

# Contract Documents

## Knott Landfill Flare Expansion Project



**Deschutes County**  
Department of Solid Waste  
61050 SE 27th Street  
Bend, Oregon 97702

June, 2016



# TABLE OF CONTENTS

---

	ITEM	NUMBER OF PAGES
Part I	Invitation to Bid	1
Part II	Information for Bidders	6
Part III	General Conditions	8
Part IV	Special Provisions	56
Part V	Bid Proposal Forms	
	Bid Proposal	1
	Bid Schedule	3
	Specification Compliance Checklist	15
	Project Experience References	1
	Bid Bond	1
	Subcontractor Disclosure	1
Part VI	Agreement Forms	
	Contract	2
	Performance Bond	2
	Payment Bond	2
	Insurance Requirements	2
Part VII	Project Drawings	13 Sheets



**Deschutes County, Oregon**  
**Department of Solid Waste**  
**PART I-INVITATION TO BID**  
**Knott Landfill Flare Expansion Project**

Sealed bids will be received at the Deschutes County Department of Solid Waste, 61050 SE 27th Street, Bend, Oregon 97702, until but not after, 2:00 p.m. on Thursday, August 11, 2016; at which time all bids for the above-entitled public works project will be publicly opened and read aloud. Bidders must submit a First Tier Subcontractor Disclosure Statement Form. The Subcontractor Disclosure Statement may be submitted in the sealed bid prior to 2:00 p.m. on Thursday, August 11, 2016 or in a separate sealed envelope marked "FIRST TIER SUBCONTRACTOR DISCLOSURE STATEMENT-KNOTT LANDFILL FLARE EXPANSION PROJECT" prior to 4:00 p.m. on Thursday, August 11, 2016 at the above location.

Said work is to be performed at Knott Landfill, 61050 SE 27<sup>th</sup> Street in Deschutes County, Oregon and shall include: furnishing and installing new landfill gas flare, including connection to existing landfill gas flare and collection system, installation of electric power service, and performance of such additional and incidental work as specified in the plans and specifications. The estimated project cost is \$465,000.

Plans, specifications and other bid documents may be inspected at the Deschutes County Bids and RFPs web page (<http://www.deschutes.org/rfps>) or obtained from Deschutes County Department of Solid Waste (541-317-3163), 61050 SE 27th Street, Bend, Oregon 97702, for a fee of \$50.00, which is not refundable. If bidder prefers to have plans and specifications mailed, bidder must include an additional \$5.00 with the request. Should expedited handling be desired, Federal Express or equivalent service will be utilized on a collect on delivery basis. Inquiries pertaining to this project shall be directed to Chad Centola, Operations Manager at (541) 322-7172 or [chadc@deschutes.org](mailto:chadc@deschutes.org).

**IMPORTANT:** Prospective bidders downloading/accessing website-posted project plans, specifications and other bid documents MUST complete and submit the Contact Information Form provided on the website, or contact the Department of Solid Waste by telephone (541-317-3163), to provide contact information, to receive follow-up documents (addenda, clarifications, etc). Failure to provide contact information to the Department of Solid Waste will result in bidder disqualification. Only pre-bid meeting attendees and those notifying the Department of Solid Waste of website access to the project plans and specifications will receive follow-up documents (addenda, clarifications, etc).

A pre-bid meeting will be held at 10:00 a.m. on Tuesday, July 26, 2016 at the Department of Solid Waste Office, located at 61050 SE 27th Street, Bend, Oregon. All bidders are encouraged to attend. For bidders unable to attend, the pre-bid meeting will be available via teleconference. Bidders attending via teleconference shall notify the Department of Solid Waste at (541) 322-7172 no later than 3:00 p.m. on Friday, July 22, 2016 to receive teleconference log-in instructions.

Bids shall be made on the forms furnished by the County, incorporating all contract documents, including a Bid Bond or Cashier's Check for the minimum amount of 10% of the Bid Price, addressed and mailed or delivered to Deschutes County Department of Solid Waste, 61050 SE 27th Street, Bend, Oregon 97702 in a sealed envelope plainly marked "Knott Landfill Flare Expansion Project" and the name and address of the bidder.

No bid will be considered by Deschutes County unless the bid contains a statement by the bidder that the provisions of ORS 279C.800 – 279C.870 are to be complied with. Each bid must contain a statement as to whether the bidder is a resident bidder, as defined in ORS 279A.120. Vendors shall use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this document.

Bidders shall have demonstrated experience having completed a minimum of three (3) successful projects for the installation and start-up of a landfill gas collection and control systems, including a landfill gas flare system within the past ten (10) years. References are required and are to be submitted on forms provided in the Bid Proposal Forms section of these Contract Documents. The successful bidders and subcontractors providing labor shall maintain a qualified drug testing program for the duration of the contract. Bidders shall be registered with the Construction Contractor's Board. Contractors and subcontractors need not be licensed under ORS 468A.720.

Deschutes County may reject any bid not in compliance with all prescribed bidding procedures and requirements, and may reject for good cause any or all bids upon a finding of Deschutes County it is in the public interest to do so. The protest period for this procurement is seven (7) calendar days.

Timm Schimke,  
Director of Solid Waste

PUBLISHED: THE BEND BULLETIN: Wednesday July 6, 2016 and Monday, July 11, 2016  
DAILY JOURNAL OF COMMERCE: Friday, July 8 and Monday, July 11



## PART II - INFORMATION FOR BIDDERS

1. **General Description of Project.** A general description of the work to be performed is contained in the Invitation to Bid. The scope is indicated in the applicable parts of these Contract documents.
2. **Contract Documents.** The Contract documents under which it is proposed to execute the work consist of the material bound herewith. These Contract documents are intended to be mutually complementary and to provide all details reasonably required for the execution of the proposed work.

Any person contemplating the submission of a proposal and being in doubt as to the meaning or intent of said contract document shall at once notify, in writing, the Solid Waste Department Director of Deschutes County, Oregon. Any interpretation of change will be mailed or delivered to each person receiving a set of documents.

3. **Form of Proposals.** All proposals must be submitted on the forms furnished. Subcontractor disclosure form may be submitted with bid or in a separate envelope.
4. **Substitutions.** Materials and/or products called for in the specifications are named in order to establish standards of quality and design. Manufacturers or suppliers of such products similar to those specified may submit bids on the work providing requests for approval of substitution materials are made at least seven (7) calendar days prior to the bid opening. Adequate information on which to base approval or disapproval must be furnished to the Solid Waste Department Director or his representative and the Solid Waste Department shall be the sole judge of any request. When the Solid Waste Director approves a substitution, it is with the understanding that the Contractor guarantees the substituted article or materials to be equal to or better than that specified.
5. **Preparation of Proposals.** All blank spaces in the proposal form must be filled in, in ink, or typed, in both words and figures where required. No changes shall be made in phraseology of the forms. Written amount shall govern in cases of discrepancy between the amount stated in writing and amount stated in figures.

Any proposal shall be deemed informal which contains omissions, erasures, alterations, or additions of any kind, or prices uncalled for, or which, in any manner shall fail to conform to the conditions of the published invitation to bidders.

The bidder shall sign his proposal in the blank space provided therefore. Proposals made by corporations or partnerships shall contain names and addresses of the principal officers or partners therein. If a corporation makes a proposal, it must be signed by one of the principal officers thereof, and the corporate seal affixed.

If made by a partnership, it must be signed by one of the partners, clearly indicating that he is signing as a partner of the firm. In the case of a proposal made by a joint venture, each of the joint venturers must sign the proposal in his personal capacity.

The wording of the proposal shall not be changed. Any additions, conditions, limitations or provisions inserted by the bidder will render the proposal irregular and may cause its rejection.

All Bids must be submitted on the Bid Proposal Forms attached hereto as Part V of these Contract Documents.

6. **Submission of Proposals.** All proposals must be submitted in the time and place and in the manner prescribed in the Invitation to Bid. Proposals must be made on the prescribed proposal forms furnished. Each proposal must be submitted in a sealed envelope, so marked as to indicate its contents without being

opened. If the proposal is submitted by mail, the sealed envelope containing the bid must be enclosed in a separate envelope plainly addressed for mailing to conformance with instructions in the Invitation to Bid.

**NOTE: A proposal must include completed original set of all forms provided in Part V-Bid Proposal Forms of these Contract Documents.**

7. **Modification or Withdrawal of Proposal.** Any bidder may modify his bid by written or electronic (facsimile or email) communication at any time prior to the scheduled closing time for receipt of bids, provided such communication is received by the County prior to the bid closing time, and provided further that a written confirmation of an electronic modification over the signature of the bidder was mailed prior to the bid closing time. If written confirmation of an electronic communication is not received within at least two calendar days of the closing time, no consideration will be given to the modification. The written or electronic communication should not reveal the bid price, but should state the addition or subtraction or other modification so that the County will not know the final prices or terms until the sealed bid is opened.

Proposals may be withdrawn prior to the scheduled time for the opening of the proposals either by telecommunication (facsimile) or written request, or in person. No proposal may be withdrawn after the time scheduled for opening of proposals, unless the County has failed to comply with the time limits applicable to award of the Contract.

8. **Disclosure of First Tier Subcontractors.** Bidders must submit a First Tier Subcontractor Disclosure Statement where the bid exceeds \$100,000. The subcontractor disclosure statement may be submitted in the sealed bid prior to the bid closing OR it may be submitted in a separate sealed envelope marked "FIRST TIER SUBCONTRACTOR DISCLOSURE STATEMENT" and the name of the project, within two (2) working hours after the bid closing. Bidder must submit a First Tier Subcontractor Disclosure Statement on the form provided in these contract documents identifying all first-tier subcontractors that will furnish labor or labor and materials and whose contract value is equal to or greater than:

- A. 5% of the total project bid, but at least \$15,000, or
- B. \$350,000 regardless of the percentage of the total project bid.

For each subcontractor listed, Include:

- A. The name of the subcontractor,
- B. The anticipated amount of the subcontract
- C. The category of work that the subcontractor would be performing.

If no subcontracts subject to the above disclosure requirements are anticipated, a bidder is required to indicate "NONE" on the accompanying form.

To determine disclosure requirements, it is required that bidders disclose subcontract information for any subcontractor as follows:

- A. Use the forms bound herewith for the required disclosure.

Notice – Bidder's Requirements: Bidders are required to disclose information about certain first-tier subcontractors when the contract value for a Public Improvement is greater than \$100,000 (see ORS 279C.370). Specifically, when the contract amount of a first-tier subcontractor furnishing labor or labor and materials would be greater than or equal to: (i) 5% of the project bid, but at least \$15,000, or

(ii) \$350,000 regardless of the percentage, the bidder must disclose the following information about that subcontract either in its Bid submission or within two working hours after bid closing:

- 1) The subcontractor's name,
  - 2) The anticipated amount of the subcontract, and
  - 3) The category of work that the subcontractor would be performing.
- B. If the bidder will not be using any subcontractors that are subject to the above disclosure requirements, the bidder is required to indicate "NONE" on the accompanying form.
- C. Bidder shall submit the disclosure form required by OAR 137-049-0360 either in its bid submission or separately within two working hours after Bid Closing in the manner specified by the invitation to bid.
- D. Compliance with the disclosure and submittal requirements of ORS 279C.370 and OAR 137-049-0360 is a matter of Responsiveness. Bids which are submitted by Bid Closing, but for which the disclosure submittal has not been made by the specified deadline, are not responsive and shall not be considered for Contract award.
- E. County shall obtain, and make available for public inspection, the disclosure forms required by ORS 279C.370 and OAR 137-049-0360. County shall also provide copies of disclosure forms to the Bureau of Labor and Industries as required by ORS 279C.835. County is not required to determine the accuracy or completeness of the information provided on disclosure forms.
- F. Substitution of affected first-tier subcontractors shall be made only in accordance with ORS 279C.585. County shall accept written submissions filed under the statute as public records. Aside from issues involving inadvertent clerical error under ORS 279.585(5), County does not have a statutory role or duty to review, approve, or resolve disputes concerning such substitutions. See ORS 279C.590 regarding complaints to the Construction Contractors Board on improper substitution.

**THE COUNTY MUST REJECT A BID IF THE BIDDER FAILS TO SUBMIT THE DISCLOSURE FORM WITH THIS INFORMATION BY THE STATED DEADLINE (see OAR 137-049-0360).**

9. **Bid Security.** The Bid Bond or Cashier's Check will be for a minimum of ten per cent (10%) of the amount of the bid price. If a bidder bids more than one bid proposal, each proposal must be accompanied by separate bid security. The County reserves the right to retain the bid security of the three (3) lowest bidders until the successful bidder has signed and delivered the contract and furnished one hundred percent (100%) Performance and Payment Bonds.
10. **Conditions of Work.** Each bidder must inform himself of the conditions relating to the execution of the work, and make himself thoroughly familiar with all the Contract documents. Failure to do so will not relieve the successful bidder of his obligations to enter into a Contract and complete the contemplated work in strict accordance with the Contract documents.

Each bidder must inform himself on all laws and statutes, both Federal and State, relative to the regular execution of the work, the employment of labor, protection of public health, access to the work and similar requirements.

11. **Award of Contract.** The award of the contract will be made by the County on the basis of the proposal which in its sole and absolute judgment will best serve the interest of the County.

County will issue a notice of intent to award contract. Any bidder may protest the notice of intent to award contract within seven (7) calendar days of the notice of intent to award contract.

The County reserves the right to accept or reject any or all proposals, and to waive any informalities and irregularities in said proposals.

12. **Payment and Retainage.** Payment for work performed will be made by the County as specified in the Special Provisions based upon the contract unit prices on the Bid Schedule.

Upon substantial completion of the contract, Contractor may request a partial release of retainage held by the County. The maximum amount of a request for a partial release retainage shall be the Contract amount less 150 percent of the estimated cost of the Contract yet to be performed through final completion. Upon final completion, Contractor may request release of the remaining retainage. Each request for the release of retainage shall be accompanied by the Consent of the contractor's surety.

13. **Performance Bond and Payment Bond.** The successful bidder shall file with the County, at the time of execution of the contract, a Performance Bond and a Payment Bond each of not less than the contract price on the forms furnished by the County. The Surety Company furnishing the required bonds shall have a sound financial standing and a record of service satisfactory to the County, and shall be authorized to do business in the State of Oregon. In lieu of a Performance Bond, the contractor may file cash, a Certified or Cashier's Check made payable to Deschutes County, Oregon. This money, check or certificate will be held by the County conditioned on and subject to the same provisions as set forth in the attached Performance Bond. ORS 279C.380 allows no flexibility for a cash deposit in lieu of a Payment Bond.

County may request a copy of Contractor's surety bond(s). Contractor must supply County with copy of surety bond(s) within ten (10) calendar days from the date of the request.

14. **Required Public Works Bond** The Contractor and every subcontractor must have a public works bond filed with the Construction Contractors Board, 700 Summer St. NE, Suite 300, Salem, Oregon 97309-5052, before starting work on the project, unless except under ORS 279C.836(7) or (8) of 2005 Oregon Laws Chapter 360. Every subcontract to which Contractor is a party for the performance of work under this Contract shall contain a provision requiring the subcontractor to have a public works bond filed with the Construction Contractors Board before starting work on this project, unless exempt under ORS 279C.836 (7) or (8) of 2005 Oregon Laws Chapter 360.

15. **Failure to Execute Contract.** Upon failure by the successful bidder to enter into the Contract and furnish the necessary bond within ten (10) calendar days from the date Notice of Award is made, the bid security accompanying the bid shall be forfeited, the proceeds paid to the County, and the award withdrawn. The award may then be made to the next lowest responsible bidder, or all bids rejected and work is re-advertised.

16. **Disclaimer of Responsibility.** Neither the County nor the Director of Solid Waste will be responsible for oral interpretations. Should a bidder find discrepancies in, or omissions from the drawings, specifications, or other pre-bid documents, or be in doubt as to their meaning, bidder shall notify the County at least seven (7) calendar working days prior to the bid opening date. Any and all such interpretations, any supplemental instructions or approval of manufacturer's materials to be substituted will be made only in the form of written addenda to the specifications, which, if issued, will be hand delivered or sent by regular mail, email and fax to all prospective bidders receiving a set of such documents, not later than two (2) calendar days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addendum or interpretation shall not relieve such bidder from any obligation under his bid as submitted. All addenda so issued are to be covered in the bid for such addenda to become part of the Contract.

17. **Permits and Licenses.** The successful bidder shall be required to have or obtain, at his expense, any and all permits and licenses required by Deschutes County, any City within the County, and the State of Oregon,

pertaining to the service he proposes to furnish. Licensing shall include without limitation registration with Construction Contractors Board and in the case of professional engineers and architects proof of current licensing with the appropriate State licensing board.

18. **Minimum Requirements of Bid.** The following minimum requirements as to the form and manner of submitting bids must be strictly observed; variance from these requirements will result in rejection of the bid as unresponsive.
- A. Each Bid must be submitted on forms furnished by the County, and include a complete original set of all forms provided in Part V-Bid Proposal Forms of these Contract Documents.
  - B. Each Bid must be signed by the bidder.
  - C. Bid security, in the required form and amount, must accompany each bid.
  - D. Each blank in the proposal must be filled in unless an alternative is provided. Each separate bid item must be bid on, unless the proposal form clearly indicates otherwise.
  - E. Each Bid must be submitted in a separate sealed envelope, marked to identify without opening, and in the hands of the Solid Waste Department Director at the time and place specified for bid opening.
  - F. A proposal containing modifications, deletions, exceptions or reservations which in any way conflict with or purport to alter any substantive provision contained in the bid documents, will not be considered.
  - G. A conditional bid will not be considered.
  - H. Any bid submitted without all of the pages of the bid documents, but with a sufficient number of the pages of the bid documents to allow the evaluation of the bid, shall be deemed to have been submitted with the missing pages for purposes of bid evaluation. The missing pages of the bid documents shall be deemed to be incorporated into bid by reference.
19. **Plans.** Plans are not to be taken or construed as being reproduced at precisely the indicated scale. Where the plans are photographic reductions of the original tracings, the approximate amount of reduction is indicated by a note on the plans.
20. **Specifications.** The specifications are the minimum acceptable specifications for the project for which proposals are sought. Any deviation from the specifications contained herein, shall render the bid non-responsive.
21. **Examination of Site and Conditions.** Bidders are required, prior to submission of bids, to carefully examine the site and the Plans and Specifications of the contemplated work. Errors and omissions in the Plans or Specifications shall be called to the attention of the Solid Waste Department Director prior to submission of bid so that addenda may be issued. Failure to do so on the part of the Contractor does not relieve him of responsibility for a correct and completely finished job. Only a written interpretation or correction by addendum shall be binding.
22. **Pre-Bid Inquiries.** Bidders with pre-bid inquiries shall contact Chad Centola, Deschutes County Solid Waste Department Operations Manager at (541) 322-7172 or chadc@deschutes.org.

23. **Qualification of Bidders.** Bidders shall have demonstrated experience having completed a minimum of three (3) successful projects for the installation and start-up of a landfill gas collection and control systems, including landfill gas flare systems within the past ten (10) years. References are required and are to be submitted on forms provided in the Bid Proposal Forms section of these Contract Documents.

Contractors and subcontractors need not be licensed under ORS 468A.720. This contract is subject to ORS 279C.800 to 279C.870. The successful bidders and subcontractors providing labor shall maintain a qualified drug-testing program for the duration of the contract. Bidders shall be registered with the Construction Contractor's Board. Contractors and subcontractors need not be licensed under ORS 468.710.

The County may make any further investigation deemed necessary to resolve any doubt as to the bidder's qualifications, and the bidder shall furnish to the County all such information and data for this purpose as the County may request. The County reserves the right to reject any bid if the evidence submitted or investigation of such bidder fails to satisfy the County that such bidder is in all respects able to adequately perform the obligations of the Contract and to complete the work contemplated therein.

Any bidder who is disqualified may appeal his disqualification to the Board of County Commissioners of Deschutes County, Oregon, which is the local public contract review board as provided by State Law. Written notice of such appeal must be filed with the Board of County Commissioners by the close of business on the third County business day following the bidder's receipt of notice that he is disqualified.

If a bidder has appealed his disqualification within the time provided, but there has been no disposition of the appeal by the Board of County Commissioners, he may submit his sealed bid on a form marked, "SAMPLE ONLY, NOT TO BE USED FOR BIDDING", and sealed in an envelope marked the same. His bid will not be opened, but will be forwarded to the Board of County Commissioners. If after considering the matter, the Board of County Commissioners determines that the bidder is qualified, the Board shall open and read the bid, and it shall be considered with all other bids. If the bidder is not found qualified after appeal, the bid will be opened, copied and returned to the disqualified bidder. The bid shall not be read publicly, and the Board of County Commissioners action on appeal; or its public disclosure is mandated under the procedure as specified in ORS 192.480 or 192.490.

24. **Contract Award.** Deschutes County reserves the right to postpone award of the contract for fourteen (14) calendar days from the date of the bid opening, or until a final decision is made on a protest, whichever is later.
25. **Bidder Statement.** Submission of a bid for the project shall constitute a statement by the bidder that the provisions of ORS 279C.840 are to be complied with.

## PART III – GENERAL CONDITIONS

1. **Prevailing Rates of Wage.** This Contract is subject to the “Prevailing Wage Rates for Public Works Contracts in Oregon” as published by the Oregon Bureau of Labor and Industries (dated January 1, 2016), and, if applicable the Federal Prevailing Rate of Wage required under the Davis-Bacon Act (40 U.S.C. 3141 et seq.) that may be paid to workers in each trade or occupation required for the public works employed in the performance of the contract either by the contractor or subcontractor or other person doing or contracting to do the whole or any part of the work contemplated by the contract. The following internet link may be used to obtain the access to State and Federal Prevailing Wage Rates:

[http://www.oregon.gov/BOLI/WHD/PWR/pwr\\_book.shtml](http://www.oregon.gov/BOLI/WHD/PWR/pwr_book.shtml)

2. **Required Conditions in Public Works Contract and Contract Specifications - ORS 279C.800 to 279C.870.** County shall pay to the Bureau of Labor and Industries a fee equal to one tenth of one percent (.001) of the contract price but no less than \$250 nor more than \$7,500 regardless of the contract price; that the fee shall be paid no later than the date the contract is signed; and that the fee shall be delivered to the Bureau at the following address: Prevailing Wage Rate Unit, Wage and Hour Division, Bureau of Labor and Industries, 800 NE Oregon Street #32, Portland, OR 97232.

**Posting Requirements.** Contractors shall post the prevailing wage rates applicable to the project in a conspicuous place at the site of work. The posting shall be easily accessible to employees working on the project.

When a contractor or subcontractor provides for or contributes to a health and welfare plan or pension plan for employees who are working on a public works project, the contractor or subcontractor shall post a notice containing the following information:

- A. A description of the plan or plans;
- B. Information on how and where claims can be made; and,
- C. Where to obtain more information

All required postings shall be posted in the same place and shall be in a conspicuous place at the site of work and shall be easily accessible to employees working on the project.

3. **Required Payroll Submissions.** Contractors and subcontractors on public works projects are required to prepare **weekly** certified payroll reports and statements and submit them to the public contracting agency by the fifth business day of each month. Contractors and subcontractors who fail to submit certified payroll reports as described above, will be subject to a twenty five percent (25%) withholding of the amounts owed by the County.

Information submitted on certified statements may be used only to ensure compliance with the provisions of ORS 279C.800 to 279C.870. These are public records and must be made available on request. Contractors may submit their own report as long as it contains all the same information as the WH-38 form (see Prevailing Wage Rates published by the Oregon Bureau of Labor and Industries for forms). Contractors must complete the statement of certification and attach it to the payroll submissions.

4. **Contracting Agency Payments.** If the Contractor fails, neglects, or refuses to make prompt payment of any claim for labor or services furnished to the Contractor or Subcontractor by any person, or the assignee of the person, in connection with the public works contract as such claim becomes due, the proper officer or officers

of the public contracting agency may pay such claim and charge the amount of the payment against funds due or to become due the Contractor by reason of the Contract.

5. **Interest Rate For Failure to Make Payment.** If Contractor or a first-tier subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with this contract for a public improvement within 30 days after receipt of payment from the County or a Contractor, the Contractor or first-tier subcontractor shall owe the person the amount due plus interest charges commencing at the end of the 10-day period that payment is due under ORS 279C.580(4) and ending upon final payment, unless payment is subject to a good faith dispute as defined in ORS 279C.580. The rate of interest charged to the Contractor or first-tier subcontractor on the amount due shall equal three times the discount rate on 90-day commercial paper in effect at the Federal Reserve Bank in the Federal Reserve district that includes Oregon on the date that is 30 days after the date when payment was received from the County or from the Contractor, but the rate of interest shall not exceed 30 percent. The amount of interest may not be waived.
6. **Construction Contractors Board Complaint.** If Contractor or a subcontractor fails, neglects or refuses to make payment to a person furnishing labor or materials in connection with this contract, the person may file a complaint with the Construction Contractors Board, unless payment is subject to a good faith dispute as defined in ORS 279C.580.
7. **Independent Contractor.** Contractor is engaged hereby as an independent contractor, and will be so deemed for purposes of the following:
  - A. Contractor will be solely responsible for payment of any Federal or State taxes required as a result of this Agreement.
  - B. This Contract is not intended to entitle Contractor to any benefits generally granted to County employees. Without limitation, but by way of illustration, the benefits which are not intended to be extended by this Contract to the Contractor are vacation, holiday and sick leave, other leaves with pay, tenure, medical and dental coverage, life and disability insurance, overtime, Social Security, Workers' Compensation, unemployment compensation, or retirement benefits (except insofar as benefits are otherwise required by law if the Contractor is presently a member of the Public Employees Retirement System).
  - C. Contractor is an independent contractor for purposes of the Oregon Workers' Compensation law (ORS Chapter 656) and is solely liable for any Workers' Compensation coverage under this Contract. If Contractor has the assistance of other persons in the performance of this Contract, the Contractor shall qualify and remain qualified for the term of this Contract as a direct responsibility employer under ORS 656.407, and furnish County with evidence of said insurance. If Contractor performs this contract without the assistance of any other person, Contractor shall execute a Joint Declaration with County's Workers' Compensation carrier absolving County of any and all liability from Workers' Compensation provided in ORS 656.029 (2).
8. **Delegation and Reports.** Contractor shall not delegate the responsibility for providing services hereunder to any other individual or agency, and shall provide County with periodic reports to County at the frequency and with the information prescribed to be reported by County.
9. **Constraints.** Pursuant to the requirements of ORS 279C.500 through 279C.540 and Article XI, Section 10, of the Oregon Constitution, the following terms and conditions are made a part of this Agreement:
  - A. Contractor shall:
    - 1) Make all payments promptly, as due, to all persons supplying to Contractors labor or materials for the prosecution of the work provided for in this agreement.

