

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

| | | |
|-----------------------------------|---|---------------------------|
| FOR THE PURPOSE OF AUTHORIZING |) | RESOLUTION NO. 92-1546 |
| ISSUANCE OF A REQUEST FOR BIDS |) | |
| FOR THE CONSTRUCTION OF AN |) | Introduced by Rena Cusma, |
| IMPROVED COVER SYSTEM, GAS |) | Executive Officer |
| COLLECTION SYSTEM, AND STORMWATER |) | |
| COLLECTION SYSTEM ON A PORTION OF |) | |
| ST. JOHNS LANDFILL |) | |

WHEREAS, It is in the public interest that the St. Johns Landfill closure process move forward in an expeditious manner; and


WHEREAS, Work associated with and including the construction of an improved multi-layered cover system, gas collection system and storm water collection system on a portion of St. Johns Landfill will carry forward the closure process; and

WHEREAS, This resolution along with the Request for Bid and contract form for the work described above were submitted to the Executive Officer for consideration and all were forwarded to the Council for approval; now, therefore,

BE IT RESOLVED,

That the Council of the Metropolitan Service District authorizes issuance of a Request for Bids for work associated with and including the construction of an improved multi-layered cover system, gas collection system and storm water collection system on a portion of St. Johns Landfill.

ADOPTED by the Council of the Metropolitan Service District this 9th day of January, 1992.



Jim Gardner, Presiding Officer



METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

DATE: January 6, 1992

TO: Jim Watkins, Engineering & Analysis Manager
Dennis O'Neil, Senior Planner
Craig Lewis, Senior Management Analyst
Todd Sadlo, Senior Assistant Counsel
Rich Wiley, Procurement Officer

FROM: Linda M. Pang-Wright, Associate Engineer *LPW*

RE: Summary of Revisions to The St. Johns Landfill Closure of Subarea 1,
RFB #91B-49-SW

On 12/24/91, the Contract Documents, resolution and staff report for the above-referenced RFB was filed with the Council staff for placement on the January 8, 1992 agenda. Metro's Legal, Contracts Administration and Budget Departments had reviewed the RFB packet on 12/18 - 12/24/91. The RFB Document consisted of written specifications and a set of plans. The specifications included Division 0 and the Appendices A-I, by Metro and Divisions 1, 2, 3, 5, 9, 11, 16, and Appendix J by Parametrix.

While the Contract Documents were reviewed within Metro, DEQ was also reviewing the Technical Specification sections. Several technical issues were raised by DEQ. Discussion of these issues occurred between Metro engineering staff and Parametrix. In response to DEQ, revisions to the 12/24/91 reviewed documents have been made by Metro staff. In general, the majority of the revisions address:

- 1) A requirement to pulverize the existing low permeable soil in the areas that will receive Type 'A' Final Cover before compacting the soil. Metro has included this task as an Alternate Bid (No. 2) that the Contractors are required to bid.
- 2) Monitoring, including observations and testing, of the Contractor's activities as deemed necessary by the Geotechnical Engineer or a representative of Metro.

Attached are pages of the revised RFB specification with additions shown shaded and deletions shown struck out. A clean copy will be printed for reproduction and issuance purposes after the resolution affecting this RFB has been approved by the Solid Waste Committee and Council.

The following is a list that specifically identifies the location and reason for the revisions:

LOCATION: §00030, Invitation to Bid
REASON: DEQ requests pulverizing of soil prior to compaction.

**SECTION 00030
INVITATION TO BID**

Sealed Bids for the St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW, must be delivered to the Metropolitan Service District (Metro), 2000 S.W. First Avenue, Portland, OR 97201-5398, to the attention of Ms. Linda Pang-Wright, Engineer no later than 3:00 p.m., Pacific Standard Time (PST), Monday, February 24, 1992. At that time, the Bids will be opened and publicly read aloud at Metro in the Council Chambers.

The St. Johns Landfill is located at 9363 N. Columbia Blvd., Portland, OR. The work contemplated is the first phase of the construction of final cover for the closure of the 230-acre St. Johns Landfill. Final cover will be constructed over a 35 acre portion of the site during 1992 which includes Subarea 1, the northern portion of the Powerline Corridor (PLC), and the western portion of Subarea 2. The base work elements for this Request for Bids (RFB) includes stripping and stockpiling of existing topsoil and low permeable soil; procurement and placement of subgrade embankment material; placement of a low permeable soil barrier; procurement and installation of 40 mil VLDPE geomembrane, geonet composite, Type I sand, and topsoil; and installation of surface water control measures including hydroseeding. At Metro's discretion, alternate work can include installation of gas extraction wells, PVC and HDPE gas piping, construction of a temporary gas flare system, and construction of a temporary gas condensate system, and pulverization and recompaction of areas of low permeable soil.

Drawings and Specifications may be examined at the Metro Solid Waste Department, Room 320, 2000 S.W. First Avenue, Portland, OR 97201-5398. Sets of the documents may be purchased from Metro at the above address for \$55 per set (includes both Drawings and written Specifications). The fee for the document sets will be nonrefundable. Before a contract is awarded, Metro may conduct such additional investigations as are necessary to determine whether a Bidder is qualified. Upon request, the Bidder shall promptly submit such additional information as deemed necessary by Metro to evaluate the Bidder's qualifications.

Each Bid must be submitted on the prescribed form and accompanied by a certified check or cashier's check or Bid Bond executed on the prescribed form, payable to the Metropolitan Service District in the amount of ONE HUNDRED THOUSAND DOLLARS (\$100,000.00). The Bid and bid security should be delivered in a sealed envelope marked "St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW" to the attention of Ms. Linda Pang-Wright.

Bidders shall use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this document.

The successful Bidder will be required to furnish the necessary additional Bonds for the faithful performance of the Contract and for the payment of all persons supplying labor and materials as prescribed in the Contract Documents.

No Bid will be received or considered by Metro unless the Bid contains a statement by the Bidder that the provisions of ORS 279.350, regarding prevailing wage rates, are to be compiled with.

Each Bid must contain a statement as to whether the Bidder is a resident bidder, as defined in ORS 279.029.

Bidders or Subcontractors shall be licensed under ORS 468.883 (regarding licensing of the contractors on projects involving asbestos abatement), in the event the soils may be contaminated.

Bidders and Subcontractors must be registered with the Oregon Construction Contractor's Board pursuant to ORS 701.035-90.

**SECTION 00110
INSTRUCTIONS TO BIDDERS**

1. DESCRIPTION OF WORK

The work contemplated is the first phase of the construction of final cover for the closure of the approximately 230-acre St. Johns Landfill. Final cover will be constructed over a 35 acre portion of the site during 1992 which includes Subarea 1, the northern portion of the Powerline Corridor (PLC), and the western portion of Subarea 2. The base work elements for this Request for Bids (RFB) includes stripping and stockpiling of existing topsoil and low permeable soil; procurement and placement of subgrade embankment material; placement of a low permeable soil barrier; procurement and installation of 40 mil VLDPE geomembrane, geonet composite, Type I sand, and topsoil; and installation of surface water control measures including hydroseeding. At Metro's discretion, alternate work can include installation of gas extraction wells, PVC and HDPE gas piping, construction of a temporary gas flare system, and construction of a temporary gas condensate system, and pulverization and recompaction of areas with Existing Low Permeable Soil for Type A Cover.

2. DEFINITIONS

Except as otherwise specifically provided herein, all words and phrases defined in the General Conditions shall have the same meaning and intent in these Instructions to Bidders. Bidders should refer to those definitions as they read these Instructions.

3. DOCUMENT INTERPRETATION

The Contract Documents are intended to be complementary and to provide all details reasonably required for the execution of the proposed Work. Any person contemplating the submission of a Bid shall have thoroughly examined all of the various parts of these Contract Documents. If the Bidder has any doubt as to the meaning or the intent of the Contract Documents or finds any inconsistency or discrepancy within the Contract Documents, the Bidder must request Metro's interpretation, in writing at least ten (10) working days prior to Bid opening. Such requests for interpretation shall be mailed or delivered to Metro at 2000 S.W. First Avenue, Portland, Oregon 97201-5398, Attention: Ms. Linda Pang-Wright. Any interpretations or changes in the Contract Documents will be made only in writing, in the form of Addenda to the Contract Documents which will be furnished to all Bidders receiving a set of the Bidding Documents and which shall be binding upon all Bidders as if set forth in the original Contract Documents. Bidders shall indicate receipt of all Addenda on their Bids. Metro will not be responsible for any other explanation or interpretation of the Bidding Documents. Bidders shall have no right to rely on any oral interpretation or instructions made by Metro or the Engineer, unless it is also committed to writing and issued as an Addendum.

In the absence of any pre-bid request for clarification, or any interpretation of the Contract Documents, as outlined above, any subsequent interpretation shall be made by Metro, and shall be final and binding on the successful Bidder, and Metro shall pay no extra costs or expenses to such Bidder resulting from such interpretation.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE AND COMPLIANCE WITH LAWS

Before submitting a Bid, Bidders shall fully examine and read the Contract Documents; visit the site of the proposed Work, and examine the Site and the surrounding areas; and fully inform themselves of all conditions on, in, at and around the Site, the surrounding areas, and any work that may have been done thereon. The Bidder acknowledges by the submission of its Bid that it understands the nature and location of the Work, the general and local conditions, conditions of the Site, availability of labor, electric power,

information form is not submitted with the bid, Metro will assume that none of the products offered contain any recycled product. In addition, Metro will assume that a bid item contains no recycled product if information submitted for the item is in Metro's opinion incomplete, incorrect, or unintelligible.

Metro will calculate the recycled product preference as follows: If any Bidder submits a bid price for an item that (1) meets the definition of "Recycled Product" (see Oregon Laws 1991, Chapter 385, Section 59, in Appendix), (2) meets applicable standards, and (3) can be substituted for a comparable non-recycled product, Metro will subtract 5 percent from the Bid Item for the purpose of comparing bids. In all circumstances, the Bidder shall submit the actual proposed cost of the Bid Item. It is Metro's responsibility to calculate any preferences required under Oregon law. A Bidder who claims a recycled product preference shall utilize in this Work, all of the recycled product claimed.

In determining the lowest responsive, responsible Bidder, Metro shall, for the purpose of awarding the Contract, add a percent increase on the Bid of a nonresident Bidder, as that term is defined in ORS 279.029(6)(c), equal to the percent, if any, of the preference given to that nonresident Bidder in the state in which that Bidder resides. For purposes of determining the percent increases to be applied pursuant to this section, Metro shall rely on the list published by the Oregon Department of General Services pursuant to ORS 279.029(3), and Metro shall not incur any liability to any Bidder by relying on such list.

13. ALTERNATES

The Bidder is required to bid on the Alternate work. The Alternate 1 work of the SCHEDULE OF BID PRICES solicits prices for the construction of a gas and condensate collection system. The Alternate 2 work solicits prices for pulverization and recompaction of Existing Low Permeable Soils in areas with Type A Cover. The actual performance of this work will be determined at the discretion of Metro.

14. LIST OF PROPOSED SUBCONTRACTORS

Metro will require all Bidders to furnish in writing to Metro the names of all Subcontractors and Suppliers which Bidder proposes to use in completing the Work along with a brief description of the subcontract or supply work involved and the subcontract or supply work dollar amount by the close of the next working day following Bid opening. Metro will notify the Bidder in writing within ten (10) days following receipt from Bidder of the above-described information if Metro has any reasonable objection to any such proposed Subcontractor or Supplier. The Bidder shall not subcontract with any proposed Subcontractor or Supplier to whom Metro has made a reasonable objection. In the event of such objection, Bidder shall propose another entity to whom Metro has no reasonable objection. No amounts or prices bid by the Bidder shall be increased by any difference occasioned by such substitution. Failure of Metro to reply within the above-described time period shall be construed to mean that Metro has no objection at that time. Failure of the Bidder to comply with this section shall be cause for rejection of Bidder's Bid and, in such event, the bid security submitted by Bidder shall be taken by Metro and considered as liquidated damages.

Prospective Bidders are encouraged to verify the qualifications of proposed subcontractors/suppliers and be prepared to furnish Metro with a list of similar projects performed by the proposed subcontractors/suppliers.

15. AWARD AND EXECUTION OF CONTRACT

Within sixty (60) days after the opening of bids, Metro will accept one of the Bids or reject all of the bids. The acceptance of the Bid will be by written Notice of Conditional Award, mailed or delivered to the office designated in the Bid. The Notice of Conditional Award shall not entitle the party to whom it is delivered to any rights whatsoever.

pits to the site must be paid the prevailing rate of wage. Metro requires notification of source of material supply (ie. borrow pits) in order to make the determination whether a commercial source of supply. Metro reserves the right to approve commercial status of a borrow source.

If for any reason Contractor is not required by law to pay the prevailing rate of wage to any workers specified in the paragraph, Metro shall be entitled to offset from sums owing to Contractor an amount equal to the difference between the prevailing wage and the amount of wages actually being paid to such workers. At Metro's request, Contractor shall provide the certified payroll required by state wage and hour law to Metro on a weekly basis.

6. In reference to §00700, 14.03.09:

Royalty Payments -- Contractor shall promptly pay when due, all royalties owed to the State of Oregon or other governmental entity under ORS Chapter 274 or other provision of law. It is Metro's understanding that a royalty will be due for materials taken from submerged or submersible lands and deposited at the Site. If for any reason royalties are not due for such materials, Metro shall be entitled to offset from sums owing to Contractor an amount equal to the difference between the amount of royalties required to be paid generally at the time of the bid, and the amount of royalties actually owed. ~~At the time of bid, As of July 1991,~~ royalties due generally to the State of Oregon total 40 cents per cubic yard for material removed anywhere from the mouth of the Willamette River to River Mile 72, or 25 cents per cubic yard for material taken from the mouth of the Columbia River to Bonneville Dam.

- E. Textured geomembrane shall be placed on the finished Type A low permeable soil surface as stipulated in Section 02272.

3.6.1 CONSTRUCTION OF TYPE 'A' COVER - ALTERNATE NO. 2 WORK

- A. If Alternate No. 2 Work is included in the Work, the Existing Low Permeable Soil shall be pulverized after the Topsoil has been removed and prior to compaction as described above in Paragraph 3.6. The following procedure shall be used:
1. The upper 4-inches of the Existing Low Permeable Soil shall be repeatedly pulverized using a farm type disc, rototiller, or other appropriate means so that individual soil clods are not greater than 1.5 inches in the largest dimension.
 2. If the Geotechnical Engineer determines that pulverizing operations are contaminating the Existing Low Permeable Soil by causing mixing with the underlying refuse, or if upon inspection of the pulverized soil the Geotechnical Engineer determines that it does not meet Low Permeable Soil specifications, then additional Low Permeable Soil meeting the specification for Imported Low Permeable Soil shall be placed as directed by the Geotechnical Engineer to establish a sufficient layer of suitable material for achieving a 6-inch compacted thickness.
 3. The moisture content of the pulverized soil shall be adjusted to be within a range of 2 percent below optimum to 3 percent above optimum based on ASTM D698 (standard Proctor). Prior to compaction, the Geotechnical Engineer will measure moisture content of the Low Permeable Soil to verify the soils are within the moisture range. Test frequency will be four (4) tests per acre or as deemed necessary by the Geotechnical Engineer.
 4. Compaction of the pulverized Low Permeable Soil shall be accomplished as stated above in Paragraph 3.6.
 5. The compaction shall be at least 93 percent of the maximum dry density based on ASTM D698 (standard Proctor). Compaction will be verified by the Geotechnical Engineer via periodic testing as deemed necessary by the Geotechnical Engineer.

3.7 CONSTRUCTION OF TYPE 'B' COVER

- A. The Type B cover shall be constructed by placing and compacting twelve inches, compacted thickness, of low permeable soil after the design subgrade on the top slopes of Subarea 1 and the PLC have been prepared. Provide a minimum of 12 inches, compacted thickness, of subgrade embankment below low permeable soil. Excavation of refuse may be required. Prior to geosynthetic placement, foreign materials and

- B. The Contractor shall spread topsoil evenly over the specified areas. ~~to the depth shown on the plans or as otherwise ordered by the Engineer.~~ The topsoil shall be placed in two lifts. The first lift shall be approximately four to six inches (4"-6") thick and shall be mixed into the top three to four inches (3"-4") of sand by discing, or by other methods approved by the Engineer. The second lift shall be eight to six inches (8"-6") thick and shall be placed to equal the total depth shown on the plans or as otherwise ordered by the Engineer.
- C. Topsoil shall not be placed when the ground or topsoil is frozen, excessively wet, or in the opinion of the Engineer, in a condition detrimental to the work. After the topsoil has been spread, all large clods, hard lumps, rocks larger than 1 inch in diameter, and litter shall be removed from the surface and disposed of by the Contractor. The topsoil shall then be placed to a uniform, dense state ready for hydroseeding operations.
- D. During topsoil placement and up to the time the vegetative cover is established, the Contractor shall protect the work from erosion, traffic, Contractor's activities, and any other cause of damage. The Contractor shall repair or replace any damaged topsoil and vegetative cover at no additional expense to Metro.

* * * END OF SECTION * * *

2.3.2 Weekly CQA Meetings

CQA meetings will be held at approximately weekly intervals, or as necessary, to ensure that the CQA documentation is complete, up-to-date, and accurate, and that completed work meets the requirements of the Drawings and Specifications. Generally, CQA personnel and the Contractor's quality control personnel will attend these meetings.

2.3.3 Special CQA Meetings

Special CQA meetings will be held whenever a problem or deficiency arises that is not resolved in the normal course of action.

2.4 CQA Procedures - General

2.4.1 Preconstruction

The Engineer will review submittals to ensure that the construction materials meet the performance requirements of the project, including preconstruction testing and manufacturer's, fabricator's, and installer's qualifications statements.

2.4.2 Construction

During construction, the CQA personnel will perform inspections of materials received, perform conformance sampling and testing in accordance with ASTM D4759 ("Standard Practice for Determining the Specification Conformance of Geosynthetics", carry out the schedule of in-situ testing and observations, monitor the sampling of materials for destructive and non-destructive testing, prepare daily reports and other CQA documentation, and attend CQA meetings.

2.4.3 Post Construction

Construction certification reports will be submitted to the Owner at the end of each construction season, by the CQA Officer, and shall document and certify that construction met approved performance and design specifications. Each certification report should include summaries of all construction activities, field reports, observations, test data sheets, problem reporting and corrective measures data sheets, deviations from design and material specifications, and record drawings and photographs.



METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

To: Solid Waste Committee Members

From: John Houser, Council Analyst

Date: December 31, 1991

Re: Resolution No. 92-1546, For the Purpose of Authorizing the Issuance of a Request For Bids for the Construction of an Improved Cover System, Gas Collection System and Stormwater Collection System on a Portion of St. Johns Landfill

Resolution No. 92-1546 is scheduled to be considered by the Committee at the January 7 meeting.

Background

The resolution authorizes the issuance of a Request for Bids for the construction of a final cover and stormwater collection system for portions of St. Johns Landfill in 1992. The affected area is 35 acres in size, including all of subarea 1, the northern portion of the powerline corridor and the western portion of subarea 2. This area will be the first to have a final cover system installed. In future years additional areas will be covered until the entire landfill is closed.

The bid documents also will require bidders to submit a bid for the construction of a gas collection system in the affected area. This requirement will provide Metro with additional options for the construction of the collection system. Several of the firms that have submitted gas recovery proposals have offered to build a collection system. The staff report notes that a decision about construction of the collection system will be made "by the time that bids for the cover construction project are received."

Bidders that propose to use recycled products that meet certain criteria will be given a 5% bid preference.

Issues and Questions

The committee may wish to explore the following issues when considering the proposed resolution:

- 1) The bid documents require that a significant amount of sand, soil and embankment material be procured as part of cover system construction. The committee may wish to ask staff to explain the relationship between procurement of this material and the procurement of material under the existing material procurement contract with John Jersey & Son.

2) The original purpose of designating geographic subareas within the landfill was to schedule closure work within each of these areas. It appears that the initial closure work is proposed for subarea 1 and a portion of subarea 2. In addition, the proposed gas collection system would include an even larger area. The committee may wish to ask staff how the boundaries for the work area were established.

3) Several questions may be appropriate concerning the construction of a gas collection system:

a) the staff report states that "Metro will make a decision about who will construct the gas collection system by the time that bids for the cover construction project are received." If Metro has authorized the successful energy recovery proposer to build the collection system, what will happen if a less costly system is submitted by a bidder for the cover construction project.

b) have the energy recovery project proposers submitted their collection system costs in such a manner that the costs for construction in the work area proposed in Resolution No. 92-1546 can be separated and compared with other system construction proposals.

c) will the construction of the collection system be affected by the type of energy recovery that will be attempted?

4) Does staff believe the cost estimates for FY 1991-92 and subsequent fiscal years that were presented during the budget process are still valid?

SOLID WASTE COMMITTEE REPORT

CONSIDERATION OF RESOLUTION NO. 92-1546A, FOR THE PURPOSE OF AUTHORIZING THE ISSUANCE OF A REQUEST FOR BIDS FOR THE CONSTRUCTION OF AN IMPROVED COVER SYSTEM, GAS COLLECTION SYSTEM, AND STORMWATER COLLECTION SYSTEM, GAS COLLECTION SYSTEM ON A PORTION OF ST. JOHNS LANDFILL

Date: January 8, 1992

Presented by: Councilor McFarland

Committee Recommendation: At the January 7 meeting, the committee voted unanimously to recommend Council adoption of Resolution No. 92-1546A. Voting in favor: Councilors Gardner, McLain and Wyers.

Committee Issues/Discussion: Jim Watkins and Dennis O'Neil explained the purpose of the proposed RFB. O'Neil noted that this contract will begin the final closure process at St. Johns. The RFB is for the construction of a final cover system and stormwater collection system for all of Subarea 1, a portion of the power line corridor and a portion of Subarea 2.

Each bidder also would be requested to submit an alternate bid for the construction of a methane gas collection system on the proposed work area. This requirement will give Metro the option of using one of the bidders or one of the methane gas recovery project proposers for construction of the collection system.

O'Neil responded to the questions raised in the Council staff analysis. He noted that about half of the needed cover material for the entire closure project will be procured under an existing contract with John L. Jersey & Son. Those responding to the RFB will provide additional material needed specifically for the work area involved. He noted that a portion of subarea 2 was added to proposed work area because of the topography of the landfill. Watkins noted that the cost estimates offered during the preparation of the FY 91-92 budget are still valid. A total of \$1.66 million will be spent during the current fiscal year and approximately \$3.3 during FY 92-93.

O'Neil offered printed amendments to the RFB. These amendments resulted from a concern raised by DEQ that a portion of the cover system soil should be pulverized. Metro's consulting engineers disagree with this assessment. The proposed amendments would require bidders to provide an alternate bid to provide soil pulverization should DEQ require that it be done.

Councilor DeJardin asked how the closed landfill would be contoured. O'Neil noted that there would be a series of mounds and identified their location on a map. DeJardin expressed concern about the potential DEQ requirement of soil pulverization. O'Neil explained that Metro's engineers had initially recommended soil

pulverization but a subsequent examination indicated that the soil quality was sufficient to avoid the need to pulverize it.

McFarland questioned about the depth of the soil in the cover system. Watkins explained that the soil depth had been doubled to 12 inches to permit a broader type of cover plantings to be used. Bob Martin noted that Metro was talking with outside vendors to explore a variety of types of cover plantings.

The committee adopted the proposed amendments and approved the resolution.

STAFF REPORT

IN CONSIDERATION OF RESOLUTION NO. 92-1546 FOR THE PURPOSE OF AUTHORIZING THE ISSUANCE OF A REQUEST FOR BIDS FOR THE CONSTRUCTION OF AN IMPROVED COVER SYSTEM, GAS COLLECTION SYSTEM, AND STORMWATER COLLECTION SYSTEM ON A PORTION OF ST. JOHNS LANDFILL

Date: December 18, 1991

Presented by: Jim Watkins
Dennis O'Neil

PROPOSED ACTION

Adopt Resolution No. 92-1546 which authorizes the issuance of a Request for Bids (RFB) for the Construction of an Improved Cover System, Gas Collection System and Stormwater Collection System in Order to Close a Portion of St. Johns Landfill.

FACTUAL BACKGROUND AND ANALYSIS

The primary method to control groundwater and surface water contamination from St. Johns Landfill is to construct a waterproof cap or roof over the solid waste. Metro is preparing to solicit bids to construct this greatly improved, multi-layered cover system and associated landfill gas and stormwater systems on one area of the landfill in 1992. This will be the beginning of the final cover construction effort. In successive years the remaining subareas will be covered with this improved cover system until the entire landfill is closed.

This RFB lists, as a required bid alternate, the construction of the gas collection system for this subarea and the drilling of gas wells in an adjacent subarea. By bidding this work as an alternative, Metro can obtain a price while leaving open the option to have another contractor construct the gas collection system. It is useful to leave this option open now because Metro staff is currently evaluating proposals from several firms interested in recovering energy from the landfill gas. Some of these firms propose to construct the gas collection system themselves. It is anticipated that Metro will make a decision about who will construct the gas collection system by the time that bids for the cover construction project are received.

This RFB gives a preference to bidders who use materials manufactured from recycled materials. Metro will subtract 5% from the bid price for a particular bid item for the purposes of comparing bids if any bidder submits a bid price for an item which: 1) meets the definition of Recycled Products under Oregon Law; 2) meets applicable standards; and 3) can be substituted for a comparable non-recycled product. The RFB contains information forms which may be submitted by a bidder who requests such a preference.

PROPOSED BUDGET

The estimated total cost for all work (including alternate work) listed in this RFB is 4.5 million dollars. It is expected that the work will begin in May 1992 and last for approximately six months. In the FY1991-92 budget \$1,665,000 is allocated for work to be performed during May and June 1992. The remaining funds would come from the FY1992-93 budget after it is approved by the Metro Council.

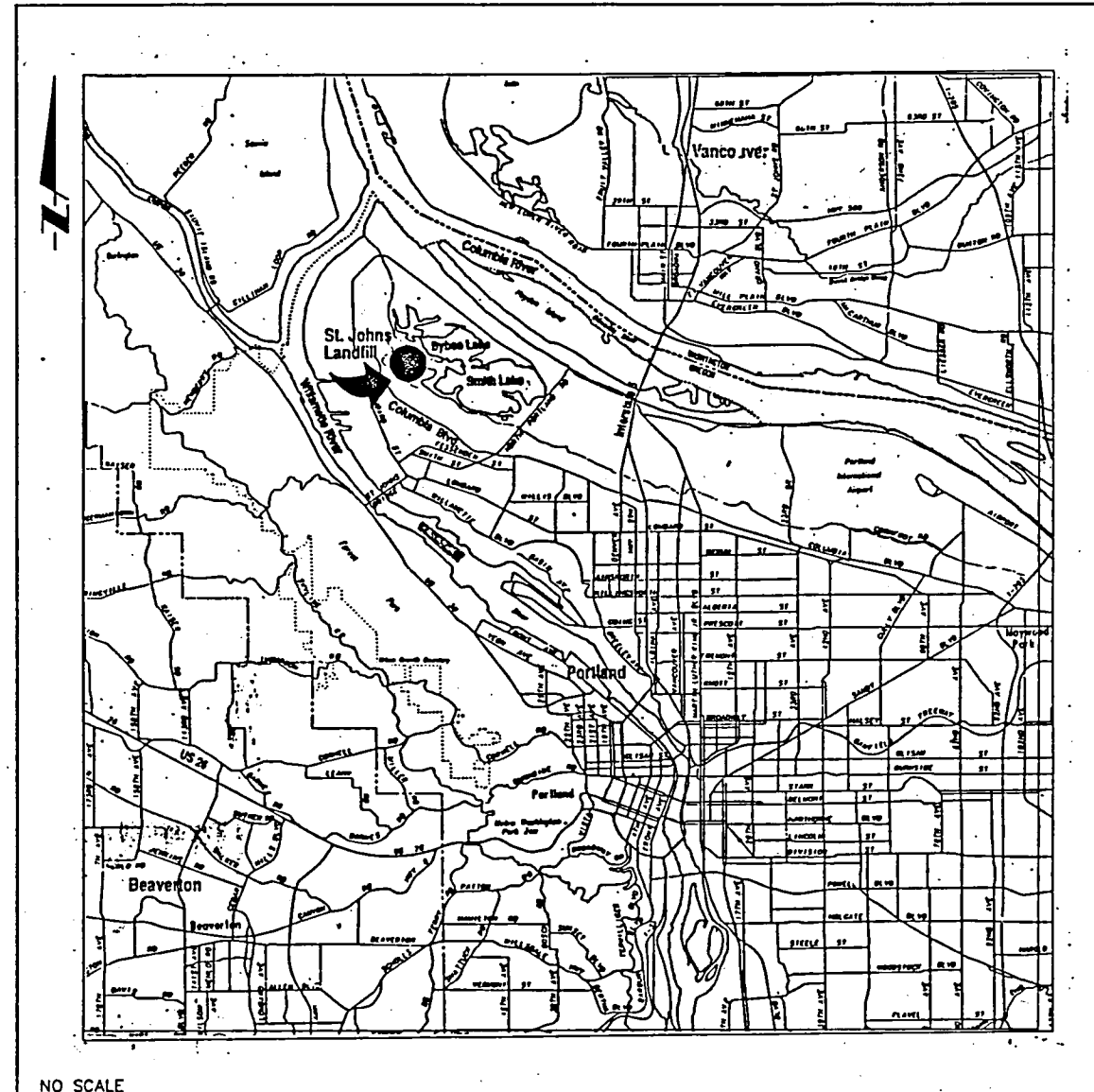
EXECUTIVE OFFICER RECOMMENDATION

The Executive Officer recommends approval of Resolution No. 92-1546.

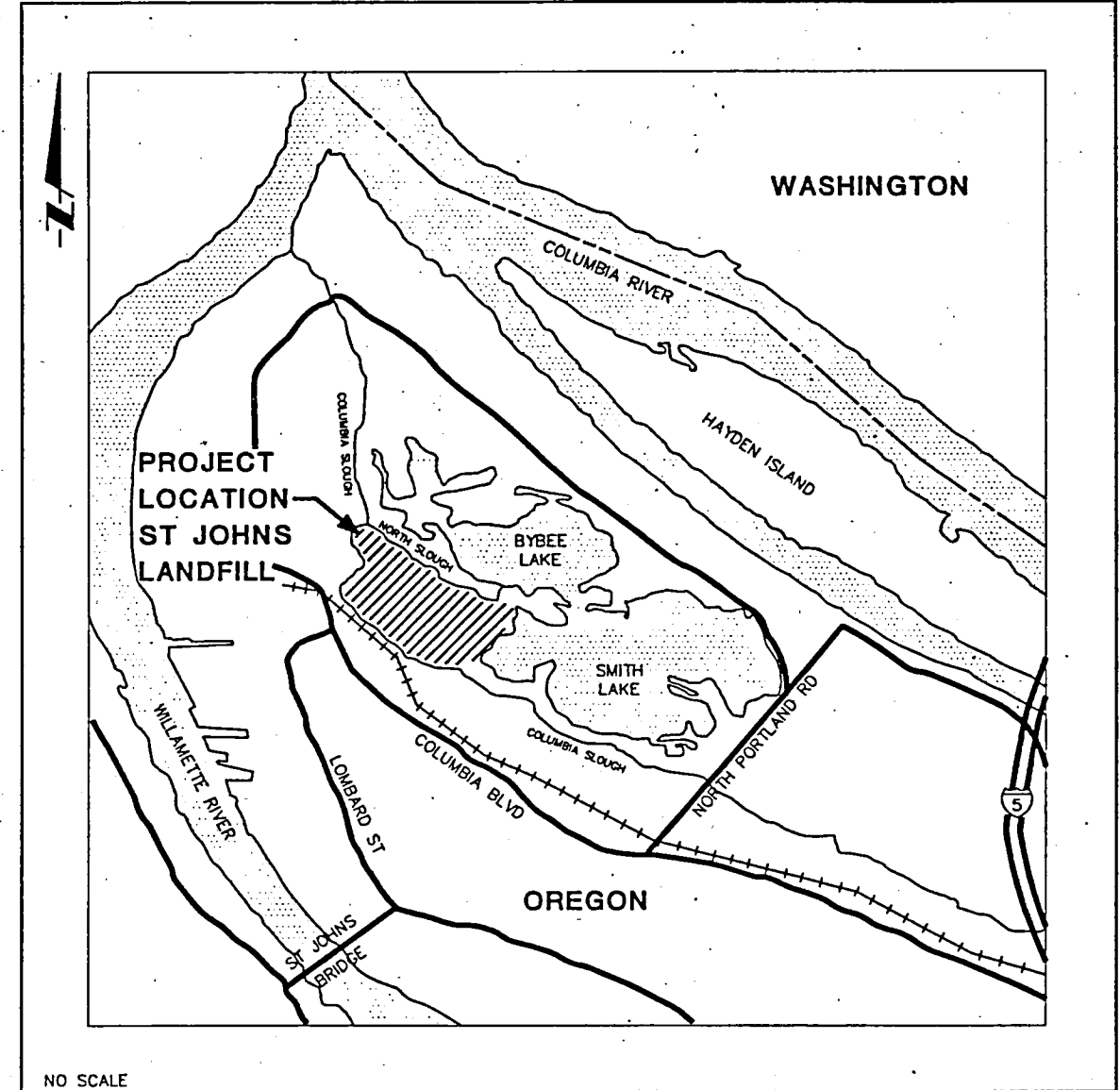
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ST. JOHNS LANDFILL CLOSURE OF SUBAREA 1

METROPOLITAN SERVICE DISTRICT, PORTLAND, OREGON



LOCATION MAP



VICINITY MAP



Parametrix, Inc.

Post Office Box 480
Sumner, Washington 98390
206-836-9810, 206-863-5128
5700 Killebrew Way, Suite 202
Burien, Washington 98312
206-377-0014

13020 Northrup Way
Bellevue, Washington 98005
206-453-2550
7820 NE Holman, Suite B-8
Portland, Oregon 97218
503-256-5444

| | NAME | DATE |
|----------------|------|-------|
| DESIGNED: | ACA | 11/91 |
| CHECKED: | CA | 11/91 |
| DRAWN: | ACA | 11/91 |
| CHECKED: | GA | 11/91 |
| DESIGN REVIEW: | EMF | 11/91 |



METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
COVER SHEET

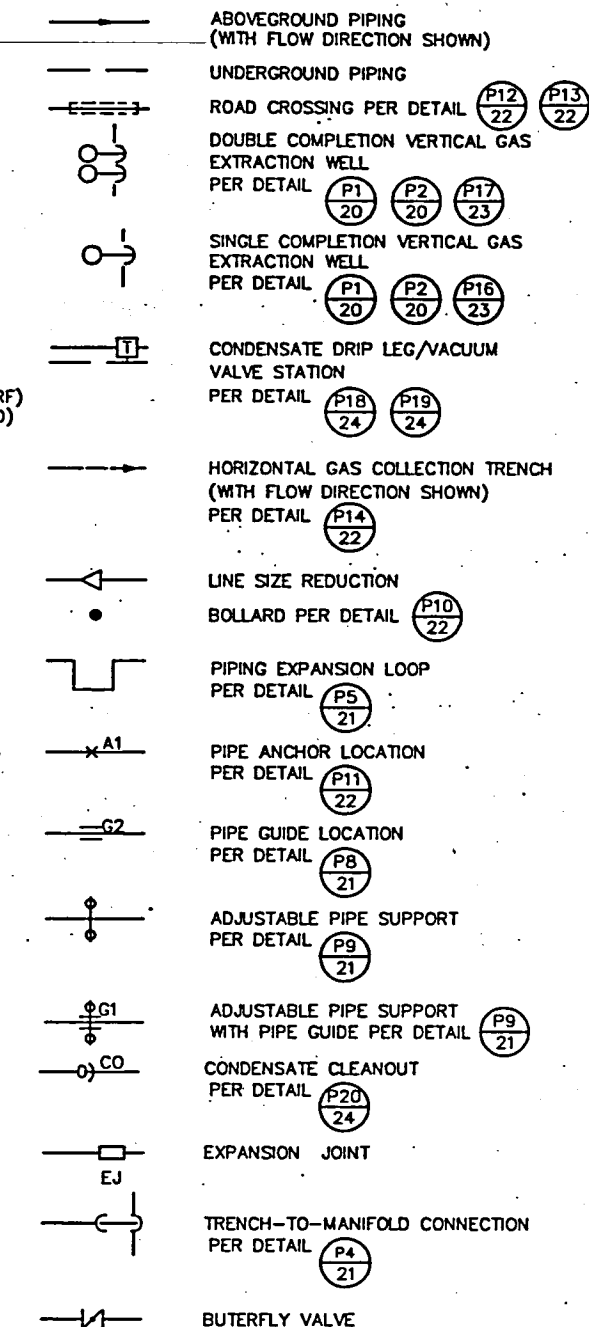
SHEET: 1
OF 30
DATE: DECEMBER 1991
DWG NO: 19190301

LIST OF ABBREVIATIONS

| | |
|--------|---------------------------------------|
| APWA | AMERICAN PUBLIC WORKS ASSOCIATION |
| B | CONDENSATE PUMP BYPASS |
| BE | FLAME SENSING ELEMENT |
| BL | BLOWER |
| BPA | BONNEVILLE POWER ADMINISTRATION |
| BOT | BOTTOM |
| BVC | BEGIN VERTICAL CURVE |
| BW | BOTH WAYS |
| C | CONDENSATE |
| CL | CENTERLINE |
| CLR | CLEAR |
| CMP | CORRUGATED METAL PIPE |
| CO | CLEANOUT |
| CONC | CONCRETE |
| CS | CARBON STEEL |
| CSBC | CRUSHED SURFACING BASE COURSE |
| CULV | CULVERT |
| CY | CUBIC YARDS |
| CC | CENTER TO CENTER |
| D | CONDENSATE PUMP DISCHARGE TO |
| DIA | DIAMETER |
| DIP | DUCTILE IRON PIPE |
| E | EAST |
| EA | EACH |
| EL | ELEVATION |
| EST | ESTIMATE |
| EVC | END VERTICAL CURVE |
| EW | EACH WAY |
| FC | CONTROL VALVE FAIL TO CLOSED POSITION |
| FL | FLOW LINE |
| FLG | FLANGE |
| F | FLARE |
| FM | FORCE MAIN PIPE |
| FO | CONTROL VALVE FAIL TO OPEN POSITION |
| FT | FOOT |
| GPM | GALLONS PER MINUTE |
| GPS | GEODETIC POINT SURVEY |
| GB | GRADE BREAK |
| H | HORIZONTAL |
| HP | HIGHPOINT |
| H:V | HORIZONTAL TO VERTICAL |
| HDPE | HIGH DENSITY POLYETHYLENE |
| IE | INVERT ELEVATION |
| IN | INCH |
| INCL | INCLUDE |
| INFO | INFORMATION |
| INT | INTERSECT |
| L | LENGTH |
| LB | POUND |
| LCP | LEACHATE COLLECTION PIPE |
| LF | LINEAL FEET |
| LFG | LANDFILL GAS |
| LS | LUMP SUM |
| LSH | LEVEL SWITCH HIGH |
| LSHH | LEVEL SWITCH HIGH HIGH |
| LSL | LEVEL SWITCH LOW |
| LT | LEFT OF CENTERLINE |
| MAX | MAXIMUM |
| MH | MANHOLE |
| MIL | 1/1000 INCH |
| MIN | MINIMUM |
| MBF | MOTOR BLOWER FLARE |
| N | NORTH |
| NC | VALVE NORMALLY CLOSED |
| NO | VALVE NORMALLY OPEN |
| N.I.C. | NOT IN CONTRACT |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| OZ | OUNCE |
| P | PUMP |
| PC | POINT OF CURVE |
| PERF | PERFORATED |
| PERM | PERMEABILITY |
| PGE | PORTLAND GENERAL ELECTRIC |
| PI | PRESSURE INDICATOR |
| PI | POINT OF INTERSECTION |
| PL | PROPERTY LINE |
| PSCP | PLAIN STEEL CULVERT PIPE |
| PT | POINT |
| PVC | POLYVINYL CHLORIDE |
| PVI | POINT OF VERTICAL INTERSECTION |
| R | RADIUS |

ABBREV. CONT.

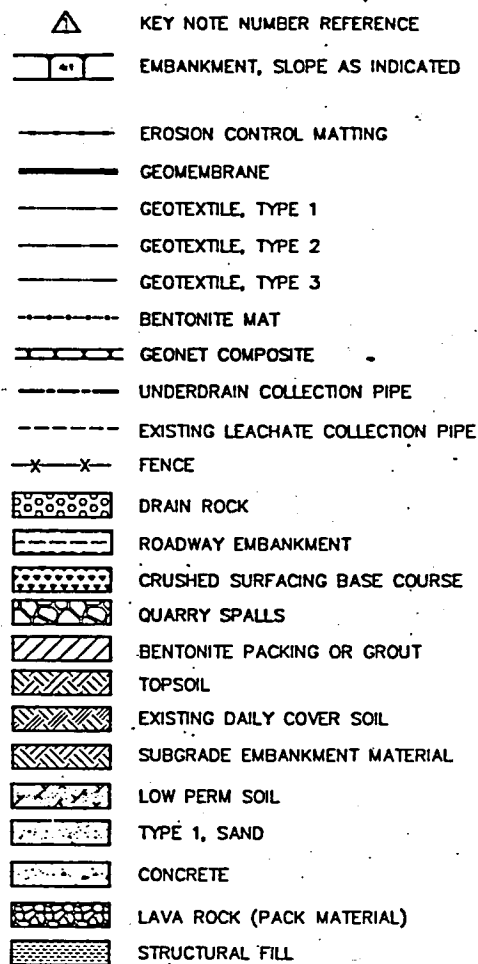
| | |
|-------|-----------------------------------|
| RCP | REINFORCED CONCRETE PIPE |
| RD | ROAD |
| RT | RIGHT OF CENTERLINE |
| R/W | RIGHT OF WAY |
| S | SLOPE |
| SA | SUBAREA |
| SCR | CONDENSATE KNOCK-OUT |
| SDR | STANDARD DIMENSION RATIO |
| SF | SQUARE FOOT |
| SL | SLOPE LINE |
| SM | SIMILAR |
| SS | SANITARY SEWER |
| ST | STRAIGHT |
| STA | STATION |
| STD | STANDARD |
| SUC | CONDENSATE PUMP SUCTION |
| SY | SQUARE YARDS |
| T | TANK |
| TE | TEMPERATURE SENSING ELEMENT |
| TH | THICK |
| THRU | THROUGH |
| TYP | TYPICAL |
| UDCP | UNDERDRAIN COLLECTION PIPE (PERF) |
| UDTP | UNDERDRAIN TRANSFER PIPE (SOLID) |
| V | VERTICAL |
| VAC | VACUUM |
| VAP | VERTICAL ANGLE POINT |
| VC | VERTICAL CURVE |
| VLDPE | VERY LOW DENSITY POLYETHYLENE |
| VP | VACUUM PUMP |
| W | WITH |
| W | WATER OR WEST |
| WNP | WATER, NON POTABLE |
| WS | WATER SURFACE |

GAS/CONDENSATE
PIPING SYMBOLS LEGENDGAS/CONDENSATE
PIPELINE DESIGNATION

LINE SIZE: 4" - PVC - C MATERIAL: HDPE - HIGH DENSITY POLYETHYLENE
PVC - POLYVINYL CHLORIDE

SERVICE: LFG - LANDFILL GAS
C - LANDFILL GAS CONDENSATE
D - CONDENSATE DISCHARGE
S - CONDENSATE PUMP SUCTION
V - VACUUM
B - CONDENSATE PUMP BYPASS

LEGEND



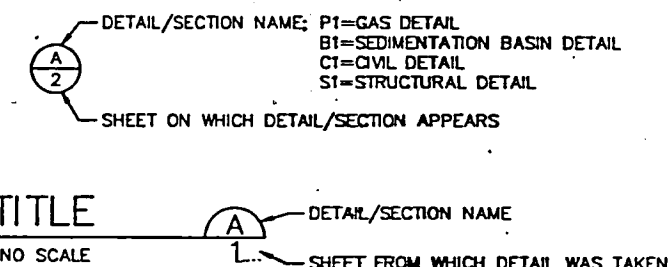
GENERAL NOTES

- EXISTING CONTOURS SHOWN ON THESE PLANS ARE BASED ON AERIAL PHOTOGRAPHY SURVEY. THE AERIAL PHOTOGRAPHY WAS COMPLETED ON JULY 11, 1991, BY DAVID SMITH AND ASSOCIATES.
- THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID DISTURBING ANY MONITORING WELL CASING OR OTHER EXISTING IMPROVEMENTS WHICH ARE TO REMAIN.
- SLOPES AND GRADES SHOWN ARE IN UNITS OF FT/FT UNLESS OTHERWISE NOTED.
- ALL LFG MANIFOLDS SHALL HAVE MIN. SLOPES OF 2% UNLESS OTHERWISE NOTED.
- ALL UNDERGROUND CONDENSATE SYSTEM PIPING SHALL BE INSTALLED AS SHOWN IN DETAILS P-21 AND P-22 ON SHEET 24. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO ASSURE THAT NO DEVIATIONS OCCUR FROM THE DEPTH OF COVER NOTED ON THESE DETAILS.
- TEMPORARY EROSION AND SEDIMENTATION CONTROL SHALL BE IMPLEMENTED BY THE CONTRACTOR IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
- "GEOMEMBRANE SUBGRADE" IS DEFINED AS THE GRADE ON WHICH THE GEOMEMBRANE IS TO BE PLACED.
- TYPE 3 GEOTEXTILE SHALL BE PLACED UNDER ALL QUARRY SPALLS USED ON THIS PROJECT.

SHEET INDEX

- COVER
- LEGEND, ABBREVIATIONS, SHEET INDEX, AND GENERAL NOTES
- EXISTING SITE PLAN-LANDFILL
- CONSTRUCTION SITE PLAN
- SA1 GRADING PLAN
- ROAD PLAN
- ROADS "C", "D", & "F" - PROFILES
- ROAD SECTIONS
- ROAD SECTIONS
- PENETRATION DETAILS
- FINAL COVER DETAILS
- SEDIMENTATION BASIN PLAN
- SEDIMENTATION BASIN DETAILS
- SURFACE WATER DETAILS
- SURFACE WATER DETAILS
- GAS/CONDENSATE COLLECTION PLAN, AREA "A"
- GAS/CONDENSATE COLLECTION PLAN, AREA "B"
- GAS/CONDENSATE COLLECTION PLAN, AREA "C"
- SA2 VERTICAL GAS EXTRACTION WELL LOCATIONS
- PIPING DETAILS/GAS COLLECTION SYSTEM
- PIPING DETAILS/GAS COLLECTION SYSTEM
- PIPING DETAILS/GAS COLLECTION SYSTEM
- VERTICAL GAS EXTRACTION WELL DETAILS
- PIPING DETAILS/CONDENSATE COLLECTION SYSTEM
- VACUUM PUMP STATION PLAN AND SECTIONS/CONDENSATE COLLECTION SYSTEM
- VACUUM PUMP STATION DETAILS/CONDENSATE COLLECTION SYSTEM
- TEMPORARY SYSTEMS DETAILS, GAS AND CONDENSATE COLLECTION SYSTEM
- ELECTRICAL SITE PLAN AND DETAILS
- ONE-LINE DIAGRAM AND ELECTRICAL SCHEDULES
- CONTROL SCHEMATIC AND ELECTRICAL DETAILS

DETAIL/SECTION REFERENCING



Parametrix, Inc.

Post Office Box 460
Sumner, Washington 98310
206-836-8810 206-863-5128

13020 Northrup Way
Burien, Washington 98009
206-836-8810 206-863-5128

5700 Klappa Way, Suite 202
Bremerton, Washington 98312
206-377-0014

7820 N.E. Hansen, Suite B-8
Portland, Oregon 97218
503-258-5444

| | | |
|----------------|------|-------|
| DESIGNED: | NAME | DATE |
| CHECKED: | CA | 11/91 |
| DRAWN: | ACA | 11/91 |
| CHECKED: | CA | 11/91 |
| DESIGN REVIEW: | EMF | 11/91 |

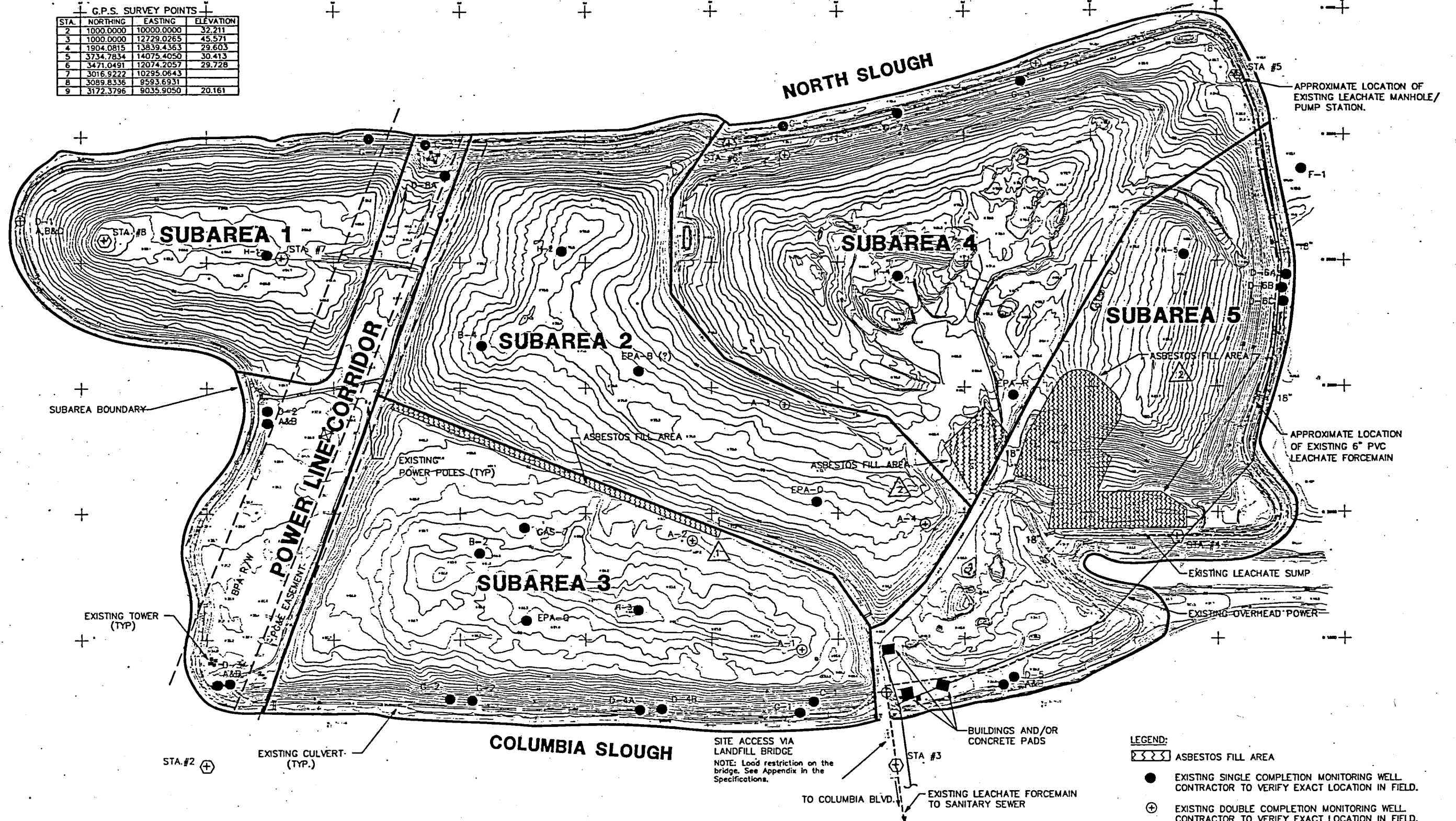


METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
ABBREVIATIONS, LEGEND, SHEET INDEX
AND GENERAL NOTES

SHEET: 2
OF 30
DATE: DECEMBER 1991
DWG NO: 19190302

| STA. | NORTHING | EASTING | ELEVATION |
|------|-----------|------------|-----------|
| 2 | 1000.0000 | 10000.0000 | 32.211 |
| 3 | 1000.0000 | 12729.0265 | 45.571 |
| 4 | 1904.0815 | 13839.4363 | 29.603 |
| 5 | 3734.7834 | 14075.4050 | 30.413 |
| 6 | 3471.0491 | 12074.2057 | 29.728 |
| 7 | 3016.9222 | 10295.0643 | |
| 8 | 3089.8336 | 9593.6931 | |
| 9 | 3172.3796 | 9035.9050 | 20.161 |



NOTES:

1. APPROXIMATE ASBESTOS FILL AREA BASED ON BEST AVAILABLE INFORMATION. ASBESTOS FILL AREAS ARE NOT LIMITED TO THIS AREA, HOWEVER OTHER LOCATIONS ARE NOT KNOWN.
2. REFERENCE, CH2M HILL, AUGUST 1990, OPERATIONS RECORD DRAWINGS, ASBESTOS FILL AREAS FROM OCTOBER 1985 TO AUGUST 1990. PROJECT NO PDX22073 DO.

Parametrix, Inc.

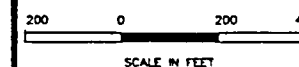
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 Bremerton, Washington 98312
 206-377-0014

13020 Northrup Way
 Bellevue, Washington 98005
 206-455-2500
 7820 N.E. Hansen, Suite B-8
 Portland, Oregon 97218
 503-238-5444

| | NAME | DATE |
|----------------|------|-------|
| DESIGNED: | CA | 11/91 |
| CHECKED: | CA | 11/91 |
| DRAWN: | ACA | 11/91 |
| CHECKED: | CA | 11/91 |
| DESIGN REVIEW: | CMF | 11/91 |



METROPOLITAN SERVICE DISTRICT
 Solid Waste Department
 Jim Watkins, Engineering Manager
 Dennis O'Neil, Project Manager



ST. JOHNS LANDFILL
 CLOSURE OF SUBAREA 1
 EXISTING SITE PLAN - LANDFILL

SHEET: 3
 OF 30
 DATE: DECEMBER 1991
 DWG NO: 19190303



SA1 CLOSURE IMPROVEMENTS,
SEE SHEET 5 FOR GRADING PLAN

NORTH SLOUGH

SA2 AND SA3 AVAILABLE FOR TEMPORARY
STOCKPILES AND LAYDOWN AREAS. COORDINATE
WITH SOIL PROCUREMENT CONTRACTOR. VERTICAL
GAS COLLECTION WELLS TO BE INSTALLED UNDER
SA1 CONTRACT. REFER TO SHEET 19.

COLUMBIA SLOUGH

APPROXIMATE LOCATION OF
TEMPORARY HAUL ROAD BY
SOIL PROCUREMENT CONTRACTOR

ACCESS BRIDGE

LEGEND:

- APPROXIMATE LIMITS OF GEOMEMBRANE PLACEMENT
- SOIL PROCUREMENT WORK, BY OTHERS
- /// ACTIVE CONSTRUCTION DEBRIS DISPOSAL AREA, BY OTHERS
- VERTICAL GAS EXTRACTION WELL, PROTECT IN PLACE, SEE SHEETS 16-18 FOR EXACT LOCATIONS
- HORIZONTAL GAS COLLECTION TRENCH RISER, PROTECT IN PLACE, SEE SHEETS 16-18 FOR EXACT LOCATIONS

NOTE:

SA1 CONTRACTOR SHALL DETERMINE CONSTRUCTION ACCESS NEEDS
AND SHALL PLAN TO CONSTRUCT SEPARATE HAUL ROAD TO ACCESS SA1.

Parametrix, Inc.

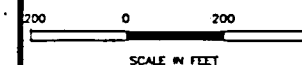
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Sumner, Washington 98380
206-836-9910 206-863-9128
5700 Kitson Way, Suite 202
Bremerton, Washington 98312
206-377-0014

13020 Northway Way
Burien, Washington 98005
206-466-2500
7820 N.E. Harmon, Suite B-8
Portland, Oregon 97218
503-258-3444

| | NAME | DATE |
|----------------|------|-------|
| DESIGNED: | ACA | 11/91 |
| CHECKED: | CA | 11/91 |
| DRAWN: | ACA | 11/91 |
| CHECKED: | CA | 11/91 |
| DESIGN REVIEW: | EMF | 11/91 |



METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager



ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
CONSTRUCTION SITE PLAN

SHEET: 4
OF 30
DATE: DECEMBER 1991
DWG NO: 19190304

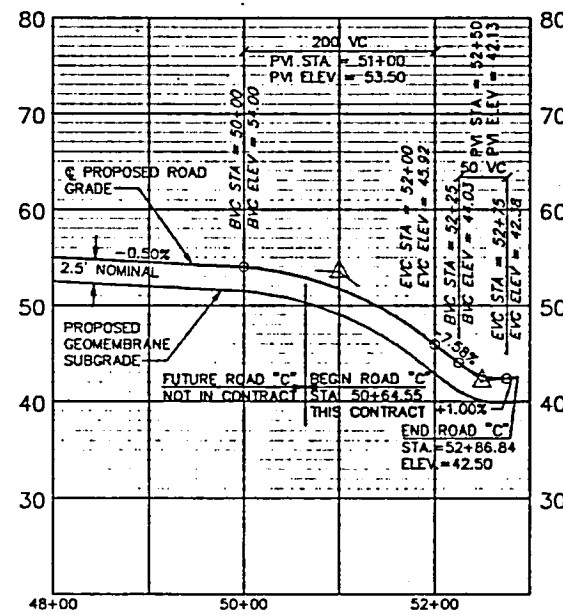


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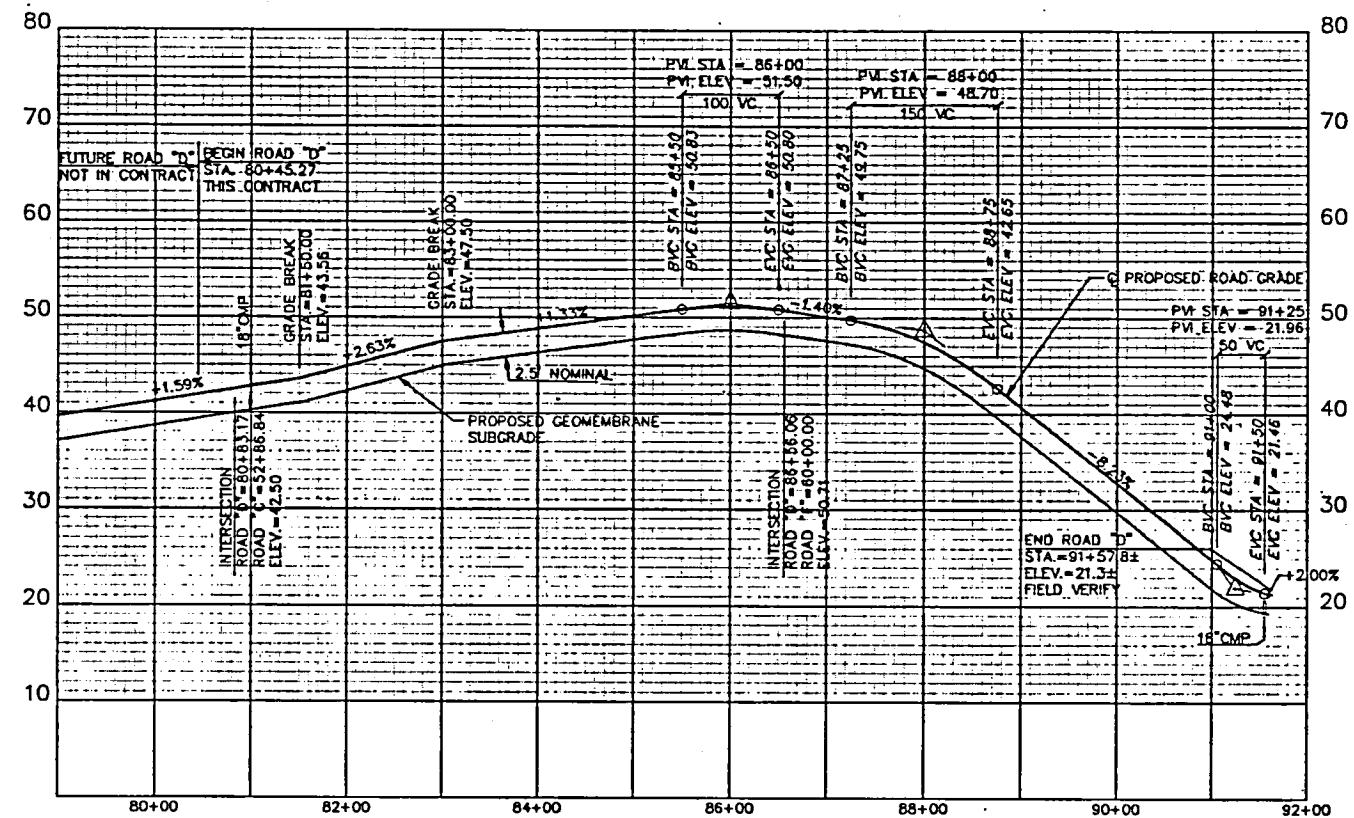
- END COVER, SEE DETAILS (C13) (C14) (C15) (C16)
- DOWN SLOPE FLUME, SEE DETAILS (C21) (C22) (C23) (C24) (C25) (C26)
- LOWER 2' DEEP DRAINAGE DITCH (C27) (C28) (C29) (C30)
- LOWER 1' DEEP DRAINAGE DITCH (C31) (C32) (C33) (C34)
- UPPER DRAINAGE DITCH, SEE DETAIL (C35) (C36)
- BIOFILTER DITCH, SEE DETAIL (C37) (C38)
- TEMPORARY DITCH, SEE NOTE 13.
- CULVERT
- EXISTING CULVERT, REMOVE
- QUARRY SPALL CHECK DAM, SEE DETAIL (C39) (C40)
- EXISTING CONTOURS FOR TYPE "A" COVER
- GEOMEMBRANE SUBGRADE CONTOURS FOR TYPE "B" COVER
- OUTFALL SPLASH PAD, SEE DETAIL (C41) (C42)
- ACCESS ROAD
- EXISTING POWER POLES
- TRANSMISSION LINE TOWER
- MONITORING WELLS, PROTECT IN PLACE, SEE DETAIL (C43) (C44)
- MONITORING WELLS, TO BE ABANDONED BY OTHERS PRIOR TO CONSTRUCTION
- APPROXIMATE LIMITS OF FINAL COVER TYPE "A" SEE DETAIL (C45) (C46) FOR TRANSITION TO FINAL COVER TYPE "B"
- SOIL PROCUREMENT WORK, BY OTHERS

NOTES:

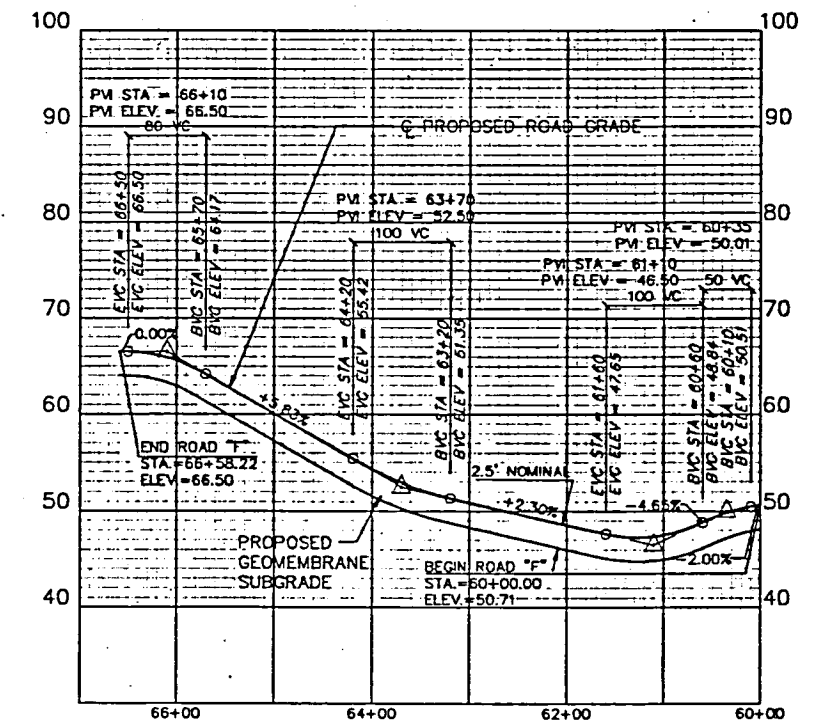
1. TYPE "A" COVER SHALL BE INSTALLED ON EXISTING SLOPES, AS SHOWN, PER DETAIL (C9) (C11). REMOVE EXISTING TOPSOIL AND RECOMPACT EXISTING LOW PERM SOIL FOR GEOMEMBRANE SUBGRADE PER THE SPECIFICATIONS. GEOMEMBRANE SUBGRADE WILL GENERALLY BE 6 INCHES BELOW EXISTING GRADES SHOWN.
2. TYPE "B" COVER SHALL BE INSTALLED WHERE GEOMEMBRANE SUBGRADE CONTOURS ARE SHOWN, PER DETAIL (C11) (C12). REMOVE EXISTING TOPSOIL AND LOW PERMEABLE SOIL AND FILL TO ONE FOOT BELOW GEOMEMBRANE SUBGRADE WITH SUBGRADE EMBANKMENT MATERIAL (FILL TO GEOMEMBRANE SUBGRADE WITH SUBGRADE EMBANKMENT WHEN INSTALLING BENTONITE MAT IN PLACE OF LOW PERMEABLE SOIL LAYER).
3. FOR ACCESS ROAD ALIGNMENTS SEE SHEET 6.
4. CONTRACTOR SHALL PLAN FOR DITCH EXCAVATION AS NECESSARY. CONTOURS DO NOT REFLECT EXCAVATION FOR DRAINAGE DITCHES.
5. PLACE QUARRY SPALL CHECKDAMS AT MID-SLOPE OF DOWN SLOPE FLUMES, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
6. SEE SHEET 10 FOR GEOMEMBRANE PENETRATION DETAILS.
7. UPPER DRAINAGE DITCHES SHALL MAINTAIN A MIN. 1% SLOPE. LOCATIONS AND SLOPES MAY BE AMENDED TO MATCH ACTUAL SITE CONDITIONS. ENGINEER MUST PREAPPROVE ALL AMENDMENTS. LOWER DRAINAGE DITCHES SHALL HAVE CONTINUOUS DRAINAGE TO CULVERT AND/OR SEDIMENTATION BASIN.
8. FOR DOWN SLOPE FLUME INLET AND OUTLET, SEE DETAIL (C25) (C26) (C27) (C28) (C29) (C30) (C31) (C32) (C33) (C34) (C35) (C36) (C37) (C38) (C39) (C40) (C41) (C42) (C43) (C44) (C45) (C46) (C47) (C48) (C49) (C50) (C51) (C52) (C53) (C54) (C55) (C56) (C57) (C58) (C59) (C60) (C61) (C62) (C63) (C64) (C65) (C66) (C67) (C68) (C69) (C70) (C71) (C72) (C73) (C74) (C75) (C76) (C77) (C78) (C79) (C80) (C81) (C82) (C83) (C84) (C85) (C86) (C87) (C88) (C89) (C90) (C91) (C92) (C93) (C94) (C95) (C96) (C97) (C98) (C99) (C100) (C101) (C102) (C103) (C104) (C105) (C106) (C107) (C108) (C109) (C110) (C111) (C112) (C113) (C114) (C115) (C116) (C117) (C118) (C119) (C120) (C121) (C122) (C123) (C124) (C125) (C126) (C127) (C128) (C129) (C130) (C131) (C132) (C133) (C134) (C135) (C136) (C137) (C138) (C139) (C140) (C141) (C142) (C143) (C144) (C145) (C146) (C147) (C148) (C149) (C150) (C151) (C152) (C153) (C154) (C155) (C156) (C157) (C158) (C159) (C160) (C161) (C162) (C163) (C164) (C165) (C166) (C167) (C168) (C169) (C170) 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ROAD "C"



ROAD "D"



ROAD "F"



Parametrix, Inc.

Post Office Box 480
Sumner, Washington 98390
206-836-8810 206-863-5128
5700 Kite Way, Suite 202
Burien, Washington 98312
206-377-0074

13020 Norview Way
Burien, Washington 98305
206-450-7200
7820 NE Harbor, Suite B-8
Portland, Oregon 97218
503-258-3444

| | NAME | DATE |
|----------------|------|-------|
| DESIGNED: | LM | 11/91 |
| CHECKED: | EMF | 11/91 |
| DRAWN: | LM | 11/91 |
| CHECKED: | EMF | 11/91 |
| DESIGN REVIEW: | EMF | 11/91 |

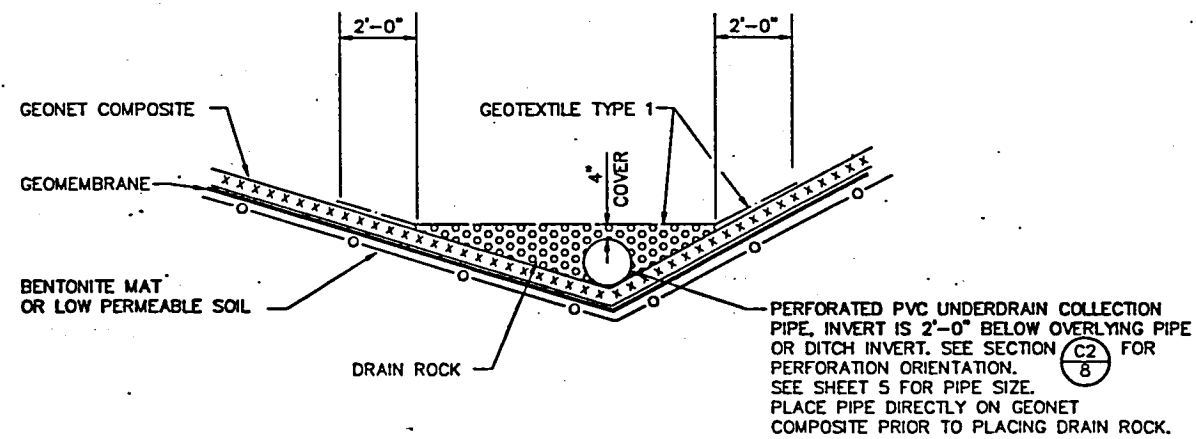


METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

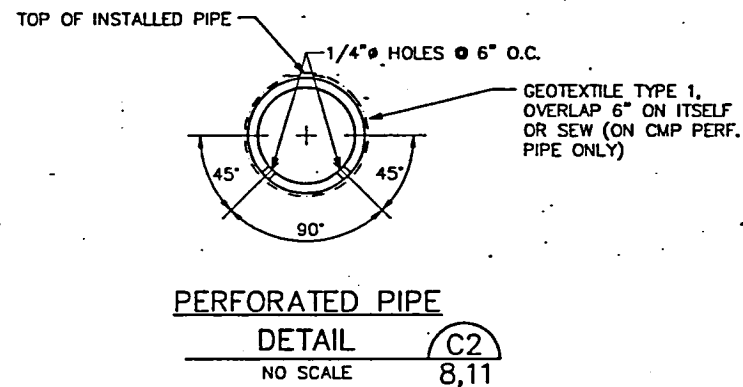
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VERTICAL: 0 10'
SCALE IN FEET

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
ROADS "C", "D" AND "F" - PROFILES

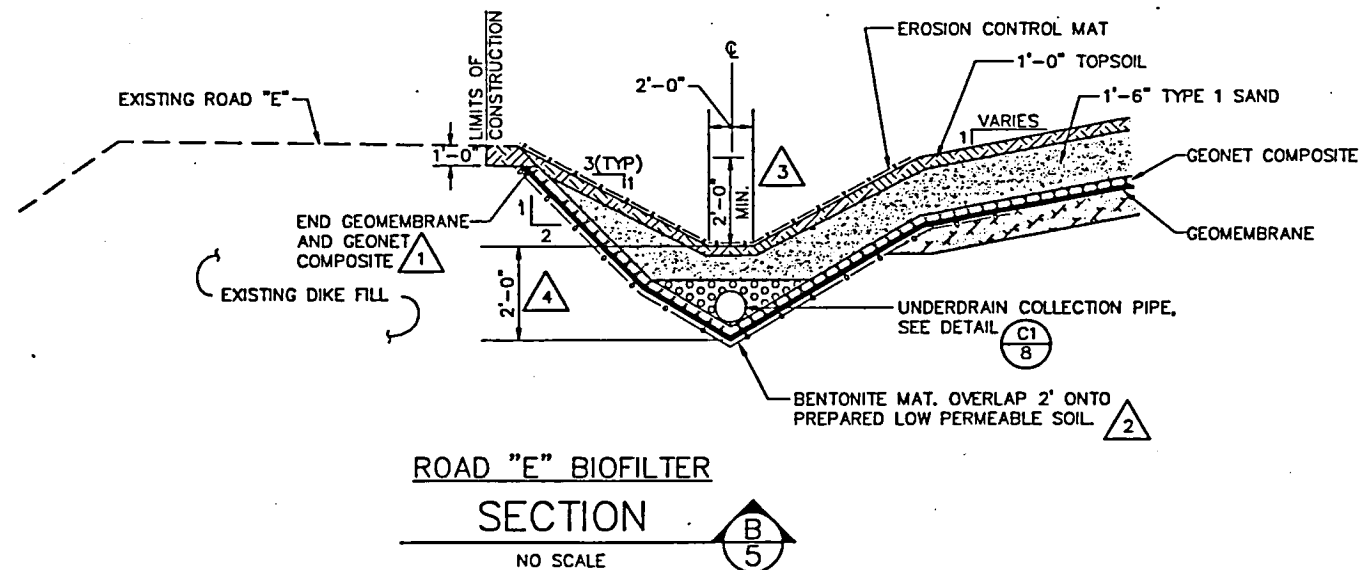
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OF 30
DATE: DECEMBER 1991
DWG NO: 19190307



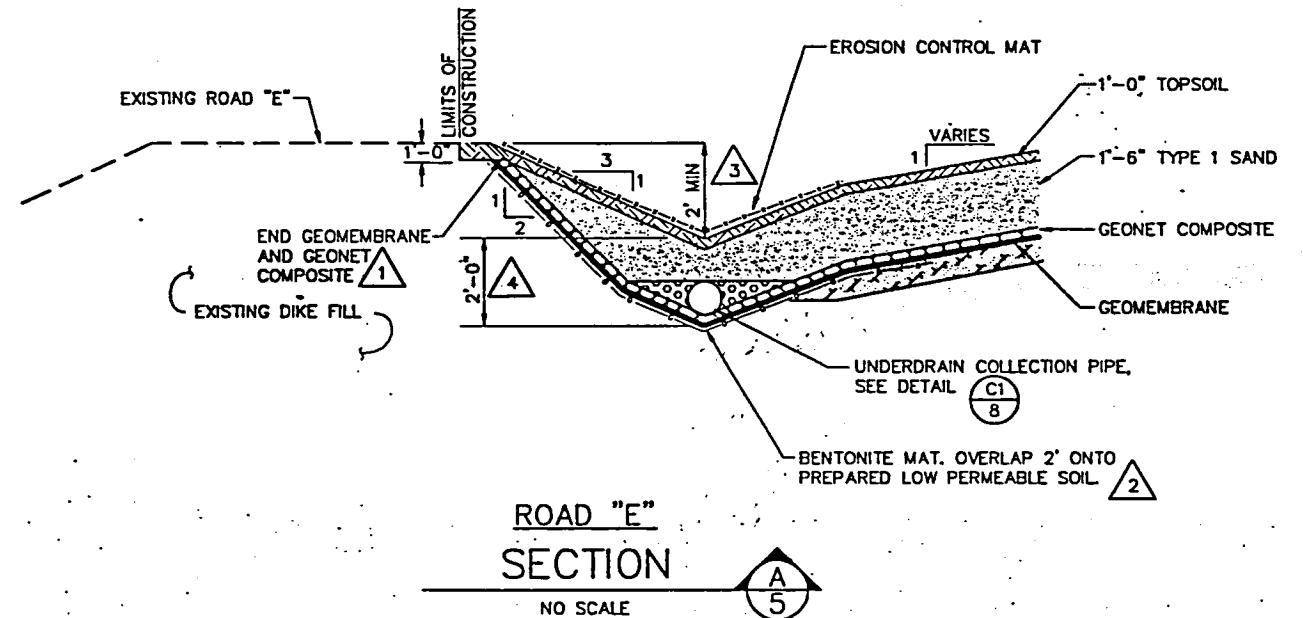
UNDERDRAIN COLLECTION PIPE
DETAIL (C1)
NO SCALE



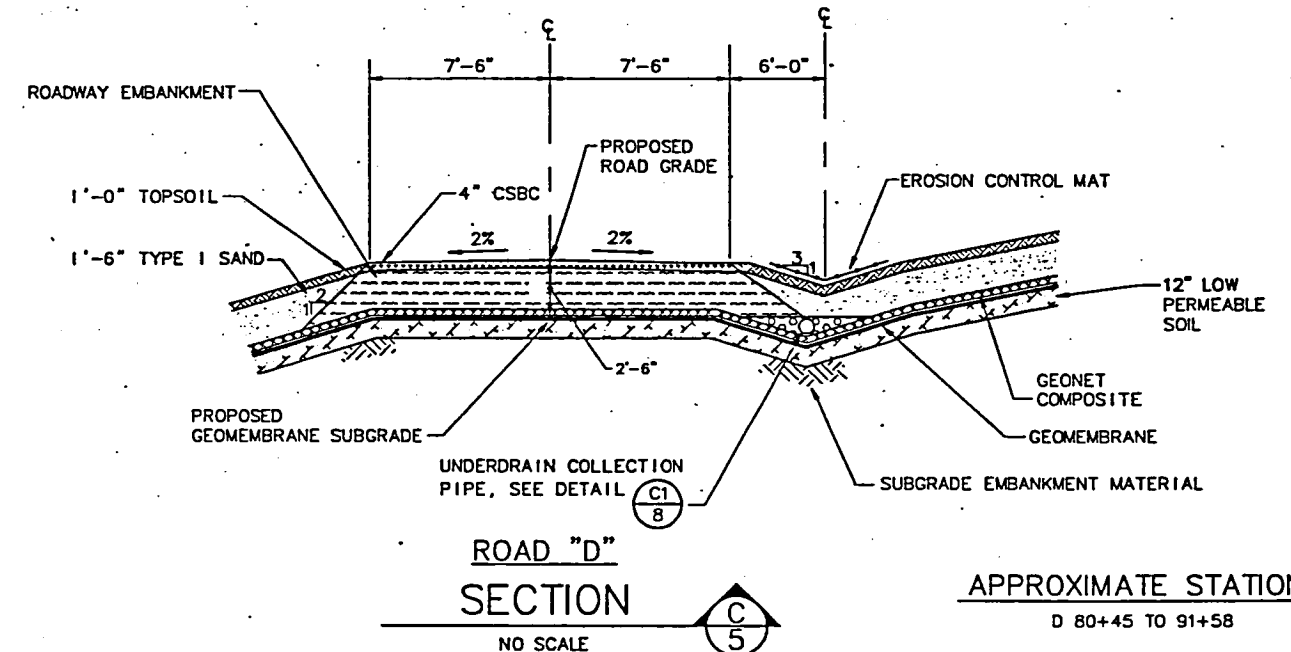
PERFORATED PIPE
DETAIL (C2)
NO SCALE 8,11



ROAD "E" BIOFILTER
SECTION (B5)
NO SCALE



ROAD "E"
SECTION (A5)
NO SCALE



ROAD "D"
SECTION (C5)
NO SCALE

NOTES:

- 1 AT EDGE OF GEONET COMPOSITE, WRAP TOP GEOTEXTILE 6" UNDER GEONET.
- 2 WHERE EXISTING LOW PERMEABLE SOIL IS REMOVED DUE TO EXCAVATION TO GEOMEMBRANE SUBGRADE, IN DITCH LINE; CONTRACTOR SHALL OVEREXCAVATE 1' AND BACK-FILL WITH SUBGRADE EMBANKMENT MATERIAL (OVER-EXCAVATE 2' WHEN REFUSE IS ENCOUNTERED).
- 3 DITCH SHALL BE GRADED TO DRAIN TO PROPOSED CULVERT OR SEDIMENTATION BASIN AS SHOWN ON SHEET 5. MINIMUM DEPTH TO FINISH DITCH GRADE TO BE 2' BELOW EXISTING ROAD "E" SURFACE, DEEPEN WHERE NEEDED TO MAINTAIN FLOW.
- 4 DITCH THICKNESS OF 2' ALONG ROAD "E" ONLY.



Parametrix, Inc.

Post Office Box 480
Sumner, Washington 98390
206-836-9810 206-843-5128
5700 Kittling Way, Suite 202
Bremerton, Washington 98312
206-377-0014

13020 Northrup Way
Bellevue, Washington 98005
206-465-2550
7820 N.E. Holman, Suite B-4
Portland, Oregon 97218
503-256-5444

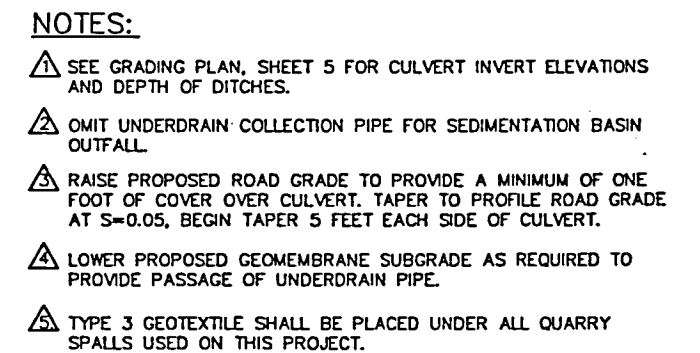
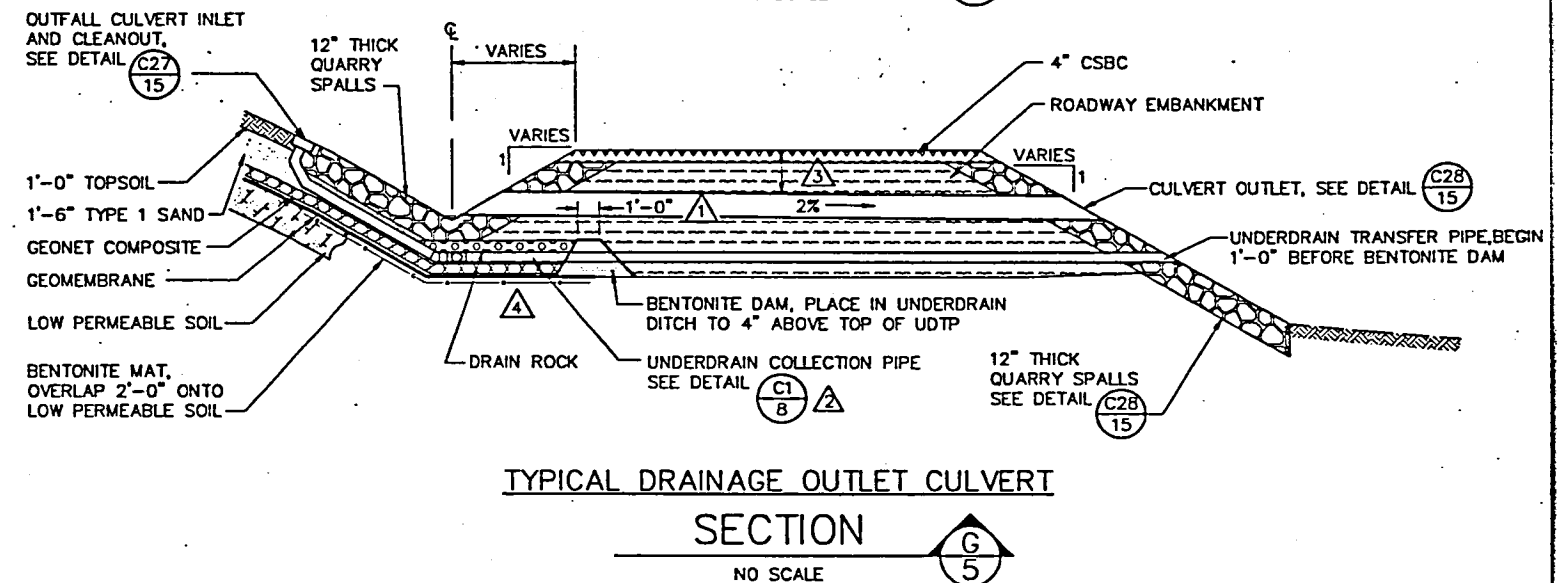
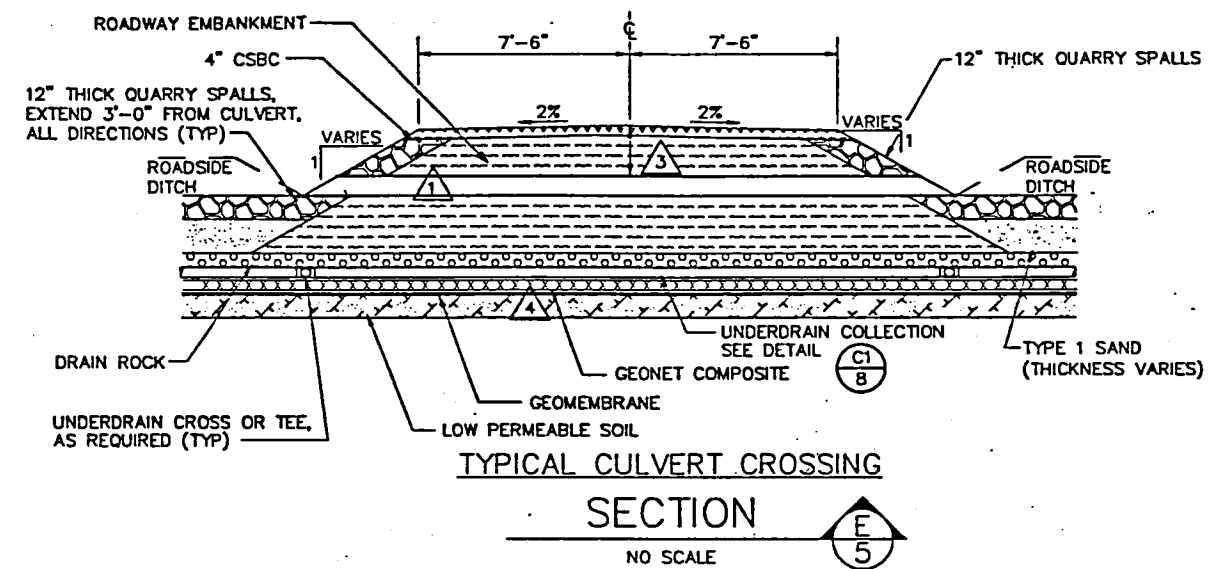
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|----------------|------|-------|
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| CHECKED: | EMF | 11/91 |
| DRAWN: | RJC | 11/91 |
| CHECKED: | EMF | 11/91 |
| DESIGN REVIEW: | EMF | 11/91 |



METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

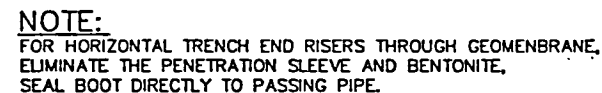
ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
ROAD SECTIONS

SHEET: 8
OF: 30
DATE: DECEMBER 1991
DWG NO: 19190308





DETAIL C3
NO SCALE 13

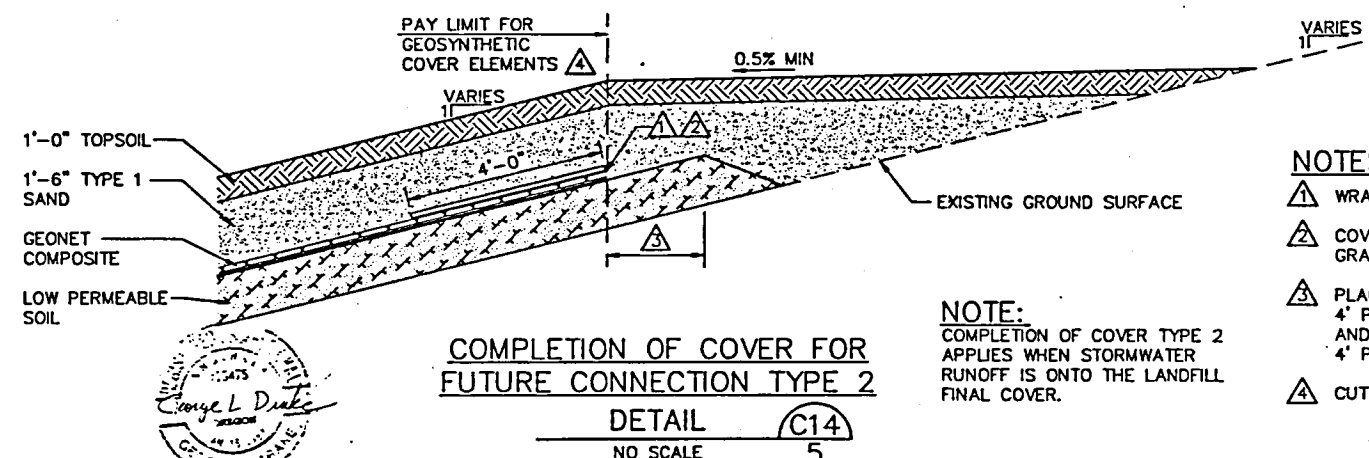
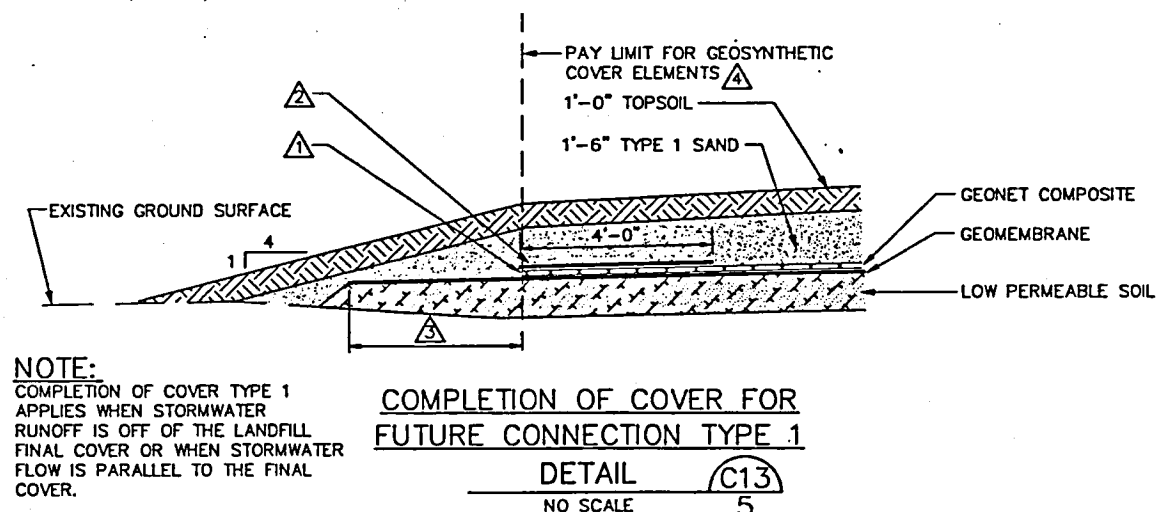
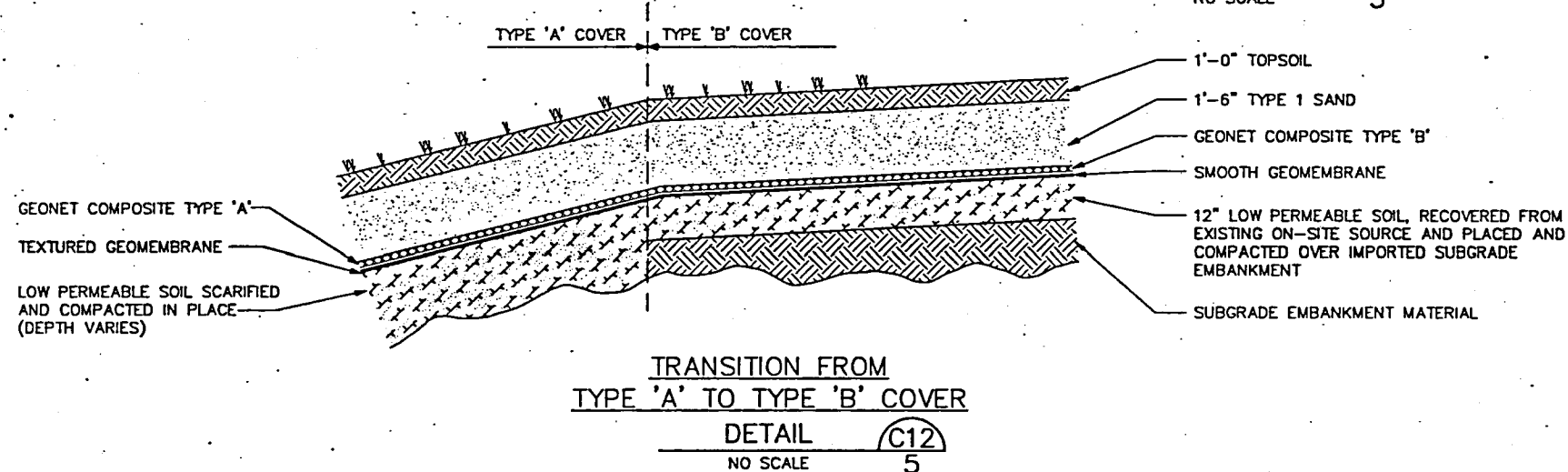
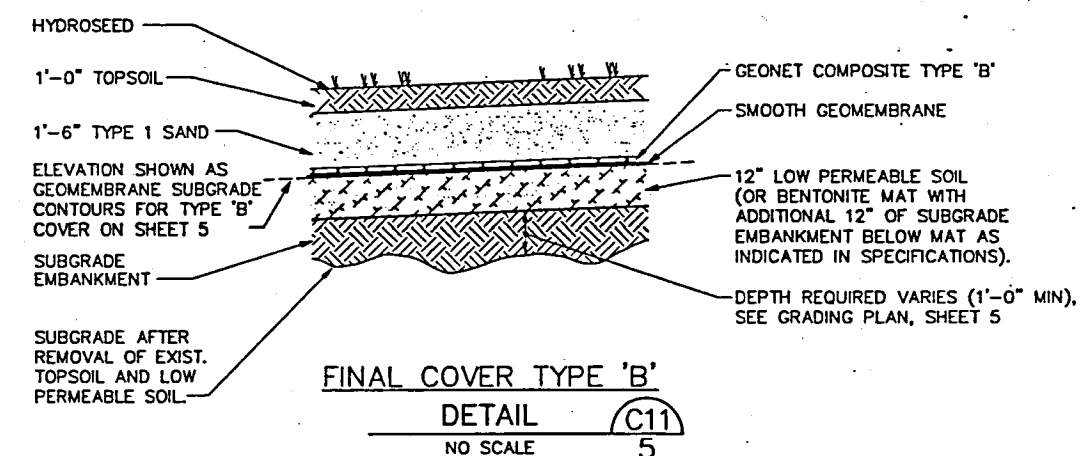
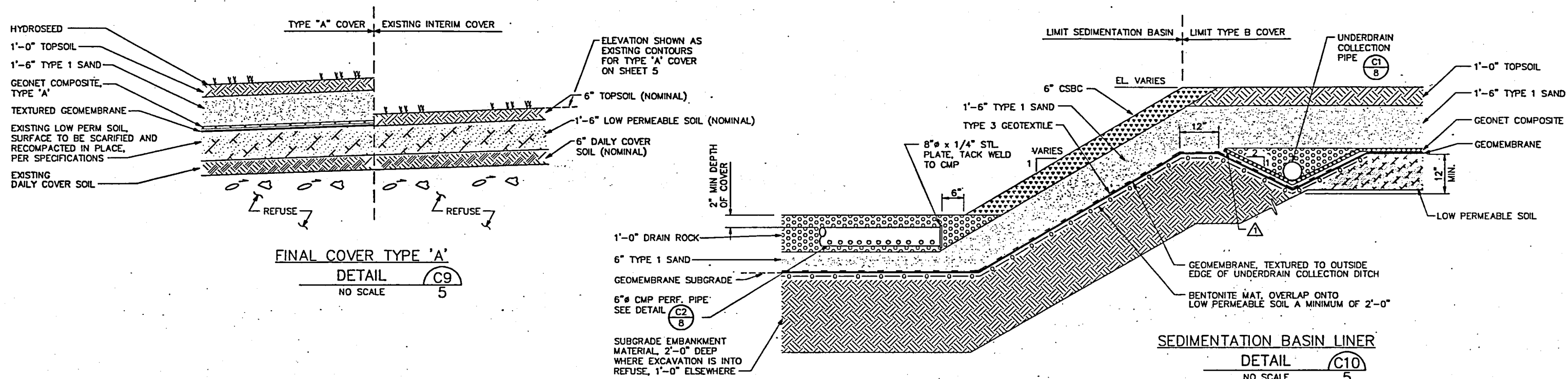


DETAIL C4
NO SCALE



- ① WRAP TOP GEOTEXTILE 6" BACK UNDER GEONET.
- ② CUT GEOMEMBRANE TO FIT AROUND PENETRATING OBJECT WITH NO MORE THAN 1" OF CLEARANCE AT ANY POINT.
- ③ BENTONITE SHALL BE HYDRATED WITH CLEAN WATER AT COMPLETION TO EFFECT SEAL.





NOTE:
COMPLETION OF COVER TYPE 1
APPLIES WHEN STORMWATER
RUNOFF IS OFF OF THE LANDFILL
FINAL COVER OR WHEN STORMWATER
FLOW IS PARALLEL TO THE FINAL
COVER.

NOTE:
COMPLETION OF COVER TYPE 2
APPLIES WHEN STORMWATER
RUNOFF IS ONTO THE LANDFILL
FINAL COVER.

NOTES:

1. WRAP TOP GEOTEXTILE 6" BACK UNDER GEONET.
2. COVER GEONET COMPOSITE WITH 3/4" CDX EXTERIOR GRADE PLYWOOD AS SHOWN FOR FUTURE CONNECTION.
3. PLACE AND COMPACT LOW PERMEABLE SOIL 4' PAST PAY LIMIT FOR TYPE 'B' COVER. PREPARE AND COMPACT EXISTING LOW PERMEABLE SOIL 4' PAST PAY LIMIT FOR TYPE 'A' COVER.
4. CUT OFF GEOSYNTHETIC AT PAY LIMIT.

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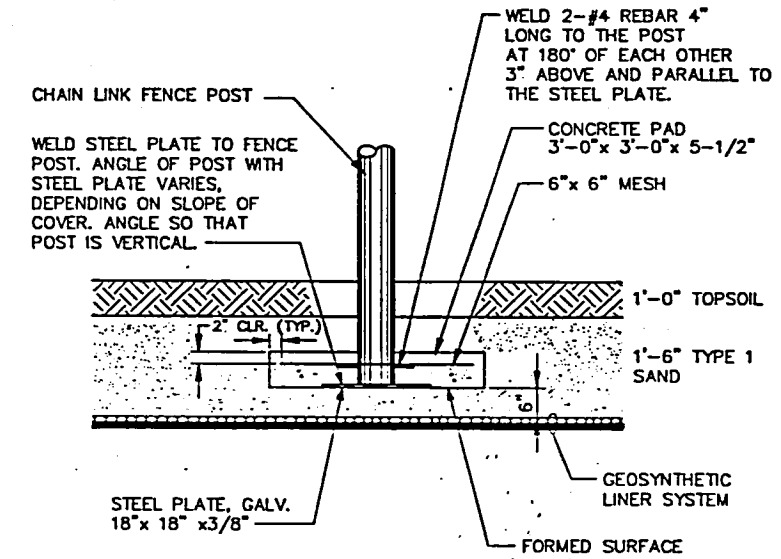
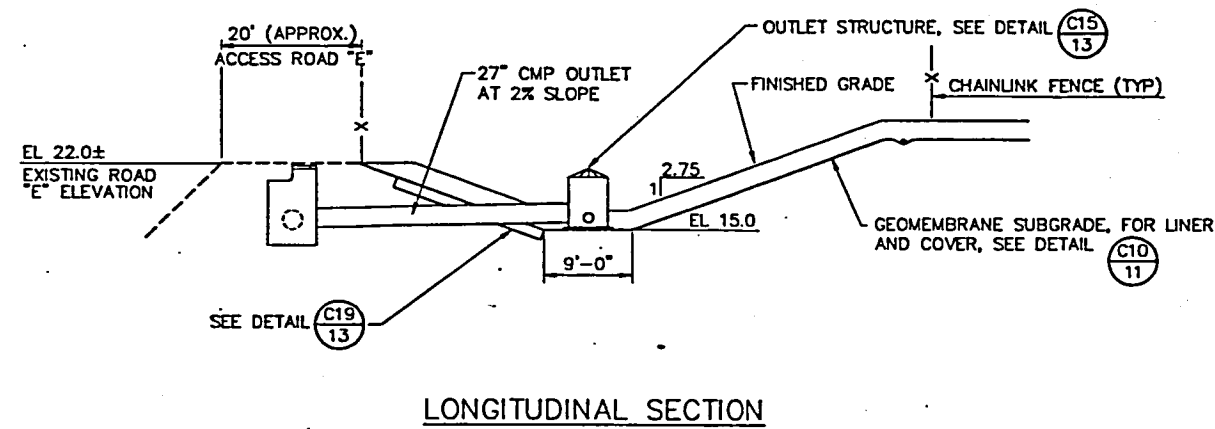
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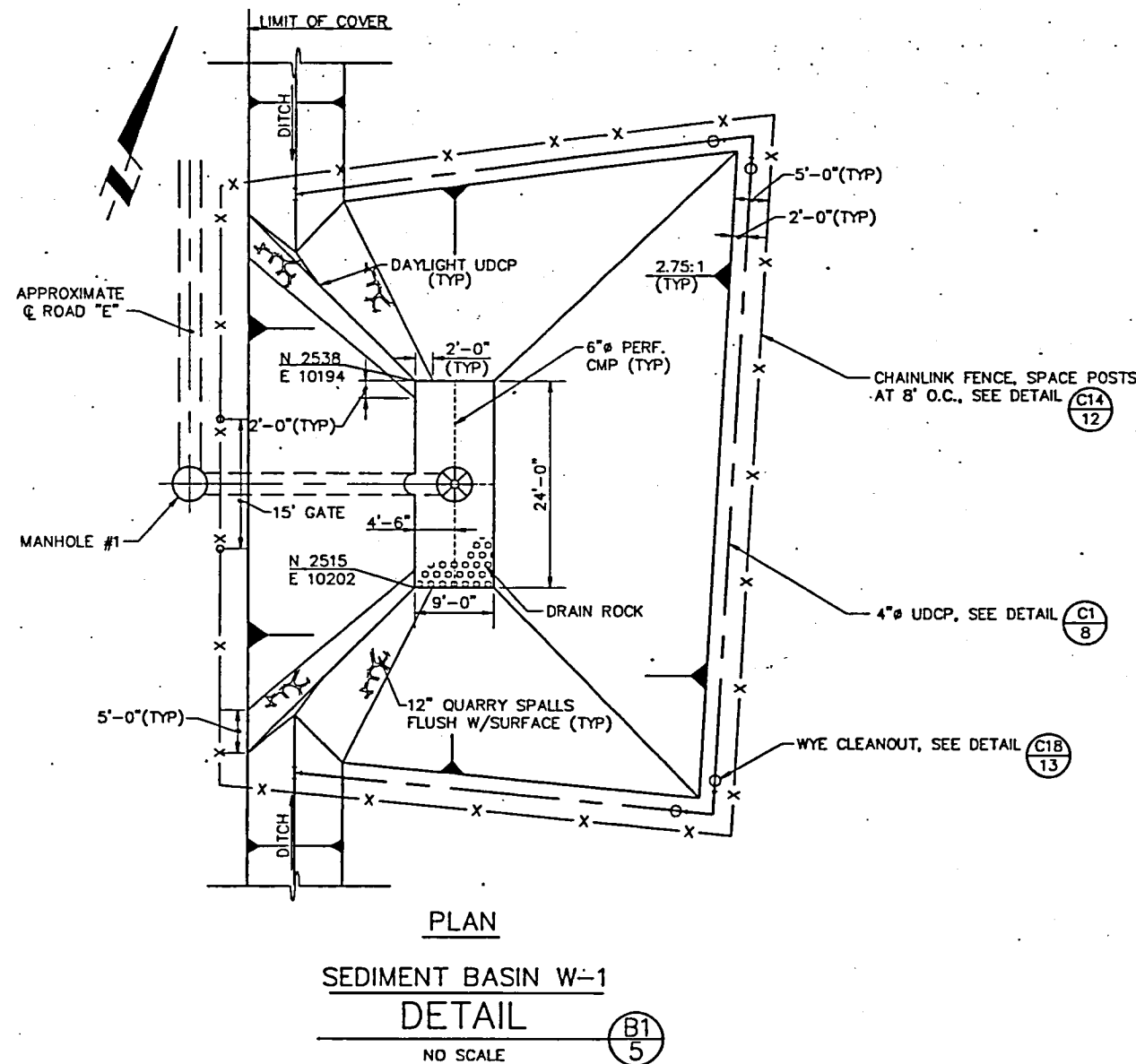
ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
FINAL COVER DETAILS

| | |
|---------|---------------|
| SHEET: | 11 |
| OF | 30 |
| DATE: | DECEMBER 1991 |
| DWG NO: | 19190311 |



NOTE:
REPAIR GALVANIZED STEEL COATINGS
DAMAGED BY WELDING (OR OTHER ABUSE)
PRIOR TO INSTALLATION WITH GALVANIZED
WELDING OR EQUAL

FENCE POST BASE
DETAIL
NO SCALE (C14)
12



PLAN
SEDIMENT BASIN W-1
DETAIL
NO SCALE (B1)
5



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| CHECKED: | CA | 11/91 |
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METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
SEDIMENTATION BASIN PLAN

SHEET: 12
OF 30
DATE: DECEMBER 1991
DWG NO: 19190312

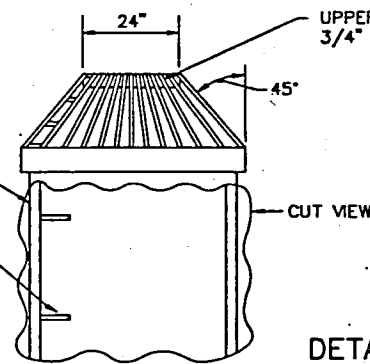
PROVIDE MAINTENANCE ACCESS BY WELDING 4 CROSSBARS TO 4 VERTICAL BARS AS SHOWN. HINGE UPPER ENDS WITH FLANGES/BOLTS AND PROVIDE LOCKING MECHANISM WITH PADLOCK ON LOWER END. LOCATE STEPS DIRECTLY BELOW.

3/4" DIA. SMOOTH BARS EQUALLY SPACED (4" O.C. MAX.)

