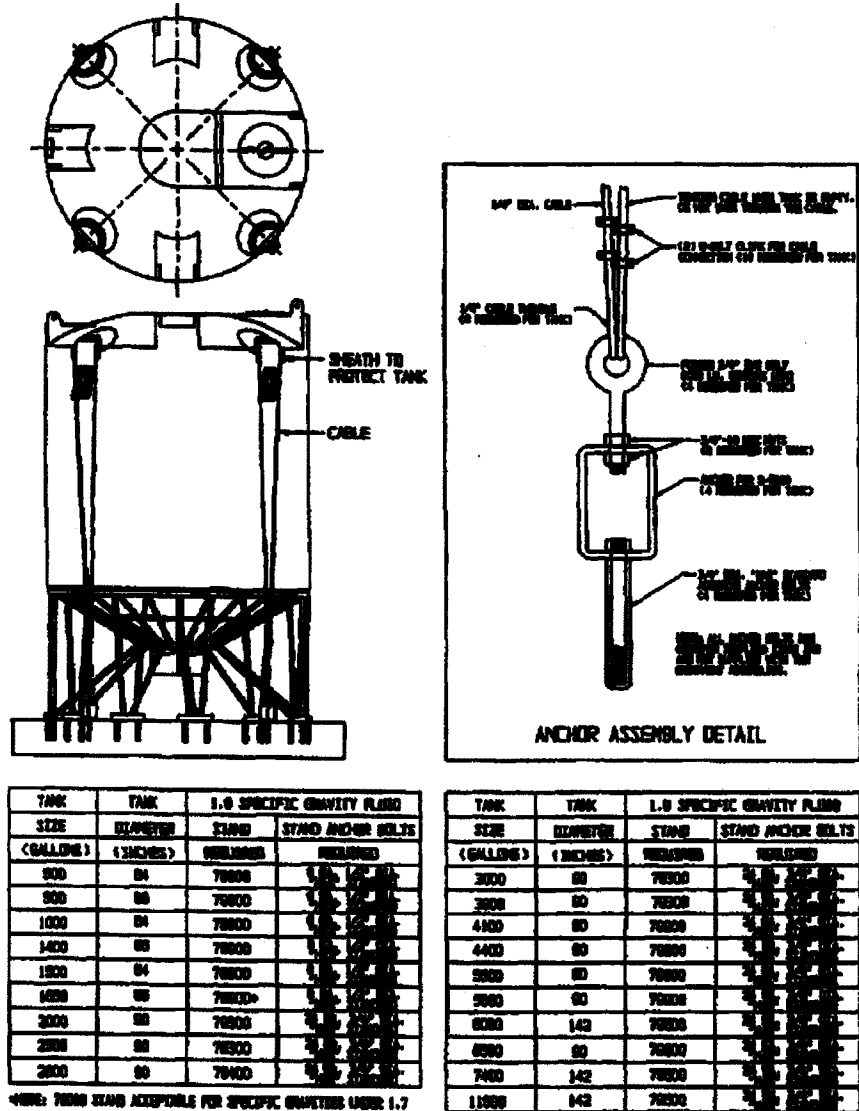


Figure 5.3

5.3.2 Locate the tank and stand on the concrete pad as desired. The pad required for the restraint system must be 24" larger in diameter than the tank diameter for proper application of 3/4" adhesive anchor bolts (assumes 10" edge distance required). Lay out the four anchors provided directly below the tank tie down locations. Make sure all anchors are located so the hole in the anchor aligns with the tank wall. Mark all the anchor bolt locations (stand and anchor positions), remove the stand and anchors and install the required Hilti adhesive model HVA anchor bolts as specified by the assembly drawing and the SII seismic restraint drawing B-3182. These anchor bolts are not provided by the manufacturer and must be purchased by the customer.

5.3 WIND/SEISMIC TANK RESTRAINT SYSTEM (CONE BOTTOM TANKS)

5.3.1 The wind/seismic tank restraint system is designed for cone bottom tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions using a SII cone stand for proper tank support. Using the assembly drawing and table shown in Figure 5.3, verify that all parts are present.

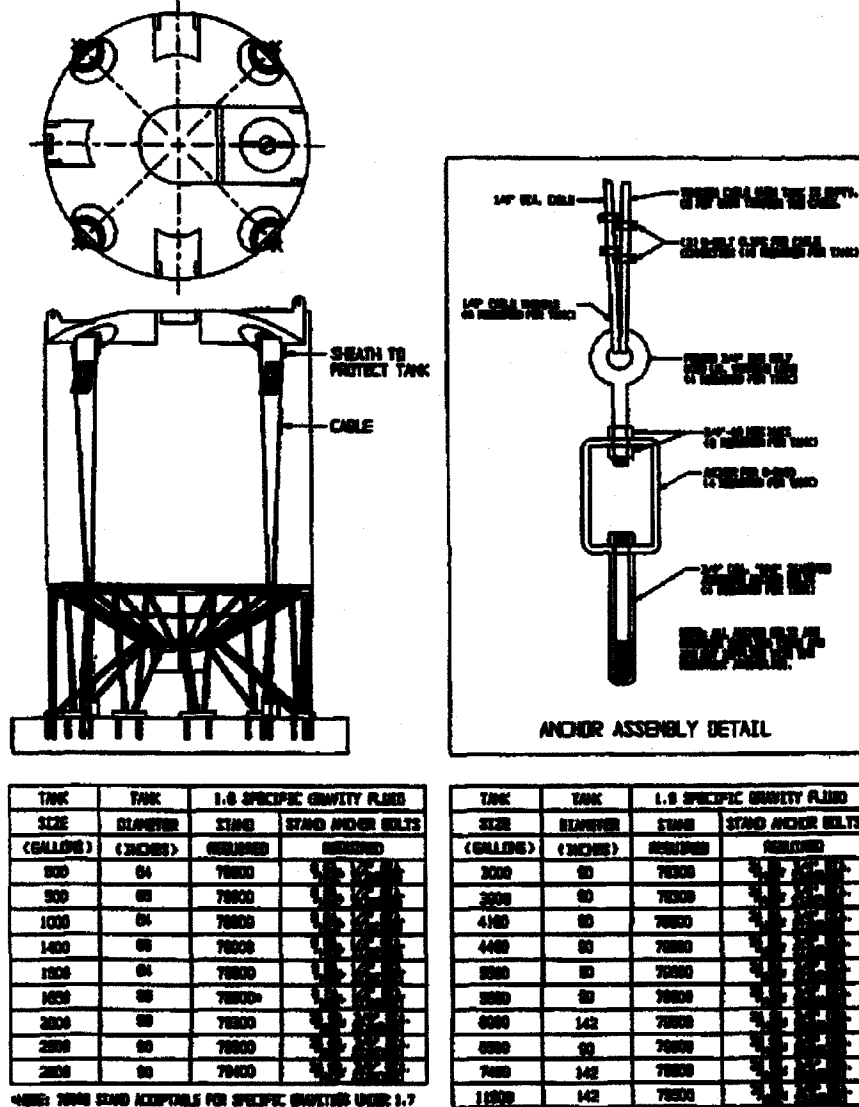


Figure 5.3

5.3.2 Locate the tank and stand on the concrete pad as desired. The pad required for the restraint system must be 24" larger in diameter than the tank diameter for proper application of 3/4" adhesive anchor bolts (assumes 10" edge distance required). Lay out the four anchors provided directly below the tank tie down locations. Make sure all anchors are located so the hole in the anchor aligns with the tank

- 5.3.3 Replace the stand and anchors and secure to the concrete pad. Install the 3/4" eyebolts loosely as shown by the drawing. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - DO NOT re-tension the cables.