- 2) Pay all contributions or amounts due the Industrial Accident Fund from such contractor or subcontractor incurred in the performance of this Agreement.
  - 3) Not permit any lien or claim to be filed or prosecuted against County on account of any labor or material furnished.
  - 4) Not permit any lien or claim to be filed or prosecuted against County on account of any labor or material furnished.
  - 5) Pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.
  - 6) Demonstrate that an employee drug testing program is in place prior to execution of this Contract.
- B. If Contractor fails, neglects or refuses to make prompt payment of any claim for labor or services furnished to Contractor or a subcontractor by any person in connection with this agreement as such claim becomes due, the proper officers representing County may pay such claim to the person furnishing the labor or services and charge the amount of the payment against funds due or to become due Contractor by reason of this agreement.
- C. Employees of Contractor shall be paid at least time and a half for all overtime worked in excess of eight hours a day or forty (40) hours in any one week when the work week is five consecutive days, Monday through Friday; or for all overtime in excess of 10 hours a day or 40 hours in any one week when the work week is four consecutive days, Monday through Friday, except individuals under this contract who are excluded under ORS 653.010 to 653.261 or under 29 U.S.C. Sections 201 to 209 from receiving overtime.
- D. Employees of Contractor providing labor shall be paid at least time and a half for all work performed on Saturday and Sunday and the following legal holidays:
- 1) New Year's Day on January 1.
  - 2) Memorial Day on the last Monday in May.
  - 3) Independence Day on July 4.
  - 4) Labor Day on the first Monday in September.
  - 5) Thanksgiving Day on the fourth Thursday in November.
  - 6) Christmas Day on December 25.
- E. An employer must give notice to employees who perform work under this agreement in writing, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that employees may be required to work.
- F. An employer must give notice to employees who perform work under this agreement in writing, either at the time of hire or before commencement of work on the contract, or by posting a notice in a location frequented by employees, of the number of hours per day and days per week that employees may be required to work.
- G. Contractor shall promptly, as due, make payment to any person or partnership, association or corporation furnishing medical, surgical and hospital care or other needed care and attention incident to sickness and/or injury to the employees of Contractor, of all sums which Contractor agrees to pay for such services, and all monies and sums which Contractor collected or deducted from the wages of Contractor's employees pursuant to any law, contract or agreement for the purpose of providing or paying for such services.
- H. This Agreement is expressly subject to the debt limitation of Oregon counties set forth in Article XI, Section 10, of the Oregon Constitution, and is contingent upon funds being appropriated therefore. Any provision herein which would conflict with law are deemed inoperative to that extent.
- I. All subject employers working under this contract are either employers that will comply with ORS 656.017 or are employers that are exempt under ORS 656.126

**10. Early Termination.** This Contract may be terminated as follows:

- A. Mutual Consent. County and Contractor, by mutual written agreement, may terminate this Contract at any time.
- B. Party's Convenience. County or Contractor may terminate this Contract for any reason upon 30 calendar days written notice to the other party.
- C. For Cause. County may also terminate this Contract effective upon delivery of written notice to the Contractor, or at such later date as may be established by the County, under any of the following conditions:
  - 1) If funding from state or other sources is not obtained and continued at levels sufficient to allow for the purchase of the indicated quantity of services as required in this contract. This Contract may be modified to accommodate the change in available funds.
  - 2) If state laws, regulations or guidelines are modified, changed or interpreted in such a way that the services are no longer allowable or appropriate for purchase under this Contract or are no longer eligible for the funding proposed for payments authorized by this contract.
  - 3) In the event sufficient funds shall not be appropriated for the payment of consideration required to be paid under this contract, and if County has no funds legally available for consideration from other sources.
  - 4) If any license or certificate required by law or regulation to be held by the Contractor to provide the services required by this Contract is for any reason denied, revoked, suspended, not renewed or changed in such a way that the Contractor no longer meets requirements for such license or certificate.
- D. Contractor Default or Breach. The County, by written notice to the Contractor, may immediately terminate the whole or any part of this Contract under any of the following conditions:
  - 1) If the Contractor fails to provide services called for by this Contract within the time specified or any extension thereof.
  - 2) If the Contractor fails to perform any of the other requirements of this Contract or so fails to pursue the work so as to endanger performance of this Contract in accordance with its terms, and after receipt of written notice from the County specifying such failure, the Contractor fails to correct such failure within 10 calendar days or such other period as the County may authorize.
  - 3) Contractor institutes or has instituted against it insolvency, receivership or bankruptcy proceedings, makes an assignment for the benefit of creditors, or ceases doing business on a regular basis.
- E. County Default or Breach. Contractor may terminate this Contract in the event of a breach of this Contract by the County. Prior to such termination, the Contractor shall give to the County written notice of the breach and intent to terminate. If the County has not entirely cured the breach within 10 calendar days of the date of the notice, then the Contractor may terminate this Contract at any time thereafter by giving notice of termination.

**11. Payment on Early Termination.** Upon termination pursuant to paragraph 10, payment shall be made as follows:

- A. If terminated under subparagraphs 10 a. through c. of this Contract, the County shall pay Contractor for work performed prior to the termination date if such work was performed in accordance with the Contract. County shall not, however, pay Contractor for any obligations or liabilities incurred by Contractor after Contractor receives written notice of termination.
- B. If this Contract is terminated under subparagraph 10 d. of this Contract, County obligations shall be limited to payment for services provided in accordance with this Contract prior to the date of termination, less any damages suffered by the County.
- C. If terminated under subparagraph 10 e. of this Contract by the Contractor due to a breach by the County, then the County shall pay the Contractor for work performed prior to the termination date if such work was

performed in accordance with the Contract (a) with respect to services compensable on an hourly basis, for unpaid invoices, hours worked within any limits set forth in this Contract but not yet billed, authorized expenses incurred and interest within the limits set forth under ORS 293.462, and (b) with respect to deliverable-based Work, the sum designated for completing the deliverable multiplied by the percentage of Work completed and accepted by County, less previous amounts paid and any claim(s) that County has against Contractor. In no event shall County be liable to Contractor for any expenses related to termination of this Contract or for anticipated profits.

**12. Remedies.** In the event of breach of this Contract the parties shall have the following remedies:

- A. Termination under subparagraphs 10 a. through c. of this Contract shall be without prejudice to any obligations or liabilities of either party already reasonably incurred prior to such termination. Contractor may not incur obligations or liabilities after Contractor receives written notice of termination. Additionally, neither party shall be liable for any indirect, incidental, consequential or special damages under this Contract or for any damages of any sort arising solely from the termination of this Contract in accordance with its terms.
- B. If terminated under subparagraph 10 d. of this Contract by the County due to a breach by the Contractor, County may pursue any remedies available at law or in equity. Such remedies may include, but are not limited to, termination of this contract, return of all or a portion of this Contract amount, payment of interest earned on this Contract amount, and declaration of ineligibility for the receipt of future contract awards. Additionally, County may complete the work either itself, by agreement with another Contractor, or by a combination thereof. If the cost of completing the work exceeds the remaining unpaid balance of the total compensation provided under this Contract, then the Contractor shall pay to the County the amount of the reasonable excess.
- C. In addition to the remedies in paragraphs 10 through 12 of this Contract for a breach by the Contractor, the County also shall be entitled to any other equitable and legal remedies that are provided by law.
- D. If previous amounts paid to Contractor exceed the amount due to Contractor under this Contract, Contractor shall repay any excess to County upon demand.
- E. If the County breaches this Contract, Contractor's sole monetary remedy shall be (a) with respect to services compensable on an hourly basis, a claim for unpaid invoices, hours worked within any limits set forth in this Contract but not yet billed, authorized expenses incurred and interest within the limits set forth under ORS 293.462, and (b) with respect to deliverable-based Work, a claim for the sum designated for completing the deliverable multiplied by the percentage of Work completed and accepted by County, less previous amounts paid and any claim(s) that County has against Contractor. In no event shall County be liable to Contractor for any expenses related to termination of this Contract or for anticipated profits.
- F. Neither County nor Contractor shall be held responsible for delay or default caused by fire, civil unrest, labor unrest, riot, acts of God, or war where such cause was beyond reasonable control of County or Contractor, respectively. Contractor shall, however, make all reasonable efforts to remove or eliminate such a cause of delay or default and shall, upon the cessation of the cause, diligently pursue performance of its obligations under this Contract. For any delay in performance as a result of the events described in this subparagraph, Contractor shall be entitled to additional reasonable time for performance that shall be set forth in an amendment to this Contract.
- G. The passage of this Contract expiration date shall not extinguish or prejudice the County's or Contractor's right to enforce this Contract with respect to any default or defect in performance that has not been cured.
- H. **LIQUIDATED DAMAGES.** It is impractical to determine the actual damages that the County would sustain in the event the project is not completed by May 15, 2017. Therefore, the Contractor shall pay to the County,

not as a penalty, but as liquidated damages, **\$500 per calendar day**, or any portion thereof, for each day in which the project is not completed by such date.

- I. County's remedies are cumulative to the extent the remedies are not inconsistent, and County may pursue any remedy or remedies singly, collectively, successively or in any order whatsoever.

13. **Contractor's Tender Upon Termination.** Upon receiving a notice of termination of this Contract, Contractor shall immediately cease all activities under this Contract unless County expressly directs otherwise in such notice of termination. Upon termination of this Contract, Contractor shall deliver to County all documents, information, works-in-progress and other property that are or would be deliverables had this Contract been completed. Upon County's request, Contractor shall surrender to anyone County designates, all documents, research, objects or other tangible things needed to complete the work.
14. **Work Standard.** Contractor shall be solely responsible for and shall have control over the means, methods, techniques, sequences and procedures of performing the work, subject to the plans and specifications under this Contract and shall be solely responsible for the errors and omissions of its employees, subcontractors and agents. For goods and services to be provided under this contract, Contractor agrees to:
  - A. Perform the work in a good, workmanlike, and timely manner using the schedule, materials, plans and specifications approved by County;
  - B. Comply with all applicable legal requirements;
  - C. Comply with all programs, directives, and instructions of County relating to safety, storage of equipment or materials;
  - D. Take all precautions necessary to protect the safety of all persons at or near County or Contractor's facilities, including employees of Contractor, County and any other contractors or subcontractors and to protect the work and all other property against damage.
15. **Hold Harmless.** To the fullest extent allowed by law Contractor shall indemnify, save harmless and defend the County from and against all claims, suits or actions for damages, costs, losses and expenses arising from Contractor's torts, as the term "tort" is defined in ORS 30.260(8).
16. **Contractor Not An Agent of County.** It is agreed by and between the parties that Contractor is not carrying out a function on behalf of County, and County does not have the right of direction or control of the manner in which Contractor delivers services under this agreement or exercise any control over the activities of Contractor.
17. **Partnership.** County is not, by virtue of this Contract, a partner or joint venturer with Contractor in connection with activities carried out under this Contract, and shall have no obligation with respect to Contractor's debts or any other liabilities of each and every nature.
18. **Insurance.** In conjunction with all services performed under this agreement: Contractor shall furnish proof of the types and amounts of insurance indicated in Part VI, Agreement Forms, attached hereto and by this reference incorporated herein. County reserves the right to require completed, certified copies of all required insurance policies, at any time.
19. **Non-Discrimination.** Contractor agrees that no person shall, on the grounds of race, color, creed, national origin, sex, marital status, or age, suffer discrimination in the performance of this Agreement when employed by Contractor. Contractor agrees to comply with Title VI of the Civil Rights Act of 1964, with Section V of the Rehabilitation Act of 1973, and with all applicable requirements of federal and state civil rights and

rehabilitation statutes, rules and regulations. Additionally, each party shall comply with the Americans with Disabilities Act of 1990 (Pub. L. No. 101-336), ORS 659A.112, and all regulations and administrative rules established pursuant to those laws.

20. **Non-Appropriation.** In the event sufficient funds shall not be appropriated for the payment of consideration required to be paid under the Contract, and if County has no funds legally available for consideration from other sources, then County may terminate this agreement in accordance with Paragraph 10 of these General Conditions.
21. **Attorney Fees.** In the event an action, lawsuit or proceeding, including appeal there from, is brought for failure to observe any of the terms of this Agreement, each party shall be responsible for their own attorney's fees, expenses, costs and disbursements for said action, suit, proceeding or appeal.
22. **Claim, Action, Suit or Proceeding.** This Contract shall be governed by and construed in accordance with the laws of the State of Oregon without regard to principles of conflicts of law. Any claim, action, suit or proceeding (collectively, "Claim") between County and Contractor that arises from or relates to this Contract shall be brought and conducted solely and exclusively within the Circuit Court of Deschutes County for the State of Oregon; provided, however, if a Claim must be brought in a federal forum, then it shall be brought and conducted solely and exclusively within the United States District Court for the District of Oregon. **THE RECIPIENT, BY EXECUTION OF THIS CONTRACT, HEREBY CONSENTS TO THE IN PERSONAM JURISDICTION OF SAID COURTS.**
23. **Land Use Permit.** This contract does not constitute a land use permit, nor does acceptance of this Contract by Contractor constitute approval of any legislative or quasi-judicial action required as a condition precedent to use of the land for the intended purpose.
24. **Drug Testing Program.** The drug testing program in place at execution of this Contract shall remain in place for the duration of the Contract.
25. **Records Maintenance; Right to Audit Records.**
  - A. **Records Maintenance; Access.** Contractors and subcontractors shall maintain all fiscal records relating to Contracts in accordance with generally accepted accounting principles ("GAAP"). In addition, Contractors and subcontractors shall maintain all other records necessary to clearly document:
    - 1) Their performance; and
    - 2) Any claims arising from or relating to their performance under this Contract. Contractors and subcontractors shall make all records pertaining to their performance and any claims under a Contract (the books, fiscal records and all other records, hereafter referred to as "Records") accessible to the County at reasonable times and places, whether or not litigation has been filed as to such claims.
  - B. **Inspection and Audit.** County may, at reasonable times and places, have access to and an opportunity to inspect, examine, copy, and audit the Records of any Entity that has submitted cost or pricing data according to the terms of a Contract to the extent that the Records relate to such cost or pricing data. If the Entity must provide cost or pricing data under a Contract, the Entity shall maintain such records that relate to the cost or pricing data for 3 years from the date of final payment under the Contract, unless a shorter period is otherwise authorized in writing.
  - C. **Records Inspection; Control Audit.** County, and its authorized representatives, shall be entitled to inspect, examine, copy, and audit any Contractor's or subcontractor's Records, as provided in Section A of this rule. The Contractor and subcontractor shall maintain the Records and keep the Records accessible and available at reasonable times and places for a minimum period of 3 years from the date of final payment under the Contract or subcontract, as applicable, or until the conclusion of any audit, controversy or litigation arising out of or related to the Contract, whichever date is later, unless a shorter period is otherwise authorized in writing.

26. **Contract Rules.** The rules applicable to this contract are the Attorney General’s Model Public Contract Rules, Chapter 137-046 and Chapter 137-049, as presently constituted and Deschutes County Code (DCC) Chapter 2.37. The provisions of DCC Chapter 2.37.150 are incorporated herein by reference. These provisions may be viewed at the following web address: <http://www.co.deschutes.or.us/dccode/Title2/docs/Chapter%202.37doc>
27. **Contractor Certifies.** By execution of this contract, Contractor certifies, under penalty of perjury, that:
- A. To the best of Contractor’s knowledge, Contractor is not in violation of any tax laws described in ORS 305.380(4), and
  - B. Contractor has not discriminated against minority, women or small business enterprises in obtaining any required subcontracts.
28. **Contract Provisions.** Contractor shall make all provisions of this contract with the County applicable to any subcontractor performing work under the contract.
29. **Contract Content.** This Contract and attached exhibits and attachments constitute the entire agreement between the parties on the subject matter hereof. There are no understandings, agreements, or representations, oral or written, not specified herein regarding this Contract. No waiver, consent, modification or change of terms of this Contract shall bind either party unless in writing and signed by both parties and all necessary County approvals have been obtained. Such waiver, consent, modification or change, if made, shall be effective only in the specific instance and for the specific purpose given. The failure of the County to enforce any provision of this Contract shall not constitute a waiver by County of that or any other provision.
30. **Hazardous Materials.** Contractor shall not generate, store, process, dispose, release or discharge into the environment any hazardous, toxic, radioactive, or other dangerous materials on or about the work site subject to this Contract, nor allow any of its subcontractors to engage in such prohibited activities. Contractor agrees to indemnify, defend and hold the County, its officer, agents, and employees harmless from and against any and all claims, suits, actions, demands, damages, costs, losses and expenses in any manner resulting from, arising out of, or connected with any such prohibited activities of Contractor or its subcontractors. Discovery by Contractor of unanticipated hazardous, toxic, radioactive or other dangerous materials present at the work site shall not constitute a release or discharge by Contractor.
- County and Contractor agree that, Contractor’s discovery of unanticipated hazardous, toxic, radioactive, or other dangerous materials constitutes a changed condition mandating re-negotiation of the scope of work to be performed by Contractor, the terms under which the work is to be performed, and the charges therefore. Except as otherwise specified in this paragraph, nothing contained in this Contract shall be construed or interpreted as requiring Contractor to assume the status of an owner, operator, or generator, under any federal or state statute governing the disposal, transportation, storage or treatment of hazardous substances or wastes. Contractor shall not directly or indirectly assume title to such hazardous or toxic substances. Should the proper and lawful transportation and disposal of any such materials be required, Contractor’s responsibilities shall be limited to facilitating the preparation of manifests or related documents for execution by County for the proper disposal, storage or treatment of such materials. In the event such materials are discovered at the work sites by County, Contractor or any of their employees, subcontractors or agents, County shall have the option to terminate this Contract pursuant to paragraph 19 herein. Contractor shall have an affirmative duty to disclose and immediately notify County upon discovery or knowledge of the existence of any such materials at the work site.

# PART IV – SPECIAL PROVISIONS

## Table of Contents

DIVISION 1: GENERAL REQUIREMENTS .....	3
SECTION 01010 - SUMMARY OF THE WORK .....	3
SECTION 01040 - TECHNICAL SPECIFICATIONS .....	4
SECTION 01042 - RESTORATION OF SURFACES .....	4
SECTION 01045 - COOPERATION WITH COUNTY AND OTHER CONTRACTORS .....	5
SECTION 01050 - SURVEYING .....	5
SECTION 01060 - CODES, PERMITS AND PREVENTION OF ENVIRONMENTAL DEGRADATION.....	5
SECTION 01070 - SAFETY PROVISIONS.....	6
SECTION 01150 - MEASUREMENT, PAYMENT AND RETAINED AMOUNTS.....	8
SECTION 01210 - CONSTRUCTION SCHEDULE .....	9
SECTION 01220 - PROGRESS MEETINGS .....	10
SECTION 01230 - PRECONSTRUCTION CONFERENCE .....	10
SECTION 01340 –REQUIRED SUBMITTALS .....	11
SECTION 01350 - OPERATION AND MAINTENANCE MANUALS .....	13
SECTION 01370 - SCHEDULE OF VALUES .....	13
SECTION 01510 - MAINTENANCE OF EXISTING FACILITIES DURING CONSTRUCTION & CONTRACTOR COORDINATION .....	14
SECTION 01530 - TEMPORARY FACILITIES, UTILITIES.....	14
SECTION 01540 - SPECIAL CONTROLS.....	14
SECTION 01570 - TRAFFIC MAINTENANCE AND PROTECTION .....	15
SECTION 01700 - PROJECT CLOSEOUT .....	15
SECTION 01710 - CONTRACT CLOSEOUT PROCEDURE.....	16
SECTION 01802 - RATE OF WAGES FOR LABORERS AND MECHANICS .....	18
SECTION 01803 - PAYROLLS AND PAYROLL RECORDS.....	19
SECTION 01804 - TERMINATION OF WORK ON FAILURE TO PAY AGREED WAGES AND COMPLETION OF WORK .....	19
DIVISION 2: SITE WORK.....	20
SECTION 02100 - MOBILIZATION .....	20
SECTION 02150 - CLEARING AND GRUBBING.....	20
SECTION 02303 - CRUSHED AREA STONE., ROAD STONE AND GRAVEL.....	20
SECTION 02410 - LANDFILL GAS AND CONDENSATE DRAINAGE PIPING.....	21
SECTION 02420 - LFG BLOWER AND CANDLESTICK FLARE SYSTEM.....	25
SECTION 02430 – CHAIN LINK FENCE AND GATES.....	39
SECTION 02510 – CONDUCTORS AND CABLES .....	42
SECTION 02520 – RACEWAYS, BOXES AND CABINETS.....	45
SECTION 02530 – UNDERGROUND DUCTS AND UTILITY STRUCTURES.....	49

# Knott Landfill Flare Expansion Project Special Provisions

---

The engineering material and data contained in these Special Provisions was prepared under the supervision and direction of the undersigned, whose seal as an Oregon registered Professional Engineer is affixed below.



EXPIRES: 6/30/2016

---

**ENERGYneering Solutions, Inc.**  
William Song, P.E.  
Engineering Manager

## Division 1: General Requirements

### Section 01010 - Summary of the Work

- A. General Statement and Extent of Work.** The work to be performed under these Contract Documents consists of furnishing all labor, materials, tools, and equipment necessary for the construction of the Knott Landfill Flare Expansion Project. The project site is at the intersection of SE 27th and Rickard Road in Bend, Oregon. Project location maps are shown on the Drawings.

The work shall be performed in a workmanlike manner, complete and usable as required by the Drawings and these specifications. The work is to be constructed for Deschutes County, herein defined as the Owner.

The general work to be performed for the Knott Landfill Flare Expansion Project includes, but is not limited to, the following major items:

- Installation of landfill gas piping systems; and
- Installation of a landfill gas blower and candle stick flare system.

- B. Drawings for Construction.** Detailed drawings for this project are shown on the contract drawings which bear the general title:

### **Contract Drawings for the Knott Landfill Flare Expansion Project Deschutes County, Oregon**

- C. Time of Completion and Liquidated Damages.** Performance of the work to be done under the Contract shall be commenced within ten (10) calendar days after receipt of written notice to proceed by the Contractor, unless later commencement of the work is authorized by the Engineer. The Contractor shall complete all work items on or before May 15, 2017. For each calendar day after this date that the work remains uncompleted, the Contractor shall pay to the Owner five hundred dollars (\$500) per calendar day as liquidated damages.

Such amounts shall be a reimbursement to the Owner for damages which the Owner will have sustained by reason of such delayed completion. Damages so liquidated are understood to include the additional cost to the Owner for interference with landfilling operations, engineering supervision, observation of construction, interest charges and overhead.

- D. Excess Work Hours.** If the Contractor wishes to work at such a time of the day which is during the period other than the regular business hours of the County, including at night, between sunset and sunrise, or on a Saturday, Sunday, or legal State holiday, he shall make a written request for construction monitoring services during such period. If such a request is made and granted, the Contractor shall notify the Engineer not less than twenty-four (24) hours in advance of the time when such monitoring services are required.
- E. Project Coordination.** It shall be the responsibility of the Contractor to coordinate all work to be performed under this Contract. This coordination shall encompass all work to be performed by the Contractor, Contractor's subcontractors, the Owner, and any public utilities which may be involved.
- F. Access to the Work.** The Contractor shall provide access to the work as may be required by the Owner or Engineer. The Contractor also shall provide access to the work for representatives of local, state, and federal agencies as may be required for inspection of the progress of the work, the methods of construction, and for any other aspect of the work or the Contractor's operation under the jurisdiction of the respective agency.

## Section 01040 - Technical Specifications

- A. **General Statement.** Articles, materials, operations or methods mentioned in these Special Provisions, or indicated on the Drawings as being required for the project, shall be provided by the Contractor, and Contractor shall provide each item mentioned or indicated, perform according to the conditions stated in each operation prescribed, and provide, therefore, all necessary labor, equipment, and incidentals necessary to make a complete and operable installation.

No attempt has been made in these Contract Documents to segregate work covered by any trade or subcontract under one specification. Such segregation and establishment of subcontract limits will be solely a matter of specific agreement between the Contractor and Contractor's subcontractors. The Contractor and subcontractor in each case is cautioned that work included in any subcontract may be divided between several general specifications, and that each general specification or subheading of the Special Provisions may include work covered by two or more subcontracts or work in excess of any one subcontract.

- B. **Standard Specifications.** The "Oregon Standard Specifications for Construction", 2015 Edition, prepared by the Oregon Department of Transportation and amendments thereto are hereby made a part of this Contract Document and shall be the "Oregon Standard Specifications". The Oregon Standard Specifications requirements for measurement and payment are not applicable to this project.

Should a conflict occur between the General and Special Provisions as contained herein and those of the Oregon Standard Specifications, the General and Special Provisions shall have precedence.

Where the term "Commission", "Department", "Division", or "Oregon Transportation Commission" appears in the Oregon Standard Specifications, it shall be interpreted to mean the Deschutes County Solid Waste Department.

Where the term "Engineer" appears in the Oregon Standard Specifications, it shall be interpreted to mean ENERGYneering Solution Inc. (ESI) directly or acting through its duly authorized representatives.

Where the term "State" appears in the Oregon Standard Specifications, it shall be interpreted to mean Deschutes County acting through authorized representatives.

## Section 01042 - Restoration of Surfaces

- A. **Roads and Streets.** The Contractor shall restore all roads and streets in which the surface is removed, broken or damaged, or in which the ground has caved or settled, due to the performance of work covered by this Contract, to the original grade and cross section unless otherwise indicated. The Contractor shall match the existing surfacing for depth, materials and surface finish, including striping and pavement markings, except as otherwise specified.
- B. **Curbs, Gutters, Driveways and Sidewalks.** The Contractor shall reconstruct all curbs, gutters, driveways, sidewalks and similar structures which are broken or damaged during construction. The Contractor shall reconstruct with the same kind of material with the same finish, and in not less than the same dimensions as the original work. The Contractor shall remove and replace the entire portions between joints or scores and not merely by refinishing the damaged part. The Contractor shall match the appearance of the existing improvements as nearly as possible, except as otherwise required.
- C. **Cultivated Areas and Other Surfaces.** The Contractor shall restore all cultivated areas, which are damaged by actions of the Contractor, to their original condition. The Contractor shall remove ornamental trees and shrubbery with earth surrounding the roots wrapped in burlap, and replant in their original positions, or, as an alternative, replace with equal material.

For lawn areas, the Contractor shall cut the sod, roll and replace after the excavation has been properly compacted. Or, as an alternative, cover the excavated area with top soil to the depth of the original top soil and

reseed, water and maintain as directed. The Contractor shall notify the owner of any private property prior to construction upon their premises.

The materials storage areas shall be regraded and seeded by the Contractor at the conclusion of the project. Any damage to fences, walks, curbs, driveways, etc. shall be handled in accordance with applicable sections of these specifications.

- D. Measurement and Payment.** No separate or additional payment will be made for Restoration of Surfaces, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

#### **Section 01045 - Cooperation with County and Other Contractors**

The County will be operating the existing Knott Landfill during construction of the Knott Landfill Flare Expansion Project. The Contractor will not be allowed to work in the active areas of the site being used for refuse disposal. The Contractor must not restrict access for the Owner and public to those areas of the landfill being used for refuse disposal. The Contractor shall construct and maintain detour routes approved by the Owner to these areas of the landfill as necessary for Contractor's convenience, at no additional cost to the Owner. If applicable, the Contractor shall submit shop drawing(s) showing proposed detour route including traffic control in accordance with Section 01340.

The Contractor shall extend full cooperation to the County, other contractors, and the public. The Contractor shall schedule and construct his work in conjunction with these and other organizations to minimize mutual interference.

No separate or additional payment will be made for cooperation with the County, the public, and other contractors, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

#### **Section 01050 - Surveying**

- A. General.** The Contractor shall verify all grades, lines, levels and dimensions shown on the Drawings and shall report any errors or inconsistencies to the Engineer before commencing work. Failure to do so shall make the Contractor responsible for any changes which may be required thereafter in connection therewith. The Contractor shall, at Contractor's expense, furnish all stakes, templates, platforms, equipment, and labor that may be required in setting or laying out any part of the work.

The Contractor will be held responsible for the proper execution of the work to such lines and grades as shown on the Drawings and as may be directed by the Engineer. All stakes or other marks thus established shall be preserved by Contractor until their removal is authorized by the Engineer.