LOWER STEEL BAND 3/4" THICK X 4" WIDE WELDED TO CMP MANHOLE

3/4" THICK X 4" WIDE LONG SMOOTH BARS WELDED TO UPPER AND LOWER BANDS (24 BARS EVENLY SPACED)

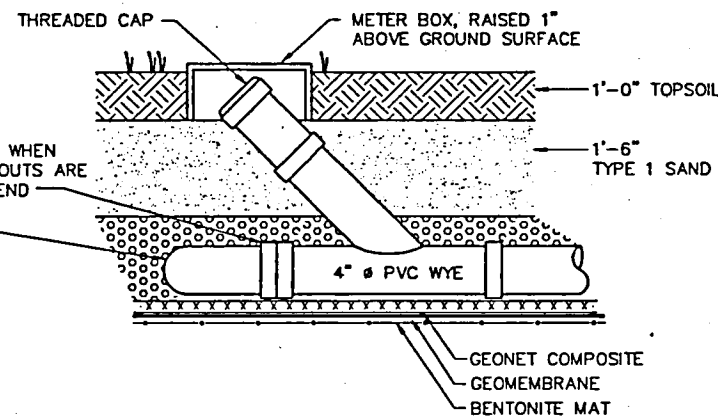
PLAN



ELEVATION

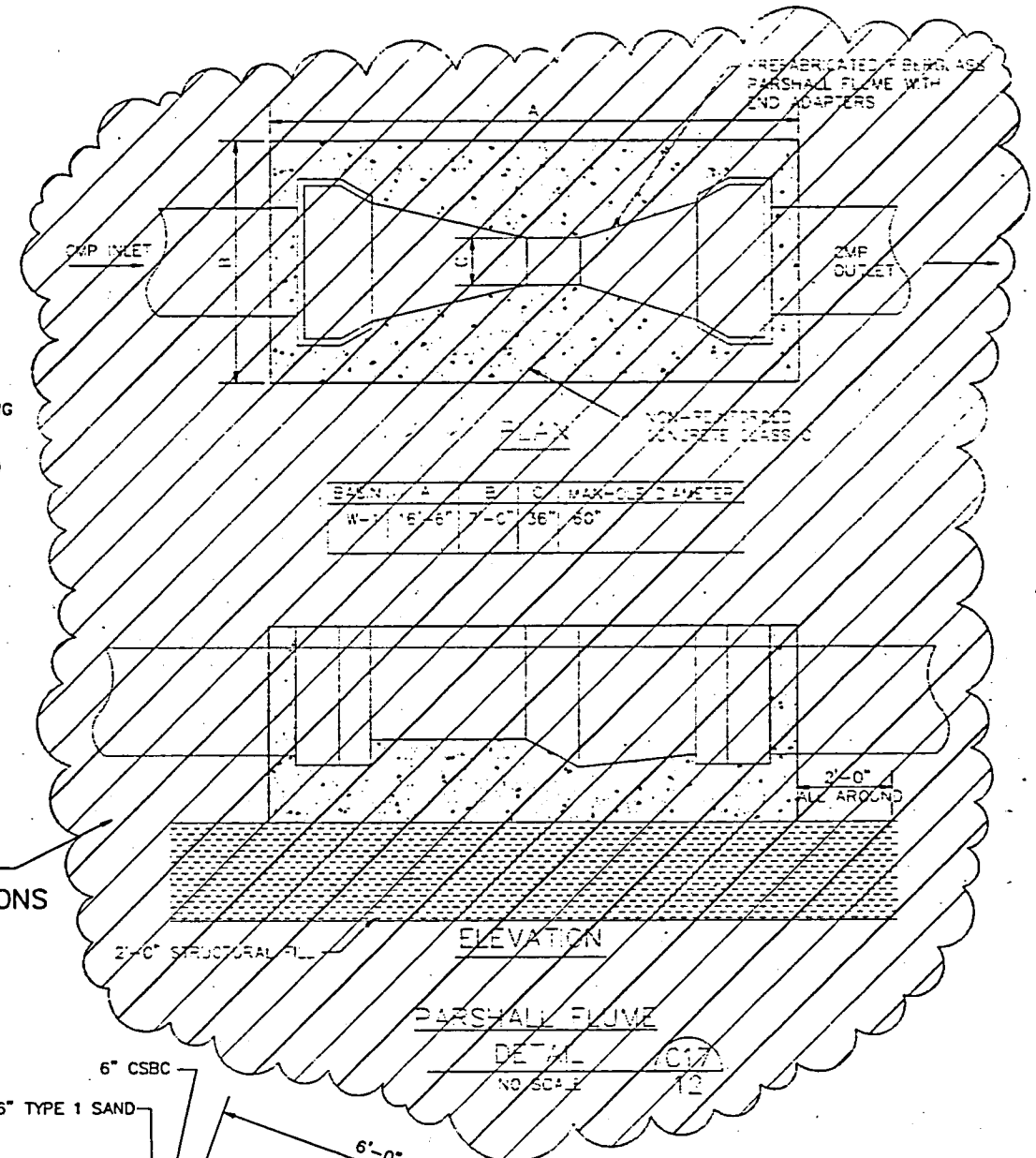
OVERFLOW STRUCTURE

DETAIL C16
NO SCALE 12



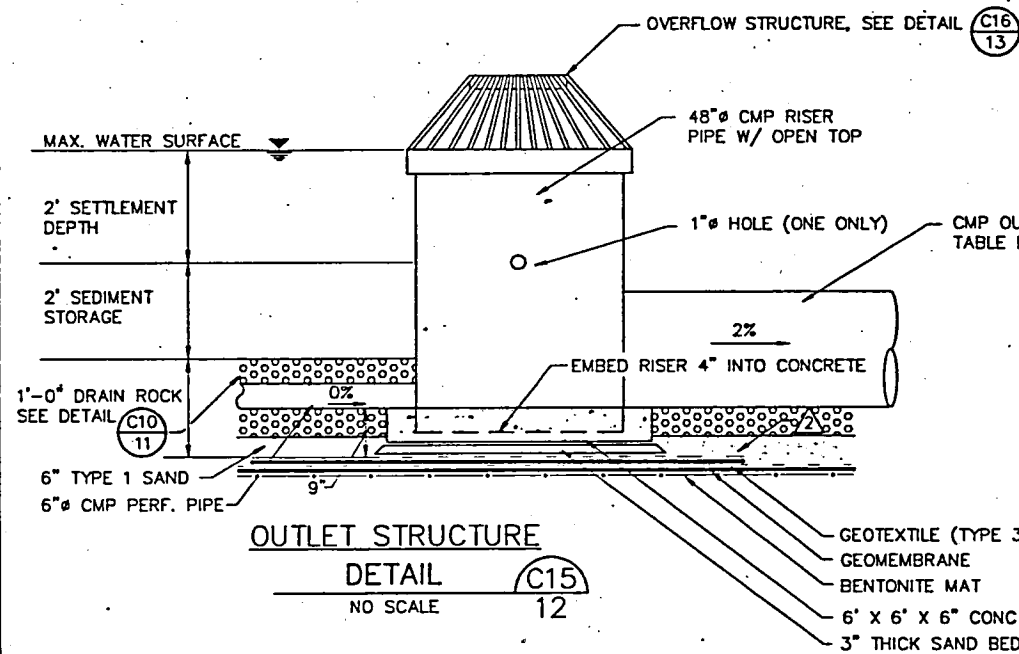
WYE CLEANOUT

DETAIL C18
NO SCALE 12



CMP LINER PENETRATION

DETAIL C19
NO SCALE 12



OUTLET STRUCTURE

DETAIL C15
NO SCALE 12

| BASIN | OUTLET PIPE SIZE |
|-------|------------------|
| W-1 | 27" |

NOTES:

- REINFORCE CONCRETE W/#4's AT 12" O.C. E.W. PROVIDE A MINIMUM OF 2" COVER OVER REBAR.
- PLACE AN EXTRA 10" DIAMETER LAYER OF TYPE 3 GEOTEXTILE AND GEOMEMBRANE UNDER RISER.

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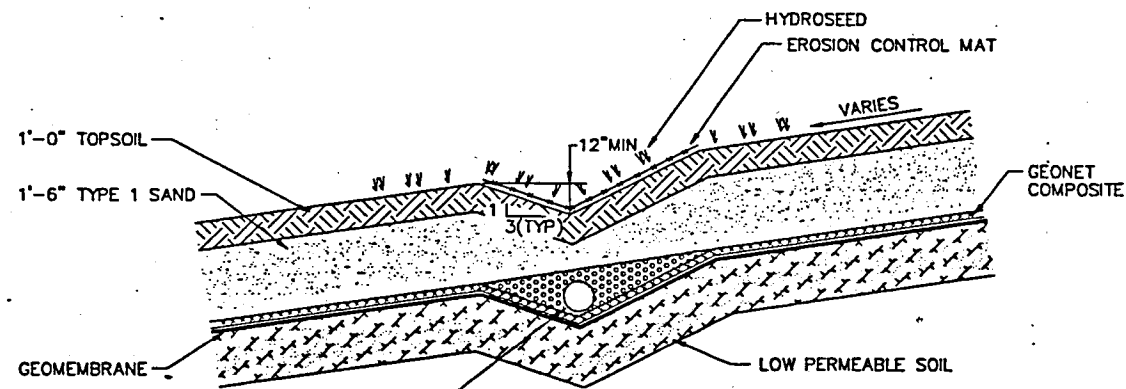
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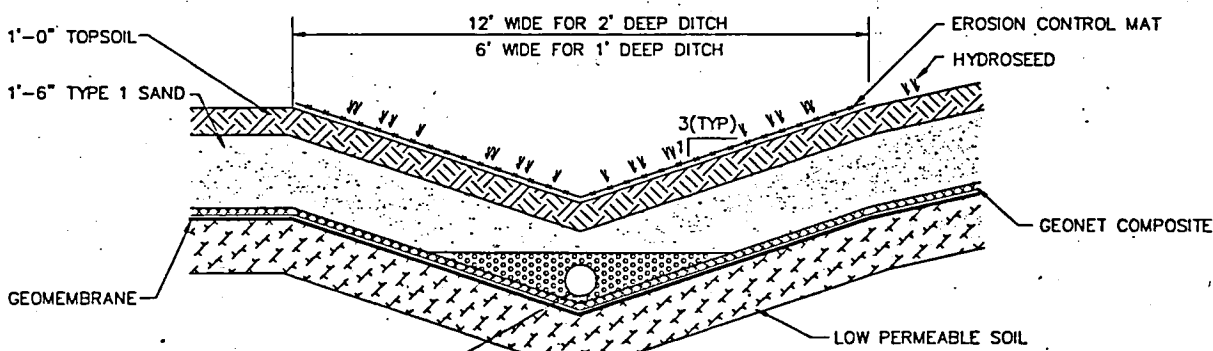
METROPOLITAN SERVICE DISTRICT
Solid Waste Department
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Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
SEDIMENTATION BASIN DETAILS

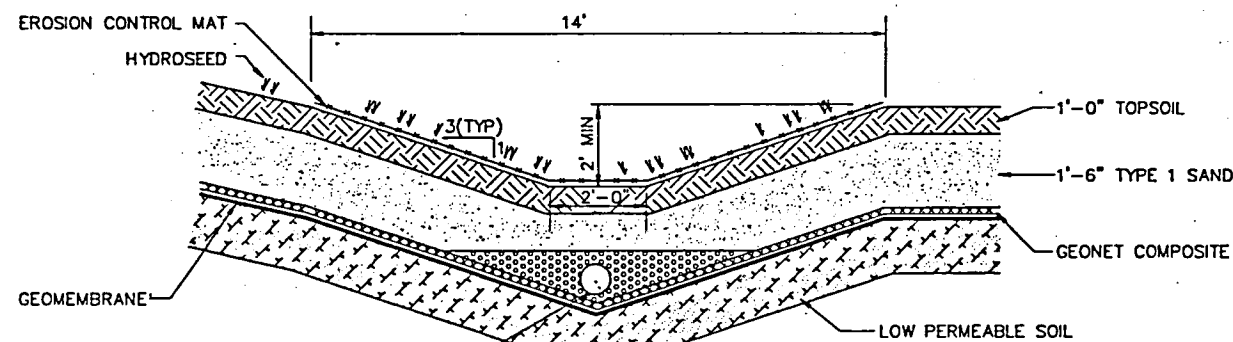
SHEET: 13
OF 30
DATE: DECEMBER 1991
DWG NO: 19190313



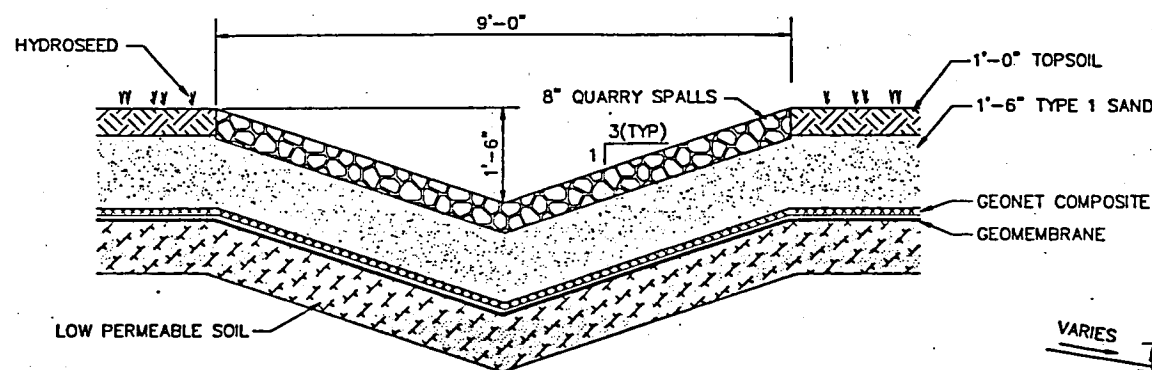
UPPER DRAINAGE DITCH
DETAIL (C20)
NO SCALE 5



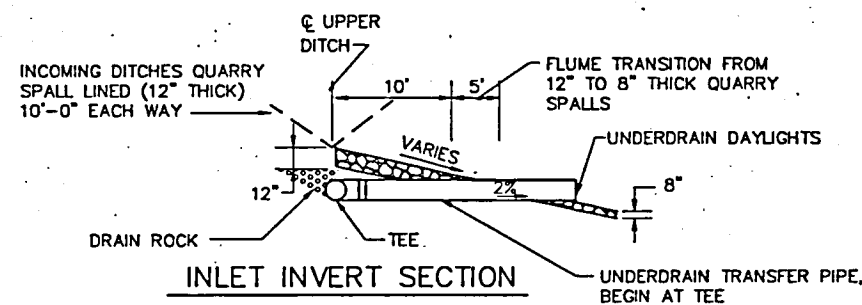
LOWER DRAINAGE DITCH
DETAIL (C22)
NO SCALE 5



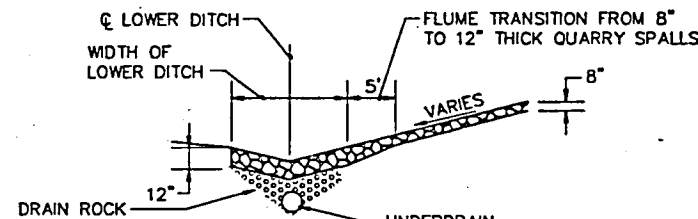
BIOFILTER DITCH
DETAIL (C24)
NO SCALE 5



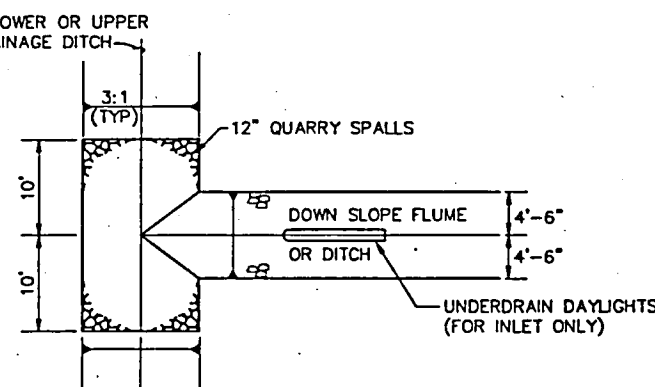
TYPICAL DOWN SLOPE FLUME
DETAIL (C21)
NO SCALE 5



INLET INVERT SECTION

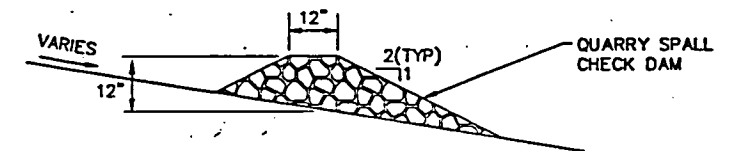


OUTFALL INVERT SECTION

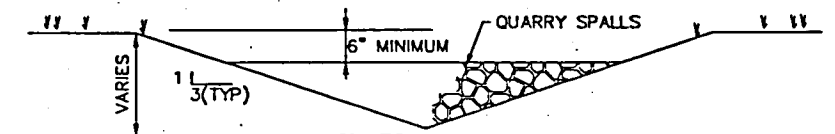


TYPICAL DOWN SLOPE FLUME AND DITCH
INTERSECTION OUTFALL AND
INLET LINING
DETAIL (C25)
NO SCALE 5

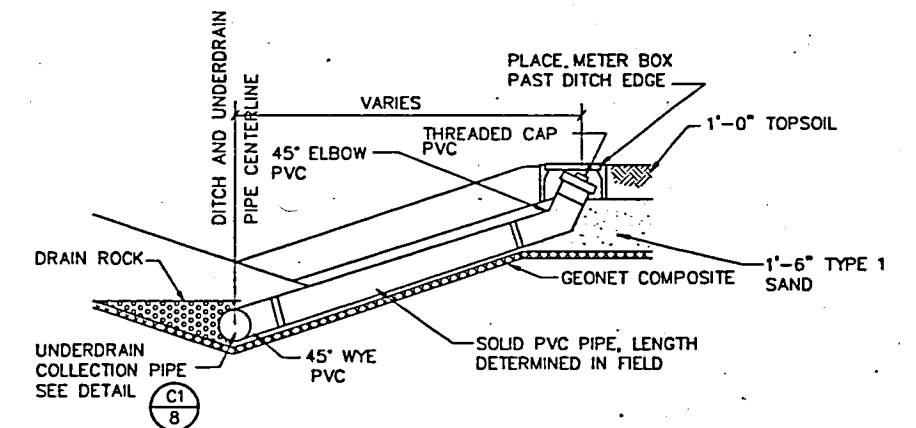
NOTE:
TYPE 3 GEOTEXTILE SHALL BE PLACED
UNDER ALL QUARRY SPALLS USED ON THIS PROJECT.



INVERT PROFILE



TYPICAL QUARRY SPALL CHECK DAM
DETAIL (C23)
NO SCALE 5



NOTES:
1. COVER MATERIAL, LINER, & SUBGRADE VARIES
2. INSTALL CLEANOUT AT 300' O.C. MIN AND AT EVERY TEE OR CROSS AND GRADE BREAKS.
3. DO NOT INSTALL CLEANOUT IN A ROAD

UNDERDRAIN COLLECTION PIPE CLEANOUT
DETAIL (C26)
NO SCALE

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| DESIGN REVIEW: | EMF | 11/91 |

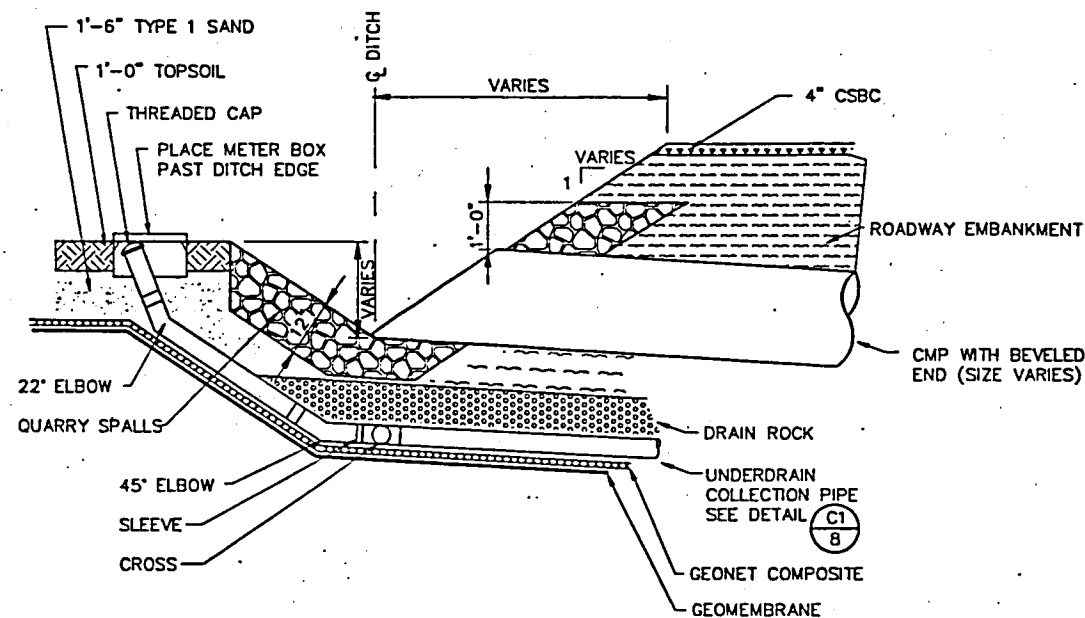


METROPOLITAN SERVICE DISTRICT
Solid Waste Department
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ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
SURFACE WATER DETAILS

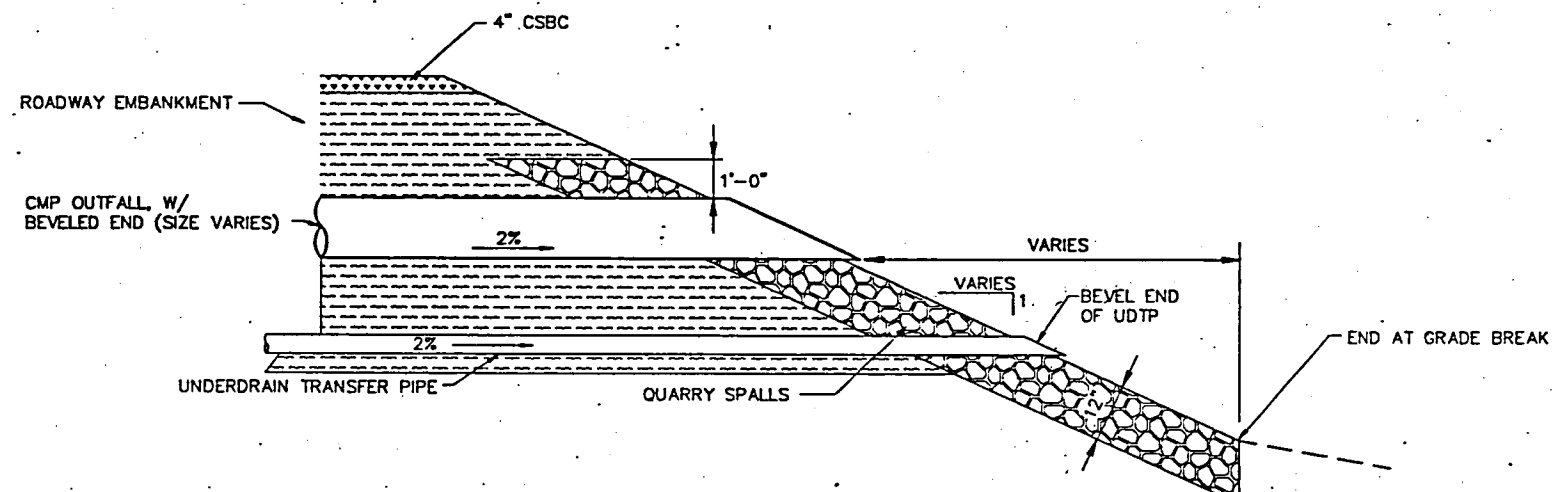
| | |
|---------|---------------|
| SHEET: | 14 |
| OF | 30 |
| DATE: | DECEMBER 1991 |
| DWG NO: | 19190314 |



NOTES:

1. PLACE METER BOX PAST EDGE OF DITCH.
2. DELETE UNDERDRAIN CLEANOUT ON ROAD CULVERT OUTLET.
3. PVC CLEANOUT PIPE LENGTHS BETWEEN FIXTURES DETERMINED IN FIELD

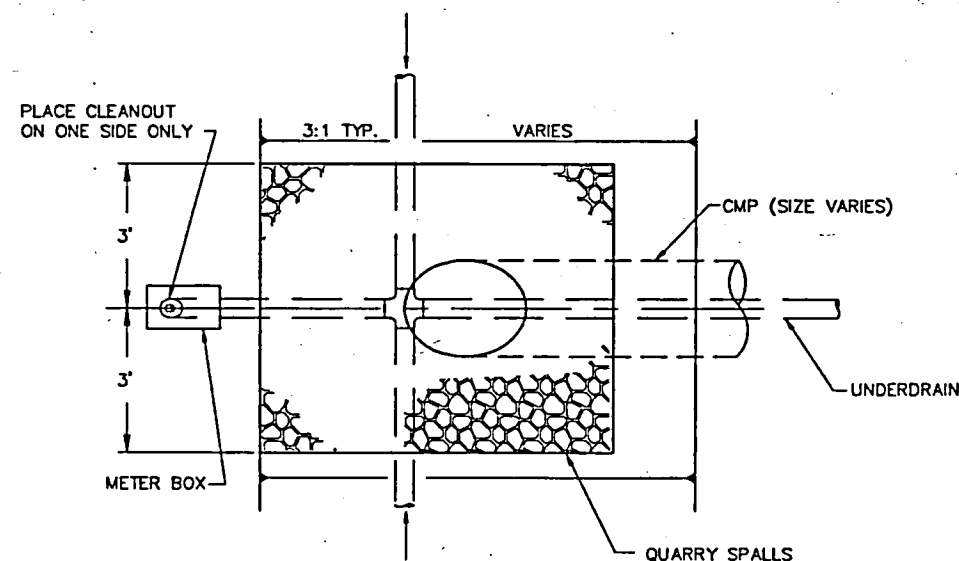
SECTION



NOTE:

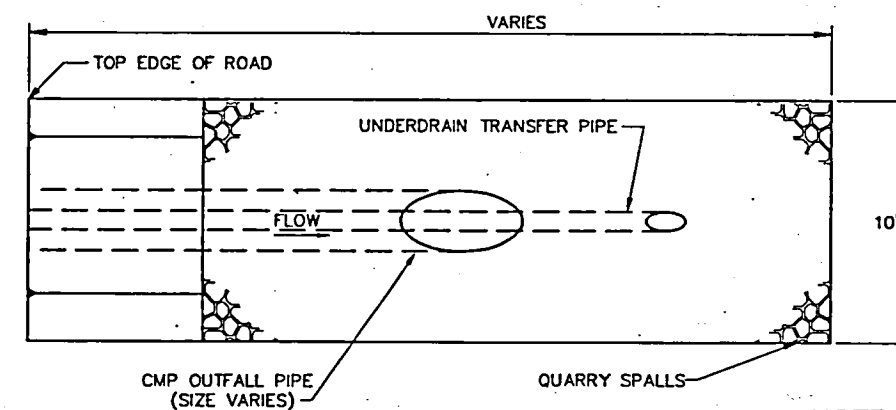
OMIT UNDERDRAIN TRANSFER PIPE FOR SEDIMENTATION BASIN OUTFALL.

SECTION



CLEANOUT AND TYPICAL CULVERT INLET/OUTLET

DETAIL C27/9
NO SCALE

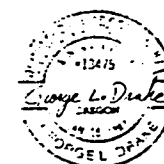


TYPICAL OUTFALL SPLASH PAD

DETAIL C28/9,12
NO SCALE

NOTE:

TYPE 3 GEOTEXTILE SHALL BE PLACED UNDER ALL QUARRY SPALLS USED ON THIS PROJECT.



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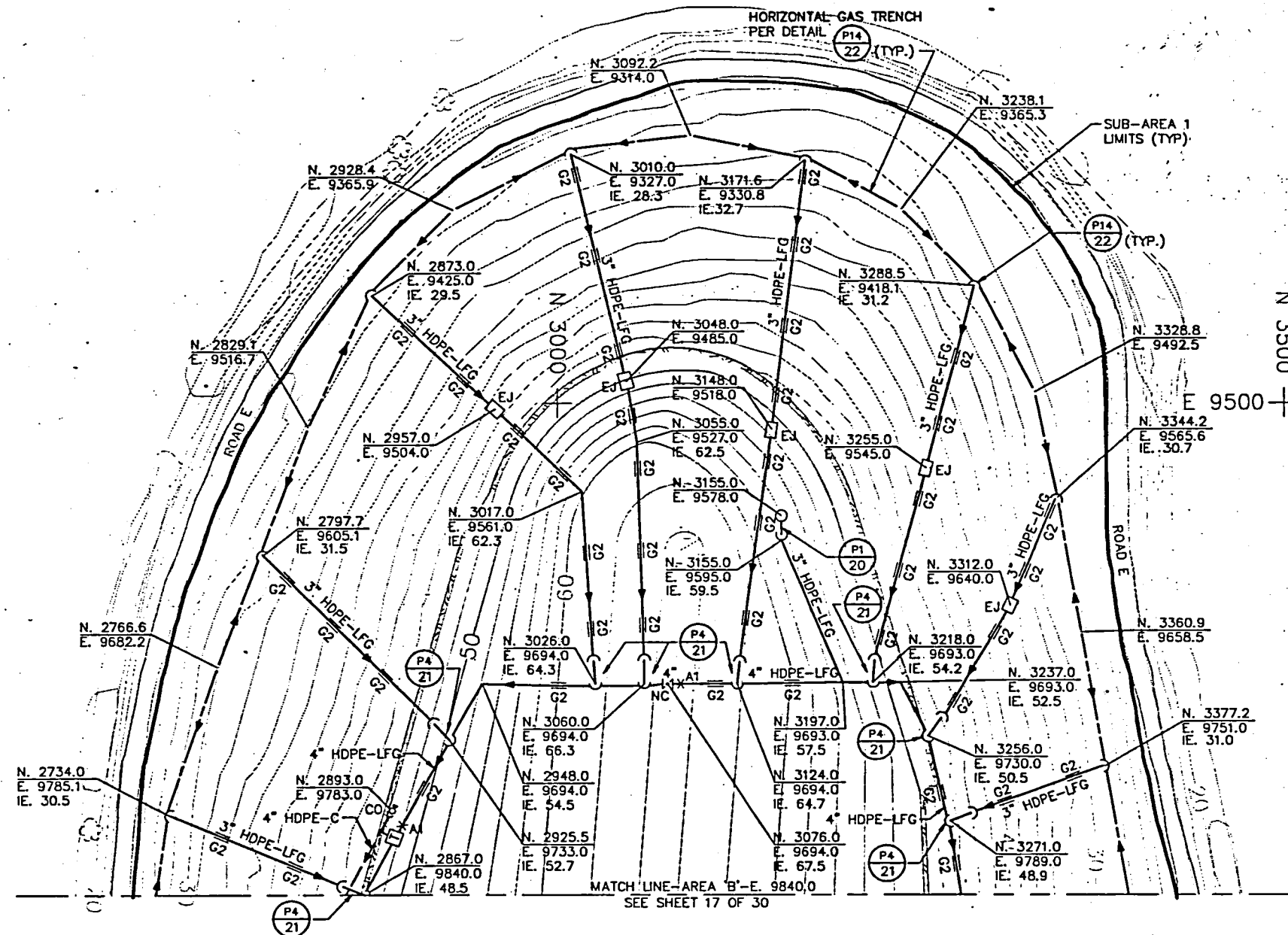
ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
SURFACE WATER DETAILS

| | |
|---------|----------------|
| SHEET: | 15 |
| OF | 30 |
| DATE: | DECEMBER, 1991 |
| DWG NO: | 19190315 |

PIPING SYMBOLS LEGEND

| | |
|--|---|
| | ABOVEGROUND PIPING (WITH FLOW DIRECTION SHOWN) |
| | UNDERGROUND PIPING |
| | ROAD CROSSING PER DETAIL (P12/P13/22/22) |
| | DOUBLE COMPLETION VERTICAL GAS EXTRACTION WELL PER DETAIL (P1/P2/P17/20/20/23) |
| | SINGLE COMPLETION VERTICAL GAS EXTRACTION WELL PER DETAIL (P1/P2/P18/20/20/23) |
| | CONDENSATE DRIP LEG/VACUUM VALVE STATION PER DETAIL (P18/P19/24/24) |
| | HORIZONTAL GAS COLLECTION TRENCH (WITH FLOW DIRECTION SHOWN) PER DETAIL (P14/22) |
| | LINE SIZE REDUCTION |
| | BOLLARD PER DETAIL (P10/22) |
| | PIPING EXPANSION LOOP PER DETAIL (P5/21) |
| | PIPE ANCHOR LOCATION PER DETAIL (P11/22) |
| | PIPE GUIDE LOCATION PER DETAIL (P8/21) |
| | ADJUSTABLE PIPE SUPPORT PER DETAIL (P9/21) |
| | ADJUSTABLE PIPE SUPPORT WITH PIPE GUIDE PER DETAIL (P9/21) |
| | CONDENSATE CLEANOUT PER DETAIL (P20/24) |
| | EXPANSION JOINT |
| | TRENCH-TO-MANIFOLD CONNECTION PER DETAIL (P4/21) |
| | BUTTERFLY VALVE |

PROJECT NORTH



NOTES:

1. FOR GENERAL NOTE AND ABBREVIATIONS SEE SHEET 2.
2. MINIMUM PIPE SLOPES ARE AS FOLLOWS:
GAS COLLECTION LINES
2% TO DRAIN IN DIRECTION OF GAS FLOW
4% TO DRAIN IN OPPOSITE DIRECTION OF GAS FLOW
CONDENSATE DRAIN LINES
1% TO DRAIN
CONDENSATE DISCHARGE/VACUUM LINES
1% TO DRAIN
HORIZONTAL GAS COLLECTION TRENCHES
1% FROM HIGH POINT AT TEE TO ENDS
3. CONTOURS SHOWN DEPICT SUBGRADE ELEVATIONS. IE'S SHOWN ARE BASED ON FINAL GRADE ELEVATIONS AND ARE 2'-6" HIGHER THAN SUBGRADE ELEVATIONS.
4. TEMPORARY GAS COLLECTION SYSTEMS SHALL BE LOCATED IN THE FIELD BY THE ENGINEER. SEE TECHNICAL SPECIFICATIONS.

AREA 'A'
SHEET 16

AREA 'B'
SHEET 17

AREA 'C'
SHEET 18



KEY PLAN

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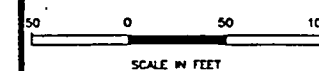
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METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager



ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
GAS/CONDENSATE COLLECTION PLAN-AREA A

SHEET: 16
OF: 30
DATE: DECEMBER, 1991
DWG NO: 19190318

NOTES:

1. FOR GENERAL NOTE AND ABBREVIATIONS
SEE SHEET 2.

2. MINIMUM PIPE SLOPES ARE AS FOLLOWS:

GAS COLLECTION LINES

2% TO DRAIN IN DIRECTION OF
GAS FLOW

4% TO DRAIN IN OPPOSITE
DIRECTION OF GAS FLOW

CONDENSATE DRAIN LINES

1% TO DRAIN

CONDENSATE DISCHARGE / VACUUM LINES

1% TO DRAIN

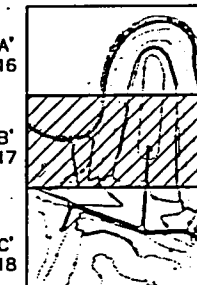
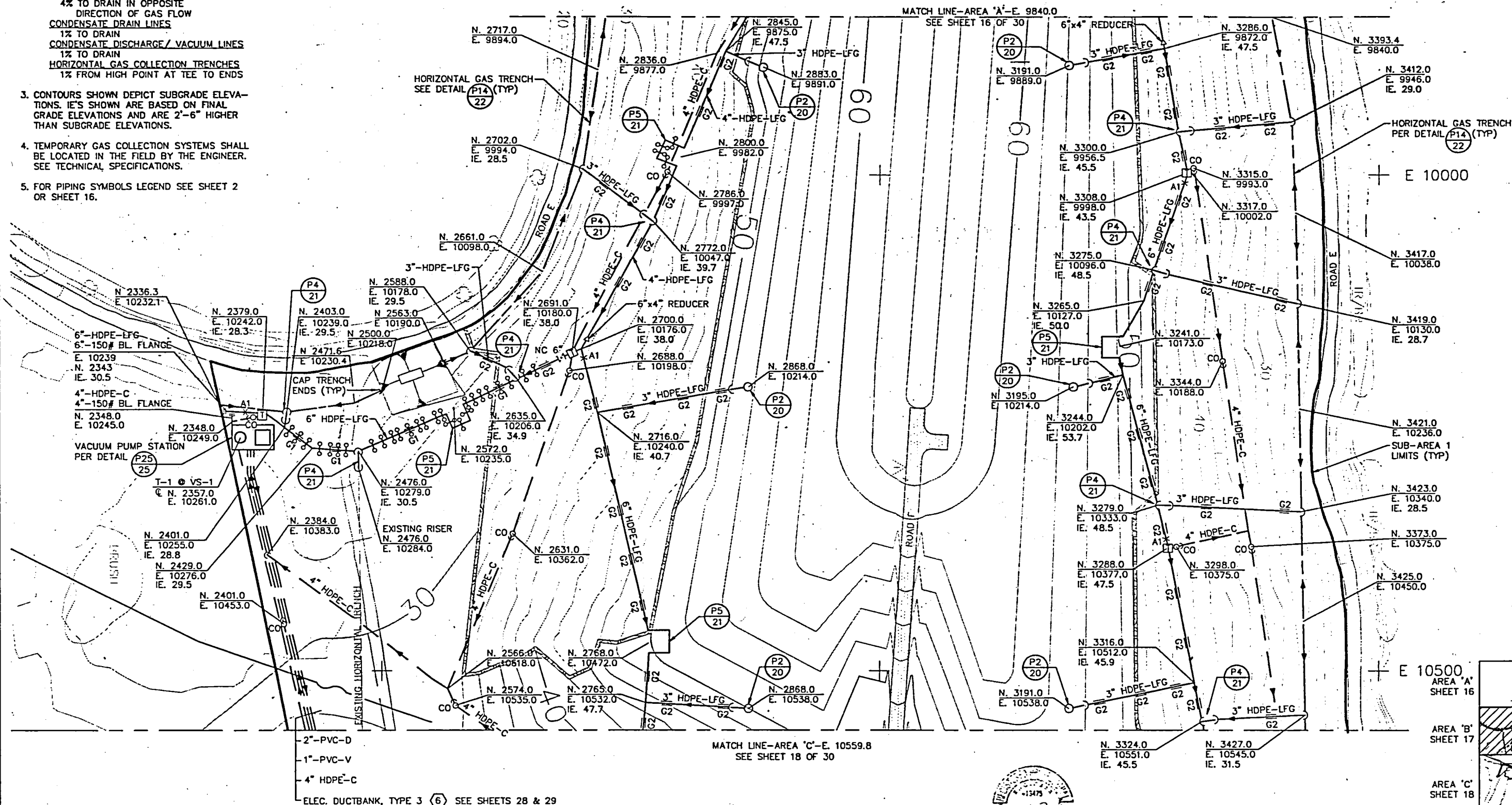
HORIZONTAL GAS COLLECTION TRENCHES

1% FROM HIGH POINT AT TEE TO ENDS

3. CONTOURS SHOWN DEPICT SUBGRADE ELEVATIONS. IE'S SHOWN ARE BASED ON FINAL GRADE ELEVATIONS AND ARE 2'-6" HIGHER THAN SUBGRADE ELEVATIONS.

4. TEMPORARY GAS COLLECTION SYSTEMS SHALL BE LOCATED IN THE FIELD BY THE ENGINEER. SEE TECHNICAL SPECIFICATIONS.

5. FOR PIPING SYMBOLS LEGEND SEE SHEET 2 OR SHEET 16.



KEY PLAN

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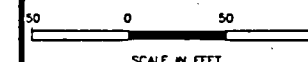
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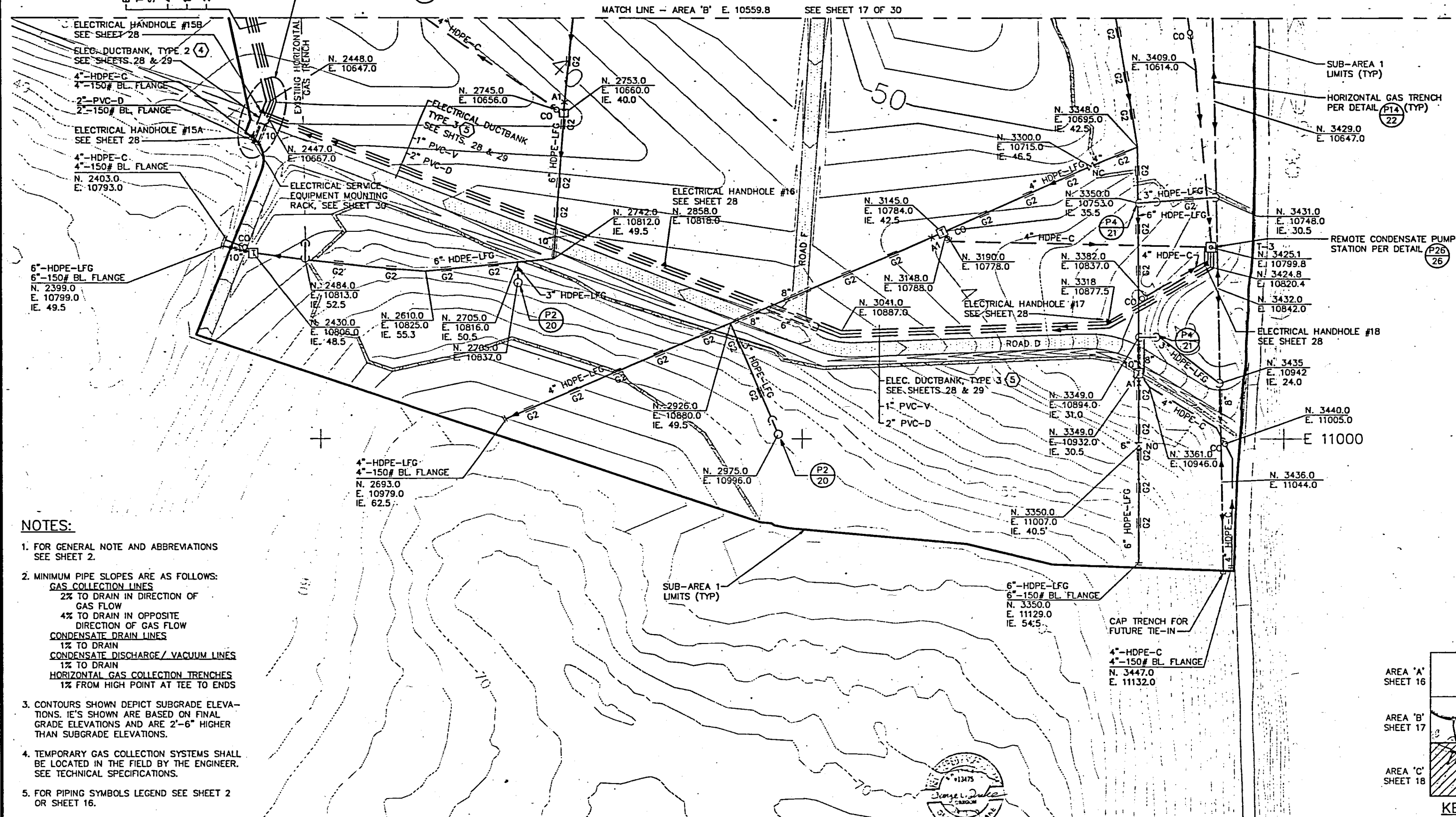


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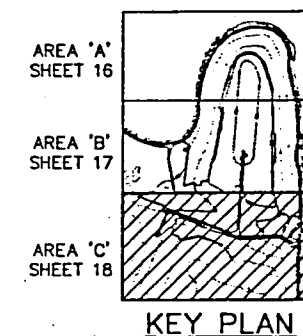
ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
GAS/CONDENSATE COLLECTION PLAN-AREA B

SHEET: 17
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190319



NOTES:

1. FOR GENERAL NOTE AND ABBREVIATIONS SEE SHEET 2.
2. MINIMUM PIPE SLOPES ARE AS FOLLOWS:
GAS COLLECTION LINES
2% TO DRAIN IN DIRECTION OF GAS FLOW
4% TO DRAIN IN OPPOSITE DIRECTION OF GAS FLOW
CONDENSATE DRAIN LINES
1% TO DRAIN
CONDENSATE DISCHARGE/VACUUM LINES
1% TO DRAIN
HORIZONTAL GAS COLLECTION TRENCHES
1% FROM HIGH POINT AT TEE TO ENDS
3. CONTOURS SHOWN DEPICT SUBGRADE ELEVATIONS. IE'S SHOWN ARE BASED ON FINAL GRADE ELEVATIONS AND ARE 2'-6" HIGHER THAN SUBGRADE ELEVATIONS.
4. TEMPORARY GAS COLLECTION SYSTEMS SHALL BE LOCATED IN THE FIELD BY THE ENGINEER. SEE TECHNICAL SPECIFICATIONS.
5. FOR PIPING SYMBOLS LEGEND SEE SHEET 2 OR SHEET 16.



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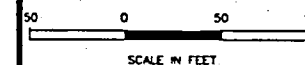
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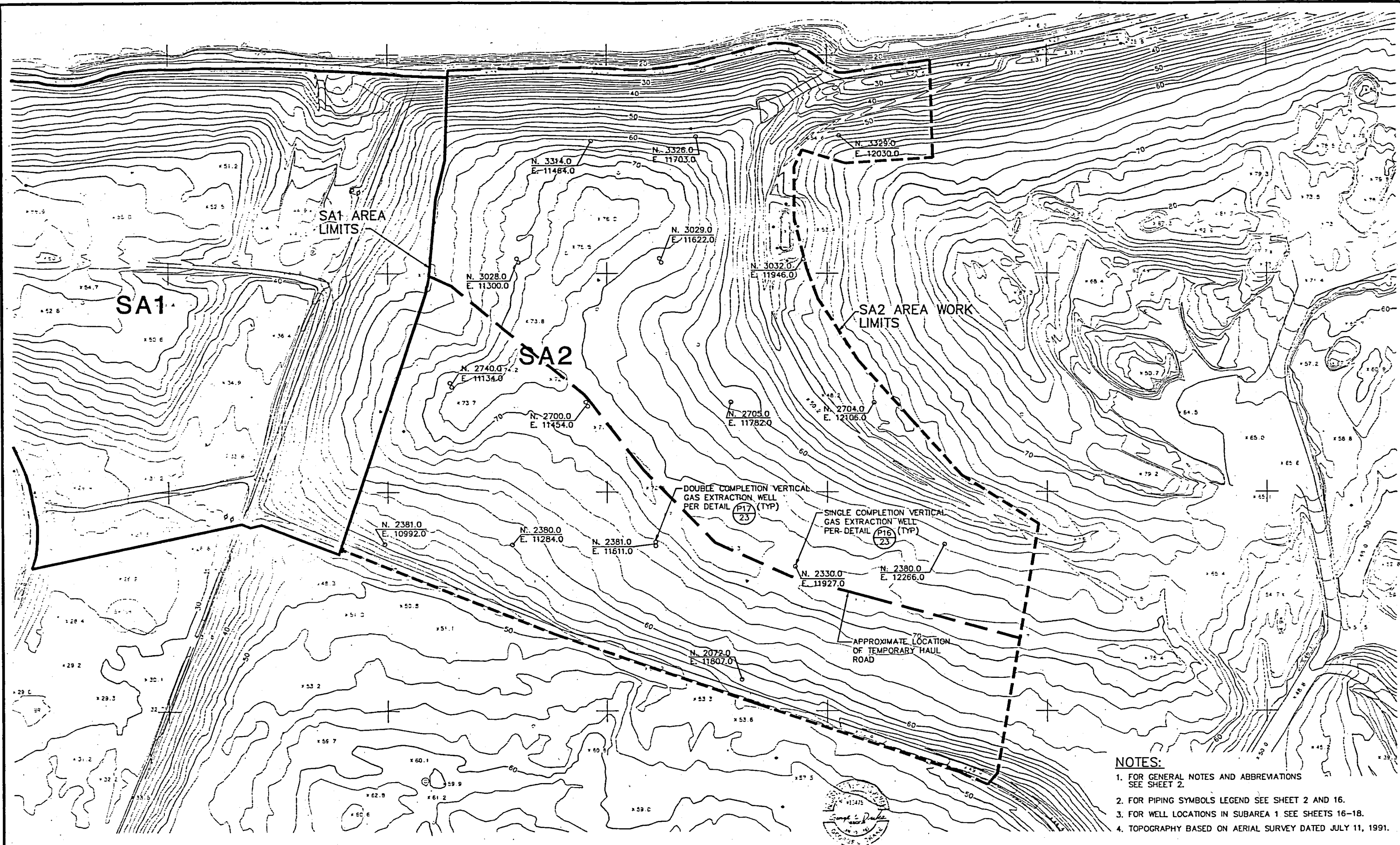


METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager



ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
GAS/CONDENSATE COLLECTION PLAN-AREA C

SHEET: 18
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190320



- NOTES:**
1. FOR GENERAL NOTES AND ABBREVIATIONS SEE SHEET 2.
 2. FOR PIPING SYMBOLS LEGEND SEE SHEET 2 AND 16.
 3. FOR WELL LOCATIONS IN SUBAREA 1 SEE SHEETS 16-18.
 4. TOPOGRAPHY BASED ON AERIAL SURVEY DATED JULY 11, 1991.

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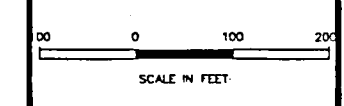
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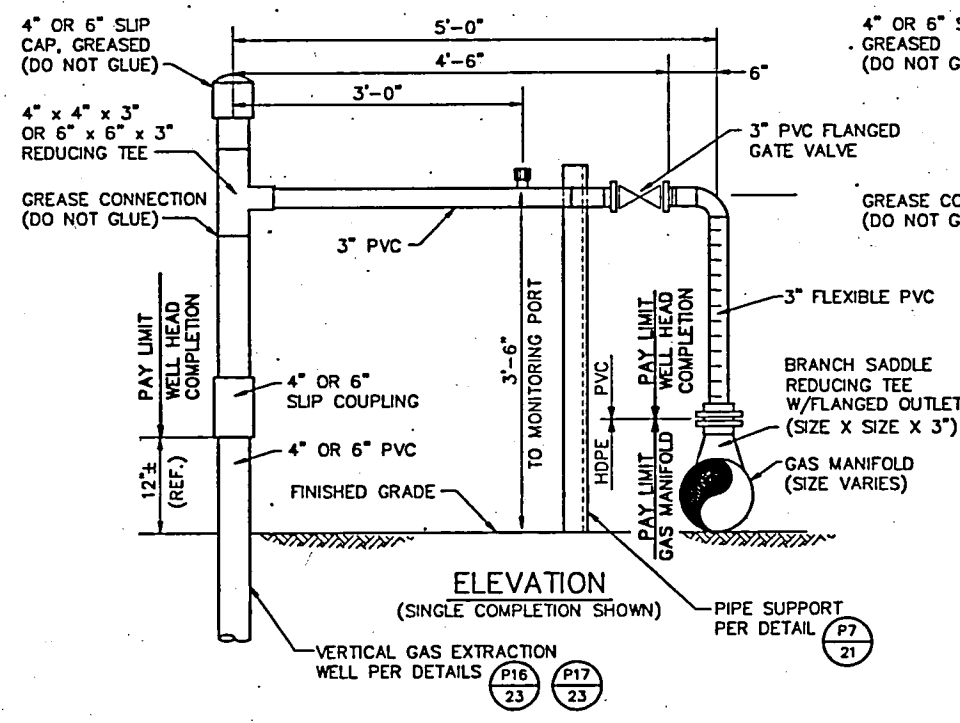
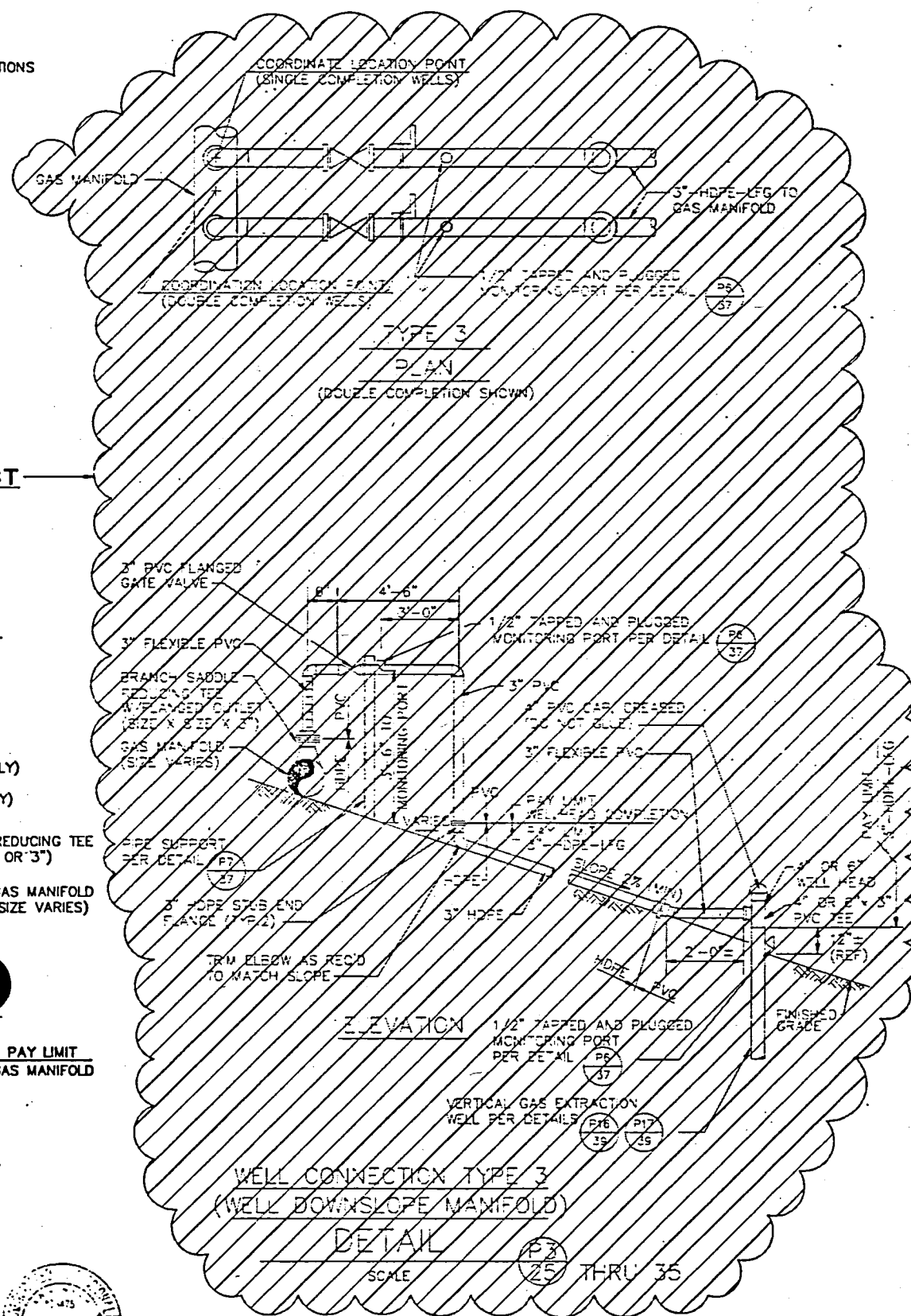
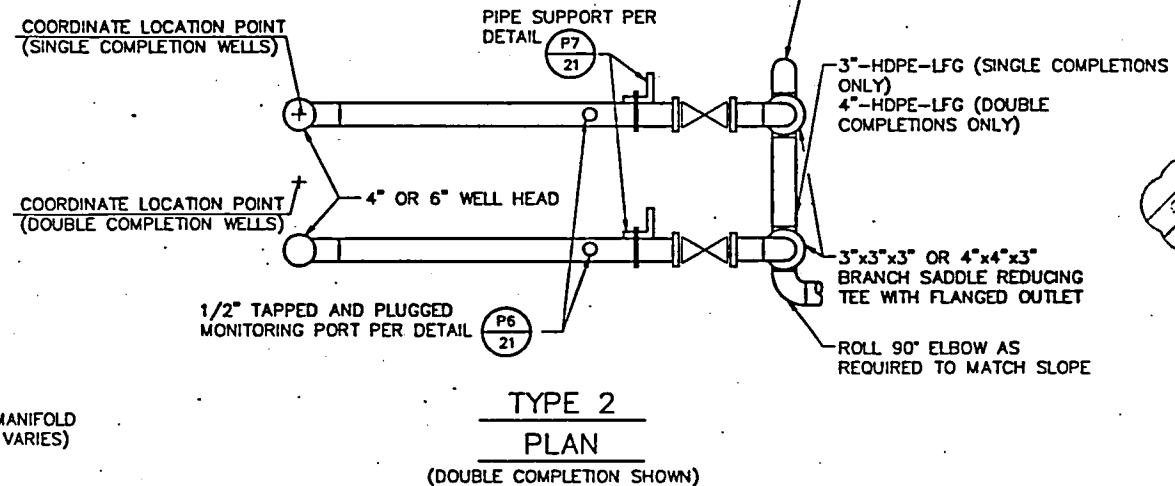
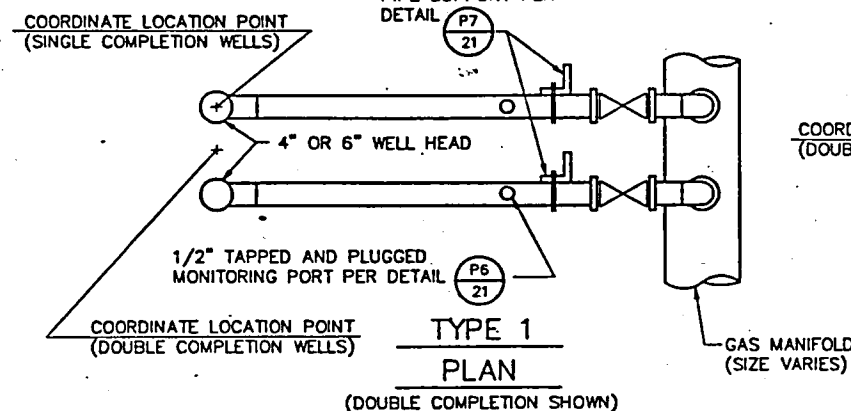


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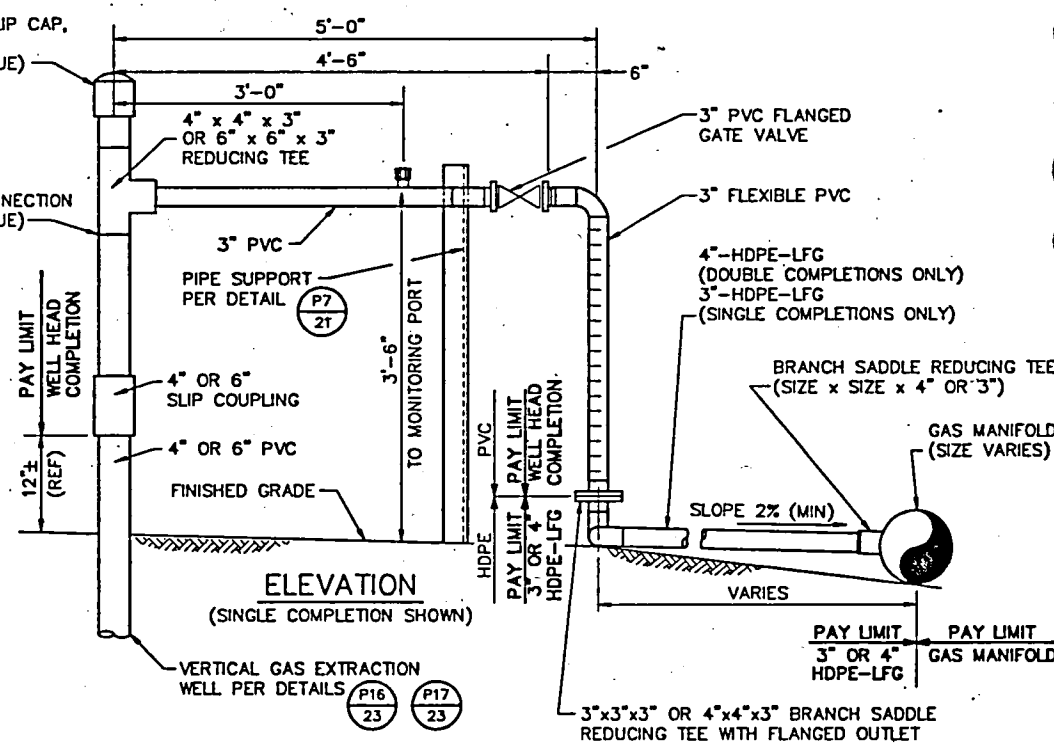


ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
SA2 VERTICAL GAS EXTRACTION
WELL LOCATIONS

SHEET: 19
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190321



WELL COMPLETION TYPE 1
(WELLS AT MANIFOLD)
DETAIL P1
NO SCALE 16 THRU 18



WELL COMPLETION TYPE 2
(WELLS UPSLOPE OF MANIFOLD)
DETAIL P2
NO SCALE 16 THRU 18

NOT IN CONTRACT

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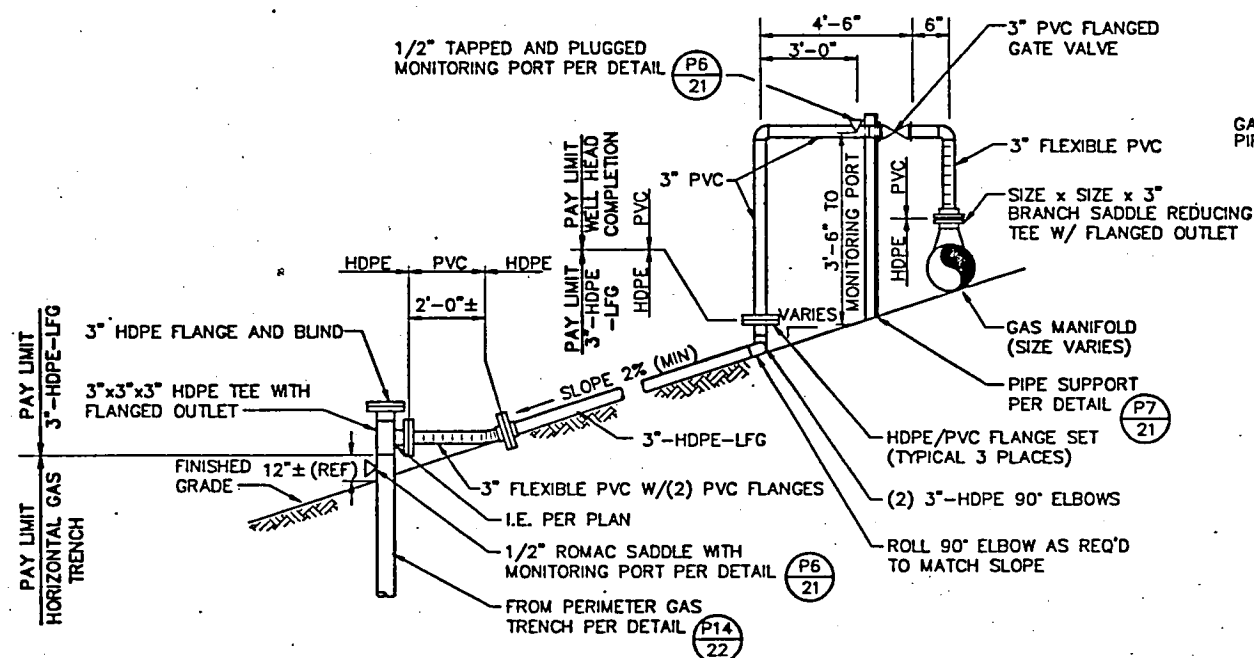
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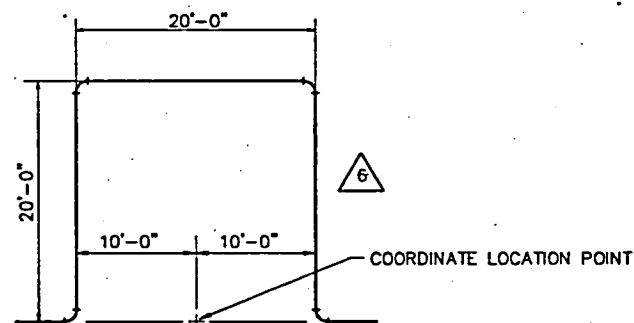
ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
PIPING DETAILS/GAS COLLECTION SYSTEM

SHEET: 20
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190322



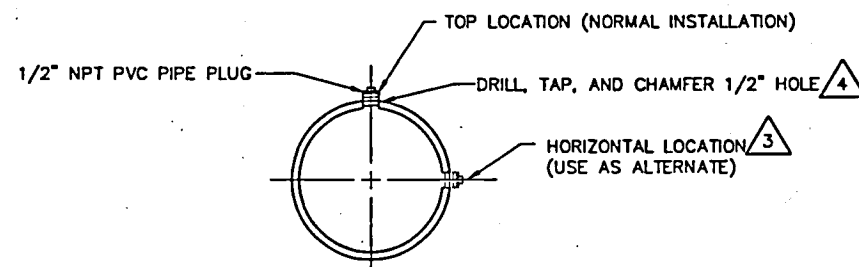
WELL COMPLETION TYPE 4
(HORIZONTAL GAS TRENCH)

DETAIL (P4)
NO SCALE 16 THRU 18



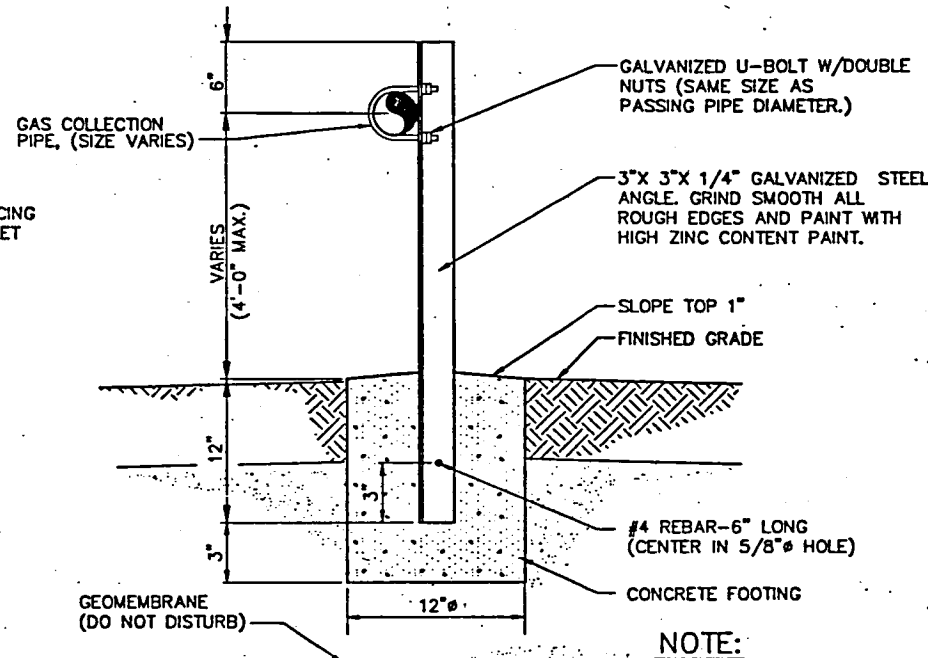
EXPANSION LOOP

DETAIL (P5)
NO SCALE 16 THRU 18



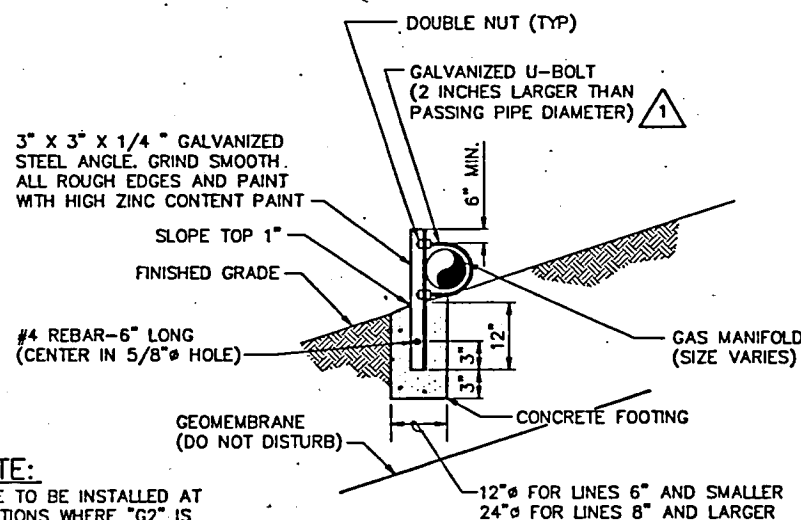
MONITORING PORT

DETAIL (P6)
NO SCALE 20,21



PIPE SUPPORT AT WELL COMPLETION

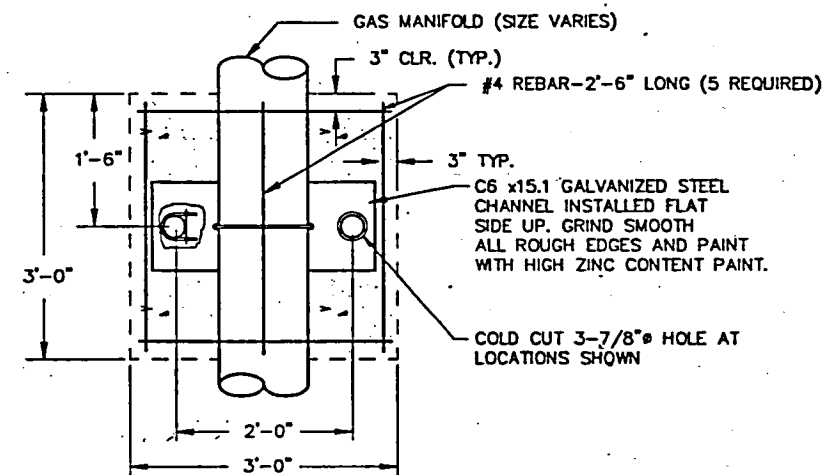
DETAIL (P7)
NO SCALE 20



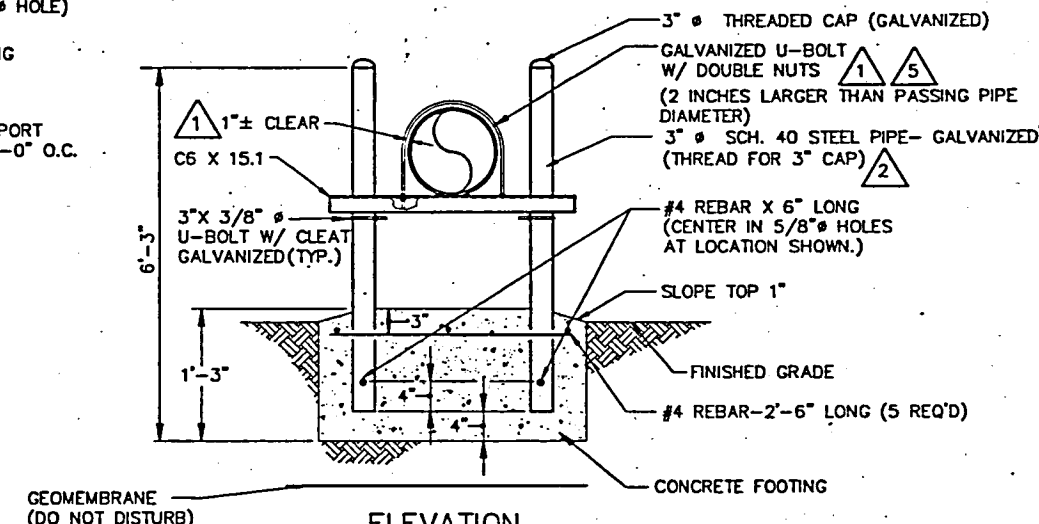
NOTE:
GUIDE TO BE INSTALLED AT LOCATIONS WHERE "G2" IS INDICATED ON SHEETS 16 THRU 18 ALONG GAS MANIFOLD PIPING. MAXIMUM 50' SPACING FOR LINES 6" & SMALLER. MAXIMUM 25' SPACING FOR LINES 8" & LARGER

GAS PIPE GUIDE (G2)

DETAIL (P8)
NO SCALE 16 THRU 18



PLAN



ELEVATION

ADJUSTABLE PIPE SUPPORT & G1

DETAIL (P9)
NO SCALE 16 THRU 18

NOTES:

- 1 MAINTAIN 1"± CLEARANCE BETWEEN U-BOLT AND PIPE.
- 2 PIPE TO BE INSTALLED VERTICAL AND PARALLEL TO ALLOW STEEL CROSS BAR TO SLIDE FREELY FULL LENGTH OF UPRIGHTS.
- 3 USE ALTERNATE WHEN TOP PORT IS NOT ACCESSIBLE
- 4 USE "ROMAC" SADDLE FOR MONITORING PORTS ON HDPE LINES.
- 5 INSTALL U-BOLT ONLY WHERE "G1" IS INDICATED ON PLANS.
- 6 SLOPE LEGS OF LOOP TO DRAIN TO SYSTEM LOW POINTS 2% MIN IN DIRECTION OF GAS FLOW, 4% MIN AGAINST DIRECTION OF GAS FLOW.



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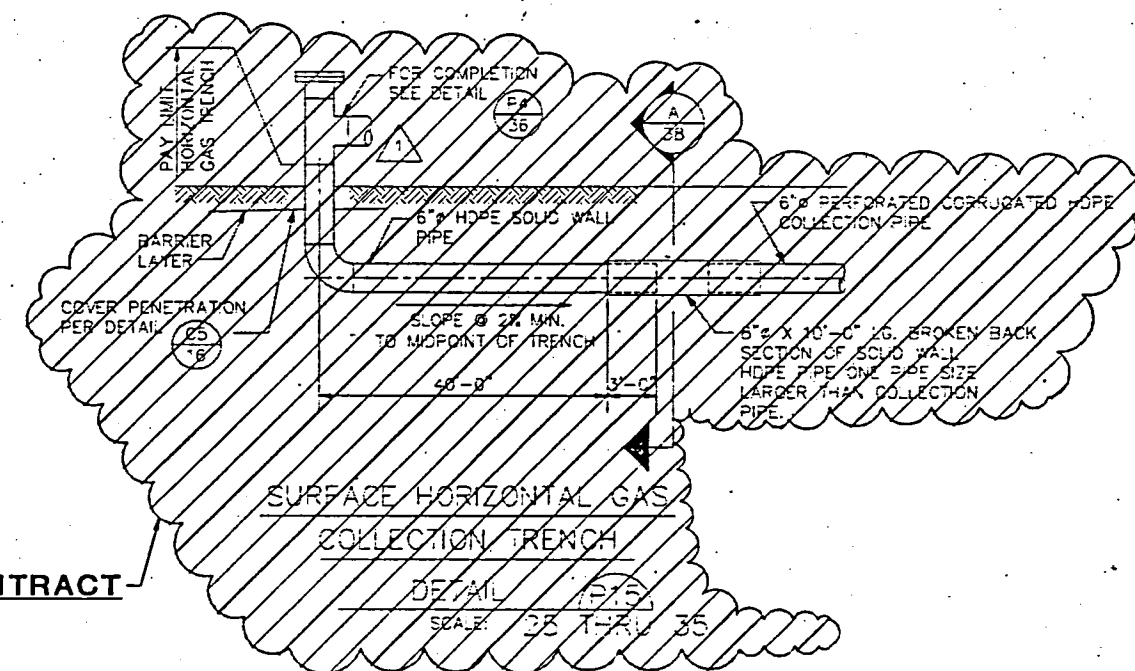
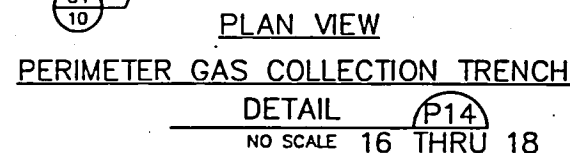
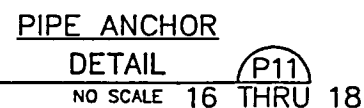
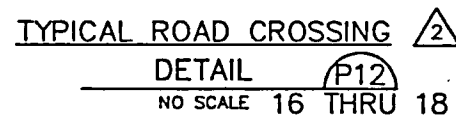
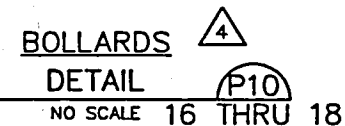
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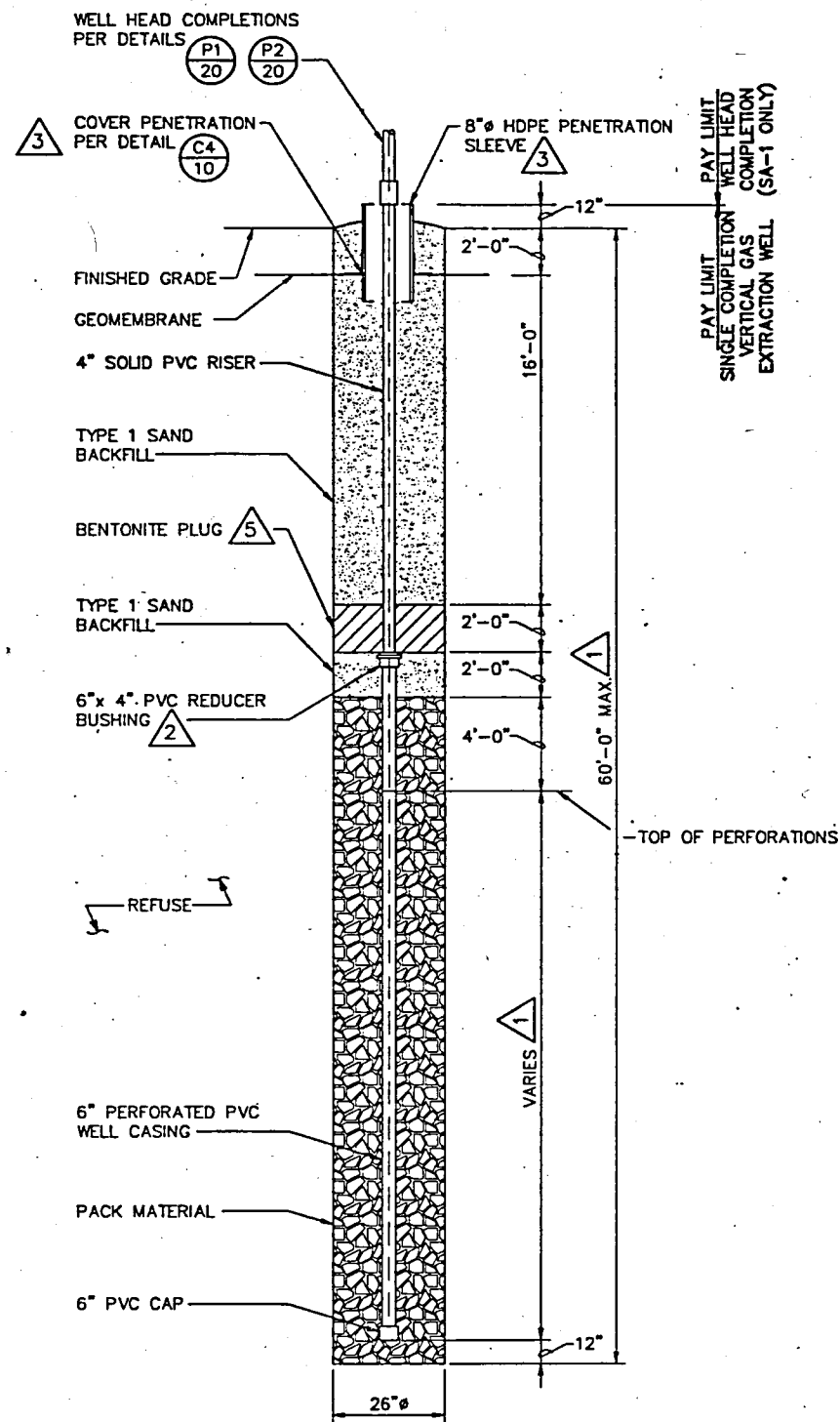
METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
PIPING DETAILS/GAS COLLECTION SYSTEM

SHEET: 21
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190323

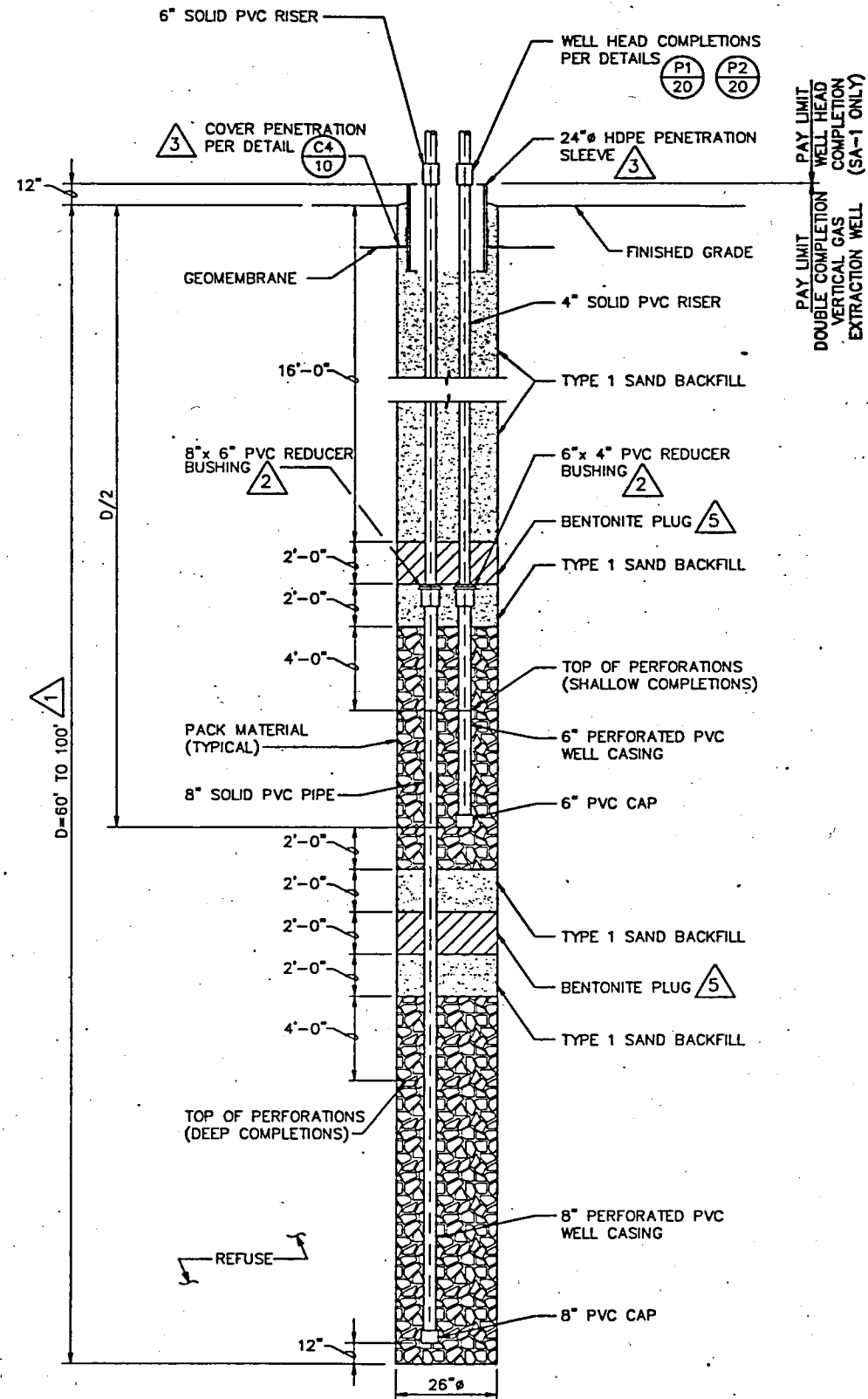


4 BOLLARDS TO BE LOCATED IN FIELD BY ENGINEER.



SINGLE COMPLETION VERTICAL
GAS EXTRACTION WELL

DETAIL P16
NO SCALE 16 THRU 18



DOUBLE COMPLETION VERTICAL
GAS EXTRACTION WELL

DETAIL P17
NO SCALE 16 THRU 18

NOTES:

- 1 WELLS TO BE DRILLED TO 100% OF DEPTH OF REFUSE. ENGINEER WILL DETERMINE DEPTH IN FIELD AT TIME OF DRILLING.
- 2 REAM STOP SMOOTH IN BUSHING AND INSERT SOLID PVC INTO BUSHING 3'-0" TO MAKE A "SLIP JOINT".
- 3 COVER PENETRATION AND HDPE PENETRATION SLEEVE NOT REQUIRED FOR WELLS DRILLED IN SUBAREA 2.
- 4 CAP WELLS DRILLED IN SUBAREA 2. WELL HEAD COMPLETIONS WILL NOT BE REQUIRED IN SUBAREA 2.
- 5 BENTONITE TO BE HYDRATED WITH CLEAN WATER.

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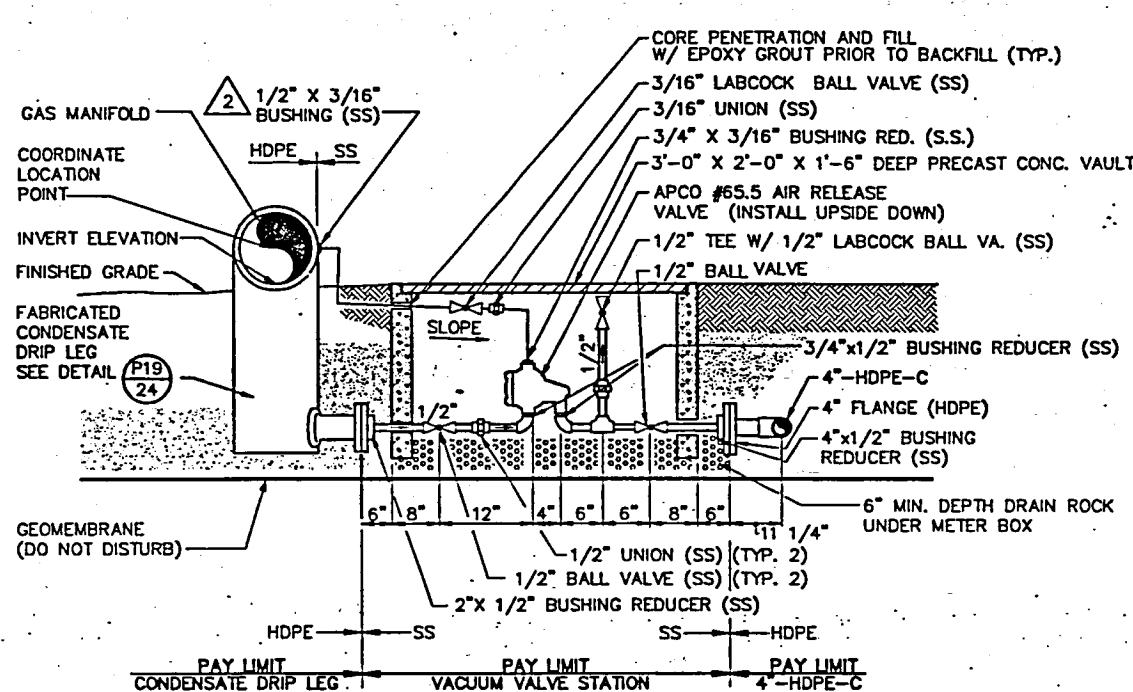
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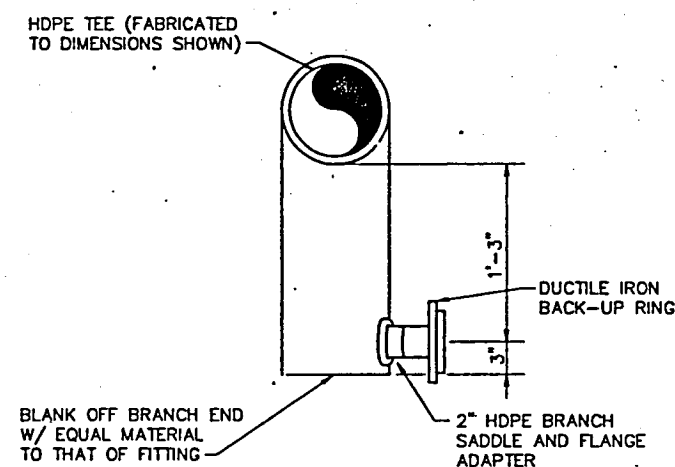
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ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
VERTICAL GAS EXTRACTION WELL DETAILS

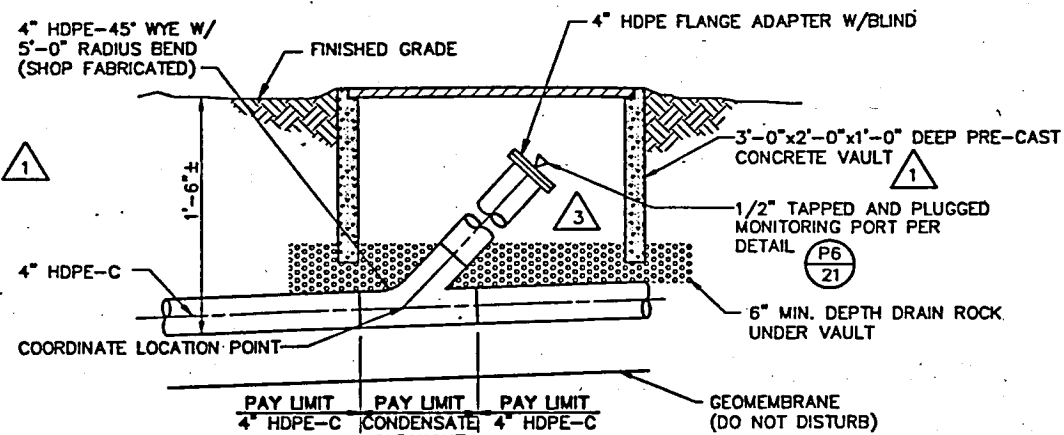
SHEET: 23
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DATE: DECEMBER, 1991
DWG NO: 19190325



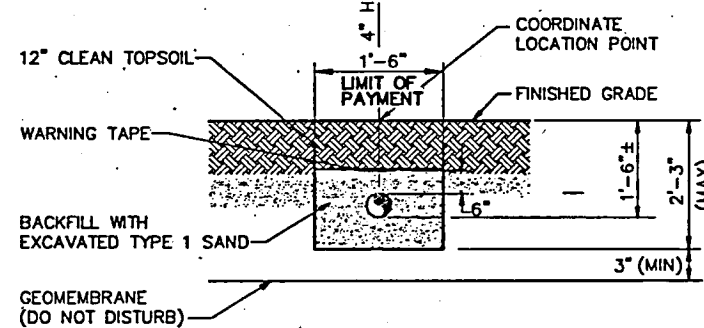
VACUUM VALVE STATION
DETAIL P18
NO SCALE 16 THRU 18



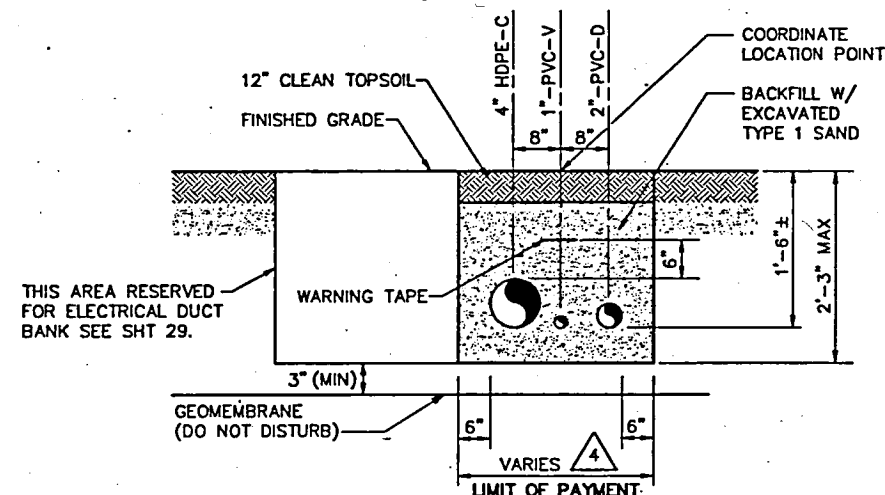
FABRICATED CONDENSATE DRIP LEG
DETAIL P19
NO SCALE 24



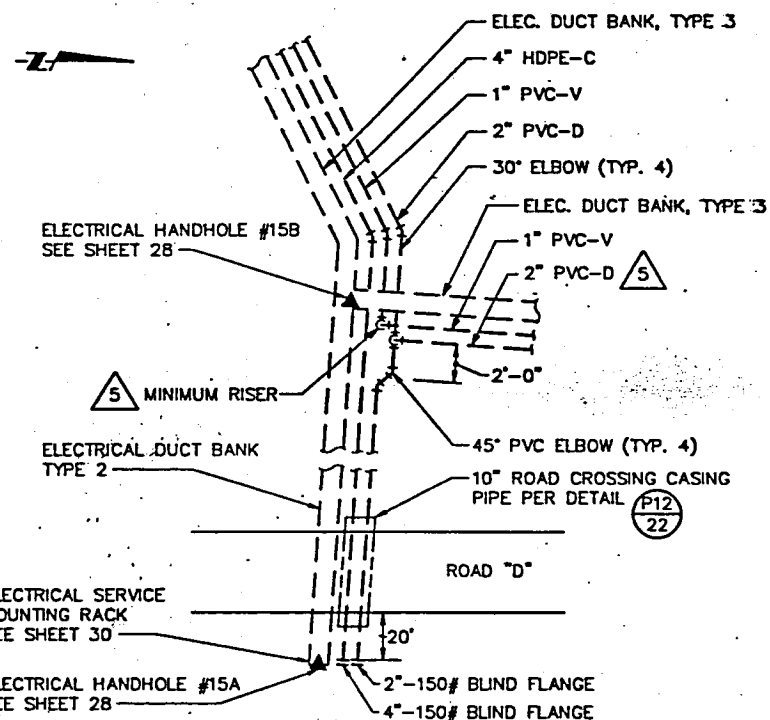
CONDENSATE CLEANOUT
DETAIL P20
NO SCALE 16 THRU 18



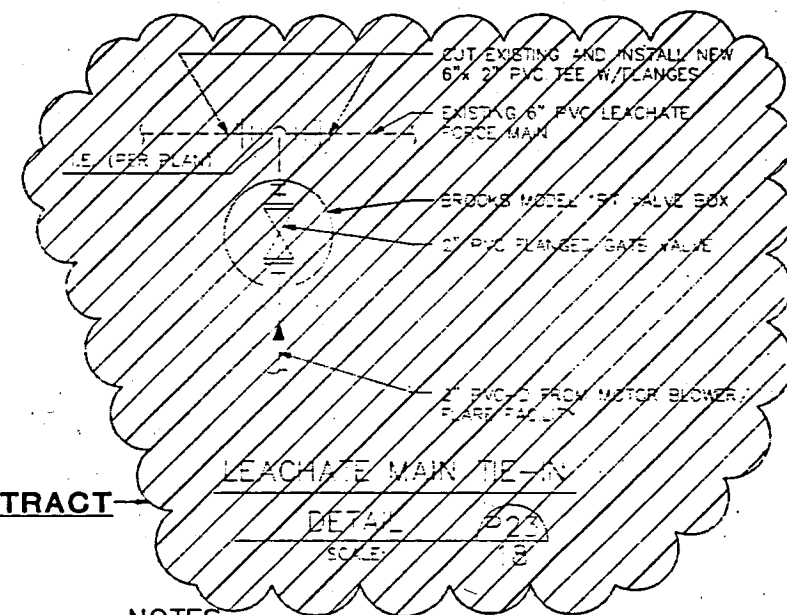
CONDENSATE COLLECTION PIPE TRENCH
DETAIL P21
NO SCALE 16 THRU 18



CONDENSATE DISCHARGE PIPE TRENCH
DETAIL P22
NO SCALE 16 THRU 18



CONDENSATE DISCHARGE PIPING INTERSECTION
DETAIL P23
NO SCALE 18



NOTES:

- 1 GLUE 1" THICK POLYFOAM BOARD TO INSIDE OF VAULT, ALL SIDES AND COVER. SLOPE GRADE AWAY FROM VAULT.
- 2 INSTALL "ROMAC" SADDLE FOR 1/2" NPT CONNECTION ON HORIZONTAL CENTERLINE OF GAS MANIFOLD.
- 3 MAXIMUM SPACING 200'-0" C/C
- 4 QUANTITY AND SIZE OF LINES MAY VARY. SEE GAS AND CONDENSATE COLLECTION PLANS. TRENCH WIDTH SHALL BE DETERMINED BY QUANTITY OF LINES PLUS 6" FROM O.D. OF PIPE TO TRENCH WALL.
- 5 CONTRACTOR TO SLOPE LINES UP AND OVER, AS NECESSARY TO MAKE TIE-INS.

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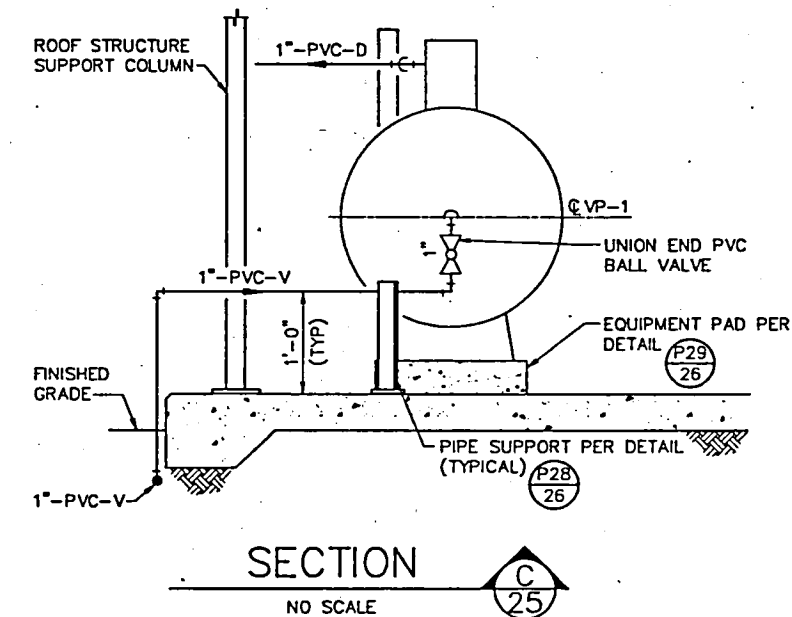
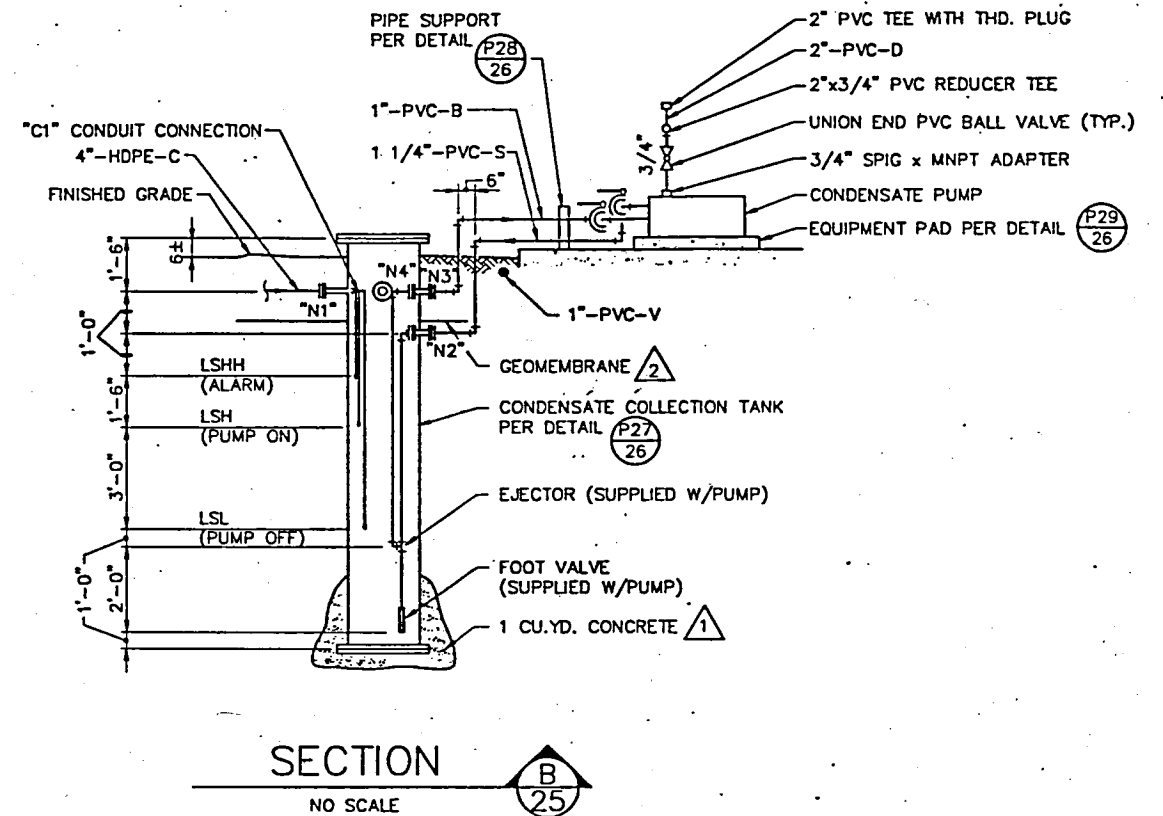
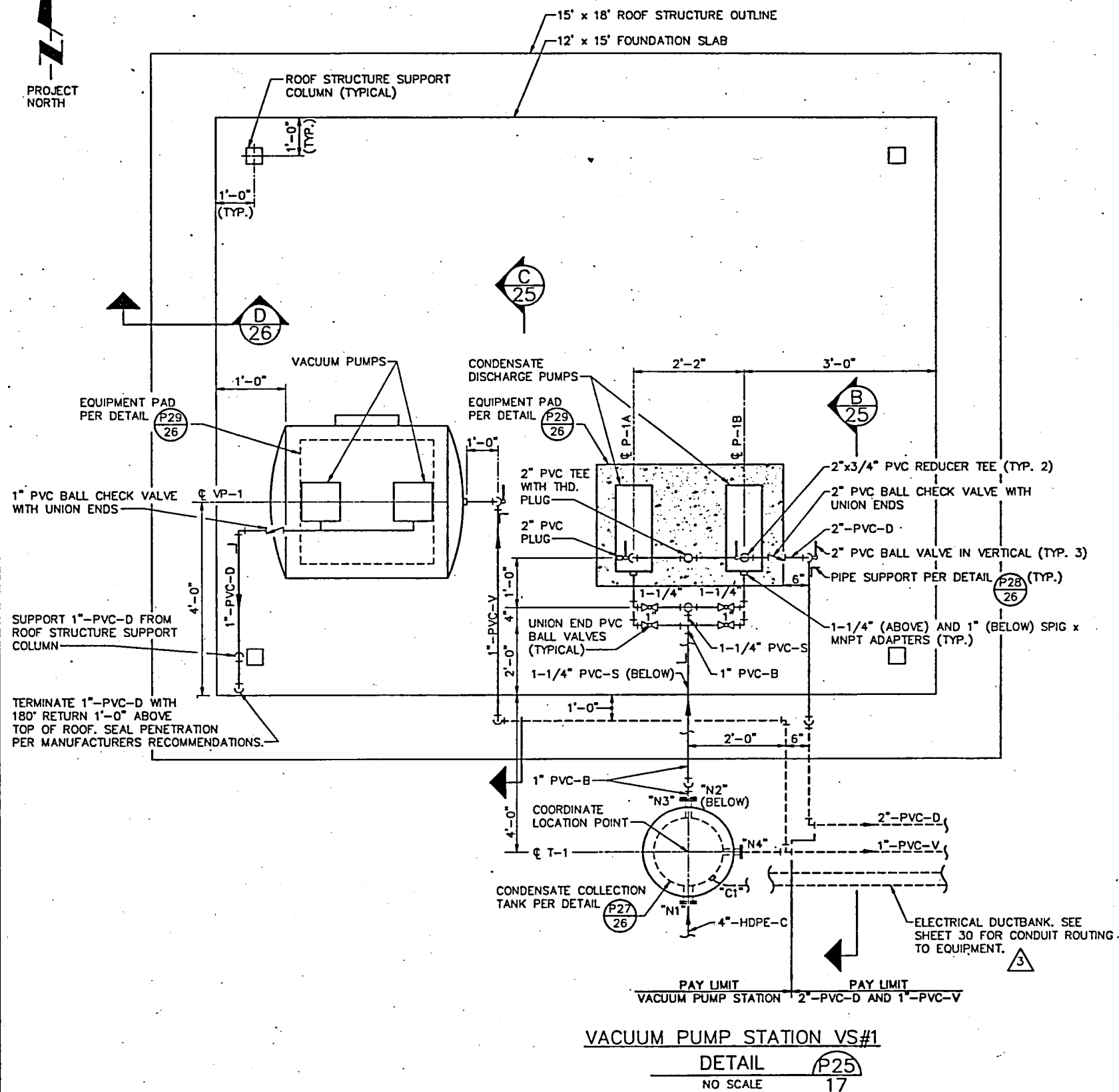
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METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
PIPING DETAILS/CONDENSATE
COLLECTION SYSTEM

SHEET: 24
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190326



NOTES:

1. CONTRACTOR TO BLOCK TANK 1'-0" ABOVE BOTTOM OF EXCAVATION TO ALLOW CONCRETE TO FLOW BENEATH.
2. COVER PENETRATION PER DETAIL C6/10.
3. COORDINATE CONDUIT PENETRATIONS THROUGH FOUNDATION WITH ELECTRICAL SHEETS.