5.4 STEEL LADDERS

- 5.4.1 Steel ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 1/4" anchor bolts (check with anchor bolt manufacturer for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 5.4, verify that all parts are present and assemble accordingly.

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper equipment for other than inspection work.

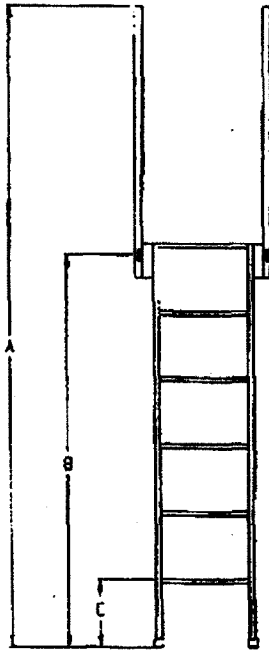
- 5.4.2 Attach the two pivoting attachment arms to the ladder using 1 ea. 1/2"-13 x 2" hex head bolt and 2 ea. 1/2" - 13 hex nuts. Double nut each bolt by tightening the first nut to 85 ft. - lbs. of torque and then jamming the second nut to the first nut by holding the first nut and tightening the second to 85 ft. - lbs. of torque. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter pin provided (see Figure 5.4). Position the ladder parallel with the side of the tank and mark the 1/4" anchor bolt locations. Install appropriate 1/4" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

5.5 STEEL LADDER CAGES

- 5.5.1 Using the assembly drawing shown in Figure 5.5 and the instructions in section 5.5.2, verify that all parts are present and assemble accordingly. These cages are designed for use only with the Slt steel ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cages are installed on the ladder before the ladder installation to the tank.

- 5.5.2 Install the cages loosely using the u-bolts provided starting with the top cage unit (4 ft. unit with a larger bolt pattern). The bottom cage unit must have a larger diameter at the bottom than at the top of the unit and the bottom edge of the unit be located a minimum of 7 feet and a maximum of 8 feet above the ground. When the cage units have been properly located and spaced evenly, tighten the u-bolts securely.



TANK SIZE	TANK P/N	A	B	C	CAGE
2000 X 90	5050XX	126.0	84.0	12	NO
2500 X 90	5090XX	145.0	103.0	7	NO
3000 X 90	5130XX	162.0	122.0	9	NO
3000 X 102	7410XX	135.0	93.0	12	NO
3900 X 90	5190XX	198.0	158.0	12	NO
4400 X 90	5210XX	219.0	178.0	9	NO
4400 X 120	8200XX	138.0	95.0	12	NO
4500 X 102	7420XX	183.0	139.0	9	NO
4900 X 90	5480XX	239.0	197.0	5	NO
5500 X 90	7020XX	258.0	215.0	12	NO
5500 X 120	7000XX	159.0	119.0	9	NO
5800 X 142	5250XX	126.0	85.0	12	NO
9000 X 102	7430XX	227.0	183.0	5	NO
3200 X 120	8220XX	179.0	135.0	5	NO
5500 X 120	7140XX	181.0	140.0	7	NO
7000 X 142	5300XX	147.0	105.0	9	NO
7500 X 102	7440XX	270.0	228.0	12	NO
8500 X 120	7400XX	222.0	182.0	12	NO
8750 X 142	5360XX	168.0	129.0	7	NO
9500 X 120	7450XX	243.0	203.0	9	NO
10500 X :42	5380XX	193.0	152.0	7	NO
12500 X :42	5350XX	222.0	181.0	12	NO
15000 X :42	5370XX	258.0	217.0	12	NO
16500 X :42	5390XX	282.0	240.0	12	YES