The Drawings show approximate elevations as of June 15, 2015.. Survey control and Drawings are referenced to the Central Oregon Coordinate System prepared by the Deschutes County Surveyor's Office. Projection parameters are on file at said office. The project datum is: Horizontal NAD (83-91), Vertical NGVD 29. Project units are in International Feet.

The Contractor shall place control stakes on each side of, and beyond the limits of the proposed construction and wherever needed.

- B. Measurement and Payment.** No separate or additional payment will be made for surveys. but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

#### **Section 01060 - Codes, Permits and Prevention of Environmental Degradation**

- A. General.** Environmental pollution control shall consist of the protection of the environment from pollution during and as a result of construction operations under the Contract. The control of environmental pollution requires the consideration of air, water and land and involves noise, dust, and other pollutants. It is the responsibility of the Contractor to investigate and comply with all applicable federal, state, and county laws and regulations concerning environmental pollution control and abatement.

- B. Protection of Land Resources.** Land resources within the project area and outside the limits of permanent work performed under the Contract shall be preserved in their present condition or be restored to a natural condition that will not detract from the appearance of the surrounding area. Except in areas marked on the Drawings to be cleared, the Contractor shall not deface, injure or destroy trees or shrubs nor remove or cut them without approval by the Owner. Any tree or other landscape feature scarred or damaged by the Contractor's equipment or operation shall be restored as nearly as possible to its original condition at the Contractor's expense.
- C. Water Pollution.** The Contractor shall not pollute water resources, including streams and drainage systems, with fuel, oils, bituminous materials, calcium chloride, acids, construction wastes, wash waters or other harmful materials. Objectionable construction discharges shall be processed, filtered, ponded or otherwise treated prior to their discharge into a waterway or drainage system. Disposal of any material, garbage, oil, grease, chemicals, trash and other similar materials in areas adjacent to streams or drainage systems is prohibited.
- D. Protection of Fish and Wildlife.** The Contractor shall at all times perform all work and take such steps to prevent any interference or disturbance to fish and wildlife.
- E. Permits.** Contractor shall be responsible for obtaining all permits necessary for completing the work.
- F. Subcontractors.** Compliance with the provisions of this section by the subcontractors will be the responsibility of the Contractor.
- G. Non-Compliance.** The Engineer will notify the Contractor of any non-compliance with the foregoing provisions and the action to be taken. If the Contractor fails or refuses to comply promptly, the Engineer, with the approval of the Owner, may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No extension of time or payment for excess costs or damage shall be made to the Contractor for the time lost due to such stop action. Failure to notify does not change the requirements.
- H. Payment.** No separate or additional payment will be made for codes, permits and prevention of environmental degradation, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

#### **Section 01070 - Safety Provisions**

- A. General.** Contractor shall comply with all health and safety rules, regulations, and ordinances promulgated by the local, state, and federal governments, the various construction permits, and other sections of the Contract Documents. Such compliance shall include, but not be specifically limited to, any and all protective devices, guards, restraints, locks, latches, switches, and other safety provisions that may be required or necessitated by state and federal safety regulations. The Contractor shall determine the specific requirements for safety provisions and shall cause inspections and reports by the appropriate safety authorities to be conducted to insure compliance with the intent of the regulations.

Contractor shall inform employees and subcontractors and their employees of the potential danger of working on and near landfills and landfill gas systems.

Contractor shall perform whatever work is necessary for safety and be solely and completely responsible for conditions of the job site, including safety of all persons (including employees of the Owner, Engineer, and Contractor) and property during the contract period. This requirement applies continuously and is not limited to normal working hours.

The Engineer's review of the Contractor's performance does not include a review or approval of the adequacy of the Contractor's safety supervisor, the safety program or any safety measures taken in, on, or near the construction site.

Contractor shall provide for the protection of employees and others from fire, explosion, or asphyxiation caused by any gases encountered during construction and landfill liquids emitted from, and present within, the existing solid waste landfill. Contractor shall provide at all times proper facilities for safe access to the work by authorized government officials.

Accidents causing death, injuries, or damage must be reported to the Engineer immediately in person or by telephone or messenger. In addition, Contractor shall promptly report in writing to the Engineer all accidents whatsoever arising out of, or in connection with, the performance of the work whether on, or adjacent to, the site, giving full details and statements of witnesses.

If a claim is made by anyone against the Contractor or any subcontractor on account of any accident, the Contractor shall promptly report the facts in writing within twenty-four (24) hours after occurrence, to the Engineer, giving full details of the claim.

- B. Warning.** The Contractor is advised that portions of the work for the Knott Landfill Flare Expansion Project will be performed near buried wastes and refuse. These buried materials decompose in the landfill, generating landfill gas typically composed of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), hydrogen sulfide (H<sub>2</sub>S), and other gases dependent on the composition of the buried materials. These gases may migrate laterally away from the landfill or vent through the landfill surface.

Some of the hazards associated with construction in landfill areas include, but are not limited to:

1. Fires which may start spontaneously from exposed or decomposing refuse.
2. Fires or explosions which may occur from the presence of methane gas.
3. Landfill gases which may cause an oxygen deficiency in trenches, borings, manholes, catch basins, and other structures.
4. Landfill gases that may cause acute toxic effects (e.g., H<sub>2</sub>S).
5. Possible caving of trenches and excavations when working over or in refuse fills.
6. Biological pathogens or other vectors.

The Contractor is entirely responsible for the health and safety of all personnel on the project site.

- C. Site Safety and Health Plan.** The Contractor shall develop and maintain for the duration of this Contract, a site safety and health plan that will effectively incorporate and implement all required county, state, and federal safety provisions. Contractor shall provide a written site safety and health plan for the construction within ten (10) calendar days after receiving a Notice to Proceed and prior to commencing work on this project. Contractor shall maintain at least one copy of the plan at the work site. Contractor shall assign an individual serving as a Site Safety and Health Officer at the job site at all times during work who is responsible and authorized to supervise and enforce compliance with the site safety and health plan. In addition to the other items that shall be addressed, the site safety and health plan shall list the appropriate procedures to be followed in the event that hazardous materials or gases are encountered.

Preparation of the written site safety and health plan is the Contractor's responsibility, and no statement made in these provisions relieves the Contractor of responsibility for information included in, and implementation of, the site safety and health plan.

The Contractor's written site safety and health plan should include, but not be limited to:

1. A list of chemical and physical hazards (such as methane exposure and electrical shock), allowable OSHA exposure levels, threshold limit values, other regulatory exposure levels, and the emergency response should an exposure or injury occur.
2. An emergency evacuation plan for immediate removal to a hospital or a doctor's care any person who may be injured on the job site including evacuation plan routes to medical treatment, and emergency telephone numbers including hospital, ambulance, fire, sheriff/police, poison control, the Engineer, and others as deemed necessary.
3. A list of safety and monitoring equipment at the job site and locations where equipment is stored or expected to be maintained.
4. Monitoring equipment action levels, frequency of testing, and recommended responses.
5. Procedures for entering confined spaces.
6. Procedures to be followed if hazardous materials or gases is encountered.

The Contractor shall inform all workers and the public visiting the site of the potential for the presence of methane and other landfill gases emanating from the natural decomposition of refuse buried at or near the job site and the importance of safety precautions to ensure the safety of workers and the public. The Contractor shall instruct all workers and maintain strict control of construction activity to protect and maintain the integrity of the closed portion of the landfill.

The Contractor shall submit copies of the site safety and health plan in accordance with Section 01340 of the Special Provisions. Failure on the part of the Contractor to follow the site safety and health plan or failure to work in a safe manner may result in suspension of the work by the Owner. The Contractor shall not be entitled to extra compensation for health- and safety-related suspensions, nor shall the Contract completion date be extended.

- D. Contractor Safety Equipment.** As part of the safety program, the Contractor shall maintain at the job site safety equipment applicable to the work as prescribed by the governing safety authorities and all articles necessary for giving first aid to the injured.

The Contractor shall train all personnel in use of the appropriate safety equipment that would be utilized during the course of their work. It is the responsibility of the Site Safety and Health Officer to ascertain that all safety equipment is properly maintained and being used when appropriate.

- E. Site Safety and Health Officer.** The Contractor shall provide a person designated as the Site Safety and Health Officer who is thoroughly trained in rescue procedures and the use of safety equipment and gas detectors. The person must be present at all times while work is being performed, and implement the written site safety and health plan and conduct testing, as necessary.

The Contractor shall provide the Site Safety and Health Officer with the delegated authority to order any person or worker on the landfill site to follow the safety rules. Failure to observe these rules is sufficient cause for removal of the person or worker(s) from this project.

The Site Safety and Health Officer is responsible for determining the extent to which any safety equipment must be utilized, depending on conditions encountered at the site.

- F. Payment.** No separate or additional payment will be made for safety provisions, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

## **Section 01150 - Measurement, Payment and Retained Amounts**

- A. Measurement and Payment - General.**

Measurement of pay items will be performed by the Engineer and the Contractor according to the United States standard measures and based upon actual units of work performed or installed. The method of measurement is described under each bid item. Each lump sum bid item has a measurement section in them stating that measurement will be by the lump sum.

Payment will be in accordance with the unit or lump sum prices shown on the Bid Schedule shown in the Proposal. The unit or lump sum contract prices shall constitute full compensation for each bid item including all costs for overhead, profit, fees, taxes, bonding, insurance, and for furnishing all plant, materials, labor, equipment, tools, and performing all operations required as well as all work incident or incidental to complete the work in accordance with the Contract Documents, and to provide operation and maintenance manuals, guarantees and warranties as well as as-built documentation of the completed work.

In the event that terms for "measurement and payment" and/or "measurement" and/or "payment" are not directly mentioned in a section, such omission shall be construed to mean that no separate or additional payment will be made for the work described in that section, but shall be considered incidental and included in various unit or lump sum bid items.

**B. Retained Amount (Retainage)**

The amount to be retained from progress payments to protect the County's interests shall be 5 percent of the value of work accomplished, and shall be withheld as described in Section 00195.50 of the Oregon Standard Specifications.

**Section 01210 - Construction Schedule**

- A. Construction Schedule.** Within ten (10) calendar days after Notice to Proceed, or such later time as may be designated by the Engineer, the Contractor shall prepare and submit to the Engineer for review a construction schedule, showing the order in which the Contractor proposes to carry on the work, the dates on which salient features will be started (including the procurement of materials, plant and equipment) and the contemplated dates for completing the same. No payment for mobilization will be made until receipt of the construction schedule by the Engineer.

The Contractor shall prepare and submit a construction schedule in the form of a Gantt Chart. The project's critical path, along with the start and end dates of each of the individual work items shall be shown. The construction schedule shall be in sufficient detail that progress of the work can be evaluated accurately at any time during the performance of the Contract.

The construction schedule shall be updated monthly. The Owner will make no progress payments under this Contract until an updated construction schedule has been submitted for review.

All costs associated with the submittal of the construction schedule updates shall be incidental to and included in the various contract items.

Review of any schedule submitted by the Contractor shall not be construed to assign responsibility of performance or contingencies to the Engineer or relieve the Contractor of responsibility to adjust forces, equipment, and work schedules as may be necessary to ensure completion of the work within the prescribed contract time.

- B. Revisions.** If, in the opinion of the Engineer, the Contractor's work activities are inconsistent with the order, sequence, or timing of the activities shown on the construction schedule, the Engineer may require the Contractor to propose methods, such as providing additional equipment and/or workers, to complete the work within the specified time limit. The Engineer may require the Contractor to submit supplementary construction schedules demonstrating the agreed rate of progress and the order and sequence of the work.
- C. Failure to Comply.** Failure of the Contractor to comply with the requirements of the Engineer under the provisions of this section shall be grounds for determination by the Engineer that the Contractor is not prosecuting the work with such diligence as will insure completion within the time specified. Upon such

determination, the Owner may terminate the Contractor's right to proceed with the work, or any separable part thereof, in accordance with determination for default or in accordance with other provisions provided in the Contract Documents.

- D. Payment.** No separate or additional payment will be made for the construction schedule, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

#### **Section 01220 - Progress Meetings**

- A. General.** The Engineer and Contractor shall arrange for and conduct progress meetings. These meetings shall include a Pre-Construction meeting, and monthly or more frequent progress meetings in advance of construction milestones (including but not limited to; trenching through roadway, inspection of below grade infrastructure and concrete reinforcement, major equipment setting, and substantial completion/commissioning). These meetings shall be attended by the Engineer and/or a designated representative, the Contractor's superintendent, and representatives of all subcontractors, utilities and others that are active in the execution of the work. The purpose of these meetings shall be to determine the status of the work; to resolve conflicts; and, in general, to coordinate and facilitate expeditious prosecution of the work.

The Engineer and/or a designated representative will prepare the agenda of progress meetings which shall include review of the progress, payment requests, narrative reports, latest construction schedule update, and record documents. The Engineer and/or a designated representative will prepare and distribute meeting minutes.

- B. Progress and Schedule Review.** The progress of the work and the construction schedule shall be reviewed at the progress meetings to verify:
1. Actual start and finish dates of completed activities since the last progress meeting.
  2. Duration and progress of all activities not completed.
  3. Reason, time and cost data for change order work that is to be incorporated into the construction schedule.
  4. Payment due to the Contractor.
  5. Reason and duration of required revisions.
- C. Review of Construction Schedule.** The Contractor shall submit a current construction schedule at the progress meeting in a form agreed upon by the Contractor and the Engineer. The construction schedule shall be in sufficient detail that the progress of the work can be evaluated accurately.
- D. Payment.** No separate or additional payment will be made for preparation for or attendance at progress meetings, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

#### **Section 01230 - Preconstruction Conference**

- A.** After the Contract has been executed, but prior to the Contractor beginning the work, a preconstruction conference will be held between the Contractor, Engineer, Owner, and such other interested or affected parties as may be invited. The purposes of the preconstruction conference will be:
1. To review the initial construction schedule.
  2. To establish a working understanding among the various parties associated or affected by the work.
  3. To establish and review procedures for progress payment, notifications, approvals, submittals, etc.
  4. To establish normal working hours for the work.
  5. To review safety standards and traffic control.

6. To discuss such other related items as may be pertinent to the work.
- B.** The Contractor shall prepare and submit at the preconstruction conference the following:
1. A list of proposed subcontractors.
  2. A preliminary schedule of submittals.
  3. A list of material sources for review, if applicable.
  4. A construction schedule.
- C. Payment.** No separate or additional payment will be made for preparation for or attendance at the preconstruction conference, but shall be considered incidental to the work and shall be included in various unit or lump sum bid items.

### **Section 01340 –Required Submittals**

- A. General.**
1. Promptly after award of the Contract, the Contractor shall notify the Engineer in writing of the proposed sources of materials, suppliers and fabricators including addresses, telephone numbers and names of contact persons. Review by the Engineer is required for all sources of materials, suppliers and fabricators prior to any ordering, fabrication, processing, or delivery.
  2. A Record of Materials, listing the materials for which source information will be required, and the submittal requirements for those items, will be given to the Contractor at the preconstruction conference. Submittal information for items shown in the Record of Materials, together with any other submittals that may be requested by the Engineer, shall be submitted sufficiently in advance of their need to allow for ordering, fabrication, inspection, delivery and installation, after the Engineer's review, in accordance with the reviewed construction schedule.
  3. The Contractor shall coordinate, check, approve and submit shop drawings, samples, catalogs, catalog cuts, layouts, color charts, bills of material, test reports, materials certifications, Site Safety and Health Plan, Operating and Maintenance Manual, Traffic Control Plan, and Manufacturers' Equipment Warranties as specified herein and in the relevant sections of these Contract Documents.
- B. Shop Drawings.**
1. The Contractor shall assemble; label with reference to the relevant section of the specifications, and/or the drawing number, detail number, bid proposal item number, location, name and address, and delivery date; and provide all other pertinent data needed for a complete shop drawing. Deviations from the provisions in the Contract Documents shall be noted on the shop drawings.
  2. Contractor shall submit shop drawings electronically in Adobe Acrobat file.
  3. The Contractor shall verify all rough-in, backing or blocking, space requirements, field measurements, conformity to Contract Documents, code requirements where applicable, and necessary coordination with other parts of the work.
  4. Form of Submittal: The Contractor shall submit a Request for Review of Materials, together with all drawings, to the Engineer for review. The request shall be submitted on a standard form supplied by the Engineer.
- C. Product Data.**
1. The Contractor shall submit manufacturer's catalog cuts, illustrations, brochures, diagrams, mixing or installing instructions for all products specified in the Record of Materials, together with any other submittals that shall be requested by the Engineer. Submittals will be required for all materials requiring coordination, verification of requirements, selection of minor accessories, and as specified in each section

of these Special Provisions. Additional or duplicating information also may be required, after review, for use by the Owner in the maintenance and operation of the facilities.

2. Form of Submittal: The Contractor shall submit a Request for Review of Materials, together with all product data, to the Engineer for review. The request shall be submitted on a standard form supplied by the Engineer.
3. Contractor shall submit product data electronically as an Adobe Acrobat, Excel or Word document file.

**D. Samples and Color Selections.**

1. The Contractor shall submit samples, color charts and finish selection requirements as may be specified elsewhere in these Contract Documents.
2. *Samples.* Unless specified otherwise, the Contractor shall submit samples in a manageable size for mailing, and storage in the project file cabinet, and as follows:
  - a. Quantity: Contractor shall submit five (5) sets of samples.
  - b. Character: The material samples shall be representative of the production line, or the product produced by the manufacturer.
3. *Color Charts.* Unless otherwise specified, colors for selection are from the manufacturer's standard color selection as currently published or manufactured in effect at the time of the Invitation to Bid.

**E. Site Safety and Health Plan**

1. A Site Safety and Health Plan shall be submitted by the Contractor as required in Section 01070 of the Special Provisions.
2. Form of Submittal. The Contractor shall submit the Site Safety and Health Plan to the Engineer for review.
3. Contractor shall submit the Site Safety and Health Plan in printed form or electronically as an Adobe Acrobat, Excel or Word document file.

**F. Operation and Maintenance Manuals**

1. An Operation and Maintenance Manual shall be submitted by the Contractor as required in Section 01350 of the Special Provisions.
2. Form of Submittal. The Contractor shall submit the Operations and Maintenance Manual to the Engineer for review.
3. Contractor shall submit the Operation and Maintenance Manual in printed form or electronically as an Adobe Acrobat, Excel or Word document file.
4. Upon acceptance after Engineer's Review, Contractor shall assemble and submit five (5) hardbound copies and one (1) electronic copy of the approved Operations and Maintenance Manual.

**G. Traffic Control Plan**

1. A Traffic Control Plan shall be submitted by the Contractor as required in Section 01570 of the Special Provisions.
2. Form of Submittal. The Contractor shall submit Traffic Control Plan to the Engineer for review.
3. Contractor shall submit the Traffic Control Plan in printed form or electronically as an Adobe Acrobat, Excel or Word document file.

**H. Equipment Warranties**

1. Equipment Warranties shall be submitted by the Contractor as required in Section 02420 of the Special Provisions.
2. Form of Submittal. The Contractor shall submit the Equipment Warranties to the Engineer for review.
3. Contractor shall submit the Equipment Warranties in printed form on the equipment manufacturers' warranty forms.

- I. After Engineer's Review.** The Engineer may require up to fourteen (14) calendar days from the date the submittals are received at the Engineer's office until they are returned to the Contractor. This time will increase if the drawings and information or samples submitted do not meet the contract requirements, or contain insufficient details.

If more than fourteen (14) calendar days are required for the Engineer's review of any individual submittal or resubmittal, an extension of time will be considered in accordance with the General Provisions.

After receiving the reviewed submittal, the Contractor shall:

1. Review and execute the direction of, and/or respond to, the Engineer's review comments.
2. Revise the material or information, if required, and date and identify revisions if any.
3. Submit revised project data for rejected submittals in the same form as specified above for original submittals.

- J. Payment.** No separate or additional payment will be made for shop drawings, product data and samples, site safety and health plan, manufacturer's operating and maintenance manual, traffic control plan, and equipment warranties, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

**Section 01350 - Operation and Maintenance Manuals**

**A. General.**

1. The Contractor shall coordinate, assemble and submit five (5) hard bound copies and one (1) electronic copy of the manufacturer's operating and maintenance manuals for the landfill gas ( LFG) blower and candlestick flare system in accordance with Section 01340 of the Special Provisions.
2. The operation and maintenance manuals shall be submitted to the Engineer prior to final payment. The Owner will not pay retainage until the approved operation and maintenance manuals have been submitted.

- B. Payment.** No separate or additional payment will be made for operation and maintenance manuals, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

**Section 01370 - Schedule of Values**

Within ten (10) calendar days of receipt of the Notice to Proceed, the Contractor shall submit a complete breakdown of all lump sum bid items showing the value assigned to each part of the work for that item. Upon review by the Engineer of the breakdown of the lump sum price, the schedule of values shall be used as the basis for all progress payments. The schedule of values shall be coordinated and consistent with the reviewed construction schedule.

No separate or additional payment will be made for schedule of values, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

### **Section 01510 - Maintenance of Existing Facilities During Construction and Contractor Coordination**

- A. General.** The Contractor may remove, relocate or adjust such existing facilities that are to remain, as may be necessary for the performance of the work, and rebuild any such disturbed existing facilities in as good condition as found (with minimum requirements as herein specified). The Contractor shall make all necessary or required revisions and perform all construction required by operations under the Contract, incident to any interference with power transmission and distribution, telephone, cable and other utility lines or with the maintenance of traffic or service thereon, all in a manner satisfactory to the owners and operators thereof.
- B. Cooperation with Other Contractors.** The Owner and others will be working within the project area while the work is in progress. The Contractor shall schedule his work in conjunction with these other organizations to minimize mutual interference, in accordance with Section 01014.
- C. Coordination of Work.** The Contractor shall maintain overall coordination for the execution of the work. Based on the progress schedule prepared in accordance with these Special Provisions, the Contractor shall obtain from each subcontractor a schedule and shall be responsible for all parties maintaining these schedules or for coordinating required modifications.
- D. Payment.** No separate or additional payment will be made for maintenance of existing facilities during construction and contractor coordination, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

### **Section 01530 - Temporary Facilities, Utilities**

- A. Electrical Service.** The Contractor shall arrange with the local utility to provide adequate temporary electrical service, if required for Contractor's operations, at a mutually agreeable location. The Contractor shall then provide adequate job site distribution facilities conforming to applicable codes and safety regulations. The Contractor shall provide, at Contractor's expense, all electric power required for construction, testing, general and security lighting, and all other purposes whether supplied through temporary or permanent facilities.
- B. Water.** The County will make available to the Contractor for his use at a designated on-site source for tasks on the Knott Landfill Flare Expansion Project.  
  
Water used for human consumption shall be kept free from contamination and shall conform to the requirements of the State and local authorities for potable water.
- C. Temporary Lighting.** If applicable, the Contractor shall provide temporary lighting in all work areas sufficient to maintain a lighting level during working hours not less than the lighting level required by OSHA standards.
- D. Sanitary Facilities.** The Contractor shall provide suitable chemical toilets or water closets at appropriate locations within the site of the work. The facilities shall be serviced weekly or more often if necessary. At the end of the job such toilets shall be removed completely.
- E. Payment.** No separate or additional payment will be made for temporary facilities and utilities, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

### **Section 01540 - Special Controls**

- A. Public Safety and Convenience.** The Contractor shall at all times conduct work as to insure the least possible obstruction to traffic and inconvenience to the general public and the residents in the vicinity of the work, and to insure the protection of persons and property. No road or street shall be closed to the public except with the permission of the Engineer and proper governmental authority.

The Contractor shall conduct work, and take preventive measures, including performing dust control to minimize or reduce dust conditions, and such that dust in the project area shall not become objectionable to the adjacent property owners. Should the Owner determine the Contractor is not fulfilling obligations in this regard, the Owner reserves the right to take such action as may be necessary, and to charge the Contractor for any costs that may be incurred in such remedial action. No separate or extra measurement and payment of any kind will be made for dust control, including watering as may be necessary or required by the Engineer.

All work shall be carried on with due regard for the safety of the public. Open trenches shall be provided with barricades of a type that can be seen at a reasonable distance, and at night they shall be distinctly indicated by adequately placed lights. Safety instructions received from the Engineer, Owner or applicable federal, state, or local agency shall be observed, but the following of such instructions shall in no way relieve the Contractor of responsibility or liability should any accident or loss occur as the result of Contractor's construction operations.

It shall be the Contractor's responsibility to see that all requirements of the Federal Williams-Steiger Occupational Safety and Health Act are observed and enforced to protect all the workers on the project, as well as the general public.

- B. Noise.** The Contractor shall comply with applicable federal, state and local rules and regulations. Daytime sound pressure levels shall comply with applicable federal, state and local regulations. All equipment working on the subject site shall be equipped with sound suppressers.

All costs incurred by the Contractor to comply with the noise restrictions shall be considered incidental to the construction bid items and no separate or additional payment will be made.

- C. Payment.** No separate or additional payment will be made for special controls, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

#### **Section 01570 - Traffic Maintenance and Protection**

The Contractor shall provide traffic maintenance and protection in accordance with the Oregon Standard Specifications. The work shall be performed under a traffic control plan which has been reviewed by the Engineer and shall create a minimum of interruptions or inconveniences to pedestrian and vehicular traffic. Prior to commencement of construction operations, and not later than 10 days after receipt of Notice to Proceed, the Contractor shall provide in writing a plan of procedure of construction, traffic handling methodology, plans for routing traffic, safety provisions, sequence of operations and any other pertinent data relating to traffic regulation and protection for the public, as may be required. All such plans and provisions shall be submitted in accordance with Section 01340 of these Special Provisions.

All expenses involved in the maintenance of traffic, detours, bridges, barricades, signing, etc. shall be borne by the Contractor and amount thereof shall be included in the unit price or lump sum proposal.

#### **Section 01700 - Project Closeout**

- A. General.** It is the intent of these Contract Documents that the Contractor shall deliver a complete and usable facility capable of performing its intended functions and ready for use.
- B. Cleanup.** Throughout the period of construction the Contractor shall keep the work site free and clean of all rubbish and debris, and shall promptly remove from any portion of the site, or from property adjacent to the site of the work, all unused materials, surplus earth and debris, excepting select material which may be required for embankment, backfill, or grading.

Upon completion of the work, and prior to final acceptance, the Contractor shall remove from the vicinity of the work all plant, surplus material and equipment belonging to or used under Contractor's direction during construction.

- C. **Waste Disposal.** The Contractor shall dispose of surplus materials, waste products and debris within the landfill at locations to be directed by the Owner.
- D. **Project Record Document.** The Contractor shall maintain at the site, available to the Owner and Engineer, one copy of the Contract Documents, Drawings, shop drawings, change orders and other modifications in good order and marked to record all changes made during construction. These documents shall be delivered to the Engineer upon completion and prior to acceptance of the work. Marking of the Drawings shall be kept current and be done at the time the material and equipment are installed. The Drawings shall be presented monthly to the Engineer for review.
- E. **Touch-Up and Repair.** The Contractor shall touch-up or repair finished surfaces on structures, equipment, fixtures or installations that have been damaged prior to final acceptance. Surfaces on which such touch-up or repair cannot be successfully accomplished shall be completely refinished or, in the case of hardware and similar small items, the item shall be replaced.
- F. **Releases.** The Contractor shall furnish, before final acceptance, a written release from the property owners of each property disturbed or otherwise interfered with by reason of construction pursued under this Contract, including disposal sites, whenever any of the work is accomplished on or through property other than that owned by the Owner. Should the release be, in the opinion of the Owner, arbitrarily withheld, then the Owner may, at its sole discretion, accept that portion of the work involved and cause final payment therefore to be made. The release must be signed by the Owner, or proper authority acting for the owner, of the property affected, stating that the restoration of the property has been satisfactorily accomplished.
- G. **Cost.** All costs in conjunction with work performed under this section shall be considered incidental to the construction bid items, and no separate or additional payment will be made.