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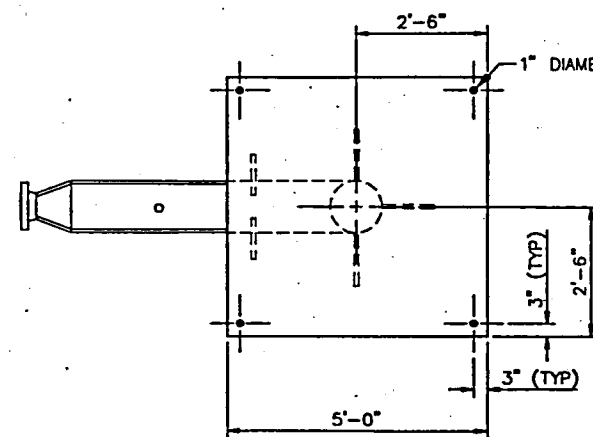
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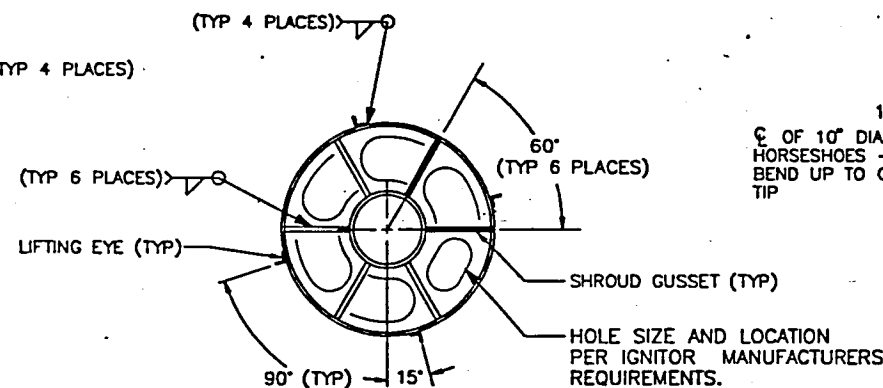
METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
VACUUM PUMP STATION PLAN AND SECTIONS
CONDENSATE COLLECTION SYSTEM

SHEET: 25
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190327

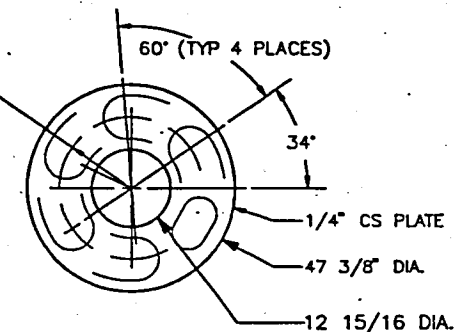


BOTTOM

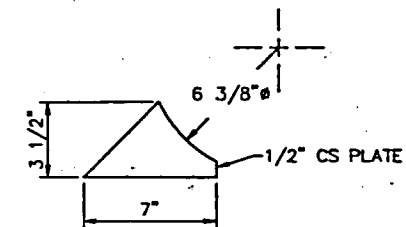


SECTION E

NO SCALE

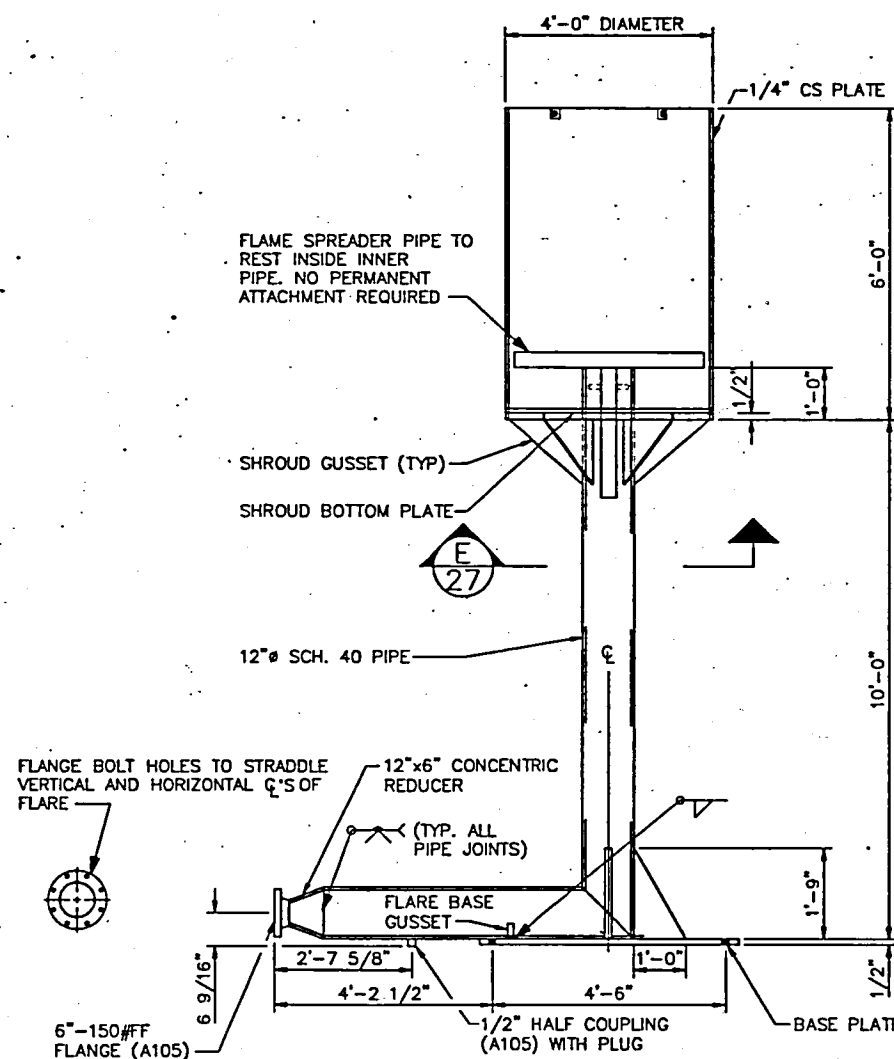


SHROUD BOTTOM PLATE
NO SCALE



FLARE BASE GUSSET
NO SCALE

NOTE:
2 REQUIRED

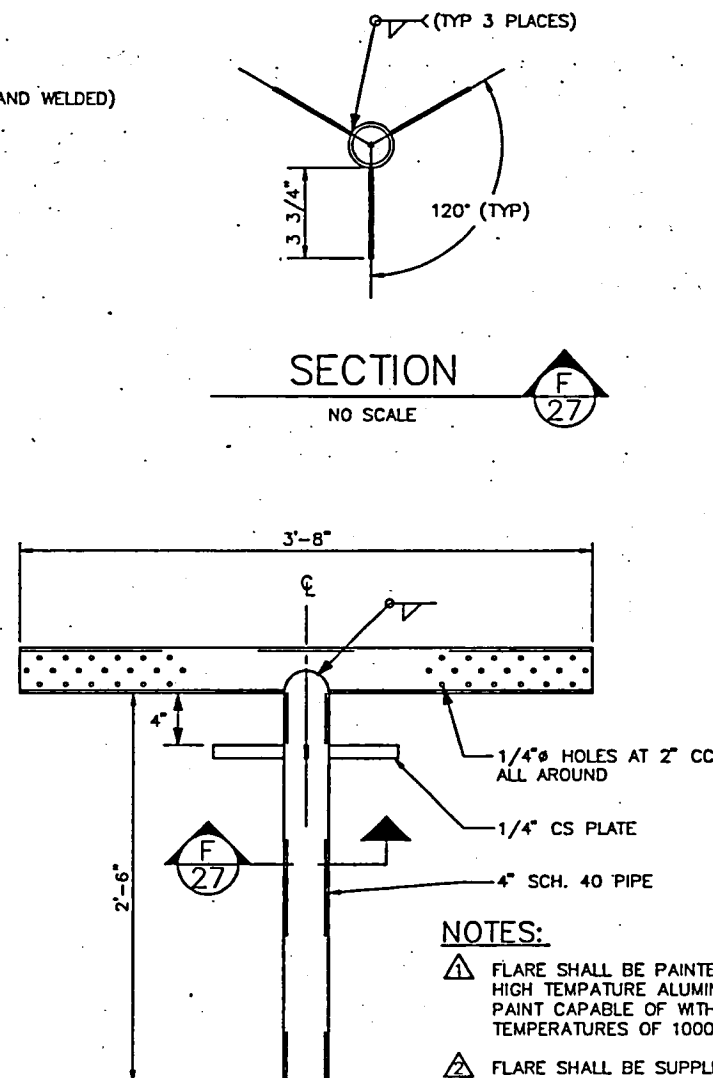


ELEVATION

TEMPORARY GAS FLARE

DETAIL P31

NO SCALE



SECTION F

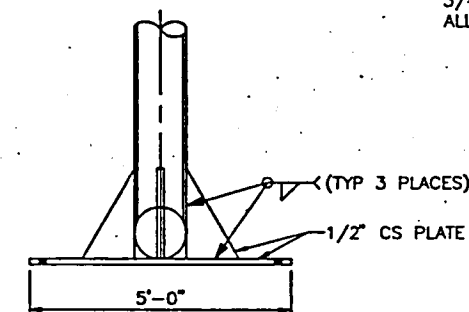
NO SCALE

FLAME SPREADER PIPE

NO SCALE

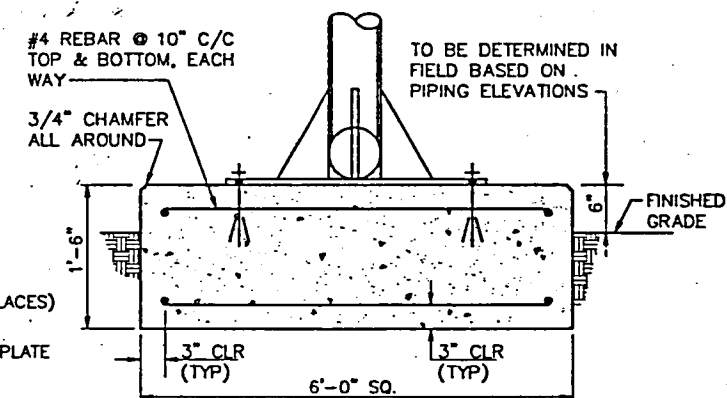
NOTES:

- FLARE SHALL BE PAINTED WITH HIGH TEMPERATURE ALUMINUM PAINT CAPABLE OF WITHSTANDING TEMPERATURES OF 1000°F.
- FLARE SHALL BE SUPPLIED WITH ALL NECESSARY GUY WIRE AND HARDWARE REQUIRED TO ANCHOR FLARE TO FOUNDATIONS.



BASE PLATE

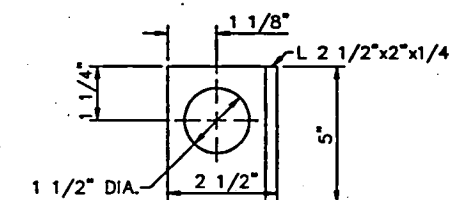
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TEMPORARY FLARE
EQUIPMENT FOUNDATION

DETAIL P32

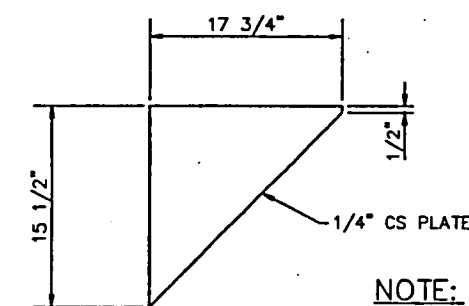
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LIFTING EYE

NO SCALE

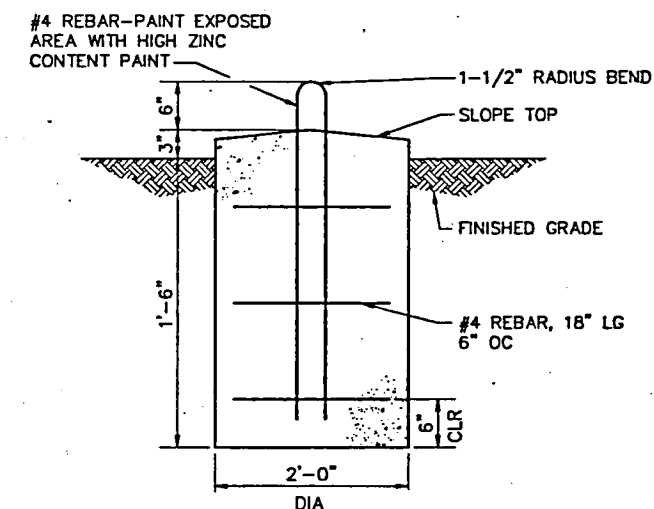
NOTE:
4 REQUIRED



SHROUD GUSSET

NO SCALE

NOTE:
6 REQUIRED



GUY WIRE FOUNDATION

DETAIL P33

NO SCALE

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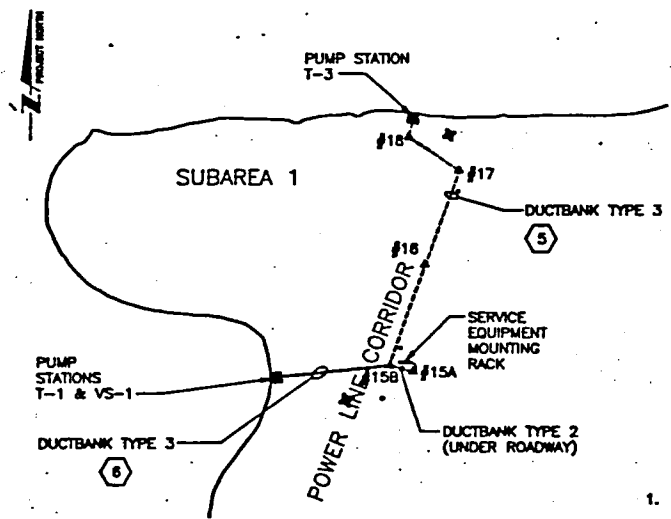
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| CHECKED: | KMZ | 11/91 |
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METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neill, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
TEMPORARY SYSTEM DETAILS
GAS AND CONDENSATE COLLECTION SYSTEM

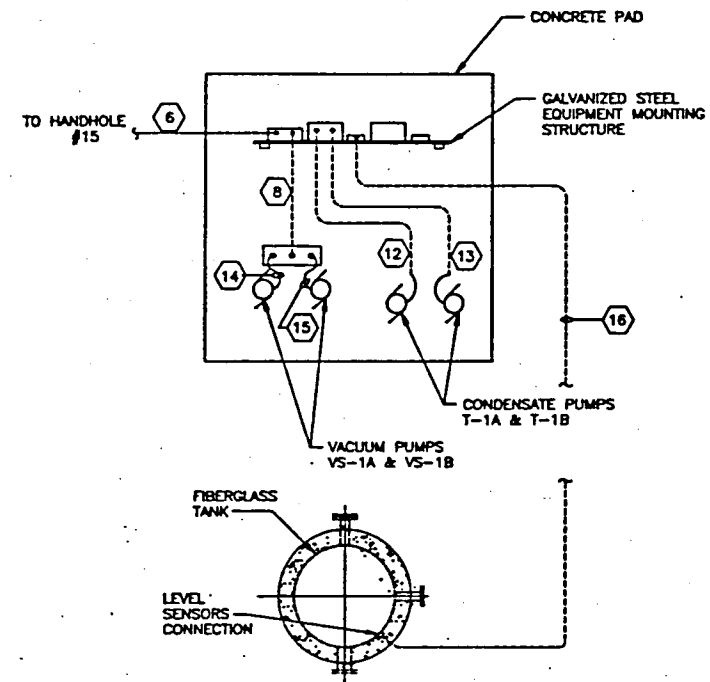
SHEET: 27
OF 30
DATE: DECEMBER, 1991
DWG NO: 19190329



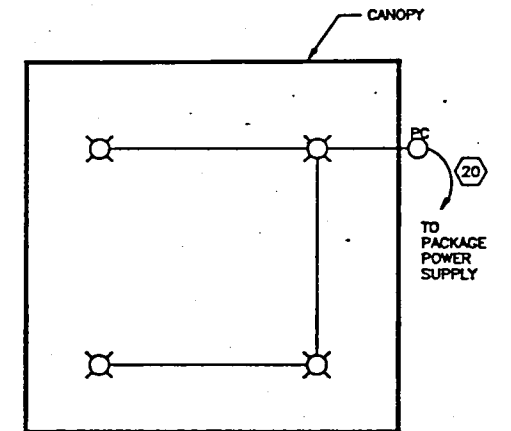
ELECTRICAL SITE PLAN
SCALE: 1" = 400'

NOTES

1. INSTALL THE DUCTBANKS IN THE SAME TRENCH AS THE PIPING. SEE THE GAS AND CONDENSATE COLLECTION PLANS (SHEETS 16, 17 AND 18) FOR THE EXACT ROUTING OF THE UTILITY TRENCHES.



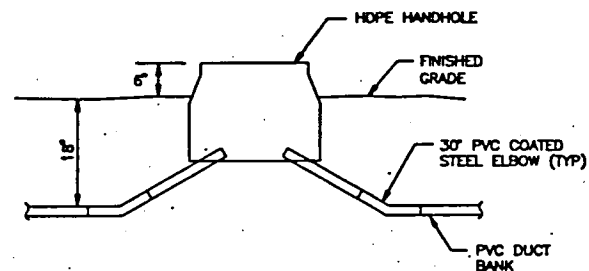
**COMBINATION VACUUM PUMP/
CONDENSATE PUMP STATION T-1/VS-1
POWER PLAN**



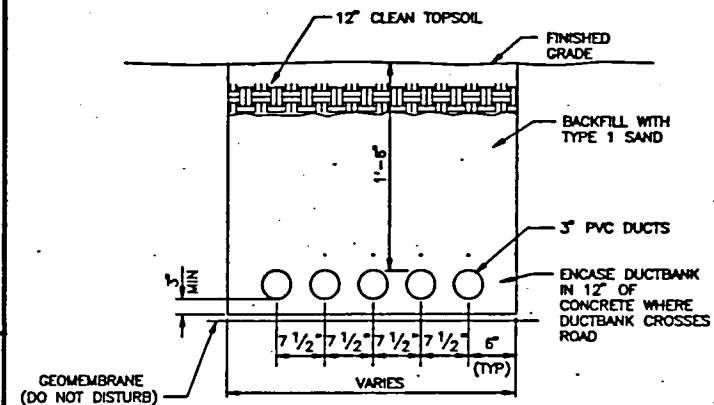
**COMBINATION VACUUM PUMP/
CONDENSATE PUMP STATION T-1/VS-1
LIGHTING PLAN**

ELECTRICAL SYMBOLS

- MOTOR
- LIGHTING FIXTURE TYPE A
- CIRCUIT BREAKER
- STARTER OR RELAY COIL
- OVERLOAD RELAY
- NORMALLY OPEN CONTACT
- LEVEL SENSOR (CLOSES ON HIGH LEVEL)
- HANDHOLE
- CONDUIT NUMBER
- PHOTOCELL SWITCH



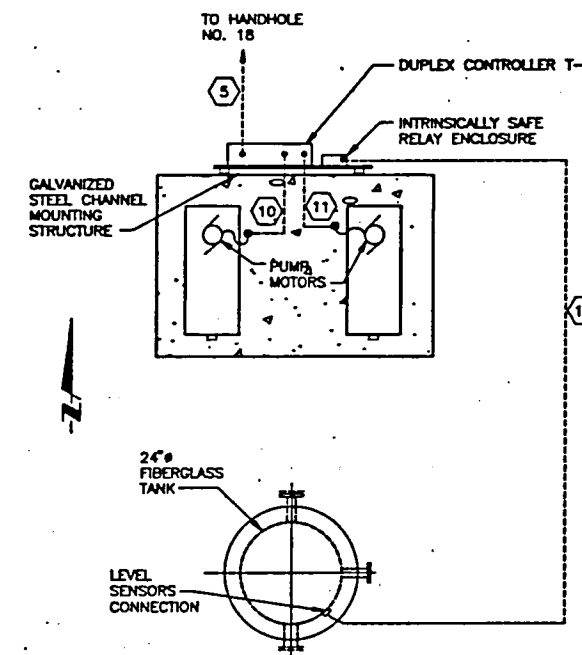
HANDHOLE DETAIL
NOT TO SCALE



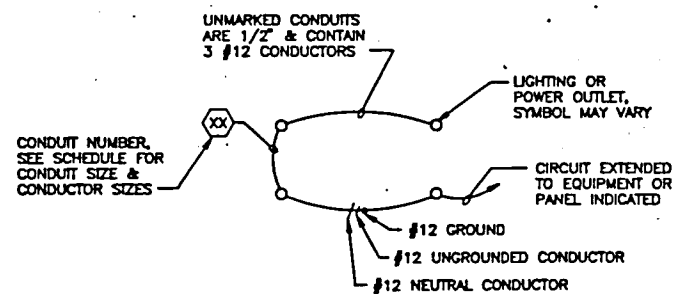
DUCTBANK TYPE 1
NOT TO SCALE

NOTES:

1. DUCTBANK TYPE 2 IS SIMILAR TO DUCTBANK TYPE 1 EXCEPT THREE DUCTS.
2. DUCTBANK TYPE 3 IS SIMILAR TO DUCTBANK TYPE 1 EXCEPT TWO DUCTS.



CONDENSATE PUMP STATION T-3
SCALE: NONE



CIRCUIT SYMBOLS DETAIL
NOT TO SCALE

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| DRAWN: | RRO | 12/2/91 |
| CHECKED: | DBC | 12/2/91 |
| DESIGN REVIEW: | SSS | 12/2/91 |



METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

**ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
ELECTRICAL SITE PLAN & DETAILS**

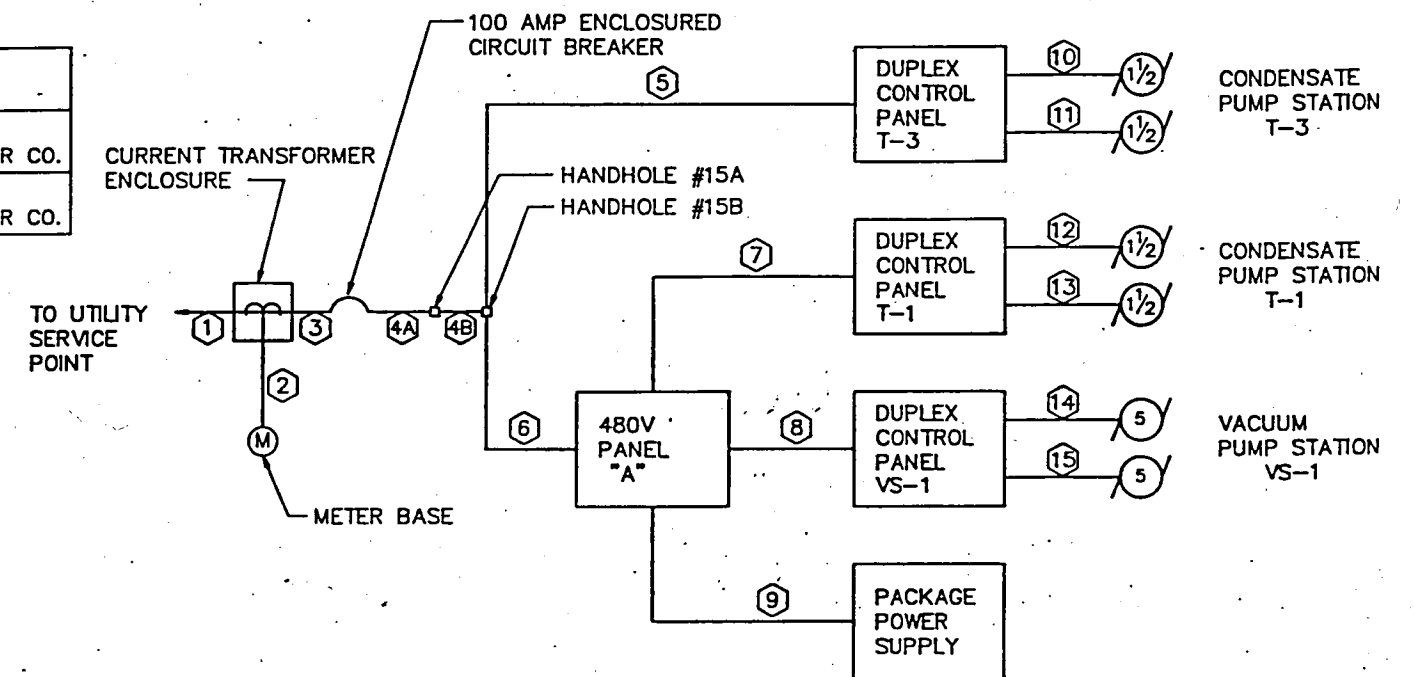
SHEET: 28
OF: 30
DATE: DECEMBER 1991
DWG NO: 19190330

CONDUIT SCHEDULE

| NO. | TYPE | SIZE | CONDUCTORS | FROM | TO | REMARKS |
|-----|------------|------|------------------------------|--------------------------------------|--|---|
| ① | - | 2" | (3) #2 | UTILITY SERVICE POINT | C.T. ENCLOSURE | FURNISH AND INSTALL CONDUIT AND CONDUCTORS AS REQUIRED BY POWER CO. |
| ② | GRS | - | - | C.T. ENCLOSURE | METER BASE | FURNISH AND INSTALL CONDUIT AND CONDUCTORS AS REQUIRED BY POWER CO. |
| ③ | GRS | 2" | (3) #2 & (1)#8G | C.T. ENCLOSURE | SERVICE CIRCUIT BREAKER | |
| ④A | PVC | 2" | (3) #2 & (1)#8G | SERVICE CIRCUIT BREAKER | HANDHOLE #15A | |
| ④B | PVC | 3" | (3) #2 & (1)#8G | HANDHOLE #15A | HANDHOLE #15B | IN TYPE 2 DUCTBANK |
| ⑤ | PVC | 3" | 3-CONDUCTOR #6 TYPE TC CABLE | HANDHOLE #15A | CONDENSATE PUMP STA T-3 DUPLEX CONTROL PANEL | VIA HANDHOLES 16,17 & 18 IN TYPE 3 DUCTBANK |
| ⑥ | PVC | 3" | 3-CONDUCTOR #2 TYPE TC CABLE | HANDHOLE #15A | CONDENSATE/VACUUM PUMP STA T-1/VS-1 | IN TYPE 3 DUCTBANK |
| ⑦ | GRS | 3/4" | (3) #12 & (1)#12G | PANEL A | DUPLEX CONTROL PANEL T-1 | |
| ⑧ | GRS | 3/4" | (3) #12 & (1)#12G | PANEL A | CONDENSATE/VACUUM PANEL VS-1 | |
| ⑨ | GRS | 3/4" | (3) #12 & (1)#12G | PANEL A | PACKAGE POWER SUPPLY | |
| ⑩ | FLEX | 3/4" | (3) #12 & (1)#12G | CONDENSATE PUMP STA T-3 DUPLEX CTRLR | PUMP T-3A MOTOR | |
| ⑪ | FLEX | 3/4" | (3) #12 & (1)#12G | CONDENSATE PUMP STA T-3 DUPLEX CTRLR | PUMP T-3B MOTOR | |
| ⑫ | FLEX | 3/4" | (3) #12 & (1)#12G | CONDENSATE PUMP STA T-1 DUPLEX CTRLR | PUMP T-1A MOTOR | |
| ⑬ | FLEX | 3/4" | (3) #12 & (1)#12G | CONDENSATE PUMP STA T-1 DUPLEX CTRLR | PUMP T-1B MOTOR | |
| ⑭ | GRS & FLEX | 3/4" | (3) #12 & (1)#12G | VACUUM PUMP STA VS-1 DUPLEX CTRLR | PUMP VS-1A MOTOR | |
| ⑮ | GRS & FLEX | 3/4" | (3) #12 & (1)#12G | VACUUM PUMP STA VS-1 DUPLEX CTRLR | PUMP VS-1B MOTOR | |
| ⑯ | GRS | 3/4" | (6) #12 | CONDENSATE TANK T-1 FLOAT SWITCHES | PUMP STATION T-1 INTRINSICALLY SAFE RELAYS | |
| ⑰ | GRS | 3/4" | (6) #12 | CONDENSATE TANK T-3 FLOAT SWITCHES | PUMP STATION T-3 INTRINSICALLY SAFE RELAYS | |
| ⑱ | GRS | 1/2" | (4) #12 & (1)#12G | INTRINSICALLY SAFE RELAY ENCLOSURE | DUPLEX CONTROL PANEL T-1 (T-3) | TYPICAL OF TWO |
| ⑲ | GRS | 1/2" | (2) #12 | INTRINSICALLY SAFE RELAY PANEL | HIGH LEVEL BEACON LIGHT | TYPICAL OF TWO |
| ⑳ | GRS | 1/2" | (4) #12 & (1)#12G | PACKAGE POWER SUPPLY | PHOTOCELL RELAY & LIGHTING FIXTURES | |
| ㉑ | GRS | 1/2" | (2) #12 & (1)#12G | PACKAGE POWER RELAY PANEL | RACK MOUNTED RECEPTACLE | |

| TYPE | VOLTAGE | LAMPS | WATTS | DESCRIPTION |
|------|---------|----------------------|-------|--|
| A | 120 | TWIN TUBE FLUOR. | 13 | VANDAL RESISTANT FLUORESCENT WITH IES TYPE V DISTRIBUTION. UL LISTED FOR DAMP LOCATIONS. HUBBELL CAT. NO. NRG-806, OR EQUAL |
| B | 120 | ROUGH SERVICE INCAN. | 150 | COPPER FREE CAST ALUMINUM BOX AND BODY, RUBY COLORED GLASS GLOBE AND UL LISTED FOR DAMP LOCATIONS HUBBELL CAT. NO. VWX-151, OR EQUAL |

LIGHTING FIXTURE SCHEDULE



| | | | | | | | | |
|---|------|-------------|-----------|--------|-----------|-------------|------|----------------------|
| PANEL A | 480 | VOLTS, | 3 | PHASE, | 3 | WIRE, | 100 | AMP BUSS |
| LOCATION: COND/VACUUM PUMP STA.T-1/VS-1 MOUNTING: SURFACE MAINS: 100 AMP AIC: 10,000 | | | | | REMARKS: | | | |
| CIRCUIT DESCRIPTION | LOAD | BKR AMPS | POE NO | | POE NO | BKR AMPS | LOAD | CIRCUIT DESCRIPTION |
| DUPLEX CONTROL PANEL T-1 | 1.5 | 20 | 1 | | 2 | 20 | 5 | PACKAGE POWER SUPPLY |
| | | | 3 | | 4 | | | |
| | | | 5 | | 6 | | | |
| DUPLEX CONTROL PANEL VS-1 | 5 | 20 | 7 | 8 | | | | SPACE ONLY ↓ |
| | | | 9 | 10 | | | | |
| | | | 11 | 12 | | | | |
| TOTAL CONNECTED LOAD = 11.5 KVA DEMAND LOAD = 11.5 KVA, 13.8 AMPS | | | | | | | | |

| | | | | | | | | | | |
|---|--------------------|-------------|---|---|----------|---|-------|-------------|------|---------------------|
| PACKAGE PWR SUPPLY | 480-120/240 VOLTS, | | | 1 | PHASE, | 3 | WIRE, | 5 | KVA | |
| LOCATION: COND./VACUUM PUMP STA. T-1/VS-1 | | | | | REMARKS: | | | | | |
| MOUNTING: SURFACE | | | | | | | | | | |
| MAINS: 20 AMP PRIMARY, 30 AMP SECONDARY | | | | | | | | | | |
| AIC: 10,000 | | | | | | | | | | |
| CIRCUIT DESCRIPTION | LOAD | BKR AMPS | W | Ø | | W | Ø | BKR AMPS | LOAD | CIRCUIT DESCRIPTION |
| LIGHTS | 0.8 | 20 | 1 | | | 2 | | | | SPACE |
| RECEPTACLE | 0.2 | 20 | 3 | | | 4 | | | | |
| SPARE | | 20 | 5 | | | 6 | | | | |
| TOTAL CONNECTED LOAD = 1.0 KVA | | | | | | | | | | |
| DEMAND LOAD = 1.0 KVA, 4.0 AMPS | | | | | | | | | | |

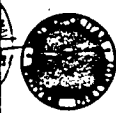
Parametrix, Inc.

Post Office Box 480
Bremerton, Washington 98310
360-438-9910 360-653-0138
5700 Knap Way, Suite 202
Bremerton, Washington 98312
360-377-0214

13020 Interbay Way
Burien, Washington 98148
206-486-3200
7800 NE Johnson, Suite B-4
Portland, Oregon 97218
503-258-8444

ALPHA ENGINEERING GROUP
22332 17th Ave SE Suite 301
Bothell, WA 98021
(206) 486-3400

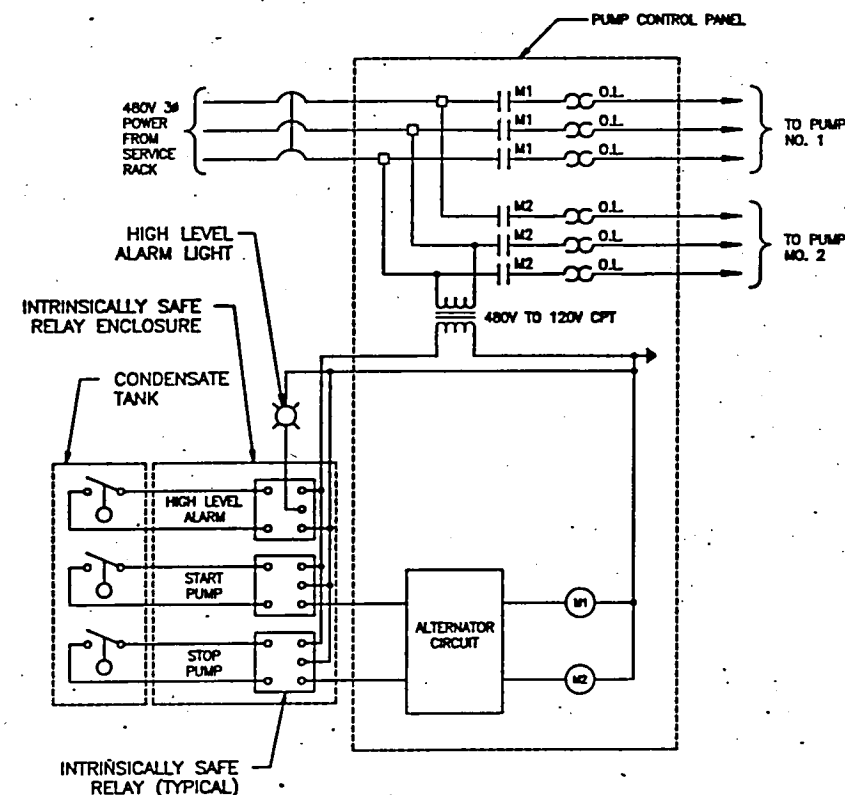
DESIGNED: DBC
CHECKED: WBS 12/2/91
DRAWN: RRO
CHECKED: DBC 12/2/91
DESIGN REVIEW: SSS 12/2/91



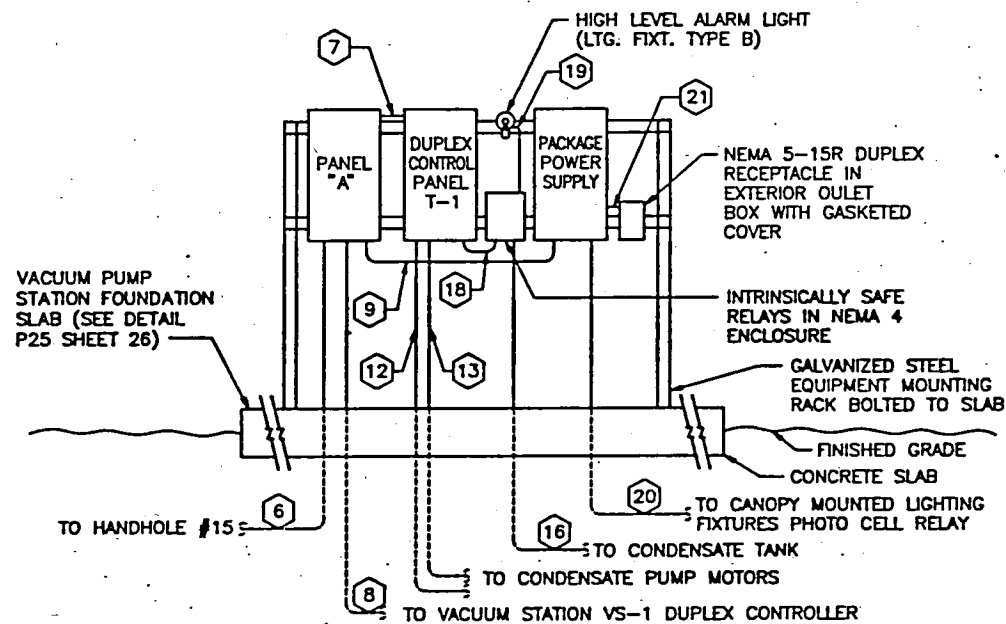
METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
ONE-LINE DIAGRAM & ELECTRICAL SCHEDULE

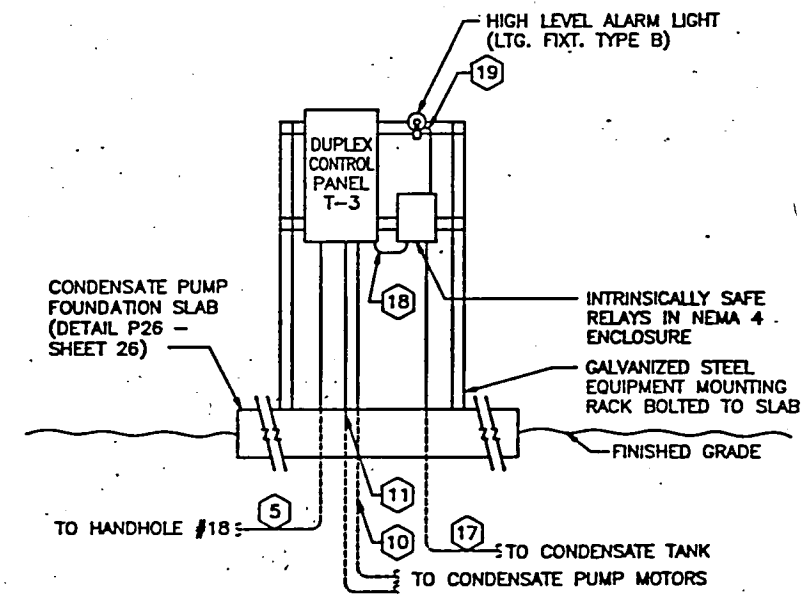
SHEET: 29
OF 30
DATE: DECEMBER 1991
DWG NO: 19190331



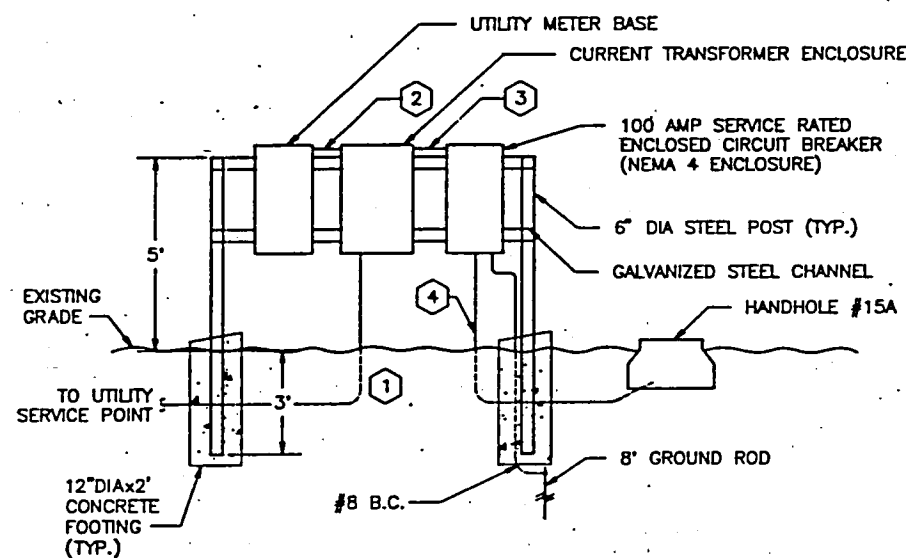
**PUMP STATIONS T-1 & T-3
CONTROL SCHEMATIC**



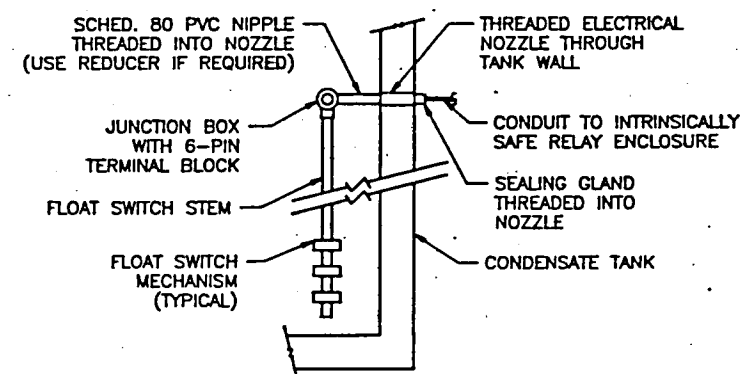
**CONDENSATE/VACUUM PUMP STATION T-1/VS-1
EQUIPMENT RACK ELEVATION**



**CONDENSATE PUMP STATION T-3
EQUIPMENT RACK ELEVATION**



SERVICE EQUIPMENT MOUNTING RACK



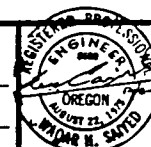
**CONDENSATE TANK FLOAT SWITCH
ASSEMBLY MOUNTING DETAIL**

Parametrix, Inc.

Parametrix, Inc.
2000 17th Ave SE Suite 301
Burien, WA 98148
206-473-0110 FAX 206-473-0118
5700 Alaskan Way, Suite 300
Seattle, WA 98101
206-473-0114

ALPHA ENGINEERING GROUP
22232 17th Ave SE Suite 301
Burien, WA 98148
(206) 486-3400

| DESIGNED: | NAME | DATE |
|---|----------------------|---------|
| CHECKED: <td>DBC <td>12/2/91</td> </td> | DBC <td>12/2/91</td> | 12/2/91 |
| DRAWN: <td>WHS <td>12/2/91</td> </td> | WHS <td>12/2/91</td> | 12/2/91 |
| CHECKED: <td>RRO <td>12/2/91</td> </td> | RRO <td>12/2/91</td> | 12/2/91 |
| DESIGN REVIEW: <td>DBC <td>12/2/91</td> </td> | DBC <td>12/2/91</td> | 12/2/91 |
| | SSS <td>12/2/91</td> | 12/2/91 |



METROPOLITAN SERVICE DISTRICT
Solid Waste Department
Jim Watkins, Engineering Manager
Dennis O'Neil, Project Manager

**ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
CONTROL SCHEMATIC & ELECTRICAL DETAILS**

SHEET: 30
OF 30
DATE: DECEMBER 1991
DWG NO: 19190332



METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

Part I of II

DATE: January 2, 1992

TO: Metro Council
Executive Officer
Interested Persons

FROM: Paulette Allen, Clerk of the Council *PA*

RE: AGENDA ITEM NO. 7.2; RESOLUTION NO. 92-1546

The Council agenda will be printed before the Solid Waste Committee meets on January 7 to consider Resolution No. 92-1546. Solid Waste Committee reports will be distributed in advance to Councilors and available at the January 9 Council meeting.

The resolution RFB will be distributed under separate cover due to the volume of that document.

ST. JOHNS LANDFILL
CLOSURE OF SUBAREA 1
RFB #91B-49-SW

Metropolitan Service District
Solid Waste Department
2000 S.W. First Avenue
Portland, Oregon 978201-5398

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SURETY

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SIGNATURE PAGE

NON-COLLUSION AFFIDAVIT

BID BOND

DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION FORM

WOMEN BUSINESS ENTERPRISES UTILIZATION FORM

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**SECTION 00030
INVITATION TO BID**

Sealed Bids for the St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW, must be delivered to the Metropolitan Service District (Metro), 2000 S.W. First Avenue, Portland, OR 97201-5398, to the attention of Ms. Linda Pang-Wright, Engineer no later than 3:00 p.m., Pacific Standard Time (PST), Monday, February 24, 1992. At that time, the Bids will be opened and publicly read aloud at Metro in the Council Chambers.

The St. Johns Landfill is located at 9363 N. Columbia Blvd., Portland, OR. The work contemplated is the first phase of the construction of final cover for the closure of the 230-acre St. Johns Landfill. Final cover will be constructed over a 35 acre portion of the site during 1992 which includes Subarea 1, the northern portion of the Powerline Corridor (PLC), and the western portion of Subarea 2. The base work elements for this Request for Bids (RFB) includes stripping and stockpiling of existing topsoil and low permeable soil; procurement and placement of subgrade embankment material; placement of a low permeable soil barrier; procurement and installation of 40 mil VLDPE geomembrane, geonet composite, Type I sand, and topsoil; and installation of surface water control measures including hydroseeding. At Metro's discretion, alternate work can include installation of gas extraction wells, PVC and HDPE gas piping, construction of a temporary gas flare system, and construction of a temporary gas condensate system.

Drawings and Specifications may be examined at the Metro Solid Waste Department, Room 320, 2000 S.W. First Avenue, Portland, OR 97201-5398. Sets of the documents may be purchased from Metro at the above address for \$55 per set (includes both Drawings and written Specifications). The fee for the document sets will be nonrefundable. Before a contract is awarded, Metro may conduct such additional investigations as are necessary to determine whether a Bidder is qualified. Upon request, the Bidder shall promptly submit such additional information as deemed necessary by Metro to evaluate the Bidder's qualifications.

Each Bid must be submitted on the prescribed form and accompanied by a certified check or cashier's check or Bid Bond executed on the prescribed form, payable to the Metropolitan Service District in the amount of ONE HUNDRED THOUSAND DOLLARS (\$100,000.00). The Bid and bid security should be delivered in a sealed envelope marked "St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW" to the attention of Ms. Linda Pang-Wright.

Bidders shall use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this document.

The successful Bidder will be required to furnish the necessary additional Bonds for the faithful performance of the Contract and for the payment of all persons supplying labor and materials as prescribed in the Contract Documents.

No Bid will be received or considered by Metro unless the Bid contains a statement by the Bidder that the provisions of ORS 279.350, regarding prevailing wage rates, are to be compiled with.

Each Bid must contain a statement as to whether the Bidder is a resident bidder, as defined in ORS 279.029.

Bidders or Subcontractors shall be licensed under ORS 468.883 (regarding licensing of the contractors on projects involving asbestos abatement), in the event the soils may be contaminated.

Bidders and Subcontractors must be registered with the Oregon Construction Contractor's Board pursuant to ORS 701.035-90.

In the event that any subcontractors are to be used, Bidders are to comply with Metro's Disadvantaged Business Program. The program goals are:

| | |
|------------------------------------|-----------|
| Disadvantaged Business Enterprises | 7 percent |
| Women-Owned Business Enterprises | 5 percent |

The percentage goals are applicable to the total amount of the Base Work.

As part of the Bid, all Bidders must submit a statement that they will comply with the contract goals or have made good faith efforts to do so. Failure to meet these goals or to demonstrate good faith efforts to do so will constitute a non-responsive Bid. See "Instructions to Bidders" for references to applicable procedures and the Appendix stating Metro's position on this issue. Any questions regarding DBE/WBE requirements should be addressed to the Metro Contracts Administrator, Mr. Rich Wiley at (503) 221-1646.

For any task or portion of a task to be undertaken by a subcontractor or materials supplier, the Contractor shall not engage a DBE/WBE subcontractor or materials supplier on an exclusive basis prior to Contract award.

This project is considered a public works project. By signing and submitting a Bid for this project, Bidders certify that payment of prevailing wage rates will be complied with, as contained in ORS 279.350.

A Pre-Bid Conference for prospective Bidders will be conducted at 10:00 a.m., PST, on Monday, January 27, 1992 at Metro, in the Council Chambers, 2000 S.W. First Avenue, Portland, Oregon. Attendance is mandatory to meet Metro's Good Faith Effort in contracting to disadvantage businesses. A Site visit is planned following the meeting.

The Bidder shall provide Metro with a certificate of insurance for Environmental Impairment Liability in the amount of ONE MILLION DOLLARS (\$1,000,000) covering emissions, discharges, dispersals, disposals, releases, escapes or seepages of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, gases, waste materials, irritants, noise, and contaminants that spoil the land, atmosphere, or water.

Metro reserves the right to reject all Bids or any Bids not conforming to the intent and purpose of the Contract Documents, to reject for good cause any and all Bids upon a finding of Metro that it is in the public interest to do so or to waive any informality or irregularity in any Bid or Bids. Metro further reserves the right to award the Contract at any time within sixty (60) days following the Bid opening date.

For information concerning the proposed work, or to make an appointment to visit the sites of the proposed work, contact Ms. Linda Pang-Wright, Engineer, or Mr. Pete Hillmann, Construction Coordinator at Metro, (503) 221-1646.

Dated on this _____ day of _____, 1992.

METROPOLITAN SERVICE DISTRICT

By: _____
Bob Martin, Director
Solid Waste Department

SECTION 00110
INSTRUCTIONS TO BIDDERS

1. DESCRIPTION OF WORK

The work contemplated is the first phase of the construction of final cover for the closure of the approximately 230-acre St. Johns Landfill. Final cover will be constructed over a 35 acre portion of the site during 1992 which includes Subarea 1, the northern portion of the Powerline Corridor (PLC), and the western portion of Subarea 2. The base work elements for this Request for Bids (RFB) includes stripping and stockpiling of existing topsoil and low permeable soil; procurement and placement of subgrade embankment material; placement of a low permeable soil barrier; procurement and installation of 40 mil VLDPE geomembrane, geonet composite, Type I sand, and topsoil; and installation of surface water control measures including hydroseeding. At Metro's discretion, alternate work can include installation of gas extraction wells, PVC and HDPE gas piping, construction of a temporary gas flare system, and construction of a temporary gas condensate system.

2. DEFINITIONS

Except as otherwise specifically provided herein, all words and phrases defined in the General Conditions shall have the same meaning and intent in these Instructions to Bidders. Bidders should refer to those definitions as they read these Instructions.

3. DOCUMENT INTERPRETATION

The Contract Documents are intended to be complementary and to provide all details reasonably required for the execution of the proposed Work. Any person contemplating the submission of a Bid shall have thoroughly examined all of the various parts of these Contract Documents. If the Bidder has any doubt as to the meaning or the intent of the Contract Documents or finds any inconsistency or discrepancy within the Contract Documents, the Bidder must request Metro's interpretation, in writing at least ten (10) working days prior to Bid opening. Such requests for interpretation shall be mailed or delivered to Metro at 2000 S.W. First Avenue, Portland, Oregon 97201-5398, Attention: Ms. Linda Pang-Wright. Any interpretations or changes in the Contract Documents will be made only in writing, in the form of Addenda to the Contract Documents which will be furnished to all Bidders receiving a set of the Bidding Documents and which shall be binding upon all Bidders as if set forth in the original Contract Documents. Bidders shall indicate receipt of all Addenda on their Bids. Metro will not be responsible for any other explanation or interpretation of the Bidding Documents. Bidders shall have no right to rely on any oral interpretation or instructions made by Metro or the Engineer, unless it is also committed to writing and issued as an Addendum.

In the absence of any pre-bid request for clarification, or any interpretation of the Contract Documents, as outlined above, any subsequent interpretation shall be made by Metro, and shall be final and binding on the successful Bidder, and Metro shall pay no extra costs or expenses to such Bidder resulting from such interpretation.

4. EXAMINATION OF CONTRACT DOCUMENTS AND SITE AND COMPLIANCE WITH LAWS

Before submitting a Bid, Bidders shall fully examine and read the Contract Documents; visit the site of the proposed Work, and examine the Site and the surrounding areas; and fully inform themselves of all conditions on, in, at and around the Site, the surrounding areas, and any work that may have been done thereon. The Bidder acknowledges by the submission of its Bid that it understands the nature and location of the Work, the general and local conditions, conditions of the Site, availability of labor, electric power, water, and the kind of surface materials on the Site, the kind of equipment needed, and all other matters

which may in any way affect the Work or the cost, including utilities not identified in the Contract Documents.

Information derived from inspection of the Contract Documents and any specific sections thereof showing location of utilities and structures will not in any way relieve the Contractor from any risk, or from properly examining the Site and making such additional investigations as it may elect, or from properly fulfilling all the terms of the Contract Documents. Investigation of Site and soil conditions have been conducted for Metro. Bidders may inspect the records of such investigations at locations specified in Section 00200.

Asbestos fill areas shown on the Drawings are known controlled disposal areas in operation since 1985. Contractor may encounter asbestos contaminated waste in other areas.

Metro does not in any way warrant the accuracy of any information in such investigations and Bidders shall have no right to rely on the information contained in such records or investigations. Furthermore, if the Bidder determines that additional investigations of site and/or soil conditions are necessary or desirable, Bidder shall cause such additional investigations to be made, at Bidder's expense, prior to submitting a Bid and subject to coordination with Metro.

Any failure of a Bidder to acquaint itself with all of the available information concerning conditions or having such additional investigations of Site and soil conditions conducted, as may be necessary, will not relieve it from responsibility for estimating properly the difficulties or cost of the Work and the Bidder shall, regardless of such failure, be bound to its Bid.

Each Bidder shall inform itself of, and the Bidder awarded a Contract shall comply with, federal, state, and local laws, codes, statutes, ordinances, and regulations, as amended, relative to the execution of the Work. Each Bidder shall prepare its Bid in accordance with, and all Bid prices shall assume compliance with, such laws, codes, statutes, ordinances and regulations. This requirement includes, but is not limited to, applicable regulations concerning minimum wage rates, prevailing wage rates, nondiscrimination in the employment of labor, protection of public and employee safety and health, environmental protection, the protection of natural resources, fire protection, burning and nonburning requirements, permits, fees, and similar subjects.

If any portion of the Contract Documents does not conform to such laws, codes, statutes, ordinances or regulations as amended, the Bidder shall so advise Metro in writing at least ten (10) days before Bids are due. If it is shown that the Contractor, as Bidder, knew or should have known that any portion of the Contract Documents does not conform to such laws, codes, statutes, ordinances or regulations and had failed to so advise Metro, it shall be liable for costs of making any deviation(s) required for compliance with such laws, codes, statutes, ordinances or regulations.

Each Bidder, in submitting its Bid, certifies that the Bidder is eligible to receive a contract for a public work, as set forth in ORS 279.361 and agrees, if awarded the Contract, that each of its Subcontractors will be required to certify such compliance, and certification will be filed with Metro prior to such Subcontractor commencing any work under the Contract. A copy of "PREVAILING WAGE RATES for Public Works Contracts in Oregon" is enclosed herein and applies to the work performed under the Contract.

5. DISADVANTAGED BUSINESS PROGRAM COMPLIANCE

Metro has made a strong commitment to provide maximum opportunities to Disadvantaged and Women-Owned Businesses in contracting. The successful Bidder will be required to meet Metro's Disadvantaged Business Program goals or clearly demonstrate that a good faith effort has been made to meet the goals. The goals for this Contract are: Disadvantaged Business Enterprises (DBEs) -- seven percent (7%), and Women-Owned Business Enterprises (WBEs) -- five percent (5%) of the Base Bid Amount. DBEs and

WBEs must be certified by the state of Oregon as DBEs/WBEs, at the time of Bid opening, to be counted toward the Contract goals.

The Bid submitted must contain a fully completed Disadvantaged Business Program Compliance Form contained herein. Metro will require apparent low Bidders to submit completed DBE and WBE Utilization Forms (also contained herein) and all good faith efforts documentation by the close of the next working day following Bid opening. Within five working days of Bid opening, such Bidders must submit to Metro signed letters of agreement between the Bidder and the DBE/WBE subcontractors or suppliers to be utilized in performance of the Contract. Detailed procedures for completing the forms and for demonstrating good faith efforts are contained in Metro Code 2.04 (Metro's Disadvantaged Business Program). Refer to the Appendix for a letter from the Metro Deputy Executive Officer which states Metro's position on this issue. Any questions are to be directed to Mr. Rich Wiley, Metro Contract Administrator.

Bidder's special attention is directed to Section 2.04.155 (Contract Award Criteria), and Section 2.04.160 (Determination of Good Faith Efforts). Bidders should note that the latter section includes a requirement of:

Advertise in trade association, general circulation, minority and trade-oriented, women-focus publications, if any, and through a minority-owned newspaper or minority-owned trade publication concerning the subcontracting or material supply opportunities (on the project) at least ten (10) days before Bids or proposals are due.

The following are minority-oriented and women-focus publications in the Portland metropolitan area that Metro is aware of:

The Hispanic News, 9203 S.E. Francis, Portland, OR 97266 (503) 777-6759

The Skanner, 2337 N. Williams Avenue, Portland, OR 97211 (503) 287-3562.

The Portland Observer, P.O. Box 3137, Portland, OR 97208 (503) 283-2486

The American Contractor, P.O. Box 11233, Portland, OR 97211 (503) 208-9000

Pro-Woman, P.O. Box 6957, Portland, OR 97228 (503) 452-0121

The requirement to advertise is but one of the actions necessary to demonstrate good faith efforts under this program.

CAUTION: Failure of the Bidder to comply with all of the requirements of the Disadvantaged Business Program will result in the Bid being deemed non-responsive.

6. PREPARATION OF BIDS

All blank spaces in the Bid Forms must be completed either by typing or in ink. Amounts shall be shown in both words and figures. Any Bids which do not include prices on all Bid Items will be considered non-responsive and will be rejected. No changes shall be made in the phraseology of the forms.

Any Bid may be deemed non-responsive which contains omissions, erasures, alterations, or additions of any kind, or prices uncalled for, or in which any of the prices are obviously unbalanced, conditioned or which in any manner shall fail to conform to the conditions of the Contract Documents.

Each Bid shall give the full business address of the Bidder and be signed by it with its legal signature.

- a. Bids by partnerships must furnish the full name of all partners and must be signed in the partnership name by one of the members of the partnership authorized to sign contracts on behalf of the partnership, or by an authorized representative, followed by the printed name and title of the person signing.
- b. Bids by corporations must be signed with the legal name of the corporation, followed by the name of the state of incorporation and by the signature and designation of the president, secretary or other person authorized to bind it in the matter. When requested by Metro, satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished.
- c. If a Bid is submitted by a joint venture, a certified copy of the legal agreement constituting the joint venture shall be attached to the Bid.

The name of each person signing shall also be typed or printed below the signature. Signatures of all individuals must be in longhand.

Failure to fulfill any of the above requirements may render the Bid non-responsive.

7. SUBMISSION OF BIDS

All Bids must be submitted not later than the time prescribed, at the place, and in the manner set forth in the INVITATION TO BID. Bids must be made on the forms provided under separate cover as the BID BOOK, these forms are also contained herein as the Bid Forms. Each Bid and all other documentation required to be submitted with the Bid must be submitted in a sealed envelope, so marked as to indicate its contents without being opened, and addressed in conformance with the instructions in the INVITATION TO BID and the ADVERTISEMENT FOR BIDS.

8. MODIFICATION OR WITHDRAWAL OF BIDS

Any Bid may be modified after delivery to the location specified in the Invitation to Bid by delivering to the same location before the time fixed for the Bid opening, a written sealed supplement to the original Bid, marked "Supplement to Bid of (Name of Bidder) for the St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW." A supplement shall clearly identify the Bid item(s) that are changed by setting forth the original Bid item(s), and the modified item(s). Metro may reject any Bid supplement that, in its opinion, does not set forth the proposed modifications clearly enough to determine the definiteness and certainty of the item(s) offered by the Bidder. No Bidder shall be allowed to submit more than one (1) Bid for this Contract.

Bids may be withdrawn by the Bidder prior to the time fixed for the receipt of Bids by having an authorized representative of the Bidder with sufficient identification personally pick up the Bid. Bids may not be withdrawn for a period of sixty (60) days from and after the opening of Bids or on or prior to the last date of any extension of such time as may be agreed upon between Metro and the Bidder.

9. BID SECURITY

Bids must be accompanied by a certified check or cashier's check drawn on a bank in good standing, or a Bid Bond on the form provided herein by Metro, issued by a surety authorized to issue such bonds in Oregon, named on the current list of approved surety companies acceptable on federal bonds, and conforming with the underwriting limitations as published in the Federal Register by the audit staff of the Bureau of Accounts and the U.S. Treasury Department, in the amount of not less than ONE HUNDRED THOUSAND DOLLARS (\$100,000.00). This bid security shall be given as a guarantee that the Bidder will not withdraw its Bid for a period of sixty (60) days after Bid opening, and that if awarded the Contract, the

successful Bidder will execute the attached Agreement and furnish a properly executed Performance Bond and a properly executed Labor and Materials Payment Bond, each in the full amount of the Bid, within the time specified. Bid security deposited in the form of a certified check or cashier's check shall be subject to the same requirements as a Bid Bond.

The Attorney-in-Fact (Resident Agent) who executes these bonds on behalf of the surety must attach a notarized copy of his/her Power of Attorney as evidence of his/her authority to bind the surety on the date of execution of the bond.

10. EXPERIENCE AND ABILITY TO PERFORM THE WORK

Within twenty-four (24) hours following request by Metro, any Bidder may be required to present information indicating that the Bidder has the necessary experience and qualifications in the class of Work to be performed, and the ability, equipment, key personnel and financial resources to perform the Work satisfactorily within the time specified. In determining the award of this Contract, such information will be considered, and the Bidder is cautioned to make complete and comprehensive presentation of its abilities and resources. Failure of any Bidder to comply fully and timely with a request for information under this section shall be grounds for rejection of that Bid.

No Bidder will be considered for contract award unless such Bidder is authorized by law to execute the Contract or perform the Work for which such Bid is received. Should it appear, at any time, that any Bidder is not or might not be authorized by law to execute the Contract or perform such Work, then such Bidder may at any time be rejected and Metro may refuse to execute any contract with such Bidder regardless of whether or not the contract had been previously awarded by the Metro Council and without any liability whatever on the part of the Metropolitan Service District, its Council, or any member of its Council, or Metro's officer, employees, or its agents, either as individuals or in official capacities.

11. REJECTION OF BIDS

Metro reserves the right to reject all Bids or any Bid not conforming to the intent and purpose of the Contract Documents, to waive any informality or irregularity in any Bid or Bids, to reject any Bid not in compliance with all prescribed public bidding procedures and requirements and, for good cause, to reject any or all Bids upon a finding by Metro that it is in the public interest to do so.

12. BASIS OF AWARD

Metro reserves the right to make award of this Contract to the lowest responsive, responsible Bidder, based on the lowest Total Base Bid amount or Total Bid amount (Base Bid + Alternative No. 1 Bid). Any Bid which does not include bid prices for all Bid items may be considered non-responsive and will therefore be rejected.

Under Oregon Law (Oregon Laws 1991, Chapter 385, Section 61, included in an Appendix to the bid documents), public agencies, including Metro, must give preference to the purchase of materials and supplies manufactured from recycled materials. All Bidders are required to specify the minimum, if not exact, percentage of recycled product in each product offered, and both the post-consumer and secondary waste content of each product offered. A Bidder may also specify that none of the products offered contain any recycled product. The definitions of "recycled product," "post-consumer waste," and "secondary waste material," as well as other explanatory materials, are included in the Appendix.

A form is included for submittal of recycled product information. The form allows a bidder to specify that different portions of a single bid item contain different amounts of recycled product. If the recycling information form is not submitted with the bid, Metro will assume that none of the products offered contain

any recycled product. In addition, Metro will assume that a bid item contains no recycled product if information submitted for the item is in Metro's opinion incomplete, incorrect, or unintelligible.

Metro will calculate the recycled product preference as follows: If any Bidder submits a bid price for an item that (1) meets the definition of "Recycled Product" (see Oregon Laws 1991, Chapter 385, Section 59, in Appendix), (2) meets applicable standards, and (3) can be substituted for a comparable non-recycled product, Metro will subtract 5 percent from the Bid Item for the purpose of comparing bids. In all circumstances, the Bidder shall submit the actual proposed cost of the Bid Item. It is Metro's responsibility to calculate any preferences required under Oregon law.

In determining the lowest responsive, responsible Bidder, Metro shall, for the purpose of awarding the Contract, add a percent increase on the Bid of a nonresident Bidder, as that term is defined in ORS 279.029(6)(c), equal to the percent, if any, of the preference given to that nonresident Bidder in the state in which that Bidder resides. For purposes of determining the percent increases to be applied pursuant to this section, Metro shall rely on the list published by the Oregon Department of General Services pursuant to ORS 279.029(3), and Metro shall not incur any liability to any Bidder by relying on such list.

13. **ALTERNATES**

The Bidder is required to bid on the Alternate work. The Alternate work of the SCHEDULE OF BID PRICES solicits prices for the construction of a gas and condensate collection system. The actual performance of this work will be determined at the discretion of Metro.

14. **LIST OF PROPOSED SUBCONTRACTORS**

Metro will require all Bidders to furnish in writing to Metro the names of all Subcontractors and Suppliers which Bidder proposes to use in completing the Work along with a brief description of the subcontract or supply work involved and the subcontract or supply work dollar amount by the close of the next working day following Bid opening. Metro will notify the Bidder in writing within ten (10) days following receipt from Bidder of the above-described information if Metro has any reasonable objection to any such proposed Subcontractor or Supplier. The Bidder shall not subcontract with any proposed Subcontractor or Supplier to whom Metro has made a reasonable objection. In the event of such objection, Bidder shall propose another entity to whom Metro has no reasonable objection. No amounts or prices bid by the Bidder shall be increased by any difference occasioned by such substitution. Failure of Metro to reply within the above-described time period shall be construed to mean that Metro has no objection at that time. Failure of the Bidder to comply with this section shall be cause for rejection of Bidder's Bid and, in such event, the bid security submitted by Bidder shall be taken by Metro and considered as liquidated damages.

Prospective Bidders are encouraged to verify the qualifications of proposed subcontractors/suppliers and be prepared to furnish Metro with a list of similar projects performed by the proposed subcontractors/suppliers.

15. **AWARD AND EXECUTION OF CONTRACT**

Within sixty (60) days after the opening of bids, Metro will accept one of the Bids or reject all of the bids. The acceptance of the Bid will be by written Notice of Conditional Award, mailed or delivered to the office designated in the Bid. The Notice of Conditional Award shall not entitle the party to whom it is delivered to any rights whatsoever.

The successful Bidder shall, within seven (7) days after receiving Notice of Conditional Award, sign and deliver to Metro the Agreement attached hereto together with an acceptable Performance Bond and a

Labor and Materials Payment Bond, certificates of insurance and certified copies of insurance policies as required in these Contract Documents.

Upon receipt of the signed Agreement and all other documents required to be submitted by the successful Bidder, as prescribed herein, Metro shall sign the Agreement and issue a written Notice to Proceed to Contractor. Contractor shall commence work within ten (10) days of issuance of the Notice to Proceed.

In the event of failure of the lowest responsive, responsible Bidder to sign and return the construction Agreement and all other documents required to be submitted, as prescribed herein, Metro may award the Contract to the next lowest responsive, responsible Bidder.

16. PERFORMANCE BOND AND LABOR AND MATERIALS PAYMENT BOND

The successful Bidder shall file with Metro a Performance Bond on the form bound herewith and in the amount described below, as security for the faithful performance of this Contract and to cover all guarantees against defective workmanship or materials, or both, for a period of one (1) year after the date of Final Completion and Acceptance of the Work by Metro. The successful Bidder shall additionally file a Labor and Materials Payment Bond on the form bound herewith and in the amount described below, as security for the payment of all persons supplying labor and materials for the construction of the Work. The surety furnishing these bonds shall have a sound financial standing and a record of service satisfactory to Metro, shall be authorized to do business in the state of Oregon, and shall be named on the current list of approved surety companies acceptable on federal bonds and conforming with the underwriting limitations as published in the Federal Register by the audit staff of the Bureau of Accounts and U.S. Treasury Department. If more than one surety is on a bond, then each surety must agree that it is jointly and severally liable on the bond for all obligations on the bond.

The amount of each bond described above shall be a sum not less than 100 percent of the Contract Amount. The Attorney-in-Fact (Resident Agent) who executes the Performance Bond and the Labor and Materials Payment Bond on behalf of the surety must attach a notarized copy of his/her Power of Attorney as evidence of his/her authority to bind the surety on the date of execution of the bond.

17. FAILURE TO EXECUTE CONTRACT AND FURNISH BONDS

The Bidder to whom a Contract is awarded who fails to promptly and properly execute this Contract and furnish the required bonds, certificates of insurance and certified copies of insurance policies shall forfeit the bid security that accompanied its Bid and the bid security shall be retained as liquidated damages by Metro. It is agreed that this sum is a fair estimate of the amount of damages Metro will sustain if the Bidder fails to enter into a Contract and furnish the bonds, certificates of insurance and certified copies of insurance policies required.

18. BID BACK-UP (Bid Preparation Documents)

Within six (6) days after Metro's request and as a condition precedent to the award of the Contract, the apparent low responsive and responsible Bidder shall submit to Metro in a sealed envelope their complete bid summary, along with corresponding back-up including, but not limited to: quantity take-off sheets, pricing sheets and information/data substantiating the Total Base Bid amount or the Total Bid amount. The back-up data provided will include that of all Subcontractors listed in the Bid, as well as all lower-tier Subcontractors. This bid summary and back-up data will be held in strict confidence by Metro in its original sealed envelope and will not be opened except in the event of dispute between Metro and Contractor. Bid Back-Up shall be delivered to Metro, 2000 S.W. First Avenue, Portland, OR 97201-5398, Attention: Ms. Linda Pang- Wright, enclosed in a double envelope to prevent accidental opening. The envelope shall

be marked "Bid Back-up Documents of (Name of Bidder) for the St. Johns Landfill Closure of Subarea 1, RFB #91B-49-SW."

SECTION 00200
INFORMATION AVAILABLE TO BIDDERS

A copy of the following permits and reports are available for review at the Metro Solid Waste Department Office:

PERMITS

Solid Waste Disposal Site Closure Permit- #116

REPORTS

1. "Final Report, St. Johns Landfill National Dioxin Study, Portland Oregon, EPA Contract No. 68-01-6692" 1986, CH2M Hill.
2. "Contract Documents for Operation of the St. Johns Landfill", June 1985.
3. "Natural Resources Management Plan for Smith and Bybee Lakes", November 8, 1990, City of Portland, Oregon.
4. "Erosion Control Plans Technical Guidance Handbook," November 1989, City of Portland & WA. Co.
5. "Geotechnical Investigation, Subarea 1 Interim Clay Cover, St. Johns Landfill", October 17, 1991, Cornforth Consultants, Inc.
6. "Technical Memorandum for Leachate Migration, Perimeter Dike, St. Johns Landfill", October 1990, Cornforth Consultants, Inc.
7. "Geotechnical Investigation for Proposed Motor Blower/Flare Facility, St. Johns Landfill, October 1990, Cornforth Consultants, Inc.
8. "St. Johns Landfill, Water Quality Impact Investigation and Environmental Management Options"; May 31, 1989; Vol.I & II, Environmental Management Options, Vol.III, Additional Tasks, Vol.IV - Appendix, Sweet-Edwards/EMCON, Inc.
9. "Revised Closure and Financial Assurance Plan of the St. Johns Landfill", September 1989, Metro.
10. Radiation Test Results of April, 1991; Radiation Control Section, State of Oregon Dept. of Human Resources, Health Division.
11. "St. Johns Landfill Closure Improvements, Engineering Report," August 1990, and "Addendum to the Engineering Report," December 1990, Parametrix, Inc.
12. "St. Johns Landfill Closure Improvements, 100% Review," December 1991, Parametrix, Inc., includes plan and specifications.

MAPS

Various topographic maps of the Site from 1979 to 1990 are available for review in the Metro Solid Waste Department.

* * * END OF SECTION * * *

**SECTION 00300
BID FORMS**

NOTE TO BIDDER: Bidders must provide all of the information requested in this Bid. Bidder should preferably type or use **BLACK** ink for completing this Bid.

To: Metropolitan Service District
Address: 2000 S.W. First Avenue, Portland, OR 97201-5398
Contract: St. Johns Landfill Closure of Subarea 1
Bidder:
Address:
Bidder's Contact:
Date:

Telephone: ()

BIDDER'S DECLARATION AND UNDERSTANDING

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

The Bidder further declares that it has carefully examined the Contract Documents for the completion of the Work, has personally inspected the Site, has satisfied itself as to the Work involved, and that this Bid is made in accordance with the provisions and under the terms of the Contract Documents which are hereby made a part of this Bid.

Any printed matter on any letter or paper enclosed herewith which is not part of the Bidding Documents or which was not requested by Metro is not to be considered a part of this Bid, and the undersigned agrees that such printed matter shall be entirely disregarded and, notwithstanding such printed matter, that the Bid is a bid to do the Work and furnish the labor and materials and all other things required by the Contract Documents strictly within the time and in accordance with such Specifications. This Bid is irrevocable for sixty (60) days following the date of the opening of Bids.

BID SECURITY

Bid security in the form of a certified check, cashier's check or bid bond as further described in the Instructions for Bidders and in the amount of ONE HUNDRED THOUSAND DOLLARS (\$100,000.00) is enclosed herewith and is subject to all the conditions stated in the Instructions for Bidders.

CONTRACT EXECUTION, BONDS AND INSURANCE

The Bidder agrees that if this Bid is accepted, it will, within seven (7) days after Notice of Conditional Award, sign the Construction Agreement in the form annexed hereto, and will at that time deliver to Metro the Performance Bond and the Labor and Materials Payment Bond required herein and in the form annexed hereto, along with all certificates of insurance and certified copies of insurance policies specified and required in these Contract Documents, and will, to the extent of its Bid, furnish all machinery, tools, apparatus, and other means of operation

and construction and do the Work and furnish all the materials necessary to complete all Work as specified or indicated in the Contract Documents.

COMMENCEMENT OF WORK AND CONTRACT COMPLETION TIME

The time frame for the award and execution of this Contract shall be as described in the Instructions for Bidders and other Contract Documents. The Successful Bidder further agrees to commence the Work within ten (10) days of issuance of the Notice to Proceed and to diligently prosecute the Work to its final completion in accordance with the Contract Documents.

ADJUSTED PAYMENTS

In the event the Bidder is awarded the Contract and fails to complete the Work in compliance with the time required by the Contract Documents, adjusted payments shall be paid to Metro as described in the General Conditions.

SALES AND USE TAXES

The Bidder agrees that all applicable federal, state and local sales and use taxes are included in the stated bid prices for the Work.

LUMP SUM AND UNIT PRICE WORK

The Bidder further proposes to accept as full payment for the Work proposed herein the amounts computed under the provisions of the Contract Documents and based on the listed lump sum and unit price amounts. The amounts shall be shown in both words and figures. In case of a discrepancy, the amount shown in words shall govern.

PREVAILING WAGES FOR PUBLIC WORK

Bidder hereby certifies that the provisions of ORS 279.350, regarding prevailing wages, shall be complied with on this project.

SCHEDULE OF BID PRICES

The Bidder, whose legal signature binding the Bidder to the bid prices indicated on these pages is found on the signature page, hereby bids as follows:

NOTE: If any of the items listed on the Bid Schedule contain "recycled product" (See Appendix), the Bidder shall specify the amounts of such product in an attachment to the Bid Form. If no attachment is included, the amount of "recycled product" in the items listed will be considered to be zero for the purpose of this Bid. Metro reserves the right to reject any or all Bids.

* * * BASE BID * * *

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-------------------------|---------------------------|--|-------------------|-------------------|
| 1. | 1 L.S. | Mobilization | | |
| <u>(Per Lump Sum)</u> | | | \$ | \$ |
| | | (Words) | (Figures) | |
| 2. | 1 L.S. | Site Safety and Health Program | | |
| <u>(Per Lump Sum)</u> | | | \$ | \$ |
| 3. | 30,000 C.Y. | Existing Topsoil Removal | | |
| <u>(Per Cubic Yard)</u> | | | \$ | \$ |
| 4. | 20,000 C.Y. | Imported Topsoil | | |
| <u>(Per Cubic Yard)</u> | | | \$ | \$ |
| 5. | 130,000 Ton | Procure and Deliver Type 1 Sand Material | | |
| <u>(Per Ton)</u> | | | \$ | \$ |
| 6. | 85,000 C.Y. | Place Type 1 Sand | | |
| <u>(Per Cubic Yard)</u> | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-----------------|---------------------------|---------------------------------------|-------------------|-------------------|
| 7. | 70,000 S.Y. | Geonet Composite, Type A | | |
| | (Per Square Yard) | | \$ | \$ |
| | | (Words) | (Figures) | |
| 8. | 105,000 S.Y. | Geonet Composite, Type B | | |
| | (Per Square Yard) | | \$ | \$ |
| 9. | 105,000 S.Y. | Geomembrane, 40 mil, Smooth | | |
| | (Per Square Yard) | | \$ | \$ |
| 10. | 70,000 S.Y. | Geomembrane, 40 mil, Textured | | |
| | (Per Square Yard) | | \$ | \$ |
| 11. | 7,000 S.Y. | Bentonite Mat | | |
| | (Per Square Yard) | | \$ | \$ |
| 12. | 70,000 S.Y. | Low Permeable Soil for Type 'A' Cover | | |
| | (Per Square Yard) | | \$ | \$ |
| 13. | 105,000 S.Y. | Low Permeable Soil for Type 'B' Cover | | |
| | (Per Square Yard) | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|------------------|---------------------------|--|-------------------|-------------------|
| 14. | 35 Acre | Hydroseeding | | |
| (Per Acre) | | (Words) | \$ (Figures) | \$ |
| 15. | 180,000 Ton | Procure and Deliver Subgrade Embankment Material | | |
| (Per Ton) | | | \$ | \$ |
| 16. | 120,000 C.Y. | Compact Subgrade Embankment | | |
| (Per Cubic Yard) | | | \$ | \$ |
| 17. | 3,500 C.Y. | Roadway Embankment | | |
| (Per Cubic Yard) | | | \$ | \$ |
| 18. | 600 C.Y. | Crushed Surfacing Base Course | | |
| (Per Cubic Yard) | | | \$ | \$ |
| 19. | 5 EA. | Remove Existing Culverts | | |
| (Per Each) | | | \$ | \$ |
| 20. | 1,200 C.Y. | Excavation for Sedimentation Basin | | |
| (Per Cubic Yard) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|--------------------------|---------------------------|---------------------------------------|-------------------|-------------------|
| 21. | 400 L.F. | 18-Inch CMP Culvert | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| | | (Words) | (Figures) | |
| 22. | 150 L.F. | 27-Inch CMP Culvert | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| 23. | 4,000 L.F. | 4-Inch PVC Perforated Underdrain Pipe | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| 24. | 3,500 L.F. | 6-Inch PVC Perforated Underdrain Pipe | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| 25. | 500 L.F. | 8-Inch PVC Perforated Underdrain Pipe | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| 26. | 1 EA. | Outlet Structure | | |
| <u>(Per Each)</u> | | | \$ | \$ |
| 27. | 2 EA. | Storm Drain Manhole | | |
| <u>(Per Each)</u> | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|--------------------------|---------------------------|-------------------------------------|-------------------|-------------------|
| 28. | 1 EA. | 18" Parshall Flume w/Access Manhole | | |
| <u>(Per Each)</u> | | | \$ | \$ |
| | | (Words) | Figures) | |
| 29. | 250 L.F. | Fence | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |
| 30. | 200 C.Y. | Quarry Spalls | | |
| <u>(Per Cubic Yard)</u> | | | \$ | \$ |
| 31. | 12,000 S.Y. | Erosion Control Mat | | |
| <u>(Per Square Yard)</u> | | | \$ | \$ |
| 32. | 150 EA. | Strawbale Sedimentation Barriers | | |
| <u>(Per Each)</u> | | | \$ | \$ |
| 33. | 2,000 L.F. | Sediment Fencing | | |
| <u>(Per Lineal Foot)</u> | | | \$ | \$ |

TOTAL BASE BID \$_____

* * * ALTERNATE BID No. 1 * * *

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|---------------------|---------------------------|--|-------------------|-------------------|
| A1. | 950 V. F. | Gas Extraction Well, Single Completion | | |
| (Per Vertical Foot) | | | \$ | \$ |
| A2. | 360 V.F. | Gas Extraction Well, Double Completion | | |
| (Per Vertical Foot) | | | \$ | \$ |
| A3. | 3,600 L.F. | Horizontal Gas Trenches | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A4. | 1 EA. | Wellhead Completions, Type 1 | | |
| (Per Each) | | | \$ | \$ |
| A5. | 8 EA. | Wellhead Completions, Type 2 | | |
| (Per Each) | | | \$ | \$ |
| A6. | 16 EA. | Wellhead Completions, Type 4 | | |
| (Per Each) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-------------------|---------------------------|----------------------------|-------------------|-------------------|
| A7. | 3,700 L.F. | 3" HDPE-LFG | | |
| (Per Lineal Foot) | | | \$ | \$ |
| | | (Words) | (Figures) | |
| A8. | 2,000 L.F. | 4" HDPE-LFG | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A9. | 2,500 L.F. | 6" HDPE-LFG | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A10. | 3,200 L.F. | 4" HDPE-C, Buried | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A11. | 1,700 L.F. | 1" PVC-V, Buried | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A12. | 1,800 L.F. | 2" PVC-D, Buried | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A13. | 50 L.F. | 6" D.I. Casing | | |
| (Per Lineal Foot) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-------------------|---------------------------|--|-------------------|-------------------|
| A14. | 150 L.F. | 8" D.I. Casing | | |
| (Per Lineal Foot) | | | \$ | \$ |
| | | (Words) | (Figures) | |
| A15. | 100 L.F. | 10" D.I. Casing | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A16. | 23 EA. | Adjustable Pipe Supports | | |
| (Per Each) | | | \$ | \$ |
| A17. | 4 EA. | Adjustable Pipe Supports w/ Guide (G1) | | |
| (Per Each) | | | \$ | \$ |
| A18. | 115 EA. | Pipe Guides (G2) | | |
| (Per Each) | | | \$ | \$ |
| A19. | 9 EA. | Pipe Anchor | | |
| (Per Each) | | | \$ | \$ |
| A20. | 15 EA. | Bollards | | |
| (Per Each) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-----------------|---------------------------|--------------------------------|-------------------|-------------------|
| A21. | 5 EA. | 3" Expansion Joint | | |
| (Per Each) | | | \$ | \$ |
| | | (Words) | (Figures) | |
| A22. | 1 EA. | 4" Butterfly Valve | | |
| (Per Each) | | | \$ | \$ |
| A23. | 2 EA. | 6" Butterfly Valve | | |
| (Per Each) | | | \$ | \$ |
| A24. | 9 EA. | Vacuum Valve Stations | | |
| (Per Each) | | | \$ | \$ |
| A25. | 1 EA. | Vacuum Pump Station | | |
| (Per Each) | | | \$ | \$ |
| A26. | 1 EA. | Remote Condensate Pump Station | | |
| (Per Each) | | | \$ | \$ |
| A27. | 2 EA. | 4" Condensate Drip Leg Fitting | | |
| (Per Each) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-------------------|---------------------------|--|-------------------|-------------------|
| A28. | 7 EA. | 6" Condensate Drip Leg Fitting | | |
| (Per Each) | | | \$ | \$ |
| | | (Words) | (Figures) | |
| A29. | 16 EA. | Condensate Cleanouts | | |
| (Per Each) | | | \$ | \$ |
| A30. | 40 L.F. | Electrical Ductbank, Type 2 | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A31. | 1,600 L.F. | Electrical Ductbank, Type 3 | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A32. | 1 L.S. | Electrical Service | | |
| (Per Lump Sum) | | | \$ | \$ |
| A33. | 2,500 L.F. | Temporary 4" PVC Gas Collection Pipe | | |
| (Per Lineal Foot) | | | \$ | \$ |
| A34. | 200 L.F. | Temporary 2" PVC Condensate Discharge Pipe | | |
| (Per Lineal Foot) | | | \$ | \$ |

| <u>Item No.</u> | <u>Estimated Quantity</u> | <u>Description of Item</u> | <u>Unit Price</u> | <u>Total Cost</u> |
|-----------------|---------------------------|--|-------------------|-------------------|
| A35. | 1 EA. | Temporary Condensate Manhole | | |
| (Per Each) | | | \$ | \$ |
| | | (Words) | (Figures) | |
| A36. | 1 EA. | Temporary Gas Flare | | |
| (Per Each) | | | \$ | \$ |
| A37. | 400 HR. | Laborers for Temporary System Construction | | |
| (Per Hour) | | | \$ | \$ |
| A38. | 120 HR. | Operator and Equipment for Temporary System Construction | | |
| (Per Hour) | | | \$ | \$ |

TOTAL ALTERNATE NO. 1 BID \$ _____

TOTAL BASE BID AMOUNT \$ _____
FROM PAGE 00300-7

**RECYCLED PRODUCT* ATTACHMENT TO
SCHEDULE OF BID PRICES**

[illegible]

*NOTES:

1. It is the Bidder's responsibility to determine if the recycled product meets the Contract specifications. Metro reserves the right to confirm information submitted by contacting the manufacturer.

ADDENDA

The Bidder is presumed to have read and hereby acknowledges receipt and acceptance of Addenda Numbers:

(Insert No. and Date of Each Addendum Received)

SURETY

If the Bidder is awarded a Contract on this Bid, the surety or sureties who provide(s) the Performance Bond and Labor and Materials Payment Bond will be:

SURETY

ADDRESS

1.

2.

DISADVANTAGED BUSINESS PROGRAM COMPLIANCE FORM

(To be submitted with Bid.)

Name of Metro Project: St. Johns Landfill Closure of Subarea 1

Name of Bidder: _____

Address: _____

Phone: _____

In accordance with Metro's Disadvantaged Business Program, the above-named Bidder has accomplished the following:

- ____ 1. Has fully met the contract goals and will subcontract ____ percent of the Bid Amount to DBEs and ____ percent to WBEs.
- ____ 2. Has partially met the contract goals and will subcontract ____ percent of the Bid Amount to DBEs and ____ percent to WBEs. Bidder has made good faith efforts prior to Bid opening to meet the full goals and will submit documentation of the same to Metro within twenty-four (24) hours of Metro's request.
- ____ 3. Will not subcontract any of the Bid Amount to DBEs or WBEs but has made good faith efforts prior to Bid opening to meet the contract goals and will submit documentation of such good faith efforts to Metro within twenty-four (24) hours of Metro's request.

RESIDENT/NON-RESIDENT BIDDER STATUS

Oregon law requires that Metro, in determining the lowest responsive Bidder, must add a percent increase on the Bid of a non-resident Bidder equal to the percent, if any, of the preference given to that Bidder in the state in which that Bidder resides. Consequently, each Bidder must indicate whether it is a resident or non-resident Bidder. A resident Bidder is a Bidder that has paid unemployment taxes or income taxes in the state of Oregon during the twelve (12) calendar months immediately preceding submission of this Bid, has a business address in Oregon, and has stated in its Bid that the Bidder is a "resident Bidder." A "non-resident Bidder" is a Bidder who is not a resident Bidder (ORS 279.029).

The undersigned Bidder states that it is: (check one)

1. A resident Bidder _____
2. A non-resident Bidder _____

Indicate state in which Bidder resides: _____

SIGNATURE PAGE

The name of the Bidder submitting this Bid is _____
doing business at

Street

City

State

Zip

which is the full business address to which all communications concerned with this Bid and with the Contract shall be sent.

The names of the principal officers of the corporation submitting this Bid, or of all of the partners, if the Bidder is a partnership or joint venture, or of all persons interested in this Bid as individuals are as follows:

If Individual

IN WITNESS hereto the undersigned has set his/her hand this _____ day of _____, 19____.

Signature of Bidder

Printed Name of Bidder

Title

If Partnership or Joint Venture

IN WITNESS hereto the undersigned has set his/her hand this ____ day of _____, 19__.

Name of Partnership or Joint Venture

By: _____

Printed Name of Person Signing

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 _____, 19__.

Name of Corporation

State of Incorporation

By: _____

Printed Name of Person Signing

Title: _____

NON-COLLUSION AFFIDAVIT

STATE OF _____)

County of _____)

I state that I am _____ (Title) of _____ (Name of Bidder) and that I am authorized to make this Affidavit on behalf of the Bidder. I am the person authorized by the Bidder and responsible for the price(s) and the amount of this Bid.

I state that:

(1) The price(s) and amount of this Bid have been arrived at independently and without consultation, communication or agreement with any other contractor, Bidder or potential Bidder, except as disclosed in the attached appendix.

(2) Neither the price(s) nor the amount of this Bid, and neither the approximate price(s) nor approximate amount of this Bid, have been disclosed to any other person who is a Bidder or potential Bidder, and they will not be disclosed before bid opening.

(3) No attempt has been made or will be made to induce any person to refrain from bidding on this contract, or to submit a Bid higher than this Bid, or to submit any intentionally high or non-competitive bid or other from of complementary Bid.

(4) This Bid is made in good faith and not pursuant to any agreement or discussion with, or inducement from, any person to submit a complementary or other noncompetitive Bid.

(5) _____ (Name of Bidder), its affiliates, subsidiaries, officers, directors and employees (as applicable) are not currently under investigation by any governmental agency and have not in the last four years been convicted of or found liable for any act prohibited by state or federal law in any jurisdiction, involving conspiracy or collusion with respect to bidding on any public contract, except as listed and described in the attached appendix.

I state that I and _____ (Name of Bidder) understand and acknowledge that the above representations are material and important, and will be relied on by Metro in awarding the Contract for which this Bid is submitted. Any misstatement in this Affidavit will be treated as fraudulent concealment from Metro of the true facts relating to the submission of Bids for this Contract.

Signature of Affiant

Printed Name of Affiant

Sworn to and subscribed before me this _____ day of _____, 19_____.

Notary Public for _____

My Commission Expires: / /

BID BOND

(NOTE: BIDDERS MUST USE THIS FORM, NOT A SURETY COMPANY FORM)

KNOW ALL MEN BY THESE PRESENTS:

We the undersigned, _____,
as PRINCIPAL, and _____, a corporation organized and existing under and by virtue
of the laws of the state of _____ and duly authorized to do surety business in the state of Oregon and
name on the current list of approved surety companies acceptable on federal bonds and conforming with the
underwriting limitations as published in the Federal Register by the audit staff of the Bureau of Accounts and the
U.S. Treasury Department and is of the appropriate class for the bond amount as determined by Best's Rating
System, as SURETY, hereby hold and firmly bind ourselves, our heirs, executors, administrators, successors and
assigns, jointly and severally, unto the METROPOLITAN SERVICE DISTRICT, as OBLIGEE, in the sum of ONE
HUNDRED THOUSAND DOLLARS (\$ 100,000) in lawful money of the United States of America, for the
payment of which sum well and truly to be made as agreed and liquidated damages.

THE CONDITION OF THIS OBLIGATION IS SUCH THAT whereas the PRINCIPAL has submitted to
the Metropolitan Service District a certain Bid for work required for the St. Johns Landfill Closure of Subarea 1,
which work is specifically described in the accompanying Bid;

NOW, THEREFORE, if the Metropolitan Service District does not award a contract to the PRINCIPAL
within the time specified in the Instructions to Bidders for the work described in said Bid, or in the alternate, if said
Bid shall be accepted and the PRINCIPAL, within the time and in the manner described under the Contract
Documents, enters into a written contract in accordance with the Bid, files the two bonds, one guaranteeing faithful
performance of the work to be done and the other guaranteeing payment for labor and materials as required by law,
and files the required certified copies of insurance policies and certificates of insurance, then the obligation shall be
null and void; otherwise, the same shall remain in full force and effect.

The SURETY, for value received, hereby stipulates and agrees that the obligation of said SURETY and this
bond shall be in no way impaired or affected by any extension of the time within which the Metropolitan Service
District may accept such Bid; and said SURETY does hereby waive notice of any such extension.

If more than one surety is on this bond, each surety hereby agrees that it is jointly and severally liable for all
obligations on this bond.

IN WITNESS WHEREOF, we have hereunto set our hands and seals _____ day of _____,
19____.

SURETY

PRINCIPAL

By: _____

By: _____

Title: _____

Title: _____

DISADVANTAGED BUSINESS ENTERPRISE UTILIZATION FORM

1. Name of Metro Project: The St. Johns Landfill Closure of Subarea 1
2. Name of Bidder _____
Address _____
3. The above-named Bidder intends to subcontract ____ percent of the Bid to the following Disadvantaged Business Enterprises (DBEs):

Names, Contact Persons, Addresses
and Phone Numbers of DBE Firms
Bidder Anticipates Utilizing

Nature of
Participation

Dollar Value of
Participation

| | | |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | | |
| _____ | | |
| _____ | _____ | _____ |
| _____ | | |
| _____ | _____ | _____ |
| _____ | | |
| _____ | | |

Total DBE Participation Amount

Amount of Base Bid

DBE Percent of Base Bid

Authorized Signature

Title

Date

THIS FORM IS TO BE COMPLETED, SIGNED AND SUBMITTED WITHIN 24 HOURS OF REQUEST BY METRO

WOMEN BUSINESS ENTERPRISES UTILIZATION FORM

1. Name of Metro Project: The St. Johns Landfill Closure of Subarea 1
2. Name of Bidder _____
Address _____
3. The above-named Bidder intends to subcontract ____ percent of the Bid to the following Women Business Enterprises (WBEs):

Names, Contact Persons, Addresses
and Phone Numbers of WBE Firms
Bidder Anticipates Utilizing

Nature of
Participation

Dollar Value of
Participation

| | | |
|-------|-------|-------|
| _____ | _____ | _____ |
| _____ | | |
| _____ | | |
| _____ | _____ | _____ |
| _____ | | |
| _____ | | |
| _____ | _____ | _____ |
| _____ | | |

Total WBE Participation Amount

Amount of Base Bid

WBE Percent of Base Bid

Authorized Signature

Title

Date

THIS FORM IS TO BE COMPLETED, SIGNED AND SUBMITTED WITHIN 24 HOURS OF REQUEST BY METRO

SECTION 00500
CONSTRUCTION AGREEMENT

This Construction Agreement is made by and between _____ hereinafter called Contractor and the Metropolitan Service District, a political subdivision of the State of Oregon, hereinafter called Metro.

Contractor and Metro agree as follows:

1. Contract Documents

The Contract Documents consist of this Construction Agreement, the Advertisement for Bids, the Invitation to Bid, the Instructions to Bidders, the Bid Forms (including Schedule of Bid Prices, Surety, Disadvantaged Business Program Compliance, Prevailing Wage Rate Compliance, Resident/Non-resident Bidder Status, Signature Page, Non-Collusion Affidavit, Bid Bond, DBE and WBE Utilization), the Performance and the Labor and Materials Payment Bonds, the General Conditions, the Supplementary Conditions, the Technical Specifications, the Drawings, the approved and updated Construction Schedule, and other information and data as listed in the Supplementary Conditions, and any modifications of any of the foregoing in the form of Addenda or Change Orders in accordance with the terms of the Contract. Where applicable, reference to this Construction Agreement herein shall be deemed to refer to all of the Contract Documents.

These documents form the Contract and are, by this reference, expressly incorporated herein. All are as fully a part of the Contract as if attached to this Construction Agreement and repeated fully herein. No amendment made to this Contract nor Change Order issued shall be construed to release either party from any obligation contained in the Contract Documents except as specifically provided in any such amendment or Change Order.

2. Scope of Work

Contractor agrees to provide all labor, tools, equipment, machinery, supervision, transportation, permits, and every other item and service necessary to perform the Work described in the Contract Documents. Contractor agrees to fully comply with each and every term, condition and provision of the Contract Documents.

3. Contract Amount

As consideration for Contractor's performance hereunder, Metro agrees to pay contractor the Contract Amount as adjusted by approved Change Orders issued pursuant to the Contract Documents and subject to the availability of monies in the Construction Fund. Contractor agrees to accept the Contract Amount as full payment for contractor's performance of the above-described Work.

The Contract Amount is _____
and _____/100TH DOLLARS (\$_____).

Metro shall make payments to Contractor in the manner and at the times provided in the Contract Documents.

4. Additional or Deleted Work

Contractor shall, when so instructed by Metro under the procedures of the contract Documents, perform additional Work or delete Work in accordance with the Contract Documents. Any increase or decrease in the Contract Amount shall be determined pursuant to the applicable provisions of the Contract Documents.

5. Time of Completion; Adjusted Payments

Time is of the essence of this Construction Agreement. The Contract Time shall commence upon issuance of the Notice to Proceed. Contractor shall commence work under this Contract within ten (10) calendar days after issuance of written Notice to Proceed. Contractor shall bring the work to substantial completion no later than October 31, 1992 or 180 calendar days after issuance of Notice to Proceed, whichever is the longer Contract Time. By executing this Construction Agreement, Contractor confirms and accepts that the Contract Time so stated is a reasonable period for performance of all of the Work.

If Contractor fails to substantially complete the Work, within the Contract Time, as determined by Metro in accordance with the Contract Documents, Contractor shall be liable for adjusted payments to Metro as described in the Contract Documents.

6. Bonds

Contractor submits herewith a Performance Bond and a separate Labor and Materials Payment Bond, both in a form acceptable to Metro and otherwise in accordance with the Contract Documents and each in the Contract Amount to ensure full compliance, execution and performance of this Contract by Contractor and payment by Contractor of labor and material Suppliers as more fully described in the Contract Documents. The Performance Bond shall stay in force for a period of one (1) year after written acceptance of the Work by Metro as a guarantee of repair or replacement of any item(s) of Work found to be defective by reason of faulty workmanship or defective materials. The Labor and Materials Payment Bond shall remain in force for the time required for actions against the bond to be filed in accordance with ORS 279.536.

7. Remedies for Default

If Contractor fails to perform as specified in the Contract Documents, Metro shall be entitled to all the rights and remedies which this Contract provides, as well as all remedies provided by law. This Contract shall not be construed as limiting or reducing the remedies provided by law which Metro would have in the absence of any provision of the Contract.

8. Laws of Oregon Apply

The law of Oregon shall govern the interpretation and construction of this Construction Agreement and all of the Contract Documents.

9. Entire Agreement

The Contract Documents constitute the final written expression of all of the terms of this Construction Agreement and are a complete and exclusive statement of those terms. Any and all representations, promises, warranties, or statements by either party that differ in any way from the terms of this written agreement shall be given no force and effect. This Contract shall be changed, amended, or modified only by written instrument signed by both Metro and Contractor. This Contract shall not be modified or altered by any course of performance by either party.

CONTRACTOR

By: _____

Title: _____

Date: _____

METROPOLITAN SERVICE DISTRICT

By: _____

Title: _____

Date: _____

SECTION 00600
PERFORMANCE BOND

(NOTE: CONTRACTORS MUST USE THIS FORM, NOT A SURETY COMPANY FORM)

KNOW BY ALL MEN BY THESE PRESENTS:

We the undersigned _____ as PRINCIPAL (hereinafter called CONTRACTOR),
and _____, a corporation organized and existing under and by virtue of the laws of the state
of _____, duly authorized to do surety business in the state of Oregon and named on the current
list of approved surety companies acceptable on federal bonds and conforming with the underwriting limitations as
published in the Federal Register by the audit staff of the Bureau of Accounts and the U.S. Treasury Department
and is of the appropriate class for the bond amount as determined by Bests Rating System, as SURETY, hereby
hold and firmly bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, to
pay to the Metropolitan Service District as OBLIGEE (hereinafter called Metro), the amount of _____
_____ Dollars (\$ _____), in lawful money of the United States of America.

WHEREAS, the CONTRACTOR entered into a contract with Metro dated _____, 19____,
which contract is hereunto annexed and made a part hereof, for accomplishment of the project described as follows:
The St. Johns Landfill Closure of Subarea 1.

NOW, THEREFORE, the condition of this obligation is such that if the CONTRACTOR shall promptly,
truly and faithfully perform all the undertakings, covenants, terms, conditions, and agreements of the aforesaid
St. Johns Landfill Closure of Subarea 1, Metro having performed its obligations thereunder, then this obligation shall
be null and void; otherwise it shall remain in full force and effect.

Whenever Contractor shall be declared by Metro to be in default under the Contract Documents for the project
described herein, the SURETY may promptly remedy the default, or shall promptly complete The St. Johns Landfill
Closure of Subarea 1 in accordance with the Contract Documents and the project specifications. SURETY, for
value received, further stipulates and agrees that all changes, extensions of time, alterations or additions to the terms
of the Contract or specifications for the St. Johns Landfill Closure of Subarea 1 are within the scope of the
SURETY's undertaking on this bond, and SURETY hereby waives notice of any such change, extension of time,
alteration or addition to the terms of The St. Johns Landfill Closure of Subarea 1 or to the work or to the
specifications. Any such change, extension of time, alteration or addition to the terms of The St. Johns Landfill
Closure of Subarea 1 or to the Work or to the Specifications shall automatically increase the obligation of the
SURETY hereunder in a like amount, provided that such increase shall not exceed twenty-five percent (25%) of the
original amount of the obligation without the consent of the SURETY.

This obligation shall continue to bind the PRINCIPAL and SURETY, notwithstanding successive payments
made hereunder, until the full amount of the obligation is exhausted.

No right of action shall accrue on this bond to or for the use of any person or corporation other than Metro
or its heirs, executors, administrators, successors or assigns.

If more than one surety is on this bond, each surety hereby agrees that it is jointly and severally liable for all obligations on this bond.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this ____ day of _____, 19____.

SURETY

CONTRACTOR

By: _____

By: _____

Title: _____

Title: _____

SECTION 00650
LABOR AND MATERIALS PAYMENT BOND

(NOTE: CONTRACTOR MUST USE THIS FORM, NOT A SURETY COMPANY FORM)

KNOW ALL MEN BY THESE PRESENTS:

We the Undersigned _____, as PRINCIPAL, and _____

_____, a corporation organized and existing under and by virtue of the laws of the state of _____, and duly authorized to do surety business in the state of Oregon and named on the current list of approved surety companies acceptable on federal bonds and conforming with the underwriting limitations as published in the Federal Register by the audit staff of the Bureau of Accounts and the U.S. Treasury Department and which carries an "A" rating and is of the appropriate class for the bond amount as determined by Best's Rating System, as SURETY, hereby hold and firmly bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and

severally, unto the Metropolitan Service District, as OBLIGEE, in the sum of _____

Dollars (\$ _____) in lawful money of the United States of America, for the payment of that sum for the use and benefit of claimants as defined below.

The condition of this obligation is such that whereas the PRINCIPAL entered into a Contract with the said Metropolitan Service District dated _____, 19____, which Contract is hereunto annexed and made a part hereof, for accomplishment of the project described as follows: The St. Johns Landfill Closure of Subarea 1.

NOW THEREFORE, if the PRINCIPAL shall promptly make payments to all persons, firms, subcontractors, corporations and/or others furnishing materials for or performing labor in the prosecution of the work provided for in the aforesaid The St. Johns Landfill Closure of Subarea 1, and any authorized extension or modification thereof, including all amounts due for materials, equipment, mechanical repairs, transportation, tools and services consumed or used in connection with the performance of such work, and for all labor performed in connection with such work whether by subcontractor or otherwise, and all other requirements imposed by law, then this obligation shall become null and void; otherwise this obligation shall remain in full force and effect, subject, however, to the following conditions:

1. A claimant is as specified in ORS 279.526.
2. The above-name PRINCIPAL and SURETY hereby jointly and severally agree with the OBLIGEE and its assigns that every claimant as above-specified, who has not been paid in full, may sue on this bond for the use of such claimant, prosecute the suite to final judgement in accordance with ORS 279.536 for such sum or sums as may be justly due claimant, and have execution thereon. The OBLIGEE shall not be liable for the payment of any judgement, costs, expenses or attorney's fees of any such suit.

PROVIDED, FURTHER, that the said SURETY for the value received, hereby stipulates and agrees that all changes, extensions of time, alternations to the terms of The St. Johns Landfill Closure of Subarea 1 or to work to be performed thereunder or the specifications accompanying the same shall be within the scope of the SURETY's undertaking on this bond, and said SURETY does hereby waive notice of any such change, extension of time, alteration or addition to the terms of The St. Johns Landfill Closure of Subarea 1 or to the Work or to the Specifications. Any such change, extension of time, alteration or addition to the terms of the Contract or to the Work or to the Specifications shall automatically increase the obligation of the SURETY hereunder in a like amount, provided that the total of such increases shall not exceed twenty-five percent (25%) of the original amount of the obligation without the consent of the SURETY.

This obligation shall continue to bind the PRINCIPAL and SURETY, notwithstanding successive payments made hereunder, until the full amount of the obligation is exhausted, or if the full amount of the obligation is not exhausted and no claim is pending resolution, until such time as no further claims can be made pursuant to law with regard to the above described project, by any claimant specified in ORS 279.526.

If more than one surety is on this bond, each surety hereby agrees that it is jointly and severally liable for all obligations on this bond.

In WITNESS WHEREOF, we have hereunto set our hands and seals this ____ day of _____, 19__.

SURETY

PRINCIPAL

By: _____

By: _____

Title: _____

Title: _____

SECTION 00700

GENERAL CONDITIONS

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SECTION 00700

GENERAL CONDITIONS

ARTICLE 1 GENERAL PROVISIONS

1.01 Definitions. Unless otherwise defined or specified in the Contract Documents, the following terms shall have the meanings indicated:

- 1.01.01 Act of God -- means an earthquake, flood, typhoon, cyclone or other natural phenomenon of catastrophic proportions or intensity.
- 1.01.02 Addendum (Plural: Addenda) -- means a document issued by Metro during the bidding period which modifies, interprets, supersedes or supplements the Contract Documents and becomes a part of the Contract Documents. It is the Bidder's responsibility to determine how addenda impact the Work. All Bids submitted shall include the cost of the Work included in any addenda issued prior to award.
- 1.01.03 Alternates Bids -- are portions of the Work for which a Bidder must submit a separate Bid amount. Alternate Bid items may or may not be awarded at Metro's discretion.
- 1.01.04 "As-Builts" or Record Documents -- are those drawings made, revised or annotated by Contractor and approved by Metro during the performance of the Contract, fully illustrating how all elements of the work were actually installed and completed.
- 1.01.05 Authorized Representative -- is a person, corporation, partnership or other legal entity acting on behalf of another through expressly delegated authority as specified in these Contract Documents.
- 1.01.06 Bid -- is the written offer of a Bidder to perform the Work as defined in these Contract Documents, when made out in accordance with all of the Contract Documents and submitted on the appropriate Bid Forms.
- 1.01.07 Bidder -- is any individual, partnership, corporation, or joint venture, acting directly or through a duly and legally authorized representative, submitting or intending to submit a Bid for the Work as described in these Contract Documents.
- 1.01.08 Bidding Documents -- See "Contract Documents."
- 1.01.09 Bid Forms -- include the following: the Bid proposal, including Schedule of Bid Prices, Surety, Disadvantaged Business Program Compliance Form, Resident/Non-Resident Bidder Status form, Signature Page, the Non-Collusion Affidavit, Bid Bond, Disadvantaged Business Enterprise Utilization Form and the Women Business Enterprise Utilization Form.
- 1.01.10 City -- means the City of Portland, Oregon.

- 1.01.11 Change Order -- is a written document signed by Metro and Contractor stating their agreement upon all of the following:
- 1.01.11.01 a change in the Work;
 - 1.01.11.02 the amount of the increase or decrease in the Contract Amount, if any; and
 - 1.01.11.03 the extent of the adjustment to the Contract Time, if any.
- 1.01.12 Clarification -- is a written document consisting of supplementary details, instruction or information issued by Metro after the award of Contract which clarifies, or supplements the Contract Documents and becomes a part of the Contract Documents. A Clarification may or may not affect the scope of work.
- 1.01.13 Completion -- See "Substantial Completion" and "Final Completion and Acceptance."
- 1.01.14 Construction Coordinator -- is the Metro representative on the construction site. The Construction Coordinator will be an employee of Metro, who will represent Metro to the extent of his authority as delegated by the Executive Officer.
- 1.01.15 Construction Manager -- is a representative of Metro, and is the interface with Contractor and will be the conduit for all Change Orders, correspondence, Requests for Information, Clarifications and negotiations.
- 1.01.16 Construction Schedule or Schedule -- is the timeline described in Section 01310 of the Specifications.
- 1.01.17 Contract Amount -- is the total amount shown in the Construction Agreement as revised by Change Orders.
- 1.01.18 Contract Documents or Contract or Bidding Documents -- consist of the Advertisement for Bids, the Invitation to Bid, the Instructions to Bidders, the Bid Forms, the Construction Agreement, the Performance Bond, the Labor and Materials Payment Bond, the General Conditions, the Supplementary Conditions, the Specifications, the Drawings, the approved and updated Construction Schedule, and any modifications of any of the foregoing in the form of Addenda, Clarifications, Change Orders or Force Account Work.
- 1.01.19 Contractor -- is the party who has entered into this Contract with Metro and who is responsible for the complete performance of the Work contemplated by the Contract Documents and for the payment of all legal debts pertaining to the Work, including its officers, agents, employees and representatives.
- 1.01.20 Contract Time -- is the period of time, including adjustments approved by Metro, which is allowed in the Contract Documents for Contractor to substantially complete the Work.

- 1.01.21 Critical Path Method or CPM -- means the critical path method of scheduling as understood and interpreted by standard industry practice.
- 1.01.22 Days -- means calendar day including Saturdays, Sundays and legal holidays.
- 1.01.23 Direct Costs -- are those costs of labor (including benefits), material and equipment incurred by the person, corporation, partnership or joint venture whose employees are actually performing the task.
- 1.01.24 Disadvantaged Business Program -- is Metro's program to provide maximum opportunities to Disadvantaged and Women-Owned Business Enterprises in contracts, which is contained in Metro Code 2.04.
- 1.01.25 Drawings -- means the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.
- 1.01.26 Engineer -- is a representative of Metro. The Engineer will have authority to act on behalf of Metro only to the extent provided in these Contract Documents.
- 1.01.27 Equal, Approved, Approved Equal -- is used to indicate that the material or product to be supplied or installed must be equal to or better than that named in function, performance, reliability, quality and general configuration and that the substitute must be approved by Engineer. Equality in reference to the Project design requirements shall be determined by Engineer prior to installation of any material or product in the Project.
- 1.01.28 Final Completion and Acceptance -- means the completion by Contractor of all of the Work called for under the Contract, whether expressly or impliedly required, including but not limited to, satisfactory operation of all equipment, completion and correction of all punch list items to the satisfaction of Metro, settlement of all claims, delivery of all warranties and agreements to correct Work, equipment operation and maintenance manuals, as-built drawings, required approvals and acceptances by federal, state or local governments or other authorities having jurisdiction over the Work, and removal of all rubbish, tools, scaffolding and surplus materials and equipment from the Site.
- 1.01.29 Final Payment -- is the balance of the Contract Amount to be paid to the Contractor upon Final Completion and Acceptance of the Work.
- 1.01.30 Force Account Work -- is work, ordered in writing by Metro, for which Contractor must report its actual costs in accordance with Paragraph 8.04 of the General Conditions.
- 1.01.31 Furnish -- means, unless the context requires otherwise, supply and deliver materials, systems and equipment to the Site, ready for unpacking, assembly, installation, etc., as applicable in each instance.
- 1.01.32 General Contractor -- is the party who enters into the Contract with Metro. See also "Contractor".

- 1.01.33 Geotechnical Engineer -- The Geotechnical Engineer is an agent of the Engineer.
- 1.01.34 Inclement Weather -- is a meteorological condition or conditions, abnormal to the Portland metropolitan area for the time of year in question, which cannot be reasonably anticipated and which has a significantly adverse effect on the Construction Schedule. Abnormality of the weather is defined as the number of days the weather parameters exceed the normal adverse weather days at the project.

For work under this contract, Metro defines adverse weather days as days on which Contractor is impacted by weather, normally defined as days with an average daily temperature of less than 32°F, significant daily precipitation or snow. Contractor will be cognizant of adverse weather days based upon long term averages when preparing project schedule, and shall refer to the annual publication of Local Climatological Data for Portland Oregon available at the Portland Weather Service Office.

- 1.01.35 Install -- includes, unless the context requires otherwise, unload, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, connect to electrical power and/or piping, and similar operations at the Site, as applicable in each instance.
- 1.01.36 Lump Sum -- means all costs and expenses of whatever nature, including Overhead and Profit, associated with the Work involved.
- 1.01.37 Material or Materials -- shall be construed to include machinery, equipment, manufactured articles, materials of construction such as formwork, fasteners, etc., and any other classes of items to be provided in connection with the Contract, except where a more limited meaning is indicated by the context.
- 1.01.38 Metro -- means the Metropolitan Service District of the Portland metropolitan area, a municipal corporation established and existing under the laws of the State of Oregon, ORS Chapter 268.
- 1.01.39 Metro Executive Officer or Executive Officer -- means the Executive Officer of Metro.
- 1.01.40 Metro Council or Council -- means the elected Council of Metro.
- 1.01.41 Miscellaneous Phrases -- in the Contract Documents shall be interpreted as follows:

Wherever the words "as directed," "as instructed," "as required," "as permitted," or words of like effect are used, it shall be understood that the direction, requirement, or permission of Metro is intended.

The words "sufficient," "necessary," "proper," and the like shall mean sufficient, necessary or proper in the judgement of Metro.

The words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to, Metro.