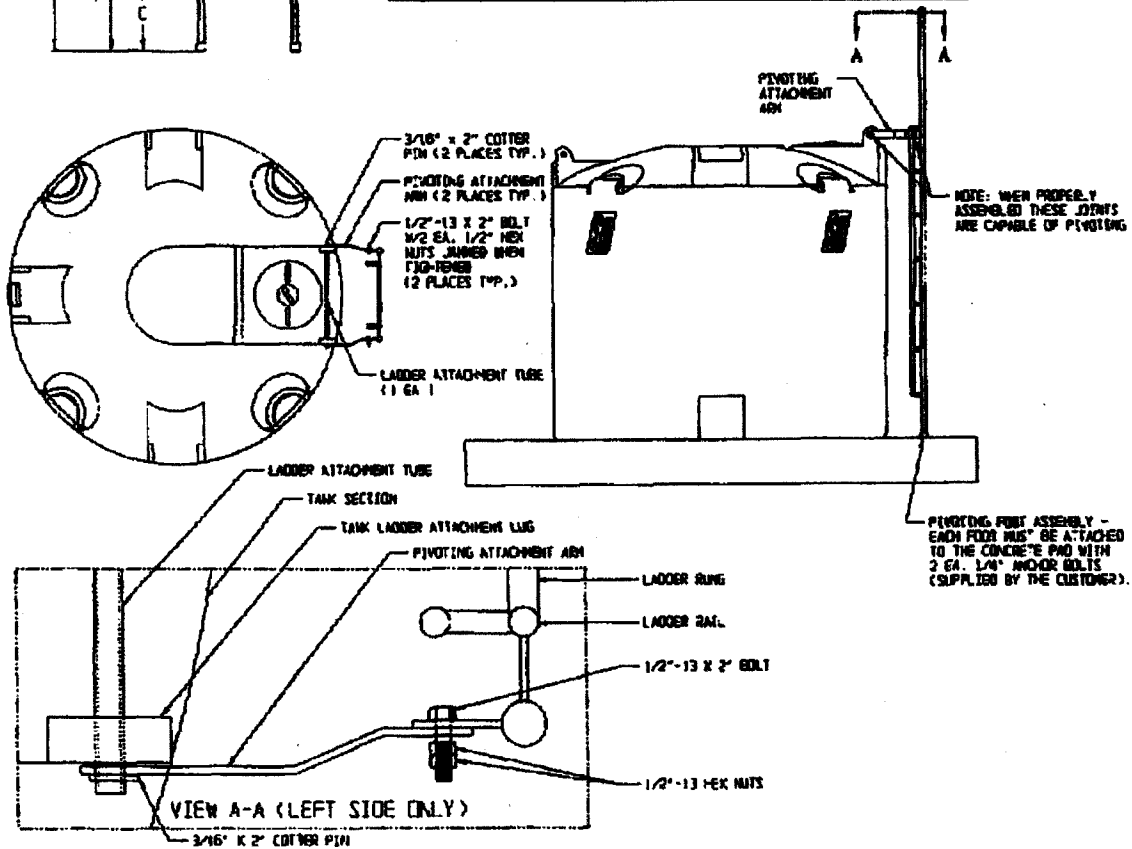


Figure 5.4

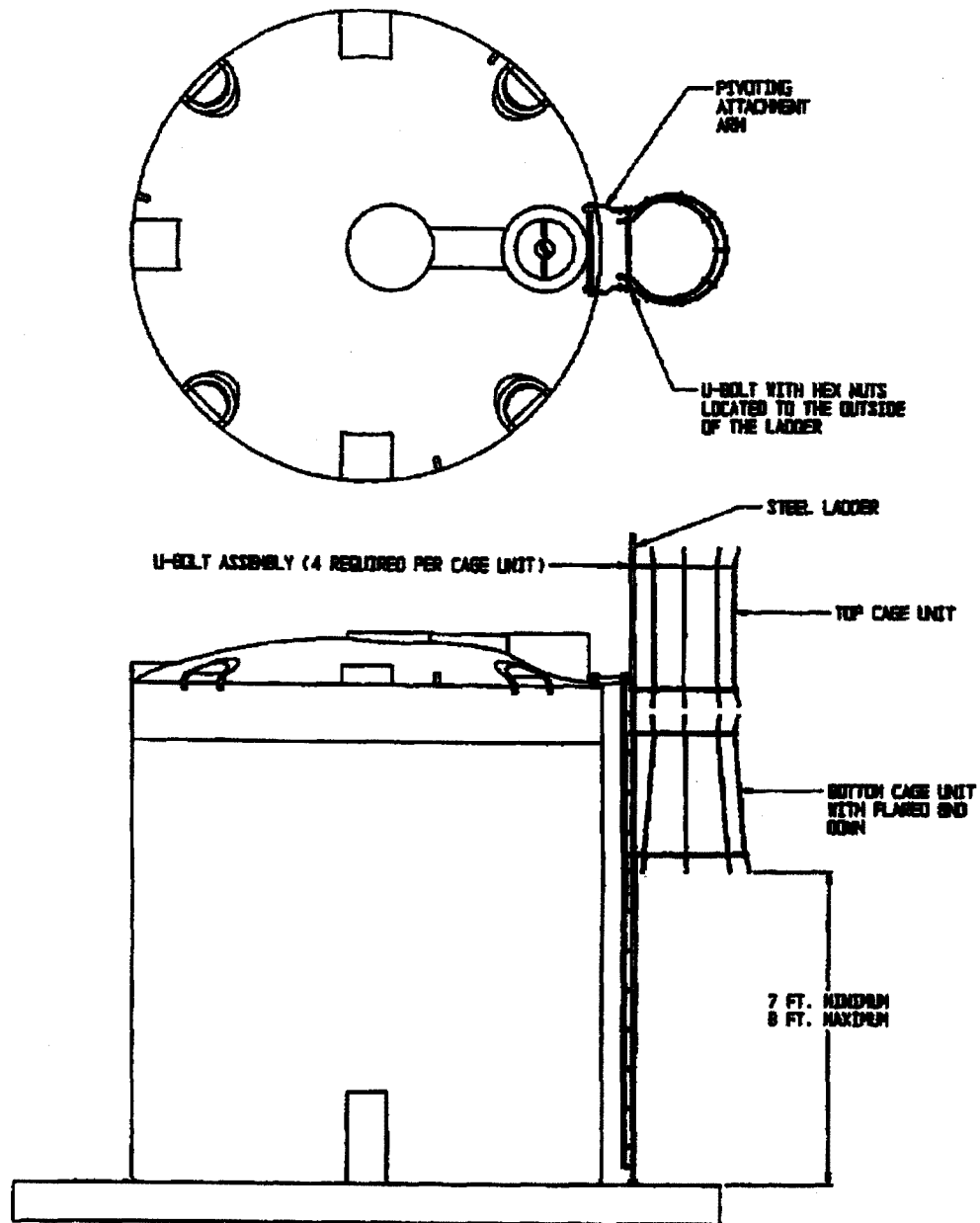


Figure 5.5

5.6 FRP LADDERS (up to 300' height)

5.6.1 FRP ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 5/8" anchor bolts (check with anchor bolt manufacture for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 5.6, verify that all parts are present and assemble accordingly.

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper safety equipment.

- 5.6.2 Attach the stainless steel top pivoting attachment arms to the ladder using the 1/2" bolt and 3/4" bushing assemblies (2 required) as shown in Figure 5.6. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter keys provided (see assembly drawing). Position the ladder parallel with the side of the tank and mark 4 ea. 5/8" anchor bolt locations. Install appropriate 5/8" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

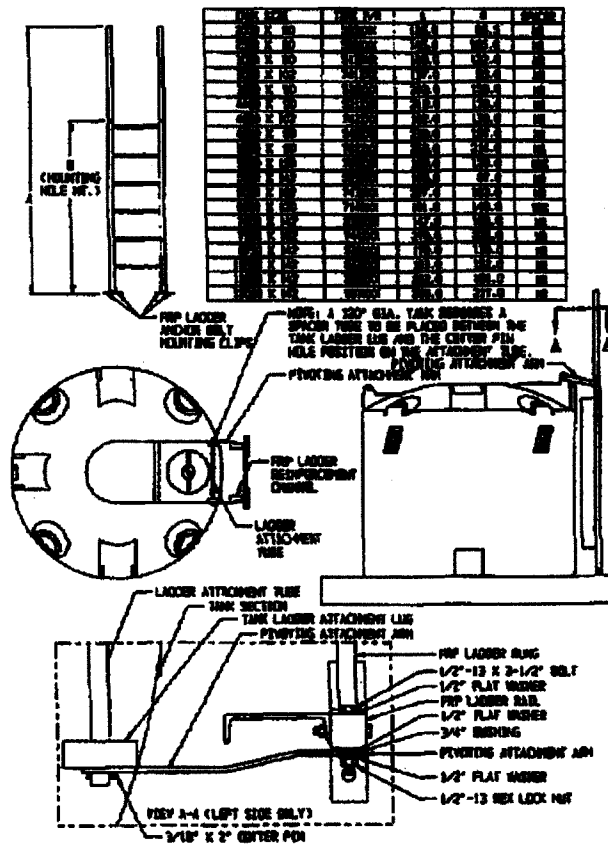


Figure 5.6

5.7 FRP LADDER CAGES

- 5.7.1 Using the assembly drawing shown in Figure 5.7 and the instructions in section 5.7.2, verify that the correct number of fasteners have been shipped to attach the FRP cage unit. These cages are designed for use only with the SII FRP ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cage unit is installed on the ladder before ladder installation.

- 5.7.2 Position the cage unit on the ladder with the flared end toward the ladder base. Attach the cage to the ladder using the 3/8" stainless steel bolts provided (4 bolt assemblies per cage hoop).