#### **Section 01710 - Contract Closeout Procedure**

- A. **Substantial Completion.**
  1. The Contractor shall submit the following:
    - a. A written certification to the Owner that the Project or designated portion of the Project is substantially complete; and
    - b. A list of items to be completed or corrected.
  2. The Owner will make an inspection after receipt of Contractor's certification.
  3. If it appears to the Owner that work is substantially complete:
    - a. The Owner may request of and the Contractor shall prepare and submit to the Owner, a list of items to be completed or corrected as determined by the inspection.
    - b. If the Owner then considers the work to be substantially complete, the Owner will issue a Certificate of Substantial Completion, with appropriate conditions, accompanied by a list of the items to be completed and corrected, as verified and amended by the Owner. Omission of any item from the list shall not relieve the Contractor from responsibility to complete all the work in accordance with the Contract.
    - c. The Owner may commence with occupancy of the Project or designated portion of the project.
    - d. The Contractor shall complete all the work within the time designated in the Certificate, or if not so designated within a reasonable time.
  4. Should the Owner consider that work is not substantially complete:
    - a. Owner shall notify the Contractor, in writing stating reasons.
    - b. Contractor shall complete work and send second written notice to the Owner certifying that Project or designated portion of Project is substantially complete.

**B. Final Inspection.**

1. The Contractor shall submit written certification that:
  - a. Work has been completed in accordance with Contract Documents.
  - b. Equipment and systems have been tested in presence of the Owner's representative and are operational.
  - c. The Project is completed, and ready for final inspection.
2. The Owner will make a final inspection within a reasonable time after receipt of certification.
3. Should the Owner consider that work is complete in accordance with requirements of Contract Documents, the Owner shall request the Contractor to make project closeout submittals.
4. Should the Owner consider that work is not complete:
  - a. Owner shall notify the Contractor in writing stating reasons.
  - b. The Contractor shall take immediate steps to remedy the stated deficiencies and upon completion send a second written notice to the Owner certifying that work is complete.
  - c. The Owner will reinspect work.

**C. Reinspection Costs.** If the Owner is required to perform second inspections because of inaccuracies in original certifications of the Contractor, the Owner will charge the Contractor for the resulting costs incurred by the Owner including consultant(s) fees.

**D. Closeout Submittals.**

1. Project Record Documents: See the requirements of Section 01700-D.
2. Guarantees, Bonds and Letters of Credit required by these specifications.
3. Easement Release(s) if applicable.
4. At the close of the Contract the Contractor shall:
  - a. Pay all utility bills.
  - b. Remove all electrical, telephone, water, offices and any other temporary service equipment that may remain.

**E. Release of Liens or Claims.** Final acceptance will not be given until satisfactory evidence of release of liens has been submitted to the Owner.

**F. Final Acceptance.** The Engineer will provide the Owner with a Recommendation of Final Acceptance following satisfactory completion of the final punch list items and all the items listed above. Owner will then provide the Contractor with Final Acceptance which will begin the warranty periods. Date of Final Acceptance from the Owner sets the completion date of the Contract.

**G. Final Adjustment of Accounts.**

1. Submit final statement of accounting to the Owner.
2. Statement shall reflect all uncompleted adjustments:

- a. Additions and deductions resulting from:
  - 1) Previous Change Orders
  - 2) Cash allowances
  - 3) Unit prices
  - 4) Other adjustments
  - 5) Deductions for uncorrected work
  - 6) Penalties and bonuses
  - 7) Deductions for liquidated damages
- b. Unadjusted sum remaining due.

**H. Final Application for Payment.** The Contractor shall submit a final application for payment.

**I. Final Certificate for Payment.**

- 1. The Owner will issue Final Certificate for Payment.
- 2. Should final completion be materially delayed through no fault of the Contractor, the Owner may issue a Final Certificate for Payment, in accordance with the specifications and existing laws.

**J. Post-Construction Inspection.**

- 1. Prior to expiration of one year from Date of Final Acceptance, the Owner may make visual inspection of the Project in company with the Contractor to determine whether correction of work is required, in accordance with provisions of the General Conditions.
- 2. For guarantees beyond one year, the Owner will make inspections after notification to the Contractor.
- 3. The Owner will promptly notify the Contractor, in writing, of any observed deficiencies.

**K. Measurement and Payment.** No separate or additional payment will be made for Contract closeout procedure, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

**Section 01802 - Rate of Wages for Laborers and Mechanics**

The Contractor is referred to the rates of minimum wages which shall be paid to the various classes of laborers and mechanics engaged in the performance of the Contract on the job site, contained elsewhere herein.

The minimum wages for the Knott Landfill Flare Expansion Project shall not be less than the wages published by the State of Oregon Bureau of Labor and Industries (BOLI) under the title of Prevailing Wage Rates for Public Works Contracts in Oregon (subject only to state law). The publication is available on BOLI's web site at [www.oregon.gov/BOLI](http://www.oregon.gov/BOLI).

No laborer or mechanic shall be permitted or required to work on Saturday, Sunday, or a legal holiday of the State or in excess of eight (8) hours on any other day unless they receive compensation for all hours worked on Saturday, Sunday, and a legal holiday of the State or in excess of eight (8) hours on any other day at a rate not less than one and one-half times the basic hourly rate of pay. For the purposes of determining overtime compensation, the basic hourly rate of any laborer or mechanic shall not be less than the basic hourly rate determined by the Commissioner of the Bureau of Labor and Industries of the State to be the prevailing basic hourly rate for corresponding classes of laborers and mechanics on projects of similar character in the State.

The Contractor and Contractor's subcontractors shall pay all mechanics and laborers employed on the job site, unconditionally and not less often than once a week, and without deduction or rebate on any account, except as allowed by law, the full amounts of their wages including overtime, accrued to not more than five (5) working days prior to the time of

payment, at wage rates not less than those referred to hereinabove, regardless of any contractual relationship which may be alleged to exist between the Contractor or subcontractor and the laborers and mechanics.

The rates of wages to be paid shall be posted by the Contractor in a prominent and easily accessible place at the job site. A copy of the rates of wages required to be posted, shall be given to each laborer and mechanic employed under the Contract by the Contractor at the time of employment, provided that where there is a collective bargaining agreement, the Contractor does not have to provide employees the wage rate schedule.

The Owner may withhold from the Contractor so much of the accrued payments as may be considered necessary to pay to laborers and mechanics employed by the Contractor or any subcontractor on the job site the difference between the wages required as hereinabove referred to and the wages received and not refunded to the laborers and mechanics.

No separate or additional payment will be made for the provisions of this Section, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

### **Section 01803 - Payrolls and Payroll Records**

A certified copy of all payrolls shall be submitted to the Engineer within the first 15 days of work and monthly thereafter. The Owner will make no progress payments under this Contract until the payroll records for the period have been submitted for review.

The Contractor shall be responsible for the submission of certified copies of the payrolls of all subcontractors. The certification shall affirm that the payrolls are correct and complete, that the wage rates contained therein are not less than the applicable rates contained in the wage determination decision of the Commissioner of the Bureau of Labor and Industries referred to hereinabove, and that the classifications set forth for each laborer or mechanic conform with the work performed.

Payroll records for all laborers and mechanics working at the site of the work shall be maintained by the general Contractor and Contractor's subcontractors during the course of the work and preserved for a period of three (3) years thereafter. The records shall contain the name of each employee, their correct classification, rate of pay, daily and weekly number of hours worked, deductions made and actual wages paid. The records shall be made available for inspection by the Owner, Commissioner of the Bureau of Labor and Industries of the State, and any authorized representatives thereof who may also interview employees during working hours on the job.

No separate or additional payment will be made for payrolls and payroll records, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

### **Section 01804 - Termination of Work on Failure to Pay Agreed Wages and Completion of Work**

In the event that the Owner finds that any laborer or mechanic employed on the job site by the Contractor or any subcontractor has been or is being paid wages at a rate less than the required rate, the Owner may by written notice to the Contractor, terminate Contractor's right, or the right of any subcontractor, to proceed with the work or with the part of the work in which the required wages of compensation have not been paid and may complete such work or part by contract or otherwise, and the Contractor and Contractor's sureties shall be liable to the Owner for any excess costs occasioned thereby.

No separate or additional payment will be made for the provisions of this Section, but shall be considered incidental to the work and shall be included in the various unit or lump sum bid items.

## Division 2: Site Work

### Section 02100 - Mobilization

- A. Description.** This work shall consist of preconstruction costs of preparatory work and operations performed by the Contractor, including, but not limited to, those necessary for the movement of his personnel, equipment, supplies and incidentals to the project site; for the establishment of his offices, buildings and other facilities necessary for work on this project; for the preparation of the health and safety plan; for premiums on bonds and insurance for the project and for work and operations which he must perform or costs he must incur before beginning production work on the various items on the project site. This cost also includes demobilization upon completion of the project. Mobilization costs for all subcontracted work shall be considered to be included.
- B. Measurement and Payment.** Measurement and payment for Mobilization shall be in accordance with Section 01150 and the following:
1. **Measurement:** Shall be measured by lump sum (LS), and shall not exceed ten (10%) percent of the overall contract cost.
  2. **Payment:** Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for project mobilization, including move in of personnel and equipment; set up of all temporary offices, facilities and utilities; provision of parking facilities for personnel working on the project; preparation of site health and safety plan; preparation of the Contractor staging area; preconstruction expenses; costs of the preparatory work and operations; and demobilization performed by the Contractor in association with this Contract as described in the Contract Documents. Payment will be made as follows:
    - a. When five percent (5%) of the total original contract amount is earned from other bid items, excluding amounts paid for materials on hand, fifty percent (50%) of the amount bid for mobilization will be paid.
    - b. When ten percent (10%) of the total original contract amount is earned from other bid items, excluding amounts paid for materials on hand, the remaining amount bid for mobilization will be paid.

### Section 02150 - Clearing and Grubbing

- A. Description.** The work under this Section consists of removing vegetation and buried matter and disposing of this material in a location specified by the owner. The areas of work to be cleared and grubbed shall be those within the landfill gas (LFG) flare construction area, unless otherwise directed by the Engineer.
- B. Construction.** Clearing and grubbing shall be performed in accordance with Section 00320 of the Oregon Standard Specifications, except as otherwise provided herein.
- C. Measurement and Payment.** Measurement and payment for Clearing and Grubbing shall be in accordance with Section 01150 and the following:
1. **Measurement:** Shall be measured by lump sum (LS). There will be no measurement of area or other measurement for work performed under this Section.
  2. **Payment:** Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for clearing, grubbing, removal of structures, hauling, disposal, cleanup as well as performing all other work and incidentals necessary to complete the work as specified herein

### Section 02303 – Crushed Area Stone, Road Stone and Gravel

- A. Description.** Contractor shall furnish and place Crushed Area Stone at working area as shown in the Drawings.
- B. Submittals.** The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples. Contractor shall furnish grain size analyses for the crushed stone, geogrid or gravel for each use to the Engineer and shall advise of the source location. Contractor shall submit samples to a commercial testing laboratory for sieve analysis, if requested by the Engineer.

**C. Materials**

1. Crushed Stone or Gravel for foundations, trenches, subbase course and Equipment Area. The materials shall be well-graded clean screened gravel or crushed stone (AASHTO No. PENNDOT No. 2A). The gradation shall be as follows: Maximum size shall be 1 ½ inch, 90-100% shall pass a 1-inch sieve, and no more than 5% shall pass a 3/8" sieve.
2. Road Stone shall be PENNDOT No. 2A aggregate, underlain by Tensar Geogrid BX 1100.

**D. Construction.**

1. Aggregate for foundations, trenches, surface area stone and road stone shall be spread in layers of uniform thickness not exceeding 8 inches and shall be thoroughly compacted with suitable power driven tampers or other power driven equipment.
2. Tensar Geogrid under road areas shall be unrolled in the direction of road travel and overlapped by 2 feet where necessary to reach the limit of road width and anchored in place prior to stone placement. Assure a minimum of 6 inches of stone is on the geogrid prior to any tracked equipment spreading. Grade smooth to avoid any waves in the grid.

**E. Measurement and Payment.** Measurement and payment for Crushed Area Stone material shall be in accordance with Section 01150 and the following:

1. Measurement: Shall be measured by the cubic yard (CY) of material that is provided in accordance with these specifications, or as directed by the Engineer.
2. Payment: Shall be paid for at the applicable contract unit price, payment for which shall constitute full compensation for the material, in-place, including hauling, spreading, compacting, and all other work and incidentals necessary to place the material as shown on the drawings and described in the specifications.

**Section 02410- Landfill Gas and Condensate Drainage Piping**

**A. Description**

1. *General.* The work under this section consists of the performance of all operations pertaining to furnishing and installing the LFG and condensate drainage piping for the Knott Landfill Flare Expansion Project, in accordance with the drawings, these specifications, and as required by the Engineer.

**B. Submittals**

1. The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples. Minimum (but not limited to) material submittal requirements will include details for:
  - a. Pipe and Fittings,
  - b. Valves,
  - c. Gasket Material, and
  - d. Fasteners.

**C. Materials**

1. High-Density Polyethylene (HDPE) Pipe:

The polyethylene pipe shall be HDPE pipe, polyethylene resin type 3408, conforming to ASTM D1248. Minimum cell classification values shall be PE345434C, as referenced in ASTM D3350. Pipe shall be SDR 11 for liquid drainage lines, SDR 9 for compressed air conveyance lines, and SDR 17 for LFG conveyance lines unless otherwise requested by the County or the Engineer. The pipe shall contain a minimum of 2-percent carbon black.

The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification from the same raw material supplier.

The polyethylene pipe shall be homogeneous throughout, and free of visible cracks, holes, foreign inclusions, or other injurious defects. Any pipe with nicks, scrapes, or gouges deeper than 5 percent of the nominal wall thickness shall be rejected. The pipe shall be uniform in color, opacity, density, and other physical properties.

The following information shall be continuously marked on the pipe, or spaced at intervals not exceeding 5 feet:

- a. Name and /or trademark of the pipe manufacturer
- b. Nominal pipe size
- c. Standard Dimensional Ration (SDR)
- d. PE 3408
- e. Manufacturing Standard Reference
- f. A production code from which the date and place of manufacture can be determined

Compliance of the requirements of these specifications shall be certified in writing by the pipe manufacturer and submitted in accordance with Section 01340 of these specifications.

Damaged pipe that results in a reduction of the wall thickness by more than 10-percent shall be cut out and discarded.

2. Fittings:

Fittings shall be butt fusion type, meeting the requirements of ASTM D3261. Fittings shall be manufactured using polyethylene resin type 3408 in accordance with the requirements of ASTM D2513. All fittings shall be rated to match the system piping to which they are fused. Pipe connections between dissimilar materials shall be joined by stub end and backing flange.

Electro-fusion type fittings may be substituted where required when approved by the Engineer.

3. Flanges:

Flanges, when required, shall be of a plate type ANSI B16.5, Class 150 lb. Flange surfaces that require gaskets shall use Hypalon, Buna-N, or an approved equal.

4. Fasteners:

Bolts shall conform to the requirements of ASTM A307-92a. Bolts shall be carbon steel, Grade B, heavy hex, hot dip zinc coated in accordance with the requirements of Class C or ASTM A153. Nuts shall conform to the requirements of Class C or ASTM A563. Nuts shall be Grade A, heavy hex, hot dip zinc coated in accordance with the requirements of Class C ASTM A153. Washers shall be Grade A, hot dip zinc coated in accordance with the requirements of Class C of ASTM A153.

5. Valves:

All valves shall be complete with all necessary operators, actuators, handwheels, worm and gear operators, wrenches, and other accessories or appurtenances which are required for the proper completion of work included under this Section.

Valves shall be suitable for the intended service. Renewable parts, including discs, packing, and seats, shall be of types recommended by valve manufacturer for intended service, but not of lower quality than specified herein.

Butterfly Valves:

- a. All valve shafts shall be connected to operators by use of keys and keyways. The use of compression or friction connection will not be accepted.

- b. Butterfly valves shall have ductile or cast-iron full lug-style valve body with contoured 316 stainless steel disc, 316 stainless steel stem and Buna-N or Viton resilient seat. Valves shall be bubble-tight at 150 psi differential pressure and shall be suitable for installation between ANSI 150-pound flanges.
- c. Valves greater than 3-inches shall have a gear operator. Valves 3-inches and less shall have a multi-position locking handle.
- d. All butterfly valves shall open left or counterclockwise when viewed from the stem. Manual valve operators shall be either gear or lever type, or as shown on the drawings. All operators shall have mechanical stop limiting devices to prevent over travel of the disc.
- e. Interior of valve body (except for valve disc, valve seat, and stainless steel valve seat rings) shall be coated in accordance with the latest version of AWWA C550. Coatings shall be free of imperfections with a minimum thickness of 12 mils. Surface shall be clean, dry, and free from rust and grease before coating.
- f. All exterior surfaces of butterfly valves shall be clean, dry and free from rust and grease coatings. The exterior ferrous parts of all valves shall be shop primed at the factory.

**D. Construction**

1. Aboveground Installation

Thermal expansion and contraction plays a critical role in above-grade installed pipes. Temperature changes both externally and internally will cause the pipe to expand or contract, and limiting and accommodating these expansions and contractions is very important.

Prior to installation of the pipe, the Contractor shall prepare grade along the pipe route to lines and grades as shown in the drawings. The grade shall be finished relatively smooth to accommodate movements of the pipe in all directions during expansion and contraction.

Pipe to be installed on the prepared grade as shown in the design drawings.

Where piping is required to be installed above grade, adequate pipe supports, anchoring, or expansion joints will be utilized to manage thermal expansion movement and minimize stress at connection fittings.

2. Below-Ground Installation:

Trench excavation shall be as shown on the design drawings and shall be open cut from the ground surface.

Trenches shall be excavated to maintain depth and width as required to maintain minimum cover and condensate drainage slope as shown in the drawings. Where not shown, a minimum of 3% continuous slope is to be maintained in the direction of the condensate collection points.

Unless otherwise specified, all condensate piping shall be installed in below grade trenches with a minimum of 2-feet of cover measured from the top-of-pipe. Where required to provide a smooth grade, or if trenching is located within the refuse, a minimum of 4-inches pipe bedding shall be utilized. Bedding material shall be clean soil or as approved by the engineer.

The Contractor shall be responsible for maintaining alignment and depth of the pipeline.

When lowering pipe into the trench, prevent damage to or twisting of the pipe. Proper facilities shall be provided for lowering sections of pipe into the trenches. Under no circumstances shall pipe be laid in water, and no pipe shall be laid when the trench or weather conditions are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary.

All pipe, fittings, weld joints must be reviewed by the Engineer prior to backfilling. The Contractor shall provide timely notice (at least 2 working days in advance of backfilling) to allow time for the Engineer to arrange for necessary inspections. Backfilling will not be allowed prior to the Engineer's review. This review does not relieve the Contractor of the responsibility for protection of the pipe against damage during backfilling.

3. **Pipe Drainage Slope:**  
All piping installed on or in compacted native soils shall be installed with a minimum 3% drainage slope unless otherwise shown in the drawings or approved by the Engineer. Slope direction is to be as shown in the drawings or as required to direct condensate within the piping system to a condensate collection point.
4. **Pipe Cutting:**  
Cutting shall be done with approved mechanical equipment in a manner that will not damage the pipe. Pipe shall be firmly and uniformly supported. Pipe interior shall be kept thoroughly clean as the work progresses.  
All pipe cuts shall be square, perpendicular to center of the pipe.
5. **Pipe Joining:**  
Unless otherwise shown on the drawings, the HDPE pipe shall be joined by the method of thermal butt-fusion, as outlined in ASTM D-2657, Heat Joining Polyolefin Pipe and Fittings. Butt-fusion joining of pipe and fittings shall be performed in accordance with the procedures recommended by the manufacturer.  
Thermal butt-fusion of the pipe shall be performed by an experienced technician, certified by the pipe manufacturer in the jointing of high-density polyethylene pipe, in accordance with Title 49 CFR 192-285. The pipe manufacturer, or his authorized representative, shall submit descriptive information about the fusion equipment to be used, and the qualifications of the joining technician. Written certification of the individual welders shall be required prior to the performance of any welding.  
The Contractor shall remove all interior debris, clean, and flush all piping prior to installation.
6. **Pipe Pressure Testing:**  
The Contractor shall conduct testing of installed piping, including fittings and flanges where applicable. All necessary equipment and materials are to be furnished by the Contractor.  
Testing may be completed on complete lengths of lengths of piping or on isolated sections as required.  
Piping joints and flanges to be backfilled are to remain exposed until completion of the associated test.  
The Engineer shall be notified at least 48-hours in advance of testing.  
The HDPE LFG conveyance piping shall be subjected to a pneumatic test of 5 psig for one hour. Pressure in the test section shall be gradually increased to the target pressure. During the observation period, the pressure should remain steady within 5-percent to indicate no leakage. Pressure readings shall be recorded at 15-minute intervals.  
The Contractor and Engineer should visually inspect the piping being tested prior to applying pressure.  
Ambient temperature should be monitored and limited to 10-percent variation during the testing observation period. Temperature readings shall be recorded at the same time the pressure readings are recorded.  
The Contractor shall recognize the hazards associated with pneumatic testing and shall take all necessary precautions to protect test personnel. During the testing, no personnel should be allowed to walk along the test piping unless authorized by the Contractor.  
During the observation period, the Contractor shall listen for any leakage and apply a liquid solution to inspect connection points and suspect portions of the piping for leaks. Leaks are to be fixed as required and the piping re-tested in the area of repair.  
Upon Engineer approval the Contactor may modify the testing procedures if required due to field conditions.  
Test Records shall include:

- 1) Date of test,
  - 2) Description and identification of the piping tested,
  - 3) Test pressure,
  - 4) Remarks such as leaks or repair locations, and
  - 5) Certification by the Contractor and signed acknowledgement by the Engineer.
7. Valves:
- Valves of the size and type as shown on the drawings shall be set plumb and installed at the locations indicated or otherwise approved by the Engineer.

Valves shall be installed in accordance with the manufacture's installation instructions.

Valves shall be installed such that they are supported properly in their respective positions, free from distortion and strain. Valves shall be installed such that their weight is not borne by equipment that is not designed to support the weight of the valve.

Valves shall be tested at the same time that the associated pipeline is tested.

Valves shall be carefully inspected by the Engineer during installation; they shall be opened wide and then tightly closed and the various nuts and bolts shall be tested for tightness. Special care shall be taken to prevent foreign matter from becoming lodged in the valve seat. Check and adjust valves for smooth operation.

Install valves with the operating stem in either horizontal or vertical position.

Allow sufficient clearance around the valve operator for proper operation.

If the size of the disc interferes with the inside diameter of the pipe, the Contractor may order flange adapters with an ID larger than the disc diameter, to be approved by the Engineer.

**E. Measurement and Payment** - Measurement and payment for Landfill Gas and Condensate Drainage Piping shall be in accordance with Section 01150 and the following:

1. *Measurement:* Shall be measured by the lump sum (LS) complete and in place.
2. *Payment:* Shall be paid for at the applicable contract unit price, payment for which shall be full compensation for the Landfill Gas and Condensate Drainage Piping, in place, complete including excavation, furnishing, hauling, assembling, pipe, valves, jointing, special fittings, joint materials, pipe bedding, testing and all incidental work and material necessary for a complete installation to the required lines and grades shown on the drawings and where ordered by the Engineer.

**Section 02420- LFG Blower and Candlestick Flare System**

**A. Description**

*General.* The work described in this section consists of supplying all labor, materials, equipment, and incidentals necessary to furnish, install and field test a LFG Blower and Candlestick Flare System, in accordance with the plans and specifications as described herein.

The LFG Blower and Candlestick Flare System shall include the following;

- a. Gas Handling System,
- b. Control System,
- c. Piping System, and
- d. Candlestick Flare System.

The LFG Blower and Candlestick Flare shall be pre-manufactured and delivered to the site mounted on a skid. The blower/flare skid supplier shall be responsible for all on-skid piping and electrical wiring connections for operation and control of all equipment related to the LFG Blower and Candlestick Flare System. The blower/flare skid supplier shall have a minimum of 5 years of experience in the design and assembly of LFG blower/flare skids, and have a minimum of 10 units operating successfully on similar landfill gas installations.

Acceptable Suppliers include but are not limited to the following:

- a. Perennial Energy, LLC, (PEI), [scressman@perennialenergy.com](mailto:scressman@perennialenergy.com), (417) 256-2002
- b. LFG Specialties, LLC (a CB&I Company), [Russell.keckler@cbi.com](mailto:Russell.keckler@cbi.com), (419) 424-4999
- c. John Zink Company, LLC, [melissa.hennrick@johnzink.com](mailto:melissa.hennrick@johnzink.com), (918) 439-5912

The Contractor shall be responsible for equipment offload and installation, LFG header piping to the skid inlet, interconnection piping and electrical wiring between the blower skid and flare equipment, and power and communication wiring between the blower skid and SCADA communication equipment.

## **B. Submittals**

1. Blower/Flare equipment bid submittals shall include enough information to confirm compliance with the equipment specifications. Equipment bids not meeting, or not clearly demonstrating compliance with the equipment specifications will not be accepted.
2. The blower/flare skid supplier shall provide equipment design basis information including but not limited to blower skid footprint dimensions, inlet and discharge pipe size and locations, candlestick flare footprint and height, and electrical power requirements.
3. All equipment and accessories shall have manufacturer's shop drawings approved by the Engineer prior to shipment and shall be tested for conformance with these specifications prior to acceptance and final payment by the Owner. The following information shall be submitted:
  - a. A complete bill of materials for all equipment and accessories.
  - b. Catalog information and/or descriptive literature of all equipment and accessories. Catalogs shall be condensed and highlighted as necessary to clearly signify size and configuration of equipment and accessories.
  - c. Certified Shop Drawings showing all important details of construction, dimensions, and delivery weight.
  - d. Complete performance data that will indicate full compliance with the design conditions. This includes but is not limited to performance curves and calculations for flow capacity at pressure/vacuum and elevation conditions.
  - e. Complete control panel diagrams and elevation drawings showing all components, wires, connections, and numbered terminals.
  - f. Complete electrical interconnection diagram showing all wires and terminals between the control panel and external devices.
  - g. Certification that the equipment furnished for this project does not exceed the noise limit specified herein.
4. Upon completion, the supplier shall provide the Owner with a comprehensive operations and maintenance (O&M) manual including as-built updates per section B.2 above, start-up procedures, shut-down procedures, and any additional information needed for safe and efficient operation and maintenance of the system.