- 1.01.42 Notice of Conditional Award -- is the document issued by Metro to the lowest responsive, responsible Bidder whose Bid complies with all the requirements prescribed by the Contract Documents. The Notice of Conditional Award shall be given pursuant to the provisions of the Instructions to Bidders. It shall not entitle the party to whom it is given to any payment under the Contract, nor shall Metro be liable to such party or to any person for any alleged damages for any action taken in reliance upon such notice.
- 1.01.43 Notice to Proceed -- is the written notice given Contractor to commence the prosecution of its Work as defined in the Contract Documents. The Notice to Proceed will also establish the date and time of a preconstruction conference.
- 1.01.44 Other Metro Contractors -- are all individuals, corporations, partnerships, or joint ventures (except Contractor or Engineer) with whom Metro has a contract to perform work on, or related to, the Project.
- 1.01.45 Overhead -- when applied to the cost of the work, shall include the following items, when reasonable and necessary for completion of the work:
- 1.01.45.01 All on-site payroll costs, taxes, insurance fringe benefits and bonuses of same, for supervising, estimating, expediting, purchasing, drafting and clerical/secretarial services where directly incurred in the performance of the Contract.
 - 1.01.45.02 Small tools (less than \$250 capital cost per item).
 - 1.01.45.03 Equipment maintenance and repairs.
 - 1.01.45.04 Temporary construction, utilities, and safety requirements.
 - 1.01.45.05 Transportation of materials other than direct identifiable cost of specific deliveries, or as included in price of material.
 - 1.01.45.06 Parking fees for workers (if applicable).
 - 1.01.45.07 Permit fees.
 - 1.01.45.08 Cost of reproduction.
 - 1.01.45.09 Field office costs.
- Home or branch office overhead shall not be included, but shall be part of Contractor's profit and shall include, but is not limited to, the following:
- 1.01.45.09.01 Accounting functions of Contractor's Home and Branch Office.
 - 1.01.45.09.02 General expenses of Contractor's Home and Branch Office.
 - 1.01.45.09.03 Interest on capital.

1.01.45.09.04 Salaries of any home and branch office estimators and administration.

- 1.01.46 Owner -- means Metro.
- 1.01.47 Plans -- means Drawings.
- 1.01.48 Profit -- means that portion of Contractor's Bid price that is not Direct Costs or Overhead.
- 1.01.49 Project -- means the Work described in the Contract Documents.
- 1.01.50 Provide -- means furnish and install complete and in place and ready for operation and use.
- 1.01.51 Punch List -- is the list prepared by the Construction Manager at the time of Substantial Completion which reflects Contractor's incomplete, nonconforming work. Punch list items must be completed to the satisfaction of the Engineer and Metro in order for the Project to reach Final Completion and Acceptance.
- 1.01.52 Request for Clarification -- is a written request made by Contractor for additional information to clarify an ambiguity in the Contract Documents.
- 1.01.53 Retainage or Retention -- is the difference between the amount earned by Contractor on the Contract and the amount paid on the Contract by Metro.
- 1.01.54 Schedule of Values -- is the detailed breakdown of a lump sum contract amount as required in Section 01370 of the Specifications.
- 1.01.55 Separate Contract -- is a contract between Metro and a party other than Contractor for the construction or furnishing of a portion of the Project.
- 1.01.56 Shown, As Shown -- work shown on the Drawings which is a part of the Contract Documents.
- 1.01.57 Site -- is the real property upon which the Project is located.
- 1.01.58 Special Inspector -- is a representative of the Engineer or Geotechnical Engineer with specialized knowledge applicable to the installation of certain elements of the work.
- 1.01.59 Specifications -- are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards and workmanship for the Work, and performance of related services.
- 1.01.60 Subcontractor -- means a person, partnership, corporation or joint venture which has a direct contract with Contractor to perform a portion of the Work at the Site.
- 1.01.61 Submittals -- include shop drawings, samples, manufacturer's brochures, pamphlets, catalog cuts, color charts or other descriptive data, clearly defining

the article, material, equipment or device proposed by Contractor for use in the Work. "Shop drawings" are the drawings and diagrams showing details of fabrication and erection which Contractor is required to submit to the Engineer.

- 1.01.62 Substantial Completion -- is the stage in the progress of the Work, as determined by Metro, when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that Metro can occupy or use the Work for its intended use.
- 1.01.63 Supplier -- means an individual, partnership, corporation or joint venture entering into an agreement with Metro or Contractor for furnishing a portion of the Work which requires no labor at the Site, other than common carriers.
- 1.01.64 Unit Prices -- are the costs for specific units of work as defined in the Bid and Supplementary Conditions and include all costs, including, but not limited to, equipment, labor, materials, incidentals, Overhead and Profit, for the unit of work described.
- 1.01.65 Work -- means, unless the context requires otherwise, the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by Contractor to fulfill Contractor's obligations. The Work may constitute all or a portion of the Project as the context requires.

1.02 Intent and Interpretation of Contract Documents

- 1.02.01 Intent -- The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. The intent of the Contract Documents is to include in the Contract price the cost of all labor and materials, water, fuel, tools, plant, scaffolding, equipment, power, light, transportation, and all other facilities, services and expense as may be necessary for the proper execution of the Work, unless otherwise indicated in these Contract Documents. In interpreting the Contract Documents, words describing materials or work which have a well-known technical or trade meaning, unless otherwise specifically defined in the Contract Documents, shall be construed in accordance with such well-known meaning recognized by Engineer and Metro.
- 1.02.02 Divisions and Headings -- Titles and headings are for the convenience of organizing the Contract Documents and shall not be construed to limit Contractor's obligations hereunder. The General Conditions are divided into fifteen (15) Articles. The first-tier subheadings of each Article shall be referred to as Paragraphs; the second-tier sub-headings shall be referred to as Subparagraphs; and the third-tier subheadings shall be referred to as Clauses.
- 1.02.03 Mandatory Nature of Specifications and Drawings -- mention in the Specifications or indication on the drawings of articles, materials, operations, sequence or methods requires Contractor to furnish and install (i.e., provide) each article mentioned or indicated, of quality or according to qualifications noted, to perform each operation called for, in the sequence called for, and to

provide therefor, all necessary labor, equipment and incidentals. The determination of the type of operations and methods to be utilized in the performance of the Work shall be the responsibility of Contractor unless the Contract Documents prescribe a specific type of operation, sequence or method, in which case Contractor shall comply with the prescribed operation, sequence or method. Sentences in the imperative tense or command format in these Contract Documents shall be deemed to be directed to Contractor and to require Contractor to perform the services and/or provide the materials described.

- 1.02.04 Precedence of Contract Documents -- all determination of the precedence of, or discrepancy in, the Contract Documents shall be made by Metro, but in general, precedence will be in accordance with the following list with the highest precedence item at the top:

1.02.04.01 Signed Construction Agreement.

1.02.04.02 Supplementary Conditions.

1.02.04.03 General Conditions, Advertisement for Bids, Instructions to Bidders, Invitation to Bid, Bid Forms, Performance Bond and Labor and Materials Payment Bond.

1.02.04.04 Specifications

1.02.04.05 Drawings.

Detailed information takes precedence over general information and words take precedence over numbers unless obviously incorrect.

Addenda, Clarifications and all Change Orders to the Contract Documents take the same order of precedence as the specific sections that they are amending.

- 1.02.05 Discrepancies, Errors and Omissions -- the intent of the Contract Documents is to require Contractor to perform and provide every detail and item necessary for completion of the Project. The Contract Documents are not complete in every detail, however, and Contractor shall comply with their intent and meaning, taken as a whole, and shall not avail itself of any manifest errors or omissions to the detriment of the Work. Should any error, omission, discrepancy or ambiguity appear in the Contract Documents, instructions or work done by others, Contractor shall immediately upon discovery submit a Request for Clarification to Metro pursuant to Paragraph 3.02. If Contractor proceeds with any such work without receiving a Clarification, Contractor shall be responsible for all resulting damage and defects, and shall perform any work necessary to comply with Metro's Clarifications at no cost to Metro. Any work or material not indicated in the Contract Documents, which is manifestly necessary for full and faithful performance of the Work in accordance with the intent of the Contract Documents shall be indicated by Contractor on the shop drawings and provided by Contractor to the same extent as if both indicated and specified.

Any work indicated on the drawings but not specified, or vice versa, shall be furnished in the manner specified above as though fully set forth in both. Work not particularly detailed, marked or specified shall be the same as similar parts that are detailed, marked or specified. In case of discrepancy or ambiguity, in quantity or quality, the greater quantity or better quality as determined by Metro, shall be provided at no extra cost to Metro.

- 1.02.06 Standards to Apply Where Detailed Specifications Are Not Furnished -- wherever in these Contract Documents or in any directions given by Metro pursuant to or supplementing these Contract Documents, it is provided that Contractor shall furnish materials or manufactured articles or shall do work for which no detailed Specifications are set forth, the materials or manufactured articles shall conform to the usual standards for first-class materials or articles of the kind required, with due consideration of the use to which they are to be put. Work for which no detailed Drawings or Specifications are set forth herein shall conform to the usual standards for first-class work of the kind required.
- 1.03 Supply of Contract Documents -- Metro shall supply Contractor, without charge, a maximum of twenty (20) sets of Contract Documents. Contractor shall contact Metro for additional sets of documents for which Contractor shall be charged the cost of printing.
- 1.04 Use of Contract Documents -- the Contract Documents were prepared for use in the construction of this Project only. No part of the Contract Documents shall be used for any other construction or for any other purpose except with the written consent of Metro. Any unauthorized use of the Contract Documents is at the sole responsibility of the user and such unauthorized use shall be deemed an activity in the performance of the Contract for purposes of Contractor's duty to indemnify under Article 11.
- 1.05 Copyright -- all submittals, record documents and any other products or documents produced by Contractor pursuant to this Contract are the property of Metro and it is agreed by the parties hereto that such documents are works made for hire. Contractor does hereby convey, transfer and grant to Metro all rights of reproduction and the copyright to all such documents.
- 1.06 Severability Clause -- should any provision of this Contract at any time be in conflict with any law, regulation or ruling, or be legally unenforceable for any reason, then such provision shall continue in effect only to the extent that it remains valid. In the event that any provision of this Contract shall become legally unenforceable, in whole or in part, the remaining provisions of this Contract shall nevertheless remain in full force and effect.
- 1.07 Notice or Service -- any written notice required or allowed under the Contract shall be deemed to have been communicated to the other party and service thereof shall be deemed to have been made if such notice is delivered in person to the individual, a member of the partnership or joint venture, or an officer of the corporation for whom it was intended or if delivered at or sent by regular, registered or certified mail to the last business address of the relevant person or party known to the person or party giving the notice or to Contractor's Site office if the notice is directed to Contractor. The date or time of service for purposes of all notices required or allowed under the Contract shall

be the date and/or time upon which the relevant document was mailed or delivered as above-described.

The address given in the Bid is hereby designated as the legal business address of Contractor, but such address may be changed at any time by ten (10) days prior notice in writing, delivered to Metro.

ARTICLE 2 CONTRACTOR'S ORGANIZATION

- 2.01 Contractor's Authorized Representatives -- prior to commencing any work under this Contract, Contractor shall submit in writing to Metro a list of Contractor's authorized representatives. Such list shall include the name and title of each representative along with the extent to which each representative is authorized to represent, bind and act for Contractor. The description of extent of representation shall include, but not be limited to, the maximum dollar value of Change Orders which the individual may authorize, whether the individual may respond to Request for Proposals and for what maximum dollar amount and whether the individual may submit a claim pursuant to Paragraph 3.03. Contractor shall be fully liable for the acts, omissions and decisions of such representatives to the extent stipulated in the written list submitted to Metro.

Contractor shall at all times be represented at the Site by one or more of such authorized representatives, who, cumulatively, shall have complete authority to represent, bind and act for Contractor in all matters pertaining or related to this Contract. In the event that Contractor does not comply with this paragraph and, consequently, is not fully represented at the Site at all times, Contractor shall be deemed to acquiesce in all actions taken by Metro which pertain or relate to this Contract.

- 2.02 Contractor's Office at the Site -- prior to commencement of work at the site, Contractor shall establish a field office at the site acceptable to the Construction Coordinator. This office shall be located in a job trailer or temporary building. This office shall be the headquarters of Contractor's representatives authorized to receive notices, instructions, drawings or other communications from the Construction Manager on behalf of Metro or the Engineer and to act on Change Orders or other actions. Such notices, instructions, drawings or other communications given to such a representative or delivered to Contractor's site office in his/her absence shall be deemed to have been given to Contractor.

- 2.03 Key Personnel -- Contractor shall submit, in writing, to Metro a list of the names, addresses, and telephone numbers of its key personnel who are to be contacted in case of emergencies on the job during non-working hours, including Saturdays, Sundays and holidays and all other key personnel as may be required.

- 2.04 Contractor's Employees -- Contractor shall enforce strict discipline and good order among Contractor's employees and other persons carrying out the Work. Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

Whenever Metro shall notify Contractor that any employee on the Work is, in the judgment of Metro, incompetent, unfaithful, disorderly or refuses to carry out the provisions of the Contract, such employee shall be discharged or transferred from the Work.

Contractor shall give Metro, at its request at any time, full and correct information as to the number of workers employed in connection with each subdivision of the Work, the classification and rate of pay of each worker, the cost to Contractor of each class of materials, tools and appliances used by it in the Work, and the amount of each class of materials used in each subdivision of the Work.

- 2.05 Daily Construction Reports -- each day Contractor shall deliver to the Construction Manager a daily construction report which shall include, at a minimum, the following information:
- 2.05.01 Name of Contractor and Project.
 - 2.05.02 Weather, temperature and any unusual Site conditions for the day in question.
 - 2.05.03 A brief description and location of the day's work activities and any special problems and/or serious accidents or environmental releases, including preventative or mitigation measures taken. (including work of Subcontractors)
 - 2.05.04 A description of significant progress in construction for that day as well as any problems encountered that might affect the progress of the Project as they relate to the Construction Schedule.
 - 2.05.05 Any other information as requested by Metro or its representative.
- 2.06 Contractor to Supply Sufficient Material and Workers -- Contractor shall at all times keep on the premises sufficient material and employ sufficient supervision and workers to prosecute the Work at the rate necessary to substantially complete the Work herein required within the time specified in the Contract and in accordance with the Construction Schedule. Contractor shall coordinate the Work of its Subcontractors so that information required by one will be provided by others involved in time for incorporation in the Work in proper sequence and without delay of any materials, devices or provisions for future work.
- 2.07 Construction Plant, Equipment and Methods --the construction plant and equipment provided by Contractor, and Contractor's methods and organization for handling the Work shall be such as will secure a good quality of work and rate of progress which will ensure the completion of the Work within the time specified, in accordance with the Construction Schedule, and without violating city, local, state or federal environmental regulation during construction.

Contractor shall give Metro full information in advance as to Contractor's plans for carrying on any part of the Work. If at any time before the commencement or during the progress of the Work, any part of Contractor's plant or equipment, or any of Contractor's methods of executing the Work, appears to Metro to be inadequate to ensure the required quality, environmental protection or rate of progress of the Work, Metro may order Contractor to increase or improve its facilities or methods, and Contractor shall promptly comply with such orders. Neither compliance with such orders nor failure of Metro to issue such orders shall relieve Contractor from obligation or liability to secure the quality of work and the rate of progress required by the Contract. Contractor shall be responsible for overload of any part or parts of structures beyond their safe calculated carrying capacities, and for release of pollutants into surrounding waters resulting from Contractor's activities on the Site.

Contractor shall provide temporary utilities pursuant to the Specifications and shall be responsible for the safety and adequacy of its plant, equipment and methods.

- 2.08 Contractor's Temporary Structures -- Contractor shall obtain all necessary permits for and shall erect and maintain at its own expense, and remove upon completion of the Work or as ordered by Metro temporary structures, sheds, barriers, walks, hoisting equipment, scaffolds, etc., as are necessary for the Work pursuant to these Contract Documents.

Contractor's temporary structures, equipment, stored materials, stored equipment, etc., shall be located so as not to interfere with the prosecution of the Work. If not so located, they shall be moved by Contractor, as directed by Metro, at no cost to Metro. Contractor's temporary structures, equipment or materials that obstruct progress of any portion of the work shall be removed or relocated by Contractor at Contractor's expense.

ARTICLE 3 ADMINISTRATION OF THE CONTRACT

- 3.01 Authority and Relationships of Metro and Engineer -- the following provisions shall govern the authority of the various officers, agents, representatives, consultants and employees of Metro, and Engineer. Except as specifically provided in this section, no individual acting or purporting to act as an officer, agent, representative, consultant or employee of Metro or Engineer shall have any authority to make representations, statements or decisions of whatever nature binding Metro or Engineer regarding any aspect of this Contract. Except as specifically provided in this Article, Contractor shall have no right to, and shall not rely on any such representation, statement or decision. Any reference to action by Metro in this Contract requires the written approval of the Metro Executive Officer or a person who is designated in writing by the Metro Executive Officer as having authority to act for Metro but only to the extent that such authority is expressly delegated in writing.

- 3.01.01 Authority of Metro -- except as otherwise provided herein, Metro shall determine the amount, quality, acceptability, fitness, and progress of the Work covered by the Contract. Metro and Engineer will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, and they will not be responsible for Contractor's failure to carry out the Work in accordance with the Contract Documents. Metro and Engineer will not be responsible for or have control over the acts or omissions of Contractor, Subcontractors, or any of their agents or employees, or any other persons performing any of the Work. Nothing contained in this Contract is intended nor shall be construed to create any third-party beneficiary relationship between Metro and Contractor's subcontracting agents or employees.

It shall be the duty of Contractor to comply with all procedures established and/or implemented by Metro as stated above. In the event any such procedures are at variance with other provisions of these Documents, such procedures shall prevail.

Metro may call for meetings of Contractor, Contractor's Subcontractors and Suppliers as Metro deems necessary for the proper supervision and inspection

of the Work. Such meetings shall be held at the Site on regular working days during regular working hours, unless otherwise directed by Metro. Attendance shall be mandatory for all parties notified to attend.

Contractor shall immediately comply with any and all orders and instructions given in accordance with the terms of this Contract by Metro.

Contractor has no right to, and shall not, rely on representations of whatever nature made by any individual, whether or not employed by or purporting to represent Metro or Engineer, unless such individual has been specifically and expressly delegated authority to make such representations pursuant to these Contract Documents. Likewise Contractor has no right, and shall not rely on any representations of authorized changes in the contract of whatever size or nature unless such change is in writing and signed by Metro.

Nothing contained in this Paragraph shall obligate Metro or Engineer to supervise Contractor's work under this Contract and Contractor shall remain fully responsible for the complete and proper supervision of all of the Work.

- 3.02 Clarifications -- should it appear that the Work to be done or any of the matters relative to the Contract Documents are not sufficiently detailed or explained in the Contract Documents, or should there be any questions which may arise as to the meaning or intent of the Contract Documents, Contractor shall immediately submit to Metro a written Request for Clarification which shall fully describe the information sought. It is Contractor's responsibility to request information under this Paragraph in sufficient time for review by Engineer and Metro so that the orderly progress and prosecution of the Work is not delayed.

The Engineer, in consultation with Metro, shall interpret the meaning and intent of the Contract Documents and shall issue, within ten (10) days of receiving a Request for Clarification from Contractor, a written Clarification describing such meaning and intent. Additionally, the Engineer, after consulting with Metro, may at any time issue written Clarifications as deemed necessary to carry out the Work included in the Contract Documents. Notwithstanding any dispute or disagreement which Contractor may have concerning any such Clarifications, Contractor shall perform the Work as prescribed and in accordance with all such Clarifications.

If notified by Metro that a Clarification is forthcoming, any related work done before the receipt of the Clarification shall be coordinated with Metro so as to minimize the effect of the Clarification on work in progress. Any related work not coordinated with Metro done before receipt of the Clarification shall be at Contractor's risk and at no cost to Metro if that work does not conform to the Clarification.

If Contractor proceeds with work which is not sufficiently detailed or explained in the Contract Documents without requesting and obtaining a Clarification pursuant to this Paragraph, Contractor shall do so at its own risk and shall, at no cost to Metro, perform any additional work which may be required by Metro to bring the work into conformance with the intent of the Contract Documents.

- 3.03 Contractor's Claims

3.03.01 Generally -- no claims of any sort whatsoever by Contractor shall be considered or allowed under this Contract except as specifically provided and prescribed under this Paragraph. Failure to make a claim as specifically prescribed by this Paragraph or failure to perform disputed work, if any, as directed by Metro shall bar Contractor from any recovery of any sort or extension of time resulting from the facts surrounding the claim. Contractor's full and complete compliance with this Paragraph shall be a condition precedent to any right of Contractor to further prosecute any claim against Metro arising out of or related to Work described in the Contract Documents. Every decision and action of Metro shall be considered final unless Contractor makes a claim concerning such decision or action pursuant to this Paragraph.

3.03.02 Types of Claims -- the types of claims which Contractor may make are limited to the following:

3.03.02.01 Claims based upon justifiable delays as described in Subparagraph 3.03.03;

3.03.02.02 Claims based upon differing Site conditions as described in Subparagraph 3.03.04;

3.03.02.03 Claims based upon Clarifications or Change Orders issued by Metro or any other decision, action or failure to act by Metro as described in subparagraph 3.03.05.

As a condition precedent to any such claim, Contractor shall comply with all applicable procedural and substantive requirements of this Contract.

Contractor may make claims which include requests for extensions of the Contract Time and/or requests for increases in the Contract Amount. If Contractor believes that a single circumstance or set of facts gives rise to both a claim for an extension to the Contract Time and an increase in the Contract Amount, Contractor must state both such allegations in one written claim or waive the unstated allegation.

3.03.03 Claims For Justifiable Delays

3.03.03.01 Definition of Justifiable Delay -- if Contractor is significantly and justifiably delayed in the prosecution of the Work due to any of the acts, events or conditions described as justifiable delays below, Contractor may make a claim for an increase in the Contract Time and/or Contract Amount pursuant to Clause 3.03.03.02.

"Justifiable Delay" shall mean, and is limited to, the acts, events or conditions described in sections (a) through (j) below, if such act, event or condition has a materially adverse effect on the ability of Contractor to obtain the benefits of its rights or to perform its obligations under this Contract or materially increases the cost to Contractor to obtain the benefits of such rights or to perform such obligations and if such act, event or condition and its effect:

- 3.03.03.01.01 are beyond the reasonable control of Contractor (or any third party for whom Contractor is directly responsible);
- 3.03.03.01.02 do not arise out of (a) strikes, labor disputes or other labor difficulties involving Contractor or its Subcontractors or Suppliers or entities providing transportation to Contractor or its Subcontractors or Suppliers, (b) labor shortages, or (c) changing economic conditions; and
- 3.03.03.01.03 could not have been reasonably anticipated by Contractor.

The acts, events and conditions are:

- (a) An Act of God.
- (b) Inclement Weather.
- (c) Acts of a public enemy, war (whether or not declared) or governmental intervention resulting therefrom, blockage, embargo, insurrection, riot or civil disturbance.
- (d) The failure to issue or renew, or the suspension, termination, interruption or denial of, any permit, license, consent, authorization or approval essential to the Work, if such act or event shall not be the result of the willful or negligent action or inaction of Contractor, or of any third party for whom Contractor is directly responsible, and if Contractor shall be taking or have taken or shall cause to or have caused to be taken, all reasonable actions in good faith to contest such action (it being understood that the contesting in good faith of any such action shall not constitute or be construed as a willful or negligent act of Contractor).
- (e) The failure of any appropriate federal, state, municipal, county or other public agency or authority or private utility having operational jurisdiction over the Work or Site to provide and maintain utilities, services, water and sewer lines and power transmission lines to the Site, which are required for and essential to the Work.
- (f) Epidemics or quarantines.
- (g) Material, equipment or fuel shortages or freight embargoes.
- (h) Priorities or privileges established for the manufacture, assembly or allotment of material by order, decree, or otherwise of the U. S. or by any department, bureau, commission, committee, agent or administrator of any legally constituted public authority.

- (i) Changes in the work ordered by Metro if they require additional time to complete the work and adversely impact the Critical Path.
- (j) The prevention by Metro of Contractor from commencing or prosecuting the Work.

Acts, events, or conditions outside the control of the Engineer, Construction Manager, Metro or Contractor which are found to be justifiable delay under 3.03.03.01.03 (a) through (h), may result in a time extension but the risk for bearing the cost of extended overhead will remain with Contractor.

No claim for extension of the Contract Time will be considered for Inclement Weather unless Contractor submits documentation that such weather conditions are abnormal for the area and period of time in question; that they could not have been reasonably anticipated; and that the Inclement Weather had a significantly adverse effect on the Construction Schedule.

Delays in delivery of equipment or material purchased by Contractor or its Subcontractors or Suppliers (including Metro-selected equipment) shall not be considered as a just cause for delay if timely ordering would have made the equipment available. Contractor shall be fully responsible for the timely ordering, scheduling, expediting, delivery, and installation of all equipment and materials.

The term "delay" shall specifically not include and no extension of the Contract Time or increase in the Contract Amount shall be allowed for (i) any delay which could have been avoided by the exercise of care, prudence, foresight and diligence on the part of Contractor; (ii) any delay in the prosecution of parts of the Work, which may in itself be unavoidable but which does not necessarily prevent or delay the prosecution of other parts of the Work, nor the Substantial Completion of the Work of this Contract within the time specified; (iii) any reasonable delay resulting from the time required by Metro for review of Submittals or Shop Drawings submitted by Contractor and for the making of surveys, measurements and inspections; (v) any delay arising from an interruption in the prosecution of the Work on account of the reasonable interference from Other Metro Contractors which does not necessarily prevent the Substantial Completion of the Work of this Contract within the time specified; and (vi) any delay resulting in any manner from labor disputes, strikes or difficulties or any delay resulting in any manner from any labor-related

event, act or condition whether or not Contractor has any control over such event, act or condition.

- 3.03.03.02 Justifiable Delay Claims Procedure -- Contractor shall, within twenty-four (24) hours of the start of the occurrence or Contractor's first knowledge of the occurrence which is the basis of the claim for justifiable delay, which ever is earlier, notify Metro in writing of such delay. The written notice by Contractor shall indicate the cause of the delay and shall estimate the possible time extension requested. Within ten (10) days after the cause of the delay has been remedied, Contractor shall give written notice to the Construction Manager of any actual time extension and any increase in the Contract Amount requested as a result of the aforementioned occurrence in accordance with this Contract.

Within Twenty-one (21) days after Contractor submits to the Construction Manager such a written notice for an extension of time and/or increase in the Contract Amount, the Construction Manager will issue the decision on each request. If Contractor is dissatisfied with such decision, Contractor may preserve its claim as provided and prescribed by Subparagraph 3.03.06.

- 3.03.04 Claims for Differing Site Conditions -- Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Construction Manager of (i) subsurface or latent physical conditions at the Site which differ materially from those indicated in this Contract, or (ii) unknown physical conditions at the Site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

The Construction Manager shall investigate the Site conditions promptly after receiving the notice. If the conditions do materially so differ as to cause an increase or decrease in Contractor's cost of, or the time required for performing any part of the Work under this Contract, whether or not changed as a result of the conditions, an equitable adjustment shall be made and a Change Order issued.

If Contractor is dissatisfied with the decision of the Construction Manager under this Subparagraph, Contractor may preserve its claim as provided and prescribed by Subparagraph 3.03.06.

- 3.03.05 Other Contractor Claims -- Contractor claims based upon Clarifications or Change Orders issued by Metro or any other decision, action or failure to act by Metro shall be made according to this Subparagraph.

Contractor shall, within twenty-four (24) hours following discovery of the facts which give rise to its claim, notify the Construction Manager in writing of its intent to make the claim. Within ten (10) days following discovery of the facts which give rise to its claim and prior to commencing the work or conforming to the Clarification on which the claim is based, if any, Contractor shall submit its formal written claim to the Construction Manager. Contractor's formal claim shall include a description of:

- 3.03.05.01 the factual occurrences upon which Contractor bases the claim including the decision, action or failure to act by Metro or its authorized representatives that allegedly give rise to the claim;

- 3.03.05.02 how Metro's decision, action or failure to act has affected Contractor's performance or otherwise affected Contractor;
- 3.03.05.03 whether the claim is for an extension in the Contract Time or increase in the Contract Amount or both and the specific extension or increase requested;
- 3.03.05.04 the provisions of the Contract upon which the claim is based.

Submission of written notice of intent to make a claim and formal claim as specified above shall be mandatory and failure to comply shall be a conclusive waiver to any claim by Contractor. Oral notice or statement will not be sufficient nor will notice or statement after commencing the work in question.

After the written notification is submitted by Contractor (if the claim is not resolved or withdrawn in writing) and only upon written direction by the Construction Manager, Contractor shall proceed without delay to perform the work pursuant to the direction of the Construction Manager. While the work on an unresolved claim is being performed, Contractor shall keep track of costs and maintain records in the manner set forth in the section on Force Account Work, at no cost to Metro. Such notice by Contractor and the fact that Contractor is keeping track of costs and maintaining records shall not in any way be construed as proving the validity of the claim nor the costs thereof.

Provided the claim or claims have been submitted in accordance with the requirements of this Article, the Construction Manager will consider and investigate the claim or claims of Contractor. Within twenty-one (21) days of receipt of the above-described written notification of claim the Construction Manager will advise Contractor of the Construction Manager's decision to accept or reject the claim or claims, in full or in part. If Contractor is dissatisfied with the decision of the Construction Manager under this Subparagraph, Contractor may preserve its claim as provided and prescribed by Subparagraph 3.03.06.

- 3.03.06 Preservation of Claims -- Within forty-five (45) days after a rejection of claim, in whole or in part, by Metro under Subparagraphs 3.03.03, 3.03.04 or 3.03.05, Contractor may preserve its claim by submitting a fully documented claim package to Metro. That package shall include substantiating documentation with an itemized breakdown of Contractor and Contractor's Subcontractor's costs on a daily basis which shall include, but not be limited to, labor, material, equipment, supplies, services, Overhead and Profit. All documentation that Contractor believes is relevant to the claim shall be provided in the claim package including without limitation, payroll records, purchase orders, quotations, invoices, estimates, correspondence, profit and loss statements, daily logs, ledgers and journals. Failure to submit the claim package in full compliance with this requirement, and/or maintain cost records as herein required, will constitute a waiver of the claim.

If Contractor elects to pursue any claims by filing a lawsuit against Metro, it must commence such lawsuit within six (6) months after the date of Substantial

Completion. Failure to commence a lawsuit within this time limitation shall constitute a waiver of all such claims by Contractor.

3.04 Metro's Right to Adjust Payments

3.04.01 Adjusted Payments for Delay -- Time is of the essence in this Contract. Metro and Contractor understand and agree that Metro will be damaged if Contractor fails to substantially complete the Work within the Contract Time, and that Metro will be vulnerable to further damages if Metro is obligated to continue paying Contractor for work performed after the Contract Time has expired. It is therefore agreed that after the Contract Time, Metro may adjust its payments to Contractor by either (1) making no further payments to Contractor until the Work is substantially complete, or (2) paying the Subcontractor costs incurred by Contractor without any overhead, profit or fee of any kind going to Contractor, or (3) by collection of liquidated damages as may be provided for in Supplementary Conditions.

Permitting Contractor to continue and finish the work or any part thereof after the Contract Time has expired shall in no way operate as a waiver on the part of Metro of any of its rights under this subparagraph or the balance of the Contract Documents.

3.04.02 Adjusted Payments Not a Bar to Metro's Right to Other Damages -- Payment of adjusted payments shall not release Contractor from obligations in respect to the complete performance of the Work, nor shall the payment of such adjusted payments constitute a waiver of Metro's right to collect any additional adjusted payments which it may sustain by failure of Contractor to fully perform the Work, it being the intent of the parties that the aforesaid adjusted payments be full and complete payment only for failure of Contractor to complete the Work on time. Metro expressly reserves the right to make claims for any and all other damages which Metro may incur due to Contractor's failure to perform in strict accordance with this Contract.

3.05 Arbitration -- Both parties shall, in good faith, attempt to negotiate resolutions to all disputes arising out of this Contract. Subject to the conditions and limitations of this paragraph, any controversy or claim arising out of or relating to this Contract which remains unresolved after such negotiations shall be exclusively settled by arbitration under the laws of the state of Oregon, in accordance with the Commercial Arbitration Rules of the American Arbitration Association. All disputes shall be heard and decided by one arbitrator and all arbitration proceedings shall be held in Portland, Oregon. However, all disputes concerning Metro's right to the equitable remedy of specific performance shall not be subject to arbitration, but shall be decided exclusively by a court of competent jurisdiction in Multnomah County, Oregon, under the laws of the state of Oregon.

Contractor agrees to consolidation of any arbitration between Metro and Contractor with any other arbitration involving, arising from, or relating to this Contract.

In the event that Metro determines, in its sole opinion, that the public interest requires a speedy resolution of any controversy or claim regardless of the amount, Metro shall have the option of electing resolution of the controversy or claim by the Expedited Procedures of the Commercial Arbitration Rules of the American Arbitration Association (Rules 54 through 58).

In no event shall submission of a dispute arising out of this Contract, by either party, relieve Contractor of its obligation to fully perform the requirements of the Contract as directed by

Metro, pending resolution of the dispute pursuant to the procedures set forth in this Article. In the event Contractor, in Metro's opinion, fails to fully perform the requirements of the Contract pending resolution of a dispute, Metro shall be entitled to exercise its rights to impose adjusted payments pursuant to Subparagraph 3.04.01, or terminate the Contract pursuant to Article 15 of this Contract.

Each party hereto and Contractor's Surety accepts jurisdiction of the courts of the state of Oregon for the purposes of commencing, conducting and enforcing such arbitration proceedings and agrees to accept notice in writing sent by certified letter addressed to said party of intention to proceed with arbitration and of any other step in connection therewith or enforcement thereof, with the same effect as though personally served therewith in the state of Oregon. The decision of the arbitrator shall be final and binding upon both parties and Contractor's Surety who hereby agree to comply therewith. The parties agree that proper venue for any judicial proceeding to enforce any decision or award made by an arbitrator under this section shall be exclusively in the county of Multnomah in the state of Oregon.

ARTICLE 4 SUBCONTRACTING AND ASSIGNMENT OF THE CONTRACT

- 4.01 Contractor's Responsibility for the Work -- Contractor shall perform or cause to be performed all labor, services and work of whatever nature and shall provide or cause to be provided all materials, equipment, tools and other facilities of whatever nature necessary to complete the Work and shall otherwise cause the Work to be completed in accordance with the Contract Documents.

Contractor shall take and assume all risk for all work and material involved in the Project until the entire Project has been finally accepted by Metro.

Contractor shall supervise and direct the Work, using Contractor's best skill and attention. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters.

- 4.02 Subcontracting -- Contractor shall arrange and delegate its work in conformance with trade practices and union regulations, if applicable, but shall remain responsible to Metro for performance of all work required or implied by the Contract Documents. Contractor shall also be responsible for coordinating the efforts of its Subcontractors and Suppliers.

- 4.02.01 Objection to Subcontractors or Suppliers -- Metro reserves the right to make reasonable objection to any of Contractor's Subcontractors or Suppliers if Metro discovers any data or information at any time during the performance of the Contract which gives Metro a basis for such reasonable objection.

Metro will notify Contractor in writing if Metro has any reasonable objection to any of Contractor's Subcontractors or Suppliers. Contractor shall not subcontract with any Subcontractor or Supplier to which Metro has made a reasonable objection. In the event of Metro's reasonable objection to any Subcontractor or Supplier, Contractor shall propose another entity to which Metro has no reasonable objection. The Contract Amount shall not be increased by any difference in cost occasioned by such substitution, nor shall the Contract Time be extended.

- 4.02.02 Substitution, Change or Addition of Subcontractors or Suppliers -- At any time that Contractor intends to substitute, change or add a Subcontractor or Supplier during the performance of the Contract, Contractor shall give Metro prior written notice of such intention. Contractor shall not substitute, change or add any such Subcontractor or Supplier if Metro gives Contractor reasonable objection in writing within ten (10) days after Metro receives such notice.

When any Subcontractor fails to prosecute a portion of the Work in a satisfactory manner, Metro may so notify Contractor. If the Subcontractor fails to cure the unsatisfactory work promptly, Contractor shall remove such Subcontractor immediately upon written request of Metro and Contractor shall request approval from Metro of a new Subcontractor to perform this section of the Work at no increase in the Contract Amount, and with no change in the Contract Time.

- 4.02.03 Metro Not Obligated to Detect Unsatisfactory Work -- Nothing contained in this Contract shall obligate Metro or place on Metro an affirmative duty to detect or discover unsatisfactory work or materials of Contractor's Subcontractors or Suppliers. Failure of Metro to detect or discover such unsatisfactory work or materials shall not relieve Contractor of any of its obligations under this Contract.

- 4.02.04 No Contractual Relationships Between Metro and Contractor's Subcontractors and Suppliers -- Nothing contained in this Contract is intended nor shall be construed to create any contractual or third-party beneficiary relationship between Metro and any of Contractor's Subcontractors, Suppliers or agents, save and except in relation to the Labor and Materials Payment Bond .

- 4.02.05 Contractor's Agreements with Subcontractors -- Contractor shall provide in all subcontract and supply agreements that the Subcontractor or Supplier will be bound by the terms and conditions of this Contract to the extent that they relate to the Subcontractor's or Supplier's work. Where appropriate, Contractor shall require each Subcontractor to enter into similar agreements with sub-tier Subcontractors and Suppliers. Contractor shall make available to each proposed Subcontractor and Supplier, prior to the execution of the subcontract or supply agreement, copies of the Contract Documents which apply to the work and materials to be provided by the Subcontractor or Supplier. Subcontractors and Suppliers shall similarly make copies of applicable portions of such documents available to their respective proposed sub-tier Subcontractors and Suppliers.

All Subcontractor's and Supplier's agreements shall also provide that they are assignable to Metro at Metro's option, in the event that Metro terminates the Contract. Contractor will provide to Metro, a copy of all subcontracts and supply contracts for permanent materials.

Nothing contained in this Subparagraph shall be construed as creating a direct or indirect contractual relationship between Metro and any of Contractor's Subcontractors or Suppliers. No such Subcontractor or Supplier shall have, or shall claim to have, any third-party beneficiary rights or status in relations to this Contract, save and except in relation to the Labor and Materials Payment Bond provided by Contractor.

- 4.03 Assignment -- Contractor shall constantly give its personal attention to the faithful prosecution of the Work. Contractor shall keep the Work under its personal control and shall not assign

any or all of Contractor's rights, by power of attorney or otherwise, nor delegate any of its duties except with the prior written approval of the Metro Council.

ARTICLE 5 TIME OF COMPLETION AND SCHEDULE FOR THE WORK

5.01 Prosecution of Work Generally -- Contractor shall commence the Work within ten (10) days after issuance of written Notice to Proceed from Metro and will diligently prosecute the Work to its Final Completion and Acceptance. The start of Work shall include attendance at preconstruction conferences, preparation and submittal of shop drawings, equipment lists, Schedule of Values, CPM construction schedules, requests for substitutions and other similar activities, as described by these Contract Documents.

5.02 Time of Completion -- Contractor shall bring the Work to Substantial Completion within the Contract Time as set forth in the Construction Agreement.

The time limits stated in these Contract Documents are of the essence of this Contract. By executing the Construction Agreement, Contractor confirms that the Contract Time is a reasonable period for performing all of the Work.

Failure of Contractor to substantially complete the Work within the Contract Time and according to the provisions of these Contract Documents shall subject Contractor to damages pursuant to the applicable sections of these Contract Documents.

5.03 Extensions of Time -- Extensions of the Contract Time shall be made pursuant to the procedure and according to the provisions and requirements contained in Articles 3 and 8 of these Contract Documents.

5.04 Project Scheduling -- Contractor shall submit to Metro a detailed Construction Schedule for completion of the work pursuant the Specifications. The Construction Schedule shall, when approved and as updated and approved by Metro, become a part of the Contract Documents.

5.05 Use of Completed Parts of the Work Before Acceptance -- Whenever, in the opinion of Metro, the Work or any part thereof is in a condition suitable for use and it is in the best interest of Metro to require such use, Metro may take possession of, connect to, open for public use, or use the Work or a part thereof. When so used, maintenance and repair due to ordinary wear and tear or vandalism will be made at Metro's expense and Metro will defend liability claims which may result from such use by Metro. The use by Metro of the Work or part thereof as contemplated in this Paragraph shall in no case be construed as constituting acceptance of the Work or any part thereof. Such use shall neither relieve Contractor of any of its responsibilities under the Contract Documents, nor act as a waiver by Metro of any of the conditions thereof.

ARTICLE 6 COORDINATION WITH OTHER METRO CONTRACTORS

6.01 Other Metro Contractors Generally -- Metro reserves the right to award other contracts in connection with the work. Contractor shall afford all such Other Metro Contractors reasonable opportunity for storage of their materials and execution of their Work, shall provide that the execution of Contractor's Work properly connects and coordinates with work of all Other Metro Contractors, and shall cooperate with Other Metro Contractors to the end of facilitating the Work in such a manner as Metro may direct. Connection between the work of the Contractor and other Metro Contractors will be the responsibility of the party which is last in time to construct, unless otherwise directed in the Contract Documents.

- 6.02 Duty to Inspect Other Metro Contractors' Work -- Where Contractor's Work is associated with that of Other Metro Contractors, or is to interface in any way with such Other Metro Contractor's work, Contractor shall examine, inspect and measure the adjacent or in-place work of such Other Metro Contractors. If Contractor determines that any defect or condition of such adjacent or in-place work will impede or increase the cost of Contractor's performance or otherwise prevent the proper execution of Contractor's Work, Contractor shall immediately, and before performing any work affected by the Other Metro Contractors' work, submit a Request for Clarification to Metro pursuant to Paragraph 3.02. If Contractor proceeds without examining or inspecting the work and submitting a Request for Clarification, Contractor shall be held to have accepted the Other Metro Contractors' work or material and the existing conditions, and shall be responsible for any defects in Contractor's Work resulting therefrom and shall not be relieved of any obligation or any warranty under this Contract because of any such condition or imperfection. This provision shall be included in any and all of Contractor's subcontracts for Work to be performed.

The foregoing does not apply to latent defects. Contractor shall report latent defects in any Other Metro Contractors' work at any time such defects become known or Contractor should have known, and Metro shall promptly thereafter take such steps as may be appropriate. If Contractor in the exercise of reasonable care should have known of such defects but did not report them, such defects shall not be considered latent.

- 6.03 Duty to Maintain Schedule -- It shall be the responsibility of Contractor to maintain its schedule so as not to delay the progress of the Project or the work of Other Metro Contractors. Contractor is required to cooperate in every way possible with Other Metro Contractors. Except as otherwise specifically provided in this Contract, no additional compensation will be paid for such cooperation. If Contractor delays the progress of the Project or the progress of Other Metro Contractors, it shall be the responsibility of Contractor to take all of the steps necessary to bring the affected work into compliance with any affected schedules and to indemnify Metro from all liability for such delays pursuant to Article 11.

Metro shall be under no duty to monitor or detect any delays of Contractor or any Other Metro Contractor on the Project or any lack of coordination on the Project. Consequently, the failure of Metro to so monitor or detect shall not be construed as relieving Contractor of its duties to fully perform all of its obligations under the Contract.

- 6.04 Failure to Maintain Schedule -- If, in the opinion of Metro, Contractor falls behind the Construction Schedule or delays the progress of Other Metro Contractors and is not entitled to an extension of time pursuant to the Contract Documents, Contractor shall perform all steps which are necessary, in the opinion of Metro, to bring Contractor's Work into compliance with the Construction Schedule or to remedy any delay to the progress of Other Metro Contractors. Contractor shall submit operation plans to Metro, which plans shall fully demonstrate the manner of intended compliance with this Paragraph. The steps referred to above shall include, but not be limited to:

- 6.04.01 Increase manpower in such quantities and crafts as will substantially eliminate the backlog of work.
- 6.04.02 Increase, when permitted, the number of working hours per shift, shifts per working day, working days per week, or the amount of equipment or any combination of the foregoing, sufficient to eliminate the backlog of work.

6.04.03 Reschedule activities to achieve maximum practical concurrence of accomplishment of activities.

6.04.04 Expedite delivery of materials and equipment such as use of air freight.

If Metro directs Contractor to take measures described in this Paragraph, or if Contractor takes such measures without direction from Metro, Contractor shall bear all costs of complying. Metro shall, however, reimburse Contractor for reasonable costs of complying if such directive to accelerate from Metro was issued to overcome delay caused by the acts or omissions of Metro or persons acting for Metro, provided Contractor has complied with all applicable provisions of Articles 3 and 8 of this Contract.

Failure to maintain the construction schedule or to take action to regain the schedule or to furnish a schedule as outlined in the specifications may result in withholding of all or part of the monthly progress payments.

6.05 Failure to Coordinate Work -- If Contractor fails to coordinate its work with the work of Other Metro Contractors as directed by Metro, Metro may, upon written notice to Contractor:

6.05.01 Withhold any payment otherwise due hereunder until Contractor complies with Metro's directions.

6.05.02 Direct others to perform portions of the affected Work and charge the cost of such Work against the Contract Amount or deduct the cost from sums held in Retainage.

6.05.03 Terminate any or all portions of the Work for Contractor's failure to perform in accordance with the Contract.

6.06 Other Metro Contractors' Failure to Coordinate -- If Contractor determines that any Other Metro Contractor on this Project is failing to coordinate its work with the Work of Contractor, Contractor shall immediately and before performing any affected Work submit a Request for Clarification to Metro pursuant to Paragraph 3.02.

6.07 Conflicts Among Contractors -- Any difference or conflict that may arise between Contractor and Other Metro Contractors in regard to their work shall be adjusted as determined by Metro. If directed by Metro, Contractor shall suspend any part of the Work specified or shall carry on the same in such manner as may be prescribed by Metro when such suspension or prosecution is necessary to facilitate the work of Other Metro Contractors.

6.08 Coordination Drawings -- Contractor shall prepare coordination drawings as determined necessary by Metro, to satisfactorily coordinate and interface its Work with the work of all Other Metro Contractors, thereby avoiding conflicts which may arise.

6.09 Conferences -- At any time during the progress of the Work, Metro shall have authority to require Contractor to attend any conference of any or all of Contractors engaged in the Project or related projects.

ARTICLE 7 CONTROL AND QUALITY OF WORK AND MATERIAL

7.01 Quality Control

7.01.01 Generally -- Contractor has the primary responsibility for quality control. Contractor will provide continuous superintendence and inspection to insure that the work is completed in accordance with the plans and specifications. Additionally, during the performance of the Work, Metro, the Engineer, and Special Inspectors, or any other persons deemed necessary by any of them acting within the scope of the duties entrusted to them, including representatives of federal, state, and local agencies having jurisdiction over the Work, may at any time, and for any purpose, enter upon the Site, the shops where any part of such Work may be in preparation, or the factories or sites where any materials for use in the Work are being or are to be manufactured or derived. Contractor shall provide proper and safe facilities therefor, and shall make arrangements with manufacturers or other suppliers to facilitate inspection of their processes and products to such extent as Metro's interest may require.

No claims for extension of the Contract Time or increase in the Contract Amount shall be allowed for any access allowed to Metro under this Paragraph.

7.01.02 Quality Control Plan -- Contractor shall prepare and submit to the Construction Manager within thirty (30) days following Notice to Proceed a Quality Control Plan which describes Contractor's procedures for implementing the Quality Control Program. The Plan shall include, but not be limited to, the Quality Control Organization, inspection procedures, tests anticipated, materials control, contingency plans related to fire protection and remediation of contaminated releases or other environmental improvement, and reports. Metro reserves the right to accept or reject or modify the Quality Control Plan. Contractor will submit an interim Quality Control Plan prior to the start of work to cover the first thirty (30) days of construction.

7.01.03 Quality Control Manager -- Prior to initiation of construction Contractor shall designate in writing a Quality Control Manager who shall be responsible for coordinating Contractor's Quality Control Program. The individual so designated shall be the interface with the Construction Manager on matters relating to submittals, inspection, scheduling, unacceptable work product and corrective actions. Metro reserves the right to accept or reject the Quality Control Manager designated by Contractor.

7.02 Inspection -- Contractor has the primary responsibility for providing inspection and testing, except as otherwise set forth in the specifications. Metro and its agents will also inspect at their discretion or as outlined in the specifications.

7.02.01 Generally -- Contractor shall at all times commencing with the issuance of the Notice to Proceed until Final Completion and Acceptance of the Work, permit Metro, the Engineer, and Special Inspectors, or any other persons deemed necessary by any of them acting within the scope of the duties entrusted to them, including representatives of federal, state, and local agencies having jurisdiction over the Work, to visit and monitor the progress of the Work for conformance of the Work with the Contract Documents.

7.02.02 Special Inspections -- Contractor shall at all times, commencing with the issuance of the Notice to Proceed until Final Completion and Acceptance of the Work, permit Metro, the Engineer, and Special Inspectors, or any other persons deemed necessary by any of them acting within the scope of the duties entrusted to them, including

representatives of federal, state, and local agencies having jurisdiction over the Work, to visit and inspect the Work, the materials and the manufacture and preparation of such materials, and subject the Work and materials to inspection and testing to determine if the Work conforms to the requirements of the Contract Documents. Contractor shall maintain proper facilities and safe access for all such inspections. Where the Contract requires work to be inspected or tested, it shall not be covered up until inspected, tested and approved by Metro. Contractor shall be solely responsible for notifying Construction Manager at least two (2) working days prior to performing such work, so that necessary arrangements for inspection and testing can be made. Should any work be covered without such inspection or test and approval, it shall be uncovered and repaired at Contractor's expense.

7.02.03 Notice to Metro for Certain Work Days -- Whenever Contractor intends to perform work on Saturday, Sunday or any legal holiday, it shall give written notice to Metro of such intention at least two (2) working days prior to performing such work, or such other period as may be specified by Metro, so that Metro may make the necessary arrangement for testing and inspection.

7.02.04 Correction of Defective Work Before Acceptance -- Any defective work or work which otherwise fails to conform to the Contract Documents, which is discovered before Final Completion and Acceptance of the Work, shall be corrected immediately by Contractor, and any unsatisfactory materials shall be rejected and replaced with satisfactory materials, notwithstanding that they may have been overlooked by the authorized inspector. The inspection of the Work by Metro, the Engineer or any other agency shall not relieve Contractor of any of its obligations to perform fully all of the terms and provisions of the Contract Documents.

7.02.05 Acceptance Not Implied by Failure to Object -- Failure or neglect on the part of Metro or any of its authorized representatives to condemn or reject defective, improper or inferior work or materials shall not be construed to imply a final acceptance of such work or materials and shall not be construed as relieving Contractor of its duties to perform fully all requirements of the Contract Documents.

7.03 Unsatisfactory Materials and Workmanship

7.03.01 Generally -- Material, work or workmanship which, in the opinion of the Construction Manager, does not conform to the Contract Documents, or is not equal to the samples submitted to and approved by the Construction Manager, or is in any way unsatisfactory or unsuited to the purpose for which it is intended, will be rejected. Contractor shall bear the cost of correcting or removing as deemed necessary by Metro, all non-conforming materials, work or workmanship. Contractor shall make a close inspection of all materials as delivered, and shall promptly replace all defective materials with conforming materials without waiting for their rejection by Metro.

7.03.02 Removal of Rejected or Non-Conforming Work or Material -- All rejected material or work, and all defective or non-conforming work or material, shall be removed from the Site without delay. If Contractor fails to do so within forty-eight (48) hours after having been so directed by Metro, the rejected material may be removed by Metro and the cost of removal charged against Contractor and deducted from Retainage held by Metro or offset against payments due Contractor, at Metro's option.

If in the judgment of Metro it is undesirable or impracticable to replace any defective or non-conforming work or materials, the compensation to be paid to Contractor shall be reduced by Change Order or Force Account, as applicable, by such amount as, in the judgment of Metro, shall be equitable.

- 7.04 General Warranty of Contractor -- Contractor warrants to Metro that materials and equipment provided under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects and contaminants not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by Metro, Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

The warranty made by Contractor under this Paragraph shall be in addition to any other specific warranties and certifications required elsewhere in these Contract Documents.

- 7.05 Correction of Work by Contractor -- Contractor shall be responsible for and shall promptly correct or replace any defective Work, whether due to faulty or contaminated materials or errors in workmanship, or Work failing to conform to the requirements of the Contract Documents which may be discovered or which may develop within one (1) year after the date of Substantial Completion or within such longer period as is specified below or otherwise in these Contract Documents.

In the case of equipment manufactured by others and supplied and/or installed by Contractor, the one (1) year period shall commence upon the date of first beneficial operation of such equipment by Metro. In the case of Work which is corrected or replaced by Contractor, the one (1) year period shall commence again on the date of acceptance by Metro of such corrected or replaced Work. Testing shall not be construed to mean acceptance.

If Metro does not require correction or replacement of defective Work or Work failing to conform to the Contract Documents, Contractor, if required by Metro, shall repay to Metro such portion of the Contract Amount as is equitable under the circumstances, as determined by Metro.

Contractor's responsibilities under this Paragraph shall not extend to correction or replacement of defects which are attributable to mistreatment by Metro or to normal wear and tear.

- 7.06 Warranty and Correction Agreements by Subcontractors

7.06.01 Generally -- In addition to any requirements for written warranties required by the Specifications, Contractor shall require all of its Subcontractors and Suppliers of any tier to make the same warranty to Metro as Contractor makes under Paragraph 7.04. Contractor shall also require all of its Subcontractors and Suppliers of any tier to agree to correct or replace defective Work or Work not conforming to the Contract Documents, and to take full responsibility for defective materials, in the same manner as Contractor agrees to correct or replace such Work under Paragraph 7.05.

7.06.02 Form of Submissions -- Contractor shall require all of its Subcontractors and Suppliers of any tier to sign documents evidencing the promises made pursuant to

Subparagraph 7.06.01 above and shall submit such documents to Metro with its request for Final Payment. Such documents shall be signed by both Contractor and the applicable Subcontractor or Supplier and shall be in the following form:

"We the undersigned hereby warrant that the _____

(described work performed and/or materials provided)

which we have provided for the construction of the Closure of Subarea 1 for the St. Johns Landfill has been done in accordance with the Contract Documents and that the work as provided will fulfill the requirements of the warranty included in Article 7 of the Contract Documents.

"We agree to correct or remove and replace any or all of our work, together with any other adjacent work which may be displaced or affected by so doing, that may be defective in its workmanship or materials or which may fail to conform to the requirements of the Contract Documents within a period of one (1) year following the applicable date described in Paragraph 7.05 without any expense whatsoever to Metro, normal wear and tear and mistreatment excepted.

"In the event of our failure to comply with the above-mentioned conditions within twenty (20) calendar days after Metro notifies Contractor in writing, we collectively and separately do hereby authorize Metro to proceed to have said defects repaired and corrected at our expense and we will honor and pay the costs and to dispose of nonconforming materials and charges therefore upon demand."

- 7.07 Remedies Not Restrictive -- The remedies provided for in this Article shall not be restrictive of but shall be cumulative and in addition to all other remedies of Metro in respect to latent defects, frauds or failure to perform all work as required by the Contract Documents.
- 7.08 Proof of Compliance with Contract Provisions -- For Metro to determine whether Contractor has complied or is complying with the requirements of the Contract which are not readily enforceable by inspection and test of the Work, Contractor shall, upon request, promptly submit to Metro such properly authenticated documents as may be necessary to demonstrate compliance with the Contract or other satisfactory proof of its compliance with such requirements.
- 7.09 Patents, Copyrights, Trademarks -- All fees or costs of claims for any patented invention, article or arrangement or any copyrights or trademarks that may be used upon or in any manner connected with the performance of the Work or any part thereof, shall be included in the Bid for doing the Work. Contractor shall save, keep, hold harmless, and fully indemnify Metro and Engineer from all damages, claims for damage, lawsuits, costs, expenses or liabilities of whatever nature in law or equity, including attorney's fees and court costs, which may at any time arise or be set up for any infringement of the patent rights, copyrights or trademarks of any person or persons in consequence of the use by Metro of articles to be supplied under the Contract and of which Contractor is not the patentee or assignee or has not the lawful right to sell the same. This is in addition to all other hold harmless and indemnification clauses in these Contract Documents.
- 7.10 Anti-Trust Claims -- By entering into this Contract, Contractor, for consideration paid to Contractor under the Contract, does irrevocably assign to Metro any claim for relief or cause of

action which Contractor now has or which may accrue to Contractor in the future, including, at Metro's option, the right to control any such litigation on such claim for relief or cause of action, by reason of any violation of 15 USC Section 1-15, ORS 646.725 or ORS 646.730, in connection with any goods or services that are used, in whole or in part, for the purpose of carrying out Contractor's obligations under this Contract.

Contractor shall require all Subcontractors and Suppliers to irrevocably assign to Metro, as a third party beneficiary any right, title or interest that has accrued or may accrue to the Subcontractors or Suppliers by reason of any violation of 15 USC Section 1-15, ORS 646.725 or ORS 646.730, including, at Metro's option, the rights to control any litigation arising thereunder, in connection with any goods or services provided to the Subcontractors or Suppliers by any person, in whole or in part, for the purpose of carrying out the Subcontractors' or Suppliers' obligations as agreed to by Contractor in pursuance of the completion of the Contract.

In connection with Contractor's, Subcontractors' or Suppliers' assignment, it is an express obligation of Contractor, Subcontractor or Supplier that it will take no action which will in any way diminish the value of the rights conveyed or assigned hereunder to Metro. It is an express obligation of Contractor, Subcontractor or Supplier to advise the General Counsel of Metro:

- 7.10.01 In advance, of its intention to commence any action on its own behalf regarding such claims for relief or causes of action;
- 7.10.02 Immediately, upon becoming aware of the fact that an action has been commenced on its own behalf by some other person or persons, of the pendency of such action; and
- 7.10.03 The date on which it notified the obligor(s) of any such claims for relief or causes of action of the fact of its assignment to Metro.

Furthermore, it is understood and agreed that in the event that any payment under any such claim is made to Contractor, Subcontractor or Supplier, it shall promptly pay over to Metro its proportionate share thereof, if any, assigned to Metro hereunder.

ARTICLE 8 CHANGES IN THE WORK

- 8.01 Change Orders Generally -- Metro may order changes in the Work herein required, including deletions of work, and may order additional materials and work in connection with the performance of the Work.

If such changes in the Work increase or decrease the cost of any part of the Work or change the time necessary to complete the Work, the Contract Amount shall be increased or decreased by such amount and the Contract Time changed as Contractor and Metro may agree upon as reasonable in a written Change Order. Contractor shall promptly comply with such Change Orders and carry them out in accordance with the Contract Documents.

No order for any alteration, modification or additional work which shall increase or decrease the Contract Amount or change the Contract Time shall become part of the Contract unless the resulting Change Order shall have been agreed upon in writing and the Change Order signed by Contractor and Metro, unless the work is Force Account work. Metro may, at its discretion, also require the signature of Contractor's surety on the Change Order. Prior to the approval of such Change Order, the Engineer shall have approved any design modifications entailed thereby.

8.02 Procedure for Determining Impact of Change Orders on Contract Amount

- 8.02.01 Price before Proceeding -- If Metro intends to order changes in the Work, it may request a proposal by Contractor for the proposed added or deleted work before directing Contractor to commence work. Within fourteen (14) days after issuance of such request by Metro, Contractor shall furnish three copies of a complete breakdown of costs of both credits and additions directly attributable to the change in the Work proposed, itemizing materials, labor, taxes, affect on Contract Time, if any, and Overhead and Profit on a form supplied by Metro and in accordance with the limitations described in the following Paragraph. Subcontract work shall be so indicated and written proposals from Subcontractors or Suppliers shall be included with similar breakdowns provided. Following submission of its cost breakdown, Contractor shall meet with Metro to discuss all aspects of scope, costs, scheduling and construction methods.
- 8.02.02 Proceed While Pricing -- If Metro finds it necessary to make changes in the Work in an expeditious manner, it may direct Contractor to proceed with the change while preparing a proposal for the added or deleted Work. In such an instance, Metro may assign an estimated value to the change which Contractor shall not exceed without further authorization by Metro. Within fourteen (14) days after issuance of such by Metro, Contractor shall furnish three copies of a complete breakdown of costs of both credits and additions directly attributable to the change in the Work proposed, itemizing materials, labor, taxes, affect on Contract Time, if any, and Overhead and Profit on a form supplied by Metro and in accordance with the limitations described in the following Paragraph. Subcontract work shall be so included with similar breakdowns provided. Following submission of its cost breakdown, Contractor shall meet with Metro to discuss all aspects of scope, costs, scheduling and construction methods.
- 8.02.03 Unit Prices -- If the proposed additional or deleted work is the subject of Unit Prices stated in the Contract Documents or subsequently agreed upon, such Unit Prices shall be binding upon Contractor in calculating the increase or decrease in the Contract Amount attributable to the proposed additional or deleted work.

8.03 Limitations when Change Orders Impact Contract Amount-- The following limitations shall apply in the calculation of the costs of changes in the Work:

- 8.03.01 Overhead and Profit -- Contractor will be permitted a reasonable allowance for Profit and Overhead on its increased Direct Cost resulting from any changes in the Work ordered by Metro. Likewise, Profit and Overhead will be deducted for any portion of the Work which is deleted. In the case of a change involving both credits and extras, Overhead and Profit shall be applied to the net extra after subtraction of credits.

Overhead and Profit for the entity performing the work with its own crews shall not exceed 10 percent of the Direct Cost of the changed work.

Overhead and Profit for Contractor or Subcontractor who has had the work performed by a lower tier Subcontractor shall not exceed ten percent of the Direct Cost of the changed work.

If the Work is performed by a second-tier or inferior Subcontractor, the total Overhead and Profit for all tiers shall in no event exceed 25 percent of the Direct

Cost of the changed work. Distribution of this Overhead and Profit among the tiers is the responsibility of Contractor.

- 8.03.02 Taxes and Insurance -- Federal, state, regional, county and local taxes, including, but not limited to, income taxes, excise taxes, sales and use taxes and payroll taxes and insurance shall be shown separately and will be allowed on extras and shall be credited on credits. No Overhead and Profit will be allowed on taxes and insurance.
- 8.03.03 Bond Premiums -- The actual rate of bond premium as paid on the additional Direct Cost plus the cost of taxes defined in 8.03.02 will be allowed. No Overhead and Profit will be allowed on such premiums.
- 8.03.04 Equipment Costs -- The allowance for equipment costs (both rental as well as Contractor-owned equipment) shall be limited to those rates in the Rental Rate Bluebook published by Dataquest Incorporated, 1290 Ridder Park Drive, San Jose, California 95131-2398, (800) 227-8444.
- 8.04 Force Account Work -- If Contractor does not respond to Metro's Request for Proposal with a cost breakdown within the fourteen (14) day period as required above, or if Metro determines that Contractor's breakdown of costs is unreasonable in consideration of the work proposed to be added or deleted, or if Metro determines that the proposed work must be commenced promptly to avoid delay to the Project, Metro may issue an order for Force Account work and Contractor shall promptly perform or delete the work described in such order. Change, if any, in the Contract Amount due to such Force Account work shall be the sum total of the following items:
 - 8.04.01 Actual labor cost, including premium on compensation insurance and charge for social security taxes, and other taxes pertaining to labor.
 - 8.04.02 The proportionate cost of premiums of public liability property damage and other insurance applicable to the extra work involved and required by these Contract Documents.
 - 8.04.03 Actual cost of material, including applicable taxes pertaining to materials.
 - 8.04.04 Actual cost of plant and equipment rental, at rates to be agreed upon in writing before the work is begun or at rates per Subparagraph 8.03.04 above. No charge for the cost of repairs to plant or equipment will be allowed. Equipment items having a capital cost of under \$250.00 are considered small tools and classified as Overhead.
 - 8.04.05 Overhead and Profit as provided and limited in Paragraph 8.03.
 - 8.04.06 The proportionate actual costs of premiums for bonds required by these Contract Documents.

Whenever any Force Account work is in progress, Contractor shall furnish each working day to Metro a detailed written report signed by Contractor of the amount and cost of all of the items listed in (1) through (6) above, and no claim for compensation for such extra work will be allowed unless such report shall have been made. Metro reserves the right to provide such materials as it may deem expedient and no compensation, overhead or profit will be allowed to Contractor for such materials.

- 8.05 Oral Modifications -- No oral statement of any person whomsoever shall in any manner or degree modify or otherwise affect the terms of this Contract.
- 8.06 Contractor Proposals for Changes in Work
- 8.06.01 Generally -- At any time during the performance of the Work, Contractor may propose to Metro changes in work which Contractor believes will result in higher quality work, improve safety, shorten the Contract Time, decrease the Contract Amount, or otherwise result in better or more efficient work.
- 8.06.02 Purpose -- Metro encourages Contractor to submit Value Engineering Change Proposals (VECPs) in order to avail Metro of potential cost saving that may result. Contractor and Metro will share any savings, computed in accordance with instructions herein. Contractor is encouraged to submit VECPs whenever he identifies an area which can be improved, using the format described herein.
- 8.06.03 Application -- This clause applies to a contractor developed and documented VECP which: (1) requires a change to this Agreement to implement the VECP; and (2) reduces the Contract Price without impairing essential functions or characteristics of the Work, provided it is not based solely on a change in specified quantities.
- 8.06.04 Documentation -- At a minimum, the following information shall be submitted by Contractor with each VECP: (1) description of the existing requirements of the Contract Documents which are involved in the proposed change; (2) description of the proposed change; (3) discussion of differences between existing requirements and the proposed change, together with advantages and disadvantages of each changed item; (4) itemization of the requirements which must be changed if the VECP is accepted (e.g., Drawing numbers and Specifications); (5) justification for changes in function or characteristics of each such affected item and effect of the change on the performance of the end item; (6) effect of proposed change on life-cycle costs, including operation and maintenance, replacement costs, and life expectancy; (7) date or time by which a Change Order adopting the VECP must be issued in order to obtain the maximum cost reduction, noting any effect on Contract Time or delivery schedule; and (8) cost estimate for existing contract requirements correlated to his lump sum breakdown and proposed changed requirements. Costs of development and implementation by Contractor shall be identified. Estimated Metro costs (e.g., cost of testing and redesign) shall also be identified.
- 8.06.05 Submission -- To expedite a determination, VECPs shall be submitted directly to Engineer. Proposals will be processed expeditiously; however, Metro will not be liable for any delay in acting upon any proposal submitted pursuant to this clause. Contractor shall have the right to withdraw, in whole or in part, any VECP at any time prior to acceptance by Metro.
- 8.06.06 Acceptance -- Metro may accept, in whole or in part, by Change Order, any VECP submitted pursuant to this clause. Until a Change Order is issued, Contractor shall remain obligated to perform in accordance with this Agreement. The decision as to acceptance or rejection of any VECP will be at the sole discretion of Metro and will be final and not subject to review by arbitration or otherwise.

- 8.06.07 Sharing -- If a VECP submitted by Contractor pursuant to this clause is accepted, Contractor shall proceed with the change and the Contract Price will be adjusted in accordance with the following provisions:

Definitions

- 8.06.07.01 Estimated Gross Savings to Contractor (GS): The difference between cost of performing the Work according to the existing requirement and the cost if performed according to the proposed change. In each instance, Contractor's profit shall not be considered part of the cost.
- 8.06.07.02 Contractor Costs (CC): Reasonable costs incurred by Contractor in preparing the VECP and making the change such as cancellation or restocking charges where required.
- 8.06.07.03 Estimated Net Savings to Contractor (NS): Gross savings (GS) less Contractor costs (CC).
- 8.06.07.04 Metro's Costs (OC): Reasonable costs incurred by Metro for evaluating and implementing the VECP, such as testing and redesign, where required.

Calculations

- 8.06.07.05 The Contract Price shall be reduced by an amount equal to 50 percent of (NS) plus 50 percent of (OC), expressed by the formula:
$$\text{Reduction} = 0.5 (\text{NS}) + 0.5 (\text{OC}).$$
- 8.06.07.06 Contractor's profit will not be reduced by application of the VECP.
- 8.06.08 Subcontracts -- Contractor shall include appropriate value engineering incentive provisions in all subcontracts of \$25,000 or greater. He may include such provisions in any Agreement. Subcontracts shall contain a provision that any benefits accruing to Contractor as a result of an accepted VECP initiated by a Subcontractor shall be shared by Contractor and Subcontractor. To compute any adjustment in the Contract Price under Paragraph 6.45 above, Contractor's costs of preparation and charge for a VECP shall include any preparation and change costs. Examples are cancellation or restocking charges when required.
- 8.06.09 Disclosure Restrictions -- Contractor may restrict Metro's right to use any sheet of a VECP or of the supporting data submitted pursuant to this clause, in accordance with the terms of the following legend if it is marked on such sheet:

Legend

To the extent allowed by law, data furnished pursuant to the value engineering incentive clause of the Agreement shall not be: (1) disclosed to any outside person or agency, (2) duplicated, or (3) used. Metro may disclose, duplicate, or use furnished data to evaluate a VECP submitted under said clause. This restriction does not limit Metro's right to use information that has been obtained, or is otherwise available, from Contractor or from another source without limitations. If such a VECP is accepted, Metro shall have the right to duplicate, use, and disclose any data

reasonably necessary to the full utilization of such VECP as accepted, in any manner and for any purpose whatsoever, and have others so do.

- 8.07 Impact of Authorized Changes in the Contract -- Changes in the Work made pursuant to this Article and extensions of the Contract Time allowed by Metro due to such changes shall not in any way release any warranty or promises given by Contractor pursuant to the provisions of the Contract Documents, nor shall such changes in the Work relieve or release the sureties of bonds executed pursuant to said provisions. The sureties, in executing such bonds, shall be deemed to have expressly agreed to any such change in the Work and to any extension of Contract Time made by reason thereof.

ARTICLE 9 PAYMENTS AND COMPLETION

- 9.01 Scope of Payment -- Payment to Contractor of the Contract Amount for performing all Work required under the Contract, as adjusted for any Change Orders approved as hereinbefore specified, shall be full compensation for furnishing all labor, materials, equipment and tools necessary to the Work, and for performing and completing, in accordance with these Contract Documents, all Work required under the Contract, and for all expenses incurred by Contractor for any purpose in connection with the performance and completion of said Work.

Whenever it is specified herein that Contractor is to do work or provide materials of any class for which no price is fixed in the Contract, it shall be understood that Contractor is to do such work or provide such materials without extra charge or allowance or direct payment of any sort, and that the cost of doing such work or providing such materials is included in its Bid.

9.02 Schedule of Values

- 9.02.01 Generally -- At least 15 days prior to Contractor's application for the first progress payment, Contractor shall submit a detailed breakdown on its lump sum bid items. The format and detail of the breakdown shall be as directed by Metro and in accordance with Section 01370 of the Specifications to facilitate and clarify future progress payments to Contractor. This breakdown shall be referred to as the Schedule of Values.
- 9.02.02 Review of Schedule of Values -- Metro will review the Schedule of Values to ascertain that the dollar amounts of the Schedule of Values are in fact fair cost allocations for the work item listed. Upon concurrence by Metro, a formal approval of this Schedule of Values will be issued. Metro shall be the sole judge of fair cost allocations. Contractor's monthly progress payment requests shall reflect the cost figures included in the approved Schedule of Values and shall be based upon completed work items or percentages of work items completed prior to the end of the payment period as more fully described below.

9.03 Progress Payment Procedure

- 9.03.01 Generally -- Subject to the approval of Metro, disbursements shall be made by Metro of progress payments upon written request of Contractor and pursuant to the Contract Documents as specified in Section 01025 of the Specifications.

Before the end of each calendar month, Contractor shall file with the Construction Manager in duplicate on a form approved by Metro, a proposed payment estimate for the period commencing on the 26th day of the previous month through midnight on

- 9.03.06 Offset of Sums Due Metro from Contractor --In addition to any retention rights allowed Metro under this Contract, it is mutually understood and agreed that Metro may, upon prior written notice to Contractor, offset from any payment otherwise due Contractor, as much as may be necessary to protect and compensate Metro from any costs or expenses it may incur due to any breach of the Contract by Contractor, including applicable liquidated damages. Any sums so offset shall become the property of Metro.
- 9.03.07 Incentive Payments -- Time is the essence for the performance of the Work under this Contract. Incentive Payments may be provided for in Supplementary Conditions.
- 9.04 Substantial Completion -- When Contractor considers the Work to be substantially complete, Contractor shall submit to Metro a written notice that the Work is substantially complete and a punch list of items to be completed or corrected. Within a reasonable time after receipt of such notice, Metro and Engineer will review the Work, including a physical inspection, to determine the status of completion. Should the Engineer and Metro determine that the Work is not substantially complete:
- 9.04.01 Construction Manager will promptly notify Contractor in writing, giving the reasons therefor and including Engineer's punch list.
- 9.04.02 Contractor shall remedy the deficiencies in the Work, and thereafter send a second written notice of Substantial Completion to Metro.
- The above-described procedure shall be followed until the Work is, in the opinion of Metro and Engineer, substantially complete. At that point:
- 9.04.02.01 The Engineer will prepare a Certification of Substantial Completion on AIA Document G704, accompanied by the approved punch list of items to be completed or corrected as verified and amended by the Engineer.
- 9.04.02.02 Metro shall submit the Certificate of Substantial Completion to Contractor for signature. Contractor shall complete the items on the approved punch list.
- 9.05 Final Completion and Acceptance -- When Contractor considers the Work to be finally complete, Contractor shall submit written certification to Metro that:
- 9.05.01 Contract Documents have been reviewed.
- 9.05.02 Work has been inspected for compliance with Contract Documents.
- 9.05.03 Work has been completed in accordance with Contract Documents to include submission of record documents.
- 9.05.04 Equipment systems have been tested in presence of Metro and are operational.
- 9.05.05 Work is ready for final inspection.

Engineer and Metro will promptly review the Work and include a physical inspection to verify the status of completion and shall inform Metro of the conclusions. Metro shall, within fifteen (15) days after receipt of Contractor's certification, either accept

the Work or notify Contractor of the work yet to be performed on the Contract as outlined below.

Should the Engineer and Metro consider that the work is incomplete or defective:

- 9.05.05.01 Construction Manager will promptly notify Contractor in writing, listing the incomplete or defective work.
- 9.05.05.02 Contractor shall take immediate steps to remedy the stated deficiencies, and send a second written certification to Metro that the Work is complete. Metro will then advise the Engineer.
- 9.05.05.03 Engineer and Metro will review and reinspect the Work.

The above-described procedure shall be followed until the Work is, in the opinion of Metro and Engineer, finally complete. Contractor shall immediately thereafter prepare and submit Closeout Submittals as described below.

9.06 Closeout Submittals -- Contractor shall submit the following items, as applicable, with its request for Final Payment:

- 9.06.01 Evidence of Compliance with Requirements of Governing Authorities.
- 9.06.02 Project record documents in accordance with the Specifications.
- 9.06.03 Operation and maintenance data in accordance with the Specifications.
- 9.06.04 Warranties in accordance with requirements of various Specification sections and these General Conditions.
- 9.06.05 Extra stock and maintenance materials. Contractor shall submit receipts, signed by Metro, for the various specific items.
- 9.06.06 Evidence of payment and release of claims in accordance with the following section.
- 9.06.07 Consent of surety to Final Payment.
- 9.06.08 Certificates of insurance for products and completed operations in accordance with Supplementary Conditions.
- 9.06.09 If Contractor is a "foreign contractor" as that term is defined in Subparagraph 14.03.06, complete documentation of Contractor's compliance with ORS 279.021.

9.07 Releases -- Contractor and each assignee under any assignment in effect at the time of Final Payment shall execute and deliver, at the time of application for Final Payment, as a condition precedent to Final Payment, a release in form and substance satisfactory to Metro, discharging and releasing Metro and the Engineer of and from all liabilities, obligations and claims arising under this Contract.

In addition to the above-described release, Contractor shall:

- 9.07.01 Submit to Metro an affidavit certifying that Contractor has paid all federal, state and local taxes including excise, use, sales, and employee withholding taxes.
- 9.07.02 Deliver to Metro written releases of all rights to file claims against Metro or to file claims on any bonds in connection with the Contract, signed by each Subcontractor and Supplier who performed labor or furnished materials in connection with the work.
- 9.07.03 Deliver to Metro Contractor's written undertaking, with sureties acceptable to Metro:
 - 9.07.03.01 To promptly pay and obtain a release of claims on any bonds which may in the future affect the premises; and
 - 9.07.03.02 To defend, indemnify and save Metro harmless from any liability or expense because of any claim on any bond or any other claim related to the Contract or the Work.
- 9.08 Final Payment -- Upon application of Contractor and Contractor's completion of and compliance with all of the provisions of the above Paragraphs, Metro shall pay Contractor the balance of the Contract Amount subject to the availability of monies in the Construction Fund as described in Paragraph 9.01 and less any previous payments, offsets and withholdings allowed Metro under this Contract and Retainage which has been returned to Contractor. Metro will include with the final payment, any monies which may be due as incentive payment for the Contractor Substantially Completing the Work early.

Acceptance of Final Payment by Contractor shall constitute a waiver of all claims of whatever nature which Contractor may have or allege to have against Metro arising out of or related to Work described in the Contract Documents.

- 9.09 No Waiver of Rights -- Neither the final review by Metro, nor any order or certificate for the payment of money, nor any payment for, nor acceptance of the whole or any part of the Work by Metro, nor any extension of time, nor any position taken by Metro shall operate as a waiver of any provision of this Contract or of any power herein reserved by Metro or any right to damage herein provided; nor shall any waiver of any breach of this Contract be held to be a waiver of any other or subsequent breach. All of Metro's remedies provided in this Contract shall be taken and construed as cumulative; that is, in addition to each and every other remedy herein provided; and Metro shall have any and all equitable and legal remedies which it would in any case have.

ARTICLE 10 SAFETY AND PROTECTION OF THE WORK

10.01 Safety Requirements

- 10.01.01 Safety Generally -- Contractor shall be solely and completely responsible for the safety of the Work and the Site, including, but not limited to, the safety of all persons and property involved in the Work at the Site at any time until Final Completion and Acceptance of the Work.

All Work shall be performed in full accordance with all applicable safety codes, laws, ordinances and requirements including, but not limited to, the Safety and Health Regulations for Construction, promulgated by the Secretary of Labor under Section 107 of the Contract Work Hours and Safety Standards Act as set forth in Title 29 of

the Code of Federal Regulations, federal and state OSHA, Metro's insurance standards, and all other applicable safety codes. Where any of these are in conflict, the more stringent requirement shall be followed. Contractor's failure to thoroughly familiarize itself with the aforementioned safety provisions shall not relieve it from any requirements in the Contract Documents to comply with such safety provisions or from any penalties for failure to so comply.

Contractor shall inspect the Work and the Site daily and immediately correct any unsafe conditions. All job personnel shall be knowledgeable of and comply with the above safety requirements.

The site contains accumulations of potentially flammable gas and refuse. Contractor shall take all precautions to prevent the possibility of fire resulting from contract operations. Contractor shall provide properly maintained emergency fire extinguishing equipment of a readily available type and quantity as necessary to meet potential fire hazards.

10.01.02 Health and Safety Program -- Contractor shall develop, publish and implement the overall Health and Safety Program for the Project. Refer to Section 01100 of the Technical Specifications. This Program shall conform to all applicable codes including but not limited to OAR 340-25-469 which requires proper procurement for handling of material containing asbestos. Contractor shall submit the written Health and Safety Program to Metro for review and comment within fourteen (14) days after the receipt of the written Notice To Proceed. The Program, as approved by Metro, shall subsequently be distributed to and implemented by Contractor's personnel as well as its Subcontractors and Suppliers. Contractor shall fully implement and comply with the approved Safety Program. The Health and Safety Program will include provisions for submitting a hazard analysis in each new phase of work two weeks prior to starting that phase.

10.01.03 Health and Safety Officer -- Prior to initiation of construction, Contractor shall designate in writing a Site Health and Safety Officer who shall be responsible for coordinating Contractor's Health and Safety Program. The individual so designated shall be the interface with the Construction Manager on matters relating to safety, and Contractor's compliance with the approved Safety Program. Metro reserves the right to accept or reject the Health and Safety Officer designated by Contractor.

10.02 First Aid -- Contractor shall maintain on the Site during work operations, a member of its work force who is qualified in administering first aid to its personnel and shall have available in its job office the first aid equipment as required to meet all applicable safety codes. The names and credentials of qualified personnel will be submitted to the Construction Manager.

Contractor shall require or provide adequate clothing and protective gear for all personnel working on the job site. This includes but is not limited to hard hats; substantial boots or shoes, shirts with sleeves at all times; eye and ear protection, gloves, face masks, welding hoods, safety belts as required for the type of work being done.

10.03 Protection of Work, Persons and Property Against Damages -- Contractor shall protect the Work from damage due to construction operations, the action of the elements, including erosion due to normal and extraordinary weather conditions, the carelessness of other contractors, vandalism, or any other cause whatever until Final Completion and Acceptance of the Work.

Contractor shall protect all public and private property insofar as it may be endangered by operations of Contractor including adjoining lands, air and waterways, and shall be fully responsible for taking proper precautions for the prevention of accidents to persons and/or damage to such property at, on or near the Site.

All federal, state and local safety and environmental protection laws, rules and orders including fire codes, applicable to the Work to be done under the Contract, shall be obeyed, complied with and enforced by Contractor.

Contractor shall provide and maintain such guards, fences, barriers, signs, regulatory and warning lights, and other traffic control and safety devices adjacent to and on the Site as may be necessary to prevent accidents to the public and damage to property. Contractor shall also provide, place and maintain such lights as may be necessary for illuminating the said signs, guards, fences, barriers and other traffic and safety control devices.

Upon Final Completion and Acceptance of the Work, Contractor shall remove all temporary signs, lights, barriers, etc., from the Site.

ARTICLE 11 INDEMNIFICATION AND INSURANCE

- 11.01 Indemnification -- Contractor agrees that for purposes of the Oregon Tort Claims Act (ORS 30.260 through 30.300), neither Contractor, its officers, agents and employees nor any Subcontractor or Supplier of Contractor of any tier, or its officers, agents or employees, are agents of Metro. Contractor for itself and its officers, agents, employees and its Subcontractors and Suppliers of any tier and their officers, agents and employees will make no claim whatsoever against Metro for indemnification pursuant to ORS 30.260 to 30.300 and Contractor agrees to hold Metro harmless and indemnify Metro from any such claims.

Contractor shall assume all responsibility for the Work and shall bear all losses and damages directly or indirectly resulting to Contractor, Metro, Engineer, their officers, agents and employees, or to others on account of the character or performance of the Work, or accidents, unless such cause is due to the sole negligence of Metro or Engineer.

Contractor shall assume the defense, if requested, indemnify and hold harmless Metro and Engineer from all claims, liability, loss, damage, consequential or otherwise, and injury of every kind, nature and description, directly or indirectly resulting from activities in the performance of the Contract, the ownership, maintenance or use of motor vehicles in connection therewith, or the acts, omissions, operations, or conduct of Contractor or any Subcontractor or Supplier under the Contract or in any way arising out of the Contract, irrespective of whether fault is the basis of the liability or claim.

Any specific duty or liability imposed or assumed by Contractor, as may be otherwise set forth in the Contract Documents, shall not be construed as a limitation or restriction of the general liability or duty imposed upon Contractor by this Paragraph.

Such liabilities and losses from which Contractor shall indemnify and hold harmless the above-described indemnities shall include, but not be limited to:

- 11.01.01 Special activities by Metro to verify and/or expedite delivery of materials and those losses incurred by Metro as a result of any delays to Other Metro Contractors resulting from acts of Contractor or its failure to act.

- 11.01.02 Acceleration payments to Other Metro Contractors on the project or related projects resulting from Contractor falling behind the Construction Schedule for causes not entitling it to an extension of time under any provisions of the Contract Documents which cause other Metro Contractors to fall behind the Construction Schedule and who must then accelerate the performance of the work, as directed by Metro, in order to maintain progress.
- 11.01.03 Violations of the ordinances or regulations of Metro, any federal, state, county or city laws or order of any properly constituted authority in any manner affecting this Contract, in addition to any laws or regulations which might affect this Contract.
- 11.01.04 Any and all suits, actions, damages or claims of every name and description to which the above indemnified may be subjected or put by reason of injury to persons or property arising out of, in connection with, or incident to the execution of the work or resulting from acts or omissions on the part of Contractor, its Subcontractors, officers, employees or agents and all attorney's fees and court costs incident thereto.

11.02 Insurance

11.02.01 Public Liability and Property Damage Insurance

Contractor shall purchase and maintain, at the Contractor's expense, the following types of insurance covering the Contractor, its employees and agents.

- A. Broad form comprehensive general liability insurance covering bodily injury, property damage, and personal injury with automatic coverage for premises/completed operations and product liability. The policy must be endorsed with contractual liability coverage.
- B. Automobile bodily injury and property damage liability insurance.

Insurance coverage shall be on an occurrence basis with an annual aggregate limit of \$5,000,000.

METRO, its elected officials, departments, employees and agents shall be named as an ADDITIONAL INSURED. Notice of any material change or policy cancellation shall be provided to METRO thirty (30) days prior to the change.

- C. Subcontractor's Insurance -- Contractor shall require that all of its Subcontractors and Suppliers of any tier provide insurance coverage and conditions identical to Contractor's insurance coverage, except that the policy limits of all Subcontractors' insurance coverage shall be at least \$1,000,000 combined single limit for each occurrence and in the aggregate.

11.02.02 Workers' Compensation and Employer's Liability Insurance

The Contractor, its subcontractors, and all employers working under this contract are subject employers under the Oregon Workers' Compensation Law and shall comply with ORS 656.017, which requires them to provide workers' compensation coverage for all their subject workers. The Contractor shall provide METRO with certification of workers' compensation insurance including employer's liability of \$1,000,000.

11.02.03 Environmental Impairment Liability Insurance

The Contractor shall provide Metro with a certificate of insurance for Environmental Impairment Liability in the amount of \$1,000,000 covering emissions, discharges, dispersals, disposals, releases, escapes or seepages of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, gases, waste materials, irritant, noise, and contaminants that spoil the land, atmosphere, or water.

11.02.04 Forms of Policies and Other Insurance Requirements -- In addition to filing any other insurance certificates specified elsewhere in these Contract Documents, Contractor shall, within ten (10) days following Notice of Conditional Award of Contract, provide Metro two (2) certified copies of the policies of all insurance herein required to be obtained by Contractor except that Worker's Compensation Insurance may be evidenced by a Certificate of Insurance. At Metro's request, Contractor shall immediately deliver to Metro the receipts for payment of premiums on any or all such policies.

All policies of insurance and Certificates of Insurance shall be satisfactory to Metro. Approval of the insurance by Metro shall not relieve or decrease the extent to which Contractor or Contractor's Subcontractors and Suppliers of any tier may be held responsible for payment of any and all damages resulting from performance of the Work.

Each such policy or Certificate of Insurance shall bear an endorsement precluding its cancellation, expiration or any reduction in its coverage without giving to Metro at least sixty (60) days prior written notice. Contractor shall file with Metro two (2) certified copies of the required new or renewed policy or two (2) Certificates of Insurance for each such policy, as applicable, before the effective date of such cancellation, change or expiration.

If Contractor neglects to obtain or maintain in force any such insurance or to deliver such policy or policies, certificates and receipts to Metro, then Metro may, at its option, obtain and maintain such insurance. Contractor hereby appoints Metro its true and lawful attorney, to do all things necessary to obtain and maintain such insurance. All monies expended by Metro for such insurance shall be charged to Contractor and Metro may offset its costs in obtaining and/or maintaining such policies from sums due or to become due Contractor under the Contract or otherwise collect such sums from Contractor. Failure of Metro to obtain or maintain such insurance shall in no way relieve Contractor of any of its responsibilities under this Contract.

Contractor's failure to maintain any item of the required insurance shall be sufficient cause for termination or suspension of this Contract.

All insurance required shall be obtained through a company or companies having a policyholders surplus of at least ten (10) times the amount or limit of liability afforded by such insurance company on policies issued for this Contract. Such company shall be duly and legally licensed to transact business in the state of Oregon and shall be acceptable to Metro. Said insurance shall be primary over any insurance or self-insurance of Metro.

ARTICLE 12 DISADVANTAGED BUSINESS PROGRAM

Contractor shall comply with all pertinent provisions of Metro's Disadvantaged Business Program which are contained in Metro Code 2.04 and which are contained in the Appendix to these Contract Documents and which are by this reference expressly incorporated herein and made a part of this Contract.

Contractor shall not replace a disadvantaged or women-owned business enterprise Subcontractor with another Subcontractor, either before Contract award or during Contract performance, without prior written approval of Metro. In replacing a disadvantaged or women-owned business Subcontractor, Contractor shall replace such disadvantaged or women-owned business Subcontractor with another certified disadvantaged or women-owned business Subcontractor or make good faith efforts to do so. Failure to do so shall constitute Contractor's default of this Contract, and Metro, at its option, may terminate this Contract under the procedures set out in Article 15.

Metro reserves the right, at all times during the period of this Contract, to monitor Contractor's compliance with the terms of the Disadvantaged Business Program and enforce the program if Contractor should fail to so comply. Contractor shall be bound by any and all representations made concerning its compliance with the program prior to Contract award and any and all representations made by Contractor concerning the replacement of a disadvantaged or women-owned business Subcontractor during the performance of this Contract.

ARTICLE 13 EQUAL EMPLOYMENT OPPORTUNITY AFFIRMATIVE ACTION REQUIREMENT

Contractor shall be certified as Equal Employment Opportunity Affirmative Action Employers by the City of Portland, Oregon, for the entire term of the Contract. Contractor's Subcontractors and Suppliers shall be certified prior to commencement of any of their Work on the Project and shall remain certified for the entire duration of the Contract.

ARTICLE 14 MISCELLANEOUS STATUTORY RESPONSIBILITIES OF CONTRACTOR

14.01 Generally -- Contractor shall keep itself fully informed of and shall fully comply with all federal, state, regional and local laws, rules, regulations, ordinances and orders pertaining in any manner, to this Contract and those rules, regulations and orders of any agency or authority having jurisdiction over the work or those persons employed or engaged therein. Contractor shall pay all taxes, including federal, state, regional, county, city or taxes of any other governmental entity applicable to the work performed or materials provided under this Contract.

14.02 Environmental Laws -- Contractor shall fully comply with all federal, state and local laws, ordinances and regulations dealing with the prevention of environmental pollution and the preservation of natural resources and all amendments thereto. Contractor shall also fully comply with all rules, regulations and ordinances enacted or to be enacted by any federal, state or local agency dealing with the prevention of environmental pollution and the preservation of natural resources that affect the performance of the Contract. Such statutes, rules, regulations and ordinances shall include, but are not limited to those in 7 USCA Sections 136 to 136Y, 15 USCA Sections 2601 to 2629, 33 USCA Sections 1251 to 1376, 33 USCA Sections 1401 to 1445, 42 USCA Sections 300f to 300j-11, 42 USCA Sections 4321 to 4370a, 42 USCA Sections 4901 to 4918, 42 USCA Sections 6901 to 6991i, 42 USCA Sections 7401 to 7642, 42 USCA Sections 9601 to 9675, 29 USCA Sections 651 et seq., Oregon Administrative Rules Chapter 61, and Title 18 of the City of Portland Code.

Such agencies shall include, but not be limited to, the following:

FEDERAL AGENCIES

Agriculture, Department of
 Forest Service
 Soil Conservation Service
Defense, Department of
 Army Corps of Engineers
Energy, Department of
Environmental Protection Agency
Health and Human Services, Department of
Interior, Department of
 Fish and Wildlife Service
 Heritage Conservation and Recreation Service
 Bureau of Land Management
 Bureau of Indian Affairs
 Water and Power Resource Service
 Office of Surface Mining
Labor, Department of
 Occupational Safety and Health Administration
 Mine Safety and Health Administration
Transportation, Department of
 Coast Guard
 Federal Highway Administration

STATE AGENCIES

Agriculture, Department of
Energy, Department of
Environmental Quality, Department of
Fish and Wildlife, Department of
Forestry, Department of
Geology and Mineral Industries, Department of
Human Resources, Department of
Land Conservation and Development, Department of
Soil and Water Conservation Commission
State Engineer
State Land Board and Division of State Lands
Water Resources Board, Department of
Bureau of Labor and Industries

LOCAL AGENCIES

City of Portland
Multnomah County
Metropolitan Service District
Planning Commissions (as applicable)

14.03 Other Provisions of Oregon Law

- 14.03.01 Generally -- The provisions set out in Oregon Revised Statutes Chapters 187 and 279, as amended or superseded, including the latest additions and revisions, are incorporated by reference as part of these Contract Documents. Such sections include, but are not necessarily limited to, ORS 187.010, 187.020 279.021, 279.312, 279.314, 279.316, 279.318, 279.320, 279.334, 279.338, 279.348, 279.350, 279.352, 279.354, 279.355, 279.356, 279.359, 279.361, 279.365, and 279.400 through 279.435. Contractor shall fully comply with all applicable provisions of these statutes. The specific requirements of certain of these sections are set out below.
- 14.03.02 Payment to Subcontractors and Laborers -- Pursuant to ORS 279.312, Contractor shall make payment promptly, as due, to all persons supplying such Contractor labor or material for the prosecution of the Work provided in this Contract. Contractor shall pay all contributions or amounts due the Industrial Accident Fund (IAF) from such Contractor, Subcontractor or Supplier incurred in the performance of the Contract. Contractor shall not permit any lien or claim to be filed or prosecuted against Metro, the State, County, school district, municipality, municipal corporation, or subdivision thereof, on account of any labor or material furnished. Contractor shall pay to the Department of Revenue all sums withheld from employees pursuant to ORS 316.167.
- 14.03.03 Failure to Make Payment for Labor or Services -- Pursuant to ORS 279.314, 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 Contract as such claim becomes due, Metro 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 such Contract. Metro's payment of such a claim in the manner authorized by ORS 279.314 shall not relieve Contractor or Contractor's surety from obligation with respect to any unpaid claims.
- 14.03.04 Hours of Work -- Except as provided in ORS 279.334, no person shall be employed for more than eight (8) hours in any one day, or forty (40) hours in any one week, except in cases of necessity, emergency, or where the public policy absolutely requires it, and in such cases the laborer shall be paid at least time and a half pay for all overtime in excess of eight (8) hours a day and for work performed on Saturday and on any legal holiday specified in ORS 279.334. Contractor shall furthermore comply with any applicable provisions of ORS 279.316, 279.334, 279.336 and 279.338.
- 14.03.05 Payment for Medical Care -- Pursuant to ORS 279.320, Contractor shall promptly, as due, make payment to any person, co-partnership, association or corporation, furnishing medical, surgical and hospital care or other needed care and attention, incident to sickness 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 employees pursuant to any law, contract or agreement for the purpose of providing or paying such service.
- 14.03.06 Requirements for Foreign Contractors -- Pursuant to ORS 279.021, any "foreign contractor" awarded a public contract with a price exceeding \$10,000, shall promptly report to the Department of Revenue, on forms to be provided by the Oregon Department of Revenue, the total contract price, terms of payment, length of contract and such other information as may be required before Final Payment can be received

15.01.02 Place no further orders or subcontracts, or suspend the same, as applicable, for materials, services or facilities except as necessary to complete the portion of the work under the Contract which is not terminated or suspended.

15.01.03 Terminate or suspend, as applicable, all orders and subcontracts to the extent that they relate to the performance of such work terminated or suspended.

Metro may, at its discretion, avail itself of any or all of the above rights or remedies and its invoking of any one of the above rights or remedies will not prejudice or preclude Metro from subsequently invoking any other right or remedy set forth above or elsewhere in the Contract.

None of the foregoing provisions shall be construed to require Metro to complete the Work, nor to waive or in any way limit or modify the provisions of the Contract relating to the fixed and liquidated damages suffered by Metro on account of failure to complete the Project within the time prescribed.

15.02 Termination in the Public Interest -- It is hereby agreed that Metro has the right to terminate the Contract in whole or in part when Metro considers it to be in the public interest.

In the event the Contract is terminated as being in the public interest, Contractor shall be entitled to a reasonable amount of compensation for preparatory work and for all reasonable costs and expenses arising out of the termination, excluding lost profits.

In the event of termination under this Paragraph, the amount to be paid to Contractor shall be determined on the basis of the Schedule of Values in the case of any fully completed separate item or portion of the Work for which there is a separate or unit contract price and in respect to any other work under the Contract, Contractor will be paid a percent of the Contract price equal to the percentage of the work completed.

SECTION 00800
SUPPLEMENTARY CONDITIONS

CONDITION: All conditions as set forth in the General Conditions and Division 1 are applicable to all contractors and shall apply to such extent that they are not in conflict with these Supplementary Condition. In the event of such conflict, these Supplementary Conditions shall take precedence.

1. In reference to §00500, #5, Construction Agreement:
Time of Completion; Adjusted Payments

Time is of the essence of this Construction Agreement. The Contract Time shall commence upon issuance of the Notice to Proceed. Contractor shall commence work under this Contract within ten (10) calendar days after issuance of written Notice to Proceed. Contractor shall bring the work to substantial completion no later than October 31, 1992 or 180 calendar days after issuance of Notice to Proceed, whichever is the longer Contract time. By executing this Construction Agreement, Contractor confirms and accepts that the Contract Time so stated is a reasonable period for performance of all of the Work

2. In reference to §00700, 3.04.01:
Liquidated Damages for Delay -- Time is the essence of the performance of the Work under this Contract. If Contractor fails to substantially complete the Work within the Contract Time, the actual damage to Metro for the delay will be substantial but will be difficult or impractical to determine. It is therefore agreed that Contractor will pay to Metro, not as a penalty but as liquidated damages, the amount of one thousand (\$1,000.00) dollars, for each and every day that the date of Substantial Completion extends beyond the Contract Time.

3. In reference to §00700, 9.03.07:
Incentive Payments -- No incentive payments are provided for Contractor's Substantial Completion of Work before the end of the Contract Time.

4. In reference to §00700, 10.03:
Protection of Work, Persons and Property Against Damages --
The specifications for the Project include procedures for preventing release of pollutants from the site, including procedures to prevent erosion into waters adjacent to the site and to monitor materials brought onto the site. The parties recognize that such procedures cannot anticipate all circumstances that may lead to a release of soil, leachate, gases or other contaminants and emissions into the air or waters adjoining the site. Contractor shall make reasonable efforts to anticipate special circumstances in the course of construction that may lead to such releases, and plan accordingly. If, due to Contractor's activities on the site, such releases occur during the term of this agreement, Contractor shall respond immediately, take all steps determined necessary by the Engineer to prevent further release, and perform all necessary remedial action as specified by any jurisdictionally responsible state or federal agency. All measures necessary to prevent or remedy the release of soil, leachate, gases or other contaminants and emissions from the site resulting from Contractor's activities on the site during the term of this agreement shall be the responsibility of Contractor under this agreement, with no additional expenses for such release chargeable to Metro or the Engineer.

5. In reference to §00700, 14.03.07:
Prevailing Wage -- Metro's understanding that ORS 279.350, OAR chapter 839, Division 16 and this section 14.03.07 require that Contractor pay the prevailing rate of wage to truck drivers delivering material to the site if those drivers are employed directly by the Contractor or if they are employed through a subcontract. In addition, workers employed at a borrow pit dedicated exclusively or nearly so to the work or established specifically for the work, and workers employed to supply material from such

pits to the site must be paid the prevailing rate of wage. Metro requires notification of source of material supply (ie. borrow pits) in order to make the determination whether a commercial source of supply. Metro reserves the right to approve commercial status of a borrow source.

If for any reason Contractor is not required by law to pay the prevailing rate of wage to any workers specified in the paragraph, Metro shall be entitled to offset from sums owing to Contractor an amount equal to the difference between the prevailing wage and the amount of wages actually being paid to such workers. At Metro's request, Contractor shall provide the certified payroll required by state wage and hour law to Metro on a weekly basis.

6. In reference to §00700, 14.03.09:

Royalty Payments -- Contractor shall promptly pay when due, all royalties owed to the State of Oregon or other governmental entity under ORS Chapter 274 or other provision of law. It is Metro's understanding that a royalty will be due for materials taken from submerged or submersible lands and deposited at the Site. If for any reason royalties are not due for such materials, Metro shall be entitled to offset from sums owing to Contractor an amount equal to the difference between the amount of royalties required to be paid generally at the time of the bid, and the amount of royalties actually owed. At the time of bid, royalties due generally to the State of Oregon total 40 cents per cubic yard for material removed anywhere from the mouth of the Willamette River to River Mile 72, or 25 cents per cubic yard for material taken from the mouth of the Columbia River to Bonneville Dam.

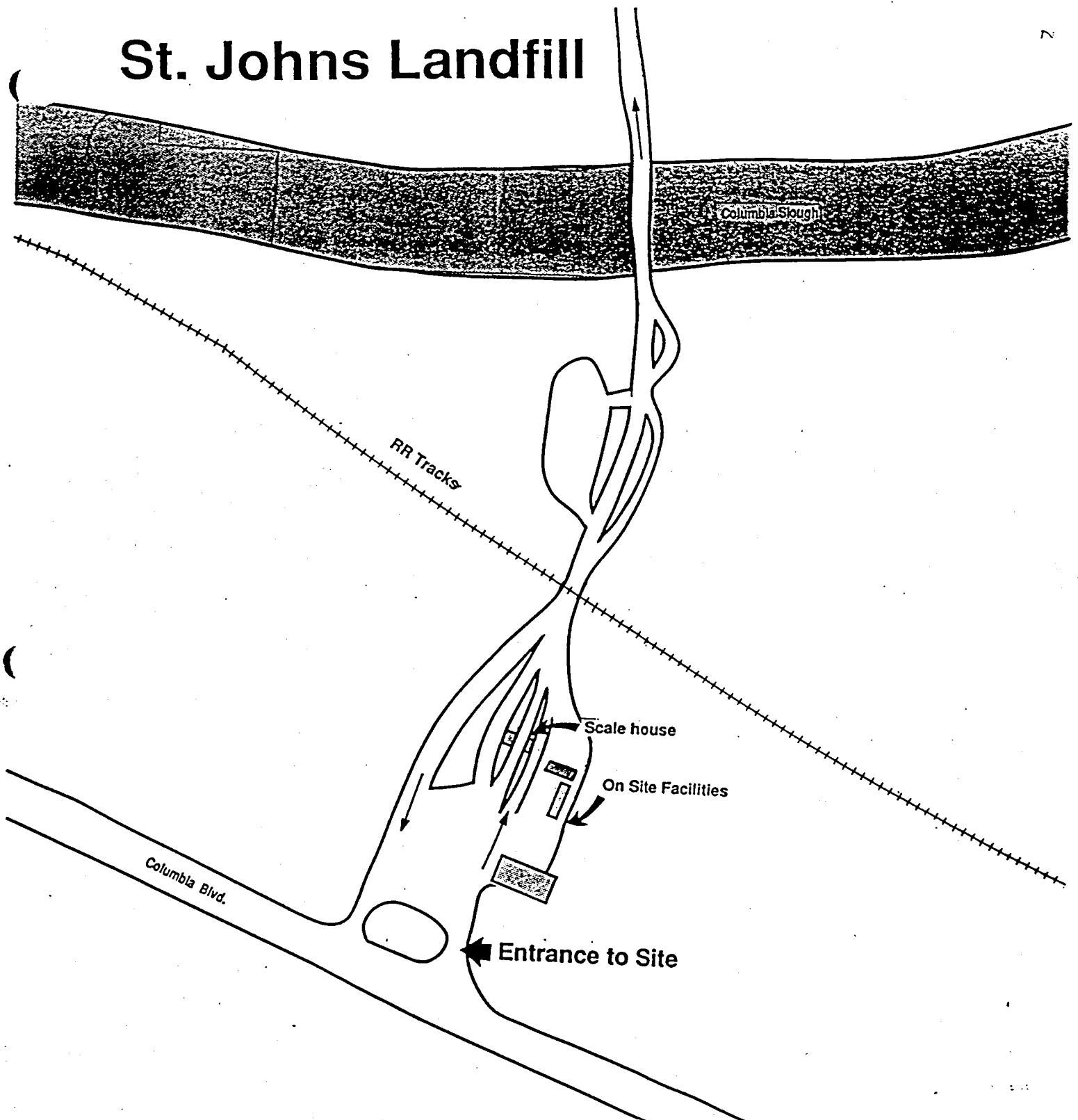
APPENDICES

| | |
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| APPENDIX A | SITE ACCESS PLAN |
| APPENDIX B | LANDFILL BRIDGE - ALLOWABLE LOADS LETTER REPORT |
| APPENDIX C | SITE CHARACTERIZATION/HEALTH & SAFETY HAZARDS REPORT |
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APPENDIX A
SITE ACCESS PLAN

St. Johns Landfill

2



APPENDIX B

LANDFILL BRIDGE - ALLOWABLE LOADS LETTER REPORT

OBEC CONSULTING ENGINEERS

*Transportation / Structural Engineering
Planning • Environmental Services*

May 20, 1991

Linda Pang-Wright, P.E.
METRO
2000 SW First Avenue
Portland, OR 97201-5398

RE: Incinerator Road Bridge
OBEC Job No. 193-2

Dear Ms. Pang-Wright:

Enclosed are the results of our analysis and load rating of the existing Incinerator Road Bridge including one copy of the calculations as well as three copies each of the Load Rating Summary Report and Figure 1 depicting the five rating vehicles (Trucks 1 - 5).

The procedure for evaluating the existing structure was based on design parameters in accordance with AASHTO "Manual for Maintenance Inspection of Bridges 1983." The bridge was load rated by the "Working Stress" method for two service load levels; the Inventory Rating and the Operating Rating. The Inventory Rating is defined as that load which can safely utilize an existing structure for an indefinite period. The Operating Rating is defined as the maximum allowable load to which a structure may be subjected. The live loads used in establishing the Inventory and Operating Ratings for each member are shown in Figure 1. Trucks 2, 3, and 5 represent vehicle configurations that were supplied to OBEC by METRO as specific vehicles anticipated on the structure. Trucks 1 and 4 correspond to typical Oregon Legal Load Types T3 and 3-3 respectively.

Incinerator Road Bridge was built in 1957 and serves to provide access to the St. Johns Landfill. The total width of the bridge is 34'- 2", consisting of a 26' roadway, a 5'- 10" sidewalk and railing on the right side, and a 2'- 6" curb and railing on the left. The bridge superstructure consists of a 94' main span constructed of four 4'- 4" deep composite steel plate girders with a 7-1/2" concrete deck. The 25' approach spans at each end of the structure consist of six 12" x 21" precast reinforced concrete girders with a 7" composite concrete deck. The load rating was based on copies of the original as-built drawings dated 1957 as provided to us by METRO, as well as West Coast Steel shop drawings depicting revisions to the original plate girder details.



Linda Pang-Wright
May 20, 1991
Page 2

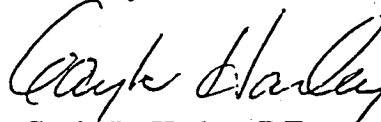
The most recent inspection did not reveal any problems that would result in section loss or reduction of capacity.

The longitudinal girders and the concrete decks were load rated in bending, for both impact and without impact. The distribution of wheel loads to the girders was based on current AASHTO factors for a two lane bridge. The steel girder span controlled all of the vehicle ratings both for Inventory and Operating levels. The Summary Report indicates that all of the vehicles except for Truck 3 have sufficient capacity at Inventory level including impact for the two lane loading. Truck 3 rates slightly below the legal load for two lane loading, but is well within the limits when one lane loading is considered.

Based on the results of our analysis and the most recent inspection, we do not see the need to restrict the bridge for any of the five loadings considered. The fact that Truck 3 with impact slightly exceeds the Inventory capacity for two lane loading should not be a problem since the bridge has plenty of reserve capacity before reaching the operating rating. The Inventory Ratings with impact represent the loads that can be permitted on the bridge without further review. We do feel that for any loads in excess of these ratings and for loadings of differing configuration, a review should be made prior to allowing such a vehicle on the bridge. OBEC will be available to perform such reviews under Task 2 of our agreement should the need arise.

Please do not hesitate to call if you have any questions.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gayle D. Harley".