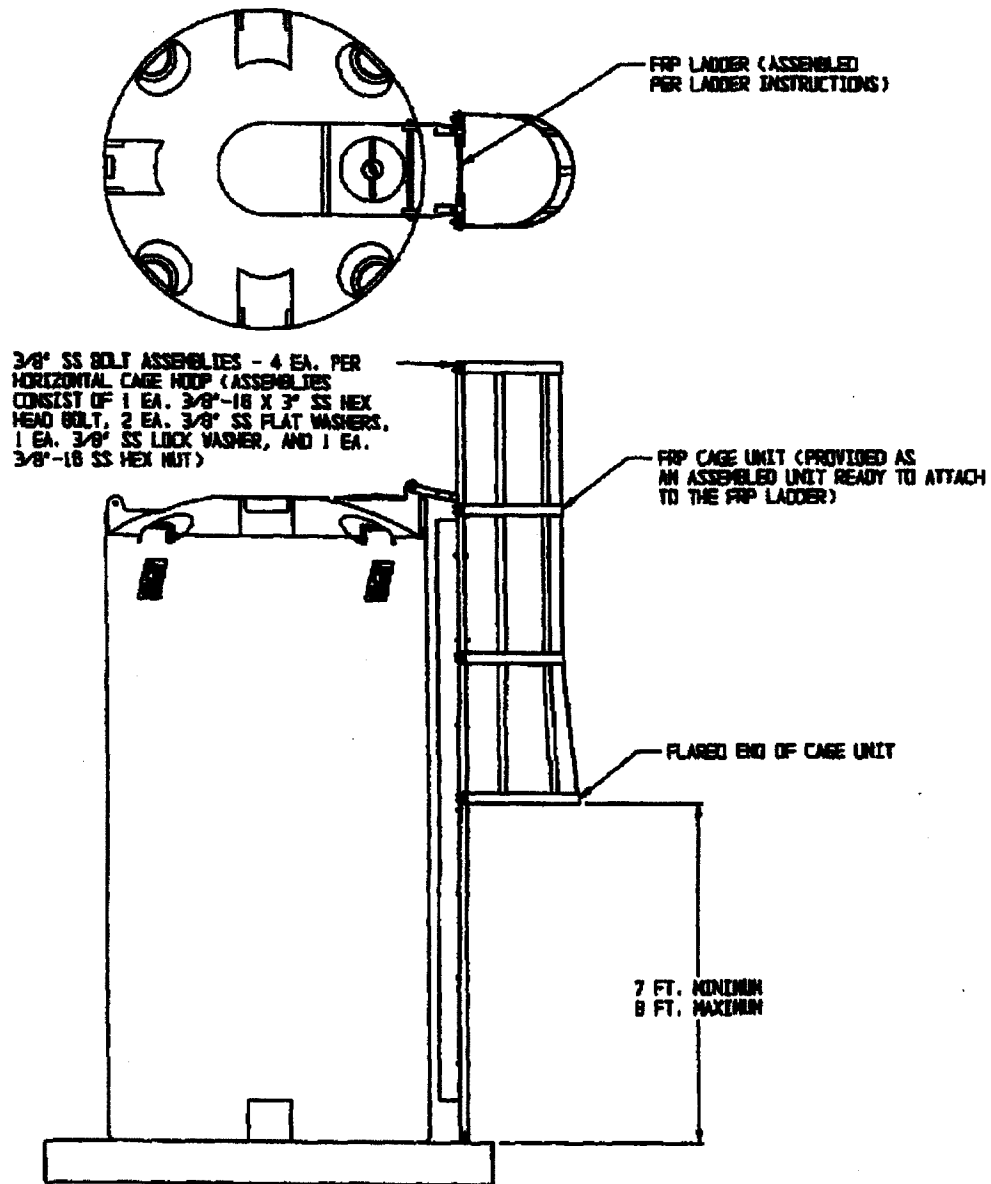


Figure 5.7

5.8 HORIZONTAL LEG TANK SKIDS

- 5.8.1 Horizontal leg tank skids are designed to provide adequate support for SII horizontal leg tanks (750-1685 gallons) and a structural support frame which provides easy attachment for a variety of stationary applications. The hoop pipe restraints restrain the leg tank and give it additional structural support. Hoop restraints are available for tanks 525 gallons and larger. Hoops are required on tank sizes above 730 gallons. The use of a SII skid is not required, but it is important to have proper support under all of the tank support areas (points which would contact the ground if the tank was

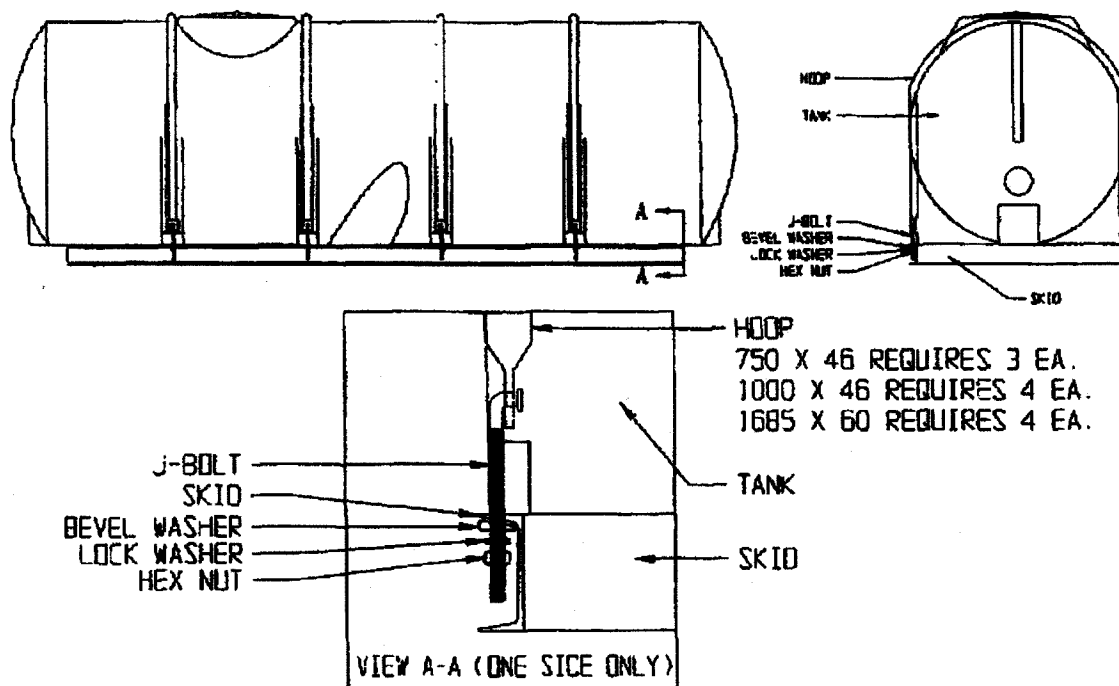


Figure 5.8

sitting on level ground). Use the assembly drawing shown in Figure 5.8 to assist in part identification and assembly.