**C. Design Conditions**

1. Site Conditions:
  - a. Elevation: 3720 feet above sea level
  - b. Maximum ambient temperature: 115 degrees F
  - c. Minimum ambient temperature: -10 degrees F
  - d. Noise limit: 85 dbA at 3 feet
2. Gas Conditions:
  - a. Maximum LFG Flow: 2000 SCFM with LFG Inlet Pressure: (-60) in WC
  - b. Minimum LFG Flow: 200 SCFM with LFG Inlet Pressure: (-40) in WC
  - c. LFG Discharge Pressure: 10 in WC (or as needed for Candlestick Flare System)
  - d. LFG Inlet Temperature: 100 degrees F
  - e. Relative Humidity: 100%
  - f. Gas Composition: (50% CH<sub>4</sub>, 45% CO<sub>2</sub>, 4% N<sub>2</sub>, 1% O<sub>2</sub>)
3. Candlestick Flare Conditions:
  - a. Capacity: 2000 SCFM of 50% methane LFG
  - b. Turn Down Ratio: 10 to 1
  - c. Minimum Flare Height: 29 feet
  - d. Emission and Destruction Efficiency based on EPA 40 CFR 60.18 and AP-42 Supplement D:
    - 1) 98% Overall Destruction Efficiency;
    - 2) 0.068 lb/MMBtu NO<sub>x</sub>; and
    - 3) 0.37 lb/MMBtu CO.

**D. Equipment Description**

1. The LFG Blower and Candlestick Flare shall include:
  - a. Two (2) 100% capacity centrifugal blowers equipped with VFDs;
  - b. Local power distribution panel, outdoor rated and air conditioned;
  - c. Local control panel with display, outdoor rated and air conditioned;
  - d. Productivity 3000, MicroLogix 1400 or approved equal PLC with Ethernet communication port;
  - e. PLC and HMI program files including full tag list and all necessary information for additions and SCADA integration by a 3rd party.
  - f. 10” minimum C-more or approved equal touch panel interface with data logging capabilities;
  - g. Temperature and pressure compensated LFG flow meter;
  - h. Discharge port with blind flange for future connection extending horizontally after the blowers and prior to the flow meter run;
  - i. Recirculation line with air/fan cooled LFG cooler, if deemed necessary to achieve the required system turndown without blowers entering a surge state; and
  - j. Candlestick Flare System.

2. Each blower equipment rating shall be based upon data previously established by tests in accordance with the ASME Power Test Code for Centrifugal Blowers.
3. Blower controls system shall coordinate with the candlestick flare. The flow rate and/or well field vacuum shall be set-points in the blower controls system.
4. All equipment shall be manufactured in accordance with codes and guidelines per this specification and in accordance with the applicable portions of the following codes and standards.
  - a. Local laws and ordinances
  - b. State and Federal laws
  - c. National Electrical Code
  - d. National Electrical Manufacturers Association (NEMA)
  - e. Underwriters Laboratories (UL)
  - f. Uniform Building Code (UBC)
  - g. American National Standards Institute (ANSI)
  - h. American Society of Mechanical Engineers (ASME)
  - i. American Gas Association (AGA)
  - j. Institute of Electrical and Electronic Engineers (IEEE)
  - k. Instrument Society of America (ISA)
  - l. Industrial Risk Insurance (IRI)
  - m. Factory Mutual (FM)
  - n. National Fire Protection Agency (NFPA)
  - o. Environmental Protection Agency (EPA)
5. The layout for the blower/flare skid is requested to resemble, as feasible, the layout shown in the Drawings (Sheet M1.01). It is preferred to have the LFG inlet, the condensate discharge and the control panel in the respective locations as shown in the Drawings.
6. The equipment shall be delivered as fully assembled as transportation will allow. Assembled components shall not be dismantled for shipment unless approved by the Engineer.
7. All equipment shall be properly protected to prevent damage or deterioration during shipment and during on-site storage. All exposed pipe connection points shall be protected at a minimum with blind flanges comprised of wooden planks bolted to the opening.

**E. Products**

1. General:
  - a. Equipment shall be new and not have been in service, except for shop tests, at any time prior to delivery. The equipment shall be factory-assembled to the furthest extent possible and ready for installation.
  - b. Equipment shall be designed and sized to have sufficient space for inspection, repairs, and adjustments.
  - c. Equipment shall be amply sized for all stresses which may occur during operation, fabrication, transportation, and installation.

- d. Provisions shall be made by the blower/flare skid supplier to protect equipment and personnel from the heat flux produced by the candlestick flare, including but not limited to a heat shield roof over the gas handling system and components.
  - e. These specifications are intended to give a general description of what is required, but do not cover all requirements. Ancillary equipment or components necessary for proper operation of the proposed system not included in these specifications or shown in the design drawings shall be furnished and installed.
  - f. A stainless steel nameplate shall be attached to each piece of equipment in a visible location to clearly identify the following information.
    - 1) Manufacturer name, address, and contact information,
    - 2) Equipment serial number, model number, and any other information necessary for complete equipment identification
  - g. A stainless steel tag shall be attached to each component to clearly indicate identify component numbering per the equipment piping and instrumentation diagram(s).
2. Gas Handling System:
- a. Blower and Motor
    - 1) The blower unit shall be a direct drive, variable frequency, multistage centrifugal type. Impellers shall be mounted on one shaft supported on each end by bearings mounted in the outboard bearing housings. The blower shall be built from parts cast in patterns from which previous units have been built and tested. The blower shall comply with the design conditions per this specification. A blower type other than multistage centrifugal, i.e. fan style, may be accepted as an alternate provided that design conditions per this specification are met.
    - 2) The blower housings shall consist of cast iron sections held securely between cast iron inlet and outlet heads with steel tie rods.
    - 3) No contact shall be made between the shaft rotor and the housing, other than through the bearings. Labyrinth style or approve equal grease lubricated seals shall be used to insure no gas leakage or bearing contamination.
    - 4) The inlet and outlet connections shall feature a drilled and tapped flange pattern per ANSI 1316.1, 125-pound or greater, and shall be an integral part of the heads.
    - 5) Impellers shall be one piece cast aluminum alloy, keyed to the shaft and held by a locknut. Hubs of the impellers shall butt against each other directly or through one piece metal spacers. There shall be ample clearance and tip speed shall not exceed 375 feet per second.
    - 6) Impellers shall be precisely machine balanced. Vibration shall not exceed 2 mils in the vertical plane measured at the blower bearing housings.
    - 7) Diffuser sections which receive the gas from the impeller and guide the gas to the next impeller shall be provided. The diffusing vanes shall be an integral part of the sections.
    - 8) Each shaft shall be made of high grade steel of sufficient diameter for the application and operate below the critical speed.
    - 9) Each blower shall be provided with two antifriction bearings. It shall be possible to replace bearings without disconnecting piping or disassembling the blower casing. Both inlet and outlet bearings shall be designed for a minimum expected life of 10 years of continuous operation. Vibration sensors shall be installed at the inlet bearing housing (motor side) of each blower for monitoring and alarm purposes.
    - 10) Each blower stage shall be provided with 3/8-inch diameter casing drains manifolded to a single manual shut-off valve.

- 11) The blower internals shall be furnished with a factory applied phenolic or approved equal coating to provide resistance to corrosion by landfill gas. The coating shall be applied a minimum of 10 mils thick to all parts of the blower (excluding aluminum impellers) which come in contact with the landfill gas stream.
  - 12) Each blower shall be direct-coupled to a horizontal 480V, 3-phase, variable frequency drive motor. The blower/flare skid supplier shall be responsible for selecting the proper motor size to suit this equipment, the performance requirements noted herein, and the site conditions. The motor shall be totally enclosed fan-cooled (TEFC) suitable for Class 1, Division 2, Group D, classified location, and UL-approved. Motor shall be rated at above the ambient temperature per the design conditions of this specification with not more than 131 degrees F rise in conformance with NEMA MG-1. Bearings shall be of the antifriction type with a minimum expected life of 10 years of continuous operation.
  - 13) The blowers shall be connected to the drivers with a suitable flexible coupling. The blower/flare skid supplier shall check and adjust alignment of the couplings and drives, on-site during commissioning, in accordance with the instructions of the blower manufacturer to a tolerance of plus or minus 2 mils. Couplings shall be covered with a base-mounted aluminum or non-sparking metallic guard.
  - 14) Epoxy-coated steel bedplates of suitable size for mounting blowers and drivers shall be furnished by the blower manufacturer. The blower and motor shall be carefully aligned and then bolted in place. Suitable vibration isolation pads shall be provided under the steel bedplates of the units.
  - 15) The blower-motor assemblies shall be located, installed, and plumbed on a skid, and delivered to the site as a complete unit.
  - 16) Stainless steel bellows flex connectors shall be installed at all blower connections.
  - 17) An aluminum check valve shall be installed at the discharge of each blower.
  - 18) Blowlers shall be manufactured in the United States. Blower manufacturers shall have a minimum of 5 years of experience in the design and manufacture of this type of equipment and have a minimum of 10 operating installations on landfills in the U.S.
  - 19) Blower manufacturer shall be Atlas-Copco (formerly Houston Service Industries, Inc.), Continental, Gardner Denver, or an approved equal.
- b. Moisture Separator Assembly (Knockout)
- 1) The moisture separator shall be completely fabricated from 304 stainless steel and be of a vertical, cylindrical design with an element removal from the top. An 8-inch flanged, covered, inspection port shall be provided in the side near the bottom for manual clean out of accumulated debris. Nozzle flanges shall meet ANSI 125-pound specifications.
  - 2) The demister shall be made of an approved corrosive resistance mesh and shall be supported on and held down by high open area, stainless steel grid. The moisture separator shall be able to remove 99 percent of droplets greater than 5 micron and shall also remove particles having a density equal to or greater than water which are greater than 5 micron in size.
  - 3) The moisture separator shall have a flow capacity greater than the design conditions per this specification. At the design flow rates, temperatures and pressure, the moisture separator shall have a pressure drop no greater than 5 inches of water column and shall be capable of withstanding no less than 4.0 pounds per square inch gauge vacuum.
  - 4) There shall be a pneumatic double diaphragm, or approved alternate, pump to pump the liquid from the separator. The pump and all connections shall be insulated and heat traced to prevent freezing. There shall be a 2-inch Schedule 40S 304 stainless steel drain line to the edge of the skid coming from the pump. A stainless steel ball valve shall be installed between the separator and the pump. The drain line shall terminate at the edge of the skid with a 2-inch 304 stainless steel flange conforming to ASME A182. Flange shall be 150# RF weld neck.

- 5) There shall be two ½-inch pipe couplings in the side of the unit, one upstream and one downstream of the demister element material, with a differential pressure monitoring device(s) for the purpose of monitoring demister element performance.
- 6) The moisture separator(s) and all condensate lines shall be insulated and heat traced appropriately based on the climate. As a minimum, the moisture separator(s) (knockout) shall be insulated and heat traced to 3” above the maximum anticipated liquid level. All condensate drain or conveyance piping, as well as any sensors or other equipment that will be hindered by cold temperatures, shall be heat traced and insulated to prevent freezing. An additional 10 feet of heat trace wire shall be provided with the blower skid to be installed on additional condensate drain piping extending from the moisture separator drain port. Insulation shall be foam-glass or other approved insulation material which is attractively protected from the elements with metal or other approved weather jacketing. Weather jacketing and sealants used shall be suitable for direct sunlight and shall prevent moisture ingress into the insulation material. Heat trace wire shall be suitable for installation on a high density polyethylene (HDPE) pipe, which will be connected to the moisture separator drain port.
- 7) The moisture separator assembly shall be located, installed, and pre-plumbed on the gas handling system skid.
- 8) A high condensate level switch shall be installed in the assembly and alarm in the control system.
- 9) The moisture separator manufacturer shall have a minimum of 5 years of experience in the design and manufacturer of this type of equipment, and have a minimum of 10 units operating successfully on similar landfill gas installations in the U.S.

### 3. Piping System

#### a. Butterfly Valves:

- 1) All valve shafts shall be connected to operators by use of keys and keyways. The use of compression or friction connectors will not be accepted.
- 2) The butterfly valves, for low-pressure/vacuum landfill gas services, shall have cast-iron wafer or full lug body with contoured 316 stainless steel disc and stem, acetyl stem bushing, and replaceable seat. Valve seats shall be Viton or approved equal. Valves shall be bubble-tight at 150 psi and shall be suitable for installation between ANSI 125-pound flanges.
- 3) All butterfly valves shall open left of counterclockwise when viewed from the stem. Manual valve operators, for valves 3” or larger, shall be worm gear type. Valves installed greater than 5 feet in elevation above the skid platform or the ground shall include chain wheel operators. All operators shall have adjustable mechanical stop limiting devices to prevent over-travel of disc. Should an adjustment of the disc be required to maintain seal, this adjustment shall be made externally without removing the operator housing cover. The operator shall be designed such that adjustments can be made under pressure and without the possibility of dirt getting into the operator lubricant. Adjustments through the lower shaft will not be acceptable. Operator components shall, at the extreme operator positions, withstand without damage a pull of 200 lb for hand-wheel or a torque of 300 ft-lb for operating nuts.
- 4) Interior of valve body (except for valve disc, valve seat and stainless steel valve seat rings) shall be coated with a fusion bonded, thermosetting epoxy coating in accordance with the latest version of AWWA C550. Coatings shall be free of imperfections with a minimum thickness of 12 mils. Surface shall be clean, dry, and free from rust and grease before coating.
- 5) All butterfly valves shall be manufactured by ABZ or approved equal. Replacement valves and parts shall be commonly available.

#### b. Piping:

- 1) Piping on the gas handling system shall be SCH 10, 304 type stainless steel, or approved equal. The same specification applies to tees, elbows, flanges, and other pipe fittings. Flanges shall conform to ANSI 125-pound specifications.

- 2) The gaskets shall be full-face Hypalon, Viton, or approved equal, 1/16 inch to 1/8 inch in thickness, and shall meet the requirements of ANSI Specification A21.11 and be rated for the temperatures and chemicals the gasket will encounter.
  - 3) Where required, pipes and fittings shall be drilled and fitted with weld o-lets to accommodate drainage or other pipe fittings. All holes shall be drilled at right angles to the axis of pipes and fittings.
  - 4) Piping and fittings shall be supported to prevent any strain being transmitted between sections and connected equipment. Release of any joint shall result in no transverse piping movement and shall allow easy removal and replacement of any piping component.
  - 5) Stainless steel flex joints shall be provided as necessary to isolate vibration from blowers and to accommodate thermal expansion. Flex joints shall be comprised of T-321 stainless steel bellows with hot dipped, galvanized steel floating flanges on both ends.
  - 6) The stainless steel piping spool going from the blowers to the flare shall have a tee and a blind flange for a future connection.
4. Flow Meters:
- a. Averaging pitot tube (annubar) flow meters shall consist of a single in line probe and remote electronics. The method of operation shall be the measurement of differential pressure created by the in-line tube. At each flow measurement location, a thermocouple and pressure transducer will be installed to measure the LFG temperature and pressure to correct the flow measurement to standard temperature and pressure conditions. Where the flow meter turndown ratio is not sufficient to accurately measure flow at +/- 5%, two flow meters may be required. The flow meters shall have a digital LCD readout showing instantaneous (SCFM) and communicate with the control system per this specification.
  - b. The gas flow meter shall be temperature and pressure corrected and shall be manufactured by Rosemount, Veris Incorporated, or approved equal.
5. Candlestick Flare System
- a. The Candlestick Flare System shall be designed to integrate seamlessly with the skid-mounted LFG Blower System and destruct LFG in accordance with the design conditions per this specification.
  - b. The Candlestick Flare shall be at least 29 feet tall, and preferable taller if self mounting allows.
  - c. The Candlestick Flare shall be self mounted, and without any guywires for support.
  - d. The Candlestick Flare System shall include, but not be limited to the following components.
    - 1) **Main Gas Valve:** A pneumatically (compressed air) operated butterfly valve with a stainless steel disk and Viton or approved equal seat. The operator shall be provided as a fail close spring device and shall close completely within 5 seconds of receiving a shut-off signal from the controls system. The blower/flare skid supplier shall provide the regulator train and mounting facilities for the compressed air supply.
    - 2) **Flame Arrester:** A Varec, or approved equal, flame arrester shall be installed at the inlet to the flare. The pressure drop it imposes on the system shall not exceed 2 inches of water column. The flame arrester housing shall be constructed of cast aluminum and contain an aluminum flame element. Pressure monitoring devices shall be provided to monitor both flare back pressure and flare + flame arrester back pressure.
    - 3) **Flare Mast:** A flare mast shall be constructed of ASTM A53 piping, and be of sufficient diameter for the LFG flow rate and overall flare height per this specification. The flare mast shall include a drain valve installed at or near the base of the mast assembly to drain any condensate or rain water accumulation. The flare mast shall include provisions for mounting conduit, tubing, and equipment as required.

- 4) **Burner and Shroud Assembly:** The burner and shroud assembly shall be constructed of 304/316 stainless steel and include an adjustable landfill gas nozzle and adjustable air inlet dampers at the base of the shroud assembly. A minimum of 1” ceramic fiber insulation blankets shall be installed on the inner surface of the shroud assembly, and be attached using Inconel welded stud type pins with Inconel retaining washers. A stainless steel lip shall be welded at the top edge of the flare shroud to protect the top edge of the insulation.
  - 5) **Thermocouple:** 1 each, type K or type E flame monitoring thermocouple. The thermocouple assembly shall be housed in bendable protection sheathing of either stainless steel or Inconel material, and shall include powdered magnesium oxide type insulation.
  - 6) **Propane pilot system:** A removable pilot assembly shall be rated at a minimum of 35,000 Btu/hr. This igniting system shall include the pressure regulator, pressure indicator, solenoid valve, manual shutoff valve, and pilot gas pressure monitoring port.
  - 7) **High temperature primer and finish coatings** shall be applied to all non stainless steel surfaces. Surfaces shall be sand blasted, according to SPC SP-6 guidelines, prior to application of the coating.
6. Control System
- a. The control panel for the LFG Blower and Candlestick Flare shall be compliant with NEMA 12/3R specifications at a minimum. The main control panel shall be sized to accommodate the required controls, and shall be provided with a swing out panel door with NEMA 4 gasketing and a 3 point locking handle. The control panel shall be mounted, installed, and pre-wired by the manufacturer. The panel shall include, but not be limited to, the following components.
    - 1) A load center for the motors, outlets, fixtures, controls, devices, lights, etc.
    - 2) A control center to receive all signals from the various safeties, controls, and monitoring equipment, and to automatically control all the components of the system.
    - 3) An operator control panel with touch panel interface to allow either manual or automatic selection for the control of the operating components of the system.
    - 4) Blower controls shall include variable frequency drives, voltage monitors, dual set point ammeter switch gauges (undercurrent and over-current points shall be clearly indicated on the ammeters), running time meters, hand-off-auto switches, and green push-to-test run lights. A time delay will prevent blower restart until sufficient time has elapsed for the shaft to stop spinning (approximately 8 minutes)
    - 5) Variable frequency drives (VFD) shall be wall mounted in the panel with an EMC filter, AC reactor, and a control panel with LCD display and operator pushbuttons. The VFDs shall be ABB ACS550 or approved equal.
  - b. Blowers are to operate individually. The blower controls shall provide for each blower operation through a hand-off-auto selector switch.
  - c. The blower system shall be controlled by a PLC based system with sufficient input and output cards for a fully functional system. The system shall communicate with the Owner’s existing network/SCADA system over a telemetry system (to be installed by Contractor) over Ethernet TCP/IP or Modbus TCP/IP protocols. The PLC equipment shall be Automation Direct Productivity 3000, Allen Bradley MicroLogix 1400, or approved equal. SCADA integration will be performed by the Owner.
  - d. A weather/heat shield shall be provided to protect the control panel against radiated heat (solar and/or flare) and rain. The control system shall be designed and manufactured as an outdoor system including air conditioner and heater.
  - e. The system shall be equipped with the following safeties as a minimum:
    - 1) Blower-motor overcurrent shall cause system shutdown.

- 2) Blower-motor undercurrent (surge) shall cause system shutdown.
- 3) Blower-motor high vibration shall provide a warning alarm.
- 4) Blower-motor high high vibration shall cause system shutdown.

f. Miscellaneous Equipment

- 1) Local alarm light
- 2) Auxiliary lighting shall be provided via photocell-activated light mounted on the flare/blower control panel rack and a second light in the vicinity of the blowers.
- 3) Two outdoor receptacles (120V) with ground fault protection shall be provided at the flare/blower control panel rack.
- 4) A shelf or sufficient space to set a laptop computer during maintenance or troubleshooting.

g. Gauges

The system shall be equipped with the following gauges as a minimum:

- 1) Blower inlet and outlet temperature indicators shall be dial-type gauges installed at the inlet and outlet of each blower. The gauges shall range from 0 to 200 degrees F.
- 2) Pressure, Vacuum, and Differential Pressure Gauges shall be Capsuhelic or Magnehelic with Buna-N diaphragm as manufactured by Dwyer Instruments, Inc. or approved equal. Gauges shall read "Inches of Water".
- 3) Moisture separator pressure drop indicator gauge shall be capable of measuring 0 to 15 inches of water, differential pressure.
- 4) Blower vacuum gauge shall be capable of measuring 0 to 100 inches of water.
- 5) Blower pressure gauge shall be capable of measuring 0 to 50 inches of water.
- 6) System vacuum gauge shall be mounted upstream of the knock-out pot and be capable of measuring -100 to 100 inches of water.
- 7) System pressure gauge shall be mounted downstream of the blowers and be capable of measuring -100 to 100 inches of water.

h. Transmitters

The system shall be equipped with the following transmitters as a minimum:

- 1) Pressure and vacuum transmitters shall be diaphragm type gauges manufactured by Emerson Process Management, Rosemount, or approved equal. Transmitters shall read in "Inches of Water Column" and transmit the signal via 4-20 mA signals.
- 2) Well field vacuum shall be scaled -100 to 100 inches of water.
- 3) Blower discharge pressure scaled -100 to 100 inches of water.

i. Spare Parts

The blower/flare skid supplier shall provide the following spare parts as a minimum:

- 1) Five 14 oz tubes of lubricating grease (or other applicable lubricant) used for blower bearings/seals.
- 2) One shaft coupling.
- 3) Two thermocouples.
- 4) Indicator light package.
- 5) One set fuses/relays.

7. Telemetry System:
- a. The blower/flare skid manufacturer shall provide a mounting 2” conduit pole for a radio above the control panel. The radio mounting height shall be 15’ above the base of the skid. A conduit route from the radio location to the control panel shall be provided for the wires between the radio and the Ethernet communication port on the PLC system.
  - b. The Contractor shall provide all labor, materials, tools, equipment, and services required to furnish, install, adjust, and test a radio communication system between the new flare station and the existing network equipment at the Central Embankment Building.
  - c. The radios shall be used as a Peer to Peer Bridge for TCI/IP Ethernet communication. The radios will act as a bridge to link the Ethernet devices at the new flare station with the existing Ethernet telemetry network at the Central Embankment. The radios shall be equipped with one or more Ethernet ports (RJ45 connectors) to interface with the wired portions of the network.
  - d. The radios and antennas shall be housed in Nema 3R or higher weatherproof housings with daylight visible LED alignment indicators. The radios are to be mounted on galvanized steel poles, as required to achieve elevation for line of sight, and are to be mounted at approved locations where they will not be affected by the heat of the flare system or interfere with site operations. The radios shall have an operating temperature range of -50°C to 50°C as a minimum.
  - e. Power over Ethernet (PoE) shall be used to provide power to the radios. The PoE injector shall have a built in surge protector. The radio system shall include a web based management/setup tool. The management system shall include a password protected login.
  - f. The radio system shall be suitable for communication over a distance of at least 1 mile, provided good line of sight exists between radios. Radios shall be Tranzeo TR-5a-20f or approved equal.

8. Concrete Slab

A concrete slab with steel reinforcement shall be furnished and installed for the placement of the blower skid. The Contractor is responsible for providing a Stamped Structural Design based on the weight and dimensions provided by the blowers skid manufacturer. Contractor shall provide structural design submittals to the Engineer for review prior to the start of work. The concrete slab with steel reinforcement shall be furnished and installed in accordance with Section 00759 of the Oregon Standard Specifications. The following material and installation standards shall be followed for the installation of the concrete slab.

- a. Perform work in accordance with ACI 301.
- b. Concrete Forming:
  - 1) Perform work in accordance with ACI 347 for quality assurance
  - 2) Form material:
    - (i) Plywood: Douglas Fir species; solid one side, sheathing grade; sound undamaged sheets with clean, true edges.
    - (ii) Lumber: Douglas Fir species; Number 2 grade; with grade stamp clearly visible.
    - (iii) Prefabricated metal forms in good condition may be used.
  - 3) Form Accessories:
    - (i) Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture.
    - (ii) Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

- 4) During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to cleanout forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.
  - 5) Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- c. Reinforcing steel shall be ASTM A615, 60 ksi, yield grade; deformed billet steel bars, unfinished.
  - d. Tie Wire: Minimum 16 gage annealed type.
  - e. Cement: ASTM C150, Type I - Normal or Type II - Moderate.
  - f. Fine and Coarse Aggregates: ASTM C33.
  - g. Vapor Barrier: 6 mil thick clear polyethylene film, use for below grade application on sub grade.
  - h. Admixtures:
    - 1) Air Entrainment: ASTM C260; or as approved by the ENGINEER.
    - 2) Chemical: ASTM C494 Type A - Water Reducing, Type C - Accelerating, Type E - Water Reducing and Accelerating, only as approved by the ENGINEER.
  - i. Joint Filler ASTM D994; Asphalt impregnated fiberboard or felt, 1 inch thick.
  - j. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
  - k. Do not use calcium chloride.
  - l. Provide concrete to the following criteria:
    - 1) Compressive Strength (28 day): 4000 psi
    - 2) Water/Cement Ratio (maximum): 0.55 by weight (mass)
    - 3) Aggregate Size (maximum): ¾ inches
    - 4) Slump - Plus or minus 1 inch: 4 inches
  - k. Add air entraining agent to normal weight concrete mix for Work exposed to exterior.
  - n. Placing Concrete:
    - 1) Place concrete in accordance with ACI 304.
    - 2) Notify ENGINEER minimum 24 hours prior to commencement of operations.
    - 3) Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, are not disturbed during concrete placement.
    - 4) Install vapor barrier under slabs on grade. Lap joints minimum 12 inches.
    - 5) Repair vapor barrier damaged during placement of concrete reinforcing. Repair with vapor barrier material; lap over damaged areas minimum 12 inches.
    - 6) Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
    - 7) Saw cut joints within 24 hours after placing or earlier as directed by the ENGINEER. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
    - 8) Screed slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft.
  - o. Concrete Finish:
    - 1) Provide formed concrete surfaces to be left exposed with sack rubbed finish.
    - 2) Finish concrete slab surfaces in accordance with ACI 301.

- 3) Steel trowel surfaces which are scheduled to be exposed, broom finish flare foundation outside of bolt circle
- p. Curing and Protection:
- 1) Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
  - 2) Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
  - 3) Cure floor surfaces in accordance with ACI 308
- q. Field Quality Control:
- 1) Field and laboratory testing, in accordance with ACI 301, will be performed by an independent concrete laboratory provided by the Owner.
  - 2) Provide free access to Work and cooperate with appointed firm.
  - 3) Submit proposed mix design of each class of concrete to the Engineer for review 48 hours minimum prior to commencement of Work.
  - 4) Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
  - 5) Three concrete test cylinders will be taken for every 100 or less cu yds of concrete placed. Test one cylinder at 7 days, 2 at 28 days.
  - 6) One additional test cylinder will be taken during cold (less than 35 ° F) weather concreting, cured on job site under same conditions as concrete it represents.
  - 7) One slump test will be taken for each set of test cylinders taken.
- r. Patching:
- 1) Allow Engineer to inspect concrete surfaces immediately upon removal of forms.
  - 2) Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
  - 3) Patch imperfections as directed in accordance with ACI 301.
- s. Defective Concrete:
- 1) Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
  - 2) Repair or replacement of defective concrete will be determined by the Engineer.
  - 3) Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Engineer for each individual area.