Gayle D. Harley, P.E.
Special Projects Engineer

GDH/djb
Enclosure

LOAD RATING SUMMARY REPORT

Bridge Name INCUBATOR RD. BR. No. _____

Rated By LHF Date 5/14/91

Checked By GDH Date 5/15/91

| | <u>With Impact</u> | | <u>Without Impact</u> | | <u>Suggested Posting</u> |
|----------------------------------|---|---|---|--|--------------------------|
| | <u>Inventory Rating</u> | <u>Operating Rating</u> | <u>Inventory Rating</u> | <u>Operating Rating</u> | |
| Truck 1 (25 ^T) | <u>34^T</u> | <u>65^T</u> | <u>41^T</u> | <u>80^T</u> | <u>-</u> |
| Truck 2 (40 ^T) | <u>45^T</u> | <u>87^T</u> | <u>55^T</u> | <u>107^T</u> | <u>-</u> |
| Truck 3 (44 ^T) | * <u>38^T</u> (49 ^T) | <u>74^T</u> (95 ^T) | <u>47^T</u> (60 ^T) | <u>91^T</u> (116 ^T) | <u>-</u> |
| Truck 4 (40 ^T) | <u>40^T</u> | <u>78^T</u> | <u>49^T</u> | <u>95^T</u> | <u>-</u> |
| Truck 5 (52.75 ^T) | <u>57^T</u> | <u>110^T</u> | <u>70^T</u> | <u>135^T</u> | <u>-</u> |

* RATINGS FOR ONE-LANE LOADING

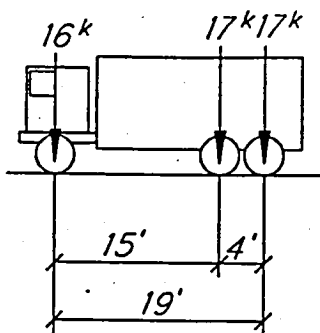
ALL RATINGS CONTROLLED BY STEEL GIRDER SPAN



LOAD RATING VEHICLES

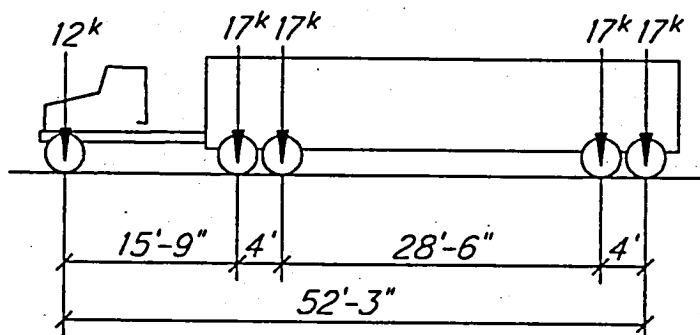
TRUCK 1
(T3)

50^k
25^T



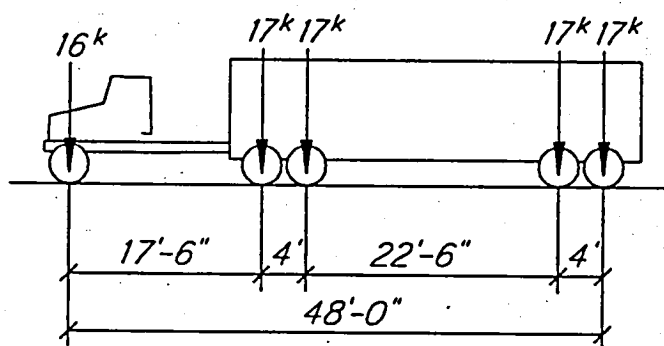
TRUCK 2

80^k
40^T



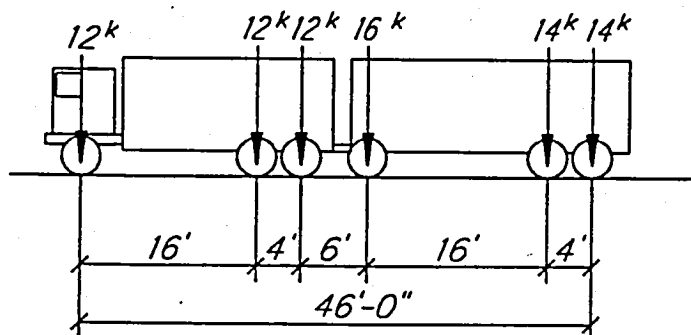
TRUCK 3

88^k
44^T



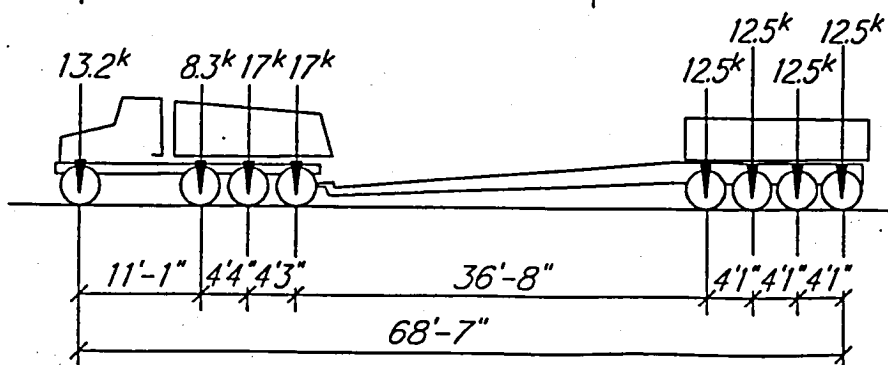
TRUCK 4
(3-3)

80^k
40^T



TRUCK 5

105.5^k
52.75^T



APPENDIX C

SITE CHARACTERIZATION/HEALTH & SAFETY HAZARDS REPORT

SOURCE:

Site Health & Safety
Plan prepared for Parametrix, Inc.
by Marine & Environmental Testing, Inc.,
July 25, 1990

IV. SITE CHARACTERIZATION

The St. Johns Landfill is located on the extensive floodplain at the confluence of the Columbia and Willamette Rivers. The site is generally flat in the anticipated work areas although there are areas of the site with slopes which must be considered when operating heavy equipment. Elevations in the landfill range from 10 feet to 80 feet above sea level. Slopes of up to 45° are present along the perimeter of the landfill.

The landfill is known to have accepted drums of 2,4-D manufacturing residues although a study completed by CH₂M Hill did not demonstrate levels of dioxin of concern for site workers. The site also routinely accepts asbestos waste.

Previous groundwater and leachate studies have evaluated water concentrations (see Appendix B). These studies have identified a variety of chemicals, however levels identified are low (part per billion range) and should not constitute an inhalation hazard to site workers.

Studies of the components of the landfill gases have also been conducted. These studies indicate that gases contain a variety of organic chemicals in low concentrations. These chemicals were monitored using passive organic vapor badges. Badges worn by field crew members did not detect any of these organics in the crew's breathing zones; however badges suspended

in monitoring wells overnight showed trace amounts of various organic chemicals. Concentrations of these chemicals were less than 100th of the 8-hour TLV, even though the badges measured a much longer time period. Chemicals detected by the badges included:

| <u>Compound</u> | <u>Results (mg/m³)</u> | <u>TLV (mg/m³)</u> |
|--------------------------|-----------------------------------|-------------------------------|
| 1,2-Dichloroethane | 0.008 | 40 |
| Benzene-CCl ₄ | 0.137 | 30 |
| Isooctane | N.D. | — |
| Trichloroethylene | 0.088 | 270 |
| Toluene | 0.051 | 375 |
| Octane | 0.019 | 1450 |
| Tetrachloroethylene | N.D. | 335 |
| p-Xylene | 0.381 | 435 |
| m-Xylene | 0.272 | 435 |
| o-Xylene | 0.230 | 435 |
| Tetrachloroethane | N.D. | 7 |

As with the leachate/water borne chemicals, these gases do not constitute a significant inhalation hazard. Gases of most concern on this project include methane (fire hazard) and hydrogen sulfide (toxic inhalation hazard). These gases will be discussed in the site hazards section of the plan.

V. SITE HAZARDS

Chemical Hazards:

As was discussed in the Site Characterization section, airborne vapors and gases are not expected to be a problem with the exceptions of methane and hydrogen sulfide. Contact with the leachate should be avoided since some chemicals noted by previous studies may be skin absorbed and could also present ingestion hazards.

Hydrogen Sulfide:

Hydrogen Sulfide, (H₂S) is a naturally occurring toxic gas which is often present where sulfur containing organic material has decomposed. The gas is heavier than air and tends to concentrate in confined spaces rather than rise and dissipate. It is commonly found during drilling, well monitoring and excavating operations on municipal land fills. This gas has a characteristic "rotten egg" odor which is detectable at very low concentrations; however, at higher levels it paralyzes the olfactory nerves so that potential lethal concentrations are not detectable. For this reason, H₂S is considered to have poor warning properties and air-purifying respirators are not allowed

for protection in concentrations above the TLV/PEL. H_2S causes pulmonary paralysis from high level acute exposures (>300 ppm), but is not of a concern from chronic, low level exposures ($<STEL$). The PEL for hydrogen sulfide is 10 ppm as an 8 hour TWA and 15 ppm as a 15 minute STEL. The Immediately Dangerous to Life or Health value (IDLH) is 300 ppm or 0.03%. These levels can easily be reached in confined spaces or bore holes during landfill operations, although exposures above the TLV in open air are unlikely. Monitoring by M&ET has demonstrated hydrogen sulfide levels at the mouth of monitoring well in the area in excess of the STEL. Workers will be monitored for the 8 hour TWA as well as "real time" monitoring for the STEL or any other peak exposures.

Asbestos Containing Materials:

Since the landfill routinely has accepted and continues to accept asbestos waste, it is possible that drilling or excavating may uncover or damage asbestos containing materials. Asbestos presents an increased risk for respiratory diseases including lung cancer and asbestosis if employees are exposed to friable, airborne asbestos fibers. Any suspect material noted (insulation, wrapped pipes, etc.) will be wetted to prevent fibers from becoming airborne and will immediately be brought to the attention of the Site Health and Safety Officer. If large quantities of asbestos are encountered, the respiratory protection may have to be modified.

Bio-Hazards:

Some areas of the landfill may contain medical wastes. More recently disposed of medical waste presents an increased risk of disease pathogens (microbial, viral, etc.) This type of waste is usually characterized by "Red Bags" and appropriate medical markings. Examples would include spent needles, syringes and wound dressings. Contact with this material should be avoided at all times. If any suspect materials are encountered, the Site Health and Safety Officer should be notified immediately.

Water/Leachate & Refuse Contaminants:

The other contaminants present in the waste residue and leachate are in low levels but still present concern from a high dust level inhalation or skin contact standpoint. If the amount of contaminated dirt that is breathed or skin contact with liquids is minimized (as near "zero" as possible), overexposure to other contaminants on the site is very remote. Use of good work practices such as dust control with water, good decontamination procedures, and personal hygiene practices designed to remove any contaminated soil before going on breaks will adequately protect the workers if there other contaminants present.

PHYSICAL HAZARDS

Fire/Explosion (Methane Gas):

Methane is not toxic but is a highly flammable gas. Methane is often found at landfills or whenever organic materials are decomposing. This gas can be explosive in confined conditions and always presents a significant increased fire risk (LEL: 5%; UEL: 15%); Fire and explosion hazards exist while digging or drilling through pockets of methane. Also, methane may displace air in an excavation pit, making the atmosphere within the excavation oxygen deficient. All drilling and excavating will be monitored for the presence of methane.

Heavy Machinery:

The use of machinery at the site poses hazards which need to be addressed. Only experienced personnel will operate drilling and excavating equipment on the site. All equipment will have operating backup alarms and horns. Barriers and/or banner guard will be placed around the exclusion zone (work area). Roll-over protection will be required on moving equipment such as backhoes when working on sloping surfaces which present increased risks of rollover. Equipment will be equipped with seat belts which will be used by operators. All equipment will have good functioning brakes. Personnel working around the equipment must watch where they are walking so not to step in front of moving equipment.

Heat Stress:

The use of PPE may lead to heat induced illness. This may occur while wearing PPE during heavy exertion, especially in elevated temperatures or if workers are not acclimated or have not had enough liquids in their diet. Alcohol, coffee, tea and caffeine-containing soft drinks should be avoided since they increase the rate of dehydration. The Site Health & Safety Officer will determine if heat stress poses a particular risk during the project, and will monitor the workers' temperature or pulse rate at the start of each break period when heat stress potential is high.

The normal work cycle will be:

| | |
|----------------|--------------------|
| work - 2 hours | rest - 15 minutes |
| work - 2 hours | lunch - 60 minutes |
| work - 2 hours | rest - 15 minutes |
| work - 2 hours | |

Workers will monitor themselves and their buddy for signs of heat stress. The following guidelines for monitoring heat stress are from NIOSH and should be consulted as a reference.

If the worker's pulse exceeds 110 beats per minute at the start of a break period, the following work period should be shortened by 1/3. If at the start of the following break period the worker's pulse is still 110 beats per minute, shorten the following work period an additional 1/3.

Heat stroke victims are recognized by their dry skin (lesser degrees of heat related illness commonly cause very damp skin). They will be disoriented and probably will not be able to respond to commands or to help themselves.

Heat stroke is life threatening!!! Prompt treatment of heat stroke must be given at the site for anyone stricken by this illness. Treatment includes cooling the victim with whatever is at hand (ice water from on-site ice chest). Do not wait for medical services to arrive to begin treatment.

Falls/Trips:

As with all sites, caution must be exercised to prevent slips on rain slick surfaces, oily spots, etc. Never work on elevated platforms or drill towers without fall protection. All excavations and wells will be properly marked and guarded to prevent the unwary from falling into an open hole.

Noise:

The use of heavy machinery may lead to excessive noise exposure. Personnel in the immediate area must use hearing protection (eg.-foam inserts) if noise levels exceed 85 Db.

Confined Spaces:

Personnel are forbidden from entering any confined space (such as an excavation) unless the space is properly tested by the Site Health & Safety Officer or other competent person and all precautions required by the Site Health and Safety Officer are followed. A safety watch will always be required whenever a worker is in a confined space.

Weather Hazards:

Due to the hazard from electrical storms, site activities will cease if thunderstorms are present. High wind conditions may create a safety hazard for overhead equipment such as cranes or drill towers. Winds may also spread contamination and increase inhalation problems; winds causing excessive dust clouds or risk to operating equipment will require site activities to be curtailed. If excessive dust is a problem, it may be controlled by use of water spray.

Utilities:

No conductive material will be brought closer than 20 feet to any energized or suspect overhead transmission line. No drilling, excavating, etc. will be done where there may be any underground utility such as electrical lines or water/ gas pipes. If underground utilities are suspected, the local utility will be contacted so that they can properly locate the line. Some form of ground penetrating metal locator will be used for suspect areas. If work must be performed in the immediate area, the utility lines will be de-energized.

Task - Risk Analysis

Drilling: The primary hazards associated with drilling on this site include the mechanical hazards associated with heavy equipment operations, H₂S inhalation and fire from methane gas pockets. Exposure to low levels of chemicals in the water or soil pose a lower risk, however all of these hazards are significant and will be controlled by the following methods.

1. Risk - Chemical Exposure

Control- Workers will not eat, smoke, etc. at any time while in the exclusion (contaminated) zone. Workers will avoid any direct contact with leachate or garbage. Proper decontamination practices, followed by a hand and face wash prior to breaks and lunch, will be followed at all times. The Site Health & Safety Officer will closely monitor the work to ensure that these practices are followed. If dust or odors are excessive team members may use 1/2 face air purifying respirators with acid gas/organic vapor cartridges and dust pre-filters.

The use of Level B respiratory protection will be used when monitoring indicates that hydrogen sulfide exposures are above the 10 ppm TLV. Emergency rescue SCBAs will also be maintained in a state of readiness by the Site Health and Safety Officer.

The Site Health and Safety Officer will monitor hydrogen sulfide levels whenever H₂S is noted or expected. He/She will require work stoppage or evacuation as outlined in the monitoring section of the plan.

2. Risk- Methane Fire

Control- The Site Health and Safety Officer will continually monitor for the presence of methane in the work area. Work will be stopped and the site evacuated until adequately ventilated when flammable gas concentrations reach >10% LEL in the general work area atmosphere. Drill holes will be

monitored prior to any welding or hot work. Holes with methane concentrations > 10% LEL will be ventilated with a air hose prior to hot work such as casing welding. The air flow will be maintained in the hole during all hot work.

Suitable fire extinguishers will also be maintained on-site at all times.

3. Risk- Being struck by moving machinery (drill equipment, backhoes, etc.)

Control- Only experienced personnel will operate the equipment. All machinery will have operating backup alarms. Unauthorized personnel will not be allowed in the work area. Workers will be cautioned to look carefully where they walk to avoid moving machinery. The swing radius of moving equipment such as cranes or backhoes will be guarded or marked with barrier tape. The Site Health & Safety Officer will monitor the work to eliminate dangerous work practices; concurrent operations may have to be curtailed to prevent workers from being placed in dangerous proximity to moving heavy equipment.

4. Risk- Heat Stress

Control- Workers and the Site Health & Safety Officer will monitor vital signs such as pulse, and force fluids to prevent heat related illness. A source of cold water will be available to treat heat stroke and/or for liquid replacement. Proper training in limitations of PPE and heat stress will be required and reviewed as a part of this plan. Heat stress conditions will be monitored as outlined in the heat stress paragraph of the site hazards section of the plan. "Breathable" disposable coveralls such as Kleenguard will be used to help minimize the heat stress of the PPE.

5. Risk- Hazardous Atmospheres in Excavations

Hazards: Exposure to oxygen deficient, flammable, or toxic atmospheres.

Control- The Site Health & Safety Officer will test excavations prior to worker entry at the start of each day, and after breaks. Excavations will be ventilated as necessary.

6. Risk- Cave-in of Excavation

Control- Follow all OSHA regulations for shoring/ sloping the walls of the excavation. Use ladders to enter/exit excavations over four feet deep (do not use the bucket of a back-hoe as an elevator).

SOURCE:

Appendix A

Health and Safety Monitoring

Cornforth Consultants, Inc.

Oct. 1990, "Five Interior

Monitoring Wells, As Constructed, St Johns Landfill."

Inhalation of hydrogen sulfide (H_2S), fire from methane gas, and physical hazards associated with drilling and heavy equipment operations were primary hazards associated with installation of monitoring wells in the St. Johns Landfill. Monitoring for these gases was conducted during drilling and installation activities to assure personal and environmental safety. Drilling personnel were monitored with dosimeter tubes to measure personal hydrogen sulfide exposure. A portable combustible gas indicator along with hydrogen sulfide electro-chemical detectors were used to monitor the hazardous gases. Detector tube pumps were also used to monitor for hydrogen sulfide. Detailed notes of environmental and personal monitoring were maintained in the field.

Table A-1 is a summary of gas monitoring during the well drilling activities. Explosive gas was measured at levels greater than 20 percent of the Lower Explosive Limit (LEL), and most often at 100 percent LEL during all well drilling and installation. Prior to well drilling, hydrogen sulfide was detected from two EPA monitoring wells at levels above the OSHA permissible exposure limit (PEL = 10 ppm). While drilling monitoring well H-5, hydrogen sulfide was detected at levels above the OSHA ceiling (C = 20 ppm). After developing the monitoring wells, hydrogen sulfide was detected from two well casings (H-3 and H-5) at levels above the ceiling.

To decrease our risk of personal exposure, we used the portable gas monitors to outline an area of gas concentrations as a "plume" emitting from the top of the auger, drill hole, or well casing, then blowing downwind and rapidly dissipating. The rate of gas dissipation depended on its concentration and the wind velocity.

Exposure to hydrogen sulfide was minimized by approaching the well hole from the side or upwind and placing a large capacity fan to ventilate gases away from the workers and the drill rig. Occasionally, wafting air current brought hydrogen sulfide momentarily into the workers' breathing zone. However, personal dosimeter tubes showed no hydrogen sulfide exposure to the drill crew during the work. The fan also ventilated methane from around the drill crew and under the drill rig.

Work was performed for the most part in Level D personal protection equipment (PPE). Level C PPE was worn occasionally due to a combination of excessive odor, high concentrations of airborne dust, and exposure to low levels of hydrogen sulfide. Tyvek was worn as particulate protection, and Polycoat Tyvek was often worn to guard against splash.

SOURCE:
 Cornforth Consultants, Inc.
 Oct. 1990, "Five Interior Monitoring Wells, As Constructed,
 St Johns Landfill." Table A-1
 Summary of St. Johns Landfill Gas Monitoring

| <u>Well Site</u> | <u>H₂S (ppm)</u> | <u>LEL (%)</u> | <u>O₂ (%)</u> | <u>Test* Location</u> | <u>Date(s) (1990)</u> |
|--------------------------------------|-----------------------------|----------------|--------------------------|---------------------------|---------------------------|
| <u>OLD EXISTING WELLS</u> | | | | | |
| EPA-B | 13 | 100 | | 1B | 7/16 |
| EPA-B | 40 | | | 1B | 7/30 |
| EPA-B | 20 | 100 | | 1B | 7/31 |
| B-4 | | 10 | | 2B | 7/16 |
| A-2 | 0 | 100 | | 2C | 7/16 |
| EPA-Q | 10 | 100 | | 2C | 7/16 |
| A-1 | 0 | 100 | | 2C | 7/16 |
| EPA-O | 16-18 | 100 | | 1B | 7/16 |
| EPA-P | | 55-90 | | | 7/16 |
| <u>NEW INTERIOR MONITORING WELLS</u> | | | | | |
| H-1 | 0-3 | 100 | 18 | 1A | 7/27-7/31 |
| H-1 | 1-2 | 100 | 10 | 2B | 8/27, 8/29 |
| H-2 | 2 | 10-60 | | 1A, 2A | 8/14, 8/16 |
| H-2 | 0 | 20 | | 2C | 8/29 |
| H-3 | 1-5 | <60 | | 1A | 8/20, 8/21 |
| H-3 | 60-140 | 60 | | 2C | 8/27-8/29 |
| H-4 | 9-18 | 100 | | 1A | 8/23, 8/24 |
| H-4 | 1 | 100 | | 2C | 8/27, 8/29 |
| H-5 | 2-22 | 100 | | 2A | 8/8-8/13 |
| H-5 | 7-20 | 100 | | 2C | 8/29 |

*Test Locations: 1A Inside Auger During Drilling Activity
 1B Inside Well Casing
 2A Top of Auger During Drilling Activity
 2B Top of Well Casing
 2C Opening in Well Cap

APPENDIX D

SITE EVALUATION OF LOW LEVEL RADIATION LETTER REPORT

Parametrix, Inc.

Consultants in Engineering and Environmental Sciences

13020 Northup Way Bellevue, WA 98005
206-455-2550 • Fax: 206-869-9556



Mr. Dennis O'Neil
Project Manager
Metropolitan Service District
2000 SW First Avenue
Portland, OR 97201

August 5, 1991
21-1919-02 (31D)

Dear Mr. O'Neil:

I have enclosed a copy of the final report that contains the evaluation of potential risk from exposure to low level radioactive material buried at the St. Johns Landfill related to sampling internal monitoring wells. Likewise, there is an accompanied invoice for the services performed by Parametrix to cooperate with Metro in this evaluation.

As you know, this work was carried out as a result of low level radioactive waste being placed within the landfill. Whereas, Metro and the appropriate approving agencies have acknowledged there is limited risk of exposure to the material as disposed, the risk of potential exposure to concentrations of radiation transmitted by either landfill gas or leachate was not evaluated. Thus the accompanying evaluation was performed to determine whether or not Parametrix employees received unacceptable radiation exposure during subsurface investigations.

The report will be useful to Metro in evaluating risk from potential radiation exposure to anyone carrying out subservice investigation or construction related to the landfill closure in the future. This report will also be part of our overall health and safety plan for the site which will be available to future contractors.

We appreciate the cooperation of Metro and the Oregon State Health Department in resolving this particular issue. If you have any questions related to this report or its findings, please do not hesitate to contact myself, or Cheri Zehner, Health and Safety Officer for Parametrix.

Sincerely,

Doug Drennen

Enclosure

cc: Rich Mullen
Cheri Zehner

RECEIVED
AUG 09 1991



Printed on Recycled Paper

MEMORANDUM

to: Health and Safety Plan

June 17, 1991

from: Rich Mullen

21-1919-02 (31D)

re: St. Johns Landfill Low-Level Radioactive Sludge

This memo is an addendum to the *St. Johns Landfill Site Assessment Health and Safety Plan* prepared by Marine Environmental Testing, Inc. for Parametrix personnel, dated July 25, 1990. The purpose of the memo is to provide Parametrix personnel with additional information regarding the hazardous nature of the site. Specifically, the memo addresses sewage sludge containing low levels of radioactivity that was dumped in St. Johns Landfill in the spring of 1990. The radioactivity was primarily due to thorium-232 (Th-232) and originated from manufacturing processes at Precision Castparts Corporation.

In a letter from the Department of Human Resources, Health Division, dated April 12, 1990, the Th-232 containing sludge material was cleared for disposal at St. Johns Landfill. The letter stated that the Health Division had no concerns or rules that would prohibit the sludge from disposal at the Landfill. It could be buried or used as a daily cover. After letters and meetings between responsible/concerned agencies regarding this material, Metro decided to take the conservative approach and bury it. In addition, they treated the material as a "special waste" which required testing, documentaion, and tracking of the sludge from receiving to placement.

In August 1990, two monitoring wells were constructed in the sludge disposal areas (H4 and H5). Parametrix field personnel were sent to collect samples from H4 and H5 in December 1990. After sampling H5 and before sampling H4, the personnel were informed of the radioactive material disposed in this area. The field personnel expressed concern over potential health effects due to exposure. The Radiation Safety Officer from Parametrix responded by outlining a program to survey the landfill for radioactive contamination.

The survey program outline was developed from regulatory requirements and professional experience. It was meant to be comprehensive. However, it was also meant to be implemented in phases. If initial measurements indicated no potential problems due to the radioactive sludge, then no additional tests would be conducted.

to: Project File
from: Rich Mullen
June 17, 1991
Page 2

The Radiation Control Section of Oregon Department of Human Resources investigated the site on April 11, 1991. The investigation included measurement of the ambient radiation levels in specific areas of the landfill. An air sample was also collected at a point between wells H4 and H5. The sample was analyzed for both particulate and gaseous radionuclides. In addition, a leachate sample was obtained from the leachate sump. The sample was analyzed for alpha, beta, and gamma activity.

The results of this investigation indicated no elevated levels of radioactivity at the landfill. The measured ambient levels on the landfill were all normal (at normal background levels). The air sample did not show any detectable radioactivity above background. The water sample also indicated no abnormal levels of radioactivity. Neither a sample of the air next to one of the leachate wells nor a gas sample from the well was collected. However, even if there is elevated levels of radioactivity in the gas in the well, samplers do not normally breathe the gas. Breathing of the gas would be the only possible exposure pathway. In addition, when drilling through this material, precautions should be taken to prevent ingestion or inhalation of the material.

With the information provided by Metro regarding the sludge and the field survey data, Parametrix believes that there are no significant health risks associated with working around the sludge. This includes both sampling and drilling activities.

In accordance with OSHA 29 CFR Part 1920.120, information within this memo is available to other parties conducting activities in conjunction with Parametrix. However, other parties are responsible for providing their own site-specific health and safety plan that addresses their specialized activities. Parametrix, Inc. assumes no responsibility or liability for the use or misuse of its health and safety plan by another party.

APPENDIX E

METHODOLOGY FOR DETERMINING NORMAL ADVERSE WEATHER DAYS FOR CONSTRUCTION

**MONTHLY ANTICIPATED ADVERSE WEATHER DELAYS
FOR ST. JOHNS LANDFILL**

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|--------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Rain (.01" or more) | 18 | 16 | 17 | 14 | 12 | 9 | 4 | 5 | 8 | 13 | 18 | 19 |
| Snow (1" or more) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Freezing Temperatures | 13 | 8 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 5 | 10 |

Example of Weather Delay Computation

Example - The weather in December 1991 is typical for Portland weather. The U.S. Weather Service records the following for the month.

| of Delay | Actual | - | Expected (climatology) | = | Upper limit |
|--------------------------|-------------|---|---------------------------|---|-------------|
| Rain (>.01") | 18 cal days | | 19 cal days | | 0 cal days |
| Snow (>1") | 3 cal days | | 1 cal days | | 2 cal days |
| Freezing Temperatures | 10 cal days | | 7 cal days | | 3 cal days |

The Contractor is running behind schedule and has scheduled work for six days per week. During the month, the Contractor calls off work on six working days because of rain. Wet soil prompts Metro to stop work on three additional working days. The Contractor is also prevented from working on two out of the three snow days this month and in addition is prevented from working on two additional work days because of a heavy accumulation of snow which fell at the end of November. On both of the snow impact days in December the ground was frozen and the Contractor could not have worked even if it had not been snowing. The Contractor experienced several other days when the temperatures dropped below freezing at night but was able to continue working. Calculations for weather delays could be made as follows.

A. Rain

| | |
|-----------------------------|-----------------------|
| Actual days of rain impact | 6 working days |
| Metro stops work - wet soil | + 3 working days |
| | <u>9 working days</u> |

| | |
|------------------------------|------------------------|
| Conversion factor | |
| working days to cal days 7/6 | <u>x 1.17</u> |
| | = 10.5 cal days impact |

No time for rain is justified because actual rainfall does not exceed expected.

B. Snow

The Contractor has experienced four working days of impact because of snow. Based upon climatology and the actual weather in December the maximum allowable delay due to snow is only two calendar days. The Contractor decided to claim only the two working days he missed at the beginning of the month for the snow on the ground left over from November.

Actual days of snow impact
working days to cal days 7/6

2 working days
x 1.17
2.34 cal days impact

The upper limit of delay due to snow in December 1991 is two calendar days. The justifiable delay for snow is therefore two calendar days.

C. Freezing temperatures

Actual days of freezing impact
working days to cal days 7/6

2 working days
x 1.17
2.34 cal days impact

The upper limit of delay due to freezing temperatures is three calendar days. Therefore the justifiable delay for freezing temperatures is 2.34 calendar days.

D. Recap of justifiable weather delays for December 1991

| | | |
|-----------------------|-------------|---------------|
| Rain | 0 | calendar days |
| Snow | 2 | calendar days |
| Freezing temperatures | <u>2.34</u> | calendar days |
| TOTAL | 4.34 | calendar days |

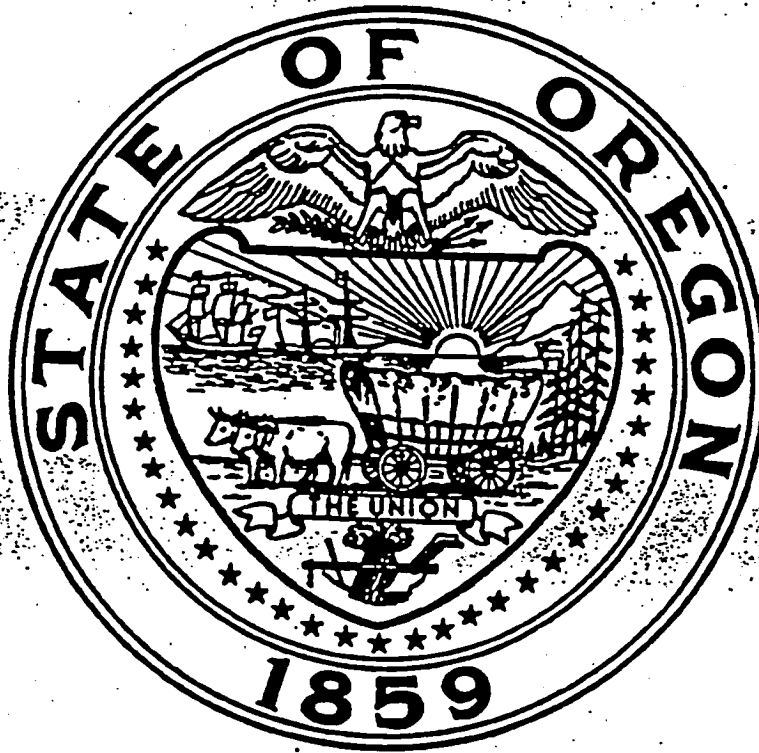
which rounds to four calendar days for the month.

APPENDIX F
PREVAILING WAGE RATES

PREVAILING WAGE RATES

for

Public Works Contracts in Oregon



BOLI

Mary Wendy Roberts
Commissioner
Bureau of Labor and Industries

Effective January 1, 1991¹⁹⁹²

*Shall be included
when available.*

APPENDIX G

METRO LETTER REGARDING DISADVANTAGED BUSINESS PROGRAM COMPLIANCE

METRO

2000 SW First Avenue
Portland, OR 97201-5398
(503) 221-1646
Fax 241-7417

October 22, 1991

Dear Potential Bidder/Proposer:

For the past ten years, the Metropolitan Service District has had a special contracting program to encourage participation in metro contracts by businesses owned by minorities including women. This program has been applied to both federally funded and locally funded projects.

We have now been advised by our General Counsel that the Metro Code provisions relating to participation by minority-owned businesses in locally funded contracts are unconstitutional.

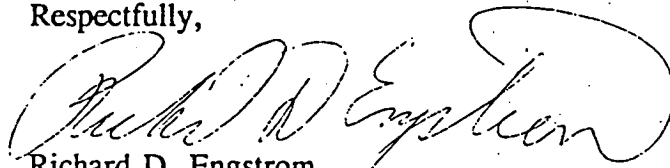
Therefore, I must reluctantly advise you that until the Metro Council acts to correct this defect and/or adopts a new program, I cannot and will not act in probable violation of the law and attempt to enforce the present Metro DBE and WBE Program requirements on locally funded projects.

The economy of the Metro region is comprised of a multitude of emerging and small businesses which mirror the racial diversity within our boundaries. They're our customers and clients. They pay taxes. They hire the local work force. They determine the health of the local economy. Supporting those businesses should not be viewed as just a requirement. Supporting those businesses should be viewed as good business!

I, therefore encourage you to set the legal question aside and voluntarily follow good faith efforts to utilize Disadvantaged, Minority and Women Owned Business Enterprises as your subcontractors and suppliers.

Please consider these issues carefully. Talk to your legal counsel. Reflect upon the larger issue. If you have questions, please contact Rich Wiley at Metro 221-1646 x 116.

Respectfully,



Richard D. Engstrom
Deputy Executive Officer

Executive Officer
Rena Cusma

Metro Council

Tanya Collier
Presiding Officer
District 9

Jim Gardner
Deputy Presiding
Officer
District 3

Susan McLain
District 1

Lawrence Bauer
District 2

Richard Devlin
District 4

Tom DeJardin
District 5

George Van Bergen
District 6

Ruth McFarland
District 7

Judy Wyers
District 8

Roger Buchanan
District 10

David Knowles
District 11

Sandi Hansen
District 12

APPENDIX H
METRO CODE SECTION 2.04.100

METRO CODE SECTION 2.04.100
Disadvantaged Business Program
METROPOLITAN SERVICE DISTRICT
Revised February, 1990

2.04.100 Disadvantaged Business Program, Purpose and Authority:

(a) It is the purpose of this ordinance to establish and implement a program to encourage the utilization by Metro of disadvantaged and women-owned businesses by creating for such businesses the maximum possible opportunity to compete for and participate in Metro contracting activities.

(b) The portions of this ordinance which relate to federally funded contracts are adopted pursuant to 49 CFR 23 and are intended to comply with all relevant federal regulations. Federal regulation 49 CFR 23 and its amendments implement section (105)(f) of the Surface Transportation Assistance Act of 1982 relating to the participation by Minority Business Enterprises in Department of Transportation programs.

(c) This ordinance shall be known and may be cited as the "Metro Disadvantaged Business Program," hereinafter referred to as the "Program."

(d) This ordinance supersedes the Metro "Minority Business Enterprise (MBE) Program" dated October 1980 and amended December 1982.

(Ordinance No. 83-165, Sec. 1; amended by Ordinance No. 84-181, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.105 Policy Statement:

(a) Through this Program, Metro:

(1) expresses its strong commitment to provide maximum opportunity to disadvantaged and women-owned businesses in contracting;

(2) informs all employees, governmental agencies and the general public of its intent to implement this policy statement; and

(3) assures conformity with applicable federal regulations as they exist or may be amended.

(b) It is the policy of Metro to provide equal opportunity to all persons to access and participate in the projects, programs and services of Metro. Metro and Metro contractors will not discriminate against any person or firm on the basis of race, color, national origin, sex, sexual orientation, age, religion, physical handicap, political affiliation or marital status.

(c) The policies, practices and procedures established by this ordinance shall apply to all Metro departments and project areas except as expressly provided in this ordinance.

(d) The objectives of the program shall be:

(1) to assure that provisions of this ordinance are adhered to by all Metro departments, contractors, employees and USDOT subrecipients and contractors.

(2) to initiate and maintain efforts to increase program participation by disadvantaged and women businesses.

(e) Metro accepts and agrees to the statements of 49 CFR §23.43(a)(1) and (2), and said statements shall be included in all USDOT agreements with USDOT subrecipients and in all USDOT assisted contracts between Metro or USDOT subrecipients and any contractor.

(Ordinance No. 83-165, Sec. 2; amended by Ordinance No. 84-181, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.110 Definitions: For purposes of this Ordinance, the following definitions shall apply:

(a) APPLICANT -- one who submits an application, request or plan to be approved by a USDOT official or by Metro as a condition to eligibility for Department of Transportation (USDOT) financial assistance; and "application" means such an application, request or plan.

(b) CONSTRUCTION CONTRACT -- means a contract for construction of buildings or other facilities, and includes reconstruction, remodeling and all activities which are appropriately associated with a construction project.

(c) CONTRACT -- means a mutually binding legal relationship or any modification thereof obligating the seller to furnish supplies or services, including construction, and the buyer to pay for them. For purposes of this ordinance a lease or a purchase order of \$500.00 or more is a contract.

(d) CONTRACTOR -- means the one who participates, through a contract or subcontract, in the Program and includes lessees.

(e) DEPARTMENT or "USDOT" -- means the United States Department of Transportation, including its operating elements.

(f) DISADVANTAGED BUSINESS ENTERPRISE or DBE -- means a small business concern which is certified by an authorized agency and:

(1) which is at least 51 percent owned by one or more socially and economically disadvantaged individuals, or, in the case of any publicly-owned business, at least 51 percent of the stock of which is owned by one or more socially and economically disadvantaged individuals; and

(2) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it.

For purposes of USDOT assisted contracts, the term Disadvantaged Business Enterprise shall be deemed to include Women-Owned Business Enterprises.

(g) EXECUTIVE DEPARTMENT -- means the State of Oregon's Executive Department.

(h) JOINT VENTURE -- is defined as an association of two or more businesses to carry out a single business enterprise for profit for which purpose they combine their property, capital, efforts, skills and knowledge. In a joint venture between a DBE/WBE and non-DBE/WBE, the DBE/WBE must be responsible for a clearly defined portion of the work to be performed and must share in the ownership, control, management responsibilities, risks and profits of the joint venture. A joint venture of a DBE/WBE and a non-DBE/WBE must receive Metro approval prior to contract award to be counted toward any DBE/WBE contract goals.

(i) LABOR AND MATERIALS CONTRACT -- is a contract including a combination of service and provision of materials other than construction contracts. Examples may include plumbing repair, computer maintenance or electrical repair, etc.

(j) LESSEE -- means a business or person that leases, or is negotiating to lease, property from a recipient or the Department on the recipient's or Department's facility for the purpose of operating a transportation-related activity or for the provision of goods or services to the facility or to the public on the facility.

(k) OREGON DEPARTMENT OF TRANSPORTATION OR "ODOT" -- means the State of Oregon's Department of Transportation.

(l) PERSONAL SERVICES CONTRACT -- means a contract for services of a personal or professional nature.

(m) PROCUREMENT CONTRACT -- means a contract for the purchase or sale of supplies, materials, equipment, furnishings or other goods not associated with a construction or other contract.

(n) RECIPIENT -- means any entity, public or private, to whom USDOT financial assistance is extended, directly or through another recipient for any program.

(o) SMALL BUSINESS CONCERN -- means a small business as defined pursuant to section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto.

(p) SOCIALLY AND ECONOMICALLY DISADVANTAGED INDIVIDUALS OR DISADVANTAGED INDIVIDUALS -- means those individuals who are citizens of the United States (or lawfully admitted permanent residents) and who are Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans or Asian-Indian Americans and any other minorities or individuals found to be disadvantaged by the Small Business Administration pursuant to section 8(a) of the Small Business Act. Certifying recipients shall make a rebuttable presumption that individuals in the following groups are socially and economically disadvantaged. Certifying recipients also may determine, on a case-by-case basis, that individuals who are not a member of one of the following groups are socially and economically disadvantaged:

(1) "Black Americans," which includes persons having origins in any of the Black racial groups of Africa;

(2) "Hispanic Americans," which includes persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Portuguese-American, Spanish culture or origin, regardless of race;

(3) "Native Americans," which includes persons who are American Indians, Eskimos, Aleuts, or Native Hawaiians;

(4) "Asian-Pacific Americans," which includes persons whose origins are from Japan, China, Taiwan, Korea, Vietnam, Laos, Cambodia, the Philippines, Samoa, Guam, the U.S. Trust Territories of the Pacific, and the Northern Marianas; and

(5) "Asian-Indian Americans," which includes persons whose origins are from India, Pakistan, and Bangladesh.

(q) USDOT ASSISTED CONTRACT -- means any contract or modification of a contract between Metro and a contractor which is paid for in whole or in part with USDOT financial assistance.

(r) USDOT FINANCIAL ASSISTANCE -- means financial aid provided by USDOT or the United States Railroad Association to a recipient, but does not include a direct contract. The financial aid may be provided directly in the form of actual money, or indirectly in the form of guarantees authorized by statute as financial assistance services of Federal personnel, title or other interest in real or personal property transferred for less than fair market value, or any other arrangement through which the recipient benefits financially, including licenses for the construction or operation of a Deep Water Port.

(s) WOMEN-OWNED BUSINESS ENTERPRISE or WBE -- means a small business concern, as defined pursuant to section 3 of the Small Business Act and implementing regulations which is owned and controlled by one or more women and which is certified by an authorized agency. "Owned and controlled" means a business which is at least 51 percent owned by one or more women or, in the case of a publicly owned business, at least 51 percent of the stock of which is owned by one or more women, and whose management and daily business operations are controlled by one or more women. For purposes of USDOT assisted contracts, the term Disadvantaged Business Enterprise shall be deemed to include Women-Owned Business Enterprises.

(Ordinance No. 165, Sec. 3; amended by Ordinance No. 84-181, Sec. 2; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.115 Notice to Contractors, Subcontractors and Subrecipients: Contractors, subcontractors and subrecipients of Metro accepting contracts or grants under the Program which are USDOT-assisted shall be advised that failure to carry out the requirements set forth in 49 CFR 23.43(a) shall constitute a breach of contract and, after notification by Metro, may result in termination of the agreement or contract by Metro or such remedy as Metro deems appropriate. Likewise, contractors of Metro accepting locally-funded contracts under the Program shall be advised that failure to carry out the applicable provisions of the Program shall constitute a breach of contract and, after notification by Metro, may result in termination or such other remedy as Metro deems appropriate.

(Ordinance No. 83-165, Sec. 4; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.120 Liaison Officer:

(a) The Executive Officer shall by executive order, designate a Disadvantaged Business Liaison Officer and, if necessary, other staff adequate to administer the Program. The Liaison Officer shall report directly to the Executive Officer on matters pertaining to the Program.

(b) The Liaison Officer shall be responsible for developing, managing and implementing the program, and for disseminating information on available business opportunities so that DBEs and WBEs are provided an equitable opportunity to bid on Metro contracts. In addition to the responsibilities of the Liaison Officer, all department heads and program managers shall have responsibility to assure implementation of the Program.

(Ordinance No. 83-165, Sec. 5; amended by Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.125 Directory: A directory of DBEs and WBEs certified by ODOT or the Executive Department, as applicable shall be maintained by the Liaison Officer to facilitate identifying such businesses with capabilities relevant to general contracting requirements and particular solicitations. The directory shall be available to contract bidders and proposers in their efforts to meet Program requirements.

(Ordinance No. 83-165, Sec. 6; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.130 Minority-Owned Banks: Metro will seek to identify minority-owned banks within the policies adopted by the Metro Council and make the greatest feasible use of their services. In addition, Metro will encourage prime contractors, subcontractors and consultants to utilize such services by sending them brochures and service information on certified DBE/WBE banks.

(Ordinance No. 83-165, Sec. 7; amended by Ordinance No. 84-181, Sec. 3; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.135 Affirmative Action and Equal Opportunity Procedures: Metro shall use affirmative action techniques to facilitate DBE and WBE participation in contracting activities. These techniques include:

(a) Arranging solicitations, time for the presentation of bids, quantities specifications, and delivery schedules so as to facilitate the participation of DBEs and WBEs.

(b) Referring DBEs and WBEs in need of management assistance to established agencies that provide direct management assistance to such businesses.

(c) Carrying out information and communications programs on contracting procedures and specific contracting opportunities in a timely manner, with such programs being bilingual where appropriate.

(d) Distribution of copies of the program to organizations and individuals concerned with DBE/WBE programs.

(e) Periodic reviews with department heads to insure that they are aware of the program goals and desired activities on their parts to facilitate reaching the goals. Additionally, departmental efforts toward and success in meeting DBE/WBE goals

for department contracts shall be factors considered during annual performance evaluations of the department heads.

(f) Monitor and insure that Disadvantaged and Women Business Enterprise planning centers and likely DBE/WBE contractors are receiving requests for bids, proposals and quotes.

(g) Study the feasibility of certain USDOT-assisted contracts and procurements being set aside for DBE/WBE participation.

(h) Distribution of lists to potential DBE/WBE contractors of the types of goods and services which Metro regularly purchases.

(i) Advising potential DBE/WBE vendors that Metro does not certify DBE/WBEs, and directing them to ODOT until December 31, 1987, and, thereafter, to the Executive Department.

(j) Specifying purchases by generic title rather than specific brand name whenever feasible.

(k) Establishing an interdepartmental contract management committee which will meet regularly to monitor and discuss, among other issues, potential DBE and WBE participation in contracts. In an effort to become more knowledgeable regarding DBE and WBE resources, the committee shall also invite potential DBE and WBE contractors to attend selected meetings.

(l) Requiring that at least one DBE or WBE vendor or contractor be contacted for all contract awards which are not exempt from Metro's contract selection procedures and which are 1) for more than \$500 but not more than \$15,001 in the case of non-personal services contracts; and 2) for more than \$2,500 but not more than \$10,001 for personal services contracts. The Liaison Officer may waive this requirement if he/she determines that there are no DBEs or WBEs on the certification list capable of providing the service or item. For contracts over the dollar amounts indicated in this section, all known DBEs and WBEs in the business of providing the service or item(s) required shall be mailed bid or proposal information.

(m) The Executive Officer or his/her designee, may establish and implement additional affirmative action techniques which are designed to facilitate participation of DBEs and WBEs in Metro contracting activities.

(Ordinance No. 83-165, Sec. 8; amended by Ordinance No. 84-181, Sec. 4; Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.140 Certification of Disadvantaged Business Eligibility:

(a) To participate in the Program as a DBE or WBE, contractors, subcontractors and joint ventures must have been certified by an authorized certifying agency as described in subsection (b) of this section.

(b) Metro will not perform certification or recertification of businesses or consider challenges to socially and economically disadvantaged status. Rather Metro will rely upon the certification and recertification processes of ODOT and will utilize ODOT's certification list until December 31, 1987, and, thereafter, the Executive Department's list in determining whether a prospective contractor or subcontractor is certified as a DBE or WBE. A prospective contractor or subcontractor must be certified as a DBE or WBE by one of the above agencies, as applicable, and appear on the respective certification list of said agency, prior to the pertinent bid opening or proposal submission date to be considered by Metro to be an eligible DBE or WBE and be counted toward meeting goals. Metro will adhere to the Recertification Rulings resulting from 105(f) or state law, as applicable.

(c) Prospective contractors or subcontractors which have been denied certification by one of the above agencies may appeal such denial to the certifying agency pursuant to applicable law. However, such appeal shall not cause a delay in any contract award by Metro. Decertification procedures for USDOT-assisted contractor or potential contractors will comply with the requirements of Appendix A "Section by Section Analysis" of the July 21, 1983, Federal Register, Vol. 45, No. 130, p. 45287, and will be administered by the agency which granted certification.

(d) Challenges to certification or to any presumption of social or economic disadvantage with regard to the USDOT-assisted portion of this Program, as provided for in 49 CFR 23.69, shall conform to and be processed under the procedures prescribed by each agency indicated in paragraph (b) of this section. That challenge procedure provides that:

(1) Any third party may challenge the socially and economically disadvantaged status of any individual (except an individual who has a current 8(a) certification from the Small Business Administration) presumed to be socially and economically disadvantaged if that individual is an owner of a firm certified by or seeking certification from the certifying agency as a disadvantaged business. The challenge shall be made in writing to the recipient.

(2) With its letter, the challenging party shall include all information available to it relevant to

a determination of whether the challenged party is in fact socially and economically disadvantaged.

(3) The recipient shall determine, on the basis of the information provided by the challenging party, whether there is reason to believe that the challenged party is in fact not socially and economically disadvantaged.

(i) If the recipient determines that there is not reason to believe that the challenged party is not socially and economically disadvantaged, the recipient shall so inform the challenging party in writing. This terminates the proceeding.

(ii) If the recipient determines that there is reason to believe that the challenged party is not socially and economically disadvantaged, the recipient shall begin a proceeding as provided in paragraphs (b), (4), (5) and (6) of this paragraph.

(4) The recipient shall notify the challenged party in writing that his or her status as a socially and economically disadvantaged individual has been challenged. The notice shall identify the challenging party and summarize the grounds for the challenge. The notice shall also require the challenged party to provide to the recipient, within a reasonable time, information sufficient to permit the recipient to evaluate his or her status as a socially and economically disadvantaged individual.

(5) The recipient shall evaluate the information available to it and make a proposed determination of the social and economic disadvantage of the challenged party. The recipient shall notify both parties of this proposed determination in writing, setting forth the reasons for its proposal. The recipient shall provide an opportunity to the parties for an informal hearing, at which they can respond to this proposed determination in writing and in person.

(6) Following the informal hearing, the recipient shall make a final determination. The recipient shall inform the parties in writing of the final determination, setting forth the reasons for its decision.

(7) In making the determinations called for in paragraphs (b)(3)(5) and (6) of this paragraph, the recipient shall use the standards set forth in Appendix C of this subpart.

(8) During the pendency of a challenge under this section, the presumption that the challenged party is a socially and economically disadvantaged individual shall remain in effect." 49 CFR 23.69.

(Ordinance No. 83-165, Sec. 9; amended by Ordinance No. 84-181, Sec. 5; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.145 Annual Disadvantaged Business Goals:

(a) The Metro Council shall, by resolution each June, establish annual DBE goals and for locally-funded contracts, separate WBE goals for the ensuing fiscal year. Such annual goals shall be established separately for construction contracts, labor and materials contracts, personal services contracts, procurement contracts, and USDOT assisted contracts regardless of type.

(b) Annual goals will be established taking into consideration the following factors:

(1) projection of the number and types of contracts to be awarded by Metro;

(2) projection of the number, expertise and types of DBEs and WBEs likely to be available to compete for the contracts;

(3) past results of Metro's efforts under the Program;

(4) for USDOT-assisted contract goals, existing goals of other local USDOT recipients and their experience in meeting these goals; and

(5) for locally-funded contract goals, existing goals of other Portland metropolitan area contracting agencies, and their experience in meeting these goals.

(c) Annual goals for USDOT-assisted contracts must be approved by the United States Department of Transportation. 49 CFR §23.45(g)(3).

(d) Metro will publish notice that the USDOT-assisted contract goals are available for inspection when they are submitted to USDOT or other federal agencies. They will be made available for 30 days following publication of notice. Public comment will be accepted for 45 days following publication of the notice.

(e) Metro will publish notice regarding proposed locally-funded contract goals not later than ten (10) days prior to adoption of the goals.

(Ordinance No. 83-165, Sec. 10; amended by Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.150 Contract Goals:

(a) The annual goals established for construction contracts shall apply as individual contract goals for construction contracts over \$50,000.

(b) The Liaison Officer may set a contract goal for any contract other than construction contracts over \$25,000. The setting of such contract goal shall be made in writing prior to the solicitation of bids for such contract. Contract goals for contracts other than construction contracts over \$50,000 shall be set at the discretion of the Liaison Officer and shall not be tied, necessarily, to the annual goal for such contract type.

(c) Even though no DBE/WBE goals are established at the time that bid/proposal documents are drafted, the Liaison Officer may direct the inclusion of a clause in any RFP or bid documents for any contract described in this section which requires that the prime contractor, prior to entering into any subcontracts, make good faith efforts, as that term is defined in Section 2.04.160, to achieve DBE/WBE participation in the same goal amount as the current annual goal for that contract type.

(d) Contract goals may be complied with pursuant to Section 2.04.160 and/or 2.04.175. The extent to which DBE/WBE participation will be counted toward contract goals is governed by the latter section.

(Ordinance No. 83-165, Sec. 11; repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.155 Contract Award Criteria:

(a) To be eligible for award of contracts containing a DBE/WBE goal, prime contractors must either meet or exceed the

specific goal for DBE and WBE participation, or prove that they have made good faith efforts to meet the goal prior to the time bids are opened or proposal are due. Bidders/Proposers are required to utilize the most current list of DBEs and WBEs certified by ODOT until December 31, 1987, and, thereafter, by the Executive Department, in all of the bidders'/proposers' good faith efforts solicitations. The address where certified lists may be obtained shall be included in all applicable bid/proposal documents.

(b) All invitations to bid or request for proposals on contracts for which goals have been established shall require all bidders/proposers to submit with their bids and proposals a statement indicating that they will comply with the contract goal or that they have made good faith efforts as defined in Section 2.04.160 to do so. To document the intent to meet the goals, all bidders and proposers shall complete and endorse a Disadvantaged Business Program Compliance form and include said form with bid or proposal documents. The form shall be provided by Metro with bid/proposal solicitations.

(c) Agreements between a bidder/proposer and a DBE/WBE in which the DBE/WBE promises not to provide subcontracting quotations to other bidders/proposers are prohibited.

(d) Apparent low bidders/proposers shall, by the close of the next working day following bid opening (or proposal submission date when no public opening is had), submit to Metro detailed DBE and WBE Utilization Forms listing names of DBEs and WBEs who will be utilized and the nature and dollar amount of their participation. This form will be binding upon the bidder/proposer. Within five working days of bid opening or proposal submission date, such bidders/proposers shall submit to Metro signed Letters of Agreement between the bidder/proposer and DBE/WBE subcontractors and suppliers to be utilized in performance of the contract. A sample Letter of Agreement will be provided by Metro. The DBE and WBE Utilization Forms shall be provided by Metro with bid/proposal documents.

(e) An apparent low bidder/proposer who states in its bid/proposal that the DBE/WBE goals were not met but that good faith efforts were performed shall submit written evidence of such good faith efforts within two working days of bid opening or proposal submission in accordance with Section 2.04.160. Metro reserves the right determine the sufficiency of such efforts.

(f) Except as provided in paragraph (g) of this section, apparent low bidders or apparent successful proposers who state in their bids/proposals that they will meet the goals or will show good faith efforts to meet the goals, but who fail to comply with paragraph (d) or (e) of this section, shall have their bids or proposals rejected and shall forfeit any required bid security

or bid bond. In that event the next lowest bidder or, for personal services contracts, the firm which scores second highest shall, within two days of notice of such ineligibility of the low bidder, submit evidence of goal compliance or good faith effort as provided above. This process shall be repeated until a bidder or proposer is determined to meet the provisions of this section or until Metro determines that the remaining bids are not acceptable because of amount of bid or otherwise.

(g) The Liaison Officer, at his or her discretion, may waive minor irregularities in a bidder's or proposer's compliance with the requirements of this section provided, however, that the bid or proposal substantially complies with public bidding requirements as required by applicable law.

(Ordinance No. 83-165, Sec. 12; amended by Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.160 Determination of Good Faith Efforts:

(a) Bidders or Proposers on USDOT-assisted contracts to which DBE goals apply must, to be eligible for contract award, comply with the applicable contract goal or show that good faith efforts have been made to comply with the goal. Good faith efforts should include at least the following standards established in the amendment to 49 CFR §23.45(h), Appendix A, dated Monday, April 27, 1981. A showing of good faith efforts must include written evidence of at least the following:

(1) Attendance at any presolicitation or prebid meetings that were scheduled by Metro to inform disadvantaged and women business enterprises of contracting and subcontracting or material supply opportunities available on the project;

(2) Advertisement in trade association, general circulation, minority and trade-oriented, women-focus publications, if any and through a minority-owned newspaper or minority-owned trade publication concerning the sub-contracting or material supply opportunities at least 10 days before bids or proposals are due.

(3) Written notification to a reasonable number but no less than five (5) DBE firms that their interest in the contract is solicited. Such efforts should include the segmenting of work to be subcontracted to the extent consistent with the size and capability of DBE firms in order to provide reasonable subcontracting opportunities. Each bidder should send solicitation letters inviting

quotes or proposals from DBE firms, segmenting portions of the work and specifically describing, as accurately as possible, the portions of the work for which quotes or proposals are solicited from DBE firms and encouraging inquiries for further details. Letters that are general and do not describe specifically the portions of work for which quotes or proposals are desired are discouraged, as such letters generally do not bring responses. It is expected that such letters will be sent in a timely manner so as to allow DBE sufficient opportunity to develop quotes or proposals for the work described.

(4) Evidence of follow-up to initial solicitations of interest, including the following:

(A) the names, addresses, telephone numbers of all DBE contacted;

(B) a description of the information provided to DBE firms regarding the plans and specifications for portions of the work to be performed; and

(C) a statement of the reasons for non-utilization of DBE firms, if needed to meet the goal.

(5) Negotiation in good faith with DBE firms. The bidder shall not, without justifiable reason, reject as unsatisfactory bids prepared by any DBE firms;

(6) Where applicable, the bidder must provide advice and assistance to interested DBE firms in obtaining bonding, lines of credit or insurance required by Metro or the bidder;

(7) Overall, the bidder's efforts to obtain DBE participation must be reasonably expected to produce a level of participation sufficient to meet Metro's goals; and

(8) The bidder must use the services of minority community organizations, minority contractor groups, local, state and federal minority business assistance offices and other organizations identified by the Executive Department's Advocate for Minority and Women Business that provide assistance in the recruitment and placement of DBEs and WBEs.

(b) Bidders or proposers on locally-funded contracts to which DBE/WBE goals apply shall achieve the applicable contract goal or demonstrate that they have made good faith efforts to achieve the goals. Good faith efforts shall include written documentation of at least the following actions by bidders:

(1) Attendance at any presolicitation or prebid meetings that were scheduled by Metro to inform DBEs and WBEs of contracting and subcontracting or material supply opportunities available on the project;

Documentation required: Signature of representative of bidder or proposer on prebid meeting attendance sheet.

(2) Identifying and selecting specific economically feasible units of the project to be performed by DBEs or WBEs to increase the likelihood of participation by such enterprises;

Minimum documentation required: At least the documentation required under subsection (4) below.

(3) Advertising in, at a minimum, a newspaper of general circulation, and trade association, minority and trade oriented, women-focused publications, if any, concerning the subcontracting or material supply opportunities on the project at least ten (10) days before bids or proposals are due;

Documentation required: copies of ads published.

(4) Providing written notice soliciting sub-bids/proposals to not less than five (5) DBEs or WBEs for each subcontracting or material supply work item selected pursuant to (2) above not less than ten (10) days before bids/proposals are due.

If there are less than five certified DBEs/WBEs listed for that work or supply specialty then the solicitation must be mailed to at least the number of DBEs/WBEs listed for that specialty. The solicitation shall include a description of the work for which subcontract bids/proposals are requested and complete information on bid/proposal deadlines along with details regarding where project specifications may be reviewed.

Documentation required: Copies of all solicitation letters sent to DBE/WBE along with a written statement from the bidder/proposer that all the

letters were sent by regular or certified mail not less than 10 days before bids/proposals were due.

(5) Making, not later than five days before bids/proposals are due, follow-up phone calls to all DBEs/WBEs who have not responded to the solicitation letters to determine if they would be submitting bids and/or to encourage them to do so.

Minimum documentation required: Log showing a) dates and times of follow-up calls along with names of individuals contacted and individuals placing the calls; and b) results attained from each DBE/WBE to whom a solicitation letter was sent (e.g., bid submitted, declined, no response). In instances where DBE/WBE bids were rejected, the dollar amount of the bid rejected from the DBE/WBE must be indicated along with the reason for rejection and the dollar amount of the bid which was accepted for that subcontract or material supply item.

(6) Using the services of minority community organizations, minority contractor groups, local, state and federal minority business assistance offices and other organizations identified by the Executive Department's Advocate for Minority and Women Business that provide assistance in the recruitment and placement of DBEs and WBEs; where applicable, advising and assisting DBEs and WBEs in obtaining lines of credit or insurance required by Metro or the bidder/proposer; and, otherwise, making efforts to encourage participation by DBEs and WBEs which could reasonably be expected to produce a level of participation sufficient to meet the goals.

Minimum documentation required: Letter from bidder/proposer indicating all special efforts made to facilitate attainment of contract goals, the dates such actions were taken and results realized.

(7) Notwithstanding any other provision of this section, bidders and proposers on locally-funded contracts to which DBE/WBE goals apply need not accept the bid of a DBE or WBE on any particular subcontract or material supply item if the bidder/proposer demonstrates that none of the DBEs or WBEs submitting bids were the lowest responsible, responsive and qualified bidders/proposers on that particular subcontract item and that the subcontract item was awarded to the lowest responsible, responsive bidder/proposer.

Metro reserves the right to require additional written documentation of good faith efforts and bidders and proposers shall comply with all such requirements by Metro. It shall be a rebuttable presumption that a bidder or proposer has made a good faith effort to comply with the contract goals if the bidder has performed and submits written documentation of all of the above actions. It shall be a rebuttable presumption that the bidder has not made a good faith effort if the bidder has not performed or has not submitted documentation of all of the above actions.

(Ordinance No. 83-165, Sec. 13; amended by Ordinance No. 84-181, Sec. 6 and Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.165 Replacement of DBE or WBE Subcontractors: Prime contractors shall not replace a DBE/WBE subcontractor with another subcontractor, either before contract award or during contract performance, without prior Metro approval. Prime contractors who replace a DBE or WBE subcontractor shall replace such DBE/WBE subcontractor with another certified DBE/WBE subcontractor or make good faith efforts as described in the preceding section to do so.

(Ordinance No. 83-165, Sec. 14; amended by Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.170 Records and Reports:

(a) Metro shall develop and maintain a recordkeeping system to identify and assess DBE and WBE contract awards, prime contractors' progress in achieving goals and affirmative action efforts. Specifically, the following records will be maintained:

- (1) Awards to DBEs and WBEs by number, percentage and dollar amount.
- (2) A description of the types of contracts awarded.
- (3) The extent to which goals were exceeded or not met and reasons therefor.

(b) All DBE and WBE records will be separately maintained. Required DBE and WBE information will be provided to federal agencies and administrators on request.

(c) The Liaison Officer shall prepare reports, at least semiannually, on DBE and WBE participation to include the following:

- (1) the number of contracts awarded;
- (2) categories of contracts awarded;
- (3) dollar value of contracts awarded;
- (4) percentage of the dollar value of all contracts awarded to DBE/WBE firms in the reporting period; and
- (5) the extent to which goals have been met or exceeded.

(Ordinance No. 83-165, Sec. 15; amended by Ordinance No. 84-181, Sec. 7, and Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

2.04.175 Counting Disadvantaged Business Participation Toward Meeting Goals:

(a) DBE/WBE participation shall be counted toward meeting the goals on each contract as follows:

(1) Subject to the limitations indicated in paragraphs (2) through (8) below, the total dollar value of a prime contract or subcontract to be performed by DBEs or WBEs is counted toward the applicable goal for contract award purposes as well as annual goal compliance purposes.

(2) The total dollar value of a contract to a disadvantaged business owned and controlled by both disadvantaged males and non-disadvantaged females is counted toward the goals for disadvantaged businesses and women, respectively, in proportion to the percentage of ownership and control of each group in the business.

The total dollar value of a contract with a disadvantaged business owned and controlled by disadvantaged women is counted toward either the disadvantaged business goal or the goal for women, but not to both. Metro shall choose the goal to which the contract value is applied.

(3) Metro shall count toward its goals a portion of the total dollar value of a contract with an eligible joint venture equal to the percentage of

the ownership and control of the disadvantaged or female business partner in the joint venture.

(4) Metro shall count toward its goals only expenditures to DBEs and WBEs that perform a commercially useful function in the work of a contract. A DBE or WBE is considered to perform a commercially useful function when it is responsible for execution of a distinct element of the work of a contract and carrying out its responsibilities by actually performing, managing and supervising the work involved. To determine whether a DBE or WBE is performing a commercially useful function, Metro shall evaluate the amount of work subcontracted, industry practices and other relevant factors.

(5) Consistent with normal industry practices, a DBE or WBE may enter into subcontracts. If a DBE or WBE contractor subcontracts a significantly greater portion of the work of the contract than would be expected on the basis of normal industry practices, the DBE or WBE shall be presumed not to be performing a commercially useful function. The DBE or WBE may present evidence to Metro to rebut this presumption. Metro's decision on the rebuttal of this presumption is subject to review by USDOT for USDOT-assisted contracts.

(6) A DBE or WBE which provides both labor and materials may count toward its disadvantaged business goals expenditures for materials and supplies obtained from other than DBE or WBE suppliers and manufacturers, provided that the DBE or WBE contractor assumes the actual and contractual responsibility for the provision of the materials and supplies.

(7) Metro shall count its entire expenditure to a DBE or WBE manufacturer (i.e., a supplier that produces goods from raw materials or substantially alters them before resale).

(8) Metro shall count against the goals 60 percent of its expenditures to DBE or WBE suppliers that are not manufacturers, provided that the DBE or WBE supplier performs a commercially useful function in the supply process.

(9) When USDOT funds are passed-through by Metro to other agencies, any contracts made with those funds and any DBE participation in those contracts shall only be counted toward Metro's goals. Likewise, any

USDOT funds passed-through to Metro from other agencies and then used for contracting shall count only toward that agency's goals. Project managers responsible for administration of pass-through agreements shall include the following language in those agreements:

(a) Policy. It is the policy of the Department of Transportation that minority business enterprises as defined in 49 CFR Part 23 shall have the maximum opportunity to participate in the performance of contracts financed in whole or in part with federal funds under this agreement. Consequently, the MBE requirements of 49 CFR Part 23 apply to this agreement.

(b) MBE Obligation. The recipient or its contractor agrees to ensure that minority business enterprises as defined in 49 CFR Part 23 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with federal funds provided under this agreement. In this regard, all recipients or contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 23 to ensure that minority business enterprises have the maximum opportunity to compete for and perform contracts. Recipients and their contractors shall not discriminate on the basis of race, color, national origin or sex in the award and performance of USDOT-assisted contracts."

(b). DBE or WBE participation shall be counted toward meeting annual goals as follows:

(1) Except as otherwise provided below, the total dollar value of any contract which is to be performed by a DBE or WBE is counted toward meeting annual goals.

(2) The provisions of paragraphs (a)(2) through (a)(8) of this section, pertaining to contract goals, shall apply equally to annual goals.

(Ordinance No. 83-165, Sec. 16; amended by Ordinance No. 84-181, Sec. 8; and Ordinance No. 86-197, Sec. 1; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1; and Ordinance No. 88-252, Sec. 1)

2.04.180 Compliance and Enforcement:

(a) Metro shall reserve the right, at all times during the period of any contract, to monitor compliance with the terms of this chapter and the contract and with any representation made by a contractor prior to contract award pertaining to DBE and WBE participation in the contract.

(b) The Liaison Officer may require, at any stage of contract completion, documented proof from the contractor of actual DBE and WBE participation.

(Ordinance No. 83-165, Sec. 17; all previous Ordinances repealed by Ordinance No. 87-216, Sec. 1; amended by Ordinance No. 87-231, Sec. 1)

APPENDIX I

OREGON LAWS 1991, CHAPTER 385, SECTION 61

velopment, revision, amendment and implementation of local solid waste reduction, reusing, recycling and solid waste management programs that comply with the opportunity to recycle established in ORS 459.165. The department shall give special emphasis to assisting rural and remote counties.

NOTE: Sections 53 to 58 were deleted by amendment. Subsequent sections were not renumbered.

SECTION 59. ORS 279.731 is amended to read:

279.731. As used in ORS 279.731 to 279.739, unless the context otherwise requires:

(1) "Post-consumer waste" means a finished material which would normally be disposed of as solid waste, having completed its life cycle as a consumer item. "Post-consumer waste" does not include manufacturing waste.

(2) "Public agency" means a county, city, special district or other public or municipal corporation, and any instrumentality thereof.

(3) "Recycled material" means any material that would otherwise be a useless, unwanted or discarded material except for the fact that the material still has useful physical or chemical properties after serving a specific purpose and can, therefore, be reused or recycled.

[(2)] (4) "Recycled paper" means a paper product with not less than:

(a) Fifty percent of its total weight consisting of secondary waste materials; or

(b) Twenty-five percent of its total weight consisting of post-consumer waste.

(5) "Recycled product" means all materials, goods and supplies, not less than 50 percent of the total weight of which consists of secondary and post-consumer waste with not less than 10 percent of its total weight consisting of post-consumer waste. "Recycled product" also includes any product that could have been disposed of as solid waste, having completed its life cycle as a consumer item, but otherwise is refurbished for reuse without substantial alteration of the product's form.

[(3)] (6) "Secondary waste materials" means fragments of products or finished products of a manufacturing process which has converted a virgin resource into a commodity of real economic value, and includes post-consumer waste, but does not include excess virgin resources of the manufacturing process. For paper, "secondary waste materials" does not include fibrous waste generated during the manufacturing process such as fibers recovered from waste water or trimmings of paper machine rolls, mill broke, wood slabs, chips, sawdust or other wood residue from a manufacturing process.

[(4)] (7) "State agency" includes the Legislative Assembly, the courts and their officers and committees and the constitutional state officers.

SECTION 60. ORS 279.733 is amended to read:

279.733. (1) All state agencies purchasing supplies, materials, equipment or personal services shall:

[(1)] (a) Review their procurement specifications currently utilized in order to eliminate, wherever economically feasible, discrimination against the procurement of recovered resources or recycled materials.

[(2)] (b) Provide incentives, wherever economically feasible, in all procurement specifications issued by them for the maximum possible use of recovered resources and recycled materials.

[(3)] (c) Develop purchasing practices which, to the maximum extent economically feasible, assure purchase of materials which are recycled or which may be recycled or reused when discarded.

[(4)] (d) Establish management practices which minimize the volume of solid waste generated by [them by] reusing paper, envelopes, containers and all types of packaging and by limiting the amount of materials consumed and discarded.

[(5)] (e) Use and require persons with whom they contract to use, in the performance of the contract work, to the maximum extent economically feasible, recycled paper.

(2) Any invitation to bid or request for proposal under ORS chapter 279 shall include the following language: "Vendors shall use recyclable products to the maximum extent economically feasible in the performance of the contract work set forth in this document."

SECTION 61. ORS 279.739 is amended to read:

279.739. (1) Notwithstanding provisions of law requiring a state agency or a public agency to enter into contracts with the lowest responsible bidder and subject to subsection (2) of this section, any state agency or public agency charged with the purchase of materials and supplies for any public use [may, in its discretion,] shall give preference to the purchase of materials and supplies manufactured from recycled materials.

(2) A state agency or public agency [may] shall give preference to materials and supplies manufactured from recycled materials [only] if:

[(a) The bids of the persons or manufacturing concerns supplying the recycled materials, or the prices quoted by them, do not exceed by more than five percent the lowest bid or prices quoted by persons and manufacturing concerns offering nonrecycled materials; and]

[(b) The public agency finds that the public good will be served thereby.]

(a) The recycled product is available;

(b) The recycled product meets applicable standards;

(c) The recycled product can be substituted for a comparable nonrecycled product; and

(d) Recycled product costs do not exceed the costs of nonrecycled products by more than five percent.

[(3) As used in this section:]

[(a) "Public agency" means a county, city, special district, or other public and municipal corporations, and any instrumentality thereof.]

[(b) "Recycled material" means any material that would otherwise be a useless, unwanted or discarded material except for the fact that the material still has useful physical or chemical properties after serving a specific purpose and can, therefore, be reused or recycled.]

(3) At its discretion, a state or public agency may give preference to the purchase of materials and supplies manufactured from recycled materials, even if the cost differential exceeds the five percent preference set forth in subsection (2) of this section.

(4) State agencies, unless otherwise specified in ORS 279.731 to 279.739, and public agencies may give preference to the suppliers of recycled products and recycled paper or to products that reduce the amount of waste generated. State agencies, unless otherwise specified in ORS 279.731 to 279.739, and public agencies may determine the amount of this preference.

(5) In any bid in which the state has reserved the right to make multiple awards, the recycled product or recycled paper preference shall be applied to the extent possible to maximize the dollar participation of firms offering recycled products or recycled paper in the contract award.

(6) A state or public agency shall require the bidder to specify the minimum, if not exact, percentage of recycled paper in paper products or recycled product in products offered, and both the post-consumer and secondary waste content regardless of whether the product meets the percentage of recycled material specified for recycled paper or recycled products in ORS 279.731. For paper products, a state agency or public agency also shall require that the bidder specify the fiber type. The contractor may certify a zero percent recycled paper or product. All contract provisions impeding the consideration of products with recycled paper or recycled products shall be deleted in favor of performance standards.

(7) The department shall review and work with state agencies to develop procurement specifications that encourage the use of recycled products whenever quality of a recycled product is functionally equal to the same product manufactured with virgin resources. Except for specifications that have been established to preserve the public health and safety, all procurement and purchasing specifications shall be established in a manner that encourages procurement and purchase of recycled products.

(8) All public and state agencies shall establish purchasing practices that assure, to the maximum extent economically feasible, purchase of materials, goods and supplies that may be recycled or reused when discarded.

SECTION 62. Sections 63 to 81 of this Act are added to and made a part of ORS 279.731 to 279.739.

SECTION 63. (1) The Legislative Assembly finds that:

(a) It is the policy of the state to conserve and protect its resources. The maintenance of a quality environment for the people of this state now and in the future is a matter of statewide concern.

(b) The volume of solid waste generated within the state, an increased rate in the consumption of products and materials, including paper products, and the absence of adequate programs and procedures for the reuse and recycling of these products and materials threaten the quality of the environment and well-being of the people of Oregon.

(2) Therefore, the Legislative Assembly declares that the policy and intent of ORS 279.731 to 279.739 is to improve environmental quality by providing for:

(a) The procurement of products made from recycled materials; and

(b) The recycling of waste materials.

SECTION 64. As used in sections 64 to 67 of this 1991 Act:

(1) "Industrial oil" means any compressor, turbine or bearing oil, hydraulic oil, metal-working oil or refrigeration oil.

(2) "Lubricating oil" means any oil intended for use in an internal combustion crankcase, transmission, gearbox or differential or an automobile, bus, truck, vessel, plane, train, heavy equipment or machinery powered by an internal combustion engine.

(3) "Recycled oil" means used oil that has been prepared for reuse as a petroleum product by refining, rerefining, reclaiming, reprocessing or other means provided that the preparation or use is operationally safe, environmentally sound and complies with all laws and regulations.

(4) "Used oil" has the meaning given that term in ORS 468.850.

(5) "Virgin oil" means oil that has been refined from crude oil and that has not been used or contaminated with impurities.

SECTION 65. Every state agency or public agency shall revise its procedures and specifications for the purchase of lubricating oil and industrial oil to eliminate any exclusion of recycled oils and any requirement that oils be manufactured from virgin materials.

SECTION 66. Every state agency and public agency shall require that purchases of lubricating oil and industrial oil be made from the seller whose oil product contains the greater percentage of recycled oil, unless a specific oil product containing recycled oil is:

(1) Not available within a reasonable period of time or in quantities necessary to meet an agency's needs;

APPENDIX J

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN

CONSTRUCTION QUALITY ASSURANCE (CQA) PLAN FOR THE ST. JOHNS LANDFILL CLOSURE OF SUBAREA 1

1. INTRODUCTION

1.1 Purpose

The final cover system and gas and condensate collection system function together to provide adequate control of gas and leachate at the St. Johns Landfill. The CQA Plan governs the actions that the Engineer and Owner will undertake to ensure that the landfill closure will be in accordance with the Contract Drawings and Specifications and existing regulatory requirements. The Engineer in cooperation with the Owner will be responsible for quality assurance and will conduct inspection, testing, observation and documentation as described herein to ensure that the Contractor is properly controlling the quality of his work and producing an acceptable product. The Owners CQA Plan is included as an appendix to these specifications for the Contractors information and reference.

1.2 Scope

The CQA plan does not establish construction requirements. Construction requirements are established by the contract Drawings and Specifications and therefore are not restated here. The actual testing methods used and the criteria for passage will be as defined in the contract Drawings and Specifications.

The CQA plan provides a course of proceedings for inspections, observations, testing, and documentation of the observed quality of materials and work during construction of the final cover system and gas and condensate collection system at the St. Johns Landfill.

1.3 Limitations

The CQA Plan provides a means to observe and document the quality of the construction work by the Contractor. It does not establish procedures to control and/or guide the operations of the manufacturer of materials or the Contractor or relieve them of their contractual responsibility to set up the necessary procedures and controls within their organizations to produce the quality of work called for in the Drawings and Specifications. The CQA plan is not intended to function as or replace the Contractor's quality control program. It is the Owners Quality Assurance Plan.

2. CQA PLAN ELEMENTS

2.1 Responsibility and Authority

2.1.1 Regulatory Agencies

The Oregon State Department of Environmental Quality (DEQ) has the responsibility and authority to review and approve the CQA Plan prior to construction, and to review all CQA documentation during and following construction as necessary to confirm that the construction meets the requirements of the Drawings and Specifications. CQA documentation may be reviewed at the Engineer's office on-site during construction.

2.1.2 Facility Owner/Operator

The Solid Waste Management Division of the Metropolitan Service District is the Owner/Operator (Owner) of the facility.

2.1.3 Engineer

Parametrix, Inc. has the responsibility for the design of the facility such that the design meets the operational and performance requirements of the Owner and the regulatory agencies. Construction observation and quality control testing observation will be carried out by the CQA personnel, in conformance with this Plan, under the supervision of the CQA officer.

2.1.4 CQA Personnel

2.1.4.1 CQA Officer

The CQA Officer is a representative of the Engineer and has the responsibility to administer the CQA Plan. Duties of the CQA officer include:

- Schedule and coordinate CQA meetings, inspections and testing.
- Compile all CQA documents and check for accuracy and completeness.
- Review all CQA inspection and test results to verify compliance with project requirements.
- Provide CQA reports to the Owner and regulatory agencies.

- Liaison with the Owner's construction coordinator.
- Direct the activities of the CQA inspectors.

The CQA officer may (or may not) also be the Resident Field Engineer

2.1.4.2 CQA Inspector(s)

CQA inspector(s) will be the on-site representative(s) of the CQA Officer and will have the responsibility to carry out the various aspects of the CQA plan. Duties of the CQA inspectors include:

- Check construction materials upon arrival to the site and observe general conformance to the Drawings and Specifications.
- Perform inspections and observe work in progress to determine if work complies with contract requirements.
- Report to the CQA officer all areas of work found to be deficient in quality as soon as they become known.
- Perform inspections of completed areas of work prior to covering to determine that the area meets the requirements of the contract documents, by observation, testing, or other specified methods.
- Record on a daily basis, all CQA observations, inspections and test results and submit records to CQA officer.

CQA manpower requirements will be determined prior to each construction season and will depend on the amount and type of work scheduled.

2.1.4.3 Resident Field Engineer

The Resident Field Engineer is the on-site representative of the Engineer whose role is to monitor the construction activities of the Contractor and interpret and clarify the Drawings and Specifications.

2.1.4.4 Resident Geotechnical Engineer

The Resident Geotechnical Engineer is an on-site representative of the Engineer. The Resident Geotechnical Engineer will be responsible for inspection of all on-site earthworks.

2.1.5 Construction Contractor

The construction Contractor has the responsibility to provide his own internal quality control procedures so as to produce the work in accordance with the Drawings and Specifications. He will be expected to cooperate with the Engineer, owner, and CQA personnel.

2.2 Documentation

Documentation of all CQA Plan elements will have a consistent format throughout the project for each of the following:

- Daily Report
- CQA Observations and Testing Data Sheets
- Problem Reporting / Corrective Action Sheets

2.2.1 Daily Report

An overall project daily report will be prepared by the resident field engineer or his representative for each day that the Contractor is working. This report will summarize the Contractor's activities for that day and include the following:

- Project name.
- Owner.
- Parametrix job number.
- Date.
- General weather information: sky condition, temperature range, wind velocity and direction, precipitation.
- Construction Contractor and Contractor's representative.
- Observed items of work performed by the Contractor.
- Specific location of work performed by the Contractor.
- Time period of observed work performed by the Contractor.
- Equipment, including model numbers, used to perform the work.
- Description of work as observed.
- Number and classifications of workers on site.
- Problems encountered during construction; if none, so state.

2.2.2 CQA Observation and Testing Data (CQA) Reports

CQA reports will be filled out daily by the CQA inspector whenever CQA observations or testing is done. Reports will include:

- Project name
- Parametrix job number.
- Date
- Description of observation or test procedure.
- Location of observation or test.
- Time of observation or test.
- Results of observation or test.
- Reference to all Problem Reporting/Corrective Action sheets submitted as a result of CQA observations or testing.
- Clarifying remarks.
- Signature of CQA inspector.
- Forms shall be attached to the report as appropriate.

2.2.3 Problem Reporting and Corrective Action (PR/CA) Sheets

Problems observed by the CQA inspector, or reported by the Contractor, relating to the quality of the materials or construction, will be documented on a PR/CA sheet and submitted to the CQA officer. The sheet will include a complete description of the problem explaining the nature, extent, probable cause, when the problem was first noted, and required corrective measures. The problem will be brought to the Contractors attention, where appropriate. The Contractors corrective action proposal will be reviewed for adequacy by the CQA officer. When corrective actions have been taken to remedy the problem, it will be noted on the PR/CA sheet, along with the date and initials of the CQA inspector who observed the remedial work.

2.3 CQA Meetings

2.3.1 Preconstruction CQA Meeting

A preconstruction CQA meeting will be held to resolve any uncertainties in the content or execution of the CQA plan prior to construction of the facility. The CQA officer, CQA inspectors, Resident Geotechnical Engineer, construction contractor, and representatives from final cover and gas system installation subcontractors shall attend this meeting.

2.3.2 Weekly CQA Meetings

CQA meetings will be held at approximately weekly intervals, or as necessary, to ensure that the CQA documentation is complete, up-to-date, and accurate, and that completed work meets the requirements of the Drawings and Specifications. Generally, CQA personnel and the Contractor's quality control personnel will attend these meetings.

2.3.3 Special CQA Meetings

Special CQA meetings will be held whenever a problem or deficiency arises that is not resolved in the normal course of action.

2.4 CQA Procedures - General

2.4.1 Preconstruction

The Engineer will review submittals to ensure that the construction materials meet the performance requirements of the project, including preconstruction testing and manufacturer's, fabricator's, and installer's qualifications statements.

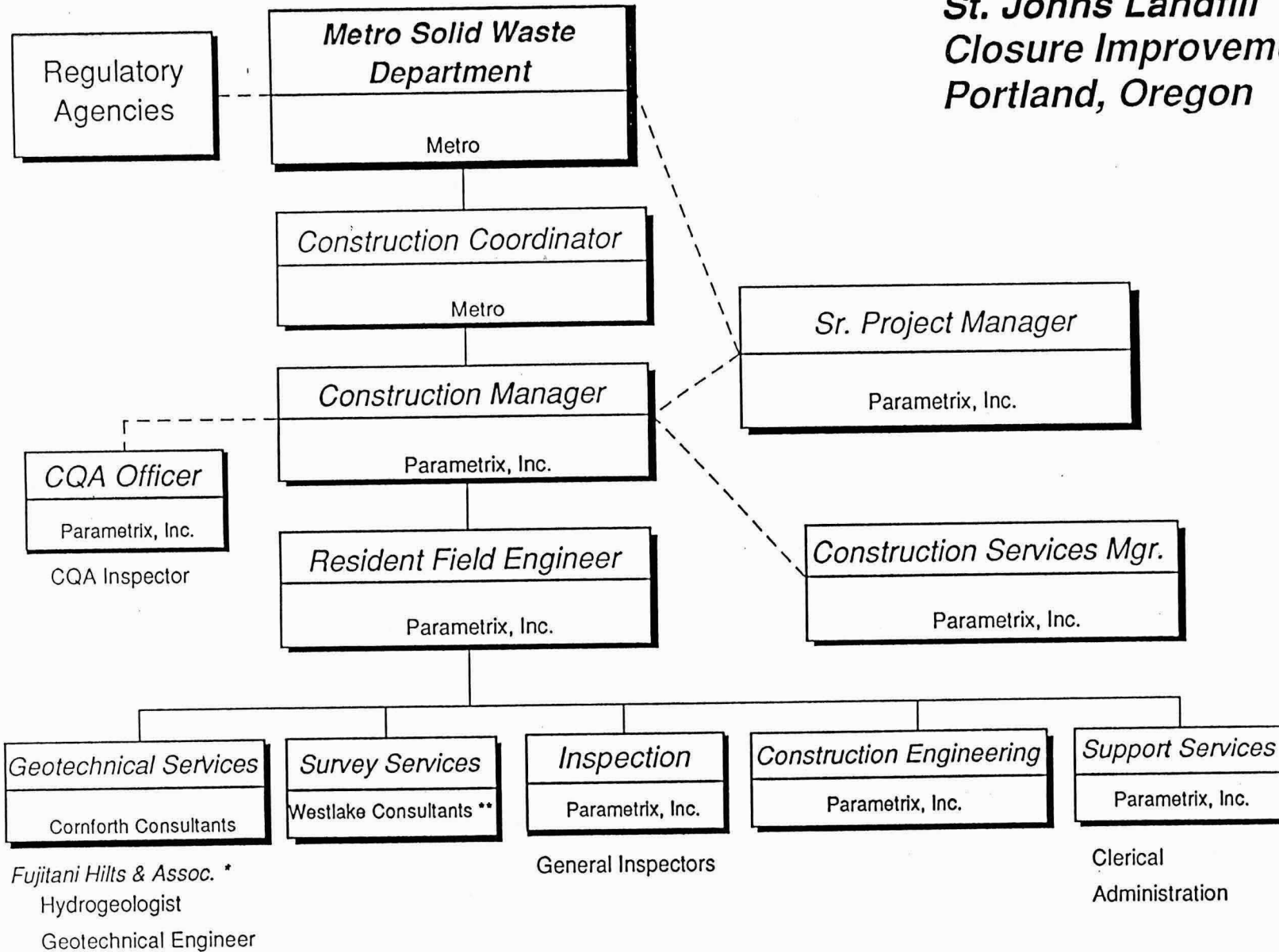
2.4.2 Construction

During construction, the CQA personnel will perform inspections of materials received, carry out the schedule of in-situ testing and observations, monitor the sampling of materials for destructive and non-destructive testing, prepare daily reports and other CQA documentation, and attend CQA meetings.

2.4.3 Post Construction

Construction certification reports will be submitted to the Owner at the end of each construction season, by the CQA Officer, and shall document and certify that construction met approved performance and design specifications. Each certification report should include summaries of all construction activities, field reports, observations, test data sheets, problem reporting and corrective measures data sheets, deviations from design and material specifications, and record drawings and photographs.

St. Johns Landfill Closure Improvements Portland, Oregon



* DBE

** WBE

3. CQA FOR THE FINAL GRADING

All observations, testing, problems, corrective actions, and rejection of materials will be documented as outlined in Sections 2.2.2 and 2.2.3.

CQA for final grading includes the following elements of construction:

- Subgrade Embankment
- Low Permeable Soil

3.1 Subgrade Embankment

Each proposed borrow source of Subgrade Embankment will be visually inspected by the Resident Geotechnical Engineer. Two to eight representative soil samples will be obtained by the Resident Geotechnical Engineer from each borrow site. Each sample will be tested for moisture content (ASTM D 2216) and grain size distribution (ASTM D422, not including hydrometer).

Materials from borrow sources which do not meet the Specifications, as determined by the Resident Geotechnical Engineer based on visual inspection and test results, shall not be suitable for use as Subgrade Embankment. Compaction curves per ASTM D698 shall be developed for each suitable borrow material.

Subgrade Embankment material delivered to the site during construction shall be visually inspected by the Resident Geotechnical Engineer. Material which is outside the Specifications shall be rejected based on the visual inspection.

The Resident Geotechnical Engineer shall monitor wet weather conditions during placement of the Subgrade Embankment. If the soils are susceptible to degradation during the wet weather, the Resident Geotechnical Engineer shall recommend that the work be stopped.

Placement and compaction shall be observed by the Resident Geotechnical Engineer. The compacted soil shall be tested a minimum of one test per acre per lift, or as required by the Resident Geotechnical Engineer. The Contractor shall excavate and replace any deficient areas in accordance with project Specifications.

The tests shall be by nuclear methods (ASTM D2922) or the Sand-Cone method (ASTM D1556). The results from the nuclear test method shall be periodically calibrated using a sand cone test run adjacent to the nuclear test. The number of sand cone calibration tests shall be as determined by the Resident Geotechnical Engineer.

3.2 Subgrade Preparation for Geosynthetics

The Resident Geotechnical Engineer shall monitor wet weather conditions during subgrade preparation. If the prepared surface or soils are susceptible to degradation during the wet weather, the Resident Geotechnical Engineer shall recommend that the work be stopped.

3.2.1 Low Permeable Soil for Type "A" Cover

The Type A cover shall be constructed by compacting the in-place Existing Low-Permeable Soil after the Topsoil has been removed. Prior to compaction, foreign materials and protrusions shall be removed and the surface made uniformly sloping as indicated on the Drawings. The surface shall be free from angular rocks, roots, grass and vegetation. Cavities, excavations, and zones containing less than 6-inches of in-place Low-Permeable Soil shall be backfilled with material meeting the specification for Low-Permeable Soil.

Compaction shall be accomplished using a multi-tired pneumatic or heavy pneumatic rubber tire roller greater than 40,000 pounds. A minimum of four passes of the roller encompassing the area of Type 'A' cover construction shall be required.

The roller shall provide uniform compaction, work well on a slope, and leave a relatively smooth surface. Vibratory action shall not be used. The specific roller used for compacting the Type 'A' cover shall be approved by the Geotechnical Engineer in advance of the work. Substitutes for rubber tire rollers will not be accepted.

General construction traffic shall not be allowed on the compacted Low-Permeable Surface except for grading equipment needed to finish the surface prior to placing the Geosynthetic.

The finished surface shall be inspected by the Resident Geotechnical Engineer and geosynthetic installer's representative before installation of the geosynthetic.

3.2.2 Low Permeable Soil for Type "B" Cover

The Type B cover shall be constructed by placing and compacting twelve inches of low-permeable soil after the final grades on the top surface of Subarea 1 and the PLC have been prepared. Prior to placement, foreign materials and protrusions shall be removed and the surface made uniformly sloping and indicated on the Drawings.

Low-Permeable Soil delivered to Subarea 1, or the PLC, will be visually inspected by the Geotechnical Engineer. Material which is outside the specifications, as determined by the Geotechnical Engineer, will be rejected based on the visual inspection. This will be implemented for on-site stockpile material from Subarea 1, or Low-Permeable Soil imported onto the site. Rejected materials shall be disposed of in Subarea 4 by the Contractor at the

Contractor's Expense. The Geotechnical Engineer may also reject materials that contain excessive free water.

Contractor must utilize all stockpiled Low-Permeable Soil from Subarea 1, as directed by the Geotechnical Engineer, prior to importing Low-Permeability Soil from off-site or from a stockpile on-site containing low permeable soil.

The Low-Permeability Soil shall be placed and compacted using the following procedure:

1. The Low-Permeability Soil shall consist of clods no greater than 1.5-inches in the largest dimension. If larger clods are present, the Soil shall be repeatedly pulverized using a farm type disc, rototiller, or other appropriate means to meet the size requirement.
2. The moisture content of the soil shall be adjusted to be within a range of 2 percent below optimum to 3 percent above optimum based on ASTM D698 (standard Proctor).
3. Compaction shall be accomplished using a medium weight roller greater than 30,000 pounds with penetrating feet greater than 6-inches long. The roller shall provide uniform compaction. Vibratory action shall not be used. The specific roller used for compacting the Type 'B' cover shall be approved by the Geotechnical Engineer in advance of the work.
4. The Type B cover shall be constructed in two 6-inch finish thickness lifts. The material shall be placed in successive horizontal layers and compacted to the 6-inch thickness as required. Each layer shall be compacted to the specified requirement before the overlying lift is placed.
5. Each layer shall be compacted to not less than 95 percent of the standard Proctor maximum dry density. Placement and compaction shall be observed by the Geotechnical Engineer. The compacted soil shall be tested as required by the Geotechnical Engineer.

General construction traffic shall not be allowed on the compacted Low-Permeable Surface except for grading equipment needed to finish the surface prior to placing the Geosynthetic.

The finished surface shall be inspected by the Resident Geotechnical Engineer and geosynthetic installer's representative before installation of the geosynthetic.

3.2.3 Subgrade for Bentonite Mat

The finished Subgrade Embankment surface shall be inspected for conformance with the Drawings and Specifications by the Resident Geotechnical Engineer and bentonite mat installer's representative before installation of the bentonite mat.

4. CQA FOR THE FINAL COVER

All observations, testing, problems, corrective actions, and rejection of materials shall be documented as outlined in Sections 2.2.2 and 2.2.3.

4.1 Subgrade Preparation

CQA for the Subgrade shall be carried out in accordance with Section 3.2.

4.2 Installation Procedures for Synthetic Components

Construction of the synthetic components making up the final cover system shall proceed in such a way that each layer is observed, tested, and approved by CQA personnel prior to covering by each subsequent layer. If requested, the DEQ and Owner shall be notified prior to beginning work on placement of synthetic components.

4.2.1 Bentonite Mat

The following tests and inspections are to be performed by the CQA inspectors for the bentonite mat:

- Review all required submittals.
- Visual inspection of material after receipt on-site, in accordance with Receiving Inspection Form R-1.
- Visual inspection of installation in accordance with Construction Inspection Form C-3.

4.2.2 Geomembrane Cover (GC)

The tests and inspections to be performed by the CQA inspectors for the geomembrane cover are as follows:

- Review all required submittals.
- Visual inspection of material after receipt on-site, in accordance with Receiving Inspection Form R-1.
- Visual inspection of installation in accordance with Construction Inspection Forms C-1 and C-2.

- Identify locations for and observe all destructive field testing of seam samples taken from installed sections of GC. Review daily reports of all Contractors field and laboratory testing. Arrange for one independent test of destructive test samples, including material thickness, for every ten destructive tests performed by the Contractor. Results of independent tests shall be delivered to the Contractor within two working days after the test patch was cut from the installed geomembrane.

4.2.3 Geonet Composite

The following tests and observations shall be performed by the CQA Inspectors for Geonet Composite:

- Review all required submittals
- Visual inspection of the Geonet Composite materials after receipt on-site, in accordance with Receiving Inspection Form R-1.
- Visual inspection of installation in accordance with Construction Inspection Form C-4.

4.2.4 Liner System Penetrations

Work associated with pipe and other penetrations of the cover system (GC, Bentonite Mat and Geonet Composite) shall be observed to assure that the proper materials are used and all construction requirements are met.

4.3 Type 1 Sand

4.3.1 Placement and Compaction

Each proposed borrow source of Type 1 Sand shall be visually inspected by the Resident Geotechnical Engineer. Two to eight representative soil samples shall be obtained by the Resident Geotechnical Engineer from each borrow site. Each sample shall be tested for moisture content (ASTM D2216) and grain size distribution (ASTM D422, not including hydrometer).

Materials from borrow sources which are outside the Specifications, as determined by the Resident Geotechnical Engineer based on the visual inspection and test results, shall not be suitable for use as Type 1 Sand. Compaction curves per ASTM D698 shall be developed for each suitable borrow material.

Type 1 Sand delivered to the site during construction shall be visually inspected for debris, contaminants, and organic matter by the Resident Geotechnical Engineer. Based on the visual observation, materials outside the specification shall be rejected.

Proposed placement methods and compaction equipment shall be reviewed by the Resident Geotechnical Engineer.

Placement and compaction shall be observed by the Resident Geotechnical Engineer. The compacted Type 1 Sand shall be tested for soil gradation at a minimum of one test per acre per lift or as required by the Resident Geotechnical Engineer. The Contractor shall excavate and replace any deficient areas in accordance with project Specifications.

4.3.2 Protection of the Underlying Geosynthetic Liner

The compacted lift thickness and condition of the underlying geosynthetic shall be evaluated by the Resident Geotechnical Engineer by periodic careful hand excavation down to the geosynthetic at critical locations. The location, extent, and frequency of the excavations shall be determined by the Resident Geotechnical Engineer.

If the compacted Type 1 Sand layer is less than the required thickness, or damage or disturbance of the underlying geosynthetic liner system is observed, then three similar excavations shall be taken on a 20-foot radius around the deficiency to define the extent of the deficient area. The Contractor shall fill the deficient thin sand areas with Type 1 Sand in accordance with the Specifications.

5. CQA FOR THE GAS AND CONDENSATE COLLECTION SYSTEMS

5.1 Preconstruction Inspections

Prior to the system installation, the CQA Inspector shall review all required submittals. The CQA Inspector will inspect gas and condensate collection system materials for the following items.

- Manufacturer's identification to verify the proper material and equipment was received.
- Cuts, gouges, or other damage from handling equipment or poor packaging.
- Curvature or deterioration due to thermal expansion or sunlight.

5.2 Construction Inspections

5.2.1 Pipe Installation

Inspections will be performed by CQA Inspectors to verify the following:

- That the pipe material and size conforms to the Specifications.
- That the pipe is installed in accordance with the Drawings and Specifications.
- That no obstructions or debris are left in the pipe prior to connection.
- Verify that the Contractor has prepared and implemented a Health and Safety Plan that addresses all health concerns related to fabricating and installing the gas and condensate collection manifold.
- Verify that the crew which will be performing the work has the proper certifications and/or experience.
- Verify that all piping is leak tested according to the Specifications.
- Verify that the Contractor has cleaned up his work area.

5.2.2 Gas Well Drilling

CQA Inspectors will verify that:

- The driller has prepared and will implement a Health and Safety Plan that addresses all health concerns related to drilling and completing of the gas extraction wells.
- All crew personnel have the proper certifications and experience to do their assigned tasks.
- All materials used are in general conformance with the Drawings and Specifications and approved submittals.
- All work is performed in general accordance with the Drawings and Specifications.

- The drill rig and other equipment including casing, auger, and cable tool bit is decontaminated if required.

5.3 Construction Inspections for Vacuum/Condensate Pump Stations

CQA Inspectors will verify that:

- The Contractor has prepared and implemented a Health and Safety Plan that addresses all health concerns related to fabricating and installing the Pump Stations.
- The crew which will be performing the work has the proper certifications and/or experience.
- The materials and equipment to be used in the construction of the Pump Stations meet the Specifications and have been approved by the Engineer.
- All equipment and piping are installed in general according to the Drawings and Specifications.
- All piping and "gas containing" equipment is leak tested according to the Specifications.
- The Contractor has cleaned up his work area.
- Equipment manufacturers have certified the installations are correct prior to start-up, where appropriate.
- All equipment, valves, and piping perform in accordance with the Specifications, during and after start-up.

5.4 Gas and Condensate Collection System Start-Up Procedures

5.4.1 Landfill Gas Manifold

The following procedures must be followed:

- Walk along the entire LFG manifold and verify that all trench end valves are open, and all in-line isolation valves are open or closed as indicated on the Plans.
- Prepare the Motor Blower/Flare Facility as described in Section 5.4.4.

5.4.2 Horizontal Gas Extraction Trenches and Vertical Gas Extraction Wells

The following are the start-up procedures for initial operation of new gas extraction trenches:

- Adjust the throttling valve at the trench or well head to full open position to allow gas to vent passively to temporary flare.

5.4.3 Condensate Extraction Manifold

Each vacuum valve station between the LFG manifold and the condensate extraction manifold should be checked to verify that all valves are open, to allow condensate to flow from the LFG header to the condensate header. The vacuum valve will create a seal between the two manifolds to prevent landfill gas from the LFG header from being sucked into the condensate extraction manifold.

6. FORMS

The forms are provided to indicate the checks to be made for inspection. The format of the inspection forms may be modified by the CQA officer. However, the revised form must include all checks and information contained in the original form.

METHODOLOGY FOR DETERMINING
NORMAL ADVERSE WEATHER DAYS FOR
CONSTRUCTION AT ST. JOHNS LANDFILL

I. Analysis of Weather Impacts

- A. General Climatology - The work site is approximately seven miles from the Portland Airport, which is the nearest weather station. The U.S. Weather Service publishes Local Climatological Data for Portland, Oregon yearly. We will use the 1990 issue for our base line data (in particular, page 3, entitled "Normals, Means and Extremes").
- B. Rain - Rainfall will have a heavy impact on earth work, due to difficulty in compacting soils, trafficability, possible damage to existing landfill cover, etc. Metro will consider that the category of "Precipitation, .01 Inches or More" will describe the number of rainy days we can expect each month. If the actual number of rainy days experienced during a particular month exceeds those expected, a justifiable delay may have occurred. In this case, the Contractor must show that the rainfall impacted the work by at least 50% on a particular work day. The upper limit for justifiable delay due to rain would be the difference in calendar days between the expected and actual numbers of rainy days. The Contractor would then multiply the number of scheduled work days impacted by a factor to convert work days to calendar days in order to determine the amount of this request.

Example - The weather in April 1992 is extremely rainy. The U.S. Weather Service records rainfall of .01" or more on 17 calendar days, while the Climatology Report tells us to expect 12. The Contractor is rained out and sends his entire work force home on each of six working days. On two more rainy days, a 50% loss of productivity is experienced. The calculations for justifiable delay due to rain would be as follows:

| | | |
|-----------------------------|------------|---------------------------------|
| Actual Rain Days | 17 | calendar days |
| - <u>Expected Rain Days</u> | <u>12</u> | <u>calendar days</u> |
| Upper Limit of Rain Delay | 5 | calendar days |
| | | |
| Actual Days of Rain Impact | 6 | work days x 100% |
| | <u>2</u> | <u>work days x 50%</u> |
| | 7 | work days |
| | x 1.4 | cal days/workdays |
| | | (5 day work week) |
| | <u>9.8</u> | <u>cal days > 5 cal days</u> |

Justifiable delay for rain is 5 cal days for April 1992.

- C. Snow - Snowfall could impact the progress of the work for many of the same reasons as rainfall. In addition, snow may cause visibility or traffic problems for the truck haul, perhaps even preventing the work force from getting to the site. The Climatology Report forecasts the expected frequency of snow or ice pellets over 1" deep for each month. If the Contractor experiences actual delays caused by snow during a particular month, calculations to determine the justifiable delay for snow will be the same as for rainfall.
- D. Freezing Temperatures - Excavation, placement and compaction of fill materials in freezing weather is nearly impossible. In addition, freezing temperatures may cause unsafe road conditions. The Climatology Report gives us a monthly forecast of the number of days that the maximum temperature is below 32° F, and the number of days when the minimum temperature is below 32° F for each month. The tendency for soil to remain frozen is great when the temperatures are fluctuating above and below freezing during a 24-hour period. The number of days that the minimum temperature is below 32° F will be used as the criteria for determining if freezing temperatures are a possible source of justifiable delay. If the Contractor experiences actual delays because of freezing temperatures during a particular month, calculations to determine the justifiable delay will be the same as for rain and snowfall.

II. In order for Metro to grant a time extension for inclement weather, the following conditions must be satisfied:

- A. The weather at the job site during the Contract period must be found to be unusually severe; that is, more severe than the adverse weather anticipated.
- B. The unusually severe (inclement) weather must actually cause a delay to the completion of the project. The delay must be documented and reported to Metro in the daily Quality Control Report as the work progresses. Further, the delay must be beyond the control and without the fault or negligence of the Contractor. The delay must occur on a normal work day, and must prevent work on actual activities for at least 50% of the Contractor's scheduled work day.

III. Enclosed is the schedule of monthly anticipated adverse weather delays based upon Local Climatological Data for Portland, 1990. The Contractor's schedule will reflect this anticipated adverse weather in all weather-dependent activities.

IV. Actual adverse weather delay days must prevent work on critical activities for 50% or more of the Contractor's work day. The calculations for each type of weather delay will

follow the example in Enclosure 2. An actual delay day will only be used in calculations for one type of delay (rain, snow or freezing temperatures). If a day is impacted by more than one factor, the Contractor may choose the factor that brings him the most advantage.

- V. The Contractor may rely on the monthly weather records of the U.S. Weather Service for Portland, or upon other proposed records that may be agreeable to Metro for computation of actual adverse weather delays.
- VI. Requests for time extension for inclement weather will be prepared on a monthly basis and submitted in a timely manner within the following month. The Contractor will include copies of all supporting documentation in the request.
- VII. Article 3 of the General Conditions provides for extensions of time for inclement (unusually severe) weather, but does not provide for compensation.

PH:gbc

- Enclosures -
- 1. Schedule of Monthly Anticipated Adverse Weather Delays for St. Johns Landfill
 - 2. Example of Weather Delay Computation



METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

Part II of II

DATE: January 2, 1992

TO: Metro Council
Executive Officer
Interested Persons

FROM: Paulette Allen, Clerk of the Council *PA*

RE: AGENDA ITEM NO. 7.2; RESOLUTION NO. 92-1546

The Council agenda will be printed before the Solid Waste Committee meets on January 7 to consider Resolution No. 92-1546. Solid Waste Committee reports will be distributed in advance to Councilors and available at the January 9 Council meeting.

The resolution RFB will be distributed under separate cover due to the volume of that document.

DIVISION 1 - GENERAL CONSTRUCTION PROVISIONS

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SECTION 01001

SPECIFICATION STRUCTURE

1. GENERAL

1.1 FORMAT

- A. This specification is organized on the format promulgated by the Construction Specification Institute (CSI Format).
- B. This format assigns permanent numbers to all Divisions and Sections and so far as possible assigns all products, processes, activities and construction requirements permanent places in the specifications. A number is assigned which will not change from specification to specification.
- C. Division, Section and Subsection numbers which are not required are omitted from the Specification.
- D. Reference to an Article is a numbered clause in the General Conditions.

1.2 INDEX

All Sections required for a complete Contract appear in the index. Sections not required are omitted.

1.3 ARRANGEMENT

- A. The Project manual is organized as follows:
 - 1. Procedural and legal documents in Division O.
 - 2. Specifications in Divisions 1 to 16.
- B. No attempt has been made in these specifications or plans to segregate Work covered by any trade or Subcontractor under one specification. Such segregation and establishment of subcontract limits shall be solely a matter of specific agreement between Contractor and his Subcontractors and shall not be based upon an inclusion, segregation or arrangement in or of these specifications. Contractor and Subcontractor in each case is warned that work included in any subcontract may be divided between several general specifications and that each general specification or subhead of the Technical Specifications may include work covered by two or more subcontracts in excess of any one subcontract.

- C. Contractor shall be responsible for all work shown or specified, regardless of location in the Contract Documents.

1.4 LANGUAGE

- A. These Specifications are written in imperative and abbreviated form.
- B. This imperative language of the technical sections is directed at Contractor, unless specifically noted otherwise.
- C. Incomplete sentences shall be completed by inserting "shall", "Contractor shall", and "shall be", and similar mandatory phrases by inference in the same manner as they are applied to notes on the drawings. The words "shall be" shall be supplied by inference where a colon (:) is used within sentences or phrases.
- D. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated imperatively or otherwise.

*** * * END OF SECTION * * ***

SECTION 01010

SUMMARY OF WORK

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Coordination: Section 01041
- B. Field Engineering Section 01050
- C. Construction Schedules: Section 01310
- D. Schedule of Values: Section 01370
- E. Temporary Electricity: Section 01511
- F. Temporary Water: Section 01515
- G. Protection and Maintenance of Work and Property: Section 01545
- H. Product Requirements/Substitutions: Section 01600

1.2 SCOPE OF WORK

- A. The work covers construction work specifically shown on the Contract Drawings and described herein.
- B. In general, work under this Contract includes furnishing and installing the final cover system and related appurtenances for Subarea 1 and the northerly portion of the Power Line Corridor. Specifically included, but not limited to, are stripping and stockpiling of existing topsoil and low permeable soil, procurement and placement of subgrade embankment soil, placement of low permeable soil barrier, installation of gas collection wells, trenches piping and vacuum pump station, installation of geomembrane liner and geonet drainage material, placement of Type I sand and topsoil, installation of surface water control facilities such as ditches, sedimentation basins and hydroseeding.

1.3 CONTRACTOR'S DUTIES

- A. Except as specifically noted, provide and pay for:

1. Labor, materials and equipment.
 2. Tools, construction equipment, machinery and fuel.
 3. Water, heat, and utilities required for construction.
 4. Protection of existing installations such as wells, road systems and drainage, and vegetation and soil covers, as required for construction.
 5. Testing except as provided by the ENGINEER.
 6. Field Engineering except as provided by the ENGINEER.
 7. Daily Quality Control.
 8. Other facilities and services necessary for proper execution and completion of Work.
- B. Pay legally required consumer use and other taxes as may be required by law.
- C. Give required notices.
- D. Comply with codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of work.
- E. Promptly submit written notice to Metro and Engineer of observed variance of Contract Documents from legal requirements.
- F. Enforce strict discipline and good order among employees. Employ only skilled personnel of good character. Remove from the jobsite individuals who display poor workmanship or superintendence, repeatedly break rules of discipline or safety, or engage in unlawful acts on or around the jobsite.

1.4 CONTRACTOR FURNISHED

- A. Labor, materials and equipment required for the project, including all soil and rock materials except clay and topsoil stripped from Subarea 1.
- B. Water for construction and fire protection.
- C. All gates, barricades, fences, handrails, guardrails, and security required by the Contract or by laws and regulations.

- D. Sanitary facilities adequate for all workers and complying with all codes and regulations.
- E. Shelter and drying facilities for workers.
- F. Guards, marks, shields, protective clothing, rain gear, and other equipment required by law, ordinance, labor contracts, OSHA and other regulations for the maintenance of health and safety.
- G. First Aid Kits and equipment required by law and regulations.

1.5 PERMITS AND LICENSES

- A. Metro has secured all general permits for the project. Copies of the permits are on file at Metro. All requirements set forth by these permits shall be investigated prior to bidding and are to be strictly enforced by Contractor and his agents.
- B. Contractor shall acquire and pay for all specialty permits such as electrical permits, transportation permits, wage and hour regulations permits, and all other permits of a temporary nature relating to the construction of the project.
- C. Contractor is invited to review the provisions of the Oregon Mined Land Reclamation (ORS 5.17.750-517.955). The Oregon Department of Geology and Mineral Industries can be contacted to determine if this act is pertinent to Contractor's borrow sources.