- 5.8.2 Position the skid provided in the desired location and attach as necessary for the application. Position the tank on the skid with the legs centered over the hoop mounting holes in the top of the skid.
- 5.8.3 With one person on each side of the tank, insert J-bolts into the hoop holes and lift the hoop into position directly above the tank legs. Spread the hoop slightly while sliding the hoop (centered in the pipe guide channel formed into the tank legs) onto the tank. Insert the J-bolts into the proper holes in the top of the skid. Install the bevel washer, lock washer, and hex nut on each of the J-bolts loosely. Do not tighten the hex nuts yet. See view A-A shown in Figure 5.8 for an illustration of the loosely assembled J-bolt/hoop assembly.
- 5.8.4 Repeat the procedure as detailed in section 5.8.3 for each of the remaining hoops required. When all hoops have been loosely installed, check the tank and hoop alignment to make sure the placement is correct. When proper alignment has been established, start tightening the hex nuts on each hoop. Tighten both sides of the hoop equally until the top of the hoop is tight all the way around the top of the tank and proper tension is obtained. Proceed to the next hoop and repeat the tightening procedure until all of the hoops have proper tension. Recheck the hoop tension after the tank has been filled. Tighten the hoops as necessary until the top of the hoop is tight all the way around the top of the tank.
- 5.9 **EQUIPMENT PLATFORMS (64", 86", 90", AND 142")**
- 5.9.1 Equipment platforms are designed to provide structural support for tank fittings, piping, mixers, etc. The platforms relocate the load caused by tank accessories to the tank wall for maximum tank support. Tanks with diameters of 86" or less have equipment platforms with a rated load capacity of 400 lbs. Tanks with diameters of 90" or more have equipment platforms with a rated

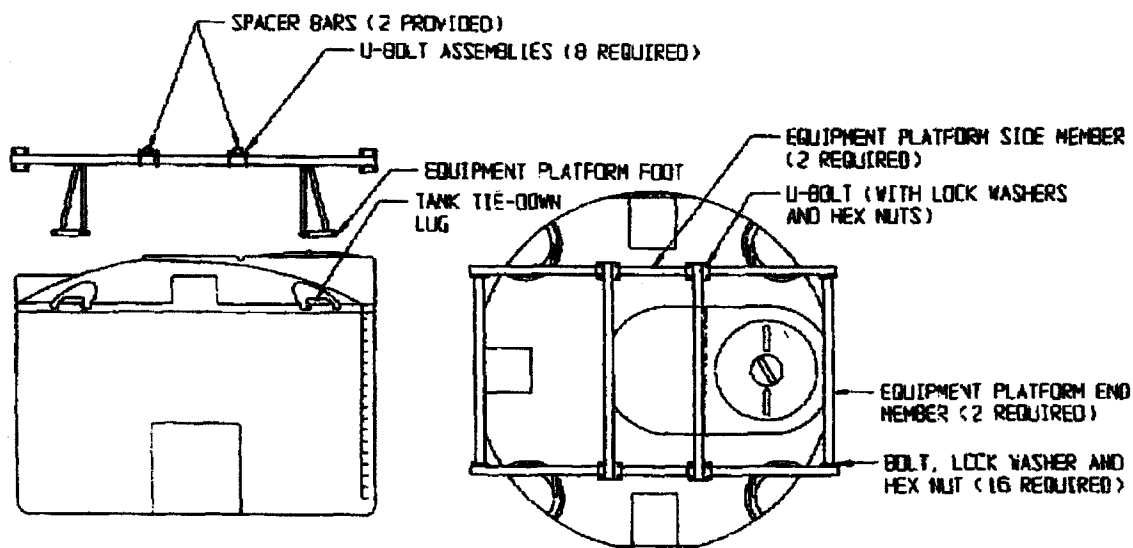


Figure 5.9

load capacity of 600 lbs. Refer to the assembly drawing shown in Figure 5.9 for assistance in part identification and assembly information.

- 5.9.2 Position the equipment platform structural components as shown in the assembly drawing on the ground. Using the fasteners provided, assemble the equipment platform and tighten the fasteners on the ground. When all fasteners have been properly installed, position the equipment platform on the tank with appropriate lifting equipment (when properly installed the platform feet should be locked behind the tank tie-down lugs). Using appropriate safety equipment, position the spacer bars appropriately to connect the tank equipment requiring support to the spacer bars and tighten U-bolts to secure the spacer bars in place. Other support pieces may be necessary to connect the tank equipment to the spacer bars and will have to be provided by the customer for the specific application. SII recommends use of the cable style "wind/seismic tank restraint system" when using this style of equipment platform to support motor driven equipment. The cable will go through the platform feet restraining all equipment to the floor.

5.10 EQUIPMENT PLATFORMS (102" AND 120")

- 5.10.1 Equipment platforms are designed to provide structural support for tank fittings, piping, mixers, etc. The platforms relocate the load caused by tank accessories to the tank wall for maximum tank support. These equipment platforms have a rated load capacity of 600 lbs. Refer to the assembly drawing shown in Figure 5.10 for assistance in part identification and assembly information.
- 5.10.2 Position the equipment platform structural components as shown in the assembly drawing on the ground. Using the set screws provided, assemble the equipment platform and lightly lock the tubes in place. When all fasteners have been properly installed, position the equipment platform on the tank with appropriate lifting equipment and secure one mounting leg to one of the tank's lifting lug sets with 1 ea. attachment tube, 4 ea. 1" flat washers, and 2 ea. 3/16" x 2" plated cotter pins. Loosen the set screws and slide the other mounting legs into position. Secure each of the mounting legs with attachment tubes, washers, and cotter pins as stated previously. Center the