**F. Execution**

1. The existing LFG blower/flare skid shall be kept operational during construction. The maximum amount of time that is allowed for shutdown of the existing LFG blower/flare skid during piping and electrical system tie-ins shall be 8 hours. Contractor shall provide 24 hour minimum notice to the Owner prior to any flare downtime.
2. The following items shall be installed on the main skid of the new LFG blower/flare skid:
  - a. Blower-motor assemblies;
  - b. Moisture separator assembly (knock-out pot);
  - c. Piping and fittings;

- d. Valves;
  - e. Instrumentation;
  - f. Flow Meters;
  - g. Control Panels;
  - h. Shut-off valve at flare inlet; and
  - i. Flame arrester at flare inlet.
3. All equipment shall be installed in strict accordance with codes, standards, and the manufacturer's recommendations.
  4. All skid-mounted equipment and piping shall be installed plumb and perpendicular to the skid base.
  5. Marred or abraded surfaces of equipment shall be cleaned and refinished to match original finish.
  6. The blower/flare skid supplier shall coordinate the on-skid electrical work with all equipment manufacturers as necessary to provide a complete, integrated, and automated system.
  7. The Contractor shall be responsible for the offloading, erection, anchoring, and installation of blower/flare skid and the tools required. The rigging contractor shall have 5 years of experience and have a National Commission for the Certification of Crane Operators (NCCCO) license. The loading, transporting, and offloading of blower/flare skid shall be conducted so that the equipment will be kept clean and free from injury from rough handling. Any damage will be at the Contractor's expense to repair or replace

**G. Start-Up and Testing**

1. The controls for the landfill gas blower system shall be tested at the blower/flare skid supplier's facility before shipment. Complete test reports shall be provided to the Engineer which show that all system controls operate correctly prior to shipment.
2. A blower/flare skid supplier representative with complete knowledge of proper start-up, operation and maintenance shall be provided for a minimum of three (3) 8-hour days to commission the system and instruct representatives of the Owner on proper operation and maintenance of the blower system. If there are difficulties in operation of the equipment due to equipment manufacturer's fabrication or design, additional services shall be provided at no cost to the Owner.
3. Functional and validation tests shall be performed upon completion of the installation and commissioning. Validation tests shall be performed by the Contractor with the assistance of the blower/flare skid supplier's representative, in the presence of the Engineer or his representative.

**H. Demonstrations**

1. Demonstrations shall be separate from the installation, startup, and equipment adjustment services described in this specification. System operations under all alarm conditions shall be demonstrated. Some of these alarm conditions may be simulated (i.e. via electrical jumpers) for demonstration purposes.
2. The Demonstration Test shall demonstrate that all items of these specifications have been met by the equipment as installed and shall include, but not be limited to the following:
  - a. The system has been properly installed and all parts are in correct alignment;
  - b. There are no mechanical or electrical defects in any of the parts; and
  - c. The controls perform satisfactorily, including the automatic starting and stopping, manual operation, and safety shutdowns under all alarm conditions.

**I. Warranty**

1. The LFG Blower and Candlestick Flare System shall be fully and completely warranted for a period of two (2) year from the date of acceptance of the completed installation by the blower/flare skid supplier. The warranty shall provide for the replacement or repair of any defective work, parts, or materials.
2. Any work performed under warranty shall be invoiced at no charge to the Owner. Each invoice shall detail the work performed, with parts itemized and all charges shown.
3. A copy of written equipment warranties shall be furnished by the Contractor for review in accordance with Section 01340 of these Specifications. An original copy of the warranty as reviewed by the Engineer shall be submitted prior to final acceptance.

**J. Measurement and Payment.** Measurement and payment for the LFG Blower and Candlestick Flare System shall be in accordance with Section 01150 of these Specifications and the following:

1. Measurement: Shall be measured by the lump sum (LS) complete and in place.
2. Payment: Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for furnishing and installing the LFG Blower and Candlestick Flare System complete: including the blower/flare skid with warranty; all equipment, gauges, transmitters and control panels; concrete slab with steel reinforcement; connection to the existing LFG system and electrical service; and all necessary piping, spools, and attachments, and all other incidentals necessary to provide the work as shown on the drawings and as described in these specifications.

**Section 02430 – Chain Link Fence and Gates**

- A. Description.** The work described in this section consists of furnishing all labor, materials, and equipment necessary to install chain-link fence and gates around the LFG flare, blower skid and existing flare, complete as shown on the Contract Drawings and as specified herein.
- B. Submittals.** The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples. Minimum (but not limited to) material submittal requirements will include details for:
1. Product data in the form of manufacturer’s technical data, specifications, and installation instructions for gates, posts, fabric, PVC slats, and accessories.
  2. Shop Drawings showing location of gates, each post, and details of post installation, extension arms, gate swing, hardware, and accessories Fasteners.
- C. Materials**
1. General: Posts, rails, rods, fittings, and hardware shall be galvanized coated steel. Repair of damaged metal and coating to be by a qualified professional. Fence components shall be galvanically compatible. All components shall be coated with a galvanized coating.
  2. Frame work: Schedule 40 steel pipe with 1.8 ounces of zinc coating per square foot of surface area conforming to Standard Specification ASTM A-120 with galvanized coating. Pipe shall be straight, true to section, and conform to the following weights:

Pipe Size Outside Diameter	Weight lbs/ft
1-5/8 inch	2.27
2 inch	2.72
2-1/2 inch	3.65
3 inch	5.79

3-1/2 inch	7.58
4 inch	9.11

3. Fabric: Zinc-Coated or Aluminum-Coated Steel with galvanized coating. Zinc-coated fabric shall be galvanized after weaving with a minimum 1.2 ounces of zinc per square foot of surface area and conform to ASTM A-392, Class I. Aluminum-coated fabric shall be manufactured in accordance with ASTM A-491 and coated before weaving with a minimum of 0.1 ounces of aluminum per square foot of surface area. The steel wire and coating shall conform to ASTM A-817. Galvanized or aluminum-coated steel wire, 9 gauge, woven in a 2-inch diamond mesh with top salvage twisted and bottom salvage knuckled. Fence heights up to 12 feet to be one-piece widths.
4. Fittings: Pressed steel or cast iron, galvanized with a minimum of 1.2 ounces of zinc per square foot of surface area, or cast aluminum alloy, all conforming to ASTM F-626. All fittings should be coated with galvanized coatings. All fittings shall have:
  - a. Post Caps - pressed steel, cast iron, or cast aluminum alloy designed to fit snugly over posts to exclude moisture. Supply cone type caps for terminal posts and loop type for line posts.
  - b. Rail and Brace Ends - pressed steel, cast iron, or cast aluminum alloy, cup-shaped to receive rail and brace ends.
  - c. Top Rail Sleeves - tubular steel, 0.051 thickness by 7 inch long, expansion type.
  - d. Tension Bars - steel strip, 5/8 inch wide by 3/16 inch thick.
  - e. Tension Bands - pressed steel, 14 gage thickness by 3/4 inch wide.
  - f. Brace Bands - pressed steel, 12 gage thickness by 3/4 inch wide.
  - g. Truss Rods - steel rod, 3/8-inch diameter merchant quality with turnbuckle.
5. Concrete Mix: ASTM C-94 Portland Cement concrete with maximum 3/4" aggregate having a minimum compressive strength of 2,500 psi at 28 days.

6. Fence Posts:

Fabric Height	Line Post Outer Diameter	Terminal Post O.D.
Under 6-feet	2-inch	3-inch
6-feet to 9-feet	2-1/2-inch	3-inch
9-feet to 12-feet	3-inch	4-inch

7. Gate Posts:

Single Gate Width	Double Gate Width	Post O.D
Up to 6-feet	Up to 12-feet	3-inch
7-feet to 12-feet	13-feet to 25-feet	4-inch

8. Rails and Braces: 1-5/8" O.D. Steel Pipe.
9. Gates: Frame assembly of 2-inch O.D. steel pipe with welded joints. Weld areas repaired with zinc-rich coating applied per manufacturer's directions. Fabric to match fence. Gate accessories, hinges, latches,

center stops, keepers, and necessary hardware of quality required for industrial and commercial application. Latches shall permit padlocking of gate.

10. Tension Wire: Marcellled 7 gage steel wire with minimum coating of 0.80 ounces of zinc or 0.10 ounces of aluminum per square foot of wire surface and conforming to ASTM A-821.
11. Tie Wires: Aluminum 9 gage, alloy 1100-H4 or equal.
12. Hog Rings: Steel wire, 11 gage with a minimum zinc coating of 0.80 ounces per square foot of wire surface.

**D. Inspection.**

1. Contractor shall examine site and report in writing to Engineer any conditions detrimental to the proper and timely completion of the work. The Contractor shall include in the report a discussion of the necessity of grounding the fence in accordance with the National Electric Safety Code (NEC). Clearing, grading, fence line layout and staking of terminals to be completed by Contractor before start of fence installation. The grading of the fence line shall not impact the surface water flow.
2. Contractor shall receive reviewed Shop Drawings from Engineer before starting installation.

**E. Construction.**

1. General. Fence installation to conform to requirements of ASTM F-567.
2. Height. Provide fence heights as indicated on the Contract Drawings.
3. Post Spacing. Space line posts at intervals not exceeding 10 feet.
4. Post Setting. Set terminal, gate, and line posts plumb in concrete footings as indicated on Contract Drawings. Top of footing to be 2 inches above grade and sloped to direct water away from posts.
5. Bracing. Brace gate and terminal posts back to adjacent line posts with horizontal brace rails and diagonal truss rods.
6. Top Tension Wire. Stretch between terminal posts and fasten to outside of line posts with tie wires. It shall also be fastened to the fabric every 18 inches with either wire ties or hog rings.
7. Bottom Tension Wire. Stretch between terminal posts no more than 6 inches above grade and fasten to outside of line posts with tie wires. It shall also be fastened to the fabric every 18 inches with either wire ties or hog rings.
8. Fabric. Pull fabric taut to provide a smooth uniform appearance, free from sag, with bottom salvage no more than 2 inches above grade. Fasten to terminal posts with tension bars threaded through mesh and secured with tension bands at maximum 15-inch intervals. Tie to line posts and top rails with tie wires spaced at maximum 12 inches on posts and 24 inches on rails. Attach to bottom tension wire with hog rings at maximum 24-inch intervals.
9. Gates. Install gates plumb, level, and secure for full opening without interference. Anchor center stops and keepers in concrete. Adjust and lubricate hardware for smooth operation.
10. Fasteners. Install nuts for fittings, bands, and hardware bolts on inside of fence. Peen ends of bolts or score threads to prevent removal.
11. The fence shall be grounded in accordance with the requirements of the NEC as determined by the Contractor and approved by the Engineer as being applicable to this site.
12. The area of installation shall be left neat and free of any debris caused by the erection of the fence.

- F. Measurement and Payment.** Measurement and payment for the Chain Link Fence shall be in accordance with Section 01150 of these Specifications and the following:
1. Measurement: Shall be measured by the lump sum (LS) complete and in place.
  2. Payment: Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for furnishing and installing the Chain Link Fence complete.

**Section 02510 – Conductors and Cables**

- A. Description.** Contractor shall furnish and install conductors and cables as specified at locations shown in the Drawings and as ordered by the Engineer, including that necessary connectors, splices, terminations, sleeves and sleeve seals for cables.
- B. Submittals.** The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples. Contractor shall provide product data for each type of product indicated, qualification data for testing agency, and shall provide field test reports indicating and interpreting test results relative to compliance with performance requirements of testing standard.
- C. General**
1. Quality Assurance:
    - a. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association (NETA) or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
      - 1) Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
    - b. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
    - c. Comply with NFPA 70.
  2. Substitutions:
    - a. Wherever possible, several makes of materials, fixtures and devices have been specified. The project shall use material as specified, or equal, approved by the Engineer.
    - b. A list of material and equipment, including the name of the manufacturer, which the Contractor proposes to install, shall be submitted to the Engineer for approval. All items so listed shall conform to the Specifications. No substitution shall be accepted unless approved in writing by the Engineer.
      - 1) When proposing a substitution, an official submittal for the substitution of that specific material shall be presented for evaluation.
      - 2) A submittal for the evaluation of a substitution shall include all applicable data to allow the proper evaluation, e.g. calculations, layout, characteristics, etc.
      - 3) A submittal for the evaluation of a substitution shall be presented as a whole, thus, partial submittal shall not be accepted.
  3. Coordination: Contractor to coordinate layout and installation of cable with other trades.
- D. Materials**
1. Conductors and Cables:

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Alcan Products Corporation; Alcan Cable Division.
    - 2) American Insulated Wire Corp.; a Leviton Company.
    - 3) General Cable Corporation.
    - 4) Senator Wire & Cable Company.
    - 5) Southwire Company.
  - b. Copper Conductors: Comply with NEMA WC 70.
  - c. Conductor Insulation: Comply with NEMA WC 70 type THWN-2.
  - d. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC and ground wire.
  - e. Single phase circuits: All single phase 120V and single phase 277V circuits shall have a dedicated neutral conductor for each phase conductor.
  - f. Bare stranded copper for grounding equipment.
2. Connectors and Splices:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) AFC Cable Systems, Inc.
    - 2) AMP, Inc.
    - 3) O-Z/Gedney; EGS Electrical Group LLC.
    - 4) 3M; Electrical Products Division.
    - 5) Tyco Electronics Corp.
  - b. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

**E. Construction.**

- 1. Conductor Material Application:
  - a. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
  - b. Branch Circuits: Copper. Stranded, unless otherwise noted. Contractor shall refer to provided drawings for specific wiring requirements.
  - c. Control Circuits: Copper. Stranded, unless otherwise noted. Contractor shall refer to equipment shop drawings for specific wiring requirements.
- 2. Conductor Insulation and Multiconductor Cable Application and Wiring Methods:
  - a. Exposed Feeders: Type THWN-2, single conductors in raceway.
  - b. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THWN-2, single conductors in raceway.
  - c. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THWN-2, single conductors in raceway.
  - d. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THWN-2, single conductors in raceway.
  - e. Class 1 Control Circuits: Type THWN-2, in raceway.
  - f. Class 2 Control Circuits: Type THWN-2, in raceway.

3. Installation of Conductors and Cables:
  - a. Comply with installation depths indicated in drawings.
  - b. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
  - c. Splices shall not be permitted unless cable exceeds roll length in new installation.
  - d. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
  - e. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
  - f. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
  - g. Identify and color-code conductors and cables as required by drawings.
4. Connections:
  - a. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
  - b. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
  - c. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.
5. Field Quality Control:
  - a. The Contractor will perform tests and inspections and prepare test reports to submit to the Engineer and the Owner.
  - b. Tests and Inspections:
    - 1) After installing conductors and cables and before electrical circuitry has been energized, test all feeder and branch conductors for compliance with requirements.
    - 2) Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification section 7.3.2. Certify compliance with test parameters.
    - 3) A megger test shall be performed on the 480V power conductor, and the megger readings shall be submitted and approved. This is to insure that the electrical insulation was not damaged in shipping or installation. The voltage on the megohmmeter shall be as specified by the equipment manufacturer.
  - c. Test Reports: Prepare a written report to record the following:
    - 1) Test procedures used.
    - 2) Test results that comply with requirements.
    - 3) Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
  - d. Remove and replace malfunctioning units and retest as specified above.

**F. Measurement and Payment.** Measurement and payment for Conductors and Cables shall be in accordance with Section 01150 and the following:

1. Measurement: Shall be measured by the lump sum (LS) complete and in place.

2. Payment: Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for furnishing and installing the Conductors and Cables.

**Section 02520 – Raceways, Boxes and Cabinets**

**A. Description.** Contractor shall furnish and install raceways, fittings, boxes, enclosures, and cabinets for electrical wiring as shown in the Drawings.

1. Definitions:

- 1) EMT: Electrical metallic tubing.
- 2) ENT: Electrical nonmetallic tubing.
- 3) LFMC: Liquidtight flexible metal conduit.

2. Quality Assurance:

- 1) Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- 2) Comply with NFPA 70.

**B. Submittals.** The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples.

1. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
2. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
  - a. Custom enclosures and cabinets.
  - b. For handholes and boxes for underground wiring, including the following
    - 1) Duct entry provisions, including locations and duct sizes.
    - 2) Frame and cover design.
3. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  - a. Structural members in the paths of conduit groups with common supports.
  - b. HVAC and plumbing items in the paths of conduit groups with common supports.

**C. Materials**

1. Metal Conduit and Tubing:

- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1) AFC Cable Systems, Inc.
  - 2) Alflex Inc.
  - 3) Allied Tube & Conduit; a Tyco International Ltd. Co.
  - 4) Anamet Electrical, Inc.; Anaconda Metal Hose.
  - 5) Electri-Flex Co.
  - 6) Manhattan/CDT/Cole-Flex.

- 7) Maverick Tube Corporation.
  - 8) O-Z Gedney; a unit of General Signal.
  - 9) Wheatland Tube Company.
  - b. Rigid Steel Conduit: ANSI C80.1.
  - c. EMT: ANSI C80.3.
  - d. FMC: Zinc-coated steel.
  - e. LFMC: Flexible steel conduit with PVC jacket.
  - f. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
    - 1) Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
    - 2) Fittings for EMT: Steel or die-cast, compression type.
  - g. Joint Compound for Rigid Steel Conduit: Explosion-proof compound listed for use in conduit connector assemblies, and compounded for use to form an explosion-proof seal around each conductor. Compound shall be designed to restrict the passage of gases, vapors and flames through the sealing fitting. Compound shall be Crouse-Hinds CHICO X sealing compound or approved equal.
2. Nonmetallic Conduit and Tubing:
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) AFC Cable Systems, Inc.
    - 2) Anamet Electrical, Inc.; Anaconda Metal Hose.
    - 3) Arnco Corporation.
    - 4) CANTEX Inc.
    - 5) CertainTeed Corp.; Pipe & Plastics Group.
    - 6) Condux International, Inc.
    - 7) ElecSYS, Inc.
    - 8) Electri-Flex Co.
    - 9) Lamson & Sessions; Carlon Electrical Products.
    - 10) Manhattan/CDT/Cole-Flex.
    - 11) RACO; a Hubbell Company.
    - 12) Thomas & Betts Corporation.
    - 13) Carlon.
  - b. RNC: Schedule 80 PVC, unless otherwise indicated.
  - c. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
3. Surface Metal Raceways: Galvanized steel with snap-on covers.
- a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Thomas & Betts Corporation.
    - 2) Walker Systems, Inc.; Wiremold Company (The).

- 3) Wiremold Company (The); Electrical Sales Division.
4. Boxes, Enclosures, and Cabinets:
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
    - 2) EGS/Appleton Electric.
    - 3) Erickson Electrical Equipment Company.
    - 4) Hoffman.
    - 5) Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
    - 6) O-Z/Gedney; a unit of General Signal.
    - 7) RACO; a Hubbell Company.
    - 8) Robroy Industries, Inc.; Enclosure Division.
    - 9) Scott Fetzer Co.; Adalet Division.
    - 10) Spring City Electrical Manufacturing Company.
    - 11) Thomas & Betts Corporation.
    - 12) Walker Systems, Inc.; Wiremold Company (The).
    - 13) Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
  - b. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
  - c. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
  - d. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
  - e. Cabinets:
    - 1) NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
    - 2) Hinged door in front cover with flush latch and concealed hinge.
    - 3) Key latch to match panelboards.
    - 4) Metal barriers to separate wiring of different systems and voltage.
    - 5) Accessory feet where required for freestanding equipment.

**D. Construction.**

1. Raceway Application
  - a. Outdoors: Apply raceway products as specified below, unless otherwise indicated.
    - 1) Exposed Conduit: Rigid steel conduit.
    - 2) Concealed Conduit, Aboveground: Rigid steel conduit.
    - 3) Underground Conduit: RNC, Type EPC-80-PVC, direct buried.
    - 4) Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
    - 5) Boxes and Enclosures, Aboveground: NEMA 250, Type 4.
  - b. Comply with the following indoor applications, unless otherwise indicated:
    - 1) Exposed, Not Subject to Physical Damage: EMT.

- 2) Exposed, Not Subject to Severe Physical Damage: EMT.
  - 3) Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
  - 4) Damp or Wet Locations: Rigid steel conduit.
  - 5) Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: EMT.
  - 6) Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, nonmetallic in damp or wet locations.
- c. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- d. Raceway Fittings: Compatible with raceways and suitable for use and location. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated

## 2. Installation

- a. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- b. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- c. Complete raceway installation before starting conductor installation.
- d. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- e. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- f. Raceways Embedded in Slabs:
  - 1) Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
  - 2) Change from Type EPC-80-PVC to rigid steel conduit before rising from above grade.
- g. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- h. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- i. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.
- j. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
  - 1) 3/4-Inch (19-mm) Trade Size and Smaller: Install raceways in maximum lengths of 50 feet (15 m).
  - 2) 1-Inch (25-mm) Trade Size and Larger: Install raceways in maximum lengths of 75 feet (23 m).
  - 3) Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.

- k. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
    - 1) Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    - 2) Where otherwise required by NFPA 70.
  - 3. Protection:
    - a. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
      - 1) Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer spaces.
      - 2) Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.
- E. Measurement and Payment.** Measurement and payment for Raceways, Boxes, and Cabinets shall be in accordance with Section 01150 and the following:
- 1. Measurement: Shall be measured by the lump sum (LS) complete and in place.
  - 2. Payment: Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for furnishing and installing the Raceways, Boxes, and Cabinets.

**Section 02530 – Underground Ducts and Utility Structures**

- A. Description.** Contractor shall furnish and install conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks and in single duct as well as handholes and boxes runs as shown in the drawings. Products provided under this section include pulling eyes, cable stanchions, cable arms, and insulators.
- a. Furnish materials complete with associated fasteners, packaged with protective covering for storage and with identification labels clearly describing contents.
  - b. It shall be the responsibility of the contractor to take all necessary precautions to ensure the safety of all existing structural elements during all phases of his work.
  - c. No materials, cranes, trucks or any other construction loads shall cross over or be positioned until the contractor has determined the adequacy of that structure to carry the intended load without damage or overstress.
- 1. Definitions:
    - a. RNC: Rigid nonmetallic conduit.
    - b. Duct: Electrical conduit and other raceway, either metallic or nonmetallic, used underground, embedded in earth or concrete.
    - c. Duct Bank: Two or more conduits or other raceway installed underground in the same trench or concrete envelope.
    - d. Handhole: An underground junction box in a duct or duct bank.
  - 2. Quality Assurance:
    - a. Manufacturer Qualifications: Firm experienced in manufacturing underground precast concrete utility structures of types and sizes required and similar to those indicated for this project. Firm must have a record of successful in-service performance.
    - b. Comply with ANSI C2.
    - c. Comply with NFPA 70.

- d. Listing and Labeling: Provide products specified in this section that are listed and labeled. The terms “Listed” and “Labeled”: As defined in the National Electrical Code, Article 100.
3. Delivery, Storage and Handling:
    - a. All materials and equipment delivered to the site shall be stored at locations approved by the owner. Contractor shall be responsible for their proper care and protection, and shall protect and be responsible for any damage to these materials.
    - b. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
    - c. Store precast concrete underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
    - d. Lift and support precast concrete units only at designated lifting or supporting points.
  4. Coordination:
    - a. Coordinate layout and installation of ducts, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.
    - b. Coordinate elevations of ducts and duct-bank entrances into handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to manholes and handholes, and as approved by Engineer.

**B. Submittals.** The contractor will supply all submittal information in accordance with Section 01340-Shop Drawings, Product Data, and Samples.

1. Product Data: For the following:
  - a. Duct-bank materials, including separators and miscellaneous components.
  - b. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
  - c. Accessories for handholes, boxes, and other utility structures.
  - d. Warning tape.
  - e. Warning planks.
2. Shop Drawings for Factory-Fabricated Handholes: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:
  - a. Duct entry provisions, including locations and duct sizes.
  - b. Cover design
  - c. Grounding details.
  - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
3. Product Certificates: For concrete and steel used in precast concrete handholes, as required by ASTM C 858.
4. Inspection report for factory inspections, according to ASTM C 1037.
5. Source quality-control test reports.

6. Record documents: Show dimensioned locations of underground ducts and handholes.

**C. Materials**

1. Conduit:
  - a. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
  - b. RNC: NEMA TC 2, Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.
2. Nonmetallic Ducts and Duct Accessories:
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) ARNCO Corp.
    - 2) Carlon Electrical Products; Lamson & Sessions Company.
    - 3) Certainteed Products Corp.; Pipe & Plastic Group.
  - b. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
  - c. Duct Accessories:
    - 1) Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
    - 2) Warning Tape: Underground-line warning tape specified in Division 16 Section "Electrical Identification."
3. Handholes.
  - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Quazite.
  - b. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
  - c. The enclosures shall be designed to be installed flush to grade with the cover fitting flush to the box.
  - d. The enclosures shall be of a stackable design for greater installation flexibility.
  - e. All covers shall be equipped with a minimum of two stainless steel lockdown mechanisms.
  - f. All enclosure covers will have some type of recessed access point to allow removal of the cover with a hook. The access points will be placed in such a location to allow for the greatest amount of leverage and safety possible.
  - g. Enclosures shall be designed and suitable for installation and use through a temperature range of -40 deg F to 140 deg F.
  - h. A certified copy of all test reports must be signed and stamped by a registered professional engineer and submitted prior to shipment of products.
  - i. All enclosures and covers shall be rated based on tier H-20 loading for roadways and other areas subject to deliberate vehicular traffic. Designed to AASHTO H-20 and ASTM C857 A16 certified proof of compliance from foundries in lieu of testing. A description of the testing methods shall be included with the test reports and must match the descriptions in this specification. The three position tests required by this document are the minimum for the product evaluation

4. Utility Structures Accessories:
  - a. Duct Supports: Rigid PVC spacers selected to provide minimum duct spacings and concrete cover depths required, while supporting ducts during concreting.
  - b. Cable Rack Assembly: Steel, hot-dip galvanized, except insulators.
    - 1) Stanchions: T-section or channel; 2-1/4-inch nominal size; punched with 14 holes on 1-1/2-inch centers for cable-arm attachment.
    - 2) Arms: 1-1/2 inches wide, lengths ranging from 3 inches with 450-lb minimum capacity to 18 inches with 250-lb minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
    - 3) Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
  - c. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
  - d. Cover Hooks: As required to lift covers provided on project. Two required.
  - e. Provide 3" wide, 4 mil thickness, insert polyethylene plastic, and marker tapes impervious to alkalis, acids, chemical reagents and solvents normally encountered in soil. Tape to be red for power, continuously imprinted along entire length in permanent black letters with word "ELECTRIC". Tape to be placed along entire length of underground runs at minimum of 24" above ducts and 6" to 24" below grade. Brady, Allen, Seton or equal.
5. Source Quality Control:
  - a. Test and inspect precast concrete utility structures according to ASTM C 1037.
  - b. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
    - 1) Strength tests of complete boxes and covers shall be by either an independent testing agency or the manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
    - 2) Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.
6. Construction Materials:
  - a. Mortar: Conform to ASTM C 270, type M, except for quantities less than 2.0 cu.ft., where packaged mix complying with ASTM C 387, type M may be used.
  - b. Concrete.
    - 1) Strength: 3000 psi minimum 28\_day compressive strength.
    - 2) Aggregate for duct encasement: 3/8\_inch maximum size.