1.6 TYPE AND EXTENT OF WORK

- A. All work incidental and necessary to the completion of the work described herein and shown on the drawings shall be completed under the bid items listed in the Bid Form and no other compensation will be allowed, except as authorized by formal Change Order.

1.7 WORK UNDER SEPARATE CONTRACTS

- A. During the course of this Project, Metro may award separate contracts in connection with other work at the Site. Other Metro Contractors on the Site will be involved in:
 - 1. Procurement and Stockpiling of Soils for the St. Johns Landfill-Construction is currently underway and is anticipated to continue through October, 1992.

2. Monitoring of Groundwater Wells - Periodic monitoring well sampling is currently underway and shall continue through the life of this project.
 3. Abandonment of groundwater wells D-8A and C-3 and Extension of well H-1.
- B. Contractor shall cooperate with Other Metro Contractors in every way possible. It shall be the responsibility of Contractor to maintain its schedule so as not to delay the progress of the Project or the work of Other Metro Contractors. Cooperation shall include, but not limited to:
1. Sharing access routes, designation of laydown areas, and temporary utility corridors.
 2. Maintenance of continuous traffic flow onto the Site. The St. Johns Landfill bridge is currently the only road access to the landfill.
- C. Regular Coordination meetings will be held on the Site during the course of this Contract with all contractors involved in work at St. Johns Landfill.

1.8 METRO FURNISHED PRODUCTS

- A. Metro will furnish no material except in-place clay and topsoil stripped from Subarea 1. Other furnished materials are specifically called for in other sections of the specifications or the drawings.

1.9 CONSTRUCT WORK IN STAGES

- A. In general, construction of work in stages will be required as set out in the plans or specifications to accommodate anticipated schedules and weather considerations. The staging shall be coordinated with Metro and reflected in the contract schedule.
- B. Construction of the gas collection wells shall be completed in the SA-1 closure area prior to commencement of earthwork/grading operations. The installation of gas collection wells in SA-2 under this contract shall be completed after the SA-1 wells are completed and prior to the end of the contract period at the Contractors convenience.

1.10 USE OF PREMISES

- A. Limitations:

1. Contractor shall confine his apparatus, storage of materials, and construction operations to such limits as may be directed by Metro, and shall not unreasonably encumber the premises with his materials.
 2. Contractor shall enforce any instructions of Metro regarding signs, advertising, danger signals, barricades, and shall require all persons employed on the work to comply with all regulations while on the premises.
 3. Contractor shall not permit the landfill access bridge structure to be loaded with vehicle weights greater than the allowable loads. Refer to the Allowable Loads in the Appendix.
- B. Confine operations at site to areas permitted by:
1. Laws
 2. Ordinances
 3. Permits
 4. Contract Documents
 5. Right-of-Way

1.11 CONTRACT DOCUMENTS

- A. The precedence for interpretation of the Contract Documents is in accordance with Article 1 of the General Conditions.
- B. If apparent conflicts or questions arise, Contractor shall immediately contact the Engineer for interpretation or correction.
- C. Contractor with the advice of the Engineer will establish a system for Requests for Information (RFI's) which will be used to seek and receive direction quickly, track and record the action, provide a possible basis for change orders as required, provide documentation for possible claims. Additional information may be found in Article 3 of the General Conditions.

1.12 RECORD DOCUMENTS

- A. Record documents in accordance with Section 01720 shall be maintained onsite. Section 01720 describes the record drawings which are required onsite.

* * * END OF SECTION * * *

**SECTION 01025
MEASUREMENT AND PAYMENT**

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Bid Form: Section 00300
- B. Payments: Article 9 General Conditions
- C. Schedule of Values: Section 01370

1.2 MEASUREMENT OF PAY QUANTITIES

A. General:

1. Contractor shall make all interim measurements, and determine all interim quantities and amounts of completed work done under the Contract. At the time measurements are made for quantity determinations, the Engineer or Metro shall be present to verify such measurements. From quantity figures so ascertained, it will be Contractor's responsibility to prepare a monthly periodical estimate of the work accomplished to date. This estimate and application for payment shall be submitted to the Engineer each month for his review not later than the date established at preconstruction conference. The form of such monthly estimates and application for payment to be subject to the approval of the Engineer. The Engineer will take measurements and determine final quantities for payment with Contractor present to verify such measurements.
2. Some settlement of the subgrade is anticipated during the filling operations. Measurement of pay for fill quantities is by weight so Contractor is paid for materials placed as set out in these contract drawings and specifications. The amount of settlement is a function of the rate of filling and therefore the actual fill quantities may vary from the estimated fill quantities given in the schedule of bid prices. Variation in actual required, versus estimated fill quantities shall not be a basis for a claim to Metro.

B. Description of Methods for Measurement of Quantities:

1. When Items are specified to be measured by an area unit (e.g.

square yards, acres), direct in-place horizontal measurement shall be employed by the most practical means as determined by the Engineer. Where survey traverse measurements are used for area computation, horizontal measure will be the basis. No allowance for slopes will be made in computing areas. Contractor's bid price shall be adjusted accordingly.

2. For Items specified to be measured by a volume unit (e.g. cubic yards), in-place measurement will be used by the Engineer. For subgrade embankment and existing topsoil removal, in-place survey cross-sections will establish final in-place geometry. The quantity for payment will be the calculated difference between this in-place cross-section and the pre-construction cross-section or a prior applicable measurement. For all other "cubic yard" pay items (such as Topsoil, Type I Sand, Roadway Embankment, Crushed Surfacing, & Quarry Spalls), neat line measure for depth as shown on the Drawings will be used together with in-place horizontal measurement for area, (as defined in B1 above) to calculate in-place volumes.
3. Where Items are to be measured by a weight unit (e.g. Tons), material shall be weighed on scales that are accurate within the tolerances required by the State of Oregon. Certification of scale accuracy and its licensing with the State shall be provided to the Engineer upon request. Contractor will be responsible to provide a copy of all certified weight bills to the Engineer at the time of delivery. All trucks are to be numbered or otherwise uniquely marked for identification purposes.

All weigh bills shall include a reference to the borrow source, the intended use of the material, (i.e. Subgrade Embankment or Type I Sand) the delivery vehicle identification, date and time delivered to the landfill.

At the option of the Engineer, random checks of truck weight and weigh bill accuracy may be performed by weighing an arriving truck at the Metro scale at the landfill entrance. Where a discrepancy is encountered, Metro may elect to adjust all weigh bills received since a prior check date.

Specific quantities deductions in weight will be made for excess moisture contained in the following items:

- a. Subgrade Embankment or Type I Sand. The deductions

will be made based on material samples taken at the entrance to the landfill site. No provisions for adding weight will be made for drier materials.

The amount of weight deduction for excess moisture will be made as follows:

- a. Compaction curves per ASTM D698 shall be developed by the Geotechnical Engineer for each suitable borrow source of Subgrade Embankment or Type I Sand proposed by Contractor. These tests shall be completed for each borrow area in advance of any materials being brought onto the site from that borrow source.
- b. The optimum moisture content per ASTM D698 shall serve as a basis for weight deductions for borrow source materials brought onto the site. No deduction will be made up to plus-two percent (+2%) by weight moisture above optimum moisture content in materials with more than 50 percent gravel or rock. No deduction will be made up to plus-four percent (+4%) by weight moisture above optimum moisture content in of Subgrade Embankment with less than 50 percent gravel or rock.
- c. Moisture content shall be determined by the Geotechnical Engineer of representative samples of Subgrade Embankment or Type I Sand brought onto the site each day. Compaction check points (ASTM D698) will be carried out for each material type so that the moisture sample can be matched to the appropriate compaction curve.
- d. The moisture content tests shall be by microwave oven method ASTM D4643 or over drying method ASTM D2216. The moisture content results from the nuclear test method shall be periodically calibrated using ASTM D2216 run on split samples.
- e. A minimum of 1 moisture content test per 150 trucks or 1 test per 3,000 tons of material will be carried out. Additional, more frequent, moisture content and check point determinations will be carried out as determined by the Geotechnical Engineer. Moisture content test results for each material for each borrow source shall be averaged over a 24 hour period of work.
- f. The average moisture content for each material for each borrow source for each day will be compared to the

allowable moisture content in (b) above. The amount over the allowable percentage is the excess percentage (by weight) of moisture. The deduction shall be the excess weight of water calculated by multiplying the excess percentage (decimal) of moisture by the corresponding total weight of each material brought onto the site for that day. The final determination of the excess weight of water deduction shall be made by the Geotechnical Engineer. During construction, all records supporting this determination will be available for inspection by Contractor.

4. For Items specified to be measured by a length unit (e.g. lineal or vertical foot), pay length will be measured along the line and grade of the item involved as actually placed and accepted.
5. Where lump sum is the specified pay unit, complete payment for the work described to be done, completed and accepted, without further measurement will be used. The Contractor shall furnish a Schedule of Values in accordance with Section 01370 of this Specification if partial payment is desired by Contractor.

C. No measurement will be made for:

1. Work performed or materials placed outside of lines indicated in the plans or established by the Engineer.
2. Materials wasted, used, or disposed of in a manner not called for under the contract.
3. Rejected materials (including material rejected after it has been placed, if the rejection is due to the contractor's failure to comply with the provisions of the contract).
4. Hauling and placement of materials from or to interim stockpiles.
5. Hauling and disposing of rejected materials.
6. Material on hand after completion of the work.

7. Any other work or material when payment is contrary to any provision of the contract.

1.3 ESTIMATED QUANTITIES (UNIT PRICE ITEMS)

- A. The estimated quantities shown in the Bid Forms are estimates only, being given only as the basis for the comparison of Bids, and Metro does not warrant, expressly or by implication, that the actual amount of work will correspond therewith. The right to increase or decrease the amount of any class or portion of the work, or to make changes in the work required as may be deemed necessary is reserved by Metro as provided elsewhere in these specifications. The basis of payment will be the actual unit bid items of Work performed and measured in accordance with the contract. All prospective Bidders should note that certain bid items may be included in the Bid Form to establish a unit price should use of those items become necessary during construction. Allowance will not be made for loss of anticipated profits or additional compensation should the use of these items be deemed unnecessary.

1.4 PAYMENT FOR LUMP SUM ITEMS

- A. Payment for work items designated by Lump Sum units shall be in accordance with Article 9 of the General Conditions.

1.5 PAYMENT FOR UNIT PRICE ITEMS

- A. Payments to be made to the Contractor will be made as set forth in Article 9 of the General Conditions and according to the unit price schedule provided in Section 00300.

1.6 PAYMENT FOR MATERIAL STORED OFF SITE

- A. Refer to Article 9 of the General Conditions.

1.7 DESCRIPTION OF BID ITEMS

A. GENERAL:

1. Payment will be made only under those items listed in the Schedule at Bid Prices, Section 00300. All other items required for the work where a specific bid item was not provided shall be considered incidental to the project and all costs are to be included with the listed Schedule of Bid Prices.

2. Where common materials are used in several applications, payment shall be made under each specific bid item unless specifically stated otherwise. For example, Type I Sand may be used as gas well backfill material, bedding for pipes or as the protective material above the final cover geosynthetics. Hence, the cost of furnishing, delivering, placing sand as well backfill material shall be included in the price bid for the well installation.

1.8 DESCRIPTION OF BASE BID ITEMS:

ITEM 1 MOBILIZATION:

1. This item 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 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. Mobilization costs for all subcontracted work shall be considered to be included.
2. Items which are not to be included in this item include, but are not limited to:
 - a. Any portion of the work covered by a specific bid item or incidental work which is to be included in a bid item or items.
 - b. Profit, interest on borrowed money, overhead or management costs.
3. The lump sum price bid for "Mobilization," partial payments will be made as follows:
 - a. When 5% of the total original contract amount is earned from other bid items, 50% of the amount bid for mobilization, or 5% of the total original contract amount, whichever is the least will be paid.
 - b. When 10% of the total original contract amount is earned from other bid items, 100% of the amount bid for mobilization, or 10% of the total original contract amount, whichever is the least, will be paid.
 - c. Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10% of the

total original contract amount will be paid.

ITEM 2 SITE SAFETY AND HEALTH PROGRAM:

1. The lump sum price bid for the Site Safety and Health Program shall constitute complete compensation for the investigation of existing conditions and potential hazards, preparation of all required safety and health program elements and implementation of the approved Program throughout the course of the contractors work on the landfill site.

ITEM 3 EXISTING TOPSOIL REMOVAL:

1. The unit price bid per cubic yard for Existing Topsoil Removal shall be full compensation for removing all existing topsoil above the existing low permeable soil at the Landfill in those areas requiring Type A or B cover placement.
2. This bid item shall specifically include, but not be limited to, all costs of excavating, hauling to temporary stockpile, interim erosion control measures at disturbed areas and stockpile(s), hauling from temporary stockpile and placement at final cover locations, restoration of interim cover in area of stockpile or haul roads if disturbed.
3. Imported Topsoil, bid separately, will supplement Existing Topsoil removal only if existing topsoil quantities are not sufficient to achieve Final Cover requirements. Prior approval by the Engineer will be required to import topsoil.
4. Measurement for payment will be made for existing topsoil removal in its original position based on preconstruction and post removal topographic surveys by the Engineers.

ITEM 4 IMPORTED TOPSOIL:

1. The unit price bid per cubic yard for Imported Topsoil shall be full pay for loading, hauling, stockpiling, placing, spreading, processing and compacting Imported Topsoil as indicated on the Drawings or in the Specifications.
2. All costs of testing to verify that all requirements are satisfied for Imported Topsoil are to be included in this bid item.
3. Contractor shall obtain prior approval from Engineer before supplying Imported Topsoil. The use of Imported Topsoil shall supplement Existing Topsoil, as bid separately.

ITEM 5 PROCURE AND DELIVER TYPE I SAND MATERIALS:

1. The unit price per ton, less a weight deduction for excess moisture and scale check differences, shall constitute full compensation for all labor, materials, and equipment required to procure, deliver and dump Type I Sand materials above the geomembrane/geonet composite as indicated in the Contract Documents.
2. Alternative methods of measurement (other than scales) will be considered by Metro if methods of conveyance to the site other than highway legal trucks are proposed by Contractor.
3. The costs for grading, placing and compacting Type I Sand material are not included in this bid item.
4. The costs for temporary protection of materials prior to and after placement is included in this bid item.
5. All costs for Type I Sand used in other applications (e.g. gas wells, pipe bedding, casing backfill, etc.) shall be included with those other bid items and shall be excluded from this bid item.

ITEM 6 PLACE TYPE I SAND:

1. The unit price per cubic yard shall constitute full compensation for all labor and equipment required for grading and placing Type I Sand materials above the geomembrane/geonet composite in accordance with the Contract Documents.
2. All costs for compaction of Type I Sand are considered incidental to this bid item.
3. The cost of the Type I Sand material has been included in a separate bid item.
4. The cost of placing Type I Sand material in other applications (e.g. gas wells, pipe bedding, casing backfill, etc.) shall be included with those other bid items and shall be excluded from this bid item.

ITEMS 7 & 8 GEONET COMPOSITE:

1. The unit price bid per square yard for Geonet Composite, Type A or B, shall include all costs for materials, labor, equipment, and tools required to furnish and install the Geonet Composite in accordance with these Specifications, and Drawings.
2. All costs associated with furnishing and placing perforated PVC pipe at ditch locations above the geonet composite are to be paid under separate bid items.

3. The unit price shall also include all costs required to furnish and bond geotextile above and below the geonet.

ITEMS 9 & 10 GEOMEMBRANE - 40 MIL:

1. The unit price bid per square yard for Geomembrane - 40 mil, smooth or textured as specified, shall include all costs for materials, labor, equipment, and tools required to furnish and install the geomembrane in accordance with the Specifications, and Drawings.
2. All costs including but not limited to, penetrations seaming, pressure testing of seams, destructive testing of seams, repair of test areas, repair of areas with material defects or installation defects shall be included in this unit price.
3. The cost of furnishing and placing bentonite required at penetrations shall be included in these bid items.

ITEM 11 BENTONITE MAT:

1. The unit price bid per square yard shall constitute full compensation for all labor, material and equipment necessary to furnish and install Bentonite Mat in areas without existing interim cover, under ditches, roads and sedimentation basins, as specified, and as shown on the Drawings or Specifications.
2. All costs of overlapping, splicing or anchoring of bentonite mat in accordance with Manufacturers recommendations shall be included in this unit price and no additional compensation or measurement for payment for these items will be made.
3. No measurement or payment will be made for Bentonite Mat placed in areas receiving Type "B" Cover which had existing interim cover.
4. Costs for extra Bentonite Mat are to be included with separately bid items (e.g. Outlet Structure) and will not be included under this bid item.

**ITEM 12 LOW PERMEABLE SOIL FOR FINAL COVER TYPE
'A':**

1. The unit price bid per square yard shall constitute full compensation for all labor, materials, and equipment required to prepare the surface of the existing low permeable soil, in its existing position, as shown on the Drawings and as directed in these Specifications.

2. The cost of removing existing topsoil above the existing low permeable soil shall be included in a separate bid item.

ITEM 13 LOW PERMEABLE SOIL FOR FINAL COVER TYPE 'B':

1. The unit price bid per square yard shall constitute full compensation for all labor, materials, and equipment required to excavate the existing low permeable soil, haul, temporarily stockpile, place, compact, and prepare the surface of the low permeable material as shown on the Contract Drawings and as directed in these Specifications.
2. When Bentonite Mat or imported low permeable material is used in lieu of existing low permeable material, in areas which had interim cover, due to the Contractor's failure to excavate or protect sufficient quantities of the material, all labor, materials, and equipment required to furnish, deliver and place the Bentonite Mat or imported low permeable material will be incidental to the work. No additional measurement or payment for the Bentonite Mat or imported low permeable soil will be made.

ITEM 14 HYDROSEEDING:

1. The unit price bid per acre for Hydroseeding shall constitute full compensation for all materials, labor and equipment required to hydroseed the areas shown on the Drawings or specified in the Specifications.
2. All costs of furnishing, placing, and maintaining temporary clear plastic sheeting on slopes following hydroseeding, as necessary, shall be included in this bid item.
3. All costs of sampling and testing of existing and imported topsoil to determine fertilizer needs are to be included in this bid item.

ITEM 15 PROCURE AND DELIVER SUBGRADE EMBANKMENT MATERIALS:

1. The unit price per ton, less a weight deduction for excess moisture and scale check differences, shall constitute full compensation for all labor, materials, and equipment required to procure and deliver, dump and spread subgrade embankment materials to locations and grades indicated in the Contract

Documents.

2. Alternative methods of payment will be considered by Metro if methods of conveyance to the site other than highway legal trucks are proposed by Contractor.
3. The costs for grading and compacting material to subgrade contours are not included.
4. The costs for temporary protection of materials prior to and after placement is included in this bid item.
5. The cost of subgrade embankment used in applications other than for achieving the required grading plan shall be excluded from this bid item and shall be paid under separate bid item as applicable.

ITEM 16: COMPACT SUBGRADE EMBANKMENT:

1. The unit price per cubic yard shall constitute full compensation for all labor and equipment required for grading and compacting subgrade embankment materials to achieve subgrade contours in accordance with the Contract Documents.
2. All costs for rough grading to the subgrade contours, establishing surface drainage and erosion control features (except as separately bid), and compaction are considered incidental to this bid item.
3. The cost of the subgrade embankment material has been included in a separate bid item.
4. The cost of excavation and disposal of refuse necessary to provide a 1 foot minimum thickness of subgrade embankment below Type B low permeable soil shall be included in this bid item.

ITEM 17 ROADWAY EMBANKMENT:

1. The unit price bid per cubic yard shall constitute complete payment for all labor, materials, and equipment necessary to furnish, place and compact Roadway Embankment materials to the lines and grades and sections shown on the Drawings and as directed in these Specifications.

ITEM 18 CRUSHED SURFACING BASE COURSE:

1. The unit price bid per cubic yard shall be complete payment for all labor, materials, and equipment necessary to furnish, place and compact Crushed Surfacing Base Course as indicated on

the Drawings and as directed by the Specifications.

ITEM 19 REMOVE EXISTING CULVERTS:

1. The unit price bid per each shall constitute full compensation for all labor, materials, and equipment required to excavate to, remove, and dispose of each culvert and to backfill and install Bentonite Mat, as directed in these Specifications.

ITEM 20 EXCAVATION FOR SEDIMENTATION BASIN:

1. The unit price bid per cubic yard shall constitute full compensation for Excavation for Sedimentation Basin shown on the Drawings. All labor, materials and equipment shall be included in this unit price with no additional compensation allowed.
2. The cost of all work associated with temporary control of leachate flow at basin excavations shall be included in this bid item. Leachate shall be disposed in the leachate collection system in SA-5.
3. Excavated material shall be disposed on-site at Subarea 4 or as directed by the Engineer. All costs for this disposal, including hauling, shall be included in this bid item.

ITEMS 21 - 22 CORRUGATED METAL PIPE (CMP) CULVERTS:

1. The unit price bid per linear foot for CMP culverts, size as specified, shall constitute full compensation for all labor, materials and equipment required to provide, deliver, and place CMP, bedding, backfill, and CMP Connections to other pipe sections and riser in accordance with the Drawings and Specifications.
2. All labor and equipment required for excavation and compaction shall be included in this bid item.
3. Storm Drain Manholes, Parshall Flume will access manhole and outlet structure are paid under separate bid items.

ITEMS 23 - 25 PERFORATED PVC UNDERDRAIN PIPE:

1. The unit price bid per linear foot, size as specified, shall constitute full compensation for all labor, materials, and equipment required to furnish, deliver, and place either perforated PVC underdrain collection or transfer pipe.

2. The cost to furnish, deliver, and place drain rock, geotextile above the drain rock, fittings, and cleanouts associated with the underdrain collection pipes shall be considered incidental to the work.
3. The cost to excavate for and furnish, deliver, and place bedding material, backfill material, fittings, and bentonite dams associated with the underdrain transfer pipes shall be considered incidental to the work. The cost of excavation and disposal of refuse, where required, shall be included in his bid item.

ITEM 26 OUTLET STRUCTURE:

1. The unit price bid per each Outlet Structure shall constitute full compensation for all labor, materials and equipment required to furnish, deliver and place forty-eight inch diameter CMP riser, overflow structure, galvanized steps, concrete support slab, sand bedding and six-inch perforated CMP drain pipe in accordance with the Drawings and Specifications.
2. The cost of the CMP outlet pipes, Storm Drain, Manholes and Parshall Flume with Access Manhole will be paid under separate bid items for these materials.
3. The cost of installing Type 1 geotextile and the perforated CMP drain pipe, extra bentonite mat and geomembrane layers under the Outlet Structure as detailed on the Drawings shall be included in this Bid Item.

ITEM 27 STORM DRAIN MANHOLE:

1. The unit price bid per each shall constitute full compensation for all labor, materials and equipment required to furnish and install Storm Drain Manholes at the locations shown on the Plans.
2. Excavation, bedding material, backfilling and compaction shall be included in this bid item.
3. All costs for the manhole frame and grate are included.
4. All costs of disposal of refuse excavated shall be included.

ITEMS 28 PARSHALL FLUME WITH ACCESS MANHOLE:

1. The unit price bid per each shall constitute full compensation for all labor, materials and equipment required to furnish, deliver and place Parshall Flume with integral access manhole,

- concrete support slabs/flume encasement in accordance with the Drawings and Specifications
2. Excavation, bedding, and backfilling shall be included in this bid item.
 3. All costs of disposal of refuse excavated shall be included.

ITEM 29 FENCE:

1. The unit price bid per lineal foot for Fence shall include all costs for materials, equipment, labor and tools necessary to install chain link fencing, including access gates, at sedimentation basins according to the Drawings and Specifications.

ITEM 30 QUARRY SPALLS:

1. The unit price bid per cubic yard for Quarry Spalls shall constitute full compensation for all labor, materials and equipment required to furnish, deliver and place Quarry Spalls at locations designated on the Drawings and Specifications.
2. All costs for the geotextile required under Quarry Spalls shall be included in this bid item.

ITEM 31 EROSION CONTROL MAT:

1. The unit price bid per square yard shall constitute full compensation for all labor, materials and equipment required to finish, deliver and place Erosion Control Mat and staking in accordance with the Drawings and Specifications.

ITEM 32 STRAWBALE SEDIMENTATION BARRIERS:

1. The unit price bid per each shall constitute full compensation for all labor, materials and equipment required to establish and maintain temporary strawbale barriers for sedimentation control.

ITEM 33 SEDIMENT FENCING:

1. The unit price bid per lineal foot shall constitute full compensation for all labor, materials and equipment required to establish and maintain temporary sediment fencing for sedimentation control.

1.9 DESCRIPTION OF ALTERNATE No. 1 BID ITEMS:

ITEMS A1 & A2 GAS EXTRACTION WELLS:

1. The unit price bid per vertical foot for Gas Extraction Well, single completion or double completion, shall be full compensation for all labor, tools, equipment, and materials necessary to drill, furnish materials and install the wells, complete in place. Work will include but not be limited to, drilling, installation of well casing and screened intervals and installation of all well backfill materials as described in the Drawings and Specifications.
2. Costs for Mobilization to and from each well location including all costs for temporary access (e.g. crushed rock, wood timber supports, etc.) if required, are to be included with the unit price bid for this item.
3. Also included, but not limited to, are all costs for drilling safety and methods, soil sampling and borehole logging, abandonment of incomplete wells, decontamination, well records, site restoration and waste soil collection and disposal.
4. Cost, for all well materials (e.g. Type I Sand, PVC pipe) are to be included in the unit price bid for this item. No payment for materials used in well installation will be made under any other bid item.
5. In the event abandonment of an incomplete well is necessary due to unforeseen conditions and not the result of poor contractor workmanship, the cost of abandonment will be paid at the unit price bid for this item. Prior approval by the Engineer will be required.

ITEM A3 HORIZONTAL GAS TRENCHES:

1. The unit price bid per linear foot for Horizontal Gas Trenches shall constitute full compensation for all labor, material, tools, and equipment necessary for installing the gas trench as shown on the plans and as specified.

2. All costs associated with trenching through refuse, solid or perforated HDPE pipe and fittings, bedding, Type 1 Geotextile placement, backfill and compaction are to be included in the unit cost for this item with no additional compensation allowed.
3. The cost of disposal of excavated refuse shall be included in this bid item.
4. All costs necessary to excavate existing low permeable soil in the trench zone, temporarily stockpile and replace a minimum 12" depth as backfill in the upper trench zone shall be included in this bid item. Costs for protection of the low permeable soil from contamination and compaction of the low permeable soil in the trench zone are to be included in this bid item.

ITEMS A4 - A6 WELLHEAD COMPLETIONS:

1. The unit price bid per each shall constitute full compensation for all labor, materials, tools and equipment necessary to furnish and install Wellhead Completions of the type specified.
2. This item shall include all costs for PVC or HDPE piping and fittings, valves, monitoring ports, pipe support at well completion, connections to vertical gas extraction wells or horizontal gas trenches and gas manifold piping, all as shown on the Drawings.
3. The cost of vertical gas extraction wells, horizontal gas trenches, gas manifold piping and adjustable pipe supports is specifically excluded from this bid item and will be paid under those separate bid items.

ITEMS A7 - A9 HDPE-LFG:

1. The unit price bid per linear foot for above-grade HDPE Gas System Piping and Fittings, size as noted, shall include all labor, material, tools, and equipment necessary for its installation.

ITEM A10 HDPE-C (BURIED):

1. The unit price bid per linear foot for buried HDPE Condensate System Piping and Fittings, size as noted, shall include all labor, material, tools, and equipment necessary for its installation.
2. All costs associated with trenching, bedding, backfill and compaction are to be included in the unit cost for this item with no additional compensation allowed.

ITEM A11 PVC-V (BURIED):

1. The unit price bid per lineal foot for buried PVC Vacuum System Piping and Fittings, size as noted, shall constitute full compensation for all labor, material, tool and equipment costs necessary for its installation.
2. All costs associated with trenching, bedding, backfill and compaction are to be included in the unit cost for this item with no additional compensation allowed.

ITEM A12 PVC-D (BURIED):

1. The unit price bid per linear foot for buried PVC Condensate and Vacuum Pump Discharge Piping and Fittings, size as noted, shall include all labor, material, tools, and equipment necessary for its installation.
2. All costs associated with trenching, bedding, backfill and compaction are to be included in the unit cost for this item with no additional compensation allowed.

ITEMS A13 - A15 D.I. CASING:

1. The unit price bid per linear foot for Ductile Iron Casing, size as noted, shall be full compensation for all labor, tools, equipment, and materials necessary to furnish and install the casing pipe at locations shown on the Drawings where gas system piping crosses an access road.
2. All costs for D.I. Casing trenching and backfilling, furnishing and placing (blowing) sand into the annular space to immobilize the condensate or vacuum pipes, furnishing and installing wooden blocking banded to the condensate or vacuum pipe with stainless steel clamps shall be included in this bid item.
3. Specifically excluded shall be the cost of the condensate or vacuum piping to be placed through the D.I. casing and it shall be paid under separate bid item described elsewhere.

**ITEMS A16 - A20 PIPE
SUPPORTS/GUIDES/ANCHORS/BOLLARDS:**

1. The unit price bid per each for Adjustable Pipe Supports, Pipe Guides (G2), Adjustable Pipe Supports with Guides (G1), Pipe Anchors and Bollards shall be full compensation for all labor, materials, tools and equipment necessary for their installation

- as shown on the Drawings.
2. Specifically included, but not limited to, are all costs for concrete footings or piers, reinforcing steel, steel pipe, paint, galvanizing, channel, angle iron, pipe clamps, U-bolts and miscellaneous fittings and hardware.
 3. The cost of gas piping and associated fittings are to be paid under separate Bid Item.
 4. Specifically excluded are all costs for Supports/Guides/Anchors/Bollards which are within the Bid Limits for the Vacuum Pump Stations, Remote Condensate Pump Stations and Wellhead Completions or other bid limits as applicable.

ITEM A21 EXPANSION JOINT:

1. The unit price bid per each shall constitute full compensation for all labor, equipment and materials necessary to furnish and install Expansion Joints of the size specified as indicated in the Drawings and Specifications.

ITEMS A22 & A23 VALVES:

1. The unit price bid per each for Butterfly, Gate or Check Valves; Worm Gear, Lever or Handwheel Operated; size as noted, shall be per valve installed and shall include all labor, tools, and equipment necessary for installation.

ITEM A24 VACUUM VALVE STATIONS:

1. The unit price bid for Vacuum Valve Station will be per each vacuum valve station installed. Payment will be from the HDPE-to-stainless steel flange break as shown on the Drawings and shall include, but not limited to, furnishing and installing the following specific items:
 - a) All piping and fittings between the "HDPE-to-stainless steel" flange break at the gas collection manifold and the condensate collection manifold.
 - b) Two 1/2 inch stainless steel ball valves as shown on the Plans.
 - c) 3/16 or 1/2 inch stainless steel tubing with fittings and valves as shown on the Plans.
 - d) One APCO model 65.5 air release valve.

- e) One meter box with gravel bedding.

ITEM A25 VACUUM PUMP STATION:

1. Payment for Vacuum Pump Station shall be per each, lump sum, and shall be full compensation for all materials, labor, and equipment required to install the vacuum pump station as per the Drawings and Specifications, including, but not limited to, furnishing and installing the following specific items:
 - a) All piping, fittings, supports, guides, and valves within the vacuum pump station and between the vacuum pump station and the condensate collection tank as shown on the Plans.
 - b) One Vacuum Reserve Tank System
 - c) Two Condensate Discharge Pumps, including concrete slab.
 - d) One Condensate Collection Tank, including concrete foundation.
 - e) One Vacuum Pump Station Roof Structure, including concrete slab. Cost of enclosure design (if required) shall be included.
 - f) All other piping, tubing, electrical tracing, and all other appurtenances as described in these specifications and on the Plans
 - g) All costs for electrical equipment and conductors associated with this Pump Station shall be included in this bid item.

ITEM A26 REMOTE CONDENSATE PUMP STATION:

1. Payment for Remote Condensate Pump Station shall be per each, lump sum, and shall be full compensation for all materials, labor, and equipment required to install the remote condensate pump station as per the Drawings and Specifications, including, but not limited to, furnishing and installing the following specific items:
 - a) All piping, fittings, supports, guides, and valves between the condensate discharge pumps and the condensate collection tank as shown on the Plans.
 - b) Two Condensate Discharge Pumps including concrete slab.

- c) One Condensate Collection Tank including foundation.
- d) All other piping, tubing, electrical tracing, and all other appurtenances as described in these specifications and on the Plans.
- e) All costs for electrical equipment and conductors associated with this Pump Station shall be included in this bid item.

ITEM A27 & A28 CONDENSATE DRIP LEG FITTINGS:

- 1. The unit price bid per each for Condensate Drip Leg Fittings shall be full compensation for all labor, material, tools, and equipment necessary for fabricating and installing the condensate drip leg fittings as shown on the Drawings.

ITEM A29 CONDENSATE CLEANOUTS:

- 1. The unit price bid per each for Condensate Cleanouts shall be full compensation for all labor, tools, equipment and materials required for the installation.
- 2. Specifically included, but not limited to, are all costs for riser pipe, fittings, monitoring port, vault with cover, drain rock and polyfoam board inside vault.

ITEM A30 & A31 ELECTRICAL DUCT BANK:

- 1. The unit price bid per linear foot for buried Electrical Ductbank, type as specified, shall be full compensation for all labor material, tools, and equipment necessary for installing the ductbank.
- 2. All costs associated with trenching, bedding, backfill and compaction are to be included in the unit cost for this item with no additional compensation allowed.
- 3. Specifically included but not limited to, are all costs of furnishing and installing PVC electrical ducts, select backfill or Type I Sand or concrete bedding and handholes including PVC-coated steel elbow fittings.
- 4. Excluded are all costs of the electrical service, all electrical conductors, Pump Station electrical equipment, etc.

ITEM A32 ELECTRICAL SERVICE:

- 1. The lump sum price bid for Electrical Service shall constitute

full compensation for all materials, labor and equipment required to provide and install the electrical service for SA-1 Closure Improvements.

2. All costs for electrical service conduits(s), service equipment, service connection(s), metering and service conductors shall be included in this bid item to provide an electrical service, complete, tested, ready to use.
3. Specifically excluded, but not limited to, are all costs for conduit, conductors, electrical equipment located beyond the service equipment mounting rack in the SA-1/Power Line Corridor project area. These costs shall be identified with each of the separate bid items as appropriate.

ITEM A33 TEMPORARY 4" PVC GAS PIPING:

1. The unit bid price per linear foot for Temporary 4" PVC Gas Collection Piping shall be full compensation for all labor, tools, equipment, and materials necessary to furnish the temporary 4" PVC Gas Collection pipe as directed by the Engineer and these Specifications.

ITEM A34 TEMPORARY 2" PVC CONDENSATE DISCHARGE PIPING

1. The unit bid price per linear foot for 2" PVC Condensate Discharge Piping shall be full compensation for all labor, tools, equipment and materials necessary to furnish and install the temporary condensate piping as directed by the Engineer and these Specifications.

ITEM A35 TEMPORARY CONDENSATE MANHOLE:

1. The unit price per each for the Temporary Condensate Manhole shall be full compensation for all labor, tools, equipment, and materials necessary to furnish and install the temporary condensate manhole as directed by the Engineer and these Specifications.

ITEM A36 TEMPORARY GAS FLARE:

1. The unit price per each Temporary Gas Flare shall be full compensation for all labor, tools, equipment and materials necessary to furnish, install, transport, and reinstall the

Temporary Gas Flare, including foundations, as indicated on the Plans and as directed by the Engineer and these Specifications.

ITEM A37 LABORERS FOR TEMPORARY SYSTEM CONSTRUCTION:

1. The unit price per hour for the Laborers for Temporary System Construction shall be full compensation for help to assist the Owner, as required, with the installation of the Temporary Gas Collection System as directed by these Specifications.

ITEM A38 OPERATOR AND EQUIPMENT FOR TEMPORARY SYSTEM CONSTRUCTION

1. The unit per hour for Operator and Equipment for Temporary System Construction shall be full compensation for all labor, tools, equipment, and materials necessary to transport the Temporary 4" PVC gas collection piping as directed by the Owner and these Specifications.

*** * * END OF SECTION * * ***

SECTION 01041

PROJECT COORDINATION

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Separate Contracts: Article 6 General Conditions
- B. Subcontractors: Article 4 General Conditions
- C. Work Under Separate Contracts: Section 01010
- D. Job Site Administration: Section 01043
- E. Field Engineering: Section 01050
- F. Preconstruction Conferences: Section 01210
- G. Progress Meetings: Section 01220
- H. Shop Drawings, Project Data and Samples: Section 01340

1.2 POLICY IN PRACTICE

- A. Engineer is Metro's Advisor and Consultant:
 - 1. Inspection and Testing Laboratories are to furnish data and guidance only and may make no decisions involving changes in the Contract.
 - 2. All job located questions or problems shall be handled through the Resident Engineer/Construction Manager.
- B. Metro's desires and instructions will be channeled through the Engineer regarding all phases of the Contract.
- C. Contract related communication from Contractor shall be handled through the Engineer.
- D. Coordination of all Subcontractors is the responsibility of the Contractor.
- E. Documents of the Contract are directed to the Contractor and not the Subcontractors involved.
- F. The Contractor is solely responsible for construction methods and the results thereof regardless of any advice, information, methodology or scheduling unless such advice, methodology or scheduling is written

into the Contract or given in writing by the Engineer or Metro.

- G. Metro is solely responsible for approving and all changes to the Contract Documents. All such changes will be provided in writing via a Contract Change Order.

1.3 COORDINATION OF TRADES AND SUBCONTRACTORS

- A. Coordination is the responsibility of the Contractor. He shall assure coordination with suppliers, electrical contractors, mechanical contractors and all trades to the end that:
 - 1. All necessary equipment, work and structures are scheduled, installed and tested in proper sequence.
 - 2. He shall assure that electrical and mechanical equipment, wiring and control equipment, piping and plumbing, grading and landscaping and all problems of supply, installation and scheduling are coordinated and that the relations of all elements are carried out in an orderly manner in accordance with the Contract.
 - 3. Contractor shall coordinate all suppliers of equipment, controls and electrical supplies before submittal of shop drawings.

1.4 COORDINATION OF UTILITIES

- A. Contractor shall schedule and supply utilities as required in the Contract.

1.5 PUBLIC AGENCIES

- A. Contractor shall coordinate his schedule and activities with Metro, the Engineer and various agencies involved as the necessity arises and as required by the Contract:
 - 1. Power
 - 2. Water
 - 3. Sewer
 - 4. Electrical
 - 5. Other Utilities

6. Police
7. Fire
8. Schools
9. County
10. City
11. State
12. Other Public Agencies

*** * * END OF SECTION * * ***

SECTION 01041

PROJECT COORDINATION

1. GENERAL

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- A. Separate Contracts: Article 6 General Conditions
- B. Subcontractors: Article 4 General Conditions
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- E. Documents of the Contract are directed to the Contractor and not the Subcontractors involved.
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 3. Contractor shall coordinate all suppliers of equipment, controls and electrical supplies before submittal of shop drawings.

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- A. Contractor shall schedule and supply utilities as required in the Contract.

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2. Water
3. Sewer
4. Electrical
5. Other Utilities
6. Police
7. Fire
8. Schools
9. County
10. City
11. State
12. Other Public Agencies

* * * END OF SECTION * * *

SECTION 01043

JOB SITE ADMINISTRATION

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Supervision: Article 2, General Conditions
- B. Summary of Work: Section 01010
- C. Project Coordination: Section 01041
- D. Temporary Electricity: Section 01511
- E. Temporary Water: Section 01515
- F. Protection and Maintenance of Work and Property: Section 01545

1.2 REMOVAL OF DEBRIS, CLEANING, ETC.

- A. Equipment, walls and floors shall be left clean and free of stains, paint or roofing splashes or other marks or defects.
- B. Upon completion, the site of all work or equipment and material storage areas shall be restored to substantially their original condition.

1.3 TESTS

- A. Where the Specifications require work to be specifically tested or reviewed, it shall not be tested or covered up without timely notice to the Engineer of its readiness for inspection, unless the Engineer waives such notice.
- B. Should any such work be covered up without such notice, approval or consent, it must, if required by the Engineer, be uncovered for examination at the Contractor's expense.
- C. Where work is to be tested, all necessary equipment shall be set up and the work given a preliminary test so that any and all defects may be discovered and repaired prior to calling out the Engineer for the "record" test.

1.4 COMMENCEMENT OF WORK ON PUBLIC AND PRIVATE RIGHT-OF-WAY

- A. Work shall not be started on any public or private right-of-way until clearance is given the Contractor by the Engineer.
- B. It will be the responsibility of the Contractor to comply with any special requirements of any permits or easements acquired by Metro for the project

* * * END OF SECTION * * *

SECTION 01050

FIELD ENGINEERING

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Job Site Administration: Section 01043**
- B. Construction Schedules: Section 01310**

1.2 GENERAL REQUIREMENTS

- A. The Contractor shall protect and preserve in their original position all stakes, points, or marks set for the work.**
- B. If any stakes and markings are destroyed or defaced by the Contractor's operations before their use is ended, the full cost of replacing them will be at the Contractor's expense.**
- C. Working operations shall be suspended at different points for such brief and reasonable time as may be required for giving of lines and grades, taking measurements and making inspections. Such delays shall be considered incidental to the Contract and no additional compensation will be allowed.**
- D. Any claim by the Contractor for extra compensation by reason of alterations or reconstruction work allegedly due to error in the Engineer's staking, will not be allowed unless the original control points set by the Engineer still exist, or unless other satisfactory substantiating evidence to prove the error is furnished to the Engineer.**
- E. The Contractor shall transfer lines and grades from the control points given to his own work at his own expense.**

1.3 PRECONSTRUCTION SURVEY BY ENGINEER

- A. Preconstruction survey will be performed by the Engineer to include the following:**
 - 1. Survey Control Points**

2. Existing Site Contours

1.4 CONSTRUCTION STAKING BY ENGINEER

A. The Engineer will provide the following construction stakes:

1. Survey Control Points will be established at four (4) locations for the Contractors use. Each point will establish horizontal and vertical control for the project. The four Survey Control Points will be located as follows:

- Sta #7 (see Sheet 3 of Plans)
- Sta #8 (see Sheet 3 of Plans)
- North most BPA tower footing
- Center BPA Tower footing (south of SA-1 project

limits)

2. An AutoCAD file will be provided to the Contractor for the grading plan (Sheet 5 of Plans) to enable the Contractors surveyor to obtain additional detailed control information necessary for the successful completion of the grading plan.

B. Surveys will be performed by the Engineer in conjunction with appropriate unit price bid items which require final volumetric measurement. Refer to Section 01025. The timing of these surveys will vary with Contractors work schedule. The Engineer will provide surveys for the following final quantity measurements:

1. Existing Topsoil Removal
2. Compact Subgrade Embankment

Additional surveys may be performed by Engineer where necessary. Contractor will make measurements as required for interim progress payments.

1.5 CONSTRUCTION STAKING BY CONTRACTOR

- A. Contractor will provide and pay for all survey and field engineering services except as provided by the Engineer.
- B. Contractor will record changes in location or layout of permanent features or structures on the Project Record Documents.
- C. Staking when performed by Contractor shall be done by qualified

licensed surveyors. Prior to the Contractor conducting any survey work, the Contractor shall submit to Metro evidence of the qualifications of the person(s) he will assign to do the survey work for the project. Metro reserves the right to disallow the person(s) selected by the Contractor for surveying if, in Metro's opinion, the person is not qualified to do the work. The Contractor shall select another surveyor and submit qualifications to Metro until a qualified person is approved by Metro.

- D. Control points shall be utilized by the Contractor's surveyor to stake out the project. The Engineer will provide the Contractor with a copy of survey field notes, when appropriate.
- E. The Contractor shall provide the Engineer with a copy of all field notes including references to control points or other features. Notes shall be submitted to the Engineer as quickly as possible following the staking, but in no case longer than 2 days after staking is completed. The Contractor shall provide the Engineer with a copy of grade sheets, prior to construction work on any specific portion of the project.

*** * * END OF SECTION * * ***

SECTION 01070

ABBREVIATIONS AND SYMBOLS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Definitions: General Conditions

1.2 ABBREVIATIONS

A. Whenever the following abbreviations are used on the plans, specifications, proposals, and contracts, they shall be construed to mean the words and terms as listed below.

B. Duplicate definitions shall be interpreted in context of use.

| | | | |
|----------|--|------|---|
| <u>A</u> | | | |
| AASHTO | American Association of State Highway and Transportation Officials | AISC | American Institute of Steel Construction |
| ACI | American Concrete Institute | AISI | American Iron and Steel Institute |
| AITC | American Institute of Timber Construction | | |
| AGA | American Gas Association | AMCA | Air Moving and Conditioning Association |
| AGC | Associated General Contractors of America | ANSI | American National Standards Institute |
| AGMA | American Gear Manufacturer Association | APA | American Plywood Association |
| AIA | American Institute of Architects | API | American Petroleum Institute |
| | | APWA | American Public Works Association |

| | | | |
|----------|--|---------------------------------------|---|
| AREA | American Railway Engineering Association | CPM | Critical path method |
| ASAE | American Society of Agricultural Engineers | CRSI | Concrete Reinforcing Steel Institute |
| ASCE | American Society of Civil Engineers | CMP | Corrugated Metal Pipe |
| ASHRAE | American Society of Heating, Refrigeration, and Air Conditioning Engineers | <u>D</u> | |
| ASME | American Society of Mechanical Engineers | DFP | Douglas Fir Plywood Association |
| ASTM | American Society for Testing and Materials | DIPRA | Ductile Iron Pipe Research Association |
| AWPA | American Wood Preservers Association | DI | Ductile Iron |
| AWS | American Welding Society | <u>E</u> | |
| AWWA | American Water Works Association | EA | Each |
| <u>B</u> | | EEO | Equal Employment Opportunity |
| BTU | British thermal unit | EPA | Environmental Protection Agency (Federal) |
| BTUH | British thermal units per hour | <u>F</u> | |
| <u>C</u> | | F | Fahrenheit |
| C | Centigrade/Celsius | FED SPEC | Federal Specification |
| CBMA | Certified Ballast Manufacturers Association | FHWA | Federal Highway Administration |
| CFM | Cubic feet per minute | FPM | Feet per minute |
| CFS | Cubic feet per second | FT, FT ² , FT ³ | Foot, square feet, cubic feet |
| CY | Cubic Yard | <u>G</u> | |
| <u>H</u> | | GA | Gage, Gauge |
| HDPE | High Density Polyethylene | GAL | Gallon |
| HOA | Hand-Off-Auto | GALV | Galvanized |
| HP | Horsepower | GPD | Gallons per day |
| HR | Hour | GPH | Gallons per hour |
| | | GPM | Gallons per minute |
| | | <u>L</u> | |
| | | L | Length |
| | | LB | Pounds |
| | | LF | Linear feet |
| | | LS | Lump Sum |

HT Height

Hz Hertz

I
ID Inside Diameter

IEEE Institute of Electrical
and Electronics Engineers

IN, IN², IN³ Inch, square inches,
cubic inches

ISA Instrument Society of America

J
JIC Joint Industry Conference of
Hydraulic Manufacturers

K
KV Kilovolt

KVA Kilovolt ampere

KVAR Reactive kilovolt amperes

KW kilowatts

KWH kilowatt hours

NESC National Electric Safety
Code

NFPA National Fire Protection
Agency

NPC National Plumbing Code

NPT National pipe thread

NRS Non-rising stem

NLMA National Lumber Manufacturers
Association

M

M Thousand

MA Milliamperes

MBTUH One thousand British
thermal units per hour

MGD Million gallons per day

mgl Milligrams per liter
mil One thousandth of an inch

MIN Minute

MSS Manufacturers Standardization
Society of the Valve and Fittings
Industry

MV Millivolts

MVA Megavolt amperes

N
NAMM National Association of
Metal Manufacturers

NBFU National Bureau of Fire
Underwriters

NEC National Electrical Code

NEMA National Electrical Manuf. Ass.

PVC Polyvinyl chloride
PT Pint

Q

R
RPM Revolutions per minute

S

SAE Society of Automotive Engineers

SCBA Self-contained Breathing Apparatus

SCFM Standard cubic feet per minute

O
OD

Outside diameter

OZ

Ounce

P

PCA Portland Cement Association

pcf Pounds per cubic foot

ph Hydrogen ion concentration

PH

Phase

PPM

Parts per million

PSF

Pounds per square foot

PSI

Pounds per square inch

PSIG

Pounds per square inch gauge

V

V Volt

VLDPE Very Low Density Polyethylene

W

WCLIB West Coast Lumber Inspection
Bureau

WWPA Western Wood Products
Association

X

Y

Z

SF Square Foot

SMACNA Sheet Metal and Air
Conditioning Contractors
National Association

SY Square Yard

SQFT Square foot

SQIN Square inch

SQMI Square mile

SSPC Steel Structures Painting
Council

T

T Tons

U

UBC Uniform Building Code

UL Underwriter's Laboratory

UPC Uniform Plumbing Code

*** END OF SECTION ***

SECTION 01090

REFERENCE STANDARDS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. All Divisions: As referenced

1.2 AUTHORITY

- A. Contractor is responsible to conform to all codes and regulations legally in effect at the location of the project.
- B. Contractor shall conform to all requirements and regulations of the authority administering such codes and regulations.

1.3 REFERENCE CODES

- A. Contractor shall conform to all codes and sections thereof as may be referred to in the specifications.
- B. Referenced codes are, by such reference, incorporated into this Contract as if set forth herein in full.

1.4 SPECIFICATIONS INCORPORATED BY REFERENCE

- A. Where Federal, AWWA, ASTM, or any other standard specifications are referred to, or included by reference, the latest issue and/or amendment there to published at the date of issue of the Advertisement for Bids shall be incorporated in the Contract by said reference as if set forth herein in full.

*** * * END OF SECTION * * ***

SECTION 01100

HEALTH AND SAFETY PROGRAM

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. General Conditions - Article 10, Safety and Protection of the Work
- B. Section 01400 Contractor Quality Control
- C. Section 01220 Progress Meetings
- D. Section 02222 Excavating, Backfilling and Compacting for Utilities
- E. Section 02150 Shoring
- F. Appendix - Site Characterization/Health and Safety Hazards (Marine and Environmental Testing, Inc.)
- G. OSHA Regulations and Applicable Oregon Occupational Safety and Health Codes

1.2 SUBMITTALS

- A. Contractor will submit to Metro a written Health and Safety Plan no later than 14 days after Notice to Proceed. The Plan must be approved before Contractor begins work. Please refer to the special requirements for hazardous waste operations in paragraphs 1.8 through 1.10.
- B. Contractor will submit the name and qualifications of the proposed Site Health and Safety Officer as soon as possible but no later than 14 days after Notice to Proceed. This individual must be approved by Metro and appointed before Contractor begins work.
- C. Contractor will submit the names and qualifications of first aid trained personnel who will be available for administering first aid on each shift prior to beginning work. Include a list of first aid equipment available. Coordinate with and provide contact information for local health and safety agencies as follows:
 - 1. Emergency Medical Treatment and Evacuation
 - 2. Hospital

3. Fire Department
4. Law Enforcement

- D. Contractor will develop a detailed activity hazard analysis on each new phase of work prior to the start of work on that phase. This is in addition to the more preliminary hazard analysis included in the Health and Safety Plan. These hazard analyses will be reviewed with Metro and upon approval become a part of the Health and Safety Plan.
- E. Furnish reports of weekly tool box safety training as completed.

1.3 HEALTH AND SAFETY LAWS AND REGULATIONS, AND REQUIREMENTS FOR HAZARDOUS WASTE OPERATIONS

- A. The St. Johns Landfill is classified as a sanitary landfill. Most of the work involved in the project falls under OSHA and Oregon OSHA rules pertaining to ordinary construction, and Contractor shall conform to such rules when completing ordinary construction tasks. Some of the tasks involve the possibility of exposure to known and unknown materials that may be considered hazardous substances. These tasks include, but are not limited to,
 1. Work around vertical gas collection wells and water monitoring wells.
 2. Intentional excavation and work in refuse such as excavation of the horizontal gas trenches and laying gas collection pipe, excavation for manholes, sedimental basin, culverts, flume, etc.
 3. Minor excavation of refuse during grading operations
 4. Diversion, removal and disposal of leachate.

For this type of work, Contractor shall ensure compliance with all requirements of the Federal Occupational Health and Safety Act of 1970 (OSHA), as amended including, OSHA 29 CFR Part 1910 Hazardous Waste Operations and Emergency response, Final rule, Oregon Administrative Rules (OAR) 437-02-100 et. seq. and with any other applicable Oregon Industrial Health and Safety provisions as they apply to health and safety provisions for hazardous waste operations, and all other applicable federal, state, county, and local laws, ordinances, codes, the requirements set forth herein, and any regulations that may be specified in other parts of this Contract. If any of these requirements are in conflict, the more stringent requirements shall apply. Contractor's failure to thoroughly familiarize himself with the aforementioned health and safety

provisions shall not relieve Contractor of responsibility for full compliance with the obligations and requirements set forth therein. Where "Hazardous Waste Operations" is mentioned in the regulations listed above, it shall be interpreted in this Specification to include any person potentially exposed to hazards including, but not limited to, landfill gas, landfill gas condensate, asbestos or leachate at the St. Johns Landfill. Contractor is cautioned that the aforementioned OSHA and other referenced regulations require, among other items, the following:

1. A site specific Health and Safety Plan. (Note: This plan is to be written in sufficient detail to satisfy all requirements of OSHA 29 CFR Part 1910.120, and must be submitted for review by Metro prior to start of work on this site.)
2. A Site Health and Safety Officer as described in paragraph 1.5 these Specifications.
3. A provision for Personal Protective Equipment, Level "B" which shall include, at a minimum:
 - ▲ Positive pressure, full-facepiece SCBA or positive pressure supplied-air respirator with escape SCBA.
 - ▲ Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one or two-piece chemical splash suit; disposable chemical-resistant one-piece suit).
 - ▲ Inner and outer chemical-resistant gloves.
 - ▲ Chemical-resistant safety boots/shoes.
 - ▲ Hard hat.
 - ▲ Two-way radio.
4. Medical surveillance exams as described in OSHA 29 CFR Part 1910.120, Paragraph (f).
5. Hazardous Waste Operator Training as described in OSHA 29 CFR Part 1910.120, Paragraph (e).

B. The provisions mentioned above are considered minimum requirements for this project.

1.4 PRESENT SITE CHARACTERIZATION

- A. The possibility exists of encountering gases, leachates, asbestos and/or other substances that may be potentially hazardous to the health and safety of personnel during work at the St. Johns Landfill. Tables of known substances and gases at the maximum concentration levels found at the landfill site are included in the Appendix and should be considered in preparing the Health and Safety Program. The information in the

Appendix represents only the substances and gases identified to date. Since other substances and gases may be present and may be found during work pursuant to the Contract, Contractor should consider the possibility of encountering other substances or gases in preparing the Health and Safety Program. Contractor is solely and completely responsible for meeting all applicable laws, regulations and requirements of Paragraph 1.3 above for employee health and safety during the work performed under this Contract. Contractor shall provide all personnel working on the project with required orientation and training on the potential hazards anticipated and the appropriate use of safety equipment.

1.5 CONTRACTOR'S RESPONSIBILITY FOR HEALTH AND SAFETY FOR HAZARDOUS WASTE OPERATIONS

- A. Contractor shall have sole responsibility for the safety, efficiency, and adequacy of Contractor's plant, appliances, and methods, and for any damage or injury resulting from their failure, or improper maintenance, use, or operation. Contractor shall be solely and completely responsible for the conditions at the site including health and safety for the authorized persons and property in performance of the Work. This requirement shall be continuous, and shall not be limited to normal working hours. The required or implied duty of the Engineer or Metro to review or approve Contractor's performance or any submittal of Contractor shall not be construed as relieving Contractor of full responsibility for worker safety and compliance with applicable laws, regulations and requirements.
- B. Contractor shall observe and comply with all applicable laws, regulations and requirements of Paragraph 1.3, above. Such information, interpretation, or representation of laws, regulations, or ordinances referenced in the Contract Documents shall not take precedence over the law, regulation, or ordinance itself, nor relieve Contractor of responsibility for determining the true current construction and content of such laws, regulations, and ordinances.
- C. Contractor shall appoint a Site Health and Safety Officer who has experience in industrial hygiene, such as an Industrial Hygienist certified by the American Industrial Hygiene Association or approved equal and who is qualified by experience and training in hazardous waste operations in accordance with the applicable laws, regulations, and requirements of Paragraph 1.3, above. The Site Health and Safety Officer shall be qualified and authorized to monitor, supervise and enforce compliance with the site Health and Safety Program.
- D. Contractor, through his Health and Safety Officer shall be solely responsible for the detection of contaminated gases, soils or liquids.

Contractor shall provide for the protection and the health and safety of all workers and other authorized persons at the job-site from exposure to potentially hazardous substances.

- E. Contractor shall be responsible for ensuring that all necessary monitoring equipment, protective clothing, and other supplies and equipment up to the appropriate level of protection as defined by the applicable laws, regulations, and requirements of Paragraph 1.3 above are available to implement the plan. No work shall take place in areas where hazardous substances may potentially be present unless the Site Health and Safety Officer is present and monitoring of the site conditions is accomplished.
- F. Contractor, through the Site Health and Safety Officer, shall not permit any employee, in the performance of the Contract, to work under conditions which are hazardous to the employee. Should violations of the health and safety requirements be called to the Site Health and Safety Officer's attention by Metro or Engineer or any authorized representative of a regulatory agency, Contractor shall immediately correct the identified conditions.
- G. In the event Contractor fails or refuses to promptly comply with any compliance directive, Metro may issue an order to stop all or any part of the work. When compliance with the directive is accomplished an order to resume work will be issued. Contractor shall not be entitled to any extension of time or any claim for damage or to any additionally compensation for either the directive or the work suspension order. Failure of Metro to order discontinuance of any or all of Contractor's operations shall not relieve Contractor of responsibility for safety.
- H. Contractor shall maintain in a manner acceptable to Metro an accurate record of, and shall report to Metro and Engineer, all cases of death, occupational diseases, or traumatic injury to employees or the public incident to the performance of work under this Contract. Records to be kept by the Site Health and Safety Officer shall include as a minimum: daily log; all gas analyses; reports of variances in conditions; report of any illnesses, disease, injury, pulmonary disorder or death to any person on the site.
- I. The Site Health and Safety Officer shall immediately notify Metro and Engineer of any emergencies as soon as possible following an incident. The site specific Health and Safety plan must also describe the emergency reporting procedures and actions to be taken in the event of an emergency.

1.6 HEALTH AND SAFETY PLAN FOR HAZARDOUS WASTE AND CONVENTIONAL OPERATIONS

- A. Contractor shall develop and implement for the duration of the work on or around the existing landfill a Site Health and Safety Plan for hazardous waste and conventional operations for its employees that is in compliance with the laws, regulations and requirements of Paragraph 1.3 above. The plan shall incorporate the requirements of the applicable laws, regulations and requirements as well as the following items for its employees involved in hazardous waste operations. The items include, as a minimum:
- ▲ Site Characterization and Health Risk and Hazard Analysis
 - ▲ Site Control Measures
 - ▲ Training
 - ▲ Medical Surveillance
 - ▲ Engineering controls, work practices and personal protective equipment
 - ▲ Monitoring Program
 - ▲ Informational Program/Hazard Communication Program
 - ▲ Material Handling
 - ▲ Decontamination Procedures
 - ▲ Emergency Response
 - ▲ Illumination
 - ▲ Sanitation
 - ▲ Site Excavation
 - ▲ Contractors and Sub-Contractors
 - ▲ Standard operating procedures for health and safety
 - ▲ Names of key personnel and alternatives responsible for site health and safety
 - ▲ Personal protective equipment program
 - ▲ Confined space entry procedures
 - ▲ Spill containment program
- B. In the event the Health and Safety Program implemented for the duration of the work on or around the existing landfill is determined by Metro or a regulatory agency to be inadequate to protect the employees and the public, then such plan shall be promptly modified to meet the requirements of Metro or those regulatory agencies.

1.7 MONITORING FOR HAZARDOUS WASTE OPERATIONS

- A. As a part of the Health and Safety Program, Contractor shall perform monitoring so that employees are not exposed to levels which exceed established Permissible Exposure Limits or published exposure levels for hazardous substances.
- B. Identification of areas of potentially hazardous substances shall be made through observations and through a continuous ongoing monitoring program designed to detect contaminated air, soil, and surface water.

Contractor shall develop a monitoring program in accordance with the requirements outlined in these Contract specifications that will provide Metro with certain information, as specified herein, that is needed to identify these potentially contaminated areas, as well as to provide information necessary to comply with relevant worker health and safety regulations. Contractor shall require all workers to report any observations of potentially hazardous substances or odors. Such observations will be reported to Contractor's On-Site Monitor who shall be qualified and responsible for conducting a regular monitoring program and to the site Health and Safety Officer.

- C. Contractor shall develop as part of the Site Health and Safety Plan a monitoring program that will provide for detection of the presence of potentially hazardous substances during excavation operations. The program shall include, at a minimum, the following elements:
- ▲ Instruction of workers in observing and reporting potentially hazardous substances such as refuse, oily sheen or color on soils or water, and oily or chemical odors.
 - ▲ Monitoring of excavated soils using a portable continuous analyzer, such as an HNU photo-ionization detector (PID), or an approved equivalent to detect the presence of non-methane organic vapors which could indicate chemical contamination. Monitoring devices shall be capable of detecting 0.1 ppm benzene and shall be calibrated daily by qualified personnel.
 - ▲ Periodic monitoring with a combustible gas indicator such as an MSA Model 361, or an approved equivalent with both audible and visual alarms during operations where the soil surface is being disturbed or when work is being performed below ground level. Calibrate the instrument in accordance with manufacturer's instructions prior to use. Set audible alarm at 10 percent LEL (lower explosive limit).
 - ▲ Development of action levels for worker safety when potential contamination is detected by monitoring equipment.
 - ▲ Development of an emergency medical care and treatment plan.
 - ▲ Submittal of copies of all monitoring records to the Engineer on a weekly basis.
- D. During construction, Contractor's soil and gas monitoring shall consist of inspection for visual abnormalities, odors and gases using a photo-ionization detector (PID) and a combustible gas meter. The visual and odor inspection will be an ongoing responsibility of all Contractor's employees. In addition, the air quality will be monitored continuously for all trench excavations, suspect soils, and area identified as known refuse soils. The meters shall be calibrated in accordance with manufacturer's instructions.

- E. In addition to the minimal requirements outlined herein, Contractor shall fully comply with the laws, regulations, and requirements of Paragraph 1.3 above relating to worker health and safety and the potential presence of contaminated air, soil, and/or water.

1.8 NOTIFICATION AND SUSPENSION

- A. In the event Contractor's monitoring program detects the presence of a potentially hazardous substance at concentrations at or above established Permissible Exposure Limits or published exposure levels, Contractor shall immediately notify the Engineer and Metro. Following such notifications by Contractor, Metro may notify the various governmental and regulatory agencies concerned with the presence of potentially hazardous substances. Depending upon the type of the problem identified, Metro may further suspend the work in the vicinity of the material discovery.
- B. Following completion of any further testing necessary to determine the nature of the material, Metro will decide the manner in which the substance will be handled or disposed of and the actual procedures to be used in resuming the work.
- C. Although the actual procedures used in resuming the work shall depend upon the nature and extent of the potentially hazardous substance, Metro foresees the following alternatives operation as possible:
- ▲ Contractor to resume work as before suspension.
 - ▲ Contractor to move work operations to another portion of the site until measures to eliminate any hazardous conditions can be affected.
 - ▲ Metro will direct Contractor to dispose of the excavated refuse material at locations determined by Metro or at other appropriate and approved sites.
- D. If suspect air, soils and/or liquid is identified by the monitoring program and construction activity is terminated at the suspect location by Metro and Contractor cannot move his operation to another portion of the work, Contractor shall be compensated for idle time of all equipment in actual use at the time of the potentially hazardous substance identification at the potentially hazardous substance location. Contractor shall be compensated for those hours or days the equipment is idled until a determination of the condition is made. Labor that is idled and cannot be diverted to other work will be paid through the one-half shift of the day during which the work is suspended. No compensation will be made for overhead, profit and/or any other general expenses. Contractor shall maintain records in such a manner as to provide the Engineer and Owner with a daily report sheet itemizing the equipment (size, type and identification number) idled

and the charges for equipment rental. Said daily report sheets shall be signed by Contractor or an authorized agent of Contractor. The charges for equipment rental shall not exceed the rates allowed under Force Account Work set forth in the General Conditions.

1.10 CORRECTIVE ACTIONS

Appropriate corrective actions are dependent upon the nature and extent to the contamination identified, and will be determined on a case-by-case basis by Contractor, Metro and the regulatory agency having jurisdiction.

*** END OF SECTION ***

SECTION 01210

PRECONSTRUCTION CONFERENCES

1 GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Summary of Work: Section 01010
- B. Measurement and Payment: Section 01025
- C. Project Coordination: Section 01041
- D. Job Site Administration: Section 01043
- E. Progress Meetings: Section 01220
- F. Shop Drawings, Project Data and Samples: Section 01340
- G. Schedule of Values: Section 01370
- H. Product Requirements/Substitutions: Section 01600

1.2 SCHEDULE

- A. Metro will schedule a preconstruction meeting after execution of the Contract.
- B. Present at the meeting to represent Contractor shall be at least the official in charge of the project, the project superintendent, a representative of each Subcontractors, and other representatives as required.
- C. Appropriate representatives of Metro, the Engineer and the Geotechnical Engineer will be present.
- D. Proceedings of meeting to be recorded and distributed to interested parties by Metro.

1.3 AGENDA

- A. Introduction:

1. Roster - Sign in names, addresses, phone numbers.
2. Introduction of key representatives. Metro will introduce Metro representatives and representatives of regulatory agencies. Contractor will introduce their own representatives and Subcontractors who are present.

B. Construction Schedule

1. Notice to Proceed Date of Record:
2. Schedule of Work
 - a. Required Completion Date
 - b. Date for Starting Subsequent Contract
 - c. Preliminary Schedule
 - d. Initial or Zero Progress Construction Schedule
 - e. Schedule Updates
 - f. Two Week Schedule
 - g. Daily Work Plan
3. Working Hours/Overtime/Additional Shifts
4. Contractors Plan of Operation

C. Coordination

1. Soils Procurement Contractor
2. Existing Utilities
3. Existing Conditions of Site and Adjacent Area
4. Bridge Access/Limitations
5. Traffic Control/Haul Roads
6. Site Layout
7. Permits
8. Regulatory Agencies
9. Monitoring well activities

D. Communications

1. Lines of Authority Between Metro, Engineer and Contractor
2. Correspondence Routing
3. Submittals/Shop Drawings
4. Requests for Information/Clarification

E. Contract Administration/Finances

1. Contract, Bonds, Insurance
2. Scope of Work
3. Payments
 - a. Process
 - b. Formats
 - c. Timing
4. Change Order Procedure
5. Schedule of Values
6. Insurance

F. Construction

1. Survey and Layout
2. Contractors Quality Control
3. Metro Construction Quality Assurance Plan
4. Safety and Security
5. Progress Meetings
6. Record Documents
7. Delivery of Permanent Materials
 - a. Borrow Sites

- b. Measurement and Payment for Sand and Subgrade Embankment Material
 - c. Inspection and Receiving Reports
- 8. Housekeeping/Maintenance of Access Roads
- 9. Clean up and Disposal
- 10. Final Acceptance
- 11. Records
- G. Environmental Issues
 - 1. Hazardous Materials/Health & Safety Program
 - 2. Leachate Control
 - 3. Site Drainage and Erosion Control
- H. Questions
- I. Comments and Closing Remarks

*** * * END OF SECTION * * ***

SECTION 01220

PROGRESS MEETINGS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Summary of Work: Section 01010
- B. Project Coordination: Section 01041
- C. Construction Schedules: Section 01310
- D. Project Record Documents: Section 01720
- E. Preconstruction Conferences: Section 01220

1.2 MEETINGS

- A. There will be scheduled Progress Meetings every week at mutually agreed time.
- B. Special Meetings in addition to the regular Progress Meetings may be held at the discretion of Metro or other involved parties.
- C. Location of meetings: As designated during preconstruction conference.
- D. Attendance:
 - 1. Engineer and his Subconsultants
 - 2. Metro
 - 3. Contractor
 - 4. Other Contractors (if any)
 - 5. Subcontractors as pertinent to agenda
 - 6. Safety Representative (if any)
 - 7. Representatives of Governmental or other Regulatory Agencies
 - 8. Other invited parties

1.3 MINIMUM MEETING AGENDA

- A. Review, approve minutes of previous meeting.
- B. Review work progress since last meeting.
- C. Review the construction schedule. Contractor will hand out copies of the planned two week schedule at this time.

D. Discuss problems which impeded planned progress such as:

1. Submittals
2. Requests for Information
3. Claims or Changes
4. Material or equipment delivery

E. Discuss quality of work

F. Review field observations

G. Administrative, safety and housekeeping problems

H. Other Current Business

*** * * END OF SECTION * * ***

SECTION 01310
CONSTRUCTION SCHEDULES

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Summary of Work: Section 01010
- B. Project Coordination: Section 01041
- C. Field Engineering: Section 01050
- D. Progress Meetings: Section 01220
- E. Shop Drawings, Project Data and Samples: Section 01340
- F. Schedule of Values: Section 01370
- G. Product Requirements/Substitutions: Section 01600

1.2 PRELIMINARY SCHEDULE

- A. The Contractor shall submit within five (5) days after Notice to Proceed, a preliminary project schedule in graphic form (e.g. bar chart) showing proposed schedule of anticipated progress to include all major operations and items and time of anticipated completion of major portions of the work.
- B. The preliminary schedule shall be accompanied by a narrative work plan which will include the following information:
 - 1. Manpower levels planned to achieve durations shown in the preliminary schedule.
 - 2. Equipment utilization planned for each activity taking place on site.
 - 3. Identification of work planned for overtime or additional shifts.

4. Identification of planned assets for import delivery including planned borrow sites, numbers and types of trucks forecasted.
 5. Plans for wet weather work.
 6. Identification of critical work or supply activities.
- C. The preliminary schedule will be reviewed within three (3) days by the Engineer and Metro. Comments will be forwarded to Contractor for his consideration and action where appropriate. A revised preliminary schedule shall be resubmitted by the Contractor three (3) days after receiving Engineer and Metro comments, if so required.

1.3 CONSTRUCTION SCHEDULE

- A. The Contractor shall submit within twenty (20) days of Notice to Proceed an overall project schedule in both graphic and tabular form.
- B. The schedule shall utilize a standard Critical Path Method (CPM) computer program using either the Arrow Diagram Method (ADM) or Precedence Diagram Method (PDM) which will furnish a mathematical analysis and identification of the critical path.
- C. Reports to be furnished with the CPM schedule will include:
1. Work Item Number in ascending order
 2. Total Float/Early Start in ascending order
 3. Early Start in ascending order
 4. Late start in ascending order
 5. Predecessor report
 6. Successor report
- D. The graphic schedule will be of a format suitable for use by the Contractor and acceptable to Metro.
- E. The work activities in the CPM will provide a complete sequence of construction, as well as submittal and delivery activity.

- F. Information shown for each activity on the CPM will include description, responsibility, duration, float, early and late start dates, early and late finish dates, preceding and succeeding activities and relationships, percentage complete or remaining duration.
- G. The Construction Schedule will be accompanied by an narrative similar in format to the provided in the Preliminary Schedule reflecting any refinements or changes to the planning process.
- H. The Engineer and Metro will review the Construction Schedule and provide comments to the Contractor for appropriate action including potentially revision and resubmittal. Once schedule is determined acceptable by Metro, this schedule will be designated the initial or zero progress schedule.
- I. Contractor will update the CPM and submit to Engineer and Metro on a monthly basis. CPM will be accompanied by a narrative report which will include:
 - 1) Description of work completed during the past month.
 - 2) Discussion of problem areas including current and anticipated delay factors.
 - 3) Description of schedule revisions made for this months update.
 - 4) Actions planned to mitigate delays or to facilitate construction progress.

1.4 CONTRACTOR TO SCHEDULE WORK

- A. Contractor shall keep the Engineer informed sufficiently in advance of the time and places at which he intends to work in order that the necessary measurements for record and payment may be made with the minimum of inconvenience and delay to both the Engineer and the Contractor.

1.5 TWO WEEK SCHEDULE

- A. Provide to the Engineer, on a weekly basis, a two week schedule using bar chart format in sufficient detail to plan and properly coordinate upcoming work.

1.6 SUBMITTALS BY CONTRACTOR

- A. Submit Preliminary Schedule prior to starting work.
 - 1. Engineer and Metro will review overall schedule and may return reviewed copy with suggested revisions within 5 days after receipt.
 - 2. If required by the Engineer, contractor shall resubmit a revised preliminary schedule within 3 days after return of reviewed copy.
- B. Submit initial CPM Construction Schedule within 20 days after Notice to Proceed.
- C. Submit monthly updated CPM Construction Schedule accurately depicting progress to first day of each month and anticipated work schedules.
- D. Submit a Two Week Schedule every week. Deliver to Engineer at the weekly Progress Meeting.
- E. Submit six copies of schedules to Engineer, both initial submittals and revised or updated schedules.

1.6 DISTRIBUTION BY CONTRACTOR

- A. Distribute copies of reviewed schedules to:
 - 1. Job site file
 - 2. Other contractors
 - 3. Subcontractors
 - 4. Other concerned parties

*** * * END OF SECTION * * ***

SECTION 01340

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Project Coordination: Section 01041
- B. Job Site Administration: Section 01243
- C. Construction Schedules: Section 01310
- D. Testing Laboratory Services: Section 01410
- E. Project Record Documents: Section 01720
- F. Product Requirements/Substitutions: Section 01600

1.2 SUBMITTAL REGISTER AND SCHEDULE

- A. Contractor will review the Contract Documents and identify all requirements for submittal of information to the Engineer and Metro. Contractor will arrange the listing of these submittals in order by section and paragraph beginning with the General Conditions, Supplementary Conditions and finally, the Technical Specifications in numerical order by section and paragraph. This document will be identified as the Submittal Schedule and will include the following information about each required submittal.
 - 1. Specification Section and Paragraph
 - 2. Transmittal Number (leave blank until submittal is made)
 - 3. Description
 - 4. Responsibility (Contractor, Sub or Supplier)
 - 5. Schedule Date - Date on which Contractor plans to submit
 - 6. Approval Required - Date approval is required to deliver the material by required date.
 - 7. Material Required - Date material is needed onsite.

8. Submittal Date - Leave blank until submittal is actually made.
 9. Review Status - No Exceptions Taken, Make Corrections Noted, Rejected, Revise and Resubmit, Submit Specified Item.
 10. Action Date - Date on which Metro actually returned the reviewed submittal to Contractor.
 11. Comment - Cross reference on notes as required.
- B. The Submittal Schedule will be submitted no later than 10 days after Notice to Proceed and should be coordinated with the information presented in the Construction Schedule.
- C. Sufficient lead time should be allowed for review and approval by Metro. Allow 10 days for review and approval. Specifically identify those submittals which will require an expedited review process.
- D. The Submittal Schedule upon acceptance by Metro will form the basis for the Submittal Register. Contractor will keep track of submittals as submitted by sequential number. Contractor will update his submittal Schedule with information from the Submittal Register on a monthly basis and furnish a copy to Metro.

1.3 SUBMITTALS

- A. All submittals including shop drawings, data and samples shall be submitted attached to a form furnished by the Engineer entitled "Shop Drawing Transmittal". Location by drawing number and paragraph of specification shall be shown on the form for the product or material being submitted. Each transmittal shall be assigned a unique number in sequential order.
- B. Shop drawings shall be submitted and reviewed in the following manner:
1. Contractor shall review, stamp with his approval and submit postpaid with such promptness as to cause no delay in his work or in that of any other contractor, the required number of copies of all shop drawings, schedules, data, and samples required for the work of the various trades determined necessary by the Engineer, required in the General Conditions and/or described elsewhere in the Project Specifications.
 2. Shop drawings shall establish the actual detail of all manufactured or fabricated items. All shall be drawn to scale and be completely dimensioned.

3. Sheet sizes of shop drawings shall be in multiples of 8 1/2 by 11 inches, preferably not exceeding 22 by 34 inches unless there is a special requirement for larger size sheets.
4. Provide on each drawing a clear space for the Engineer's review and approval stamps and comments.
5. Four (4) copies of shop drawings, manufacturer's literature, brochures, catalog cuts, and other pertinent printed matter or data shall be submitted in addition to the number of copies Contractor wishes returned to him.
6. Shop drawings may be submitted to the Engineer in the form of a reproducible transparency, along with one blackline or blue-line print. Mylars are preferred.
7. The Engineer shall review the shop drawings with reasonable promptness and will affix the Shop Drawing Review Stamp with notations thereon indicating "No Exceptions Taken", "Make Corrections Noted", "Revise and Resubmit", "Rejected" or "Submit Specified Item". He will then obtain the prints he requires from the transparency and forward it along with one marked-up copy of the reviewed copies of the other material, in excess of four, to Contractor.
8. When shop drawings and/or other submittals are required to be revised or corrected and resubmitted, Contractor shall make such revisions and/or corrections and resubmit the drawings or other material in the same manner as specified above.
9. Contractor shall obtain and provide such number of prints or copies of drawings as is required for his field distribution.
10. It shall be Contractor's responsibility to clearly note on the shop drawings, and in writing specifically call to the Engineer's attention, any changes and deviations that vary from the Contract Drawings and Specifications. No review of the shop drawings by the Engineer shall relieve Contractor of full responsibility and at his own cost and expense to comply with the Contract Documents.
11. If corrections are required, Contractor shall make the corrections required by the Engineer and file with him the same number of corrected copies as indicated above. Contractor shall direct specific attention in writing or, on resubmitted Shop Drawings to revisions other than the corrections requested on previous submissions. The Engineer will return to Contractor copies of drawings in the same

manner and number as before.

12. Shop Drawings shall give complete information necessary for the fabrication and installation of all component parts of the equipment, structure, facility, etc. In the case of structural drawings, they shall include the location, type, and size and extent of all welds, if any are necessary. Manufacturer's standard details, catalogues, advertising literature, etc., shall not necessarily constitute all of the shop drawings required for any unit or facility. Additional shop details designed for the particular project shall be furnished when required by the Engineer. Shop drawings of electrical equipment shall include complete diagrams of electrical circuitry.
13. The Engineer's review of and placement of shop drawing review stamp on any shop drawing is understood to be an acceptance of the character of the details and not a check of any dimension or quantity and will not relieve Contractor from responsibility for errors of any sort in shop drawings data or schedules, whether or not such errors are found by the Engineer in his review of such details.
14. No changes will be made in any shop drawing after it has been reviewed except by the consent or direction of the Engineer in writing.

C. Samples shall be submitted in the same manner as shop drawings.

1. Samples to be physical examples to illustrate materials, equipment or workmanship, and to establish standards by which completed work is judged.
 - a. Office samples: of sufficient size and quantity to clearly illustrate:
 - (1) Functional characteristics of product of material, with integrally related parts and attachment devices.
 - (2) Full range of color samples.
 - (3) After review the Engineer will retain two samples and return the remainder to Contractor.
 - b. Field samples and mockups
 - (1) Erect at project site location acceptable to Engineer.
 - (2) Construct each required sample or mock-up complete, including work of all trades required in finished work.
 - (3) Coordinate sampling of natural materials with Field Engineer.
2. If any test sample fails to meet the specification requirement, all previous approvals will be withdrawn and such materials or equipment,

which fail the testing, shall be subject to removal and replacement by Contractor with materials or equipment meeting the specification requirement.

3. Affected finish work shall not be commenced until the Engineer has given written approval for the field samples.

1.4 CONTRACTOR RESPONSIBILITY

- A. All submittals shall be attached to a "Shop Drawing Transmittal" form provided by the Engineer.
- B. Contractor shall review and approve shop drawings before submittal. Submittal directly from Subcontractor or Suppliers will not be accepted.
- C. By approving and submitting Shop Drawings and Samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, catalog numbers and similar data, or will do so, and that he has checked and coordinated each Shop Drawing with the requirements of the Work and of the Contract Documents and that there is no conflict with other submittals that may affect the work of another contractor of Metro.
- D. A copy of each approved shop drawing and each approved sample shall be kept in good order by Contractor at the job site and shall be available to the Engineer.

1.5 LIMITATION

- A. Two submittals (initial and revised) of each item requiring samples and/or shop drawings will be reviewed by the Engineer in the regular course of the Contract. However, all subsequent reviews of the same item over two will be reviewed at the expense of Contractor unless the right to an additional review without charge was previously approved in writing by the Engineer. Contractor will be billed by Metro at the Engineer's current established rates.

*** * * END OF SECTION * * ***

SECTION 01370

SCHEDULE OF VALUES

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Measurement and Payment: Section 01025
- B. Project Coordination: Section 01041
- C. Job Site Administration: Section 01043
- D. Progress Meetings: Section 01220
- E. Construction Schedules: Section 01310

1.2 TIMING

Submit to the Engineer a Schedule of Values for all Lump Sum bid items, at least 15 days prior to submitting first Application for Payment.

1.3 SUPPORT

Upon request by Engineer, support values given with data that will substantiate their accuracy.

1.4 DETAILED BREAKDOWN OF LUMP SUM BID PRICES

- A. Except in cases where unit prices form the basis for payment under the Contract, Contractor shall, within 15 days prior to First Application for Payment, submit a complete breakdown of all lump sum bid prices showing the value assigned to each part of the work including an allowance for profit and overhead.
- B. Each breakdown shall include, where applicable, separate items for Field Tests and Adjustments and Cleaning Up which shall total at least five percent of each breakdown's total price.
- C. The form of the breakdown shall separate labor from materials to arrive at a total for each unit. Breakdown shall be so organized as to facilitate assessment of work and payment of Subcontractors.
- D. Breakdown shall be balanced so that progress payments will not create a condition where sufficient funds are not available to complete the work. Contractor shall provide documentation substantiating the cost allocation if the Engineer believes that the costs are unbalanced.

- E. Upon acceptance of the breakdown of the lump sum bid prices by the Engineer, it shall be used as a basis for all requests for partial payment.
- F. Where Maintenance Manuals are required, no more than 50% of applicable lump sum bid prices shall be paid prior to receipt of a rough draft of the Maintenance Manual and no more than 90% of the final payment shall be made before receipt of the Maintenance Manual complete.

*** * * END OF SECTION * * ***

SECTION 01400

CONTRACTOR'S QUALITY CONTROL

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. General Conditions - Article 7 Control and Quality of work and Material.
- B. Technical Specifications pertaining to the work.

1.2 RESPONSIBILITIES

- A. Contractor is primarily responsible for quality control and will provide for sufficient supervision and control measures on a daily basis to ensure that the Work is completed in accordance with the Contract Documents.
- B. Metro and the Engineer are responsible for quality control assurance, and will monitor the quality of Work. Their activities in no way relieve Contractor of his quality control responsibilities.

1.3 REQUIREMENTS

- A. Quality Control Plan - Contractor will prepare and submit a plan of action to establish and maintain a Quality Control Program. The program as a minimum will contain:
 - 1. The quality control organization chart beginning with the responsible corporate officer.
 - 2. The names and qualifications of personnel selected to implement the program onsite.
 - 3. Authority and responsibility of the quality control staff.
 - 4. A breakdown of the schedule of work which includes proposed inspections, tests or other means of controlling the quality of work for each phase.
 - 5. Provides controls for each phase of work by establishing a system of inspections as follows:
 - a. Preparatory Inspection - This inspection will be conducted by Contractor prior to starting any new phase of work. Contractor's Quality Control Manager will review the contract

documents to ensure that required materials, equipment and procedures have been submitted and approved, are onsite and checked, that a reasonable, coordinated work plan has been prepared, that all previous work has been completed, inspected and tested as required. Contractor will schedule a preparatory conference with the Engineer and/or Metro Construction Coordinator to discuss the findings and to develop a material understanding on execution of the work and the quality standards which will be used. The hazard analysis will also be presented and discussed at this meeting. The inspection results and minutes of the conference will be documented by Contractor and a copy furnished to the Engineer and Metro Construction Coordinator. Subsequent to the conference, but prior to start of work, all involved working personnel and inspectors will be briefed on the work plan and the quality standards expected.

- b. Initial Inspection - This joint inspection by Contractor and the Engineer/Metro Construction Coordinator will be made as soon as a representative portion of the work has been accomplished. This inspection will be repeated if new crew member(s) are assigned to the work or if acceptable standards of workmanship are not being met. Contractor will, as a minimum, document this inspection in the daily Quality Control Report.
- c. Followup Inspections - Contractor will perform daily inspections of the work until completion.

- 6. Establishes a system of Quality Control Deficiency Reports to report deficiencies in the work or materials to determine appropriate correction and to track the execution of the correction.

B. Documentation

- 1. Daily Quality Control Report - This report will be furnished by Contractor in a suitable format on a daily basis over the signature of the Quality Control Manager or onsite Quality Control Representative. It shall be delivered to the onsite Metro Representative and/or Engineer by 10:00 a.m. on the following work day, and will contain as a minimum:
 - a. Weather
 - b. Manpower (listed by craft for Contractor and total for each Subcontractor).
 - c. A summary of activity for each shift and evaluation of the workmanship.
 - d. A record of any inspections which were made
 - e. Results of tests.

- f. Identification of deficiencies or rejections.
 - g. Proposed remedial sections.
 - h. Corrective actions taken.
 - i. Safety related issues.
 - j. Permanent materials deliveries and inspections.
2. Preparatory Inspection Meeting Record - This record will be delivered to the onsite Metro Representative and/or Engineer prior to the start of that phase of work but not later than three work days after the meeting. The hazard analysis separately described in Section 01100 can be delivered at the same time.
 3. Test Reports - A record of all tests shall be kept by Contractor on the job site. A copy of all test reports done by Contractor shall be provided to the Engineer and/or Metro.
 4. Quality Control Deficiency Reports - Contractor will prepare a deficiency report on all deficiencies in the work or in the quality of materials. The report will be logged and numbered and submitted to the Engineer and/or Metro along with the recommended remedy. Contractor will track the action through to completion, submitting a final report of inspection on the work in question.

C. Duties and responsibilities of the Quality Control Manager or a designated representative includes:

1. Have the authority to stop or reject work.
2. Be onsite during normal working hours and will be assigned full time to the project.
3. Establish the Quality Control Plan and execute the Quality Control Program.
4. Review all submittals, including shop drawings and materials submittals. Reject those submittals not in accordance with the Contract Documents, approve and submit those which are in accordance. Maintain a jobsite submittal file.
5. Ensure that line, grade, depth and compaction, density and composition of materials are in accordance with the Contract Documents.
6. Ensure that all work to be inspected includes an opportunity for Metro to check work prior to covering the work.

7. Coordinate required tests and inspections with the Engineer and Metro's Construction Coordinator.
8. Inspect the work of Contractor and all Subcontractors.
9. Submit all required quality control documentation and maintain records.
10. Verify that all permanent materials delivered to the jobsite are in accordance with the Contract Documents. Submit certifications and test reports as required.
11. Accompany the Engineer and/or Metro Construction Coordinator on jobsite inspections as required.
12. Prepare and submit the project punch lists prior to job completion and acceptance.
13. Furnish representative samples for testing as required by the Contract Documents or Metro.

2. INSPECTION

2.1 Contractor will provide continuous inspection over his daily operations, including overtime and additional shifts.

A. Inspections will include but not be limited to:

1. Inspection of borrow materials entering the jobsite.
2. Inspection of placement and compaction of borrow materials including lines and grades shown on the Drawings.
3. Inspection of topsoil, low permeable soil and unsuitable materials as they are stripped and assurance that they end up in appropriate stockpiles.
4. Trenching, installation and backfilling pipes and culverts.
5. Installation of geotextiles and geomembrane.
6. Site drainage and erosion control.
7. Protection of site utilities above and below ground.

8. Installation of gas collection wells, piping and appurtenances.
 9. Compliance with provisions of the Health and Safety Program for Hazardous Waste Operations when working below the landfill cover (during trenching or excavation).
 10. Protection of existing landfill cover during Contractor operations.
- B. Inspection by Contractor for Quality Control (QC) will be supplemented by the Engineer and Metro representatives. Other regulatory agencies may also inspect as required by law and custom. The inspection by any of the above does not relieve Contractor of the requirement to inspect and to produce work in accordance with the plans and specifications. Contractor shall at all times provide safe access and assistance to Metro, the Engineer, and other authorized inspectors for inspection of the work.

3. TESTING

3.1 Metro will provide and pay for the services of an independent testing laboratory. This laboratory will provide testing services which will include:

A. For Imported Borrow Materials:

1. Compaction Curve per Standard Proctor, ASTM D698 - for each borrow source.
2. Moisture Content Test by Microwave Oven method, ASTM D4643 with periodic calibration per ASTM D2216 - a minimum of one test per 200 truckloads or one test per 5,000 tons of material for each borrow source per day.
3. Compaction Check Point Tests per ASTM D698 will be carried out as needed for the moisture test.

B. In Place Density Determination: Nuclear Test ASTM D2922 - with periodic calibration by the Sand Cone Method ASTM D1556. Conduct these tests at a frequency of one test per acre per lift for placement of subgrade embankment and Type B low Permeable Soil materials to subgrade. Metro or the Engineer may reduce this requirement if the manner of performance and visual inspection consistently produces satisfactory results.

3.2 Contractor will be responsible for all other testing which may be required. Contractor will submit the qualifications of an independent test laboratory to provide testing services as required. Services may include but not be limited to the following:

A. Gradation Tests at borrow sites

- B. Certify or tests for hazardous materials or contaminants at borrow sites
 - C. Testing and monitoring for potentially hazardous substances in accordance with the jobsite health and safety plan.
 - D. Testing and Monitoring of installation of geotextiles and geo membrane in accordance with Specifications.
 - E. Testing which may be required by other regulatory agencies.
- 3.3 Contractor will facilitate testing by Metro or the Engineer as follows:
- A. Cooperate with the Geotechnical Engineer or laboratory personnel and provide safe access to the work.
 - B. Provide representative samples of materials to be tested in required quantities. Notify Metro/Engineer in advance of changing material sources to allow testing before use of the material.
 - C. Furnish labor and facilities as required for access, gathering samples, and storage of test samples.
- 3.4 The Engineer may conduct additional testing to check on the quality of work, materials or testing. The Engineer will visually inspect, then test and develop compaction curves for material from Contractor's proposed borrow sites which appear to be adequate.
- 3.5 Metro is concerned that only safe materials, with no hazardous substances or hydrocarbon contaminants, are used in the closure and final cover of the St. Johns Landfill. Contractor is cautioned to provide only clean materials and to test any materials which may be contaminated. Soil previously contaminated with petroleum is acceptable as subgrade embankment material if remediated to level one standards in Oregon Administrative Rule 340-22-305 to 360, and accompanied by verification acceptable to Metro. If Metro suspects that materials are contaminated, the Engineer may test. If the results are negative, Metro will pay for the testing. If materials tested are found to contain hazardous materials, Contractor will pay for the testing, immediately remove the material and properly dispose of it offsite and be solely responsible for any resultant impact on the work or schedule.

4. EXECUTION

The planning, execution and results of Contractor's Quality Control Program are considered incidental to the payment for the work as indicated by the bid items. Failure to comply with the Quality Control Program may result in withholding of all or a portion of the monthly progress payments by Metro at its discretion and Metro may use these withheld funds to contract or pay for this work outside of this Contract.

*** END OF SECTION ***

SECTION 01511

TEMPORARY ELECTRICITY

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Electrical Equipment and Construction: Division 16**

1.2 TEMPORARY SYSTEM

- A. Contractor to provide an adequate temporary electrical system for the duration of the Contract.**
- B. Contractor will furnish power and/or light for:**
 - 1. All construction requirements.**
 - 2. Safe working conditions.**
 - 3. Security.**
 - 4. Field Office for contractors operations.**
- C. Power source to be arranged by Contractor.**
- D. Costs paid by Contractor.**

1.3 REQUIREMENTS OF REGULATORY AGENCIES

- A. Obtain permits and easements if required.**
- B. Comply with codes and utility regulations in force.**

1.3 USE OF PERMANENT SYSTEM

- A. Construct temporary system to prevent interference with orderly work progress.**
- B. Do not use existing system (if available) without specific written permission.**
- C. Construct and use any portion of permanent system on the supply side of the permanent meter and use that construction for a portion of the temporary supply.**
- D. Leave permanent service in condition as good as new.**

2. PRODUCTS

2.1 MATERIALS

A. General:

1. Comply with Division 16 - Electrical.
2. Materials may be new or used, but must be adequate in capacity for required purposes, and must not create unsafe conditions or violate requirements of applicable codes.

2.2 EQUIPMENT

- A. Provide appropriate enclosures for environment in which used, in compliance with NEMA standards.
- B. Provide ground fault protection.
- C. Provide adequate short circuit duty for capacity of supply transformers in use.

3. EXECUTION

3.1 GENERAL

- A. Comply with applicable sections of Division 16 - Electrical.
- B. Install work in neat and orderly manner.
- C. Make structurally and electrically sound throughout.
- D. Maintain to give continuous service and to provide safe working conditions. Provide adequate temporary lighting for all operations which are conducted during the hours of darkness.
- E. Modify and extend service as work progress requires.

3.2 INSTALLATION

- A. Temporary service and distribution may be overhead or underground.
- B. Locate to avoid interference with:
 1. Traffic and work areas.
 2. Storage areas.

3. Work under other contracts.

C. Do not run branch circuits on floor or on ground.

3.3 REMOVAL

A. Completely remove temporary materials and equipment upon completion of construction.

B. Repair damage caused by installation, and restore to specified, or original condition.

***** END OF SECTION *****

SECTION 01515
TEMPORARY WATER

1. GENERAL

1.1 DESCRIPTION OF SYSTEM

- A. Contractor shall make arrangements for and provide all necessary facilities for water supply, for both personal consumption and job-site needs, at his own expense, unless otherwise provided.

1.2 COSTS

- A. Pay costs of temporary water services, including costs of installations, maintenance and removal of facilities.
- B. Contractor may secure water from any suitable source. If Contractor purchases water from a water utility at a fire hydrant on or near the project, all arrangements shall be made by him at his own expense and payment be made to the utility in accordance with their rate schedule.

2. PRODUCTS

2.1 MATERIALS

- A. Materials for temporary water supply may be new or used but must be adequate for purpose required, sanitary and must not violate requirements of applicable codes.

3. EXECUTION

3.1 GENERAL REQUIREMENTS

- A. The water utility shall be contacted to determine if sufficient water is available at the particular time before any use.
- B. Contractor shall use only those hydrants designated by the agency in charge of water distribution and in strict accordance with its requirements for hydrant use.
- C. Contractor shall use hydrant wrenches only in open hydrants. He shall also make certain that the hydrant valve is open "full", since "cracking" the valve causes damage in the valve. An approved auxiliary valve shall be provided on the outlet line for control purposes. Fire hydrant valves must be closed slowly

to avoid a surge in the system which creates undue pressure on the water lines. Contractor shall carefully note the importance of following these directions.

- D. If one of Contractor's employees shall knowingly or unknowingly use the wrong wrench on a hydrant and thereby damage the hydrant valve stem, Contractor will be responsible. He shall immediately notify the water utility so that the damage can be repaired as quickly as possible.
- E. Upon completing the use of the hydrants, Contractor shall notify the water distribution agency, so that the hydrants may then be inspected for possible damage. Any damage resulting from the use of the hydrants by Contractor will be repaired by the water agency and the cost thereof shall, if necessary, be withheld from the final payment to Contractor.
- F. Contractor shall furnish all connectors, wrenches, valves, and small tools that may be necessary to meet the requirements of the water distribution agency pertaining to hydrant use.
- G. Violation of these requirements will result in fines and will lay Contractor liable for damage suits because of malfunctioning of damaged fire hydrants, in the event of fire or other emergencies.

3.2 REMOVAL

- A. Completely remove temporary materials and equipment upon completion of construction.

*** * * END OF SECTION * * ***

SECTION 01545

PROTECTION OF WORK AND PROPERTY

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Protection of Work, Property and Person: Article 10 General Conditions
- B. Access and Haul Roads: Section 01550
- C. Temporary Controls: Section 01560
- D. Existing Utilities/Facilities - Underground and Overhead: Section 02760

1.2 PUBLIC AND PRIVATE PROPERTY

- A. Contractor shall protect and maintain all underground or aboveground utilities and structures affected by the work and all private property crossed by or adjacent to his operation, and any damage shall be repaired and restored by Contractor, at his expense, to the satisfaction of Metro.
- B. Contractor will be responsible for all damage to roads, highways, ditches, walls, vegetation, engineered soil covers, bridges, culverts, utilities, lights, or other property, caused by the work, whether such damage be at the site of the work or caused by transporting or hauling to or from the work; and he shall repair or replace, or arrange for the repair or replacement of all such damage to the satisfaction of Metro. Any material damaged by Contractor's operations shall be replaced with new material at Contractor expense.
- C. Whenever construction work under this Contract is undertaken on easement or right-of-way all work shall be accomplished so as to cause the least amount of disturbance and a minimum amount of damage. All requirements stipulated by easements shall be met.
- D. Contractor shall take adequate precautions to protect adjoining sloughs and wetlands, and to avoid damage thereto, and he shall at his own expense completely repair any damage thereto caused by his operation.
- E. Access for fire fighting equipment or personal health emergency vehicles shall be maintained at all times.

1.3 EXISTING UTILITIES/FACILITIES - UNDERGROUND AND OVERHEAD

- A. The Contractor shall protect existing utilities/facilities, both overhead and underground as provided in Section 02760.**

*** * * END OF SECTION * * ***

SECTION 01550

ACCESS AND HAUL ROADS

1. GENERAL

1.1 ACCESS AND HAUL ROADS

- A. Comply with all laws and regulations.
- B. All off-site streets and on-site access roads used by Contractor's trucks or any other equipment hauling material to and from the construction area shall be kept reasonably clean and shall be swept and/or flushed periodically to the satisfaction of the R/W jurisdiction involved. Contractor shall provide truck washing facilities if and when hauling operations create nuisance levels of mud on nearby off-site or on-site roads.
- C. Unsurfaced roads may require an application of dust oil or shall be sprinkled with water as needed to allay dust.
- D. Any damage to roadway surfaces, surfaced or unsurfaced, as a result of Contractor's operation shall be repaired by Contractor at his expense to the satisfaction of the responsible agency.
- E. Haul roads on-site at the landfill shall generally be located at the existing road corridors wherever possible. Temporary haul roads proposed to be located elsewhere by Contractor may be allowed by Metro providing that adequate protection is provided for the existing interim cover. If deemed necessary by Metro, removal of temporary haul roads and restoration of existing interim cover may be required.
- F. Contractor shall submit to Metro, for review and approval, the proposed on-site hauling plan. This is to be handled as a submittal in accordance with Section 01340 of the Specifications. Plan shall identify ingress/egress routes, temporary access/haul routes (if any), traffic control measures, vehicle flow patterns and rates and anticipated quantities of materials involved. This hauling plan is applicable primarily to transport and placement of procured soil materials (sand and subgrade embankment). Periodic updates and resubmittals are to be provided as needed to keep Metro and Engineer fully informed of planned hauling activities.

1.2 OTHER FORMS OF ACCESS AND CONVEYANCE

- A. Contractors are encouraged to consider other forms of access or materials conveyance onto, or close to the site, such as rail, conveyor, barge, large off-

road vehicles, pipelines, etc. Pumping of water/slurry directly onto the landfill shall not be permitted.

- B. Contractors shall submit to Metro, for review and approval, any proposed alternative access and conveyance plans. Contractor shall be responsible to obtain all permits, licenses, permission for access or construction onto adjacent properties, permission for crossing the Slough(s) at alternate locations other than the existing bridge, and permission to drain water into, float, construct within, or otherwise disturb the Slough(s). Contractor shall be responsible for restoration, to the condition prior to construction, of all areas affected by the alternative access.

*** * * END OF SECTION * * ***

SECTION 01560

TEMPORARY CONTROLS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Summary of Work: Section 01010
- B. Project Coordination: Section 01041
- C. Job Site Administration: Section 01043
- D. Protection of Work and Property: Section 01545
- E. Access and Haul Roads: Section 01550

1.2 LAWS

- A. Requirements of federal, state and local statutes and regulations dealing with temporary controls described in this section shall be strictly adhered to by Contractor.

1.3 AIR POLLUTION CONTROL

- A. Contractor shall not discharge smoke, dust or other contaminants into the atmosphere that violate the regulations of the applicable city, county or state authority.
- B. All excavations, embankments, stockpiles, haul roads, access roads, plant sites, waste areas, borrow areas, and other work areas shall be maintained free from dust which would cause a hazard or nuisance. Approved temporary methods of stabilization such as sprinkling, chemical treatment, light bituminous treatment or similar methods shall be used to control dust. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area damp at all times, and sufficient equipment must be on the job to accomplish this. Dust control shall be performed as the work proceeds, wherever and whenever a dust nuisance or hazard occurs.
- C. Contractor shall comply with specific requirements of air quality control laws.
- D. Contractor shall be responsible for any damage resulting from any dust originating from his operations.

1.4 EROSION CONTROL

- A. Contractor shall provide temporary erosion control work as may be required by state or local agencies during the life of the contract. This work is intended to provide prevention, control, and abatement of water pollution/erosion within the limits of the project, and to minimize damage to the work, adjacent property, and adjacent sloughes.
- B. Contractor shall coordinate this temporary water pollution/erosion control work with the existing drainage and erosion control measures to the extent practicable to ensure that effective and continuous water pollution/erosion control is maintained during the construction of the Project.
- C. Clearing and grubbing operations shall be so scheduled and performed that embankment and grading operations and temporary erosion control features can follow immediately.
- D. If the Engineer or applicable regulatory agencies determines that water pollution and/or erosion could occur due to seasonal limitations, the nature of the material, or Contractor's progress, temporary water pollution/erosion control measures shall be taken immediately.
- E. Metro may require Contractor's operations to be scheduled so that temporary erosion control features will be installed concurrently with or immediately following grading operations.
- F. Compliance with the requirements of this section shall not relieve Contractor from his responsibility to comply with other provisions of the contract.

1.5 NOISE CONTROL

- A. Comply with applicable state, city and county requirements as to allowable noise levels during construction at all times.
- B. Equip all internal combustion engines in vehicles and construction equipment used at the project site with effective mufflers.

1.6 SANITARY PROVISIONS

- A. Contractor shall provide and maintain in a neat and sanitary condition such temporary accommodations for the use of his employees, Metro and Engineer as may be necessary to comply with the requirements and regulations of the agencies or organizations having jurisdiction over sanitary and health conditions. He shall permit no public nuisances.

1.7 PROVISION FOR WATER COURSES

- A. Contractor shall provide for the flow of all existing surface water courses, sewers or drains, intercepted or disturbed by Contractor during the progress of the work, and shall replace the same in as good condition as he found them or shall make such final provisions for them as necessary.
- B. Contractor shall make provisions to take care of all surplus surface water, mud, silt, or other runoff pumped from excavations or resulting from other operations, and shall be responsible for any damage, of whatever nature, resulting from his failure so to provide. Waters which may come into contact with solid waste and/or leachate waters, shall be handled as leachate water and will be disposed of in the sanitary sewer system as required by permit.
- C. No direct payment shall be allowed for the above work. Payment for the cost thereof shall be included in the prices bid for the various items which comprise the improvement.

1.8 TRAFFIC CONTROL

- A. Contractor shall not unnecessarily interfere with use of any public traffic facility (sidewalks, streets, pavements, etc.) required for vehicular or pedestrian traffic. If such interference becomes necessary to perform the work in a safe, proper and convenient way, and no satisfactory detour route exists, Contractor shall provide a satisfactory detour, as approved by City of Portland Approvals and Permits, and Metro. The cost of this detour, required permits and the maintenance thereon shall be borne by Contractor.
- B. Contractor is responsible to keep all public traffic facilities (sidewalks, streets, pavements, etc.) in the general vicinity of the site clean and clear at all times from debris, soils, etc., resulting from the work of his contract.
- C. Contractor shall provide qualified flagmen and/or crossing guards, as necessary, to maintain proper and safe control of vehicular and pedestrian traffic during his construction operations.
- D. Contractor shall provide warning lights, barricades, signs, etc., as necessary (beyond what is existing) to maintain such control about the perimeter roads of the site for his work.

***** END OF SECTION *****

SECTION 01600

PRODUCT REQUIREMENTS/SUBSTITUTIONS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Royalties and Patents: Article 7 General Conditions
- B. Project Coordination: Section 01041
- C. Shop Drawings, Project Data, Samples: Section 01340
- D. Schedule of Values: Section 01370

1.2 GENERAL PRODUCT REQUIREMENTS

- A. Unless otherwise specifically provided, all workmanship, equipment, and materials incorporated in the work covered by the Contract are to be new and of the best available grade of their respective kinds.
- B. For products specified only by reference standards, select any product meeting standards, by any manufacturer.
- C. For products specified by naming one or more products, but indicating the option of selecting equivalent products by stating "or equivalent" after specified product, Contractor must submit request, as required for substitution, for any product not specifically named.
- D. For products specified by naming only one product and manufacturer, there is no option, and no substitution will be allowed.

1.3 SUBSTITUTIONS REVIEW AND APPROVAL PROCEDURE

- A. Within thirty (30) days after Notice to Proceed, Engineer will consider formal requests from Contractor for substitution of products in place of those specified. Provide complete list of all products which are proposed for installation as substitutions or product options. Tabulate list by each specification section.
- B. Submit detail request for substitution in accordance with requirements for submittal of shop drawings (Section 01340) and the following additional requirements.
 - 1. For construction methods:
 - a. Detailed description of proposed method.
 - b. Drawings illustrating methods.

2. Itemized comparison of proposed substitution with product or method specification.
3. Data relating to changes in construction schedule.
4. Accurate cost data on proposed substitution in comparison with product or method specified.

C. In making request for substitution, Contractor shall specifically represent:

1. He has personally investigated proposed product or method, and determined that it is equivalent or superior in all respects to that specified.
2. He will provide the same guarantee for substitution as for product or method specified.
3. He will coordinate installation of accepted substitution into work, making such changes as may be required for work to be complete in all respects.
4. He waives all claims for additional costs related to substitution which consequently becomes apparent.
5. Cost data is complete and includes all related costs under his Contract.

D. Substitutions will not be considered if:

1. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accord with Section 01340.
2. Acceptance will require substantial revision of Contract Documents or redesign by the Engineer, without substantial benefit to Metro.
3. Requests are submitted beyond 30 days after Notice to Proceed.

E. The above shall not be construed to mean that any substitution for materials and equipment will be allowed. The Engineer reserves the right to reject and disapprove any request he deems irregular or not in compliance with the Specifications.

*** * * END OF SECTION * * ***

SECTION 01650

TESTING, STARTUP AND OPERATION

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Temporary Electricity: Section 01511
- B. Temporary Water: Section 01515
- C. Contract Closeout: Section 01700
- D. Operation and Maintenance Data: Section 01730
- E. Gas Collection System: Section 02680
- F. Equipment: Division 11

1.2 RESPONSIBILITY

- A. Testing, startup and operation shall not be cause for claims for delay by the Contract and all expenses accruing therefrom, shall be deemed to be incidental to the Contract.
- B. The Contractor shall provide all materials, supplies and labor necessary to efficiently complete the testing, startup and operation.
- C. All power and utility bills shall be paid by the Contractor up to and including the day of final acceptance of the Contract by Metro. If not paid, these charges shall be treated as claims against the Contractor.
- D. If Metro chooses to commence operations prior to final acceptance, Metro will assume payment of all power and utility charges effective the day that operation is assumed by Metro and notice is given in writing.

1.3 SCHEDULE

- A. Placing all applicable phases of the project in service shall consist of three parts: testing, start up and operations.
- B. Not less than thirty (30) days before anticipated time for beginning the testing, the Contractor will submit to the Engineer for approval, a complete plan for:
 - 1. Schedules for tests.
 - 2. Detail schedules of procedures for startup.

3. Complete schedule of events to be accomplished during startup.
4. Schedule operator training as specified.
5. An outline of work remaining under the Contract that will be carried out concurrently with the operation phases.

1.4 TESTING

- A. Testing shall consist of individual tests and checks made on equipment intended to provide proof of performance of units and proper operation of unit controls together with such necessary tests whether or not described elsewhere in these Specifications to assure proper alignment, size, condition, capability, strength, proper adjust, lubrication, pressure, hydraulic tests, leakage tests and all other checks deemed necessary by the Engineer to determine that all materials and equipment are of specified quality, properly situated, anchored and in all respects ready for use.
- B. All gravity pipe and pressure piping shall be tested as required by these specifications and applicable codes.
- C. Tests on individual items of equipment, pipelines, vessels, structures, tanks, controls and other items shall be as described in various sections describing such items.
- D. Testing will be done by the Contractor in the presence of an Inspector designated by the Engineer. Records of all official tests will be made by the Inspector.
- E. During tests, the Contractor shall correct any defective work discovered or that is not in first class operating condition.