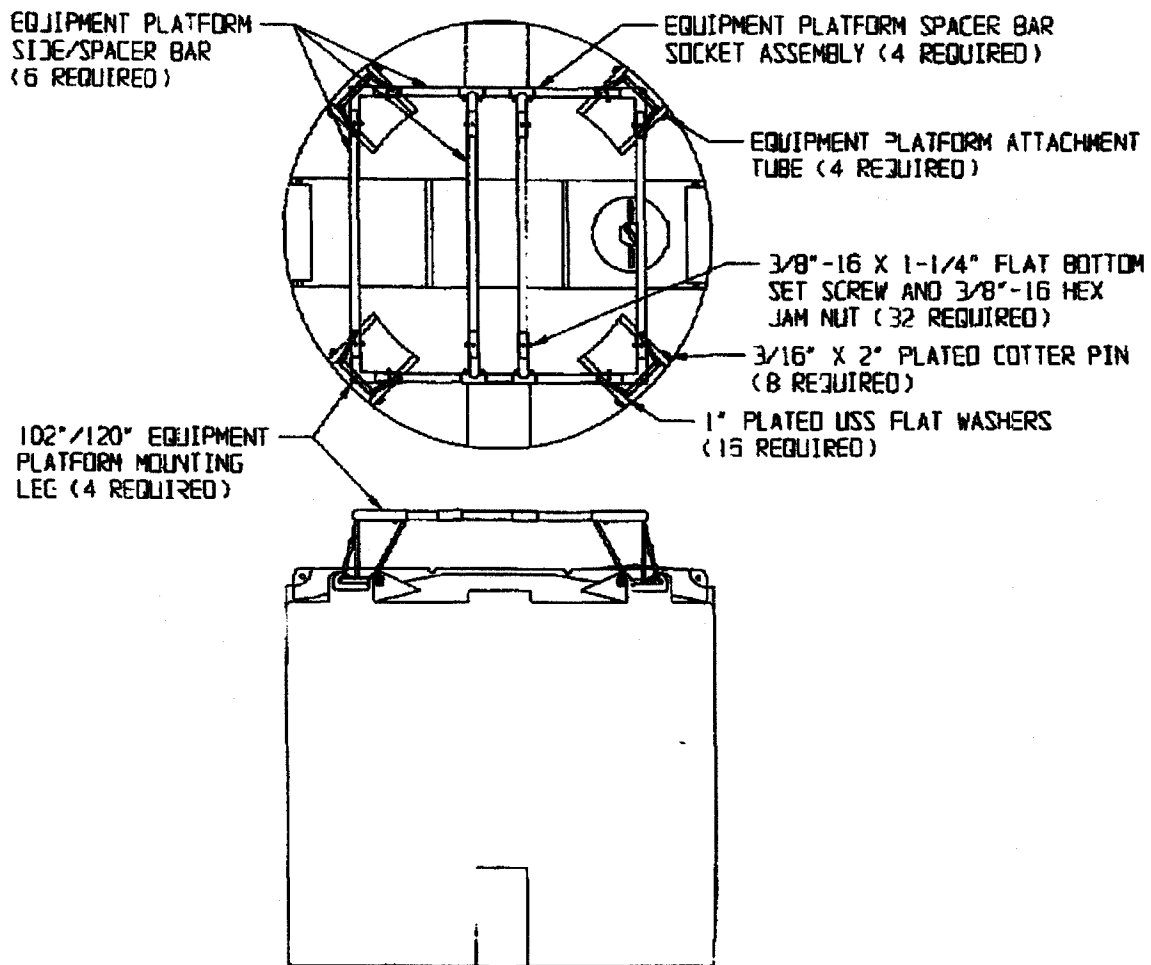


Figure 5.10

side/spacer bars within the tube socket joints and position as necessary. Tighten all of the set screws firmly and jam with the hex jam nuts provided. Other support pieces may be necessary to connect the tank equipment to the spacer bars and will have to be provided by the customer for the specific application.

5.11 CONE BOTTOM TANK STANDS

- 5.11.1 Cone bottom tank stands are designed specifically for use with SII cone bottom tanks (500 to 13,000 gallons) to provide support necessary for proper tank operation. The stands are provided as one piece welded units for minimal assembly requirements.

5.11.2 Position the cone stand provided in the desired location on a properly designed concrete pad. Stand mounting holes have been provided to secure the structure as required depending upon the tank application. (Consult site engineer for anchoring requirements.) Position the tank in the stand and complete the tank installation as necessary.

5.12 CONE BOTTOM TANK STAND EXTENSIONS

5.12.1 Cone bottom tank stand extensions are designed specifically for use with SII cone bottom tank stands. Cone bottom tank stands equipped with extensions are not approved for seismic restraint applications. The extensions are provided in 20" and 40" welded units and are used to increase cone bottom tank clearance 20" or 40".

5.12.2 Install the extensions onto the cone stand legs with the bolt assemblies provided. Tighten bolts to 300 ft.-lbs of torque. With the extensions in place, proceed with the cone stand installation as previously described.

5.13 HEATED TANKS

5.13.1 Heated tanks are insulated with a minimum of 2" of 2-3 lb./ft.³ polyurethane foam material with an "R" value of 8.33/in. The insulation is sealed with 2 coats of acrylic latex mastic. Although this appears to be a tough, resilient covering, it can be easily torn or broken if the tank is not properly transported. Use only carpeted and padded equipment to move an insulated tank. Do not allow the tank to drop or roll on rough surface as this may damage the insulation.

5.13.2 Heated tanks are equipped with at least 1 control box with maintenance temperature and over-limit temperature settings. The maintenance temperature setting should be set at the desired maintenance temperature. The over-limit temperature setting should be adjusted to 10 degrees above the desired maintenance temperature. The maximum temperature the over-limit control should be set to is 140° F for crosslinked polyethylene tanks and 130° F for high density linear polyethylene tanks. Be sure to check tank material type and design before setting any control temperatures over 100° F. It is best to keep the tank at the lowest temperature necessary to accomplish the desired objective. The Figure 5.11 on the next page shows a standard 110 VAC control box front cover with the control functions shown. This control box has calibration functions for the temperature probes. The control box is factory calibrated and should not need recalibrated. If there are any questions about control box calibration, consult the factory. Figure 5.12 shows a schematic of the terminal connections possible located under the control box front cover. The terminals available for customer connection are: line in, over-limit alarm relay, and low-limit alarm relay. There are other control boxes available with different functions not detailed in these instructions. Please consult the factory with questions regarding other types of control boxes available. Refer to the control box instructions and schematics sent with each tank for further details.