#### **D. Construction.**

##### 1. Examination

Examine site to receive ducts for compliance with installation tolerances and other conditions affecting performance of the underground ducts. Do not proceed with installation until unsatisfactory conditions have been corrected.

2. Underground Duct Application
  - a. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-80-PVC, in direct-buried duct bank, unless otherwise indicated.
  - b. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: RNC, NEMA Type EPC-80-PVC, installed in direct-buried duct bank, unless otherwise indicated.
3. Earthwork
  - a. Provide all excavation, trenching, backfill, tools, apparatus, shoring and necessary staging.
  - b. All excavation shall be unclassified and all material encountered, regardless of types of hardness, including rock or old foundations, shall be removed to accommodate the work.
  - c. Excavation and Backfill: Do not use heavy-duty, hydraulic-operated, compaction equipment where damage could result.
  - d. Provide pumping equipment to remove all water from trenches and other excavations. Discharge water only at suitable drainage points.
  - e. All backfill under walks, roads, driveways, pipes, ducts, conduits, handholes, and other specialties shall be compacted to 95 percent AASHO modified density. Test of compaction shall be conducted for each 16 inches of fill or fraction thereof, one test for each 2,000 sq.ft. or less. Copy of test results shall be forwarded to Engineer before surfaces are restored.
  - f. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
  - g. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching.
  - h. Backfill shall be clean earth and shall be free from rocks, frozen earth, debris, and foreign materials. Backfill shall be deposited in uniform layers not over 6 inches thick and each layer shall be mechanically tamped before the next layer is applied up to final 4 inches of top soil.
  - i. Where existing underground services are involved, excavation shall be performed with hand tools. The contractor shall be responsible for all damage to existing utilities.
4. Duct Installation:
  - a. Feeder raceway banks shall be encased in a concrete envelope not less than 3 inches thick all around the outside limits of the raceway group and shall not be less than 3 inches between any surface of raceway. The top of the enclosing concrete envelope shall not be less than 36 inches below finished grade. Concrete envelopes shall be reinforced at all points by #4 reinforcing rods in each corner of the envelope with vertical cross ties on 3 foot centers.
  - b. Install nonmetallic conduit and duct as indicated according to manufacturer's written instructions.
  - c. Slope: Pitch ducts a minimum slope of 1:300 down toward handholes and away from buildings and equipment. Slope ducts from a high point in runs between two handholes to drain in both directions.
  - d. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of 48 inches, both horizontally and vertically, at other locations, unless otherwise indicated.
  - e. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
  - f. Building Entrances: Make a transition from underground duct to rigid steel conduit at least 10 feet (3 m) outside the building wall without reducing duct line slope away from the building, and without

forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Follow appropriate installation instructions below.

- 1) Concrete Encased Ducts: Install reinforcing in duct banks passing through disturbed earth near buildings and other excavations. Coordinate duct bank with structural design to support duct bank at wall without reducing structural or watertight integrity of building wall.
  - 2) Waterproofed Wall and Floor Entrances: Install a watertight entrance-sealing device with the sealing gland assembly on the inside. Anchor device into masonry construction with 1 or more integral flanges. Secure membrane waterproofing to the device to make permanently watertight.
- g. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.
- h. Pulling Cord: Install 100-lbf-test nylon cord in ducts, including spares.
- i. Concrete-Encased Ducts: Support ducts on duct separators.
- 1) Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, and secure separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately 6 inches between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
  - 2) Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
    - (i) Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
    - (ii) If more than one pour is necessary, terminate each pour in a vertical plane and install 3/4-inch reinforcing rod dowels extending 18 inches into concrete on both sides of joint near corners of envelope.
  - 3) Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.
  - 4) Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
  - 5) Stub-Ups: Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
    - (i) Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    - (ii) Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of base. Install insulated grounding bushings on terminations at equipment.
- j. Direct-Buried Duct Banks:
- 1) Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.

- 2) Space separators close enough to prevent sagging and deforming of ducts, with not less than 4 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
  - 3) Excavate trench bottom to provide firm and uniform support for duct bank.
  - 4) Install backfill as required.
  - 5) After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction.
  - 6) Set elevation of bottom of duct bank below the frost line.
  - 7) Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
    - (i) Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    - (ii) For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
5. Installation of Handholes.
- a. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
  - b. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.
  - c. Elevation: Set so cover surface will be flush with finished grade.
  - d. Install handholes and boxes with bottom below the frost line.
  - e. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
  - f. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
6. Grounding.
- a. Ground underground ducts and utility structures according to Division 16 Section "Grounding and Bonding."
  - b. Grounding Bushings: Provide grounding for bushings on all conduits entering/leaving switchboard/switchgear enclosures and ductbanks. Provide insulated ground wire from grounding bushings to ground bus of switchboard/switchgear.
7. Field Quality Control.

- a. Perform the following tests and inspections and prepare test reports.
  - 1) Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
  - 2) Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
  - 3) Test handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 16 Section "Grounding and Bonding."
- b. Correct deficiencies and retest as specified above to demonstrate compliance.

8. Cleaning.

- a. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
- b. Clean internal surfaces of manholes, including sump. Remove foreign material.

**E. Measurement and Payment.** Measurement and payment for Underground Ducts and Utility Structures shall be in accordance with Section 01150 and the following:

- 1. Measurement: Shall be measured by the lump sum (LS) complete and in place.
- 2. Payment: Shall be paid for at the applicable contract lump sum price, payment for which shall constitute full compensation for furnishing and installing the Underground Ducts and Utility Structures.

## **PART V - BID PROPOSAL FORMS**

**Bid Proposal**

**Bid Schedule**

**Specification Compliance Checklist**

**Project Experience References**

**Bid Bond**

**First-Tier Subcontractor Disclosure Form**



# BID PROPOSAL

To: Deschutes County Department of Solid Waste  
61050 SE 27th Street  
Bend, Oregon 97702

Project Name: Knott Landfill Flare  
Expansion Project

The undersigned, hereinafter called the Bidder, declares that the only persons or parties interested in this Proposal are those named herein; that this Proposal is, in all respects, fair and without fraud; and it is made without collusion with any official of Deschutes County, Oregon, hereinafter called County; and that the Proposal is made without any connection or collusion with any person making another proposal on this Contract.

The Bidder further declares that he has carefully examined the Contract documents; that he has satisfied himself as to the quantities involved, including materials and equipment, and conditions of work involved; and that this proposal is made according to the provisions and under the terms of the Contract documents, which documents are hereby made a part of this Proposal.

The Bidder agrees that all of the applicable provisions of Oregon law relating to public contracts (ORS Chapter 279) are, by this reference, incorporated in and made a part of this Proposal. Bidder hereby states that bidder will comply with ORS 279C.840.

Bidder (is) (is not) a resident bidder of the State of Oregon. If Bidder is a resident of another state, specify state of residency:

\_\_\_\_\_.

The Bidder further agrees that if this Proposal is accepted, he will, within ten (10) calendar days after notification of acceptance, execute the contract with the County in the form of contract annexed hereto; and will, at the time of execution of the contract, deliver to the County the Performance and Payment Bonds (See Section 13 - Information for Bidders) required herein; and will, to the extent of this Proposal, furnish all materials necessary to complete the work in the manner, in the time, and according to the methods as specified in the contract documents and required by the Director of Solid Waste.

Bidder certifies that it has a drug testing program in place for its employees, or warrants that a drug testing program will be in place prior to execution of this contract, that the drug testing program is in writing, that new employees must pass a drug screening, that existing employees may be tested for reasonable cause or when an employee is injured or involved in an accident resulting in property damage. Bidder agrees that each subcontractor providing labor under this Contract shall maintain a qualifying drug testing program for the duration of the Contract.

The Bidder agrees to commence work upon the issuance of a "Notice to Proceed" by the County and fully complete the project according to the time schedule specially set forth in the contract documents. Bidder further agrees to pay liquidated damages for failure to complete within the specified time.

It is agreed that if the Bidder is awarded the contract for the work herein proposed and shall fail or refuse to execute the contract and furnish the contract and furnish the specified Performance and Payment Bond within ten (10) calendar days after receipt of notification of acceptance of his proposal, then, in that event, the bid security deposited herewith according to the conditions of the Invitation to Bid and Information for Bidders shall be retained by the County as liquidated damages; and it is agreed that the said sum is a fair measure of the amount of damage the County will sustain in case the Bidder shall fail or refuse to enter into the contract for the said work and to furnish the Performance and Payment Bond (See Section 13 Information for Bidders) as specified in the contract documents. Bid security in the form of a certified check shall be subject to the same requirements as a bond.

If the Bidder is awarded a contract on this Proposal, the Surety who will provide the performance bond will be

\_\_\_\_\_, whose address is

STREET

CITY

STATE

ZIP

# BID SCHEDULE

## KNOTT LANDFILL FLARE EXPANSION PROJECT

<u>BID ITEM #</u>	<u>DESCRIPTION</u>	<u>QUANTITY</u>	<u>UNIT PRICE</u>	<u>COST</u>
1	MOBILIZATION	LUMP SUM	\$ _____	\$ _____
2	CLEARING & GRUBBING	LUMP SUM	\$ _____	\$ _____
3	CRUSHED AREA STONE	10 CY	\$ _____	\$ _____
4	LANDFILL GAS PIPING	LUMP SUM	\$ _____	\$ _____
5	LANDFILL GAS BLOWER & CANDLESTICK FLARE SYSTEM	LUMP SUM	\$ _____	\$ _____
6	CONCRETE FOUNDATION	LUMP SUM	\$ _____	\$ _____
7	CHAIN LINK FENCE & GATES	LUMP SUM	\$ _____	\$ _____
8	TELEMETRY SYSTEM	LUMP SUM	\$ _____	\$ _____
9	ELECTRICAL INSTALLATION	LUMP SUM	\$ _____	\$ _____

TOTAL BID PRICE: \$ \_\_\_\_\_

TOTAL: BID PRICE (written words):

**NOTES:**

- A. Bidder must bid on all items #1 through #9.
- B. All bids must be accompanied by a bid security in the amount of ten percent (10%) of the Total Bid Price.
- C. The successful Bidder must post both a Performance and Payment Bond each in the amount of one hundred percent (100%) of the awarded contract amount Total Bid Price to guarantee that the successful bidder will fulfill all of his obligations under this Contract.

## ACKNOWLEDGEMENT OF ADDENDUMS

The undersigned acknowledges receipt of and has incorporated the addenda listed below in the Total Bid Price submitted herein:

Addenda #	Signature	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

It is understood that the right is reserved by Deschutes County to reject any or all proposals or bids. In the event that the Contract is not awarded within thirty (30) days after the receipt of bids, the Bidder will be released from his bid unless an extension of time is mutually agreed upon.

The undersigned certifies the bid prices contained in this proposal or bid have been carefully checked and are submitted as correct and final.

The name of the Bidder submitting this Proposal is:

\_\_\_\_\_ of  
NAME CCB# TELEPHONE

\_\_\_\_\_ of  
ADDRESS CITY STATE ZIP

Which is the address to which all communication concerning this proposal and the Contract shall be sent.

The names of the principal officers of the corporation submitting this Proposal, or of the partnership, or of all persons interested in this Proposal as principals, are as follows:

\_\_\_\_\_  
\_\_\_\_\_

(IF SOLE PROPRIETOR OR PARTNERSHIP)

IN WITNESS HERETO, the undersigned has set his/her hand this \_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
Signature of Bidder

\_\_\_\_\_  
Title

(IF CORPORATION)

IN WITNESS WHEREOF, the undersigned corporation has caused this instrument to be executed and its seal affixed by its duly authorized officers this \_\_\_\_\_ day of \_\_\_\_\_, 2016.

\_\_\_\_\_  
Name of Corporation

By: \_\_\_\_\_

Title: \_\_\_\_\_

Attest: \_\_\_\_\_  
Signature and Title

# SPECIFICATION COMPLIANCE CHECKLIST

Instructions: Bidder shall complete the following checklist, acknowledging compliance with specification requirements. For items where specification requirement is not met, Bidder shall provide information on specification deviations.

**A. General Conditions**

**MEETS SPECIFICATIONS**

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| <p>1. The LFG Blower and Candlestick Flare System shall include a Gas Handling System, a Control System, a Piping System, and a Candlestick Flare System.</p>   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p>2. The LFG Blower and Candlestick Flare shall be pre-manufactured and delivered to the site mounted on a skid. The blower/flare skid supplier shall be responsible for all on-skid piping and electrical wiring connections for operation and control of all equipment related to the LFG Blower and Candlestick Flare System. The blower/flare skid supplier shall have a minimum of 5 years of experience in the design and assembly of LFG blower/flare skids, and have a minimum of 10 units operating successfully on similar landfill gas installations.</p> | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

**B. Submittals**

- |  |                              |                             |
|--|------------------------------|-----------------------------|
| <p>1. Blower/Flare equipment bid submittals shall include enough information to confirm compliance with the equipment specifications.</p>  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p>2. The blower/flare skid supplier shall provide equipment design basis information including but not limited to blower skid footprint dimensions, inlet and discharge pipe size and locations, candlestick flare footprint and height, and electrical power requirements.</p> | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p>3. All equipment and accessories shall have manufacturer's shop drawings approved by the Engineer prior to shipment and shall be tested for conformance with these specifications prior to acceptance by the Owner. The following information shall be submitted:</p>         | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p style="padding-left: 20px;">a. A complete bill of materials for all equipment and accessories.</p>  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p style="padding-left: 20px;">b. Catalog information and/or descriptive literature of all equipment and accessories. Catalogs shall be condensed and highlighted as necessary to clearly signify size and configuration of equipment and accessories.</p>                       | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p style="padding-left: 20px;">c. Certified Shop Drawings showing all important details of construction, dimensions, and delivery weight.</p>  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p style="padding-left: 20px;">d. Complete performance data that will indicate full compliance with the design conditions. This includes but is not limited to performance curves and calculations for flow capacity at pressure/vacuum and elevation conditions.</p>            | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| <p style="padding-left: 20px;">e. Complete control panel diagrams and elevation drawings showing all components, wires, connections, and numbered</p>  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

terminals.

- f. Complete electrical interconnection diagram showing all wires and terminals between the control panel and external devices.  YES  NO
- g. Certification that the equipment furnished for this project does not exceed the noise limit specified herein.  YES  NO
4. Upon completion, the supplier shall provide the Owner with a comprehensive operations and maintenance (O&M) manual including as-built updates per section B.2 above, start-up procedures, shut-down procedures, and any additional information needed for safe and efficient operation and maintenance of the system.  YES  NO

**C. Design Conditions**

1. Blower/Flare Skid can operate in the following Site Conditions:
- a. Elevation: 3720 feet above sea level.  YES  NO
- b. Maximum ambient temperature: 115 degrees F.  YES  NO
- c. Minimum ambient temperature: -10 degrees F.  YES  NO
- d. Noise limit: 85 dbA at 3 feet.  YES  NO
2. Blowers can operate with the following Gas Conditions:
- a. Maximum LFG Flow: 2000 SCFM with LFG Inlet Pressure: (-60) in WC.  YES  NO
- b. Minimum LFG Flow: 200 SCFM with LFG Inlet Pressure: (-40) in WC.  YES  NO
- c. LFG Discharge Pressure: 10 in WC (or as needed for Candlestick Flare System).  YES  NO
- d. LFG Inlet Temperature: 100 degrees F.  YES  NO
- e. Relative Humidity: 100%.  YES  NO
- f. Gas Composition: (50% CH<sub>4</sub>, 45% CO<sub>2</sub>, 4% N<sub>2</sub>, 1% O<sub>2</sub>).  YES  NO
3. Candlestick Flare can operate with the following conditions:
- a. Capacity: 2000 SCFM of 50% methane LFG.  YES  NO
- b. Turn Down Ratio: 10 to 1.  YES  NO
- c. Minimum Flare Height: 29 feet.  YES  NO
- d. Emission and Destruction Efficiency based on EPA 40 CFR 60.18 and AP-42 Supplement D:
- 1) 98% Overall Destruction Efficiency.  YES  NO
- 2) 0.068 lb/MMBtu NOx.  YES  NO
- 3) 0.37 lb/MMBtu CO.  YES  NO

**D. Equipment Description**

- 1. The LFG Blower and Candlestick Flare shall include:
  - a. Two (2) 100% capacity centrifugal blowers equipped with VFDs.  YES  NO
  - b. Local power distribution panel, outdoor rated and air conditioned.  YES  NO
  - c. Local control panel with display, outdoor rated and air conditioned.  YES  NO
  - d. Productivity 3000, MicroLogix 1400 or approved equal PLC with Ethernet communication port.  YES  NO
  - e. PLC and HMI program files including full tag list and all necessary information for additions and SCADA integration by a 3rd party  YES  NO
  - f. 10” minimum C-more or approved equal touch panel interface with data logging capabilities  YES  NO
  - g. Temperature and pressure compensated LFG flow meter.  YES  NO
  - h. Discharge port with blind flange for future connection extending horizontally after the blowers and prior to the flow meter run.  YES  NO
  - e. PLC and HMI program files including full tag list and all necessary information for additions and SCADA integration by a 3rd party  YES  NO
  - i. Recirculation line with air/fan cooled LFG cooler, if deemed necessary to achieve the required system turndown without blowers entering a surge state.  YES  NO
  - j. Candlestick Flare System.  YES  NO
- 2. Each blower equipment rating shall be based upon data previously established by tests in accordance with the ASME Power Test Code for Centrifugal Blowers.  YES  NO
- 3. Blower controls system shall coordinate with the candlestick flare. The flow rate and/or well field vacuum shall be set-points in the blower controls system.  YES  NO
- 4. All equipment shall be manufactured in accordance with codes and guidelines per this specification and in accordance with the applicable portions of the following codes and standards.  YES  NO
  - a. Local laws and ordinances
  - b. State and Federal laws
  - c. National Electrical Code
  - d. National Electrical Manufacturers Association (NEMA)
  - e. Underwriters Laboratories (UL)

- f. Uniform Building Code (UBC)
  - g. American National Standards Institute (ANSI)
  - h. American Society of Mechanical Engineers (ASME)
  - i. American Gas Association (AGA)
  - j. Institute of Electrical and Electronic Engineers (IEEE)
  - k. Instrument Society of America (ISA)
  - l. Industrial Risk Insurance (IRI)
  - m. Factory Mutual (FM)
  - n. National Fire Protection Agency (NFPA)
  - o. Environmental Protection Agency (EPA)
5. The layout for the blower/flare skid is requested to resemble, as feasible, the layout shown in the Drawings (Sheet M1.01). It is preferred to have the LFG inlet, the condensate discharge and the control panel in the respective locations as shown in the Drawings.  YES  NO
6. The equipment shall be delivered as fully assembled as transportation will allow. Assembled components shall not be dismantled for shipment unless approved by the Engineer.  YES  NO
7. All equipment shall be properly protected to prevent damage or deterioration during shipment and during on-site storage. All exposed pipe connection points shall be protected at a minimum with blind flanges comprised of wooden planks bolted to the opening.  YES  NO

**E. Products**

1. General:
- a. Equipment shall be new and not have been in service, except for shop tests, at any time prior to delivery. The equipment shall be factory-assembled to the furthest extent possible and ready for installation  YES  NO
  - b. Equipment shall be designed and sized to have sufficient space for inspection, repairs, and adjustments.  YES  NO
  - c. Equipment shall be amply sized for all stresses which may occur during operation, fabrication, transportation, and installation.  YES  NO
  - d. Provisions shall be made by the blower/flare skid supplier to protect equipment and personnel from the heat flux produced by the candlestick flare, including but not limited to a heat shield roof over the gas handling system and components.  YES  NO
  - e. These specifications are intended to give a general description of what is required, but do not cover all requirements. Ancillary equipment or components necessary for proper operation of the proposed system not included in these specifications or shown in the design drawings shall be furnished and installed.  YES  NO
  - f. A stainless steel nameplate shall be attached to each piece of equipment in a visible location to clearly identify the Manufacturer name, address, and contact information as well as Equipment serial number, model number, and any other  YES  NO

information necessary for complete equipment identification.

- g. A stainless steel tag shall be attached to each component to clearly indicate identify component numbering per the equipment piping and instrumentation diagram(s).  YES  NO

2. Gas Handling System:

a. Blower and Motor:

- 1) The blower unit shall be a direct drive, variable frequency, multistage centrifugal type. Impellers shall be mounted on one shaft supported on each end by bearings mounted in the outboard bearing housings. The blower shall be built from parts cast in patterns from which previous units have been built and tested. The blower shall comply with the design conditions per this specification. A blower type other than multistage centrifugal, i.e. fan style, may be accepted as an alternate provided that design conditions per this specification are met.  YES  NO
- 2) The blower housings shall consist of cast iron sections held securely between cast iron inlet and outlet heads with steel tie rods.  YES  NO
- 3) No contact shall be made between the shaft rotor and the housing, other than through the bearings. Labyrinth style or approve equal grease lubricated seals shall be used to insure no gas leakage or bearing contamination.  YES  NO
- 4) The inlet and outlet connections shall feature a drilled and tapped flange pattern per ANSI 1316.1, 125-pound or greater, and shall be an integral part of the heads.  YES  NO
- 5) Impellers shall be one piece cast aluminum alloy, keyed to the shaft and held by a locknut. Hubs of the impellers shall butt against each other directly or through one piece metal spacers. There shall be ample clearance and tip speed shall not exceed 375 feet per second.  YES  NO
- 6) Impellers shall be precisely machine balanced. Vibration shall not exceed 2 mils in the vertical plane measured at the blower bearing housings.  YES  NO
- 7) Diffuser sections which receive the gas from the impeller and guide the gas to the next impeller shall be provided. The diffusing vanes shall be an integral part of the sections.  YES  NO
- 8) Each shaft shall be made of high grade steel of sufficient diameter for the application and operate below the critical speed.  YES  NO
- 9) Each blower shall be provided with two antifriction bearings. It shall be possible to replace bearings without disconnecting piping or disassembling the blower casing. Both inlet and outlet bearings shall be designed for a  YES  NO

minimum expected life of 10 years of continuous operation. Vibration sensors shall be installed at the inlet bearing housing (motor side) of each blower for monitoring and alarm purposes.

- 10) Each blower stage shall be provided with 3/8-inch diameter casing drains manifolded to a single manual shut-off valve.  YES  NO
- 11) The blower internals shall be furnished with a factory applied phenolic or approved equal coating to provide resistance to corrosion by landfill gas. The coating shall be applied a minimum of 10 mils thick to all parts of the blower (excluding aluminum impellers) which come in contact with the landfill gas stream.  YES  NO
- 12) Each blower shall be direct-coupled to a horizontal 480V, 3-phase, variable frequency drive motor. The blower/flare skid supplier shall be responsible for selecting the proper motor size to suit this equipment, the performance requirements noted herein, and the site conditions. The motor shall be totally enclosed fan-cooled (TEFC) suitable for Class 1, Division 2, Group D, classified location, and UL-approved. Motor shall be rated at above the ambient temperature per the design conditions of this specification with not more than 131 degrees F rise in conformance with NEMA MG-1. Bearings shall be of the antifriction type with a minimum expected life of 10 years of continuous operation.  YES  NO
- 13) The blowers shall be connected to the drivers with a suitable flexible coupling. The blower/flare skid supplier shall check and adjust alignment of the couplings and drives, on-site during commissioning, in accordance with the instructions of the blower manufacturer to a tolerance of plus or minus 2 mils. Couplings shall be covered with a base-mounted aluminum or non-sparking metallic guard.  YES  NO
- 14) Epoxy-coated steel bedplates of suitable size for mounting blowers and drivers shall be furnished by the blower manufacturer. The blower and motor shall be carefully aligned and then bolted in place. Suitable vibration isolation pads shall be provided under the steel bedplates of the units.  YES  NO
- 15) The blower-motor assemblies shall be located, installed, and plumbed on a skid, and delivered to the site as a complete unit.  YES  NO
- 16) Stainless steel bellows flex connectors shall be installed at all blower connections.  YES  NO
- 17) An aluminum check valve shall be installed at the discharge of each blower.  YES  NO

- 18) Blowers shall be manufactured in the United States. Blower manufacturers shall have a minimum of 5 years of experience in the design and manufacture of this type of equipment and have a minimum of 10 operating installations on landfills in the U.S.  YES  NO
- 19) Blower manufacturer shall be Atlas-Copco (formerly Houston Service Industries, Inc.), Continental, Gardner Denver, or an approved equal.  YES  NO
- b. Moisture Separator Assembly (Knockout):
- 1) The moisture separator shall be completely fabricated from 304 stainless steel and be of a vertical, cylindrical design with an element removal from the top. An 8-inch flanged, covered, inspection port shall be provided in the side near the bottom for manual clean out of accumulated debris. Nozzle flanges shall meet ANSI 125-pound specifications.  YES  NO
- 2) The demister shall be made of an approved corrosive resistance mesh and shall be supported on and held down by high open area, stainless steel grid. The moisture separator shall be able to remove 99 percent of droplets greater than 5 micron and shall also remove particles having a density equal to or greater than water which are greater than 5 micron in size.  YES  NO
- 3) The moisture separator shall have a flow capacity greater than the design conditions per this specification. At the design flow rates, temperatures and pressure, the moisture separator shall have a pressure drop no greater than 5 inches of water column and shall be capable of withstanding no less than 4.0 pounds per square inch gauge vacuum.  YES  NO
- 4) There shall be a pneumatic double diaphragm, or approved alternate, pump to pump the liquid from the separator. The pump and all connections shall be insulated and heat traced to prevent freezing. There shall be a 2-inch Schedule 40S 304 stainless steel drain line to the edge of the skid coming from the pump. A stainless steel ball valve shall be installed between the separator and the pump. The drain line shall terminate at the edge of the skid with a 2-inch 304 stainless steel flange conforming to ASME A182. Flange shall be 150# RF weld neck.  YES  NO
- 5) There shall be two ½-inch pipe couplings in the side of the unit, one upstream and one downstream of the demister element material, with a differential pressure monitoring device(s) for the purpose of monitoring demister element performance.  YES  NO
- 6) The moisture separator(s) and all condensate lines shall be insulated and heat traced appropriately based on the climate. As a minimum, the moisture separator(s)  YES  NO

(knockout) shall be insulated and heat traced to 3” above the maximum anticipated liquid level. All condensate drain or conveyance piping, as well as any sensors or other equipment that will be hindered by cold temperatures, shall be head traced and insulated to prevent freezing. An additional 10 feet of heat trace wire shall be provided with the blower skid to be installed on additional condensate drain piping extending from the moisture separator drain port. Insulation shall be foam-glass or other approved insulation material which is attractively protected from the elements with metal or other approved weather jacketing. Weather jacketing and sealants used shall be suitable for direct sunlight and shall prevent moisture ingress into the insulation material. Heat trace wire shall be suitable for installation on a high density polyethylene (HDPE) pipe, which will be connected to the moisture separator drain port.