1.5 STARTUP

- A. Startup shall consist of testing by a simulated operation, all operational equipment and controls. The purpose of these tests shall be to check that all equipment will function under operating conditions, that all interlocking controls and sequences are properly set and that the facility will function as an operating unit.
- B. Checks for leakage of tanks, ponds, piping, valves, gates and all other hydraulic systems and structures will be made.

- C. Factory representatives of all major units shall be present for the startup phase. The test shall continue until it is demonstrated that all disfunction of controls and machinery are corrected.
- D. The startup shall not begin until all tests required by these Specifications have been completed and approved by the Engineer.

1.6 OPERATION

- A. Operation of the facility shall be immediately started after completion of testing and startup and after satisfactory repairs and adjustments have been made and providing supply and disposal facilities furnished by others are available. If these facilities are not available, the plant will be closed down and no further testing or operation by the Contractor will be required. The Contractor, however, will be responsible that all details required by the Contract shall remain in good order until final acceptance of the whole Contract.
- B. The facility will be operated by personnel placed on the project by Metro who will perform all duties and operate all equipment.
- C. Taking possession and use of the facility shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents.
- D. If such prior use increases or causes refinishing of completed work, the Contractor shall be entitled to such extra compensation or extension of time or both, as the Engineer may determine.

*** * * END OF SECTION * * ***

SECTION 01700

CONTRACT CLOSEOUT

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Liquidated Damages: Article 3 General Conditions
- B. Payments: Article 9 General Conditions
- C. Certification and Final Payment: Article 9 General Condition
- D. Project Coordination: Section 01041
- E. Protection of Work and Property: Section 01545
- F. Project Record Documents: Section 01720
- G. Project Record Documents: Section 01720
- H. Operation and Maintenance Data: Section 01730
- I. Spare Parts and Maintenance Materials: Section 01750

1.2 SUBSTANTIAL COMPLETION

A. Contractor:

- 1. After testing and startup, submit written certification to Engineer that Project or designated portion of Project is substantially complete.
- 2. Submit punch list of items to be completed or corrected.

B. Engineer will make an inspection after receipt of Contractor's certification, together with Metro's representative.

C. If it appears to the Engineer and Metro that work is substantially complete:

- 1. The Engineer may request of and Contractor shall prepare and submit to the Engineer, a list of items to be completed or corrected as determined by the inspection.
- 2. If the Engineer then considers the work to be substantially complete, the Engineer may, with Metro's approval, 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 Engineer. Omission of any item from the list shall not relieve Contractor from responsibility to complete all the work in accordance with the Contract.

3. Metro occupancy of Project or designated portion of Project:
 - a. Metro may use all or part of the work within the time designated in the Certificate of Substantial Completion, upon notice to the insurance company or companies as provided in Article 9 of the General Conditions.
 4. Contractor shall complete all the work within the time designated in the Certificate, or if not so designated within a reasonable time.
- D. Should the Engineer and Metro consider that work is not substantially complete:
1. Engineer shall notify Contractor, in writing stating reasons and list of items.
 2. Contractor shall complete work and send second written notice to Engineer and Metro certifying that Project or designated portion of Project is substantially complete.
- E. Warranties: Under Article 7 of the General Conditions guarantee and warranty periods begin with the date of final acceptance. However, in connection with any specific equipment certified by the Engineer as completed and its use or operation thereof for its intended purpose is assumed by Metro, the warranty period for such equipment shall begin with the beginning date of such use or operation.

1.3 FINAL INSPECTION

- A. Contractor shall submit written certification that:
1. Contract Documents have been reviewed.
 2. Work has been completed in accordance with Contract Documents.
 3. Equipment and systems have been tested in presence of Metro's representative and are operational.
 4. Project is completed, and ready for final inspection.
- B. Engineer will make final inspection within a reasonable time after receipt of certification.
- C. Should Engineer consider that work is complete in accordance with requirements of Contract Documents, Engineer shall request Contractor to make project closeout submittals.

- D. Should Engineer and Metro consider that work is not complete:
1. Engineer shall notify Contractor, in writing, stating reasons.
 2. Contractor shall take immediate steps to remedy the stated deficiencies, and send second written notice to Engineer certifying that work is complete.
 3. Engineer will reinspect work.

1.4 REINSPECTION COSTS

In addition to any overtime inspection due under Article 9 of the General Conditions, should Engineer be required to perform second inspections because of failure of work to comply with original certifications of Contractor, Metro will compensate Engineer for additional services as stated in said article and charge Contractor for such fees at the Engineer's currently established billing rate.

1.5 CLOSEOUT SUBMITTALS

- A. Project Record Documents: To requirements of Section 01720.
- B. Guarantees and bonds required by these specifications: See Article 7 of General Conditions and specific equipment or material specifications.
- C. Easement Release: Section 01545 (where applicable).
- D. At the close of the Contract Contractor shall:
1. Pay all utility bills.
 2. Remove all electrical, sanitary, gas, telephone, water, offices and any other temporary service equipment that may remain.
 3. Arrange for transfer of electrical, water and other applicable utility accounts to Metro's name.
- E. Deliver evidence of compliance with requirements of governing authorities (where applicable).

1.6 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit final statement of accounting to Engineer.

B. Statement shall reflect all uncompleted adjustments:

1. Additions and deductions resulting from:
 - a. Previous Change Orders.
 - b. Cash Allowances.
 - c. Unit Prices.
 - d. Other Adjustments.
 - e. Deductions for Liquidated Damages.

2. Unadjusted sum remaining due.

1.7 FINAL APPLICATION FOR PAYMENT

Contractor shall submit final application for payment in accordance with requirements of General Conditions and shall reflect the final adjustment of accounts in Paragraph 1.6.

1.8 FINAL CERTIFICATE FOR PAYMENT

- A. Engineer will issue Final Certificate in accordance with provisions of General Conditions.
- B. Should final completion be materially delayed through no fault of Contractor, Engineer may issue a Final Certificate for Payment, in accordance with provisions of General Conditions and existing laws.

1.9 POST-CONSTRUCTION INSPECTION

- A. Prior to expiration of one year from Date of Substantial Completion or Final Acceptance, Engineer may make visual inspection of Project in company with Metro and Contractor to determine whether correction of work is required, in accordance with warranty/guarantee provisions of General Conditions.
- B. For guarantees beyond one year, Engineer will make inspections at request of Metro, after notification to Contractor.
- C. Metro will promptly notify Contractor, in writing, of any observed deficiencies.

* * * END OF SECTION * * *

SECTION 01720

PROJECT RECORD DOCUMENTS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Closeout Submittals: Article 9 General Conditions and Section 01700.
- B. Project Coordination: Section 01041
- C. Shop Drawings, Project Data, and Samples: Section 01340
- D. Operation and Maintenance Data: Section 01730

1.2 MAINTENANCE OF RECORD DOCUMENTS

- A. Contractor shall maintain at job site, one record copy of:
 - 1. Contract Drawings.
 - 2. Project Specifications.
 - 3. Addenda.
 - 4. Reviewed Shop Drawings.
 - 5. Change Orders.
 - 6. Other Modifications to Contract.
 - 7. Field Test Records.
 - 8. Operational and Maintenance Data Delivered with Mechanical and Electrical Equipment.
 - 9. Certified Weight Tickets
- B. Store record documents apart from working documents used for construction.
- C. Provide files and shelves for storage of record documents.
- D. Maintain record documents in clean, dry, legible condition.

- E. Do not use record documents for daily construction purposes.
- F. Make record documents available at all times for inspection by Engineer and Metro.

1.3 RECORDING

- A. Do not permanently conceal any work until required information has been recorded.
- B. Keep record documents current.
- C. Contract Drawings: Legibly mark to record actual construction:
 - 1. Horizontal and vertical location of underground utilities and appurtenances and references to permanent surface improvements.
 - 2. Field changes of dimension and detail.
 - 3. Changes made by Change Order.
 - 4. Details not on original Contract Drawings.
- D. Specifications and Addenda: Legibly mark up each Section to record:
 - 1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
 - 2. Changes made by Change Order.
 - 3. Other matters not originally specified.
- E. Shop Drawings: Maintain as record documents; legibly annotate drawings to record changes made after review.

1.4 SUBMITTAL

- A. At completion of project, deliver complete set of all record documents to Engineer.
- B. Accompany submittal with transmittal letter signed by Contractor or his authorized site representative.

***** END OF SECTION *****

SECTION 01730

OPERATION AND MAINTENANCE DATA

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Testing, Startup and Operation: Section 01650
- B. Material and Equipment: Section 01600
- C. Contract Closeout: Section 01700
- D. Spare Parts and Maintenance Materials: Section 01750
- E. Material and Equipment Specified: All Divisions

1.2 REQUIREMENTS

- A. The Contractor shall submit to Engineer two copies of draft operations and maintenance manuals for each major piece of equipment and system component at least 30 days prior to scheduled testing and at least 30 days prior to submitting written notice of substantial completion.
- B. Engineer and Metro will review and return one copy with comments. If corrections are required, the Contractor will make corrections and resubmit one corrected copy plus corrected pages for the copy in Metro's possession.
- C. Upon approval, the Contractor will furnish six (6) copies of the Operations and Maintenance Manuals. Complete approval of all required manuals will be a condition for final completion and payment.
- D. The Operations and Maintenance Manuals will include as a minimum the following:
 - 1. Table of Contents.
 - 2. System Description and Functions of Individual Items of Equipment.
 - 3. As Built Layout. Include locations of all elements and wiring diagram of control circuits.
 - 4. Operations and Maintenance Instructions for each major item of equipment. These instructions will clearly identify the equipment actually provided and information pertaining to other models or variations will be lined out. The instructions

will include information on:

- a) Operating conditions
 - b) Installation instructions
 - c) Startup procedures
 - d) Shut down procedures
 - e) Maintenance instructions
 - f) Trouble shooting procedures.
5. Maintenance Schedules - Cross reference these schedules to specific paragraphs in the O&M Instructions.
 6. Spare Parts and lubricants lists
 7. Warranties

E. Specific requirements for the Electrical Operations and Maintenance Manual are included in Division 16.

1.3 MANUAL ASSEMBLY

- A. Data shall be bound in first quality, heavy, permanent 3-ring type binders. The Contractor shall submit the binding he proposes to furnish to the Engineer for his approval before assembling all of the material.
- B. Manuals shall be assembled and indexed so that information on any piece of equipment can be readily found.

1.4 MAINTENANCE SCHEDULED

- A. Maintenance schedules for each item of equipment will include a "summary of maintenance" substantially in the following format:
 1. Name of Item: _____
 2. Name of Manufacturer: _____
Address: _____
 3. Name Plate Information: _____
 4. Nearest Local Representative: _____
Address: _____
Telephone No.: _____

5. Maintenance Date or
 Requirements Frequency Remarks

6. Spare Parts List (to be kept on hand)

7. Type of Lubricant (if required)

*** * * END OF SECTION * * ***

SECTION 01750

SPARE PARTS AND MAINTENANCE MATERIALS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Operation and Maintenance Data: Section 01730**
- B. Specific Requirements for Individual Items: All Divisions**

1.2 SPARE PARTS

- A. All equipment shall be furnished with spare parts as recommended by the manufacturer. All bearings, bushings and shaft sleeves shall be "export" packaged.**
- B. Additional spare parts shall be furnished when specifically listed under any products.**

1.3 LUBRICANTS

- A. The Contractor shall provide a maintenance schedule in the O&M Manual on which shall be shown, in a list, each item of equipment requiring lubricant, the type and quantity of lubricant required, the frequency of lubrication required and a space for the last date that each piece of equipment was lubricated.**
- B. The Contractor shall provide a one year's supply of every kind of packing grease or oil required for new equipment.**
- C. Furnish 1 each all oil cans, grease guns and all other necessary items for proper lubrication.**
- D. Lubrication charts shall be included in maintenance manual.**

*** * * END OF SECTION * * ***

DIVISION 2 - SITEWORK

INDEX

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SECTION 02010

SUBSURFACE INVESTIGATION

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Information Available to Bidders: Section 00200
- B. Job Site Administration: Section 01043
- C. Shoring: Section 02150

1.2 GEOTECHNICAL REPORTS

- A. Any data on geotechnical and/or subsurface conditions shown in the Plans or Specifications is not to be taken as an actual representation, but is based on limited information and is at best only an opinion; consequently, such data cannot be considered precise or complete and there is no guarantee as to its completeness, accuracy, or precision.
- B. Available reports may be reviewed at the Metro offices. Included, but not limited to are the following reports:
 - o Cornforth Consultants, October, 1991. Geotechnical Investigation of Subarea 1 Interim Clay Cover.
 - o Cornforth Consultants, October 1990. Technical Memorandum for Leachate Migration, Perimeter Dike, St. Johns Landfill.
 - o Cornforth Consultants, October 1990. Geotechnical Investigation for Proposed Motor Blower/Flare Facility, St. Johns Landfill.
 - o Cornforth Consultants, October 1990. Five Interior Monitoring Wells, As Constructed, St. Johns Landfill.
 - o Metro Solid Waste Department. 1990. Various topographic maps of the St. Johns Landfill site dated 1979 to 1990. Provided by Metro.
 - o Metro Solid Waste Department. September, 1989. Revised Closure and Financial Assurance Plan for the St. Johns Landfill.
- C. These reports were obtained and/or prepared only for use by the Engineer in design and are not a part of the Contract Documents.

* * * END OF SECTION * * *

SECTION 02050

DEMOLITION

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Embankment and Grading: Section 02220**
- B. Excavating, Backfilling and Compacting for Utilities: Section 02222**
- C. Existing Utilities/Facilities: Section 02760**

1.2 PROTECTION

- A. Access roads, monitoring wells, existing landfill cover soil and other work to remain shall be protected throughout the work or repaired by the Contractor if damaged.**

1.3 REMOVAL OF EXISTING CULVERTS

- A. Existing culverts where designated on the Drawings shall be removed. The method and timing of removal shall be part of the Contractor's erosion control plan and shall provide, at all times, for proper control of all surface water and erosion. Existing culverts may be salvaged and reused if the culvert is in suitable condition as determined by the Engineer. Culverts removed which are not suitable for reuse shall be properly disposed of by the Contractor.**
- B. For culverts along Road 'E', the excavation shall be backfilled with subgrade embankment material to the original top of existing low permeable soil. Placement and compaction shall be as required for subgrade embankment in these Specifications. Bentonite Mat shall be placed over the backfill and overlap the adjacent existing clay a minimum of two feet. The Bentonite Mat shall be in intimate contact with the existing clay in the overlap.**

*** * * END OF SECTION * * ***

SECTION 02150

SHORING

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Health and Safety Plan: Section 01100
- B. Excavating, Backfilling and Compacting for Utilities: Section 02222

1.2 QUALITY ASSURANCE

- A. Contractor's sheeting and shoring plans shall be designed by a structural engineer with experience in the work.

2.0 PRODUCTS

2.1 TRENCHES

- A. Materials used shall be at the Contractor's option. Alternately, trench excavation sloped as required per OSHA and other agencies may be acceptable in lieu of shoring.

3.0 EXECUTION

3.1 SAFETY REQUIREMENTS

- A. Shoring shall be placed in accordance with federal, state and local safety requirements.
- B. The Contractors Health and Safety Program shall apply specifically where excavating in refuse. Refer to Section 01100.

3.2 CRIBBING AND SHEETING

- A. Unless otherwise provided, the Contractor shall provide all cribbing and sheeting needed to protect the work, adjacent property and improvements, utilities, pavement, etc., and to provide safe working conditions in the trench.
- B. Removal of any or all cribbing and sheeting from the trench shall be accomplished in such a manner as to fulfill all of the above requirements and shall also be accomplished in such a manner as to prevent any damage to the work.

- C. Damages resulting from improper cribbing or from failure to crib shall be the sole responsibility of the Contractor.

3.3 SPECIAL REQUIREMENT FOR FLEXIBLE PIPE

- A. Shoring to be removed, or moveable trench shields or boxes, shall be located at least 2-1/2 pipe diameters away from the pipe if the bottom of the shoring, shield or box extends below the top of flexible pipe, unless a satisfactory means of reconsolidating the bedding or side support material disturbed by shoring removal can be demonstrated.
- B. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Contractor.

* * * END OF SECTION * * *

SECTION 02220

EMBANKMENT AND GRADING

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Subsurface Conditions: Section 02010
- B. Excavating, Backfilling & Compacting for Structures: Section 02221
- C. Excavating, Backfilling, and Compacting for Utilities: Section 02222

1.2 APPLICABLE PUBLICATIONS: The following publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

A. American Society for Testing and Materials (ASTM) Publications:

| | |
|--------|--|
| D 698 | Standard Proctor |
| D 4318 | Liquid Limit, Plastic Limit and Plasticity Index of Soils |
| D 1556 | Density of Soil In-Place by the Sand-Cone Method |
| D 1140 | Grain Size Distribution (Fines Content) |
| D 422 | Grain Size Distribution (Sieve/Hydrometer Analyses) |
| D 2922 | Density of Soil and Soil-Aggregate in place by Nuclear methods (shallow depth) |
| D 2217 | Wet Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants |
| D 2487 | Classification of Soils for Engineering Purposes |

1.3 QUALITY CONTROL

- A. Soils and Backfill: Compaction standard ASTM D698 method unless otherwise specifically approved, grainsize distribution ASTM D422 and moisture content determination ASTM D2216.
- B. In-place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.
- C. Classification of Soils ASTM D2487 and Liquid Limit, Plastic Limit and Plasticity Index of Soil ASTM D4318.
- D. Quality control assurance monitoring of subgrade, low permeable soil, backfill, embankment materials and construction will be by the Geotechnical Engineer.
- E. Contaminated borrow materials shall not be accepted on the jobsite. If any material is found to contain hazardous material or hydrocarbons, all costs for testing, removal, disposal and impact on the work will be borne by Contractor. Soil which is contaminated with petroleum (Hydrocarbons) will be acceptable for this project only as 'subgrade embankment' if it has been treated to level one standards as defined in Oregon Administrative Rule (OAR) 340-22-305 to 360. Specific written verification of said treatment will be required by Metro prior to acceptance of this contaminated borrow material on the job site.
- F. Contractor shall insure that materials containing excessive free water are not brought on the site.

1.4 SUBMITTALS

- A. Excavation, Embankment and Grading Plan - Contractor will provide an overall plan for the earthwork required for this project at least seven (7) days prior to the start of excavation and stockpile of top soil and low permeability soil and/or placement of subgrade embankment materials. The plan will include as a minimum:
 - 1. Procedures and equipment
 - 2. Location of haul roads and traffic control
 - 3. Location of stockpiles

4. Plan for site drainage and surface water control
 5. Survey control procedures to ensure excavations and embankments are made to the proper line and grade
- B. Proposed Borrow Sources - Contractor will submit the name, location and owner of all proposed borrow sources with an estimate of the quantity of suitable materials available. The submittal will include gradation tests for both Type I sand and for Subgrade Embankment materials as well as Certification by Contractor that the proposed borrow sources contain no hazardous contaminants or hydrocarbons. This information shall be submitted at least 14 days prior to required delivery to allow Metro time for their investigation and evaluation of the site. In addition to the above, should the Contractor elect to supply treated petroleum contaminated soil as 'subgrade embankment', specific submittal shall include soil treatment methods used and recent laboratory test to indicate compliance with OAR 340-22-305 to 360.
- C. Site Drainage/Leachate Control Plan - Contractor shall prepare a plan for preventing releases of contaminants or leachates into the surrounding waters and for immediate action to mitigate the damage in the event that a release occurs. The purpose is to plan for the intentional excavation into refuse such as for the gas trenches sedimentation basins, condensate tanks or for inadvertent exposure of refuse in grading operations. This plan must be submitted no later than ten (10) days after Notice to Proceed. Contractor will include procedures for working in excavated refuse or in handling leachates in the Health and Safety Plan (Section 01100)

1.5 SCOPE

- A. The embankment and grading work includes: Existing topsoil removal, stockpiling and placement; topsoil import and placement, low permeable soil removal, stockpiling and replacement; excavation and grading of roadways, ditches, channels, drains, sedimentation basins; placement and compaction of fill material for landfill subgrade and roadways; preparation of existing subgrade soils, placement, grading and compaction of Type A and Type B low permeable soils; preparation of subgrade surface; placement and grading of Type 1 sand and topsoils.

1.6 DEFINITIONS

A. REFUSE

Refuse is defined as any natural or manmade material making up any part of the contents of the landfill, including waste fills, daily cover materials, and any

soil materials that has been contaminated to any degree by contact with any part of the waste fill.

B. ON-SITE DEBRIS

On-site Debris means all nonuseable natural material produced by clearing, grubbing, or cleanup.

C. LEACHATE

Leachate is defined as any liquid, regardless of quality, that has come in contact with any part of the refuse, and includes all groundwater encountered on site, and any surface water that contacts any part of the landfill not covered by final cover, interim cover or sufficient subgrade embankment or low permeable soil as determined by the Engineer.

D. DEGREE OF COMPACTION

The Degree of Compaction is the percentage of the maximum density obtained by the test procedure presented in ASTM D698, and is abbreviated as a percent of laboratory-determined maximum density.

E. SUBGRADE EMBANKMENT

Subgrade Embankment shall be that material used to construct the final subgrade contours as shown on the plans. Material used for Subgrade Embankment may consist of clay, sand, gravel, pit run rock or a combination of these items meeting the requirements of these Specifications. Soil which is contaminated with petroleum (Hydrocarbons) will be acceptable for this project only as 'subgrade embankment' if it has been treated to level one standards as defined in Oregon Administrative Rule (OAR) 340-22-305 to 360. Specific written verification of said treatment will be required by Metro prior to acceptance of this contaminated borrow material on the job site.

F. TYPE I SAND

Type I Sand shall be that material used to cover and protect the geosynthetic components of the landfill cover as shown on the plans.

G. TOPSOIL

Topsoil consists of suitable on-site topsoils and imported topsoils used in the construction of the final cover system as shown on the plans. Topsoil materials shall be organic, friable and fertile in nature and shall be fully capable of supporting the growth of surface grasses at the St. Johns Landfill.

H. EXISTING LOW PERMEABLE SOIL

Existing Low Permeable Soil consists of on-site clayey soil that was placed as part of the existing interim cover of the landfill as shown on the Drawings.

I. IMPORTED LOW PERMEABILITY SOIL

Imported low permeable soil consists of clay, clayey silt, or silty clay imported onto the landfill site from an outside source.

J. NATIVE SOIL

Where this term is utilized on the Drawings, material furnished shall conform with Subgrade Embankment except that no rock pieces larger than 3" measured in any dimension will be permitted.

K. EXISTING DAILY COVER

Existing Daily cover consists of a minimum of six (6) inches of compacted cover material which was put onto all exposed refuse at the end of each day during active landfill operations.

L. EXISTING INTERIM COVER

Existing Interim Cover consists of approximately 18-inches of compacted Low Permeable Soil and approximately six-inches of existing topsoil material.

1.7 FINAL COVER

- A.** The barrier layer for the final cover is composed of two parts; a low permeable soil layer and a geomembrane. There are two variations of the barrier layer. These two variations are identified on the Drawings as Final Cover Types 'A' and 'B'.
- B.** Final Cover Type 'A' is generally located on the steeper side slopes of the landfill. The barrier layer for Type 'A' cover utilizes the existing low permeable soil in its existing position. The existing topsoil overlaying the low permeable soil shall be removed and the surface of the low permeable soil shall be prepared in accordance with the Specifications. Textured geomembrane shall then be placed over the prepared surface of the low permeable soil.
- C.** Final Cover Type 'B' is generally located on the flatter top slopes of the landfill. The barrier layer for Type 'B' cover also utilizes the existing low permeable soil. However, the existing topsoil and low permeable soil in these areas must be removed so that subgrade embankment material can be placed to achieve final subgrade

contours. After the subgrade embankment material is placed, the removed existing low permeable soil shall be placed and compacted in accordance with the Drawings and Specifications to achieve the geomembrane subgrade contours.

- D. In areas where interim cover does not exist, the final cover shall be Type 'B' with the following exceptions;
 - o Bentonite Mat shall replace the low permeable soil component. It shall be in intimate contact with and overlap two feet over the top of the adjacent low permeable soil at the transition.
 - o The subgrade embankment material shall be placed up to the Geomembrane Subgrade contours shown on the Drawings.
- E. In areas to receive Type 'B' cover and where interim cover does exist, but the Contractor fails to recover enough existing low permeable soil to provide full depth and coverage as required by the Drawings and Specifications; the Contractor shall provide Bentonite Mat or imported low permeable material meeting the requirements of the Specifications. Bentonite Mat shall be installed as described above. Imported low permeable material shall be installed in accordance with requirements for placement of existing low permeable soil. All cost associated with providing imported low permeable soil or Bentonite Mat, due to failure to recover sufficient existing low permeable soil, shall be incidental to work and at no additional cost to Metro.
- F. In areas to receive Type 'A' cover and where excavation through the existing low permeable soil is required for down slope flumes and horizontal gas collection trenches, the existing low permeable soil shall be excavated, protected, and reused in accordance with the requirements for Type 'B' cover. The cost for this work shall be incidental to the surface preparation of the existing low permeable soil for Type 'A' cover.

2. MATERIALS

2.1 EXISTING TOPSOIL

- A.** Existing topsoils shall be surface soils obtained above the existing low permeable soil at St. Johns Landfill. Satisfactory existing topsoils shall be free of subsoil, clay lumps, gravel, and other objects over 2" in diameter, and free of large roots, refuse, sticks or other objectionable material.

2.2 IMPORTED TOPSOIL

- A.** Shall be organic surface soils obtained in a depth of not more than 10" below native ground surface combined with yard debris compost.
- B.** Imported topsoil shall be 50% yard debris compost. Yard debris compost shall consist of brush, branches, leaves, grass clippings and clean woody yard debris. The yard debris must be ground so that a minimum of 95% of the material passes through a 5/8" screen opening. Compost shall be thoroughly mixed and heated (to 140° F) to ensure destruction of weed seed and plant pathogens. Only mature and stable compost will be acceptable; having temperature less than 20 degrees above ambient temperature and free of viable weed seed, adequate decomposition has occurred and minimal levels of herbicides and pesticides exist. All requirements to be verified by testing provided by the Contractor. The imported topsoil material shall be tested for nutrient composition (nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, N03-N and NH4-N), pH and salinity.
- C.** Imported topsoil shall be pre-mixed (topsoil and yard debris compost) off-site. Contractor shall provide certification to the Engineer with each delivery stating that imported topsoil complies with above requirements.

2.3 TYPE 1 SAND

- A.** Satisfactory Type 1 Sand materials shall consist of clean, coarse to fine sand and may consist of river dredged sand, "screenings" and/or pit run sand. Contractor shall provide gradation test results for all proposed borrow sources.

- B. River dredged, pit-run, and other sand shall conform to the following gradation limits based on wet sieve analysis, weight basis:

| Sieve Size | Percent Passing by Weight |
|------------|------------------------------|
| 1/2" | 100 |
| No. 4 | 80 - 100 |
| No. 10 | 50 - 100 |
| No. 40 | 5 - 80 |
| No. 100 | 0 - 12 |
| No. 200 | 0 - 5 |

- C. Screenings sand shall conform to the following gradation limits based on wet sieve analysis, weight basis:

| Sieve Size | Percent Passing by Weight |
|------------|------------------------------|
| 1/2" | 100 |
| No. 4 | 70 - 100 |
| No. 10 | 40 - 80 |
| No. 40 | 0 - 30 |
| No. 100 | 0 - 10 |
| No. 200 | 0 - 7 |

- D. Each proposed off-site borrow source for Type 1 Sand will be visually inspected and tested for compliance with the Specifications by the Geotechnical Engineer. Materials from off-site borrow sources which do not meet the Specifications, as determined by the Geotechnical Engineer based on visual inspection and test results, shall not be suitable for use as Type 1 Sand.
- E. Compaction curves per ASTM D698 will be developed by the Geotechnical Engineer for each suitable borrow source.
- F. Materials from borrow sources which have not been visually inspected and tested by the Geotechnical Engineer, or which are not suitable as stipulated in (D) above, shall not be brought onto the landfill site.
- G. Since the Geotechnical Engineer cannot inspect all materials coming from the borrow source(s), the inspection and testing program shall not relieve Contractor's responsibility to provide Type 1 Sand to the site which meet all requirements stipulated in the Specifications.

2.4 SUBGRADE EMBANKMENT

- A. Shall consist of any soil free of organic matter, contaminants, refuse, and rock pieces larger than 10" in diameter. Subgrade Embankment may consist of clay, sand, gravel, pit run rock, or a combination of the same.
- B. Each proposed off-site borrow source for Subgrade Embankment will be visually inspected and tested for compliance with the Specifications by the Geotechnical Engineer. Materials from borrow sources which do not meet the Specifications, as determined by the Geotechnical Engineer based on visual inspection and test results, shall not be suitable for use as Subgrade Embankment.
- C. Compaction curves per ASTM D698 will be developed by the Geotechnical Engineer for each suitable borrow source.
- D. Materials from borrow sources which have not been visually inspected and tested by the Geotechnical Engineer, or which are not suitable, as stipulated in (B) above, shall not be brought into the landfill site.
- E. Since the Geotechnical Engineer cannot inspect all materials coming from the borrow source(s), the inspection and testing program shall not relieve Contractor's responsibility to provide Subgrade Embankment to the site which meet all requirements stipulated in the specifications.

2.5 DRAIN ROCK

- A. Shall consist of a clean, well-graded gravel or rock, with not more than 5 percent passing No. 200 sieve, based on wet sieve analysis. Drain Rock shall be well graded and conform with the following gradation limits:

| <u>Sieve Size</u> | <u>% Passing (By Weight)</u> |
|-------------------|----------------------------------|
| 1-1/2" square | 100 |
| U.S. No. 200 | 0 - 5 |

2.6 QUARRY SPALLS

- A. Shall consist of angular, durable basalt or andesite rock with a minimum specific weight of 160 pcf. The rock for quarry spalls shall conform to the following gradation limits:

| <u>Size</u> | <u>% Finer (By Weight)</u> |
|-------------|--------------------------------|
| 8" | 100 |
| 3" | 40 max. |
| 3/4" | 10 max. |

2.7 ROADWAY EMBANKMENT

- A. Shall consist of a clean, well-graded gravel, having hard, strong, durable pieces, with not more than 5 percent passing No. 200 sieve, based on wet sieve analysis. It shall be well graded and conform with the following gradation limits:

| <u>Sieve Size</u> | <u>% Passing (By Weight)</u> |
|-------------------|----------------------------------|
| 1-1/2" square | 100 |
| 3/4" square | 80-100 |
| 3/8" square | 50-85 |
| U.S. No. 4 | 30-65 |
| U.S. No. 8 | 15-40 |
| U.S. No. 200 | 0-5 |

2.8 CRUSHED SURFACING BASE COURSE

- A. Shall consist of a clean, well-graded, 3/4-inch minus crushed rock with not more than 5 percent passing the No. 200 sieve, based on wet sieve analysis.

2.9 STRUCTURAL FILL

- A. Shall consist of a clean, well-graded 2" minus crushed rock, with not more than 5% passing the No. 200 sieve, based on wet sieve analysis.

2.10 LAVA ROCK BACKFILL

- A. Lava Rock Backfill for gas extraction well completions shall consist of crushed, processed, or naturally occurring granular "lava-rock" material.

It shall be essentially free from various types of wood waste or other characteristics of size and shape that it will compact readily and shall meet the following specifications for grading, quality, and density:

| <u>Sieve Size</u> | <u>Percent Passing</u> |
|-------------------|------------------------|
| 3/4" Square | 100 |

1/4" Square

0

The density shall range from 55 lb/ft³ (min.) to 67 lb/ft³ (max.).

2.11 IMPORTED LOW PERMEABLE SOIL

- A. Shall consist of a clay, silty clay, or clayey silt free of organic matter, foreign material, and rock pieces larger than 1" in diameter. The Imported Low Permeable Soil shall have a Plasticity index greater than 10 and shall conform to the following gradation limits:

| <u>Sieve Size</u> | <u>Percent Passing</u> (Wet sieve analysis) |
|-------------------|---|
| No. 4 | 97 - 100 |
| No. 40 | 85 - 100 |
| No. 200 | 75 - 100 |

3. EXECUTION

3.1 WEATHER CONDITIONS

- A. All earthwork described in this section shall be performed during dry weather, typically May through October.
- B. The Geotechnical Engineer will monitor wet weather conditions during the Contract Period. If the quality of the work is susceptible to degradation due to deficient construction procedures, or if undue damage to existing installations such as haul roads, vegetation covers, or engineered soil covers is occurring, the Engineer shall recommend to Metro that the work be stopped.

3.2 FINAL COVER

- A. The barrier layer of the final cover is composed of a geomembrane underlain by a low permeable soil layer. Two types of final covers will be constructed for this Contract: i) Final Cover Type 'A' will be constructed on the steeper sideslopes of Subarea 1 and the Power Line Corridor. The Type 'A' cover utilizes the existing low permeable soil in its existing position. The in-place low permeable soil will be recompacted under strict compaction control requirements; and ii) Final Cover Type 'B' would be located on the flat-top slopes of Subarea 1 and the flat area of the Powerline Corridor (PLC). The Type 'B' cover utilizes the existing low permeable soil which will be removed from Subarea 1 and stockpiled. Twelve inches, compacted

thickness, of low permeable soil will be placed and compacted under strict conditions of moisture and compaction control.

- B. The locations for Type 'A' and Type 'B' cover construction are shown on the Drawings.

3.3 EXISTING TOPSOIL REMOVAL, STOCKPILING AND REPLACEMENT

- A. The Contractor shall develop and follow an approved plan for stripping areas of existing on-site topsoil, stockpiling of reusable topsoil, and placing existing reusable topsoil on the prepared slopes of the final cover.
- B. Contractor shall remove existing topsoil to a depth sufficient to insure that most of the topsoil has been removed from the surface of the underlying existing low permeable soil. Approximately 6 inches thickness to topsoil will be stripped.
- C. Existing grass vegetation may be removed with the underlying topsoil provided it is cut to a height not exceeding 3 inches at the time of topsoil removal, and thoroughly mixed with the underlying topsoil prior to or during the topsoil removal process. Grass clippings resulting from cutting the grass to the specified height, may also be mixed with the underlying topsoil provided the clippings are mulched and evenly spread over the mowed area in a layer not exceeding 1.5 inches thick prior to the topsoil removal process.
- D. Topsoil deemed unsuitable for reuse by the Engineer shall be disposed of on site in Subarea 4 unless otherwise approved by the Engineer. Unsuitable topsoil means soil material which appears to be unable to support the required growth of surface grasses. Topsoil suitable for reuse shall be placed in a stockpile at a location approved by the Engineer and/or shown on the Drawings. Stockpiled topsoil shall be kept free of contamination by refuse or other objectionable materials. Temporary covering of the stockpile with plastic to prevent contamination or erosion may be necessary.

3.4 EXCAVATION IN REFUSE

- A. The variety of refuse disposed of within the landfill is unknown. Where excavation in refuse is required, the Contractor shall remove and dispose of all materials encountered in the refuse. Excavated refuse shall be disposed of on-site in Subarea 4 unless otherwise approved by the Engineer.
- B. When it is necessary to excavate into refuse in order to perform any of the work, the Contractor shall follow an approved Health and Safety

Plan during excavating, handling, and disposing of the refuse, and whenever working in proximity to exposed refuse. The Contractor is cautioned that the possibility of encountering potentially harmful gases, liquids or wastes exists.

- C. Excavation of refuse may be required to obtain a portion of the grades shown on the grading plan, for installation of horizontal gas wells, condensate tanks, drainage ditches, and sedimentation basin construction. Excavation of refuse for other facilities may also be required.
- D. Excavation into refuse may require surface water/leachate diversion and groundwater/leachate removal and disposal. Prior to any dewatering, the Contractor shall submit for approval to the Engineer a plan of the methods, installations and details of the proposed water control system and his intended disposal methods for contaminated groundwater/leachate collected during dewatering. The Contractor shall follow a plan approved by the Engineer for all dewatering. Dewatering activities shall be performed in accordance with the Contractors approved Health and Safety Plan.

3.5 EXCAVATION AND STOCKPILING OF EXISTING LOW PERMEABLE SOIL

- A. Existing Low Permeable Soil shall be excavated from areas to receive Type 'B' cover or Subgrade Embankment. The locations of Existing Low Permeable Soil removal and stockpiles are shown on the Contract Drawings.
- B. The surface of the Existing Low Permeable Soil shall be free of all topsoil and other extraneous matter, and shall be approved by the Geotechnical Engineer, prior to commencing the removal and stockpiling of Existing Low Permeable Soil for future use.
- C. Contractor shall remove the Existing Low Permeable Soil to within two (2) inches of the underlying daily cover/refuse material. Approximately 24 to 42 inches of Existing Low Permeable Soil exists above the refuse in the area shown on the Drawings. This thickness and condition of the Existing Low Permeable Soil varies over the site as shown in the October 1991 report by Parametrix and Cornforth.
- D. Contractor shall insure that the Low Permeable Soil remains clean and free from Topsoil, Dredge Sand, refuse, and other extraneous matter throughout the removal, haul, and stockpile operations. Removal of the Existing Low Permeable Soil shall be carefully performed so that refuse or other materials is not picked up and mixed with the Low Permeable Soil Stockpile.

3.6 CONSTRUCTION OF TYPE 'A' COVER

- A. The Type A cover shall be constructed by compacting the in-place Existing Low Permeable Soil after the Topsoil has been removed. Prior to compaction, foreign materials and protrusions shall be removed and the surface made uniformly sloping indicated on the Drawings. The surface shall be free from angular rocks, roots, grass and vegetation. Cavities, excavations, and zones containing less than 6-inches of in-place Low Permeable Soil shall be backfilled with material meeting the specification for Imported Low Permeable Soil.
- B. Compaction shall be accomplished using a multi-tired pneumatic or heavy pneumatic rubber tire roller greater than 40,000 pounds. A minimum of four passes of the roller encompassing the area of Type 'A' cover construction shall be required. The roller shall provide uniform compaction, work well on a slope, and leave a relatively smooth surface. Vibratory action shall not be used. The specific roller used for compacting the Type 'A' cover shall be approved by the Geotechnical Engineer in advance of the work.
- C. General construction traffic shall not be allowed on the compacted Low Permeable Surface except for grading equipment needed to finish the surface prior to placing the Geosynthetic.
- D. The surface of the Type A cover shall be finished as stipulated in Paragraph 10.
- E. Textured geomembrane shall be placed on the finished Type A low permeable soil surface as stipulated in Section 02272.

3.7 CONSTRUCTION OF TYPE 'B' COVER

- A. The Type B cover shall be constructed by placing and compacting twelve inches, compacted thickness, of low permeable soil after the design subgrade on the top slopes of Subarea 1 and the PLC have been prepared. Provide a minimum of 12 inches, compacted thickness, of subgrade embankment below low permeable soil. Excavation of refuse may be required. Prior to geosynthetic placement, foreign materials and protrusions shall be removed and the surface made uniformly sloping as indicated on the Drawings.
- B. Low Permeable Soil delivered to Subarea 1, or the PLC, will be visually inspected by the Geotechnical Engineer. Material which is outside the specifications, will not be accepted for placement based on the visual inspection. Unacceptable materials shall be disposed of in Subarea 4 by the Contractor at the Contractor's expense.

- C. Contractor shall utilize all stockpiled Low Permeable Soil from Subarea 1, prior to importing Low Permeable Soil from off-site or from other on-site stockpiles.
- D. The Low Permeable Soil shall be placed and compacted using the following procedure:
 - 1. The Low Permeable Soil shall consist of clods no greater than 1.5-inches in the largest dimension. If larger clods are present, the Soil shall be repeatedly pulverized using a farm type disc, rototiller, or other appropriate means to meet the size requirement.
 - 2. The moisture content of the soil shall be adjusted to be within a range of 2 percent below optimum to 3 percent above optimum based on ASTM D698 (standard Proctor).
 - 3. Compaction shall be accomplished using a medium weight roller greater than 30,000 pounds with penetrating feet greater than 6-inches long. The roller shall provide uniform compaction. Vibratory action shall not be used. The specific roller used for compacting the Type 'B' cover shall be approved by the Geotechnical Engineer in advance of the work.
 - 4. The Type B cover shall be constructed in two 6-inch finish thickness lifts. The material shall be placed in successive horizontal layers and compacted to the 6-inch thickness as required. Each layer shall be compacted by the Contractor to the specified requirement before the overlying lift is placed.
 - 5. Each layer shall be compacted to not less than 95 percent of the standard Proctor maximum dry density. Placement procedures will be monitored by the Geotechnical Engineer. Compaction will be verified by the Geotechnical Engineer via periodic testing of the lifts.
- E. General construction traffic shall not be allowed on the compacted Low Permeable Surface except for grading equipment needed to finish the surface prior to placing the Geosynthetic.
- F. The surface of the Type B cover shall be finished as stipulated in Paragraph 3.10.
- G. Smooth geomembrane shall be placed on the finished surface of the Type B low permeable soil as stipulated in Section 02272.

3.8 PLACEMENT OF TYPE 1 SAND

- A. Type 1 Sand shall be installed over completed sections of the Geonet Composite. During Type 1 Sand installation, the Geonet Composite shall be protected as stipulated in Section 02272.
- B. Type 1 Sand shall be placed in a single 18-inch finished thickness lift with minimal compactive effort. Extreme care shall be exercised during placement to prevent damage or major disturbance to the geosynthetic liner system. Compaction shall consist of not more than 3 passes with a smooth-drum or grid type roller, or light to medium grading equipment. Placement method, design and location of temporary haul roads, number of passes, and type and weight of compaction equipment shall be pre-approved by the Engineer.

Type 1 Sand delivered to the site during construction will be visually inspected by the Geotechnical Engineer. Material which is outside the specifications will not be accepted for placement based on the visual inspection. Unacceptable materials shall be disposed of as specified by the Geotechnical Engineer at the Contractor's expense.

All Type 1 Sand material shall be imported from off-site sources. On-site Type 1 Sand that has been stockpiled shall not be used for this work.

- C. The surface of the Type 1 Sand shall be uniformly smooth graded to within ± 2 -inches of the line, grade, and cross-sections shown on the Drawings.
- D. No construction traffic shall be allowed over the finished areas. Any damage to the liner system as a result of the Type 1 Sand placement and compaction activities shall be repaired by the Contractor at his expense.
- E. Any significantly disturbed portions of the liner system, particularly on the sideslopes shall be corrected by the Contractor at his expense.
- F. Topsoil shall be placed on the finished surface of the Type 1 Sand as stipulated in Section 02220.

3.9 PLACEMENT AND COMPACTION OF OTHER FILLS

- A. Fills or embankments to achieve subgrade contours within Subarea 1 and the PLC as shown on the Drawings shall consist of Subgrade Embankment materials. The complete fill shall conform to the shape of the typical sections and contours indicated on the Drawings. The material shall be placed in successive horizontal layers of 12 inches in

loose depth and shall be compacted to not less than 90 percent of the standard Proctor maximum dry density. Subgrade Embankment placed near (3 feet \pm) wells shall be compacted via powered hand tamper to protect well from damage.

Subgrade Embankment material delivered to the site during construction will be visually inspected by the Geotechnical Engineer. Material which is outside the specifications will not be accepted for placement based on the visual inspection. Unacceptable materials shall be disposed of as specified by the Geotechnical Engineer at the Contractor's expense. The Geotechnical Engineer may also reject materials that contain excessive free water.

All Subgrade Embankment material shall be imported from off-site sources. On-site Subgrade Embankment that has been stockpiled shall not be used for this work.

- B. Crushed Rock: Each layer of fill shall be compacted by rolling with compaction equipment approved by the Geotechnical Engineer. Materials shall be compacted in horizontal lifts to not less than 95 percent of the standard Proctor maximum dry density.
- C. Roadway Embankment and Crushed Rock Base Course for Access Roads: The roadway materials shall be compacted in horizontal 6-inch (loose measure) lifts. Each lift shall be compacted to not less than 97 percent of the standard Proctor maximum dry density.
- D. All fills shall be shaped to line, grade, and cross section, and compacted as specified. Soft or otherwise unsatisfactory material shall be removed and replaced with suitable compacted material up to the required grades as directed by the Engineer.
- E. All fills shall be finished as stipulated in Paragraph 3.9.

3.10 FINISHED EXCAVATION, FILLS, EMBANKMENTS AND GROUND SURFACES FOR GEOSYNTHETICS:

- A. All surfaces to be covered by geosynthetics, including excavated, filled, and embankment sections and adjacent transition areas, shall be uniformly smooth-graded and compacted to within ± 3 -inches of the line, grade, and cross-sections shown on the Drawings. The surface in contact with the geosynthetic shall be smooth and free of broken face stones greater than $3/8$ inch, smooth stones greater than 1-inch, sticks, roots, sharp objects, or other debris of any kind. The surface shall provide a firm, unyielding foundation for the geosynthetics with no sudden sharp or abrupt changes or breaks in grade, accept as shown on the Drawings. No standing water or excessive moisture will be

allowed. No construction traffic shall be allowed over the exposed subgrade.

- B. Ditches or channels shall be cut accurately to the cross sections and grades indicated. Care shall be taken not to excavate or grade ditches or channels below the elevations required. Provide temporary erosion control measures, described elsewhere, as needed to maintain ditch geometry and grade during construction activities prior to placement of the final cover system materials and the permanent erosion control measures.
- C. Other surfaces shall be uniformly smooth-graded and compacted reasonably true to line, grade and cross-sections shown on the Drawings.

3.11 PROTECTION:

- A. During construction, fills, embankments, and excavations shall be kept shaped and drained. Newly graded areas shall be protected from traffic and erosion, and any local subsidence or washing away that may occur from any cause shall be repaired and grades reestablished to required elevations and slopes. All work shall be conducted in accordance with environmental protection requirements of the contract. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. The finished subgrade shall not be disturbed by traffic or other operation and shall be protected and maintained by the Contractor in a satisfactory condition until final cover materials are placed. The storage or stockpiling of materials on the finished subgrade will not be permitted. Final cover materials shall not be laid until the subgrade has been checked and approved by the Contractor and Engineer, and in no case shall final cover materials be placed on a muddy, spongy, or frozen subgrade.
- B. Existing structures such as wells, control points, benchmarks, culverts, manholes and utilities poles within and adjacent to the construction area shall be clearly marked and protected from damage.
- C. Abandonment of Wells D-8A and C-3 in the Power Line Corridor will be accomplished by others prior to earthwork starting in that area. Other existing wells in Subarea 1 and the powerline corridor are to be protected and remain undisturbed. The wells to be protected in Subarea 1 and the PLC include D-1 A, B, & C, D-2 A & B, G-7 and H-1. Additional wells to be protected will be delineated on the proposed on-site hauling plan. Appropriate protection devices may be required.

- D. Extension of Well H-1 in Subarea 1 will be performed by others during placement of Subgrade Embankment material. Contractor shall coordinate this work through Metro and protect this well.

3.12 TOPSOIL PLACEMENT

- A. Topsoil for the final cover shall conform to the requirements of this section. On-site existing topsoil that has been removed and stockpiled shall be used first for the final cover. When on-site existing topsoil has been depleted, the Contractor shall supply sufficient imported topsoil as necessary to complete the work.
- B. The Contractor shall spread topsoil evenly over the specified areas to the depth shown on the plans or as otherwise ordered by the Engineer.
- C. Topsoil shall not be placed when the ground or topsoil is frozen, excessively wet, or in the opinion of the Engineer, in a condition detrimental to the work. After the topsoil has been spread, all large clods, hard lumps, rocks larger than 1 inch in diameter, and litter shall be removed from the surface and disposed of by the Contractor. The topsoil shall then be placed to a uniform, dense state ready for hydroseeding operations.
- D. During topsoil placement and up to the time the vegetative cover is established, the Contractor shall protect the work from erosion, traffic, Contractor's activities, and any other cause of damage. The Contractor shall repair or replace any damaged topsoil and vegetative cover at no additional expense to Metro.

* * * END OF SECTION * * *

SECTION 02221

EXCAVATING, BACKFILLING, AND COMPACTING FOR STRUCTURES

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Health and Safety Program: Section 01100
- B. Shoring: Section 02150
- C. Embankment and Grading: Section 02220
- D. Excavation, Backfilling, and Compacting for Utilities: Section 02222
- E. Sedimentation Control: Section 02275
- F. Storm Drainage Facilities: Section 02720

1.2 CLASSIFICATION

- A. All excavation is unclassified and the Contractor shall make his own estimate of the kind and extent of materials which will be encountered in the excavation.

1.3 QUALITY CONTROL

- A. Soils and Backfill: Compaction standard ASTM D698 method unless otherwise specifically approved.
- B. In-place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.
- C. Classification of Soils: ASTM D2487.
- D. Quality control monitoring of subgrade backfill and embankment materials and construction at structures will be by the Geotechnical Engineer.

2. PRODUCTS

2.1 CRUSHED ROCK OR GRAVEL

- A. All imported rock or gravel to be furnished under this Contract shall comply with Section 02220.

3. EXECUTION

3.1 GENERAL EXCAVATION REQUIREMENTS

- A. The Contractor shall exercise care and caution in performing the work so as not to cause any slide or slip beyond the limits of the structure excavation.
- B. Surplus excavated material suitable for Subgrade Embankment shall be stockpiled and reused on-site.
- C. The excavation shall be dewatered as described in Section 02220 during excavation, construction of structures and placement and compaction of backfill.
- D. Design of shoring is responsibility of the Contractor.
- E. Excavations shall extend a sufficient distance from walls and footings to allow for placing and removal of forms, installation of services, and for inspection, except where concrete is specified to be placed directly against excavated surfaces.
- F. The Contractor is cautioned that any excavation may encounter refuse, leachate, gases, etc. Refer to requirements for Health and Safety Program in Section 01100.

3.2 FOUNDATION PREPARATION

- A. Foundation shall be dug to final grade so that subgrade is not disturbed.
- B. Should the excavation be carried below the lines and grades specified on the drawings or should the bottom of the excavation be disturbed because of the Contractor's operations and require overexcavation and backfill, the Contractor shall refill such excavated space to the proper elevation with crushed rock at his own expense.
- C. When the foundation excavation is complete, the Contractor shall notify the Engineer who will make an inspection and approve the work before any additional work or structure is placed thereon.
- D. Contractor shall additionally notify the Engineer on completion of placement of foundation material. The Engineer will then make an inspection, make compaction tests, and the Engineer shall approve the work before any additional work or structure is placed thereon.

3.3 BACKFILLING

- A. The Contractor shall provide and place as structural fill and shall bring the site to the grades shown on the Drawings.
- B. Structural fill shall not be placed until the subgrade for the structure has been inspected by the Engineer.
- C. No structural fill material shall be deposited against concrete structures until the concrete has developed at least 80% of its design strength or until the concrete has been in place for 28 days, whichever occurs first.
- D. Structural fill material shall be placed in uniform 6" layers and shall be brought up uniformly.
- E. Minimum compaction requirements:

Beneath slabs / footings

Backfill around Structure

Top 9 inches (re:subgrade)-97%
Below 9 inches depth - 95%

95%

All compactions are referenced to percent of standard Proctor, maximum dry density.

- F. Mechanical or power tampers may be used in compacting the structural fill material; however, no equipment or tamper may be used which by its weight or movement will damage, move or tilt out of alignment any part of the structure above or below the ground surface.
- G. Contractor shall be responsible for any such damages and shall make necessary corrections and repairs at his own expense.
- H. Unless otherwise specified, backfill around and above pipelines within the excavation line of any structure shall be the same as that specified for structures.

* * * END OF SECTION * * *

SECTION 02222

EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Subsurface Conditions: Section 02010
- B. Embankment and Grading: Section 02220
- C. Excavating, Backfilling and Compacting for Structures: Section 02221
- D. Sedimentation Control: Section 02275
- E. Storm Drainage: Section 02720
- F. Existing Utilities/Facilities-Underground and Overhead: Section 02760
- G. Gas and Condensate Collection System: Section 02680
- H. Health and Safety Program: Section 01100

1.2 CLASSIFICATION

- A. All excavation is unclassified unless separate bid item is included in bid form.
- B. The terms earthwork or excavation include all materials excavated or removed regardless of material characteristics.
- C. The Contractor shall make his own estimate of the kind and extent of materials which will be encountered in the excavation.

1.3 QUALITY CONTROL

- A. Soils and Backfill: Compaction standard ASTM D698 method unless otherwise specifically approved.
- B. In-place Density Determination: Sandcone method ASTM D1556 or Nuclear method ASTM D2922.
- C. Classification of Soils: ASTM D2487

2. PRODUCTS

2.1 BEDDING MATERIAL

- A. Bedding material, if required by the Drawings or elsewhere in this Specification, shall conform to Section 02220.

- B. Unless otherwise specified, all pipe bedding material shall conform with Type I sand. Where gravel bedding is specified, it shall conform with Drain Rock.

2.2 WARNING TAPE

- A. Continual, non-metallic warning tape made of inert plastic with large, bold, black letters equivalent to Calpico Underground Marking Tapes. Provide 2" minimum width yellow tape. Tape shall identify utility line (e.g. Buried Electric Line Below or Buried Gas Line Below).

3. EXECUTION

3.1 TRENCHING - GENERAL

- A. Material shall be excavated from trenches and piled adjacent to the trench and maintained so that the toe of the slope of the spoil material is at least two (2) feet from the edge of the trench.
- B. Contractor shall keep excavations free of water or leachate during pipe laying operations and until trench backfill is placed.
- C. Contractor is responsible for shoring in accordance with Section 02150.
- D. Contractor is responsible for Health and Safety in accordance with Section 01100. No trench excavation will take place until the Health and Safety Plan is approved.

3.2 TRENCHING FOR PIPES AND CULVERTS

- A. Trenches must be of sufficient width to permit proper jointing of the pipe and backfilling of material along the sides of the pipe.
- B. Trench width at the surface of the ground shall be kept to the minimum amount necessary to install the pipe in a safe manner, ordinarily accomplished by sloping the trench sides to the angle of repose of the material encountered or alternatively, to allow placement of shoring in the trench.
- C. The length of trench excavated in advance of the pipe laying shall be kept to a minimum, and in no case shall it exceed 200 feet unless specifically authorized by the Engineer.
- D. Trenches shall be excavated below the barrel of the pipe a sufficient distance to provide for bedding material, if specified.

3.3 PIPE BEDDING

- A. Placement of bedding material in the pipe zone shall be as specified in the section regarding the pipeline being constructed or as shown on the Drawings.
- B. Pipe bedding, where required, shall be completed before backfilling operations are started.

3.4 BACKFILLING

- A. The Contractor shall take all necessary precautions to protect the pipe from any damage, movement or shifting. In general, backfilling shall be performed by pushing native material from the end of the trench into, along and directly over the pipe so that the material will be applied in the form of a rolling slope rather than by side filling which may damage the pipe. Backfilling from the sides of the trench will be permitted after sufficient material has first been carefully placed over the pipe to such a depth as to protect the pipe.
- B. Compaction equipment used above the pipe zone shall be of a type that does not damage the pipe.
- C. Temporary cribbing, sheeting, or other timbering shall be removed unless specifically authorized in writing.
- D. Dewatering shall be continued until the trench is completely backfilled.
- E. Where original excavated material is unsuitable for trench backfill, subgrade embankment materials shall be placed. In this use, maximum particle size shall be 2" diameter. The unsuitable material shall be removed to an on-site disposal area in Subarea 4. Imported material shall be used for trench backfill only where original material is unsuitable or specifically called for on the Drawings and upon prior approval by the Engineer.
- F. Install warning tape continuously in trench backfill as detailed in the Drawings.

3.5 COMPACTION REQUIREMENTS

- A. Trench backfill under roadways (existing or proposed) shall be mechanically compacted to 97% of standard Proctor maximum dry density in the top 3 feet. Below 3 feet, compaction to 95% of standard Proctor maximum dry density shall be achieved.

- B. When working in areas outside of proposed traveled roadways or parking areas, backfill compaction shall be achieved throughout the entire depth of the trench to 95% of standard Proctor maximum dry density.
- C. The Contractor shall be responsible to provide the proper size and type of compaction equipment and select the proper method of utilizing said equipment to attain the required compaction density. In place compaction tests may be made as determined by the Geotechnical Engineer. Contractor shall remove and recompact material that does not meet specified requirements.

* * * END OF SECTION * * *

SECTION 02272 GEOSYNTHETICS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Embankment and Grading: Section 02220**
- B. Shop Drawings: Section 01340**

1.2 SCOPE

- A. The work includes furnishing and installing Geosynthetic components: Very Low Density Polyethylene (VDLPE) Geomembrane, Bentonite Mat, Geonet Composite, Geotextile, incorporated into the final cover system.**
- B. The Contractor shall furnish all labor, materials, tools, and equipment to install the Geosynthetic components as indicated on the plans, described in these specifications, and as prescribed by the Geosynthetic Manufacturer for a complete and proper installation.**
- C. The Contractor shall perform the indicated quality control testing as part of the installation, and shall protect the work and materials until final acceptance by the Engineer.**
- D. The Engineer will perform Quality Assurance for the project in accordance with the Engineers' Construction Quality Assurance (CQA) Plan. The Contractor shall provide access to all areas of the work and notification of all deliveries, as necessary for proper performance of the CQA Plan by the Engineer or his agent(s). The Engineers' CQA Plan does not specify work for the Contractor; only these Specifications and Drawings stipulate work requirements for the Contractor.**

1.3 DESCRIPTION

- A. The final cover includes multiple layers of geosynthetic materials over low permeable soils that form a composite barrier. There are two types of final cover, Type 'A' and Type 'B', each having slightly different Geosynthetic components. In general, Type 'A' cover will be placed on the landfill sideslopes while Type 'B' cover will be placed on the flatter topslopes of the landfill as indicated on the plans.**
- B. The Geosynthetic components for the Type 'A' cover consist of a Geonet Composite Type 'A' and a textured 40 mil VLDPE Geomembrane.**

- C. The Geosynthetic components for the Type 'B' cover consist of a Geonet Composite Type 'B' and a smooth 40 mil VLDPE Geomembrane.
- D. The Geonet Composite underlies the Type I Sand and provides a drainage path for the final cover system. Type 'B' Geonet Composite has geotextile bonded to one side only and the Type 'A' Geonet Composite has geotextile bonded to both sides.
- E. The VLDPE Geomembrane underlies the Geonet Composite and provides a barrier to both landfill gas and surface water. Type 'A' cover uses a textured surface geomembrane to provide additional interface friction for the steeper slopes. Type 'B' cover uses a smooth surface geomembrane.
- F. Underlying the VLDPE Geomembrane is a low permeable soil layer. Preparation of low permeable soils and other subgrade soil is specified in Section 02220.
- G. Bentonite Mat is utilized in place of a low permeable soil layer in areas without interim cover, in the sedimentation ponds, and under some ditches and roads as shown on the Drawings.
- H. Geotextile Type 1 shall be placed over all refuse which is exposed during excavation of any type, prior to backfilling with subgrade embankment material. Geotextile Type 1 and 2 shall be bonded to geonet, as described herein, to form the geonet composite. Geotextile Type 3 shall be placed under all quarry spalls used as ditch or splash pad lining.

1.4 QUALIFICATIONS

1.4.1 MANUFACTURERS

The Contractor shall provide Geosynthetics manufactured by Manufacturers with the following minimum qualifications:

A. Bentonite Mat Manufacturer

The Bentonite Mat Manufacturer shall have produced at least 1 million square feet of Bentonite mat meeting the specifications for this project prior to producing materials for this project.

B. VLDPE Manufacturer

The VLDPE Manufacturer shall be listed by the National Sanitation Foundation as having met the current Standard 54 for Flexible Membrane

Liners, and shall have at least 5 continuous years experience in the manufacture of polyethylene geomembrane, and shall have manufactured a minimum of 25 million square feet of 40 mil or thinner polyethylene geomembrane, and shall have manufactured a minimum of 5 million square feet of 40 mil or thinner VLDPE geomembrane prior to producing materials for this project.

C. Geonet Composite

The Geonet Composite Manufacturer shall have produced at least 1 million square feet of Geonet Composite meeting the specifications for this project prior to producing materials for this project.

D. Geotextile

The Geotextile Manufacturer shall have produced at least 1 million square feet of each type Geotextile meeting the specifications for this project prior to producing materials for this project.

1.4.2 INSTALLERS

The Contractor shall provide for Geosynthetics installation by Installers with the following minimum qualifications:

A. Bentonite Mat Installer

The Bentonite Mat Installer shall have successfully installed at least 1 million square feet of bentonite mat.

B. VLDPE Installer

The VLDPE Installer shall have successfully installed at least 25 million square feet of 40 mil or thinner polyethylene geomembrane, and shall have successfully installed a minimum of 5 million square feet of 40 mil or thinner VLDPE geomembrane.

The Supervisor for the VLDPE Installer shall have supervised the installation of at least 5 million square feet of polyethylene geomembrane of which at least 1 million square feet shall have been incorporated into landfill barrier layers that consist of multiple geosynthetic components, and shall have supervised the installation of at least 1 million square feet of 40 mil or thinner VLDPE geomembrane.

1.5 SUBMITTALS

- A. Prior to shipping geosynthetic materials to the site, the Contractor shall submit from an approved testing laboratory, certified test results

showing that the residual interface friction angles for each of the Geosynthetic components of the final cover meet the requirements of Paragraph 2.1, Interface Friction Angles.

B. Bentonite Mat

1. Qualifications statement of Manufacturer
2. Qualifications statement of Installer
3. Samples and product description.
4. Manufacturer's certification that material meets project specifications and quality control certificates for each roll produced and delivered to the project.
5. Installation Procedures and Schedules including a plan for protecting the work, and for repairing and replacing damaged work.

C. VLDPE Geomembrane

1. Qualifications statement of Manufacturer
2. Qualifications statement of Installer
3. Resume of Installation Supervisor
4. Samples and product description
5. Manufacturer's certification that material meets project specifications, quality control certificates issued by the resin supplier, quality control certificates for each roll produced, certification that geomembrane and extrudate produced for this project have the same material properties.
6. Installation Procedures and Quality Control program, including a plan for protecting the work, and for repairing and replacing damaged work.
7. Proposed Installation Panel layout identifying seams.

D. Geonet Composite

1. Qualifications statement of Manufacturer.
2. Samples and product description for each type.

3. Manufacturer's certification that product meets project specifications.
4. Installation Procedures including a plan for protecting the work, and for repairing and replacing damaged work.

E. Geotextile

1. Qualifications statement of Manufacturer.
2. Samples and product description for each type.
3. Manufacturer's certification that material meets project specifications.

1.6 QUALITY CONTROL SUBMITTAL AND REPORTS

A. The Geomembrane Installer shall submit to the Engineer, 30 days prior to delivery of VLDPE Geomembrane to the project site, a quality control manual including quality control procedures, tests, inspection personnel, and documentation.

B. The Geomembrane Installer shall submit, on a daily basis, the following reports.

1. Daily progress reports shall be prepared including the following:

Project Name

Date

Weather conditions, including range of wind speed and temperature, cloud cover, and precipitation

Project location

Panels installed (by number) including location. Provide map/plan showing panel numbering and location.

Panels seamed

Field observations

2. Daily Quality control records acceptable to the Engineer shall be prepared detailing the initial weld qualification of equipment and welding crews. Daily quality control records shall be maintained of all field seaming including, but not limited to, the following:

Date

Project location

Weld location, panel number including plan/map.

Sheet temperature

Weld crew identification

Weld samples, if taken

Test Results

General observations

1.7 QUALITY CONTROL TESTING

- A. Quality Control Testing of geomembrane seams shall be performed by the Installer and shall include field test seams, non-destructive seam testing, and destructive seam testing.

1.7.1 FIELD TEST SEAMS

- A. Field test seams shall be conducted by the Installer on geomembrane liner to verify that seaming conditions are satisfactory. Test seams shall be conducted for each crew at the beginning of each seaming period, at the Engineer's discretion and at least once each 4 hours, for each seaming apparatus used that day.
- B. All test seams shall be made at a location selected by the Engineer in the area of the seaming and in contact with the subgrade. The test seam samples shall be 10 feet long for hot shoe welding and 3 feet long for extrusion welding with the seam centered lengthwise. Specimens 1-inch wide shall be cut from each end of the test seam at a location identified by the Engineer. The Installer shall use a tensiometer to test these specimens for shear and peel. If a test seam fails to meet field seam specifications, the seaming apparatus and seamer shall not be accepted and shall not be used for seaming until the deficiencies are corrected and two consecutive successful full test seams are achieved.

1.7.2 NON-DESTRUCTIVE SEAM TESTING

- A. The Installer shall non-destructively test all field seams over their full length. All test equipment, including but not limited to the following, shall be furnished by the Installer:

1. Vacuum Box Testing
 - 1.1 Equipment for testing single wedge fusion seams and extrusion seams shall be comprised of the following:
 - a. A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, port hole or valve assembly, and a vacuum gauge.
 - b. A steel vacuum tank and pump assembly equipped with a pressure controller and pipe connections.
 - c. A rubber pressure/vacuum hose with fittings and connections.
 - d. A plastic bucket and wide paint brush.
 - e. A soapy solution.
 - 1.2 The following procedures shall be followed by the Installer:
 - a. Excess sheet overlap shall be trimmed away.
 - b. Clean the window, gasket surfaces, and check for leaks.
 - c. Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
 - d. Wet a strip of geomembrane approximately 12 inches by 48 inches (length of box) with the soapy solution.
 - e. Place the box over the wetted area and compress.
 - f. Close the bleed valve and open the vacuum valve.
 - g. Ensure that a leak-tight seal is created.
 - h. For a period of approximately 15 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
 - i. If no bubbles appear after 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum 3 inches overlap and repeat the process.

- j. All areas where soap bubbles appear shall be marked and repaired and then retested.

1.3 The following procedures shall apply to locations where seams cannot be non-destructively tested, as determined by the Inspector:

- a. If the seam is accessible to testing equipment prior to final installation, the seam shall be non-destructively tested prior to final installation.
- b. If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the Inspector for uniformity and completeness.

2. Air Pressure Testing (For Double Fusion Seam Only)

2.1 The following procedures are applicable to those processes which produce a double seam with an enclosed space. Equipment for testing double fusion seams shall be comprised of the following:

- a. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.
- b. A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

2.2 The following procedures shall be followed by the Installer:

- a. Seal both ends of the seam to be tested.
- b. Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.
- c. Energize the air pump to a pressure between 25 and 30 psi, close valve, and sustain pressure for approximately 5 minutes.
- d. If loss of pressure exceeds 4 psi, or pressure does not stabilize, locate faulty area, repair and retest.
- e. Relieve pressure at end opposite pressure gauge to check for continuity of air channel.

- f. Remove needle or other approved pressure feed device and seal hole with an extrusion weld.

1.7.3 DESTRUCTIVE SEAM TESTING

- A. The Installer shall provide the Engineer with a minimum of one destructive test sample per 500 feet of seam length from a location specified by the Engineer. The Installer shall not be informed in advance of the sample location.

1. Sample Procedure

- 1.1 In order to obtain test results prior to completion of liner installation, samples shall be cut by the Installer as the seaming progresses. Sampling times and locations shall be determined by the Engineer. The Engineer must witness the obtainment of all field test samples and the Installer will mark all samples with their location, roll, and seam number. The Installer shall also record in written form the date, time, location, roll seam number, ambient temperatures, and pass or fail description. A copy of the information must be attached to each sample portion. All holes in the geomembrane resulting from obtaining the seam samples shall be immediately repaired. All patches shall be vacuum tested.

2. Size and Disposition of Samples

- 2.1 The samples shall be 12 inches wide by 36 inches long and the seam centered lengthwise. The sample shall be cut into three equal length pieces, with one piece given to the Engineer, for destructive testing at an independent laboratory, one piece retained by the Installer for field destructive testing and one piece sent to the Installers laboratory for destructive testing.

3. Testing

- 3.1 The Installer shall cut ten 1-inch wide replicate specimens from his sample and these shall be tested by the Installer. The Installer shall test five specimens for shear strength using ASTM D3083 and five for peel strength using ASTM D413. The Contractor shall have the required equipment on site in order to perform the above-mentioned tests. To be acceptable, four out of the five replicate test specimens must pass the strength criteria established in Section 3.3E, Paragraph 12. Any specimen that does not meet the strength requirements or fails through the weld or by adhesion at the weldsheet interface shall be considered a failure. Results of all field testing shall be

supplied to the Engineer, in written form, at the end of each working day.

- 3.2 Destructive testing shall also be performed in the installers laboratory as described in Paragraph 3.1 above. Results of all laboratory testing shall be supplied to the engineer in written form, at the end of the first working day after the sample was cut from a seam.

4. Procedures for Destructive Test Failure

- 4.1 The following procedures shall apply whenever a sample fails the field destructive test:

- a. The Installer shall reconstruct the seam between the failed location and any passed test location.
- b. The Installer can retrace the welding path to an intermediate location (at a minimum of 10 feet from the location of the failed test), at the Engineer's discretion, and take a sample for an additional field test. If this test passes, then the seam shall be reconstructed between that location and the original failed location. If the test fails, then the process is repeated.
- c. Over the length of seam failure, the Contractor shall either cut out the old seam, reposition the panel and reseam, or add a cap strip, as required by the Engineer.
- d. After reseaming or placement of the cap strip, additional destructive field test(s) shall be taken within the reseamed area. The reseamed sample shall be found acceptable if test results are approved by the Engineer. If test results are not acceptable, this process shall be repeated until the reseamed length is judged satisfactory by the Engineer.

- 4.2 In the event that a sample, including a sample supplied to the Engineer, fails a destructive test, then the above procedures shall be followed, considering laboratory tests exclusively.

2. MATERIALS

2.1 INTERFACE FRICTION ANGLES

- A. Geosynthetic components incorporated into Type 'A' final cover shall

have a residual interface friction angle of 22 degrees or greater with adjacent geosynthetic components and with adjacent soils.

- B. Geosynthetic components incorporated into Type 'B' final cover shall have a residual interface friction angle of 10 degrees or greater with adjacent geosynthetic components and with adjacent soils.
- C. Interface friction angle testing shall be performed in accordance with GRI Test Method GS6 with a minimum of three points for each interface at vertical pressures of 200 psf, 500 psf and 1,000 psf, calculated at deflection equals one inch.
- D. The testing shall be performed by GeoServices, Inc., Norcross, Georgia; Westinghouse Environmental Service, Fairfield, Ohio; STS Consultants LTD, Northbrook, Illinois; or another testing laboratory approved by the Engineer.
- E. For Interface Friction Angle testing, Existing Low Permeable Soil from the St. Johns Landfill site will be made available to any interested parties by Metro. Materials proposed for Type I Sand and Subgrade Embankment shall be supplied by the Contractor. Additional Interface Friction Angle testing may be required if materials proposed for Type I Sand or Subgrade Embankment change substantially during the project.

2.2 VERY LOW DENSITY POLYETHYLENE (VLDPE) GEOMEMBRANE LINER

- A. Smooth VLDPE geomembrane shall be "Hyperlastic" as manufactured by Gundle Lining Systems, Inc. or shall be "Dura-Flex" as manufactured of Poly-America, or approved equal. Smooth VLDPE Geomembrane liners shall conform to the following properties:

| <u>TYPICAL PROPERTIES</u> | <u>TEST METHOD</u> | <u>ACCEPTED VALUES</u> |
|---|---|----------------------------|
| o Thickness (mils) | ASTM D 1593 | 40 \pm 10% |
| o Tensile Properties. (Typical) | | |
| 1. Tensile Strength at Break (Pounds/inch-width) | ASTM D638 Type IV Dumb-bell at 2 ipm | 126 |
| 2. Elongation at Break (Percent) | | 900 |
| o Puncture Resistance Pounds (Typical) | FTMS 101 Method 2065 | 55 |
| o Tear Resistance Initiation Pounds (Typical) | ASTM D1004 Die C | 17 |
| o Dimensional Stability. % | ASTM D1204 | \pm 3 |

| | | |
|---|--|--------------|
| Change. Each Direction. (Max.) | 212°F 1 hr | |
| o Low Temperature Brittleness. °F (Typical) | ASTM D746M Procedure B | -112 |
| o Resistance to Soil Burial. Percent change in original value. (Typical) | ASTM D3083 Type IV Dumb-bell at 2 ipm | |
| Tensile Strength at Break. | | |
| o Environmental Stress Crack. Hours. (Min.) | ASTM D1693 10% Igepal, 50°C | 1500 |
| o Density g/cc (range) | ASTM D1505 | 0.90 - 0.935 |
| o Melt Index g/10 (max) | ASTM D1238 Condition E | 1.1 |
| o Carbon Black % (range) | ASTM D1603 | 2 - 3 |
| o Carbon Black Dispersion | ASTM D3015 | A-2 |

* Note: All values, except when specified as minimum or maximum, are typical test results.

- B. Textured VLDPE geomembrane shall be "Hyperlastic" manufactured by Gundle Lining Systems, Inc., or approved equal. Textured VLDPE Geomembrane liner shall conform with the following:

| <u>TYPICAL PROPERTIES</u> | <u>TEST METHOD</u> | <u>ACCEPTED VALUE</u> |
|---|------------------------|---------------------------|
| o Thickness (mils) | ASTM D1593 | 40 \pm 10% |
| o Tensile strength @ Yield | ASTM D638 Type | |
| 1. Tensile strength @ Yield (Pound/inch width) | IV Dumbbell @ 2 ipm | 35 |
| Tensile strength @ Break (Pound/inch width) | | 55 |
| 2. Elongation @ Yield (Percent) | | 10 |
| Elongation @ Break (Percent) | | 300 |
| o Puncture Resistance | FTMS 101 | 38 |
| Pounds (Typical) | Method 2065 | |
| o Tear Resistance Initiation | ASTM D1004 | 16 |
| Pounds (Typical) | Die C | |
| o Dimensional Stability | ASTM D1204 | \pm 2 |
| % Change Each Direction (Max) | 212 °F 1 hour | |
| o Low Temperature Brittleness | ASTM D746M | -112 |
| Degree °F (Typical) | | |
| o Environmental Stress | ASTM D1638 | 1500 |
| Crack Hours (Min) | 50°C | |

| | | |
|---------------------------|-------------|-----|
| o Density g/cc (Min) | ASTM D1505 | .90 |
| o Melt Index g/10 (Max) | ASTM D1238 | 1.1 |
| | Condition E | |
| o Carbon Black % (Min) | ASTM D1603 | 2.0 |
| o Carbon Black Dispersion | ASTM D3015 | A-2 |

- C. Rolls shall be labeled such that it is possible to relate each roll with manufacturing quality control documentation and raw material documentation.

2.3 GEONET

A. Type 'A' Geonet Composite

Geonet Composite Type 'A' shall consist of an integrally formed polyethylene net structure heat bonded on the top side with Type I geotextile and heat bonded on the bottom side with Type 2 geotextile.

B. Type 'B' Geonet Composite

Geonet Composite Type 'B' shall consist of an integrally formed polyethylene net structure heat bonded on the top side with Type 1 geotextile.

- C. Geonet structure shall be Gundnet XL-14 as manufactured by Gundle Lining Systems, Inc., Houston, Texas, or approved equal.

- D. The Geonet Composite shall have a minimum transmissivity of $1.1 \times 10^{-3} \text{ m}^2/\text{sec}$, at a hydraulic gradient of 0.05 and a normal stress of 250 psf, when tested in accordance with ASTM D4716, modified to include the proposed soil/geosynthetic environment as follows;

- o Standard base plate
- o 2-inches of existing low permeable material
- o Smooth geomembrane
- o Type 'B' geonet composite
- o 2-inches of Type 1 sand
- o Standard top plate

The soil materials shall be placed at densities as required by the Specifications. The test shall be performed at GeoSyntec Consultants, Inc. (Norcross, Georgia); Westinghouse Environmental Services (Fairfield, Ohio); STS Consultants LTD. (Northbrook, Illinois), or other qualified testing laboratories approved by the Engineer. Samples of existing low permeable soil will be made available to any interested parties by Metro.

In the event materials proposed for the project change substantially during construction, additional transmissivity testing may be required.

- E. The geotextile to geonet ply adhesion shall be a minimum of 1.0 pound/inch and an average of 2.0 pound/inch when tested in accordance with ASTM F904 (2"x8" @ 2ipm).

2.4 BENTONITE MAT

- A. The Bentonite Mat shall be formulated and manufactured from polypropylene geotextiles and a minimum of one pound per square foot of high swelling sodium bentonite. The maximum permeability of the Bentonite Mat shall be 1×10^{-9} cm/sec at 10-foot water head. The upper and lower geotextiles of the bentonite mat shall be mechanically connected to enhance the shear strength between the upper and lower geotextiles of the mat. The shear strength between the upper and lower geotextile must be sufficient to maintain the integrity of the mat, while hydrated, during interface friction testing as required in these Specifications.

- B. The bentonite shall have the following base mineralogical composition:

Type: High swelling granular sodium bentonite

Free Swell: Minimum 16 cc per 2 grams.

Particle Size: 20% max retained on a #20 U.S. sieve
10% max passing a #70 U.S. sieve

| | | | | |
|-----------------------|----------------|--------|----------------|-------|
| Chemical Composition: | Silica | 63.02% | Sodium | 2.57% |
| | Alumina | 21.08% | Calcium | 0.65% |
| | Iron (ferric) | 3.25% | Crystal water | 5.64 |
| | Iron (ferrous) | 0.35% | Trace Elements | 0.72% |
| | Magnesium | 2.67% | | |

- C. A 6 inch lapline and a 9 inch matchline shall be printed on both edges of the upper geotextile of the bentonite mat (as installed) for minimum overlap quality control.
- D. The encapsulating geotextiles shall be polypropylene or Engineer approved equals. The top layer of geotextile (as manufactured) shall be a 6 oz. per square yard nonwoven polypropylene needlepunched fabric. The bottom layer of geotextile shall be a 3.25 oz. per square yard woven slit film polypropylene fabric.
- E. The bentonite mat shall be BENTOMAT as manufactured by American Colloid Company, 1500 W. Shure Dr., Arlington Heights, Illinois or an approved equal.

2.5 GEOTEXTILES (Type 1, 2 & 3)

- A. The geotextiles shall be nonwoven, needle punched, and consist of long chain staple polymeric fibers or filaments composed of polypropylene or polyester. The fibers and filaments shall be oriented into a stable network whereby they retain their positions relative with each other. The geotextile shall be free of any chemical treatment or coating which reduces permeability, be inert to chemicals commonly found in soil, and shall be mildew, insect, and rodent resistant. The geotextiles shall conform to the following minimum physical properties (in each principal direction):

| PHYSICAL PROPERTY | TEST METHOD | TYPE 1 | TYPE 2 | TYPE 3 |
|---|-------------|--------|--------|--------|
| Weight, OZ/SY | ASTM D-3776 | 5.9 | 4.0 | 11.5 |
| Tensile Strength, lbs. | ASTM D-4632 | 155 | 100 | 265 |
| Elongation, % | ASTM D-4632 | 50 | 50 | 50 |
| Puncture Strength, lbs. | ASTM D-4833 | 80 | 50 | 155 |
| Mullen Burst, psi | ASTM D-3786 | 275 | 190 | 470 |
| Trapezoidal Tear Strength, lbs. | ASTM D-4533 | 60 | 40 | 130 |
| Coefficient of Permeability, cm/sec | ASTM D-4491 | 0.20 | - | - |
| Flow Rate, gpm/sq.ft. | ASTM D-4491 | 110 | - | - |
| Permittivity, 1/sec | ASTM D-4491 | 1.3 | - | - |
| Apparent Opening Size (AOS), US Std Sieve | ASTM D-4751 | 70 | - | 100 |

* Minimum value in each principal direction.

- B. The geotextile shall be furnished in a protective wrapping to protect it from ultraviolet radiation and from damage due to shipping and handling.

3. EXECUTION

3.1 GENERAL

- A. No layer of geosynthetic shall be covered until the Engineer has inspected and approved the installation.

3.2 BENTONITE MAT

A. PACKAGING AND PANEL MARKING

1. Each factory fabricated sheet shall be individually packaged for protection during shipment. Each roll of the bentonite mat shall be given prominent, unique, identifying markings indicating the sheet number and roll length.

2. The bentonite mat shall be shipped in rolls and protected with a waterproof outside covering. Folded material shall not be accepted. Any evidence of folding or other damage shall be cause for rejection of the material by the Engineer.

B. STORAGE

1. The bentonite mat storage area shall be prepared and reviewed for acceptability prior to the arrival of any material. The Contractor shall submit a written plan to the Engineer for review describing methods of unloading, storage and installation of the material. The submittal shall delineate the responsibility of the Contractor for the material and its protection from the weather during each phase of the construction process. No material shall be accepted at the site, and no payment shall be made for any of the bentonite mat until this submittal has been reviewed and approved. Under no circumstances shall this review relieve the Contractor from providing adequate protection for the material during all phases of the construction.
2. The bentonite mat shall be stored in either the original watertight shipping containers or in a warehouse with concrete floor and roof. The material shall not be stored in any areas where ponding could occur. At all times, the materials shall be protected from water. If outdoor storage is approved by the Engineer, the bentonite mat rolls must be covered by a carefully secured tarpaulin.

C. HANDLING

1. The bentonite mat rolls must be handled by the use of a heavy duty carpet pole or lifting bar placed through the cardboard core. In no case are the rolls to be unloaded or transported with forklift forks or with slings wrapped around the outside of the roll.

D. INSTALLATION

1. The Contractor shall install Bentonite Mat on prepared subgrade surface as specified in Section 02220. The Bentonite Mat Installer shall certify in writing that each section of prepared subgrade surface is acceptable for installation of Bentonite Mat prior to placing Bentonite Mat on that section.
2. The Contractor shall coordinate placement of the Bentonite Mat with the placement of the VLDPE Geomembrane and other components of the final cover as necessary to protect and

maintain the integrity of installed portions of Bentonite Mat.

3. The Bentonite Mat is extremely sensitive to moisture. The Contractor shall not allow the Bentonite Mat to be exposed to rain and shall protect and cover all installed portions at the end of each work day. Any portion of Bentonite Mat that becomes wet by any cause shall be removed and replaced at the Contractors expense.
4. The Bentonite Mat shall not be placed on snow, frost, or frozen ground.
5. The Bentonite Mat sheets shall be placed with the proper side facing up as marked by the manufacturer, and pulled tight to smooth out wrinkles and irregularities. Seams along the length of the roll shall be oriented up and down slope. Seams at the ends of the roll that traverse the slope shall be minimized.
6. The Bentonite Mat shall be laid with a 6 inch overlap at all seams. Seams at the ends of a roll that traverse a slope steeper than 10 percent shall have a minimum overlap of 24 inches.
7. Seams shall be augmented with granular bentonite to insure seam integrity. Granular bentonite shall be spread evenly from the panel edge to the lapline at a minimum rate of 1/4 pound per lineal foot. Accessory bentonite shall be of the same type as the material within the composite liner itself. Fasteners, anchor pins or adhesives may be used on seams to keep panels in place during backfill operations if necessary.

F. REPAIR

1. Damaged or defective sections of Bentonite Mat shall be patched with the same material. The patch shall be 12 inches larger in all directions than the area to be repaired.

3.3 VLDPE GEOMEMBRANE

A. PACKAGING AND PANEL MARKING

1. Each roll of geomembrane shall be uniquely marked by the manufacturer identifying the roll number, date of manufacture, sheet thickness, and sheet length.

B. SHIPPING

1. Shipping is the responsibility of the Installer. Materials

damaged in shipping shall be replaced at the Contractors expense.

2. The Contractor shall supply to the Engineer that information required in Paragraph 1.4 submittals, section C.5, prior to delivery to the site of each roll of geomembrane and each batch of extrudate.

C. STORAGE

1. The geomembrane rolls shall be stored on a smooth, flat, non-abrasive surface, not on wooden pallets, and stacked no more than two high. The Contractor shall protect the geomembrane rolls at all times from dirt, grease, moisture, heat, and any cause of damage. The Contractor shall replace geomembrane damaged by any means at his expense.

D. HANDLING

1. The Installer is responsible for handling geomembrane during off-loading, storing, moving and installing activities.

E. INSTALLATION

1. Installation shall be performed under the constant direction of Installation Supervisor(s) who shall remain on site at all times during the installation and be in responsible charge for all geomembrane installation, including panel layout, seaming, patching, testing, and all other activities associated with the installation.
2. Prior to placing geomembrane panels, the Installation Supervisor shall certify in writing that the receiving surface is acceptable.
3. Geomembrane deployment shall proceed between ambient temperatures of 45 degrees F to 90 degrees F. Placement can proceed below 45 degrees only after it has been verified by the Engineer that the material can be seamed according to the specification. Geomembrane shall not be placed during any precipitation, in the presence of excessive moisture (e.g., fog, dew) or in the presence of excessive winds.
4. The geomembrane shall be installed to the limits indicated on the Drawings. The geomembrane shall be placed in such a manner to minimize field seaming. The geomembrane shall be installed such that field seams run longitudinally down the

slope. The Contractor shall provide temporary wind anchorage during geomembrane installation. Only geomembrane panels for each day's field seaming shall be spread each day and shall be held in position by sandbags until field seaming is complete. As geomembrane materials are unrolled, the Contractor shall perform further visual inspection of the geomembrane surface. If damage or faults not previously observed are discovered, they shall be clearly marked and the respective sheet roll will be set aside. The Engineer shall be notified of the damage. All faulty areas shall be repaired in an appropriate, workmanlike manner. The geomembrane panels shall be installed by experienced workmen and handled in a good workmanlike manner. All rips, tears, puncture, or other injuries to the lining shall be repaired the same day to the satisfaction of the Engineer and in accordance with procedures as specified herein. All rips and tears with sharp edges shall be rounded prior to patching. All patches shall have rounded edges.

5. All seams, including anchor trench seams, shall be made by extrusion or fusion welding. The Contractor shall use only welding apparatus on which proper control of extrudate or wedge temperature, apparatus pressure, welding speed, width of weld, and sheet preheating temperature can be maintained. The Contractor will verify that the welding apparatus meets these requirements.
6. A determination of sheet surface temperature, peel and shear testing in a tensiometer, and visual inspection of seam surface and cross section shall be performed satisfactorily on a test weld, approximately 6 feet in length, before any seam welding is begun each day. Additional test welds at the Engineer's option may be requested before startup of any welding equipment after it has been shutdown for an extended period, at 4-hour intervals, or if the temperature falls below 45°F.
7. Extrusion welds will be made by overlapping adjacent sheets a minimum of 3 inches and extruding a ribbon of hot fusion-joining resin no less than 1.0 inch in width between the overlapped sheets or over the seams between the overlapped sheets, as required. The slick surface of the VLDPE sheet shall be roughened by an acceptable means before extrudate is placed between overlapping sheet or over the lapped seam. Excessive grinding resulting in grooving of the liner or reducing the liner thickness greater than 10 percent shall not be permitted.
8. Fusion field seams shall be made by overlapping adjacent sheets

a minimum of 3 inches and forming a double welded seam separated by an air space. Welded seams shall be produced by a double hot shoe welder capable of maintaining a recordable temperature determined by onsite conditions and shall not vary more than 10°F from the target temperature.

9. After positive evaluation of the test weld, the welding of the sheet geomembrane shall begin.
10. Welding shall not be performed unless the geomembrane sheet is dry and the sheet temperature is above 45°F (7.2°C) and below 95°F (35°C). If the temperature falls below 45°F, seaming may continue at the direction of the Engineer. Prior to allowing seaming to continue, the Engineer shall consider the need to require more frequent test welding. No welding shall be performed if it is raining or the geomembrane is wet.
11. No Geomembrane shall be covered until all inspection, field test, and repairs are satisfactorily completed. Where the installer's or engineer's laboratory tests indicate a failure for a destructive test the seam shall be repaired as required in Section 1.6.3 Destructive Seam Testing. No repair will be required, based on the engineer's laboratory test, unless the engineer delivers laboratory test data to the installer within two working days after the test patch was cut from the installed geomembrane.
12. The completed joints shall have a minimum bonded seam strength in shear of 90 percent and in peel of 50 percent of the specified parent material tensile strength at yield when tested in accordance with ASTM D 3083 and ASTM D 413, respectively. The joints shall also fail as a film tear bond (FTB).
13. Due to potential build-up of pressure under placed geomembrane from trapped landfill gases, Geonet composite and Type 1 Sand shall be installed within two days after placement of the Geomembrane material unless alternate means of maintaining the integrity of the geomembrane is proposed by the Contractor and approved by the Engineer.

F. REPAIRS

1. All seams and non-seam areas of the geomembrane shall be inspected by the Installer for defects, holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Because light reflected by the geomembrane helps to detect

defects, the surface of the geomembrane shall be clean at the time of inspection. The geomembrane surface shall be brushed, blown, or cleaned with a moist cloth by the Installer if the amount of dust or mud inhibits inspection. The Engineer shall decide if cleaning of the geomembrane is needed to facilitate inspection.

a. Evaluation

- 1) Each suspect location in seam and non-seam areas shall be non-destructively tested as appropriate in the presence of the Engineer. Each location that fails the non-destructive testing shall be marked by the Engineer, and repaired accordingly.

b. Repair Procedures

- 1) Defective seams shall be restarted/reseamed as described in these specifications.
- 2) Small holes shall be repaired by extrusion cap welding. If the hole is larger than 1/4 inch, it shall be patched.
- 3) Tears shall be repaired by patching. Sharp ends must be rounded prior to patching.
- 4) Blisters, large holes, undispersed raw materials, and contamination by foreign matter shall be repaired by patches.
- 5) Surfaces of VLDPE which are to be patched shall be abraded and cleaned no more than 15 minutes prior to the repair. No more than 10 percent of the thickness shall be removed.
- 6) Patches shall be round or oval in shape, made of the same geomembrane, and extend a minimum of 6 inches beyond the edge of defects. All patches shall be of the same compound and thickness as the geomembrane specified. All patches shall have their top edge beveled with an angle grinder prior to placement on the geomembrane. Patches shall be applied using approved methods only.

- 7) Wrinkles which may become folds during placement of material above the Geomembrane shall be repaired by cutting away the excess material and repairing as required above. No folding in the Geomembrane is allowed.

3.4 GEONET COMPOSITE

A. PACKAGING, LABELING AND SHIPPING

1. Geonet Composite shall be packaged and shipped in protective wrapping, labeled with appropriate identification including manufacturer, fabric weight, and roll length.

B. STORAGE

1. The Geonet Composite rolls shall be stored in its protective wrapping in a manner that protects the material from dirt, moisture, heat, and any other cause of damage.

C. INSTALLATION

1. The surface to receive Geonet Composite shall be free from dust, dirt, stones, and any other objects or debris. The Geonet Composite shall be installed as shown on the plans with the proper side facing up. When installed on slopes greater than 10 percent, longitudinal seams shall be oriented up and down slope.
2. Adjoining sections of Geonet Composite shall have no more than 1/4 inch gap between the edges of the net structure on each piece and shall be fastened every 10 feet of seam with plastic ties approved by the manufacturer and Engineer. All seams shall have the upper geotextile overlapped 6 inches and heat bonded the entire length of seam by a method approved by the manufacturer and the Engineer.
3. The Contractor shall secure and protect installed sections of Geonet Composite by approved methods. The Contractor shall not operate equipment or vehicles of any kind on the Geonet Composite. Any damaged sections of Geonet Composite caused by wind, weather, Contractors activities or any other means, shall be repaired or replaced at no additional cost to Metro.

4. The Contractor shall place Type I Sand over installed sections of Geonet Composite only by a method approved by the Engineer.

F. REPAIR

1. Repairs shall be made by cutting out damaged areas, in rectangular shapes, and replacing with new material. Seaming shall be as required above with a minimum of one tie on each side of the patch.

3.5 GEOTEXTILE

A. LABELING AND SHIPPING

1. Geotextile shall be packaged and shipped in protective wrapping, labeled with appropriate identification including manufacturer, fabric weight, and roll length.

B. STORAGE

1. The Geotextile rolls shall be stored in its protective wrapping in a manner that protects the material from dirt, moisture, heat, and any other cause of damage.

C. INSTALLATION

1. Geotextile shall be placed as shown on the project plans with overlaps a minimum of 12 inches unless otherwise stated. Geotextile shall be laid smooth without excessive wrinkles and held in place by an approved method until covered.

D. REPAIR

1. Torn geotextile shall be covered with a piece of the same material with at least 12 inch overlap all around.

*** * * END OF SECTION * * ***

SECTION 02275

SEDIMENTATION CONTROL

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Embankment and Grading: Section 02220
- B. Excavating, Backfilling and Compacting for Structures: Section 02221
- C. Excavating, Backfilling and Compacting for Utilities: Section 02222
- D. Storm Drainage: Section 02720
- E. Fences: Section 02831

1.2 SCOPE

- A. This section covers material and installation requirements for sedimentation control to be installed by the Contractor under of this project. This work may consist of constructing sedimentation ponds, erosion control matting, hydroseeding, temporary or permanent drainage ditches, sedimentation barriers or fences, plastic sheeting with anchors and any additional sedimentation control measures which may be necessary depending on the Contractors methods, time of year, type and location of work activity.

1.3 QUALITY CONTROL

- A. Conform to regulatory requirements, specifically City of Portland Bureau of Environmental Services.
- B. Contractor shall review the City of Portland Erosion Control requirements, his intended methods, work schedule etc., and provide a system to prevent erosion of embankment slopes or ditches and the resulting siltation of surrounding waters. Sedimentation control measures will be required to assure adequate protection of adjacent slough water quality. All requirements set forth in the City of Portland, Bureau of Environmental Services, Erosion Control handbook, latest printing, shall be satisfied during this contract.

1.4 SCHEDULE

- A. Required sedimentation control facilities must be constructed and in operation prior to land clearing and/or other construction to ensure that sediment laden water does not enter the natural drainage system.
- B. Sediment facilities shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed and potential for on-site erosion has passed.

- C. The implementation, maintenance, replacement and additions to erosion/sedimentation control systems shall be the responsibility of the Contractor.

1.5 SUBMITTALS

- A. Temporary measures required to control surface runoff, erosion and sedimentation during construction will be included with the Excavation, Embankment and Grading Plan required in Section 02220. Periodic updates of this portion of the plan may be required.
- B. The measures to control surface water and erosion for completed work on this phase of the landfill closure as outlined in the Contract Documents will be submitted in the Sedimentation Control Plan no later than 20 days after Notice to Proceed.
- C. Product information for materials required in this section will be submitted and approved prior to purchase.

2. PRODUCTS

2.1 HYDROSEEDING MATERIALS

- A. Provide fresh, clean, dry, new-crop seed complying with tolerance for purity and germination established by Official Seed Analysts of North America. Provide grass seed as follows:
 - 1. "Mecklenberger" sheep fescue, 100 pounds (PLS) per acre.
"Manhattan" perennial ryegrass, 50 pounds (PLS) per acre.
 - 2. The application rates indicated above are given in Pure Live Seed (PLS) rates. PLS rate will be determined by the percent purity times percent germination. For example, a seed mix of 95% purity and 35% germination will equal 33% PLS. Therefore, 3 pounds of the seed mix will be required to equal 1 pound of PLS.
- B. All fertilizers shall be of standard commercial manufacturer and grade. Fertilizer shall be furnished in standard, unopened, moisture-proof containers and in dry condition. Granular or pelletized forms shall be free from lumps and caking. Each container shall be marked with the weight and manufacturers guaranteed analysis certifying the percentage of each ingredient.

Fertilizer needs shall be evaluated by the contractor prior to hydroseeding. Once topsoil has been placed, appropriate top soil

analyses shall be performed based on one soil test per 5 acres to be hydroseeded. Analyses shall evaluate nutrient content, salinity, pH, organic content and other appropriate factors. Tests shall include both existing topsoils from the landfill and imported topsoils as specified.

Based on these tests, fertilizer makeup (nitrogen, phosphorous and potash) and rate of application (lbs. per acre) shall be determined to provide optimum growth for the seed mix. Contractor shall submit test results and proposed fertilizer makeup and application rate for Metro/Engineer review prior to performing work.

- C. All mulch materials shall be free of noxious weed seeds and plants and shall contain no substance detrimental to plant life. Wood cellulose fibre mulch shall be processed so that the wood fibers will remain uniformly suspended under agitation in water. The mulch shall also blend with seed, fertilizer and other typical additives of a hydroseeding mixture to form a homogeneous slurry.

This processed mulch shall have the ability to cover and hold grass seed in contact with soil. The wood fiber shall also have moisture-absorption and percolation properties to form a blotter-like ground cover. The cellulose fiber shall be colored green to visibly aid uniform application.

Wood cellulose fiber shall be shipped in packages of uniform weight ($\pm 5\%$) and labeled with the manufacturer's name and air-dry weight.

- D. Hydro-Slurry Mix:

1. Seed Mix: 150 pounds (PLS) per acre
2. Fertilizer: As Required, (Paragraph B)
3. Wood Cellulose Fiber, dyed green: 1500 pounds per acre
4. Tackifier: As required

2.2 EROSION CONTROL MATTING/BLANKET

- A. Shall be XCEL blanket manufactured by Soil Stabilization Co., or equal.

2.3 SEDIMENT FENCE

- A. Conform with Figure 3.3 in the City's "Erosion Control Plan" 1989.
- B. Filter fabric material shall conform to Section 02272-2.1.

2.4 STRAWBALE SEDIMENT BARRIER

- A. Strawbales shall be standard 40 to 60 pound rectangular bales of cereal grain or seed straw.

2.5 PLASTIC SHEETING

- A. Shall be polyethylene and have a minimum thickness of 6 mil.
- B. Anchors to be sandbags with stakes, tires or other items suitable in size and weight to adequately hold the plastic sheeting in place during windy, wet weather. Anchors shall not have sharp edges, except stakes through sandbags.

3. EXECUTION

3.1 GENERAL EROSION CONTROL

- A. Erosion control provisions shall meet or exceed the requirements of the City of Portland, Bureau of Environmental Services. Refer to City's "Erosion Control Plans Technical Guidance Handbook".
- B. When provisions are specified and shown on the Drawings, they are the minimum requirements.
- C. Contractor shall not permit sediment laden waters to enter off-site drainage facilities/sloughs.
- D. As construction progresses and seasonal conditions dictate, more siltation control facilities may be required. It shall be the responsibility of the Contractor to address new conditions that may be created and to provide additional facilities in a timely manner over and above minimum requirements as may be required.

3.2 SILTATION/SEDIMENTATION PONDS

- A. Temporary siltation/sedimentation ponds shall be installed on site to desilt all stormwater or water pumped from excavations.
- B. If additional siltation control is required, check dams or silt fences may be placed in streams or ditches receiving stormwater from areas disturbed by construction.
- C. Siltation/sedimentation ponds shall be constructed in accordance with the requirements of the agencies having jurisdiction over facilities to receive discharge from siltation/sedimentation ponds.

3.3 PLACING EROSION CONTROL MATTING

- A. Seed and fertilizer (Hydroseeding) shall be placed prior to placing of matting.
- B. Erosion Control matting shall be unrolled parallel to the flow of water. Where more than 1 strip of matting is required to cover the given area, it shall overlap the adjacent mat a minimum of 4 inches. The ends of matting shall overlap at least 6 inches with the upgrade section on top.
- C. The up-slope end of each strip of matting shall be staked and buried in a 6-inch deep trench with the soil firmly tamped against the mat. Three stakes per width of matting (1 stake at each overlap) shall be driven below the finish ground line prior to backfilling of the trench.
- D. The Engineer may require that any other edge exposed to more than normal flow of water or strong prevailing winds be staked and buried in a similar manner.
- E. Check-slots shall be placed between the ends of strips by placing a tight fold of the matting at least 6 inches vertically into the soil. These shall be tamped and stapled the same as upslope ends. Check-slots must be spaced so that one check-slot or one end occurs within each 50 feet of slope.
- F. Edges of matting shall be buried around the edges of catch basins and other structures as herein described. Matting must be spread evenly and smoothly and in contact with the soil at all points.
- G. Matting shall be held in place by approved wire staples, pins, spikes or wooden stakes driven vertically into the soil. Matting shall be fastened at intervals not more than 3 feet apart in 3 rows for each strip of matting, with 1 row along each edge and 1 row alternately spaced in the middle. All ends of the matting and check slots shall be fastened at 6-inch intervals across their width. Length of fastening devices shall be sufficient to securely anchor matting against the soil and driven flush with the finished grade.

3.4 HYDROSEEDING

- A. Do not use wet seed or seed which is moldy or otherwise damaged in transit or storage (unless soaking seed for quick germination is approved by Metro). Do not use seed from containers opened before delivery to the job site or before hydro-slurry equipment is ready. Retain seed packaging for observation by Engineer.

- B. Confirm that final subgrade is achieved, topsoil has been placed and tested (re: fertilizer needs) and is acceptable prior to commencing the hydroseeding operations. Hydroseed all areas covered by topsoil.
- C. Mix specified seed, fertilizer, and mulch in water using equipment specifically designed for hydro-slurry application. Continue mixing until uniformly blended into a homogeneous slurry suitable for hydraulic application. The materials shall be applied through a pressure-spray system providing continuous, nonfluctuating applicate rate.
- D. Apply slurry uniformly at the specified rates using a sweeping, horizontal motion. Clean hydro-mulch off areas not intended for hydroseeding which are inadvertently sprayed during applications.
- E. Unless otherwise specified or approved, this work is to be performed from August 15 to October 1. The work shall be performed only at times when local weather and other conditions are not detrimental to seeding and mulching. The work shall not be undertaken when wind velocities would prevent uniform application of the materials or would drift the materials. Work shall be done in stages along the project as soon as practicable after completion of topsoil placement on areas to be seeded and mulched.
- F. Inspection of any area will be made upon completion of hydro seeding. The work in any area will not be measured for payment until a uniform distribution of the materials is accomplished at the specified rate and the grass has started to grow. Areas not receiving a uniform application, or areas where grass fails to thrive, as determined by the Engineer, shall be reseeded, refertilized, or remulched at the Contractor's expense prior to payment.

3.5 STRAWBALE SEDIMENT BARRIER

- A. Bales to be keyed into existing ground a minimum of 4 inches. Wood stakes are to be driven through the bales and into ground a minimum of 12 inches.
- B. At no time shall more than a one foot depth of sediment be allowed to accumulate behind strawbale sediment barriers. Sediment must be removed or new lines of barriers installed uphill of sediment laden barriers.

3.6 PLASTIC SHEETING WITH ANCHORS

- A. Plastic sheeting shall be installed and maintained tightly in place by using staked sandbags or tires on ropes (10' max. grid spacing). Other anchor materials may be used which provide similar hold-down characteristics. All seams shall be taped or weighted down full length and there shall be at least

a 12-inch overlap of all seams. For seams parallel to the slope contour, the uphill sheet shall overlap the downhill sheet.

3.7 PROTECTING GEOSYNTHETICS

- A. All stakes, whether for anchoring sand bags, plastic sheeting, strawbales, matting, or other material, shall be installed in such a way as to insure the integrity of the underlying geosynthetics.

* * * END OF SECTION * * *

SECTION 02610

PIPE AND FITTINGS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Excavating, Backfilling and Compacting for Utilities: Section 02222
- B. Storm Drainage: Section 02720
- C. Gas and Condensate Collection System: Section 02680

1.2 QUALITY CONTROL

- A. Testing by Manufacturer:
 - 1. Manufacturer shall test all materials as required by these Specifications and the standards referenced.
 - 2. Manufacturer shall submit to the Engineer two (2) copies of all test results which shall include a certification that materials to be delivered are represented by the samples tested and that such delivered materials meet or exceed the specification requirements.
 - 3. No material shall be delivered until test results and certifications are in the hands of the Engineer.
 - 4. Engineer shall have free access to all testing and records pertaining to material to be delivered to the job site.
 - 5. The Engineer may elect to be present at any or all material testing operations.
- B. Joint tests are intended for qualification of joint design and shall be considered to be a qualification test to establish the adequacy of the manufacturer's joint design. The manufacturer shall certify that tests have been performed within the last year with pipes equivalent in size and design and that they have passed the test enumerated in the specifications. Tests may be waived for pipes of different strength class if joint design is the same as the pipe tested.

2. PRODUCT

2.1 FLEXIBLE COUPLINGS

- A. Use for connection between plain end pipe of same or different material.
- B. Sleeve: Gray iron ASTM A126 Class B or ductile iron ASTM A536. Ends have a smooth inside taper for uniform gasket seating.

- C. Followers: Ductile iron ASTM A536.
- D. Gaskets: Grade 30 specially compounded rubber of all new materials.
- E. Bolts and nuts: High strength low alloy steel with heavy, semi-finished hexagon nuts to AWWA C111 (ANSI-A21.11).

2.2 GALVANIZED CORRUGATED STEEL CULVERT PIPE (CMP)

- A. Conform to the requirements of AASHTO Designation M36, Type I and II, 16 gage minimum. Welded seam aluminum coated inside and outside (aluminized) CMP steel pipe is acceptable alternate.
- B. Coupling band shall meet the requirements of AASHTO M36 and wide enough to cover at least two annular corrugations. Gasket shall be provided.
- C. When specified, pipe ends shall be flared or beveled to serve as structural, hydraulic and/or aesthetic end treatment to corrugated steel culverts.

2.3 HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE

- A. Pipe used for the gas and condensate collection manifold piping system shall be High Density Polyethylene (HDPE) pipe conforming to the following specifications:
 1. Pipe sizing shall be in accordance with ASTM F714-83 and ASTM D3035-83.
 2. The pipe shall be made from Premium High Density Polyethylene resin qualified as Type III, Category 5, Class C, Grade P34 in ASTM D1248-81.
 3. This material shall have a long term hydrostatic strength of 1600 psi when tested and analyzed by ASTM D2837-76 (1981), and listed by the Plastic Pipe Institute as P.E. 3408 resin.
 4. The following minimum engineering design specifications are required:

ASTM D-638 Tensile Strength Yield (2in/min), $\geq 3,200$ PSI.

ASTM D-638 Elongation at break, 750%.

ASTM D-638 Modulus of Elasticity, 120,000 PSI.

ASTM D-790 Flexural Modulus, 135,000 PSI.

ASTM D-1693 Environmental stress crack resistance (E.S.C.R.)
Condition C, $> 5,000^{\circ}$ F, 20 Hrs.

ASTM D-2837 Long Term Strength (L.T.H.S.) @73.4 degrees Fahrenheit, 1600 PSI.

5. In addition to the above, the High Density Polyethylene Material shall have the following general characteristics:

ASTM D-1505 Density with carbon black, 0.955 g/cm³ (min).

ASTM D-1238 Melt index (E) Condition, \leq 0.14 g/10 min.

ASTM D-1238 Melt index (F) Condition, \leq 11.0 g/10 min.

ASTM D-1525 Vicat softening point, 257 degrees Fahrenheit (min).

ASTM D-746 Brittleness temperature, $<$ -180 degrees Fahrenheit (max).

ASTM C-177 Thermal conductivity, 2.7 BTU, in/ft² hrs./degrees Fahrenheit.

ASTM D-696 Thermal expansion, 1.2×10^{-4} in/in/degrees Fahrenheit (max).

ASTM D-2240 Hardness shore "D", 65.

ASTM D-3350 Cell Class, 345434C.

Resin to be N.S.F. listed.

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

7. The HDPE pipe shall be homogenous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. 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 trade mark of the pipe manufacturer.
 - b. Nominal pipe size.
 - c. Standard Dimension Ratio (SDR)
 - d. PE 3408
 - e. Manufacturer's Standard Reference
 - f. A production code from which the date and place of manufacture can be determined.
 8. Polyethylene compound shall be protected against ultra violet degradation by carbon black in concentration of not less than 2%. All gas and condensate manifold pipe shall have a minimum working pressure of 160 psi at 73.4 degrees Fahrenheit and a minimum SDR of 11.
 9. Flanges shall consist of a polyethylene flange adapter (ribbed face) fused to each length of pipe, with a shop primed convoluted ductile iron back-up ring.
 10. Flange bolts shall conform to material requirements of ASTM A307 Grade B with ANSI B18.2.1 standard hex head pattern, ANSI B1.1 coarse thread, Class 2 fit. Nuts shall meet the requirements of ASTM A307, ANSI B18.2.2 standard hex head pattern ANSI B1.1 coarse thread and have a Class 2B fit. Flat washers shall be provided with each nut for protection of flanges. All bolting materials shall be hot-dip galvanized per ASTM A153.
- B. Pipe used for the perimeter gas collection trenches shall be as described below:
1. Solid wall and "broken back collar" sections shall be as described in Paragraph A above.
 2. Perforated pipe sections shall be corrugated high-density polyethylene pipe, ASTM F405 as manufactured by Advanced Drainage Systems, 1025 Commerce Drive, Madera, California, 93637 or approved equal.