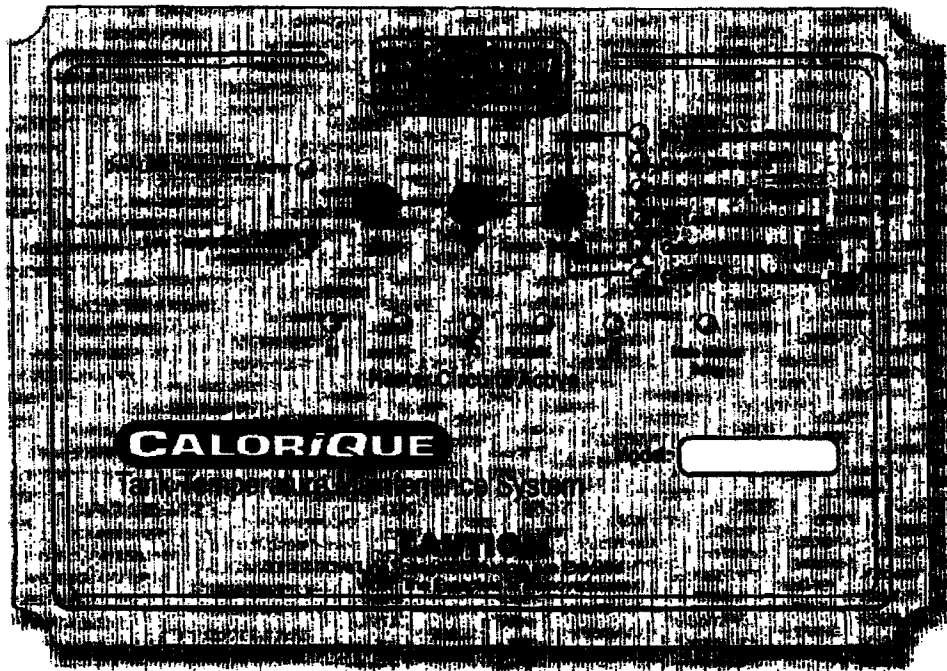


Figure 5.11

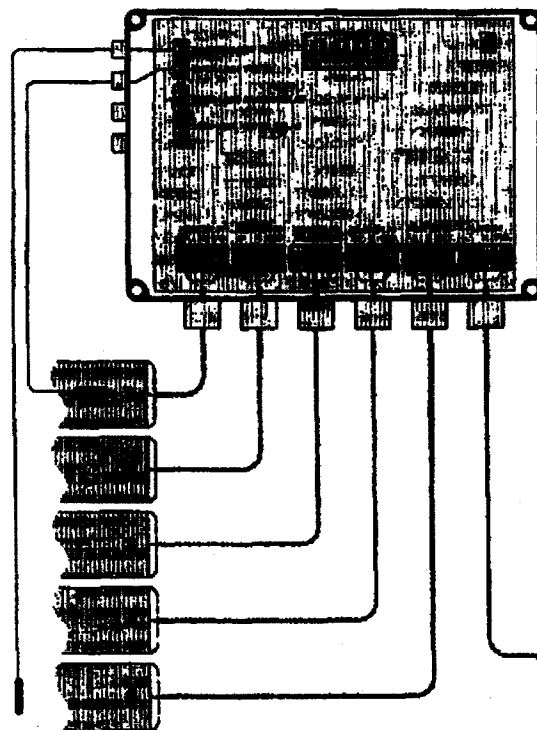


Figure 5.12

6. TANK MAINTENANCE

6.1 TANK INSPECTION

6.1.1 Simple periodic inspections of the tank installation can prevent problems and chemical loss from occurring. Inspection intervals should be consistent with site usage (the more times liquid is processed through the tank site, the more frequent the inspections). The checking procedure should be as follows:

1. Inspect the tank for physical damage such as cuts, impacts, cracks, swelling, softening of tank walls, and stress cracks (caused by long term exposure to environmental conditions and stress). NOTE: An "Environmental Stress Inspection Kit" may be obtained for tank inspections and analysis through the Customer Service Department at SII.
2. Inspect the fittings for broken parts, cracks, wear marks, or other signs of potential leaks.
3. Inspect gaskets for deterioration. Look for discoloration, bulges, checking or crazing. All of these symptoms could indicate potential failure.
4. Inspect any valves and/or pumps that may be connected to the tank. Also inspect the hoses and connections for any signs of wear.

7. SII PRODUCT POLICY STATEMENTS

7.1 SII STANDARD LIMITED WARRANTY

7.1.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers the following Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product. Record all required warranty information in section 7.4 and retain this information for use in the advent of a warranty question.

7.1.2 Snyder Industries, Inc. warrants to the purchaser for use that if any manufactured tank product is proven to be defective in material or workmanship within 3 YEARS from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. Snyder Industries, Inc. warrants to the purchaser for use that if any tank fitting, attachment, or accessory product is proven to be defective in material or workmanship within 1 YEAR from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. This Snyder Industries Standard Limited Warranty does not apply to damage resulting from misuse, improper application of recommended materials, neglect, material wear, accident, or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills performance specifications. **THE FOREGOING STANDARD LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESSED OR IMPLIED.** Snyder Industries, Inc. neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said tank product and will not be liable for incidental or consequential damages. **THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS STANDARD WARRANTY. CLAIMS UNDER THIS STANDARD LIMITED WARRANTY SHALL BE HANDLED UNDER THE SNYDER INDUSTRIES, INC. SERVICE POLICY.** Snyder Industries, Inc. will not be responsible for any charges incurred in repairing or servicing any Snyder Industries, Inc. product except as such repairs are made at Snyder Industries, Inc. or by Snyder Industries, Inc. personnel or as approved in writing from Snyder Industries, Inc. Customer Service.

7.2 SII WARRANTY EXCEPTIONS

7.2.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers any exceptions to the Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product.

7.2.2 Due to the uniqueness of tank applications, Snyder Industries, Inc. may offer warranties other than the standard warranty. These warranty statements will be in writing from Snyder Industries, Inc. The warranty period may be longer than 3 years as in the case for purchased extended warranties, or the warranty period may be shorter than 3 years as in the case for certain chemical/material applications. Please consult Snyder Industries, Inc. if you have any questions regarding warranty coverage and/or requirements.

7.3 RETURN MERCHANDISE/WARRANTY CLAIM PROCEDURE

7.3.1 SII has specific procedures for return merchandise and warranty claims. To make a claim, please contact the Customer Service Department at SII by mail or by phone:

Snyder Industries, Inc.
P.O. BOX 4583
Lincoln, NE 68504
(402) 467-5221
FAX: (402) 467-6493

The following information will be required to assist in filing your claim:

1. Product identification (tank size, part number, serial number, etc.)
2. SII customer order number
3. Name and phone number of person making the claim
4. Distributor/company name, address, and phone number
5. Description of reason for claim

7.4 WARRANTY INFORMATION

7.4.1 Record all required warranty information detailed below. Fax or mail this information to Snyder Industries at the number or address shown above. Retain a copy of this information for use in the advent of a warranty question.

7.4.2 Tank Part Number:

7.4.3 Tank Serial Number:

7.4.4 Tank Description/Size:

7.4.5 Date of Original Factory Invoice:

7.4.6 Snyder Customer Order Number:

7.4.7 Distributor Supplying Tank (name, address, and phone number):

7.4.8 Date of Water Pre-Test:

7.4.9 Water Pre-Test Observations:

7.4.10 Type of Chemical Stored:

7.4.11 Concentration of Chemical:

7.4.12 Tank Use Temperature:

REVISED: 10/01/00

FILE: 00101101

P/N: 998062

APPENDIX "G"

Optional Off-Site Dirt Haul Conditions

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**LINER SYSTEM CONSTRUCTION
PHASE 2, STAGE 4
AT
LAMB CANYON SANITARY LANDFILL**

**GUIDELINES AND CONDITIONS
FOR
PERFORMING THE OFF-SITE
DIRT HAULING OPERATION**

1. GENERAL

1. The Contractor shall provide all labor, supervision, materials, equipment, tools, facilities, and supplies to excavate, load, and transport the material to an off-site location determined by the Contractor. In addition, the Contractor shall provide all construction management oversight for the material removal, including but not limited to dust control, traffic control, survey control, and sediment control related to material removal.
2. The Contractor shall be aware that Lamb Canyon Landfill is an active landfill site. The export of material shall not impede or interrupt daily landfill operations. Full cooperation of the Contractor and its forces and subcontractors is required to assure safe working conditions. Therefore, it is necessary to emphasize that the County will have full authority to eject from the site any of the contractor's employees or subcontractors who do not immediately abide by the landfill site rules or directions of the County.
3. The work to be performed shall conform to all of the Contract Documents and all governing codes, laws, ordinances, rules, and regulations governing the performance of work.