- 7) The moisture separator assembly shall be located, installed, and pre-plumbed on the gas handling system skid.  YES  NO
- 8) A high condensate level switch shall be installed in the assembly and alarm in the control system.  YES  NO
- 9) The moisture separator manufacturer shall have a minimum of 5 years of experience in the design and manufacturer of this type of equipment, and have a minimum of 10 units operating successfully on similar landfill gas installations in the U.S.  YES  NO

3. Piping System

a. Butterfly Valves:

- 1) All valve shafts shall be connected to operators by use of keys and keyways. The use of compression or friction connectors will not be accepted.  YES  NO
- 2) The butterfly valves, for low-pressure/vacuum landfill gas services, shall have cast-iron wafer or full lug body with contoured 316 stainless steel disc and stem, acetyl stem bushing, and replaceable seat. Valve seats shall be Viton or approved equal. Valves shall be bubble-tight at 150 psi and shall be suitable for installation between ANSI 125-pound flanges.  YES  NO
- 3) All butterfly valves shall open left of counterclockwise when viewed from the stem. Manual valve operators, for valves 3” or larger, shall be worm gear type. Valves installed greater than 5 feet in elevation above the skid platform or the ground shall include chain wheel operators. All operators shall have adjustable mechanical stop limiting devices to prevent over-travel of disc. Should an adjustment of the disc be required to maintain seal, this adjustment shall be made externally without removing the operator housing cover. The operator shall be designed such that adjustments can be made under  YES  NO

pressure and without the possibility of dirt getting into the operator lubricant. Adjustments through the lower shaft will not be acceptable. Operator components shall, at the extreme operator positions, withstand without damage a pull of 200 lb for hand-wheel or a torque of 300 ft-lb for operating nuts.

- 4) Interior of valve body (except for valve disc, valve seat and stainless steel valve seat rings) shall be coated with a fusion bonded, thermosetting epoxy coating in accordance with the latest version of AWWA C550. Coatings shall be free of imperfections with a minimum thickness of 12 mils. Surface shall be clean, dry, and free from rust and grease before coating.  YES  NO
- 5) All butterfly valves shall be manufactured by ABZ or approved equal. Replacement valves and parts shall be commonly available.  YES  NO

b. Piping:

- 1) Piping on the gas handling system shall be SCH 10, 304 type stainless steel, or approved equal. The same specification applies to tees, elbows, flanges, and other pipe fittings. Flanges shall conform to ANSI 125-pount specifications.  YES  NO
- 2) The gaskets shall be full-face Hypalon, Viton, or approved equal, 1/16 inch to 1/8 inch in thickness, and shall meet the requirements of ANSI Specification A21.11 and be rated for the temperatures and chemicals the gasket will encounter.  YES  NO
- 3) Where required, pipes and fittings shall be drilled and fitted with weld o-lets to accommodate drainage or other pipe fittings. All holes shall be drilled at right angles to the axis of pipes and fittings.  YES  NO
- 4) Piping and fittings shall be supported to prevent any strain being transmitted between sections and connected equipment. Release of any joint shall result in no transverse piping movement and shall allow easy removal and replacement of any piping component.  YES  NO
- 5) Stainless steel flex joints shall be provided as necessary to isolate vibration from blowers and to accommodate thermal expansion. Flex joints shall be comprised of T-321 stainless steel bellows with hot dipped, galvanized steel floating flanges on both ends.  YES  NO
- 6) The stainless steel piping spool going from the blowers to the flare shall have a tee and a blind flange for a future connection.  YES  NO

4. Flow Meters:

- a. Averaging pitot tube (annubar) flow meters shall consist of a single in line probe and remote electronics. The method of  YES  NO

operation shall be the measurement of differential pressure created by the in-line tube. At each flow measurement location, a thermocouple and pressure transducer will be installed to measure the LFG temperature and pressure to correct the flow measurement to standard temperature and pressure conditions. Where the flow meter turndown ratio is not sufficient to accurately measure flow at +/- 5%, two flow meters may be required. The flow meters shall have a digital LCD readout showing instantaneous (SCFM) and communicate with the control system per this specification.

- b. The gas flow meter shall be temperature and pressure corrected and shall be manufactured by Rosemount, Veris Incorporated, or approved equal.  YES  NO
  
- 5. Candlestick Flare System
  - a. The Candlestick Flare System shall be designed to integrate seamlessly with the skid-mounted LFG Blower System and destruct LFG in accordance with the design conditions per this specification.  YES  NO
  
  - b. The Candlestick Flare shall be at least 29 feet tall, and preferable taller if self-mounting allows.  YES  NO
  
  - c. The Candlestick Flare shall be self-mounted, and without any guywires for support.  YES  NO
  
  - d. The Candlestick Flare System shall include, but not be limited to the following components:
    - 1) Main Gas Valve: A pneumatically (compressed air) operated butterfly valve with a stainless steel disk and Viton or approved equal seat. The operator shall be provided as a fail close spring device and shall close completely within 5 seconds of receiving a shut-off signal from the controls system. The blower/flare skid supplier shall provide the regulator train and mounting facilities for the compressed air supply.  YES  NO
  
    - 2) Flame Arrester: A Varec, or approved equal, flame arrester shall be installed at the inlet to the flare. The pressure drop it imposes on the system shall not exceed 2 inches of water column. The flame arrester housing shall be constructed of cast aluminum and contain an aluminum flame element. Pressure monitoring devices shall be provided to monitor both flare back pressure and flare + flame arrester back pressure.  YES  NO
  
    - 3) Flare Mast: A flare mast shall be constructed of ASTM A53 piping, and be of sufficient diameter for the LFG flow rate and overall flare height per this specification. The flare mast shall include a drain valve installed at or near the base of the mast assembly to drain any condensate or rain water accumulation. The flare mast shall include provisions for mounting conduit, tubing, and equipment as required.  YES  NO

- 4) Burner and Shroud Assembly: The burner and shroud assembly shall be constructed of 304/316 stainless steel and include an adjustable landfill gas nozzle and adjustable air inlet dampers at the base of the shroud assembly. A minimum of 1" ceramic fiber insulation blankets shall be installed on the inner surface of the shroud assembly, and be attached using Inconel welded stud type pins with Inconel retaining washers. A stainless steel lip shall be welded at the top edge of the flare shroud to protect the top edge of the insulation.  YES  NO
- 5) Thermocouple: 1 each, type K or type E flame monitoring thermocouple. The thermocouple assembly shall be housed in bendable protection sheathing of either stainless steel or Inconel material, and shall include powdered magnesium oxide type insulation.  YES  NO
- 6) Propane pilot system: A removable pilot assembly shall be rated at a minimum of 35,000 Btu/hr. This igniting system shall include the pressure regulator, pressure indicator, solenoid valve, manual shutoff valve, and pilot gas pressure monitoring port.  YES  NO
- 7) High temperature primer and finish coatings shall be applied to all non stainless steel surfaces. Surfaces shall be sand blasted, according to SPC SP-6 guidelines, prior to application of the coating.  YES  NO
6. Control System
- a. The control panel for the LFG Blower and Candlestick Flare shall be compliant with NEMA 12/3R specifications at a minimum. The main control panel shall be sized to accommodate the required controls, and shall be provided with a swing out panel door with NEMA 4 gasketing and a 3 point locking handle. The control panel shall be mounted, installed, and pre-wired by the manufacturer. The panel shall include, but not be limited to, the following components:
- 1) A load center for the motors, outlets, fixtures, controls, devices, lights, etc.  YES  NO
- 2) A control center to receive all signals from the various safeties, controls, and monitoring equipment, and to automatically control all the components of the system.  YES  NO
- 3) An operator control panel with touch panel interface to allow either manual or automatic selection for the control of the operating components of the system.  YES  NO
- 4) Blower controls shall include variable frequency drives, voltage monitors, dual set point ammeter switch gauges (undercurrent and over-current points shall be clearly indicated on the ammeters), running time meters, hand-off-auto switches, and green push-to-test run lights. A time delay will prevent blower restart until sufficient time has elapsed for the shaft to stop spinning (approximately 8 minutes).  YES  NO

- b. Blowers are to operate individually. The blower controls shall provide for each blower operation through a hand-off-auto selector switch.  YES  NO
- c. The blower system shall be controlled by a PLC based system with sufficient input and output cards for a fully functional system. The system shall communicate with the Owner's existing network/SCADA system over a telemetry system (to be installed by Contractor) over Ethernet TCP/IP or Modbus TCP/IP protocols. The PLC equipment shall be Automation Direct Productivity 3000, Allen Bradley MicroLogix 1400, or approved equal. SCADA integration will be performed by the Owner.  YES  NO
- d. A weather/heat shield shall be provided to protect the control panel against radiated heat (solar and/or flare) and rain. The control system shall be designed and manufactured as an outdoor system including air conditioner and heater.  YES  NO
- e. The system shall be equipped with the following safeties as a minimum:
- 1) Blower-motor overcurrent shall cause system shutdown.  YES  NO
  - 2) Blower-motor undercurrent (surge) shall cause system shutdown.  YES  NO
  - 3) Blower-motor high vibration shall provide a warning alarm.  YES  NO
  - 4) Blower-motor high high vibration shall cause system shutdown.  YES  NO
- f. Miscellaneous Equipment
- 1) Local alarm light.  YES  NO
  - 2) Auxiliary lighting shall be provided via photocell-activated light mounted on the flare/blower control panel rack and a second light in the vicinity of the blowers.  YES  NO
  - 3) Two outdoor receptacles (120V) with ground fault protection shall be provided at the flare/blower control panel rack.  YES  NO
  - 4) A shelf or sufficient space to set a laptop computer during maintenance or troubleshooting.  YES  NO
- g. The system shall be equipped with the following gauges as a minimum:
- 1) Blower inlet and outlet temperature indicators shall be dial-type gauges installed at the inlet and outlet of each blower. The gauges shall range from 0 to 200 degrees F.  YES  NO
  - 2) Pressure, Vacuum, and Differential Pressure Gauges shall be Capsuhelic or Magnehelic with Buna-N diaphragm as manufactured by Dwyer Instruments, Inc. or approved  YES  NO

equal. Gauges shall read “Inches of Water”.

- |  |                              |                             |
|--|------------------------------|-----------------------------|
| 3) Moisture separator pressure drop indicator gauge shall be capable of measuring 0 to 15 inches of water, differential pressure.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4) Blower vacuum gauge shall be capable of measuring 0 to 100 inches of water.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 5) Blower pressure gauge shall be capable of measuring 0 to 50 inches of water.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 6) System vacuum gauge shall be mounted upstream of the knock-out pot and be capable of measuring -100 to 100 inches of water.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 7) System pressure gauge shall be mounted downstream of the blowers and be capable of measuring -100 to 100 inches of water.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| h. The system shall be equipped with the following transmitters as a minimum.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 1) Pressure and vacuum transmitters shall be diaphragm type gauges manufactured by Emerson Process Management, Rosemount, or approved equal. Transmitters shall read in “Inches of Water Column” and transmit the signal via 4-20 mA signals.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 2) Well field vacuum shall be scaled -100 to 100 inches of water.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 3) Blower discharge pressure scaled -100 to 100 inches of water.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| i. The blower/flare skid supplier shall provide the following spare parts as a minimum:  |                              |                             |
| 1) Five 14 oz tubes of lubricating grease (or other applicable lubricant) used for blower bearings/seals.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 2) One shaft coupling.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 3) Two thermocouples.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 4) Indicator light package.  | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 5) One set fuses/relays.   | <input type="checkbox"/> YES | <input type="checkbox"/> NO |
| 7. Telemetry System  |                              |                             |
| a. The blower/flare skid manufacturer shall provide a mounting 2” conduit pole for a radio above the control panel. The radio mounting height shall be 15’ above the base of the skid. A conduit route from the radio location to the control panel shall be provided for the wires between the radio and the Ethernet communication port on the PLC system. | <input type="checkbox"/> YES | <input type="checkbox"/> NO |

**F. Execution:**

1. The following items shall be installed on the main skid of the new LFG blower/flare skid.
  - a. Blower-motor assemblies.  YES  NO
  - b. Moisture separator assembly (knock-out pot).  YES  NO
  - c. Piping and fittings.  YES  NO
  - d. Valves.  YES  NO
  - e. Instrumentation.  YES  NO
  - f. Flow Meters.  YES  NO
  - g. Control Panels  YES  NO
  - h. Shut-off valve at flare inlet.  YES  NO
  - i. Flame arrester at flare inlet.  YES  NO
2. All equipment shall be installed in strict accordance with codes, standards, and the manufacturer's recommendations.  YES  NO
3. All skid-mounted equipment and piping shall be installed plumb and perpendicular to the skid base.  YES  NO
4. Marred or abraded surfaces of equipment shall be cleaned and refinished to match original finish.  YES  NO
5. The blower/flare skid supplier shall coordinate the on-skid electrical work with all equipment manufacturers as necessary to provide a complete, integrated, and automated system.  YES  NO

**G. Start-Up and Testing:**

1. The controls for the landfill gas blower system shall be tested at the blower/flare skid supplier's facility before shipment. Complete test reports shall be provided to the Engineer which show that all system controls operate correctly prior to shipment.  YES  NO
2. A blower/flare skid supplier representative with complete knowledge of proper start-up, operation and maintenance shall be provided for a minimum of three (3) 8-hour days to commission the system and instruct representatives of the Owner on proper operation and maintenance of the blower system. If there are difficulties in operation of the equipment due to equipment manufacturer's fabrication or design, additional services shall be provided at no cost to the Owner.  YES  NO
3. Functional and validation tests shall be performed upon completion of the installation and commissioning. Validation tests shall be performed by the Contractor with the assistance of the blower/flare skid supplier's representative, in the presence of the Engineer or his representative.  YES  NO

**H. Warranty**

1. The LFG Blower and Candlestick Flare System shall be fully and completely warranted for a period of two (2) years from the date of acceptance of the completed installation by the blower/flare skid supplier. The warranty shall provide for the replacement or repair of any defective work, parts, or materials.  YES  NO
2. Any work performed under warranty shall be invoiced at no charge to the Owner. Each invoice shall detail the work performed, with parts itemized and all charges shown.  YES  NO

# PROJECT EXPERIENCE REFERENCES

## REFERENCE #1

Client: \_\_\_\_\_ Year Project was Completed: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Project Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contract Value: \$ \_\_\_\_\_

## REFERENCE #2

Client: \_\_\_\_\_ Year Project was Completed: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Project Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contract Value: \$ \_\_\_\_\_

## REFERENCE #3

Client: \_\_\_\_\_ Year Project was Completed: \_\_\_\_\_

Contact Person: \_\_\_\_\_ Phone Number: \_\_\_\_\_

Project Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contract Value: \$ \_\_\_\_\_

# Bid Bond

Bond No. \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS, that \_\_\_\_\_  
\_\_\_\_\_, hereinafter called the Principal, and \_\_\_\_\_,  
a corporation duly organized under the laws of the State of \_\_\_\_\_, having its principal place of business at  
\_\_\_\_\_ in the state of \_\_\_\_\_, and authorized to do business in the State of  
Oregon, as Surety, are held and firmly bound unto the \_\_\_\_\_  
hereinafter called the Oblige, in the penal sum of \_\_\_\_\_ DOLLARS  
(\$\_\_\_\_\_), for the payment of which, well and truly to be made, we bind ourselves, our heirs, executors,  
administrators, successors and assigns, jointly and severally, firmly by these presents.

The condition of this Bond is that, whereas the Principal herein is herewith submitting his or its bid proposal for the KNOTT  
LANDFILL FLARE EXPANSION PROJECT, said bid proposal, by reference thereto, being made a part hereof.

NOW THEREFORE, if the said bid proposal submitted by the said principal be accepted, and the Contract be awarded to said  
Principal, and if the said Principal shall execute the proposed Contract and shall furnish the Performance and Payment Bond as  
required by the bidding and Contract documents with the time fixed by said documents, then this obligation shall be void,  
otherwise to remain in full force and effect. Signed and sealed this \_\_\_\_ day of \_\_\_\_\_, 2016.

SURETY

CONTRACTOR

\_\_\_\_\_  
Name

\_\_\_\_\_  
Name

By: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Title: \_\_\_\_\_

# FIRST-TIER SUBCONTRACTOR DISCLOSURE FORM

KNOTT LANDFILL FLARE EXPANSION PROJECT

BID CLOSING TIME AND DATE: 2:00 pm, Thursday, August 11, 2016

NAME OF BIDDING CONTRACTOR: \_\_\_\_\_

This form must be submitted at the location specified in the Invitation to Bid on the advertised bid closing date and within two working hours (4:00 p.m.) after the advertised bid closing time.

List below the name of each subcontractor that will be furnishing labor or materials and that is required to be disclosed, the category of work that the subcontractor will be performing and the dollar value of the subcontract. Enter "NONE" if there are no subcontractors that need to be disclosed. (ATTACH ADDITIONAL SHEETS IF NEEDED.)

NAME	DOLLAR VALUE	CATEGORY OF WORK
1) _____	\$ _____	_____
2) _____	\$ _____	_____
3) _____	\$ _____	_____
4) _____	\$ _____	_____
5) _____	\$ _____	_____
6) _____	\$ _____	_____
7) _____	\$ _____	_____

Failure to submit this form by the disclosure deadline will result in a non-responsive bid. A non-responsive bid will not be considered for award.

Form Submitted by (Bidder Name): \_\_\_\_\_

Contact Name: \_\_\_\_\_ Phone No.: \_\_\_\_\_

## **PART VI - AGREEMENT FORMS**

**Contract**

**Performance Bond**

**Payment Bond**

**Certificate of Insurance**



## CONTRACT

THIS CONTRACT, made and entered into, in duplicate, by and between DESCHUTES COUNTY, a political subdivision of the State of Oregon, hereinafter called "County" and \_\_\_\_\_  
\_\_\_\_\_, hereinafter called "Contractor", for the project entitled:

### **Knott Landfill Flare Expansion Project**

#### WITNESSETH:

THAT the said Contractor, in consideration of the sums to be paid by the County in the manner and at the times herein provided, and in consideration of the other covenants and agreements herein contained, hereby agrees to perform and complete the work herein described and provided for, and to furnish all necessary things in accordance with the applicable contract documents, bound herewith, and in accordance with such alterations or modifications of the same as may be made by the County, and according to and within the meaning and purpose of this contract. This Agreement shall be binding upon the heirs, executors, administrators, successors and assigns of the Contractor.

THAT the Contract Documents, consisting of Invitation to Bid, Information for Bidders, General Conditions, Special Provisions, Bid Proposal, Bid Schedule, Award, Bid Bond, Subcontractor Disclosure, Contract, Performance Bond, Payment Bond, Certificate of Insurance, Prevailing Wage Rates, Oregon Standard Specifications, Plans and Drawings bound herewith are hereby specifically referred to and by this reference made a part hereof, and shall by such reference have the same force and effect as though all of the same were fully written or inserted herein.

THAT the Contractor shall faithfully complete and perform all of the obligations of this Contract, and in particular, shall promptly, as due, make payment of all just debts, dues, demands and obligations incurred in the performance of said Contract; and shall not permit any lien or claim to be filed or prosecuted against the County, its agents or employees. It is expressly understood that this Contract in all things shall be governed by the laws of the State of Oregon, and the Ordinances of the County.

THAT in consideration of the faithful performance of all of the obligations, general and special, herein set out, and in consideration of the faithful performance of the work as set forth in the Contract Documents in accordance with the directions of the Director of Solid Waste and to his satisfaction, the County agrees to pay to the said Contractor the amount earned, as determined from the quantities of work performed, and taking into consideration any amounts that may be deductible and under the terms of the Contract, and to make such payments in the manner and at the times provided in the applicable provisions, and schedule of contract prices.

IN WITNESS WHEREOF, DESCHUTES COUNTY has caused this agreement to be signed in its name, by its Board of County Commissioners, duly attested by its Recording Secretary; and the said Contractor has caused this Contract to be signed and sealed the same as of the \_\_\_\_\_ day of \_\_\_\_\_, 2016.

BOARD OF COUNTY COMMISSIONERS  
OF DESCHUTES COUNTY, OREGON

\_\_\_\_\_  
ALAN UNGER, CHAIR

\_\_\_\_\_  
TAMMY BANEY, VICE CHAIR

\_\_\_\_\_  
ANTHONY DeBONE, COMMISSIONER

ATTEST:

\_\_\_\_\_  
RECORDING SECRETARY

CONTRACTOR:

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

APPROVED:

\_\_\_\_\_  
TIMM SCHIMKE, DIRECTOR OF SOLID WASTE

APPROVED AS TO FORM:

\_\_\_\_\_  
LEGAL COUNSEL

**Performance Bond**

**Bond No.** \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership, or Individual)

Principal, and \_\_\_\_\_  
(Name of Surety)

hereinafter called Surety, are held and firmly bound unto Deschutes County, hereinafter called OWNER, in the penal sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the Owner, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2016, a copy of which is hereto attached and made a part hereof for the construction of the **Knott Landfill Flare Expansion Project**.

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, and conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the **TWO YEAR GUARANTY PERIOD**, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the WORK or the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the PRINCIPAL shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_ 2016.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(Seal)

\_\_\_\_\_  
Principal

BY: \_\_\_\_\_

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

\_\_\_\_\_  
Surety

ATTEST:

\_\_\_\_\_  
(Surety) Secretary

(Seal)

\_\_\_\_\_  
Agent of Record                      Telephone Number

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
Address

BY: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
Address

NOTE: Date of BOND must not be prior to date of Contract.  
If CONTRACTOR is partnership, all partners should execute BOND.

# Payment Bond

Bond No. \_\_\_\_\_

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor)

\_\_\_\_\_  
(Address of Contractor)

a \_\_\_\_\_, hereinafter called  
(Corporation, Partnership, or Individual)

Principal, and \_\_\_\_\_  
(Name of Surety)

hereinafter called Surety, are held and firmly bound unto Deschutes County, hereinafter called OWNER, in the penal sum of \_\_\_\_\_ dollars (\$ \_\_\_\_\_)

in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain Contract with the Owner, dated the \_\_\_\_ day of \_\_\_\_\_, 2016, a copy of which is hereto attached and made a part hereof for the construction of the **Knott Landfill Flare Expansion Project**.

NOW, THEREFORE, if the Principal shall promptly make payment as due to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in said contract, and any authorized modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or to the WORK to be performed thereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or to the WORK or to the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this \_\_\_\_\_ day of \_\_\_\_\_ 2016.

ATTEST:

\_\_\_\_\_  
(Principal) Secretary

(Seal)

\_\_\_\_\_  
Principal

BY: \_\_\_\_\_

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
Address

\_\_\_\_\_  
Address

\_\_\_\_\_  
Surety

ATTEST:

\_\_\_\_\_  
(Surety) Secretary

(Seal)

\_\_\_\_\_  
Agent of Record                      Telephone Number

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
Address

BY: \_\_\_\_\_  
Attorney-in-Fact

\_\_\_\_\_  
Address

NOTE: Date of BOND must not be prior to date of Contract.  
If CONTRACTOR is partnership, all partners should execute BOND.

**DESCHUTES COUNTY SERVICES CONTRACT**

Contract No. 2016-\_\_\_

**INSURANCE REQUIREMENTS**

Contractor shall at all times maintain in force at Contractor's expense, each insurance noted below. Insurance coverage must apply on a primary or non-contributory basis. All insurance policies, except Professional Liability, shall be written on an occurrence basis and be in effect for the term of this contract. Policies written on a "claims made" basis must be approved and authorized by Deschutes County.

**Project: Knott Landfill Flare Expansion Project**

**Contractor Name: TBD**

**Workers Compensation** insurance in compliance with ORS 656.017, requiring Contractor and all subcontractors to provide workers' compensation coverage for all subject workers, or provide certification of exempt status. Worker's Compensation Insurance to cover claims made under Worker's Compensation, disability benefit or any other employee benefit laws, including statutory limits in any state of operation with Coverage B Employer's Liability coverage all at the statutory limits. . In the absence of statutory limits the limits of said Employers liability coverage shall be not less than \$1,000,000 each accident, disease and each employee. This insurance must be endorsed with a waiver of subrogation endorsement, waiving the insured's right of subrogation against County.

**Professional Liability** insurance with an occurrence combined single limit of not less than:

Per Occurrence limit	Annual Aggregate limit
<input type="checkbox"/> \$1,000,000	<input type="checkbox"/> \$2,000,000
<input type="checkbox"/> \$2,000,000	<input type="checkbox"/> \$3,000,000
<input type="checkbox"/> \$3,000,000	<input type="checkbox"/> \$5,000,000

Professional Liability insurance covers damages caused by error, omission, or negligent acts related to professional services provided under this Contract. The policy must provide extended reporting period coverage, sometimes referred to as "tail coverage" for claims made within two years after the contract work is completed.

Required by County                       Not required by County (one box must be checked)

**Commercial General Liability** insurance with a combined single limit of not less than:

<u>Per Single Claimant and Incident</u>	<u>All Claimants Arising from Single Incident</u>
<input checked="" type="checkbox"/> \$1,000,000	<input checked="" type="checkbox"/> \$2,000,000
<input type="checkbox"/> \$2,000,000	<input type="checkbox"/> \$3,000,000
<input type="checkbox"/> \$3,000,000	<input type="checkbox"/> \$5,000,000

Commercial General Liability insurance includes coverage for personal injury, bodily injury, advertising injury, property damage, premises, operations, products, completed operations and contractual liability. The insurance coverages provided for herein must be endorsed as primary and non-contributory to any insurance of County, its officers, employees or agents. Each such policy obtained by Contractor shall provide that the insurer shall defend any suit against the named insured and the additional insureds, their officers, agents, or employees, even if such suit is frivolous or fraudulent. Such insurance shall provide County with the right, but not the obligation, to engage its own attorney for the purpose of defending any legal action against County, its officers, agents, or employees, and that Contractor shall indemnify County for costs and expenses, including reasonable attorneys' fees, incurred or arising out of the defense of such action.

The policy shall be endorsed to name ***Deschutes County, its officers, agents, employees and volunteers as an additional insured.*** The additional insured endorsement shall not include declarations that reduce any per

occurrence or aggregate insurance limit. The contractor shall provide additional coverage based on any outstanding claim(s) made against policy limits to ensure that minimum insurance limits required by the County are maintained. Construction contracts may include aggregate limits that apply on a "per location" or "per project" basis. The additional insurance protection shall extend equal protection to County as to Contractor or subcontractors and shall not be limited to vicarious liability only or any similar limitation. To the extent any aspect of this Paragraph shall be deemed unenforceable, then the additional insurance protection to County shall be narrowed to the maximum amount of protection allowed by law.

Required by County                       Not required by County      (One box must be checked)

**Automobile Liability** insurance with a combined single limit of not less than:

Per Occurrence

- \$500,000
- \$1,000,000
- \$2,000,000

Automobile Liability insurance includes coverage for bodily injury and property damage resulting from operation of a motor vehicle. Commercial Automobile Liability Insurance shall provide coverage for *any* motor vehicle (symbol 1 on some insurance certificates) driven by or on behalf of Contractor during the course of providing services under this contract. Commercial Automobile Liability is required for contractors that own business vehicles registered to the business. Examples include: plumbers, electricians or construction contractors. An Example of an acceptable personal automobile policy is a contractor who is a sole proprietor that does not own vehicles registered to the business.

Required by County                       Not required by County      (one box must be checked)

**Additional Requirements.** Contractor shall pay all deductibles and self-insured retentions. A cross-liability clause or separation of insured's condition must be included in all commercial general liability policies required by this Contract. Contractor's coverage will be primary in the event of loss.

**Certificate of Insurance Required.** Contractor shall furnish a current Certificate of Insurance to the County with the signed Contract. Contractor shall notify the County in writing at least 30 days in advance of any cancellation, termination, material change, or reduction of limits of the insurance coverage. The Certificate shall also state the deductible or, if applicable, the self-insured retention level. Contractor shall be responsible for any deductible or self-insured retention. If requested, complete copies of insurance policies shall be provided to the County.

Risk Management review



Date

January 14, 2016

## **PART VI - PROJECT DRAWINGS**