2. CONTRACTOR'S RESPONSIBILITIES

1. SUBMITTALS

The Contractor shall submit the following items for Department review and approval and adhere to their requirements. All submittals must be received and approved by the County prior to the start of work.

i. Safety Plan

Prior to the export of any material the Contractor shall prepare and submit an addendum to the previously submitted Site Safety Plan in order to address the off-site hauling operation. Acceptance of the Site Safety Plan by the County does not release the Contractor of liability in the event of an accident or injury, nor does it place any liability on the County. The

Contractor shall be solely responsible for adherence to the Site Safety Plan at all times.

ii. Traffic Control Plan

Prior to the start of the off-site hauling operations, The Contractor shall prepare and submit to the County a Traffic Control Plan (TCP). The TCP shall comply with all applicable laws, ordinances, and regulations of any and all governing bodies along the haul route(s). The TCP must be accepted by the County prior to the commencement of any export of material. The Contractor and any subcontractor shall comply with the TCP at all times. The TCP shall consist of but not be limited to the following:

HAUL ROUTE MAP/EXHIBIT - Haul routes shall be shown on a site map between the site entrance/exit and the excavation areas. During the course of the project, the Contractor's internal haul routes shall be modified, as needed, with coordination and approval of the County, to maintain a safe working environment.

TRAFFIC DIRECTION – The Contractor shall provide all necessary traffic direction to facilitate the project within or outside of the landfill. Traffic directors will be provided by the Contractor as necessary based on the approved haul routes. The layout of the planned traffic direction shall be shown on a site map.

SIGNS and TRAFFIC CONTROL DEVICES – All planned signs and traffic control devices must be included in the TCP and shown on the Haul Route Map/Exhibit. Signs and traffic control devices shall be industry standard and conform to the "California Manual on Uniform Traffic Control Devices, Temporary Traffic Control" (2012 Edition) by the State of California Department of Transportation. Signs and traffic control devices shall be removed and stored or covered during periods of time when they are not needed (such as at the end of each working day, weekends, and any time when no hauling work operation is being performed).

2. PERMITS

The Contractor shall obtain and comply with all required permits and licenses related to the work, pay all charges and fees, and give a copy of all required documents to the County prior to commencement of work. Required permits include but are not limited to:

i. State Water Quality Control Board's National Pollution Discharge and Elimination System (NPDES) Permit

The County complies with the State NPDES through regular inspections and monitoring and implementation of best management practices as described in the Lamb Canyon Landfill Storm Water Pollution Prevention Plan (SWPPP). The Contractor shall be responsible for compliance with the SWPPP.

Prior to the export of any material The Contractor shall prepare and submit an addendum to the previously submitted SWPPP in order to address the off-site hauling operation. The Contractor will be required to provide street sweeping on paved portions of the haul route on a daily basis, or more often as reasonably required by the County. All street sweeping, vacuuming, and the stabilized construction access shall follow the guidelines described in California Stormwater BMP handbook.

ii. Haul Truck Operating Permits

The Contractor shall obtain and submit a copy to the County of all required permits necessary to operate trucks on public roads. This includes any permits necessary from the jurisdiction where the material will be unloaded.

3. EXECUTION

1. The optional dirt haul operation shall be performed between the hours of 7:00 a.m. and 3:30 p.m., Monday through Friday, unless otherwise approved in writing by the County. No offsite dirt haul operation will be allowed on Saturdays.
2. All activities shall be conducted in such a manner as to avoid hazards and injury or damage to any persons or properties.
3. The Contractor shall be responsible to remove any vehicles or trucks that become immovable during the excavation, loading, and hauling process.
4. The Contractor shall not be allowed to haul off-site more than 375 truck loads during each working day. The County may decrease the permitted truck loads per working day if the County determines the Contractor's truck load traffic levels cause an unsafe condition or a negative impact on landfill operations.
5. An adequate freeboard must be maintained in each hauling truck above its load in order to prevent material from spilling onto landfill access roads and local streets. The Contractor shall not intentionally load a truck with more than the agreed upon 14.0 cubic yards of material per load in a double trailer bottom dump truck.
6. The Contractor shall maintain internal access roads utilized during the export, including those shared with daily landfill traffic.
7. All trucks shall adhere to the posted speed limits within the internal landfill site.
8. A reasonably graded surface within the project excavation area shall be maintained at all times during this operation in order to maintain positive drainage.
9. The Contractor shall at all times keep the site neat, tidy, and free of waste materials or rubbish resulting from work. Toxic materials, including oil, fuel

oil, gasoline, coolant, fluid filters, and other contaminants, shall be transported off-site and disposed of at an approved facility. Containers temporarily holding these toxic materials shall be covered and have no leaks, and shall be removed from the site as quickly as reasonably possible.

10. The Contractor shall halt and suspend export operations when, in the County's reasonable opinion, the conditions for such operations are unsatisfactory due to rain, wind, or any other reason that interferes with the project work or landfill operations.
11. The Contractor shall be aware that the County and its representatives will conduct periodic inspections and perform geologic observation of the work area. The Contractor shall allow access to work areas as requested by the County or its representatives.

4. NO WARRANTY PROVIDED FOR MATERIAL

THE COUNTY DOES NOT WARRANT THAT THE MATERIAL TO BE REMOVED BY THE CONTRACTOR WILL MEET THE CONTRACTOR'S NEEDS OR EXPECTATIONS OR THE NEEDS OR EXPECTATIONS OF ANY THIRD PARTIES. THE COUNTY DOES NOT WARRANT THAT THE MATERIAL WILL BE SUFFICIENT FOR THE CONTRACTOR'S PURPOSES. THE MATERIAL IS PROVIDED TO AND ACCEPTED BY THE CONTRACTOR "AS IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (WHICH ARE HEREBY EXCLUDED).

NO ORAL OR WRITTEN INFORMATION OR ADVICE GIVEN BY THE COUNTY (INCLUDING ITS OFFICERS AND EMPLOYEES) SHALL CREATE ANY TYPE OF WARRANTY RELATED TO THE MATERIAL.

THE COUNTY DOES NOT INVITE RELIANCE BY THE CONTRACTOR (OR ANY THIRD PARTY) UPON THE MATERIAL TO BE REMOVED. THE CONTRACTOR HAS VOLUNTARILY CHOSEN TO REMOVE THIS MATERIAL AND ACCEPTS THE MATERIAL AT THE CONTRACTOR'S OWN RISK. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING THE APPROPRIATENESS OF ACCEPTING THE MATERIAL.

THE CONTRACTOR ACCEPTS FULL AND COMPLETE RESPONSIBILITY FOR THE MATERIAL ONCE IT HAS BEEN REMOVED BY THE CONTRACTOR FROM THE LANDFILL SITE. COUNTY SHALL HAVE NO RESPONSIBILITY FOR THE MATERIAL AFTER IT HAS BEEN REMOVED FROM THE LANDFILL SITE BY THE CONTRACTOR. THE MATERIAL MAY NOT BE RETURNED TO THE COUNTY AFTER IT HAS BEEN REMOVED BY THE CONTRACTOR FROM THE LANDFILL SITE.

APPENDIX "H"

Project Drawings (Reduced Size – 11x17)

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