2.4 POLYVINYL CHLORIDE (PVC) PIPE FOR CONDENSATE PUMP DISCHARGE AND VACUUM SYSTEM, VERTICAL GAS EXTRACTION WELLS, WELL HEAD COMPLETIONS

- A. PVC condensate pump system, vacuum system, vertical gas well and well head completions piping shall be manufactured from Type 1 Grade 1 PVC material conforming to the requirements of ASTM D1784. All piping shall be solvent weld unless otherwise shown or required for connection to other components. Pipe that is to be threaded shall be Schedule 80.
- B. The 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% of the nominal wall thickness shall be rejected. It shall be uniform in color, density, and other physical properties.
- C. Pipe 8 inches in diameter and smaller shall meet the requirements of ASTM D1785 and shall be Schedule 40, unless otherwise noted or required. Pipe larger than 8 inches shall comply with ASTM D2241 SDR 26 Class 160.
- D. Flexible PVC pipe shall be sized with the I.D. to match the O.D. of rigid PVC pipe, have a rigid outer wall reinforcement, a minimum vacuum rating of 25 inches Hg, and shall be as manufactured by Kanaflex Corporation of America, series 101-PS flexible PVC pipe, or equal.
- E. Pipe for vertical gas extraction well casing shall be as described above with the exception that the pipe wall will be Schedule 80. Pipe for vertical gas extraction well screens shall be flush threaded, schedule 80 PVC furnished in 5 and 10 foot lengths. The slotted openings shall be 0.040-inch sized.
- F. Fittings shall be solvent weld and shall be manufactured of the same material as the pipe. All fittings shall be Schedule 80 when located below grade. Fittings above grade shall be Schedule 40.
- G. All fittings shall be rated and warranted to the full pressure of the pipe they are fabricated from. The manufacturer shall be able to demonstrate that fittings have been randomly tested to exceed the following:

Short-term quick burst at 2.5 times the normal operating pressure rating of the pipe material or greater.

Long-term 1,000 hour test at 2.0 times the normal operating pressure rating of the pipe material, or greater, without damage.

- H. All fittings 8-inches and smaller shall meet the requirements of ASTM D2466-73. Fittings over 8-inches shall be either injection molded or fabricated from PVC material utilizing butt fusion welded or mitered and welded joints. Joints for fabricated fittings for 45° and 90° bends shall be butt fusion welded. All other bends may be thermoplastic welded with a minimum of three full weld passes. Welding rod shall be of the same material as the pipe.
- I. All fabricated fittings shall be reinforced with fiberglass, chemically bonded to the fittings, to achieve a shear strength of at least 1,000 psi. Test results shall be available upon request by the Engineer.
- J. Flanges shall be 150-pound flat face solvent weld Van Stone type and shall comply with the requirements of ANSI B16.5 Class 150. Flange gaskets shall be full faced 1/8-inch thick EPDM. Solvent cement shall conform to ASTM D2564.
- K. Flange bolts shall conform to material requirements of ASTM A307 Grade B with ANSI B18.2.1 standard hex head pattern, ANSI B1.1 coarse thread, Class 2 fit. Nuts shall meet the requirements of ASTM A307, ANSI B18.2.2 standard hex head pattern ANSI B1.1 coarse thread and have a Class 2B fit. Flat washers shall be provided with each nut for protection of flanges. All bolting materials shall be hot-dip galvanized per ASTM A153.

2.5 DUCTILE IRON CASING

- A. Conform to AWWA C151 (ANSI A21.51) and shall be Class 52, unless otherwise specified.
- B. Joints shall be mechanical joint or push-on joint and shall conform to AWWA C111 (ANSI A21.11).
- C. Pipe and fittings shall have a cement mortar lining conforming to AWWA C104 (ANSI A21.4).

2.6 SOLID PVC PIPING (NON-PRESSURE)

- A. Solid PVC piping and fittings shall conform to the requirements for ASTM D3034 SDR35.

2.7 PERFORATED PVC PIPING

- A. Perforated PVC piping shall meet the requirements of AASHTO M278. At the Contractor's option, an approved equal slotted PVC pipe may be used. Should the Contractor choose this option, he shall submit plans showing pipe dimensions and slot sizes and intervals for approval.

2.8 PERFORATED CMP PIPING

- A. Conform to AASHTO M36 requirements for zinc coated (galvanized) or aluminum coated (aluminized) corrugated iron or steel pipe. Provide minimum 0.052-inch thickness for 6 inch diameter and smaller pipe and 0.064-inch thickness for 8-inch diameter and larger pipe.
- B. Perforations shall conform to the locations shown in the Drawings.
- C. Coupling bands shall conform with AASHTO M36, Type III pipe, unless otherwise approved.

2.9 EXPANSION JOINTS

- A. Conform to Section 02680.

3. EXECUTION

3.1 INSTALLATION

- A. Install pipe in accordance with specification section for pipeline being installed.
- B. Test pressure or vacuum pipes in accordance with the manufacturers recommendations prior to commencing normal service on this project. Where manufacturer does not specify a test similar to the application involved in this project, test pipe at 1.5 times working pressure or vacuum pressure to demonstrate the integrity of the installed pipe.
- C. Provide temporary protection, if required, for installed pipes with shallow burials to prevent damage from construction related equipment until the time of work completion.

* * * END OF SECTION * * *

SECTION 02680

GAS AND CONDENSATE COLLECTION

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Vacuum Pump Stations: Section 11301
- B. Pipe and Fittings: Sections 02610
- C. Remote Condensate Pump Station: Section 11302

1.2 DESCRIPTION

- A. This work shall consist of the construction of the road crossing casing pipes for the gas and condensate system, gas and condensate manifold piping, condensate system cleanouts including meter boxes, condensate pump discharge and vacuum service piping, horizontal gas collection trenches, vertical gas extraction wells, wellhead completions, and vacuum valve stations.
- B. Temporary Systems work shall consist of providing construction assistance to the Owner for installation of the temporary gas collection and condensate disposal systems. The work shall also consist of providing the pipe and the gas flare with foundation for these temporary systems.
- C. All earthwork required, including trench excavation, pipe bedding, and backfill, shall be in accordance with Section 02222 of the Specification. The installation of erosion control measures shall be in accordance with Section 02275 of this Specification.

1.3 QUALITY CONTROL

A. PROOF TESTS

- 1. The intent of this requirement is to pre-qualify a piping joint system, components of which meet the above requirements, as to the water and air/vacuum tightness capability of that joint system. This proof test shall be understood to apply to the gas and condensate lines which are to be tested for water and air/vacuum tightness prior to acceptance. Material and test equipment for proof testing shall be provided by the manufacturer. When approved by the Engineer, internal hydrostatic testing may be applied by a suitable joint tester. Proof testing will be required for the permanent system only. No proof testing will be required for the temporary system.

B. MATERIAL CERTIFICATION

1. The manufacturer shall furnish appropriate certification, based on the manufacturer's routine quality control tests, that the pipe and pipe fittings meet the requirements of the pertinent ASTM or ANSI Specifications.

2. MATERIALS

2.1 ROAD CROSSING CASING PIPE

- A. Conform to Section 02610 for Ductile Iron Casing Pipe.

2.2 HDPE GAS AND CONDENSATE COLLECTION PIPE

- A. Conform to Section 02610.

2.3 PVC PIPE FOR CONDENSATE PUMP DISCHARGE AND VACUUM SYSTEM

- A. Conform with Section 02610.

2.4 CONDENSATE CLEANOUTS

- A. Piping material to conform to Section 02610 except that the clean-out wye shall be shop fabricated with a 5' radius as shown on the Plans.
- B. Vaults for the condensate system clean-outs shall be as manufactured by Utility Vault model 2436-R6 pre-cast concrete riser with a 23-2436P cover or approved equal.

2.5 VALVES FOR GAS AND CONDENSATE SYSTEM

- A. Valves 4 inches and larger shall be butterfly valves manufactured with PVC wafer style bodies and shall be as manufactured by Asahi America Type 75 or approved equal with PVC body, Polypropylene (PP) or Polyvinylidene fluoride (PVDF) disk and EPDM seat. Valves 8 inches and larger shall be provided with a worm gear operator, position indicator and handwheel for operation. Valves 6 inches and smaller shall be provided with a ratcheting hand lever for operation. Valves shall be rated for full vacuum service.
- B. Valves 3 inch and smaller shall be gate valves manufactured with a PVC flanged body type and straight-through flow passage, with EPDM seats and handwheel operator as manufactured by Asahi America or approved equal. Valves shall be rated for full vacuum service.

2.6 HORIZONTAL GAS COLLECTION TRENCHES

- A. Piping material shall conform to Section 02610.
- B. Gravel bedding material shall conform to Section 02222-2.1.
- C. Geotextile shall conform to Section 02272.

2.7 VERTICAL GAS EXTRACTION WELLS

- A. Well casing material shall conform to Section 02610.
- B. Well screen material shall conform to Section 02610.
- C. The pack material shall be vesicular scoria or pumice as available through Red Rock, Inc. Goldendale, WA. or other low density granular "lava-rock" material as approved by the Engineer. The pack material shall conform to the specifications for grading, quality and density in Section 02220-2.10.
- D. The annular seal materials shall be a State of Oregon approved seal to the land surface. The bentonite plug placed above the pack material shall be bentonite chips. The Contractor shall measure and record depth soundings versus depth of drill casing and the number of bags of bentonite used on their State well log.

2.8 WELLHEAD COMPLETIONS

- A. Conform with Paragraphs 2.3 and 2.5 of this Section.

2.9 VACUUM VALVE STATIONS

- A. Included in each vacuum valve station are the following components:
 - 1. All piping and fittings between the "HDPE-to-stainless steel" flange break at the gas collection manifold and the condensate collection manifold as shown on the Plans.
 - 2. Two 1/2 inch stainless steel ball valves as shown on the Plans.
 - 3. 3/16 inch stainless steel tubing with fittings and valve as shown on the Plans.
 - 4. One "APCO" model 65.5 air release valve. The valve shall be installed "up-side-down" as shown on the Plans in that it will be used as a vacuum release valve rather than an air release valve.
 - 5. One precast concrete vault.
- B. The piping shall be 316L stainless steel.

- C. The ball valves shall be stainless steel body, stainless steel ball and stem, with teflon seats.
- D. All stainless steel tubing, fittings and valves shall be 316L stainless steel "Swagelock" or approved equal.
- E. The vault shall be a "Utility Vault Co." pre-cast concrete vault with two Model No. 2436-R6 risers and a Model No. 23-2436P locking cover, or approved equal. The overall dimensions of the vault shall be 3'-0" x 2'-0" x 1'-6" deep. The vault shall be installed with 1-inch thick "Styrofoam-Blue" brand polyfoam or equal and shall be secured to all interior surfaces of the vault using DOW Chemical PL-300 adhesive or approved equal.
- F. The "APCO" Model 65.5 air release valve shall be constructed of stainless steel body, internals, and seats. No substitutions will be accepted for this air release valve.

2.10. EXPANSION JOINTS

- A. Expansion joints shall be constructed of high strength silicone rubber with polyester fabric reinforcement as manufactured by Industrial Tube Corporation, 3091 Indian Avenue, Perris, California, 92370, Model IT-6000 -24 or acceptable substitute. Stainless steel Type 302 wire shall be encapsulated within the inner and outer plies and not exposed. Scuff strips shall be added to the outside of the coupling over the wire areas. The coupling shall have an operating temperature range of between -65 degree F through +325 degree F. The coupling shall have the flexibility of 50% contraction and 20% extension and a bend radius of 1.5% of the diameter.

PVC pipe collars shall meet the requirements of Section 02610 of this specification and shall be manufactured by Industrial Tube Corp., 3091 Indian Ave., Perris, Calif. 92370, Model IT-6003 or acceptable substitute. PVC pipe flanges shall meet the requirements of Section 02610 of this specification.

2.11 TEMPORARY SYSTEMS

- A. The Contractor shall be responsible for supplying 4" SCH 40 PVC pipe for the temporary gas collection system. The Contractor shall also supply 2" SCH 40 PVC pipe and a 4' dia. x 10' deep temporary condensate manhole as manufactured by Advanced Drainage Systems, or equal, for the temporary condensate disposal system. The Owner/Engineer shall supply all additional materials required for the installation of the temporary systems.

- B. The Contractor shall supply a temporary gas flare fabricated as shown on the Plans. The flare shall be provided with a solar powered ignition device, control panel, 12 volt, 650 AMP deep cycle marine battery with lockable case, 40 feet of 3/C#14 Teck cable, and all hardware required for mounting the solar panel, control panel, and battery case remote from the flare.

The ignitor assembly shall be a "MAC Ignitor" as manufactured by MAC Tronic, Ltd., Box 621 Red Deer, Alberta, Canada T4N5G6 (403) 342-1822, or approved equal.

- C. The Contractor shall supply foundations for the flare base and guy wires. These foundations shall conform with Division 3 of this specification.

3. EXECUTION

3.1 ROAD CROSSINGS CASING PIPE

- A. Road crossing casing pipe shall be installed at locations shown on the Drawings to permit landfill gas collection, condensate collection, condensate discharge and vacuum piping to cross beneath roadways.
- B. The landfill gas manifold piping, condensate piping and vacuum piping shall be inserted in the casing pipe using 2-inch by 2-inch by 18-inch long wooden blocking at 5-foot centers as shown on the Plans. Condensate piping, and vacuum piping shall be bundled together with plastic strapping where applicable and inserted into a single casing pipe as shown on the Plans. Casings for the condensate and vacuum piping shall be blown full of sand. Any build-up of the road required to achieve minimum cover over the casing pipe shall be done in accordance with Section 02220 of these Specifications.

3.2 PERMANENT HDPE GAS OR CONDENSATE PIPE INSTALLATION

- A. HDPE Pipe which is to be installed underground shall be laid in a manner that the excavation, pipe laying, and back-filling of the pipe trench, as described on the Plans, shall be completed within the same day and before the Contractor leaves the site on that day. Extreme care must be taken to ensure that the landfill geomembrane is not disturbed or damaged in any way. Any repairs made to the cover that are a result of the contractor's negligence while installing the piping will be done at the contractor's expense. Trench excavation and backfill shall be per Section 02222
- B. For HDPE pipe which is to be installed aboveground, the ground surface shall be smoothed and ruts filled in 30-inches on each side of

the pipe route prior to pipeline installation. Continuous slope between inverts shown on plans is to be maintained. Maximum deviation from inverts shown to be +/- 0.01 feet. Where necessary to meet slopes or elevations, the contractor shall excavate or backfill areas 30-inches on each side of the pipe route prior to the installation of the pipe.

- C. When necessary to cut the HDPE gas or condensate pipe, the pipe shall be cut using a tool or tools specifically designed to leave a smooth, even and square end on the pipe material to be cut. Cut ends shall be reamed to the full inside diameter of the pipe.
- D. The individual lengths of pipe and all fittings (unless otherwise noted) shall be jointed together by thermal butt fusion. This pipe shall be fused of the same type, grade, and class of polyethylene compound and supplied by the same raw material supplier.

Butt fusion shall be made only when the pipe materials to be jointed are clean and dry, and only at ambient temperatures of 40 degree Fahrenheit and above, or as approved by the Engineer.

The butt fusion shall be accomplished according to the pipe manufacturer's recommendation.

- E. The Contractor shall take care when handling the pipe so as to not damage it by dragging it over sharp and cutting objects. Sections of the pipe with gouges or cuts shall be cut out and the ends of the pipe rejoined.
- F. Where shown the Plans, lengths of pipe shall be joined together by the use of flanges rather than thermal fusion. Flange bolts shall be tightened by pulling down on diametrically opposite nuts until proper bolt torque values are achieved. Bolt torques for the HDPE Flanges are given below:

| <u>Flange Size (inches)</u> | <u>Torque (foot pounds)</u> |
|-----------------------------|-----------------------------|
| 2 to 4 | 20 to 30 |
| 6 to 8 | 33 to 50 |
| 10 | 53 to 75 |
| 12 | 80 to 110 |

Contractor shall provide necessary gaskets and bolting to install between adjoining flanges. Flanged connections are required where disconnection of one flange is required for removal, repair or maintenance of equipment.

3.3 CONDENSATE CLEAN-OUTS

- A. Conform to Paragraph 3.2.
- B. Pre-cast concrete vaults shall be installed in accordance with Section 03485 of this Specification.

3.4 PVC CONDENSATE PUMP DISCHARGE AND VACUUM SYSTEM PIPING INSTALLATION

- A. Conform to Paragraphs 3.2 A, B, C, and E.
- B. The individual lengths of pipe and all fittings (unless otherwise noted) shall be jointed together by solvent welding. The pipe or fittings bell and spigot shall be clean and dry before jointing operations begin. The bell and spigot shall both be coated with primer followed by the application of cementing material to both the bell and spigot in accordance with the manufacturer's instructions.
- C. Care shall be taken to properly align the pipe before the joints are forced home. Where dirt, water or other foreign material comes in contact with the primer or cementing material for the joints, the joint shall be thoroughly cleaned and dried and new primer and cementing material applied before the joint is forced home. The joint shall be maintained in position for the time specified by the manufacturer before any pressure is applied to the pipe.
- D. Paint all exposed portions of rigid PVC pipe per Section 09900 of this specification.

3.5 VALVE INSTALLATION

- A. All gas and condensate system valves shall be oriented for operator convenience with the operation handle or actuator in the most accessible position. Butterfly valves shall be installed with the shaft axis in the horizontal position.

3.6 HORIZONTAL GAS COLLECTION TRENCHES

- A. Horizontal Gas Collection Trenches will be installed surrounding the landfill perimeter in Subarea 1 per the Plans. These trenches are to be installed in refuse, therefore the appropriate safety precautions apply.
- B. Installation of gravel bedding material shall conform to the Plans.

- C. Installation of the geotextile shall conform to Section 02272, the manufacturer's recommendations, and as shown on the Plans.

3.7 VERTICAL GAS EXTRACTION WELLS

A. Drilling

1. These wells are to be installed in refuse, therefore the appropriate safety precautions apply. All drillers and laborers associated with the drilling operation shall have received health and safety training as defined in the Federal Occupational Safety and Health Act of 1970 (OSHA) as amended including, OSHA 29, CFR Part 1910 Hazardous Waste Operations and Emergency Responses; Interim Final Rule, as they apply to the safety and health provisions for hazardous waste operations and all other applicable federal, state, county, and local laws, ordinances, codes, and the requirements set forth herein, and any other regulations that may be set forth in any other parts of this Contract. If any of these requirements are in conflict, the more stringent requirement shall apply. The Contractor's failure to thoroughly familiarize himself with the aforementioned safety and health provisions shall not relieve the Contractor of the responsibility for full compliance with the obligations and requirements set forth therein. Where "Hazardous Waste Operations" is mentioned in the regulations listed above, it shall be interpreted in this Specification to include any persons potentially exposed to landfill gas, landfill gas condensate, asbestos, or leachate from the St. Johns Landfill.
2. All borings shall be drilled using rotary barrel core type auger drilling equipment. Drilling using cable tool or air rotary methods shall not be allowed. The drilling Contractor shall have successfully completed a minimum of 1,000 linear feet in refuse using the same procedures described above. The Contractor shall provide a rig large enough and capable of reaching the desired depth. A borehole a minimum of 26-inches in diameter is required.
3. Borings shall be drilled to 100% of the depth of refuse. When the boring begins to penetrate the underlying soils, the Contractor shall pullback and discontinue drilling. The Contractor shall fill the boring zone below the refuse with bentonite. Completion of the well shall begin within the refuse zone per the contract documents.

B. Soil Sampling and Borehole Logging

1. Sample drill cuttings shall be collected by the Contractor and placed in bags furnished by the Engineer on a routine basis, at 5-foot intervals, at the change of formation, or at the discretion of the Engineer.
2. Borehole logging will be conducted by the Engineer for the purposes of this project and must also be done by the Contractor for fulfillment of state requirements. The Contractor shall endeavor to provide information on drilling conditions that will assist the Engineer in making determinations of subsurface material character.

C. Alignment

1. Alignment requirements during drilling are that any casing, liner, or drill tools can be run freely through the boring.

D. Abandonment

1. Any well that does not meet the alignment or other requirement, or which is contaminated by the Contractor, or any well on which the Contractor stops work will be considered abandoned. A new well shall be started in the immediate vicinity at a location designated by the Engineer. The Contractor may, at his own expense, remove any ungrouted casing.

E. Gas Extraction Well Installation

1. Depending on the number of completions per boring, the Contractor shall install one or more 4 or 6-inch Schedule 80 PVC casing in each boring as shown on the Plans. Each completion shall have between 20 to 40 feet of 40 slot screen, as shown on the Plans or as determined by the Engineer. Casing threads may be lubricated with Teflon materials only.
2. The well casing will then be lowered into the boring and shall be suspended at the required depth for the remainder of the installation. The casing shall be pulled back a few inches prior to pack rock installation to insure that the completion is not caught in the drill casing. Gloves and coverall worn by the

Contractor while touching the well casing shall be new and clean. The well casing shall be cleaned before installation (unless already cleaned, wrapped and shipped in plastic bags by the manufacturer.)

F. Pack Material/Seal Installation

1. The pack material shall be placed around the completion screen up to approximately 4-foot above the screen. To separate double completions, a 2 foot layer of Type I Sand will be placed above the pack rock. A 2 foot thick bentonite chip plug will be placed above the sand layer and will be covered with additional 2 foot thick layer of Type I Sand. On the shallow completion or on single completion wells, a 2 foot layer of Type I Sand will top the pack material followed by a 2 foot thick bentonite chip plug. The remainder of the borehole will then be backfilled with Type I Sand. The bentonite plug layer shall be hydrated by pouring clean potable water through a separate tremie pipe placed in the annular space of the well.

G. Completion

1. Well casings will be terminated at least a point 12-inches above final grade elevations as shown on the Plans. A slip cap will then be installed to prevent contamination of the well until the well will be completed. An HDPE pipe sleeve shall be installed as shown on the Plans. The pipe sleeve shall be backfilled with bentonite chips and hydrated with clean water. Temporary barriers or traffic posts shall be installed at appropriate well locations after the well drilling and construction is completed to protect well from damage.
2. Wells installed in Subarea 2 shall be capped 12-inches above existing grade to prevent contamination of the well. A HDPE pipe sleeve will not be required. Temporary barriers shall be installed to protect wells from damage.

H. Decontamination

1. All drilling equipment, tools, steel casing, and PVC casing associated with the construction of the wells shall be decontaminated using a high-temperature steam cleaner.
2. The Contractor shall clean drilling equipment before mobilizing to the site, once on site before work commences, between each boring, and before demobilizing from the site. The cleaning

performed before mobilization is incidental to the mobilization charge.

3. PVC well casing shall be cleaned prior to installation, and kept clean between the time it is washed and the time it is used in the well.
4. The Contractor shall be responsible for providing all the equipment necessary for the cleaning process. This includes: clean potable water; a source of electricity; and a portable high pressure and temperature washer.
5. Wash water which has been in contact with refuse must be collected and disposed of in the SA-5 leachate system. Other wash water maybe disposed in the sanitary sewer system.

I. Site Restoration

1. At the conclusion of all work activity at a boring, all drilling tools, extra casing, trash, and other materials shall be removed from the site. No work shall begin on subsequent borings until the previous boring site has been cleaned up. All boring and miscellaneous trash materials such as bentonite bags will be properly disposed of.

J. Well Construction Records

1. The Contractor shall keep a daily written log of operations, including size and length of the casing placed, character, depth and thickness of all formations penetrated, causes of delays, and screen location. Duplicate copies of this log shall be furnished to the Engineer at the end of each work day.

One sample of material penetrated from each five feet of depth, at every change in material type, or as specified by the Engineer shall be collected by the Contractor.

K. Waste Soil

1. All soil materials which has been removed from the borings shall be considered refuse and shall be disposed of in an appropriate manner on-site.

3.8 WELL HEAD COMPLETIONS

- A. Conform to paragraph 3.4.

- B. Pipe supports shall be fabricated and installed as shown on the Plans and shall meet the requirements of Section 05500. Pipe supports shall be spaced at a maximum distance of 7 feet apart.
- C. Paint all exposed portions of rigid PVC pipe per Section 09900 of this specification.

3.9 VACUUM VALVE STATION INSTALLATION

- A. Each "Vacuum Valve Station" shall be installed per standard pipe fitting methods at the locations indicated in the Plans.
- B. Pre-cast concrete vaults shall be installed in accordance with Section 03485 of the Specification.
- C. Extreme care must be taken to ensure that the landfill geomembrane is not disturbed or damaged in any way. Any repairs made to the cover that are a result of the contractor's negligence while installing the vacuum valve station will be done at the contractor's expense.

3.10 EXPANSION JOINTS

- A. Expansion joints shall be fabricated with a PVC socket flange, PVC pipe collar and two stainless steel band clamps at each end. The distance between rigid PVC pipe ends shall allow the expansion joint to be compressed to half its resting length.
- B. Paint exposed portions of PVC flanges per Section 09900 of this specification.

3.11 TEMPORARY SYSTEMS

- A. During the Subarea 1 construction, a temporary gas collection system shall be installed to protect the final cover system from damage. This temporary piping will be installed, re-moved, and re-installed to facilitate the work of the Contractor, while meeting the performance criteria listed below. The temporary gas flare shall be installed by the Contractor during the Subarea 1 construction to burn gases collected from the temporary gas collection system. This temporary gas flare may be removed after construction and re-installed by the Contractor at a location selected by the Engineer to better facilitate the burning of gases collected from the permanent gas collection system.

Temporary condensate disposal piping and manhole shall be installed by the Contractor after Subarea-1 construction to provide a temporary means of disposal of condensate from the vacuum pump station and remote condensate pump station installed as part of this contract.

- B. The temporary gas collection system, temporary condensate disposal system, and temporary gas flare will be located in the field by the Engineer in accordance with the requirements set forth in this specification.

The Contractor shall make available to the Engineer, laborers, (maximum 2) to assist the Engineer with the installation, removal, and of the re-installation of the temporary systems. The Contractor shall also make available to the Engineer, equipment and operator(s) as required to transport the temporary piping. The Contractor shall submit to the Engineer prior to construction, a detailed Construction Sequencing Plan to allow the Engineer to make preliminary judgements on the installation of the temporary systems to best facilitate the needs of the Engineer and the Contractor. The Contractor shall provide 48 hours written notice identifying exact area's of work to allow determination for temporary pipeline alignment.

- C. Generally the performance criteria for the installation of temporary systems shall be (1) to prevent damage to the final cover system as a result of landfill gas "build-up" under the cover. (2) to provide a temporary means of flaring the landfill gas during and after the Subarea 1 construction, and (3) to provide for a temporary means of condensate disposal after Subarea 1 construction. The Contractor/Engineer will follow the performance criteria listed below with regards to the installation of the temporary gas collection system during Subarea 1 construction.

1. Any vertical gas extraction well in Sub-Area 1 displaying over 20" water column positive pressure will require inclusion into the temporary gas collection system. At no time will any of these wells be taken off-line, unless the Contractor provides 48 hours written notice and approval is given by the Engineer. The Engineer will be afforded every opportunity to sustain the temporary gas collection system.
2. The number of wells that must remain on line may vary. The maximum period in which wells may be off line is 6 hours. This decision will be on a case-by-case basis, and the Engineer shall reserve the right to maintain operation of all wells should the potential for damage to the final cover system become evident. Likewise, the Engineer may approve operation of a lesser number of wells. The Contractor therefore must plan his work to accommodate said operation. The Contractor will not receive additional compensation for conditions requiring operation of all wells.

3. Under no circumstances shall the Contractor operate any valves connect or disconnect any portion of the temporary gas collection system, or do any work that might modify the operation of the temporary gas system. The Engineer will be responsible for all gas system operations.
4. The Contractor shall give a 48-hour minimum response time notice to the Engineer's designated representative for any work which the Engineer is to perform.
5. All temporary headers and temporary connections shall allow for the free drainage of condensate to establish low points for drainage of condensate into a condensate collection system. The condensate will be removed by the Engineer.

* * * END OF SECTION * * *

SECTION 02720

STORM DRAINAGE FACILITIES

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Pipe and Fittings: Section 02610
- B. Sedimentation Control: Section 02275
- C. Excavating, Backfilling, and Compacting for Structures: Section 02221

1.2 SCOPE

- A. This section covers the material and installation requirements for storm drainage facilities to be installed under this project. This work shall consist of constructing sedimentation basin, outlet structure, measuring flume, culverts, manholes, drainage swales, underdrain lines, and subsurface drainage lines of the sizes and types designated on the Drawings and described herein.

2. MATERIALS

2.1 PERFORATED CMP SUBSURFACE DRAIN PIPES

- A. This section covers perforated CMP subsurface drain pipes to be installed in the sedimentation basin as shown on the Drawings.
- B. Perforated CMP piping shall conform to Section 02610.

2.2 UNDERDRAIN PIPE

- A. This section covers underdrain collection and transfer lines to be installed in drainage ditches and other areas as shown on the Drawings.
- B. Underdrain collection piping shall be perforated PVC piping conforming to Section 02610.
- C. Underdrain transfer piping shall be solid PVC pipe conforming to Section 02610.

2.3 AGGREGATE FOR SUBSURFACE DRAINS OR UNDERDRAINS

- A. Aggregate to be used for subsurface drains or underdrains shall consist of clean, Drain Rock conforming to Section 02220.

2.4 GEOTEXTILES

- A. Geotextiles used in conjunction with subsurface drain lines and drainage swales shall conform with Section 02272 for the type geotextile specified and shown on the Drawings.

2.5 QUARRY SPALLS

- A. Quarry Spalls shall conform to Section 02220.

2.6 CULVERTS

- A. Culverts shall conform to Section 02610.

2.7 CONCRETE

- A. Conform to Section 03300.

2.8 PARSHALL FLUMES WITH ACCESS MANHOLE

- A. Parshall Flumes shall be prefabricated of fiberglass reinforced polyester with a minimum wall thickness of 1/4" throughout. Flumes shall be equipped with an integral 12" diameter float well. Inside surfaces shall be white gelcoat, smooth and free from irregularities. The outside surface shall be provided with clips suitable for anchoring to concrete. Flumes shall be equipped with adapter end sections, flexible neoprene boots and stainless steel clamps for connection to CMP. Flumes shall also have integral head gauges. Top of exposed flume shall be covered with a fiber-reinforced plastic cover suitable for the depth of installation specified.
- B. Provide fiberglass access manhole integral to the Parshall Flume. Manhole shall conform to ANSI/ASTM D-3753 specifications for fiber-reinforced manholes. Provide 24" diameter cast iron or steel frame and cover. Size of fiberglass manhole shall be 48" diameter, minimum, height as required with suitable reducer capable of supporting H-20 highway loading. Furnish OSHA-approved access ladder, height as required.
- C. The Packaged Flume, incorporating the Parshall Flume and access manhole with cover, shall be a standard product of manufacture from Plasti-Fab, Inc., P.O. Box 100 Tualatin, Oregon 97062, (503) 692-5460 or approved equal.

2.9. OVERFLOW STRUCTURE

- A. Overflow structures shall consist of 48" diameter CMP riser pipe. Manhole steps shall be placed one foot on center and shall conform to OSHA Standards. Factory-fabricated, welded, CMP inlet and outlet pipe stubs shall be provided at CMP riser pipe to allow field-coupling of the CMP inlet and outlet pipes.
- B. Overflow screens shall be fabricated steel in accordance with Section 05500 of these specifications.

2.10. METERBOX

- A. Meterboxes for access to underdrain pipe cleanouts shall be a Brooks Meter box with concrete cover; 36 series for 4-inch pipe, 37 series for 6-inch pipe, 38 series for 8-inch pipe; or approved equivalent product.

2.11. ROCK-LINED DRAINAGE SWALES AND SPLASH PADS

- A. Splash pads and a portion of the drainage swales which are to be constructed on this project shall be lined with Quarry Spalls as shown on the Drawings. All Quarry Spalls shall be underlain with Type 3 Geotextile.

2.12. GRASS-LINED DRAINAGE SWALES

- A. The majority of the drainage swales which are to be constructed on this project shall be surface-lined with Erosion Control Matting/Blanket and hydroseeded as shown on the Drawings and specified elsewhere in this Specification.

2.13. BENTONITE

- A. Bentonite for dams associated with underdrain collection pipes shall be Volclay SC-40, as manufactured by American Colloid Company, Skokie, Illinois; Federal's Bentonite, as manufactured by Aurora Industries, Inc., Montgomery, Illinois; or approved equal.

2.14. STORMDRAIN MANHOLE

- A. Precast concrete manholes shall conform to the requirements of ASTM C478 except as specifically modified herein.
- B. Joints between precast sections used for storm sewers may be rubber gasketed or cement mortar.
- C. Base sections shall be made with the base slab integral with the wall in such a manner to achieve a completely watertight structure. Design

of base shall be in accordance with the following table for all manholes up to 25 feet deep using Grade 60 reinforcing steel.

| <u>Manhole Inside Diameter</u> | <u>Minimum Base Thickness</u> | <u>Minimum</u> | |
|--|---------------------------------------|--|--|
| | | <u>Steel-Sq.In./LF Separate Base</u> | <u>Both Directions Base Integral With Wall</u> |
| 54" | 8" | 0.19 | 0.19 |

- D. Proportion of Portland cement in concrete mixture shall be not less than 564 pounds per cubic yard of concrete.
- E. Openings to receive pipes shall be circular, and shall be sized to equal the outside diameter of the pipe to be inserted in the joint plus the manhole wall thickness.
- F. Resilient connectors conforming to ASTM C923 may be used at the Contractor's option.
- G. Provide flat top, 8" minimum depth, with offset 24" diameter opening.
- H. Provide 12" sump below pipe invert.
- I. Provide standard manhole steps for maintenance access.
- J. Provide cast metal frame and cover, non-locking type, 24" inside diameter minimum, conforming to ASTM A48, Class 30, with "DRAIN" indicated on cover with two-inch raised letters.

3. EXECUTION

3.1 SURVEY LINE AND GRADE

- A. The Contractor shall transfer line and grade and control his work.
- B. In the case the referenced methods are impractical, the Contractor may control his line and grade by the use of approved surveying instruments operated by qualified personnel.
- C. The Contractor shall constantly check line and grade of the pipe and in the event they do not meet specified limits, the work shall be immediately stopped, the Engineer notified, and the cause remedied before proceeding with the work.

3.2 PIPE LAYING

- A. Laying of drainage pipe shall be accomplished to line and grade in the trench only after it has been dewatered and the foundation and/or bedding has been prepared. Where applicable, perforations shall be placed downward. Install all pipe in strict compliance with the manufacturers recommendations.

- B. Mud, silt, gravel and other foreign material shall be kept out of the pipe and off the jointing surfaces.

3.3 PLACEMENT OF QUARRY SPALLS

- A. Quarry Spalls shall be placed in a manner which will produce a reasonably well graded mass of stone with the minimum practical percentage of voids, and shall be constructed to the lines, grades, and thickness shown on the Drawings. Type 3 Geotextile shall be placed under all quarry spalls.
- B. Quarry Spalls protection shall be placed to its full course thickness in one operation and in such a manner as to avoid displacing the underlying geotextile material or earth subgrade. Placing of quarry spalls protection in layers will not be permitted. Place quarry spalls starting at the bottom of the slope and working toward the top of the slope.
- C. Placing quarry spalls protection by dumping into chutes or by similar methods likely to cause segregation of the various sizes will not be permitted.
- D. It shall be the Contractor's responsibility to protect the embankment and excavated slopes from erosion or damage. Contractor shall maintain the quarry spalls protection until accepted and any material displaced by any cause, shall be replaced at the Contractor's expense, to the lines and grades shown on the drawings.

3.4 OVERFLOW STRUCTURES

- A. CMP overflow structure shall be embedded in concrete pads which are supported on 3 inches of sand bedding and extra layers of bentonite mat, geotextile and geomembrane as shown on the Drawings.

3.5 PARSHALL FLUMES

- A. Excavating, backfilling, and compaction shall be performed in accordance with manufacturers recommendations and Section 02221.
- B. Provide 12" thickness concrete support slab with anchor bolts. Size as required by manufacturer.
- C. Grout space under the flume full in accordance with manufacturer recommendations.

3.6 STORMDRAIN MANHOLE

A. Foundation

1. Place base on a well-graded granular bedding course conforming to Paragraph 2.3 of this section, not less than 4 inches in thickness and extending to the limits of the excavation.
2. Bedding course shall be firmly tamped and made smooth and level to assure uniform contact and support of the manhole.

B. Precast Base Section:

1. Place on the prepared bedding so as to be fully and uniformly supported in true alignment.
2. Make sure that all entering pipes can be inserted on proper grade.

C. Pipe Connections:

1. Provide flexible joint at a distance from the face of the manhole of not more than 1-1/2 times the nominal pipe diameter or 12 inches, whichever is greater, for all rigid pipes entering or leaving any manhole.
2. Firmly compact bedding under pipe within the area of the manhole excavation.
3. Openings through which pipes enter the structure are to be watertight.

D. Manhole Cover:

1. Provide not less than 4 inches or more than 16 inches of grade rings between the top of the slab and the underside of the manhole casting ring for adjustment of the casting to ground surface.

* * * END OF SECTION * * *

SECTION 02760

EXISTING UTILITIES/FACILITIES UNDERGROUND AND OVERHEAD

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Excavating, Backfilling and Compacting for Utilities: Section 02222**

1.2 LEGAL REQUIREMENTS - UNDERGROUND FACILITIES

- A. The Contractor shall, before commencing excavation in any area, comply with the provisions of any applicable laws relating to or governing the identification, location, marking, and responsibility for protecting and repairing of underground facilities.**
- B. Whenever there may be a conflict between the provisions of any law and the provisions of these specifications, the provisions of law shall control.**

1.3 DEFINITIONS

- A. Utility means any facility or item placed above or below ground for use in connection with the storage or conveyance of water, sewage, leachate, electronic, telephonic or telegraphic communication, cablevision, electric energy, petroleum products, gas, gaseous vapors, hazardous liquids, or other substances and including, but not limited to pipes, sewers, conduits, cables, valves, lines, wires, manholes, and attachments.**

1.4 IDENTIFICATION

- A. All underground utilities known by Metro to be in the proposed work area are identified on the project plan.**
- B. The underground utilities identified on the Drawings have not and cannot be precisely located by Metro or its agents or engineers and location is approximate only. Metro, under this Contract, does not warrant the location of underground utilities.**
- C. NOTICE: Overhead electrical lines may not be completely shown on the Drawings. Electrical transmission lines which are shown on the Drawings are located by point to point, power pole to power pole connections. The transmission cables or wires may be located on**

either side of the drawing location depending upon the configuration of the crossarms on the power poles or towers. Line voltage is not shown.

1.5 NOTIFICATION

- A. It is the responsibility of the Contractor to give adequate notice to Metro or owners of any utilities known or suspected to be within the area of any proposed excavation or construction activities.
- B. The Contractor is responsible to have the locations of underground utilities marked by the utility owners prior to beginning excavation.
- C. The Contractor is responsible for determining the extent of any hazard created by electrical power in all areas and shall follow procedures during construction as required by law and regulation. Prior to construction, the Contractor shall meet with utility owners and determine the extent of hazards and remedial measures and shall take whatever precautions may be required.
- D. The Contractor's attention is directed to federal, state, and local safety codes relative to limitations of work in proximity to overhead power lines.

1.6 QUALITY CONTROL

- A. Contractors shall cooperate with utility owners to aid in locations and maintenance of existing utilities.

1.7 ELECTRICAL TRANSMISSION AND SERVICE LINES

- A. Since neither the Engineer nor Metro can anticipate the construction methods or techniques and equipment to be used by the Contractor in performing the work, the extent of the possibility of the Contractor's equipment and personnel coming in contact with electrical transmission lines cannot be fully anticipated, and there is no representation that all electrical transmission lines are shown on the Drawings.
- B. The Contractor is charged with the responsibility of observing and investigating the presence of any electrical transmission lines which might impinge on his work whether overhead or underground and shall consult with and utilize the information given by utility owners and operators to determine the extent of any hazards and remedial measures required, and follow appropriate safety procedures.

1.8 ABOVE GROUND UTILITIES

- A. Existing above ground utilities, whether shown on the Drawings or not, shall be maintained, relocated, rerouted, removed and restored as may be necessary by the Contractor in a manner satisfactory to owners and operators of the utilities.

1.9 UNDERGROUND UTILITIES

- A. Existing major underground utilities and appurtenant structures within the area of excavation, whether shown on the Drawings or not shall be maintained, relocated, rerouted, removed and restored by the Contractor.
- B. Minor underground utility service lines, including but not limited to sanitary sewer services, gas services, water services, drains, leachate force main and electricity or telephone services and culverts shall be maintained, relocated, rerouted, removed and restored by the Contractor with the least possible interference with such services.

1.10 RESTORATION BY UTILITY OWNER

- A. The right is reserved by owners of public utilities and franchisee to enter upon any street, road, right-of-way, or easement for the purpose of maintaining their property and for making necessary repairs or adjustments caused by the Contractor's operations.
- B. The Contractor shall save Metro harmless of any costs so incurred in restoration of a utility damaged by the Contractor subject to the provisions of any law.

* * * END OF SECTION * * *

SECTION 02831

CHAIN LINK FENCES

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Embankment and Grading: Section 02220
- B. Concrete: Division 3

1.2 QUALITY CONTROL

- A. Erector shall be a Contractor regularly engaged in installation of similar fencing.

1.3 SUBMITTALS

- A. Certification of quality of all fence elements.
- B. Shop drawings illustrating locations of all posts, structural details of all fence elements and gate construction.
- C. Submit results of ASTM A90 test for zinc coating weight.

2. PRODUCTS

2.1 GENERAL

- A. Posts, rails, rods, bars, fittings and hardware shall be hot-dipped, zinc-coated steel per ASTM Specifications A120, A123 and A153, as applicable. Repair of damaged galvanized metal to be by Galvwelding off-site, or by cold galvanized high-zinc content paint.
- B. Fence components to be galvanically compatible.

2.2 CHAIN LINK FABRIC

- A. Chain link in accordance with ASTM A392, high carbon steel, zinc-coated Class II (2.0 ounces per square foot).
- B. No. 9 gauge x 2-inch mesh, hot-dipped after weaving, twisted and barbed at top and bottom selvages.

- C. 72-inch height (fabric roll width) or other sizes as indicated on drawings.

2.3 POSTS

- A. Terminal Posts: All end, corner and pull posts, 3 inch O.D. standard pipe, 5.79 lbs. per lineal foot (deflection in horizontal fence line of 15 degrees or more requires a terminal post).
- B. Intermediate Posts: 2-1/2 inch O.D. pipe, 3.65 pounds per lineal foot.
- C. Gate Hinge Posts
 - 1. Single leaves 6 to 13 foot width: 4 inch O.D. pipe, 9.1 pounds per lineal foot.
- D. Post Braces: 1-5/8 inch O.D. pipe, 1.17 pounds per lineal foot.
- E. All posts shall be provided with tops as required.
- F. Provide base plate welded to bottom of post as shown on the drawings. Base plate shall galvanized steel of the size shown. Weld to be fillet all around.
- G. Weld rebar to posts as shown on the drawings.

2.4 GATES

- A. Outer Frame: 2 inch O.D. pipe (all four sides), 2.72 pounds per lineal foot.
- B. Cross of "X" bracing: 1-5/8 inch O.D. pipe, 2.27 pounds per lineal foot.

2.5 ATTACHMENTS

- A. Truss Rods: 3/8-inch diameter round rod.
- B. Tension Bars (Stretcher Bar): 1/4 inch x 3/4 inch flat, high carbon steel.
- C. Tension Wire (Top and Bottom): No. 7 gauge, galvanized coiled spring wire.
- D. Fittings and Hardware: All standard fittings required for the complete fence assembly, including gates, shall be malleable cast iron or pressed steel. All ferrous material shall be hot-dipped galvanized.

2.6 CONCRETE

- A. Per Division 3 with consistency requirement altered to 6 inch maximum slump.

3. EXECUTION

3.1 CHAIN LINK FENCE INSTALLATION

A. General:

- 1. Install as illustrated on approved shop drawings by skilled mechanics experienced in erection of chain link fence and gates.

B. Posts:

- 1. Posts shall be set vertically and spaced at 8-foot centers.
- 2. Set all posts in concrete footings as detailed on the drawings. Concrete shall be worked thoroughly to remove voids.
- 3. Install post braces and adjustable truss rods at corners, gates, pull posts or as detailed on approved submittal drawings.
- 4. Install so posts are plumb when diagonal rod is under tension.
- 5. Equip posts with tops designed to exclude moisture from posts.

C. Tension Wire:

- 1. Install top tension wire, top rail not required except at corners and gates.
- 2. Install bottom tension wire along bottom 2 inches above finish grade.
- 3. Stretch tension wire prior to fabric stretching and fasten to terminal posts.
- 4. Secure chain link fabric to tension wire with 11 gauge hog rings spaced 24 inches apart.

D. Chain Link Fabric:

- 1. Stretch taut and securely fasten to posts.
- 2. Fasten chain link fabric to all terminal posts by tension bars with heavy one inch by 11 gauge pressed steel bands spaced 14 inches apart.
- 3. Fasten to line posts with 2 gauge wire clips spaced 14-inches apart.

E. Gates:

- 1. Weld all joints in gate frames. Welded connections where the spelter coating has been burned shall be thoroughly cleaned by wire brushing and all traces of welding flux and loose or cracked spelter removed. The clean areas shall then be painted with two coats of galvanizing repair paint.

2. Chain link fence shall be fastened to the end bars of the gate frames by stretcher bars and fabric bands, and to the top and bottom bars of the gate frames by tie wires in the same manner as specified for the chain link fence fabric.
3. Gates shall be properly braced to eliminate any possible sagging condition.
4. Hinges shall be of sufficient strength and design to permit easy and trouble-free operation.
5. Provide double swing gates, size as noted, equipped with center plunger rods and catches to secure gates in open and closed positions.
6. Set plunger rod and catch in 12-inch round by 18-inch deep concrete footing.

* * * END OF SECTION * * *

DIVISION 3 - CONCRETE

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SECTION 03100

CONCRETE FORMWORK

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement: Section 03200
- B. Anchors and Inserts: Section 03251
- C. Expansion and Contraction Joints: Section 03252
- D. Cast In Place Concrete: Section 03300

1.2 QUALITY CONTROL

- A. Standards
 - 1. "Recommended Practice for Concrete Formwork", ACI 347.
 - 2. "Chapter 26", Uniform Building Code.
 - 3. U.S. Product Standard PS 1 for Plywood.
 - 4. Standard Grading and Dressing Rules No. 16 of the West Coast Lumber Inspection Bureau.

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. On delivery to job site, place materials in area protected from weather.
- B. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Handle materials to prevent damage.

2. PRODUCTS

2.1 MATERIALS

- A. Plywood: New or in new condition "B-B Plyform Class 1 Exterior" grade plywood, 5/8 inch minimum thickness.
- B. Framing, Studding, and Bracing: "Standard" or "Construction" grade West Coast species lumber.
- D. Form Coating:
 - 1. Lacquer, plastic or epoxy coating or non-staining form oil that will not impair the bonding quality for final finish of the painting or protective coating.
 - 2. Coatings containing mineral oils or other non-drying ingredients will not be permitted.

- E. Chamfer Strips: Chamfer strips (for all exposed edges) 3/4 inch, 45° bevel wood strips or reusable plastic triangular strips.

3. EXECUTION

3.1 DESIGN OF FORMWORK

- A. Design formwork to safely support vertical and lateral loads which might be applied until such loads can be supported by the concrete structure. Carry vertical and lateral loads by formwork system to ground or to in-place construction which has attained adequate strength for that purpose.
- B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.
- C. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent material.
- D. Keep oil or other agents from getting on reinforcing steel, embedded items, or other surfaces requiring bond with concrete.

3.2 CONSTRUCTION OF FORMS

- A. Formwork - General:
 - 1. Before concrete is placed in any form, verify horizontal and vertical form position and correct all inaccuracies. Complete all wedging and bracing in advance of placing of concrete.
 - 2. For exposed concrete, forms shall be of new plywood, metal panel, or approved panel materials, smooth, and continuous.
 - 3. For unexposed concrete, forms shall be plywood, metal, boards, or approved material. Boards: nominal one inch minimum thickness, sound and tight, commercial construction lumber, shiplapped or tongue-and-grooved, dressed on at least one side and both edges for tight fit. Plywood, metal, or approved material equal to or better than board surface.
- B. Chamfered Corners: All corners chamfered 3/4 inch, unless shown otherwise on drawings. Provide 45-degree triangular moldings in forms for all chamfering required.
- C. Coordination: Coordinate the installation of all items to be inserted or embedded in concrete. Support all items to maintain accurate alignment and prevent distortion during concrete placement.
- D. Cleaning: All dirt, chips, sawdust, mud, water and other foreign matter shall be removed from within the forms or within the excavated areas before any concrete is deposited therein.

3.3 NOTIFICATION AND INSPECTION

- A. Prior to placing of any concrete, and after placement of reinforcing steel in the forms, notify the Engineer at least 24 hours in advance of placing concrete to permit inspection.

3.4 DEFECTIVE WORK

- A. Any form movement or deflection during construction or finished surface variations in excess of the tolerances specified will be basis for rejection of cast-in-place product and requirement for replacement of same.

3.5 REMOVAL OF FORMS

- A. Do not remove forms and supports until concrete has attained sufficient strength to support anticipated loads.
- B. Use methods of form removal which will not cause overstressing of the concrete. Remove supports to permit the concrete to uniformly and gradually take the stress due to its own weight. Do not use high impact methods to remove supports.

3.6 REUSE OF FORMS

- A. Any reused form for exposed concrete work shall be reconditioned to "like new" condition. Any reused form shall be cleaned, repaired, and recoated before each reuse.

3.7 BLOCKOUTS

- A. Where pipes, conduits or sleeves pass through the walls or slabs, place such pipes or sleeves in the forms before pouring the concrete.

* * * END OF SECTION * * *

SECTION 03200

CONCRETE REINFORCEMENT

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Framework: Section 03100

1.2 QUALITY CONTROL

- A. Manual of Standard Practice for Detailing Reinforced Concrete Structures, ACI 315.
- B. Manual of Standard Practice, Concrete Reinforcing Steel Institute.

1.3 SUBMITTALS

- A. Placing drawings, bending and cutsheet schedules.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver reinforcement to project site in bundles marked to coordinate with placement drawings.
- B. Handle and store to prevent contamination from dirt, oil and other materials which will affect bond.
- C. Store a minimum of 6" above ground and in locations where the materials will not be subject to abuse.

2. PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: Unless specified otherwise, deformed bars meeting requirements of ASTM A615, Grade 60. Supplementary Requirements S1 shall apply.
- B. Tie Wire: Steel, black annealed, 16-gauge minimum.
- C. Reinforcing Bar Supports: Per CRSI Manual Chapter 3, pregalvanized or plastic-coated.

3. EXECUTION

3.1 INSTALLATION

- A. Placement and Tolerances: Conform to CRSI "Manual of Standard Practice".

- B. Splices:
1. Do not splice bars except at locations shown or noted on the drawings or as otherwise approved.
 2. Tie lap slices securely with wire to prevent displacement of splice during placement of concrete.
 3. Perform welded splices in accordance with ACI Building Code (ACI 318).
- C. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that may reduce bond with concrete.
- D. Protection During Concreting: Keep reinforcing in proper position during concrete placement.
- E. Concrete Cover: Maintain minimum concrete cover over reinforcement as specified in ACI 318 or as noted.

* * * END OF SECTION * * *

SECTION 03251

ANCHORS AND INSERTS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 03100
- B. Cast-In-Place Concrete: Section 03300

1.2 QUALITY CONTROL

- A. Use only materials compatible with embedded concrete environment.

1.3 SUBMITTALS

- A. Shop drawings including catalog cuts for all anchors, inserts and embedded products (wall castings, pipes with seep rings, and special castings).

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store all items to be embedded in a manner to prevent damage or contamination.

2. PRODUCTS

2.1 MATERIALS

- A. Anchor Bolts: ASTM A307, Steel unless otherwise noted.
- B. Threaded or Slotted Inserts: Galvanized malleable iron or stainless steel size and type as specified.

3. EXECUTION

3.1 INSTALLATION

- A. Coordinate the location and placement of all items to be embedded in concrete.
- B. Coat any embedded aluminum with asphalt paint.

3.2 EMBEDDING

- A. Set accurately and hold in position all embedded products during placement until the concrete is set.

3.3 DRILLED IN GROUTED ANCHORS

- A. In lieu of embedding anchor bolts and when approved, drill holes in hardened concrete and install the anchor bolts and other items with special mortars. Drill with diamond boring or coring bits. Bonding mortar shall be epoxy grout type. Blow holes clean and dry before installation of embedded items. Before insertion, coat both hole and the item to be embedded with bonding compound. Studs of equal size and length may be substituted for anchor bolts if nut fasteners are used. Drilled in studs or anchors utilizing mechanical expansion locking in any process areas shall not be used.

* * * END OF SECTION * * *

SECTION 03252

EXPANSION AND CONTRACTION JOINTS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 03100
- B. Cast-In-Place Concrete: Section 03300

1.2 QUALITY CONTROL

- A. Prepare and use in strict accordance with manufacturer's instructions. Discard materials after specified "shelf-life".
- B. Deliver products in manufacturer labeled containers with complete preprinted instructions by manufacturer included.
- C. Installers experienced in use of products.

1.3 SUBMITTALS

- A. Certification on conformance to Specifications.

2. PRODUCTS

2.1 MATERIALS

- A. Preformed board shall conform to Federal Specification HH-F-341, Type I, Class B (moderately resilient) unless otherwise noted.
- B. Joint Sealant:
 - 1. Polyurethane material designated for bonding to concrete for sewage treatment plant service, which when cured, develops a high bond between surfaces and provides flexible watertight seal, non-sag, resistant to mild alkalis and acids, oils and meets all requirements for Federal Specifications TT-S-00230, Type II, Class A.
 - 2. Prior to ordering the sealant, submit to the Engineer for review, sufficient data to show experience record of sealant and general compliance with the Specification requirements.
 - 3. Joint primer supplied by the same manufacturer supplying the sealant.
- C. Backer-Rod: Closed cell polyethylene backer-rod shall be used in sealant joints. The backer-rod shall be resilient and of a diameter at least 1/8 inch larger than the groove and shall be approved by the sealant manufacturer.

3. EXECUTION

3.1 INSTALLATION

- A. Joints constructed and located as shown on the drawings.
- B. Sealant Surfaces: Clean, free of oil, grease, residue and other foreign materials, prior to application of sealant in accordance with manufacturer's recommendations. Prime all joints with joint primer.
- C. Sealant Application:
 - 1. Tape or otherwise protect surfaces adjacent to joints not intended to receive sealants. The backer rod shall be accurately placed in the joint to provide the depth of sealant called for on the drawings.
 - 2. Neatly apply sealants to fill void required to level non-sag surface. Maintain uniform application procedures to continuously apply sealant. Complete joint system without intermediate stops and starts.
 - 3. Sealant shall be applied according to manufacturer's recommendations in a manner so as to avoid entrainment of air in the joint. All sealant shall cure at least 7 days before the structure is filled with water.
 - 4. Secure preformed board to surfaces with fasteners and procedures recommended by manufacturer.

* * * END OF SECTION * * *

SECTION 03300

CAST IN PLACE CONCRETE

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Formwork: Section 03100
- B. Concrete Reinforcement: Section 03200
- C. Anchors and Inserts: Section 03251
- D. Expansion and Contraction Joints: Section 03252

1.2 QUALITY CONTROL

- A. Delivery: Furnish a certificate with each truckload of concrete product delivered to the site, indicating the composition and quality of the mix. Include size and weight of each aggregate, amount of cement, amount of water and amount and kind of any additives included in the concrete, grout fill, or mortar.
- B. Standards: All applicable standards of the following:
 - 1. American Concrete Institute - ACI
 - 2. Concrete Reinforcing Steel Institute - CRSI
 - 3. Uniform Building Code - UBC
 - 4. Other local codes or criteria noted on drawings.
- C. Concrete Consistency:
 - 1. Each truckload of concrete will be tested by the Engineer for slump. Calibrate each mixer or haul unit to be used by measuring slump near the beginning and near the end of the discharge cycle. Mix units determined by the Engineer to be deficient in mixing capability shall not be used in subsequent deliveries. Slump testing procedures per ASTM C143.
 - 2. Consistency per values below with tolerance of ± 1 inch.
 - a. 2-3 inches slump for structural elements 12 inches and greater in thickness.
 - b. 2-4 inches slump for structural elements less than 12 inches in thickness.
- D. Concrete Test Cylinders:
 - 1. A minimum of three test cylinders will be prepared by the Engineer for each location (slab, wall, beam, etc.), for each days placement or each 50 cu. yd., whichever is greater.
 - 2. Test set of 3 cylinders as follows:
 - a. One at 7 days.
 - b. Two at 28 days.
 - 3. Prepare and test cylinders per ASTM C31 and C39.
- E. Air Entrained: One test for each mix design.

1.3 SUBMITTALS

- A. Concrete mix design (for each concrete type used), including strength tests by independent laboratory, of 3 cylinders proportioned to mix design formula.
- B. Certification of quality of all concrete, mortar, and grout mix design ingredients including admixtures with supporting test data, mill quality control results and all information specified and requested by the Engineer.
- C. Curing materials and methods proposed with certification statements of materials quality.
- D. Certification of quality and type of epoxy bonding materials.
- E. Trip tickets for each load of concrete, grout or mortar indicating weights of all materials and additives used in the batch.
- F. Location of construction joints not shown on the plans.

1.4 STORAGE OF MATERIALS

- A. Maintain in continuously clean environment and in manner required to maintain homogeneity.
- B. Cements, grouts, and mortar containerized and kept in dry humidity environment. Engineer shall reject materials which have hardened or show any evidence of initial hydration.

2. PRODUCTS

2.1 CONCRETE

- A. ASTM C94 and mix design approved by Engineer.
- B. Compression strength and water cement ratio: The minimum compressive strength and cement content of concrete shall be not less than that shown in the tabulation that follows. The Engineer may order the cement content for any class of concrete to be increased over the quantity specified in the tabulation if it is determined that such increase is necessary to attain the required strength. Such increased quantities of cement, if so ordered, shall be furnished by the Contractor at no additional cost to Metro.

| <u>Concrete Min. 28-day Compr. Strength (psi)</u> | <u>Type of Work</u> | <u>Max. Size Aggregate (in.)</u> | <u>Min. Cement Pounds Per cu. yd.</u> | <u>Max. W/C Ratio</u> |
|---|---|--|---|---------------------------|
| 3,000 | Floor slabs, pads anchor blocks, footings | 1 | 564 | 0.45 |
| Lean | Encasement of dowels for future expansion | -- | 188 (235 max.) | -- |

NOTE: Type AX and C concrete shall conform to 3,000 psi concrete above.

C. Cement ASTM C150:

1. Type I or II.

D. Aggregates:

1. Conform to ASTM C33.
2. Maximum wear 50% at 500 revolutions, AASHTO T96.

E. Water:

1. Clear free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances.

F. Admixtures:

1. Use only those specified in approved mix design.
2. Air entrain all concrete unless elsewhere excepted, with agent conforming to ASTM C260. Freshwater concrete air content between 4% and 6% by volume.
3. Apply in strict accordance with manufacturer's printed instructions.
4. No chloride contents permitted.
5. Compatible with coatings specified elsewhere.

2.2 GROUT

- A. For equipment and column bases and drilled in anchors use nonshrink, nonstaining, premixed grout, Masterflow 713 by Master Builders; or equivalent. Mix in accordance with the manufacturer's directions.
- B. For Fill: Driest consistency practical composed of 1 part Portland Cement 3 parts sand (by volume). Aggregate proportions may be varied slightly to give the most workable mix.
- C. or placement at base of walls, one part fine aggregate, one part cement. In a thick cream consistency.
- D. Cure in accordance with manufacturer's recommendations.

2.3 CURING MATERIALS

- A. Polyethylene Sheeting 0.004 inch thick.
- B. Waterproof Paper: Polyethylene-coated, Fed. Spec. UU-B-790 Type I, Grades A, B, C, Style 4. Define lap control lines clearly by printed markings.
- C. Masonry Sand: ASTM C144 (Maintained continually moist).

2.4 VAPOR BARRIER (UNDER SLABS)

- A. Polyethylene sheeting 6 mil (0.006 inch) thickness. Define lap control lines clearly by continuously marking material edges.
- B. Glass fiber reinforced waterproof paper coated with polyethylene (both sides). Fed. Spec. UU-B-790 Type I grades A, B, C Style 4. Define lap control lines clearly by printed markings.

3. EXECUTION

3.1 MIXING AND TRANSPORTATION

- A. Ready-Mixed Concrete: Conform to ASTM C94 Alternate No. 3.

3.2 PLACING

- A. Deliver only in sufficient quantities required for specified time interval use and placement. Discard concrete having initial set before placement. No remixing with water or supplementing with other materials will be permitted once initial set has occurred. Initial set as evidenced by typical hydration characteristics to be determined by Engineer and Contractor quality assurance representative.
- B. Place as nearly as possible to final position to avoid segregation of the materials and displacement of reinforcement. Placement shall be completed within 30 minutes after water is first added to the mix. However, at the Engineer's discretion if climatic and temperature conditions are suitable and when the concrete is continually agitated, the time may be extended to 1-1/2 hours.
- C. Place no concrete in the absence of the Engineer.
- D. Do not change consistency (slump) for a given placement without the Engineer's written permission.
- E. Keep open trough and chutes of steel or steel lined, clean and free from coatings of hardened concrete.
- F. Do not drop concrete a distance of more than 5 feet unless approved in writing by the Engineer.
- G. Layout and sequence of placing of concrete in monolithic structures as shown on the drawings or approved by the Engineer.
- H. Within a placement, deposit concrete in horizontal layers not to exceed 18 inches in depth. Place at rate such that: (1) no concrete surface shall obtain initial set

before additional concrete is placed on it and (2) yielding of forms is not so great as to cause the concrete surfaces to exceed the tolerances specified.

- I. Unless specified otherwise, place all slabs and finished floors to finish elevation in one continuous operation, except that the Contractor may place a separate finish topping if prior approval is received from the Engineer. Floor slab sectional thicknesses shown are minimum thicknesses. Slopes on floors increase, rather than decrease, slab thicknesses.
- J. Where a separate finish topping is placed, increase structural slab thickness by the maximum thickness of the finish topping and maintain finished floor elevation as noted on the drawings.
- K. Construction Joints:
 - 1. Locate construction joints as shown on the drawings or as approved by the Engineer.
 - 2. Locate construction joints so as not to impair the strength of the structure, and only at locations shown on the drawings or approved by the Engineer.
 - 3. Construct bulkheads to neatly fit reinforcement and waterstops and prevent concrete leakage.
 - 4. Provide waterstops or sealants in construction joints where required.
 - 5. Unless shown otherwise, key all construction joints.
 - 6. Continue reinforcement through construction joint unless otherwise shown or noted.
 - 7. Before placing concrete against previously placed concrete, thoroughly roughen and clean by wet sandblasting or green cutting with an air-water jet.
 - a. Use air-water cutting at the proper time after the initial set. Use a high pressure air-water jet to expose clean, sound aggregate without undercutting the edges of the larger aggregate. Protect adjacent subgrade when cutting is used on slab edges.
 - b. After cutting or sandblasting, rinse the surface until wash water contains no cloudiness. Dispose of wastes from cutting, washing and rinsing so they do not stain or abrade exposed surfaces.
 - 8. Place concrete continuously to a predetermined construction joint.
- L. Care shall be taken in placing concrete through reinforcement so that no segregation of the coarse aggregate occurs. On the bottom of beams and slabs where the congestion of steel near the forms makes placing difficult, a layer of mortar, of the same strength as used in concrete, shall first be deposited in the forms, followed immediately by the concrete. The thickness and use of this mortar layer shall be as approved by the Engineer.
- M. Special care shall be taken to prevent splashing forms or reinforcement with concrete. Any hardened concrete or partially hardened concrete on the forms or reinforcements above the level of the concrete already in place shall be removed before proceeding with the work.
- N. Cold Weather Placement:
 - 1. Concrete shall be placed only when the temperature is at least 40°F., and rising, unless permission to pour is obtained from the Engineer.
 - 2. Material shall be heated and otherwise prepared so that batching and mixing can proceed in full accord with the provisions of this Specification.

3. Suitable means shall be provided for maintaining the concrete at a temperature of at least 50°F for a period of at least the first five (5) days and at a temperature above freezing for the remainder of the specified curing period, except that where high-early-strength cement is used, this period may be reduced to 72 hours. The methods proposed for heating the materials and protecting the concrete shall be approved by the Engineer.
 4. Salt, chemicals, or other materials shall not be mixed with the concrete for the purpose of preventing freezing. Accelerating agents shall not be used.
- O. Hot Weather Placement:
1. The temperature of fresh concrete at the time of placement during hot weather shall be a maximum of 90°F to prevent an accelerated setting of the concrete.
 2. A retarding densifier admixture shall be used when the high expected atmospheric temperature for the day is 85°F or above. Admixture shall be used in accordance with the manufacturer's recommendations.
- P. Placing Concrete Against Earth:
1. Unless otherwise called for on the drawings, earth cuts shall not be used as forms for vertical surfaces without the prior approval of the Engineer.
 2. Concrete placed on or against earth shall be placed only upon or against firm, damp surfaces free from frost, ice and standing or running water. Concrete shall not be placed upon mud, or upon fills until the required compaction has been obtained.
- Q. Placing Concrete Slabs:
1. Smooth subgrade surface irregularity with thin film of masonry sand prior to placing vapor barrier.
 2. Place vapor barrier on subgrade in maximum widths commercially available. Longitudinal laps 6 inch minimum. End laps 2 feet minimum.
 3. Edge and side laps to be in continuous contact. Place materials to maintain tight lap contact.
 4. Repair any tears in the material.
 5. Place concrete without displacing vapor barrier.
- R. Depositing Concrete in Water:
1. Concrete may be deposited in water only when specifically authorized.
 2. Methods and equipment used shall be acceptable to the Engineer.
 3. When deposited by the tremie method, the tremie shall be watertight and sufficiently large to permit a free flow of concrete. The discharge end shall be kept submerged continuously in the concrete and the shaft kept full of concrete to a point well above the water surface. Placing shall proceed without interruption until the top of the concrete has been brought to the required height.

3.3 COMPACTING

- A. Compact all concrete with high frequency internal vibrators immediately after placing.
- B. Use external vibrators for compacting concrete where the concrete is inaccessible for adequate compaction by internal vibrators; construct forms sufficiently rigid to resist displacement or damage from external vibration.

- C. Penetrate concrete with a sufficient number of vibrations immediately after it is deposited. Move vibrator throughout the mass so as to thoroughly work the concrete around reinforcement and embedded fixtures and into corners and form recesses. Vibrate the minimum time required to compact the concrete in place and not cause separation of the materials. Concrete shall be compacted to maximum density as determined by tests for yield. Select vibrator size to efficiently accommodate reinforcement clearances.

3.4 CURING AND PROTECTION

A. General:

1. Maintain at site ready to install, before actual concrete placing begins, all equipment and materials needed for optimum concrete curing and protection; maintain extra vibrators on standby in case of malfunction of any unit.
2. Protect finished surfaces or edges from stains, abrasions and breakage during the entire construction period.
3. Protect all concrete from accelerated drying and excessive heat at all times. Close all galleries, conduits and other formed openings through the concrete during the entire curing period and as long thereafter as practicable to prevent drying of concrete by air circulation.
4. Install slab curing covers immediately after initial set or as soon as free water has disappeared from the surface of the concrete after finishing or surfacing.

B. Water Curing:

1. Use water curing specified herein for all walls and slabs where watertight construction is required.
2. Keep concrete continuously wet by covering with an approved material or by a system of perforated pipes or mechanical sprinklers or other approved methods. (Periodic wetting acceptable.)
3. Keep forms wet at all times to prevent opening of joints and the drying out of the concrete.
4. Water for curing shall be clean and free from any elements which might cause objectionable staining or discoloration of the concrete.
5. Cover surfaces completely with sheeting. Where a single sheet does not cover the entire surface, lap ends and edges at least 4 inches and continuously seal with tape or other suitable means recommended by the manufacturer.
6. Continue waterproof sheet curing for 7 days. Maintain sheeting and edge and end seals intact for entire period. Repair immediately any breaks in the sheeting envelope.

C. Curing Compounds (Use only when specifically approved and for optimum climatic conditions):

1. Do not use curing compounds unless their use is authorized in writing by the Engineer. Curing compounds unacceptable where concrete is exposed to the direct rays of the sun or accelerated drying conditions.
2. Curing compounds shall not be used unless their use is face membrane type and shall be applied in accordance with the manufacturer's recommendations. They shall be of such composition and characteristics as will spread readily on moist concrete and deposit a hard, tenacious film without permanently coloring the

concrete surfaces that will be exposed. The resultant film shall adhere to the concrete surface without chemical reaction therewith, and shall not peel. Maintain coverage for 28 days to prevent detrimental loss of water from the concrete.

3. Prior to applying curing compounds to formed surfaces, the surfaces shall be moistened with a spray of water immediately after forms are removed. Moistening shall be continued until the surfaces will not readily absorb more water. The compound shall be applied as soon as the moisture film has disappeared and while the surface is still damp.
4. On unformed surfaces, the compounds shall be applied immediately after finishing and after bleeding water and "shine" has disappeared.
5. Curing compounds shall not be used on surfaces where future bonding, painting or protective coating is required. In cold weather, curing compounds shall not be used on concrete surfaces that are kept at curing temperature by the use of steam.

D. Saturated Sand Curing:

1. Horizontal construction joints and finished surfaces, cured with sand, shall be kept covered with a minimum thickness of one inch of sand. It shall be kept uniformly distributed and continuously wetted with clean water for a period of 7 days.

3.5 REPAIRING CONCRETE

- A. Immediately after removal of forms, break back all form ties and inspect concrete surfaces for defects. Complete repair of defects within 48 hours after removal of forms. No repairs shall be made until the defects have been reviewed and method of repair approved by the Engineer.
- B. Remove all defective or damaged concrete, including honeycombed, sand streaked, or fractured material from the area to be repaired. Chip out areas to one inch minimum depth. Edge shall be squared with the surface to eliminate feather edges.
- C. Before placing the repair material obtain Engineer inspection. Clean area free of chipping dust, dried mortar, and all other foreign materials.
- D. Keep surfaces to be repaired continuously wet for at least three hours prior to placing new concrete or mortar. No free water on the surface when the repair material is placed.
- E. Apply a bonding agent to the area to be repaired before placing repair material. Apply the bonding agent per manufacturer's published instructions attached to container.
- F. For all repair surfaces permanently exposed to atmosphere use white cement in proportions found by trial to be effective in producing a color that, in the hardened patch, will match the surrounding concrete surface.
- G. Make repairs or patch form tie holes by (1) dry-packing, (2) filling with concrete, or (3) plastering with mortar or a combination of all 3 in conformance with the following:
 1. Use the dry-pack method for holes at least one inch deep where the depth is equal to, or greater than the smallest surface dimension of the defect, such as

cone-bolt or form tie holes, and for narrow slots cut for the repair of cracks. Do not use the dry-pack method where lateral restraint cannot be obtained. Place and pack dry-pack mortar in layers having a compacted thickness of approximately 3/8 inch. Solidly compact each layer over its entire surface by use of a hardwood stick and hammer. Do not use metal tools for compacting. Compact surface just flush with adjacent area. Do not use steel finishing tools or water to facilitate finishing.

2. Use concrete replacement for (1) holes extending entirely through concrete sections; (2) for holes larger than one square foot and deeper than four inches in which no reinforcement is encountered; (3) for holes larger than 1/2 of one square foot where reinforcement is exposed. Concrete used for replacement shall be of the same strength and mixture as used in the structure except for color matching as specified above.
3. Use mortar replacement for holes too wide to dry-pack and too shallow for concrete replacement and when approved by the Engineer for other conditions not covered above.

H. Cure all repairs with the same methods as new concrete.

3.6 CONCRETE FINISHES AND TOLERANCE

A. General Finish:

1. Finish concrete surfaces to conform with the following table unless otherwise noted on the drawings.
2. Formed Surfaces System

| | |
|---|----|
| Exterior - Exposed and One Foot Below | F4 |
| Exterior - Below Grade | F2 |
| Interior | F4 |
3. Slabs

| | |
|--|----|
| Tops of exterior footings in contact with soil or backfill | U2 |
| Exterior - Except as Otherwise Noted | U5 |
| Interior - Walking Surface Except as Otherwise Noted (with hardener) | U4 |

B. Formed Surfaces: Finishes for formed surfaces shall be as designated below:

1. Finishing for F1 and F2 finishes consists of concrete repairing only, which is to be completed within 48 hours after forms are removed.
2. Finishing for F3 and F4 finishes shall immediately follow concrete repairing and be completed within 96 hours after the forms are removed. Except where forms are left in place for the duration of the curing period, finishing shall be done during the curing period, keeping the interruptions to the curing process as short as possible. Where forms left on prevent finishing during the curing period, finishing shall be completed within 48 hours after forms are removed. All finishes shall receive a minimum of 24 hours of curing after completion of the finish. Curing shall be carefully done so as not to disturb or remove any of the mortar.
3. Finish F1: Rough formed surface with defective concrete repaired and form tie holes and other holes over 1/2 inch deep filled. Forms may be built with a

minimum of refinement and form sheathing may be any material that will not leak mortar or yield beyond specified tolerances when the concrete is vibrated.

4. Finish F2: Smooth, formed concrete surface with all fins, projections and loose material removed and defective concrete and form tie holes and other holes over 1/2 inch deep, repaired and filled. Forms in contact with concrete shall be plywood or steel.
5. Finish F3: Smooth, formed concrete surface with all fins, projections and loose material removed, and defective concrete, form tie holes, air bubble holes, surface pits, holes from defective forms, nailhead holes and similar surface defects, repaired and filled. Forms in contact with concrete shall be plywood or steel. Form construction shall be planned so that if any pattern from the forms is left in the concrete surface it will harmonize with the structure or building. All joints shall be horizontal or vertical.
6. Finish F4: Exceptionally smooth, formed concrete surface with all fins, joint marks, bulges, projections and loose material removed. Sandblast to expose air bubble holes, surface pits and similar minor surface defects. Defective concrete, form tie holes, holes from defective forms, and other holes too large to fill by "sack rubbing" shall be repaired and filled. Finish with sack rubbing as follows.
 - a. Thoroughly wet the surface and begin treatment while the concrete is still damp. Use 1 part cement, 2 parts (by volume) of sand which will pass a No. 16 screen, and enough water so that mortar consistency will be that of thick cream. Rub mortar thoroughly over the area with clean burlap or a cork or sponge rubber float to fill all pits, surface holes and air bubble holes. While the mortar in the pits is still plastic, rub the surface with a dry mix of mortar. This dry rub shall remove all excess mortar and place enough dry material in the pits to stiffen and solidify the mortar flush with the surface. No material shall remain on the surface except that within the pits. When the ambient temperature is 85°F or higher, keep the mortar continuously damp by means of a fog spray for 24 hours during the setting period. Take care that the fog spray does not remove any of the mortar. Break finish for any area only at natural breaks in the finished surface.
 - b. Rub all surfaces that are to be finish painted with a carborundum stone to provide a smooth texture and to remove any latent material on the surface. Pre-blast walls to remove any residual form oils prior to finishing when walls are to be finish painted.
 - c. Form requirements shall be the same as Finish F-3.

C. Unformed Surfaces:

1. Working on unformed surfaces in various finishing operations shall be held to the minimum required to produce the desired finish. Use of any finishing tool in areas where water has accumulated will not be allowed. Work in these areas shall be delayed until the water has been absorbed, has evaporated, or has been removed by draining, mopping, dragging off with a loop of hose, or by other means. In no case, shall cement or mixture of cement and sand be spread on the surface to absorb excess moisture nor shall such materials or water be added to facilitate troweling. Joints and edges, unless specified otherwise, shall be carefully finished with edging tools.

2. Finishes for unformed surfaces shall be as designated below:
- a. Finish U1: Even, uniform finish. Consolidate level and screed concrete to obtain an even, uniform surface. Surplus concrete shall be removed immediately after consolidation by striking it off with a sawing motion of the straight edge or template across wood or metal strips, that have been set as guides. When the surface is curbed use screed strips at approved intervals. For long, narrow stretches of curved surfaces such as on invert paving, a heavy slip form may be used. In the case of extensive flat paving, a paving and finishing machine is preferred.
 - b. Finish U2: A wood float finish. Follow treatment specified for finish U1 by floating either by hand, or by power driven equipment. Floating to be started after some stiffening has taken place in the surface concrete and the moisture or "shine" has disappeared. Work the concrete no more than necessary to produce a surface known as "wood float finish" which is uniform in texture and free of screed marks. Do any necessary cutting and filling during the floating operations.
 - c. Finish U3: A steel troweled finish. Follow the treatment specified for the finish U2, except leave a small amount of mortar without excess water at the surface to permit effective troweling. Start steel troweling after the moisture film or "shine" has disappeared from the float surface and after the concrete has hardened enough to prevent an excess of fine material and water from being worked to the surface. Trowel with firm pressure that will flatten the sand surface left by the floating and produce a dense, uniform surface free of blemishes, ripples and trowel marks.
 - d. Finish U4: A hard, steel troweled finish burnished. Follow the treatment specified for finish U3 with additional steel troweling after the surface has nearly hardened, using firm pressure and troweling until the surface has a burnished appearance.
 - e. Finish U5: Broom finish. Follow the treatment specified for finish U3 by roughening the surface immediately after troweling with a fiber bristle broom in a direction perpendicular to the direction of traffic. Broom grooves not more than 1/16 inch deep. After brooming, neatly tool all joints and edges to configuration.

D. Tolerances:

1. Unless otherwise required, allowable tolerances for concrete surfaces shall be in accordance with those shown in the table below. Surface irregularities are classified as either "abrupt" or "gradual". Offsets caused by displaced or misplaced form sheathing, lining, or form section or by defective form lumber shall be considered as abrupt irregularities. All others are classed as gradual irregularities. Gradual irregularities shall be measured with a template consisting of a straight edge for plane surfaces and its equivalent for curved surfaces.
2. The length of the template for testing formed surfaces shall be 5 feet. The length of the template for unformed surfaces shall be 10 feet. Maintain a 5 foot length and 10 foot length steel template on the job site.

3. Maximum allowable irregularities in concrete:

| <u>Finish Designation</u> | <u>Irregularity in Inches</u> | |
|-------------------------------|-------------------------------|---------------|
| | <u>Gradual</u> | <u>Abrupt</u> |
| F1 | 1 | 1/2 |
| F2 | 1/2 | 1/4 |
| F3 | 1/4 | 3/16 |
| F4 | 3/16 | 3/16 |
| U1 thru U5 | 1/8 | 1/8 |

3.7 UNSATISFACTORY CONCRETE

- A. Any concrete placed which fails to meet or exceed the specified strength requirements as determined from molded cylinders or cores, or to meet the density or surface requirements, or which has been frozen during placing or curing, shall be removed and replaced with satisfactory materials at the Contractor's expense.
- B. Method of determining unsatisfactory concrete: Visual appearance characteristic of rain or freeze damage to concrete which is apparent to the Engineer.

* * * END OF SECTION * * *

SECTION 03485

PRECAST CONCRETE VAULTS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Shop Drawings, Product Data and Samples: Section 01340

1.2 DESCRIPTION

- A. This section covers furnishing and installation of the precast concrete vaults.

1.3 SUBMITTALS

- A. Submit complete shop drawings with detailed specifications and data for materials used, parts, devices and other accessories forming part of the vault.

1.4 ADAPTATION OF PRODUCT

- A. Furnish product readily adaptable for installation and operation in the manner shown on the drawings.

2. PRODUCTS

2.1 GENERAL

- A. The vaults shall be precast as manufactured by Utility Vault Co., Brooks, or equivalent, with tops modified as shown on the plans.

2.2 DESIGN

- A. Conform to ASTM C913.
- B. Designed for 16,000 pound wheel load, if vault is located in traffic area.
- C. Designed for earth load of 130 pounds per cubic foot.

3. EXECUTION

3.1 INSTALLATION

- A. The bottom of the excavation for the vaults shall be fine graded to a plane surface on firm undisturbed subgrade material.

- B. Gravel pipe bedding material shall be uniformly spread to a depth of 3 inches minimum over the bottom of the excavated area to provide uniform bearing for the vault.
- C. Install vault and accessories in conformance with drawings, specifications and recommendations of vault manufacturer unless otherwise instructed in writing by the Engineer.
- D. The vault joints, pipeline, and conduit penetrations through walls as shown on the plans shall be sealed watertight. No leakage will be allowed into the vault.
- E. The manhole ring and cover or access doors shall be adjusted to match the finished surface grade.

* * * END OF SECTION * * *

DIVISION 5 - METALS

INDEX

05500 METAL FABRICATIONS

SECTION 05500

METAL FABRICATIONS

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Gas and Condensate Collection System: Section 02680
- B. Vacuum Pump Stations: Section 11301
- C. Remote Condensate Pump Stations: Section 11302
- D. Storm Drainage: Section 02720

1.2 QUALITY CONTROL

- A. Welding: By operators qualified by tests as prescribed by the AWS in Standard Qualification Procedure for performance of the type of work required.
- B. Comply with OSHA and latest Building Code requirements.

1.3 SUBMITTALS

- A. Shop Drawings: All fabricated metals illustrating dimensions, erection details, cuts, copes, connections, holes, threaded fasteners and welds. Base dimensional data on actual field measurements where applicable.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in such a manner as to prevent damage to finished surfaces. Store above grade in clean dry locations. Protect from corrosion. Handle during construction to prevent overstressing any elements.

1.5 DESCRIPTION

- A. Pipe supports, pipe anchors, pipe guides and bollards shall be provided and installed at the locations or by the spacing requirements as shown on the Drawings. Contractor shall ensure that all above-grade piping is adequately supported.
- B. Provide overflow screens for overflow structures in Sedimentation Basins.

2. PRODUCTS

2.1 FABRICATED STEEL

- A. Pipe supports, pipe anchors, pipe guides and bollards shall be fabricated from ASTM A36 structural steel and ASTM A53 Grade B seamless or electric welded pipe, galvanized. U-bolts shall be carbon steel, galvanized, with 4 galvanized hex nuts each and shall be as manufactured by Grinnell Fig. 137 or equivalent. Sizes shall be as indicated on the Drawings.
- B. Overflow screens shall be fabricated from ASTM A-36 Structural Steel and shall be galvanized.
- C. "Galvanized" shall mean hot-dip galvanized per ASTM A153 and A123.

3. EXECUTION

3.1 INSTALLATION

- A. Install pipe supports, pipe anchors, pipe guides and bollards at the locations or by the spacing requirements indicated on the Drawings.
- B. All concrete foundations for pipe supports shall be installed in accordance with Section 03300 of this Specification and the Drawings.

* * * END OF SECTION * * *

DIVISION 9 - FINISHES

INDEX

09900 PAINTING

SECTION 09900

PAINTING

1. GENERAL

1.1 RELATED WORK SPECIFIED ELSEWHERE

- A. Shop coatings and/or factory finishes on fabricated or manufactured equipment may be specified in other divisions.
- B. Vacuum Pump Stations: Section 11301
- C. Gas and Condensate System: Section 02680

1.2 EXCLUSION

- A. Do not paint stainless steel, nonferrous metals, galvanizing, HDPE multiple coated factory finished baked enamel or porcelain products unless elsewhere noted or specified.

1.3 STANDARDS

- A. Acceptable Manufacturers: Ameritone, Sika Corp. Miller, Olympic, Sherwin Williams, Rhodda, Glidden, Tnemec Company, Koppers Company, and Ameron.
- B. Alternate Products:
 - 1. Coating to be same generic type.
 - 2. Coating thickness and number of coats comparable to guide product.
 - 3. Documented application, serviceability, performance, physical properties and composition equivalent to the guide product.
- C. Volume 2 of Steel Structures Painting Manual, by Steel Structures Painting Council (SSPC).

1.4 QUALITY CONTROL

- A. Establish control panel or area for each coat of each paint system on each substrate material:
 - 1. Panel to be 16 square feet square or as approved for metal equipment.
 - 2. Continue all operations to test panel area until precise thickness and surface texture is achieved and complies with procedures approved in submittal data.
- B. Obtain Engineer's inspection and provide coating thickness measurements:
 - 1. If panel is satisfactory to Engineer, proceed with painting operation.
 - 2. If panel is unsatisfactory, remove paint and reapply until test panel is acceptable.

- C. Panel to be used as a quality control reference base; and, all areas with appearance quality less than control panel subject to removal and reapplication.
- D. Continuously maintain at painting location quality thickness gauges specifically designed for use on each substrate to be coated. Provide standard shims for calibration check of dry film gauges.
- E. Deliver to the job site in the original sealed containers with manufacturer's name, product name, type of product, manufacturer's specification or catalog number, federal specification number (if applicable):
 - 1. Provide complete printed instructions.
 - 2. Permit adequate time for Engineer to inspect all unopened containers at the site prior to initiating painting.
- F. Paint manufacturer's representative to be at site and review typical quality control procedures with Engineer and Contractor prior to and during first day of application of each generic paint type used.
- G. Check coating thickness at regular intervals:
 - 1. Provide 5 measurements at random locations selected by the Engineer for each 100 square feet of each application of each material.
 - 2. Form to include a graphic depiction of area tested with locations and measured thicknesses noted.
 - 3. Obtain Engineer review of each coating layer thickness prior to applying subsequent cover coat.

1.5 SUBMITTALS

- A. Submit complete product information including systems proposed, constituent ingredients for each coating, color charts, samples of coating material on chips of substrate (steel and concrete) for each prime and finish coat, manufacturer experience and additional information requested by the Engineer.
- B. Furnish certification statements with each delivery of materials including statement of compliance with material submittals reviewed by the Engineer.
- C. Provide measurements (wet or dry film thickness) on permanent record form for each coating application.
- D. Submit samples of tints proposed for identification of coating layers.
- E. Submit proportioning statement for inhibitive additives with product submittals.
- F. Certification of shop surface preparation.

1.6 STORAGE

- A. Maintain all products in locked room and comply with local fire and health regulations.

1.7 DESCRIPTION OF WORK

- A. The Contractor shall paint the blowers, condensate knock-outs, air compressor, piping (above ground), valves, fittings, pipe supports, appurtenances, and all shop primed items at the Motor Blower/Flare Facility. In addition, all above ground PVC piping, fittings, valves, pipe supports, and equipment at the Vacuum Pump Stations and Remote Condensate Tank locations shall be painted in accordance with the Plans and these Specifications. All pre-finished machinery, painted in accordance with these specifications, shall be touched up as required. Bollards shall be painted with a High Visibility Yellow paint in accordance with these Specifications. The pipe supports, guides and anchors located above grade on the gas collection manifold piping shall also be painted in accordance with these Specifications.

2. MATERIALS

2.1 ALTERNATE MANUFACTURERS

- A. Shall provide information on all materials to indicate their proposed products are equivalent.

2.2 COMPATIBILITY

- A. Contractor shall be responsible for the compatibility of all paint products used.
- B. All products from single manufacturer where possible.

2.3 MILDEW RESISTANCE

- A. Manufacturer to formulate specific fungus or mildew inhibitive additives for all nonepoxy products.

2.4 PAINTING SYSTEMS

- A. Steel:
 - 1. System M-2: Epoxy:
 - a. Use: Submerged metal including splash zone.
 - b. Surface preparation: 3.1A
 - c. Prime (Field or Shop): Tnemec 20-1211, Koppers Pug Primer, Amercoat 71 Primer, 3-4 mils dry.
 - d. Second coat: Tnemec Series 104, Koppers Hi-Gard Epoxy, Amercoat 395FD, 5-6 mils dry.
 - e. Finish coat: Same as second coat.
 - 2. System M-3: Epoxy:
 - a. Use: Exterior/Interior nonsubmerged metal (color).

- b. Surface preparation: 3.1A
 - c. Prime: Tnemec 20-1211, Amercoat 17, 2.5 to 3 mils dry.
 - d. Second coat: Tnemec Series 104, Koppers Hi Gard Epoxy, Amercoat 383HS, 5-6 mils dry.
 - e. Finish coat: Tnemec Series 73 Hi-Build Urethane, Koppers BRS, Amershield, 3-5 mils dry.
- 3. System M-7: Semi-Gloss Alkyd Enamel:
 - a. Use: Exterior/Interior building related ferrous metals.
 - b. Surface preparation: 3.1D at galvanized metals, Miller 1289 Galvanized Wash. Note 3.1C at factory precoated finishes.
 - c. Prime: Ferrous Metal Primer, Miller 484, 1.5 mils dry.
 - d. Second coat: Exterior Semi-gloss Alkyd Enamel, Miller 6750, 400 sq.ft/gallon. 1.5 mils dry.
 - e. Finish coat: Same as second coat.
- B. Nonferrous Metals and Plastics:
 - 1. System P-6: Epoxy:
 - a. Surface preparation: 3.1G.
 - b. Prime coat: Tnemec Series 66, Koppers 40, Amercoat 178.
 - c. Finish coat: Tnemec Series 73 Hi-Build Urethane, Koppers BRS, Amershield, 3.5 mils dry.
- C. Concrete/Masonry:
 - 1. System C-9: Polymer Modified Cement Coating:
 - a. Use: Interior concrete floors.
 - b. Surface preparation: 3.1E. Sandblast/waterblast/mechanically prepare entire surface to be coated.
 - c. First coat: Sika Top 144 at coverage of 100-150 ft/gallon. 8 to 16 mils dry.
 - d. Finish coat: Same as first coat at 150-200 ft/gallon. 8 to 16 mils dry.

3. EXECUTION

3.1 SURFACE PREPARATION

- A. Ferrous Metal to Receive Coating Systems M-2 or M-3:
 - 1. Near white metal blast cleaning: SSPC-SP10.
 - 2. Round all edges and prominence to duplicate a wheelbrator finished flat plate product.
 - 3. Remove all weld spatter prior to blasting.
- B. Factory Applied Bituminous Coating On Cast Iron Or Other Products:
 - 1. Clean and dress any damaged or corroded surface as per 3.1A above.
 - 2. Apply Tnemec Series 66 before prime coat.
- C. Precoated Factory Equipment To Be Painted (where specifically required by contract documents):
 - 1. Apply appropriate "tiecoat" and provide paint system over tiecoat equivalent to that specified for general area of use.

2. System to be proposed by Contractor's paint supplier and submitted with required transmittal data to Engineer.
- D. If painting galvanized products is required by the contract documents, clean with solvent wipe then treat with Tnemec 32-120 or Koppers 30 Metal Conditioner prior to priming.
- E. Concrete:
 1. Light sand blast after form removal to completely remove all form oil and/or release agents prior to concrete finishing. Refer to Division 3 for appropriate finish.
 2. Allow concrete sufficient time to dry after specified moist curing period. (Use no was type curing seals.)
 3. Clean any contaminated surfaces with detergent, rinse and dry immediately prior to prime coating and application of finish coats.
 4. Smoothness equivalent to specified concrete finish tolerance.
 5. Remove all concrete splatter from grouting or other operations.
- F. Concrete Masonry Units:
 1. Remove all contaminants with prime detergent, rinse and dry.
 2. Remove projections with a masonry carborundum block.
 3. Remove loose material with stiff bristle broom and compressed air.
- G. Smooth Nonferrous Metals and Plastics:
 1. Copper, Aluminum, PVC, fiberglass reinforced plastic.
 2. Solvent wipe (degloss) and light sand blast to roughen and provide "tooth" for primer or paint.

3.2 COMPATIBILITY OF COATINGS

- A. Contractor shall be responsible for compatibility of all paint products.
- B. Test coatings applied to an existing surface coating by patch test to determine suitability.
- C. Allow sufficient time to demonstrate compatibility.

3.3 INSPECTION PRIOR TO APPLICATION OF FIELD PRIMER AND FINISH COATINGS

- A. Clean all surfaces immediately prior to coating.
- B. Inspect all surfaces for conformance to specified preparation standards.
- C. Request and obtain Engineer inspection for each coating surface preparation prior to coating application.

3.4 SURFACE DEFECTS OR FILLERS IN ARCHITECTURAL MATERIALS

- A. Fill defects in architectural areas with patching compound specifically designed for the intended application.
- B. Sand or otherwise finish patched or filled areas to blend with adjacent surface.

- C. Counter sink or nail set fasteners to depth necessary to provide good bond for putty or dowel stock:
 - 1. Match dowel stock or putty to color of stain on any natural finish areas.
 - 2. Carefully apply glue to dowels and immediately wipe thoroughly any surplus glue.

3.5 PAINT SMOOTHNESS, COVER AND SHEEN TOLERANCE

- A. Finish coating surface smoothness equal to base surface preparation smoothness.
- B. Uniform lustre with even appearance free of lap marks.
- C. Thickness tolerance ± 10 percent in any given location, but average not to be less than specified mil coverage.

3.6 PAINT APPLICATION CONDITIONS

- A. Clean, dry environment and at temperatures recommended in manufacturer's preprinted instructions.
- B. Surface temperature: Minimum of 5°F. above wet bulb temperature.
- C. Maximum Humidity: 85 percent.
- D. Shield from hot sun with appropriate housing when applying paints.
- E. Do not apply coatings in areas where dust is being generated.
- F. Do not apply in fog, snow, rain or to wet or damp surfaces.

3.7 APPLICATION

- A. Add fungus or mildew inhibitive additives to all nonepoxy products.
- B. Apply coatings at specified rates and consistency per selected manufacturer's specific application instructions.
- C. Buildup in multiple or single finish coats as specified.
- D. Thin only with thinners specifically formulated for use by approved manufacturer.
- E. Tint primer, second and finish coats different shades to verify coverage.

3.8 RECOAT DRY TIME

- A. Permit adequate cure-drying interval between multiple coats as determined by manufacturer's recommended drying time at specified cure conditions.

3.9 SAFETY AND PROTECTION

- A. Provide safe working environment for paint applicators.
- B. Provide adequate heat and forced mechanical ventilation for health, safety and drying requirements.
- C. Use explosion proof equipment.

- D. Provide approved face masks.
- E. Protect adjacent surfaces with suitable masking and drop cloths as required.
- F. Dispose of paint rags, empty containers, clothes, worn applicators to avoid hazardous situations.
- G. Clean up daily.

3.10 FINISH AND COLOR SCHEDULE

- A. Painted surfaces shall be colored in accordance with Metro-selected schedules provided during the construction work.
- B. Submit for approval prior to any painting, color, manufacturer and color chips of all coatings listed herein in accordance with Section 01340.

* * * END OF SECTION * * *

DIVISION 11 - EQUIPMENT

INDEX

- 11301 VACUUM PUMP STATION
- 11302 REMOTE CONDENSATE PUMP STATION

**SECTION 11301
VACUUM PUMP STATIONS**

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Gas and Condensate Collection: Section 02680
- B. Remote Condensate Pump Station: Section 11032
- C. Shop Drawings: Section 01340
- D. O & M Data: Section 01730
- E. Electrical: Division 16

1.2 DESCRIPTION

- A. The work shall consist of furnishing all equipment and material, and constructing the Vacuum Pump Station per the Plans. Included in each Vacuum Pump Station are the following components:
 - 1. All piping, valves, fittings, and pipe supports within the walls of the Vacuum Pump Station enclosure and between the Vacuum Pump Station enclosure and the Condensate Collection Tank as shown on the Plans.
 - 2. One Vacuum Reserve Tank System.
 - 3. Two Condensate Discharge Pumps (one spare)
 - 4. One Condensate Collection Tank
 - 5. One Vacuum Pump Station Roof Structure

1.3 SUBMITTALS

- A. Shall conform to Section 01340 and 01730.

2. PRODUCTS

2.1 PIPING

- A. The piping is to be PVC material as per Section 02610 of these specifications

2.2 VALVES

- A. Ball valves for use at the vacuum pump station shall have PVC bodies, socket type union ends, and EPDM seats and seals, as manufactured by ASAHI America "Duo Bloc", or approved equivalent.
- B. Check valves for use at the vacuum pump station shall be ball check valves with PVC bodies, union ends and EPDM seals as manufactured by Chemtrol, Inc., or equal.

2.3 VACUUM RESERVE TANK SYSTEM

- A. The Vacuum Reserve Tank System shall be provided with the following components:
 - (2) ea. oil-free vacuum pumps with 5 hp 230/460 volt, 3 phase, 60 Hz TEFC motors, inlet filter, vacuum regulator and exhaust muffler. The pumps shall be capable of producing, at its extremes, 56 cfm air at 0 inches Hg vacuum, and 26 inches Hg at 0 cfm air. The pumps shall be of spark-proof design suitable for methane gas service.
 - (2) ea. Pump inlet check valves
 - (2) ea. Pump isolation valves
 - (2) ea. Vacuum switches
 - (1) ea. Vacuum Gage
 - (1) ea. 80 gal. vacuum receiver
 - (1) ea. Vacuum relief valve
 - (2) ea. Ball float shut-offs on pump inlets
 - (1) ea. Duplex NEMA - 3R control panel with HOA switches

The unit shall be a complete package, fully assembled, and tested, including all plumbing, valves, gauges, and electrical connections, shipped ready for installation and start-up from the vendor.

2.4 CONDENSATE DISCHARGE PUMPS

- A. The condensate discharge pumps (one spare per location) shall be "jet" pumps as manufactured by Goulds Pumps, Model GH15 with 1 1/2 HP 460V, 3 phase motors with a FT5-12 Jet Assembly Package. The pumps shall be capable of pumping 18 gpm water against a negative suction head of 40-foot water column. The pump casing shall be close grained cast iron, with 20% glass filled "noryl" impeller. The pumps

shall be supplied with a bronze jetbody and foot valve for installation in the condensate collection tank as shown on the Drawings.

2.5 CONDENSATE COLLECTION TANK

- A. The condensate collection tank shall be furnished ready for installation in conformance with ASTM Standard Specification D3299 for "Filament-Wound Glass-Fiber-Reinforced Thermoset Resin Chemical-Resistant Tanks" and with National Bureau of Standards Specifications PS 15-19 "Product Standard for Reinforced Plastic Tanks".
- B. The Condensate Collection Tank shall have adequate wall thickness, fiberglass mat, and stiffener for an operating vacuum of 25 inches Hg.
- C. The Condensate Collection Tank shall meet the classification of Type II, Grade 2 in conformance with ASTM Standard Specification D3299. The resin used to fabricate the Condensate Collection Tank shall be a commercial-grade, vinyl ester resin, corrosion resistant thermoset suitable for corrosive leachate collection systems. The chopped strand mat, the continuous roving, and the surface mat shall be in accordance with ASTM Standard Specification D3299. The woven roving shall be in accordance with ASTM Standard Specification D2150.
- D. The Condensate Collection Tank shall be coated with a protective coating resin to resist ultraviolet degradation. The interior shall have a vinyl ester liner, 100 mil thick, and shall be Koppers Atlac 580 or approved equal.

2.6 PUMP STATION ROOF STRUCTURE

- A. This section covers the work necessary to furnish and install the Vacuum Pump Station Roof Structure, complete, as shown on the Drawings and specified herein.
- B. Materials shall be similar in nature and shall meet the intended service requirements. The roof structure shall be watertight and have corrosion-resistant paint. The roof structure shall carry a 10-year warrantee to obligate the manufacturer to repair or replace any defect in materials or workmanship. Building construction and materials shall be Underwriters Laboratories and Factory Mutual approved, as applicable.
 - 1. Manufacturer. Shall be Freedom Metal Mfr. Inc., Box 990, Sumner, WA. 98390 (206)863-7710 "Double Column Carport".

2. Dimensions. Height to be 7'0" overall dimensions and column locations shall be as shown on the Plans.
3. Roof. The roofing system shall consist of 26 GA. USG V-Beam roofing as a minimum. Rain gutters shall be provided on the front and rear sides of the roof. The roof structure shall be provided with the necessary structural metal members for exposure to Class C conditions, wind loads to 90 MPH, and to meet Uniform Building Code, 1988 requirements. All materials shall have a finish suitable to withstand the elements. Baseplates shall be provided on the support columns to sufficiently anchor the roof structure to the foundation.
4. Finish. Paint all surfaces per manufacturer's standard coating finishes and erection drawings. Provide Metro with color samples for selection prior to painting.
5. Hardware. The manufacturer shall provide all hardware for assembly and securing the roof structure in place. All hardware for securing the building components shall be corrosion-resistant with insulating washers for interface where dissimilar metals are in contact. All concrete anchors for securing the roof structure to the concrete slab shall be stainless steel and shall be anchor bolts with lock washers or inserts shot into the concrete slab.
6. Electrical. See the Plans and Division 16 of these Specifications for electrical and lighting requirements.
7. Foundation. See the Plans and Division 3 of these Specifications for enclosure foundation requirements.

2.7 PIPE SUPPORTS

- A. Pipe supports at the Vacuum Pump Station shall be fabricated as shown on the Plans. Materials and construction requirements shall be as per Section 05500 of this Specification.

3. EXECUTION

3.1 INSTALLATION REQUIREMENTS

- A. Piping at the Vacuum Pump Station shall be PVC pipe, fabricated and installed as shown on the Plans and shall meet all applicable requirements of Section 02610 of this Specification.
- B. Pipe supports shall be installed as shown on the Plans and shall meet all applicable requirements of Section 05500 of this Specification.

- C. Valves shall be installed per Section 02680 of the Specification.
- D. The Condensate Collection Tank shall be installed to match the elevations shown on the Plans. The Condensate Collection Tank shall be raised 1'-0" from the bottom of the excavation to allow concrete to flow beneath as shown on the Plans. Tank excavation shall be in accordance with Section 02221 of this Specification.
- E. The Vacuum Pump Station Roof Structure shall be designed by the manufacturer to meet local Building Code, Wind Loadings, 1988 UBC, and environmental conditions encountered at the site. Design drawings and calculations shall be stamped by a registered professional engineer in the State of Oregon and submitted in accordance with the GENERAL CONDITIONS. Design drawings shall include details for anchoring the modular structure to the concrete slab. Manufacturer's installation instructions shall also be provided.

The Vacuum Pump Station Roof Structure shall be erected and finished according to the manufacturer's printed instructions. The structure shall be watertight at all joints and conform to local Building Code and 1988 UBC.

The roof structure shall rest and be secured on the top its foundation as per the Plans. Provide watertight sealing of all joints with 20-year life sealant per the manufacturer's recommendation. Concrete foundation shall be installed in accordance with Section 03300 of this Specification and the Plans.

* * * END OF SECTION * * *

SECTION 11302
REMOTE CONDENSATE PUMP STATIONS

1. GENERAL

1.1 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

- A. Gas and Condensate Collection: Section 02680
- B. Vacuum Pump Stations: Section 11301
- C. Shop Drawings: Section 01340
- D. O&M Manual: Section 01730
- E. Electrical: Division 16

1.2 DESCRIPTION

- A. The work to be performed includes furnishing all equipment and material, and constructing the "Remote Condensate Pump Station" as per the Plans. Included in the condensate pump station are the following components:
 - 1. All piping, fittings, valves and pipe supports between the condensate pump and the condensate collection tank as shown on the Plans.
 - 2. Two Condensate Discharge Pumps (one spare) per Condensate Pump Station.
 - 3. One Condensate Collection Tank per Condensate Pump Station.
 - 4. One concrete pump foundation per Condensate Pump Station.
- B. These items shall be installed at the locations shown on the Plans.

1.3 SUBMITTALS

- A. Provide submittals per applicable portions of Section 11301 and 01340.

2. PRODUCTS

2.1 PIPING

- A. Conform with Section 02610.

2.2 VALVES

- A. Conform with Section 11301.

2.3 CONDENSATE DISCHARGE PUMPS

- A. Conform with Section 11301.

2.4 CONDENSATE COLLECTION TANKS

A. Conform with Section 11301.

2.5 PIPE SUPPORTS

A. Conform with Section 11301

3. EXECUTION

3.1 INSTALLATION REQUIREMENTS

A. Conform with applicable portions of Section 11031.

* * * END OF SECTION * * *

DIVISION 16 - ELECTRICAL

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SECTION 16000

GENERAL ELECTRICAL

1. GENERAL

1.1 CONTRACT DOCUMENTS: The General Conditions and General Requirements listed in the Index to Specifications apply to work under this Section, and to all Sections of Division 16 contained herein.

1.2 CODE COMPLIANCE

- A.** All work and materials shall comply with latest rules, codes, and regulations including but not limited to the following: OSHA, the National Electric Code, and all other applicable state and local laws and regulations.
- B.** Code compliance is mandatory. Nothing in these Drawings and Specifications permits work not conforming to applicable codes.

1.3 SAFETY AND INDEMNITY

- A.** The Contractor shall be solely and completely responsible for conditions of the job site, including safety of all persons and all property during performance of the work. This requirement will apply continuously and not be limited to normal working hours.
- B.** No act, service, drawing review, or construction observation by Metro or their Consultants is intended to include review of the adequacy of the Contractor safety measures in, on, or near the construction site.

1.4 PERMITS: Include cost in this Contract for all permits and inspections of the work. Permits and inspections shall be obtained by the Contractor when required.

1.5 WARRANTY: Warrant the installation free from defects of workmanship and materials for a period of one year after date of certificate of final payment and promptly remedy any defects developing during this period without charge. Warranty shall not apply to normal burnout of incandescent lamps that result from usage after building has been occupied.

2. PRODUCTS

- 2.1 STANDARD PRODUCTS: Material and equipment shall be a standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.2 MATERIALS ALLOWED

- A. All materials must be new and bear the U.L. label and be manufactured to NEMA and NECA standards, where applicable. Materials that are not covered by U.L. testing standards shall be tested and approved by an independent testing laboratory or governmental agency.
- B. Materials not in accordance with the Specification may be rejected either before or after installation.

2.3 ELECTRICAL O&M MANUALS

- A. General - The Electrical O&M Manual for this project will generally follow the requirements of Specification 01730 but will include the following:
 - 1. Table of Contents
 - 2. System Descriptions
 - 3. Catalog Data/Operations and Maintenance Instructions organized by specifications section and paragraph for all electrical materials and equipment.
 - 4. As Built Electrical Plans
- B. Operations and Maintenance Instructions will be required for the following items:
 - a. Panelboards (Specification 16470)
 - b. Packaged Power Supply (Specification 16470)
 - c. Motor Control (Specification 16480)
- C. Operations and Maintenance Instructions will include the following:
 - 1) Installation Instructions
 - 2) Startup Procedures
 - 3) Maintenance Instructions
 - 4) Maintenance Schedule
 - 5) Spare Parts List
 - 6) Warranties

3. EXECUTION

- 3.1 COORDINATION:** The drawings indicate the extent and the general location and arrangement of equipment, conduit, and wiring. The Contractor shall become familiar with all details of the work and verify all dimensions in the field so that the outlets and equipment will be properly located and readily accessible. Lighting fixtures, outlets, and other equipment and materials shall be located to avoid interference with mechanical or structural features; otherwise, lighting fixtures shall be symmetrically located according to the room arrangement when uniform illumination is required, or asymmetrically located to suit conditions fixed by design and shown. Raceways, junction and outlet boxes, and lighting fixtures shall not be supported from sheet metal roof decks. If any conflicts occur necessitating departures from the drawings, details of and reasons for departures shall be submitted and approved prior to implementing any change.

3.2 CUTTING AND PATCHING

- A. Perform all cutting and fitting required for work of this Section in rough construction of the building.
- B. All patching of finished construction of building shall be performed under the sections covering these materials.
- C. No joists, beams, girders, or columns shall be cut or bored by any Contractor without obtaining written permission from the Engineer.

3.3 CLEANING EQUIPMENT AND PREMISES

- A. Thoroughly clean all parts of the apparatus and equipment. Exposed parts which are to be painted shall be thoroughly cleaned of cement, foreign paint, and other unwanted materials.
- B. All oil and grease spots shall be removed.
- C. Such surfaces shall be carefully wiped and all cracks and corners scraped out.

3.4 TESTS AND DEMONSTRATIONS

- A. Test all service entrance equipment, feeders, and branch circuits, etc. for shorts and grounds prior to energizing. Service entrance conductors and feeders shall be meggered to ground. Document all readings and submit to the Engineer for the project records.

- B. Test all mechanical equipment connected to insure proper rotation and phasing.
 - C. Check the horsepower of all motors connected against the size of heater elements in the starters. If they do not match, notify the motor supplier to provide the correct size and type.
 - D. All systems shall be tested, adjusted, and balanced for proper operation. Metro and/or his official representative shall be instructed in their use and shown all controls and operating procedures. The operation of the systems shall be demonstrated in the presence of Metro and Engineer. Prior to final inspection the Contractor shall instruct personnel designated by Metro in relamping and cleaning lamp fixtures.
 - E. A letter from the Contractor acknowledging that all above mentioned tests and demonstrations have been done shall be submitted to the Engineer with the final inspection submittal.
- 3.5 **ELECTRICAL POWER SHUTDOWN:** The Contractor shall schedule with Metro the shutdown of the electrical power to any facility or portion of facility. The scheduling shall be done a minimum of 24 hours in advance of the proposed shutdown and shall fully address the requirements of Metro for such matters as maximum duration of shutdown and temporary operation of essential services.

* * * END OF SECTION * * *

SECTION 16111

CONDUIT

1. GENERAL

1.1 WORK INCLUDED

- A. Rigid metal conduit and fittings.
- B. Liquidtight flexible metal conduit and fittings.
- C. Non-metallic conduit and fittings.
- D. Pressure rated sealing gland fitting

1.2 RELATED WORK

- A. Section 02222 - Excavating, Backfilling, and Compacting for Utilities.
- B. Section 03300 - Cast in Place Concrete: Protective envelope for underground conduit installations at road crossings.

1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc-Coated.
- B. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- C. FS WW-C-566 - Specification for Flexible Metal Conduit.
- D. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- E. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

2. PRODUCTS

2.1 RIGID METAL CONDUIT AND FITTINGS

- A. Rigid Steel Conduit: ANSI C80.1.

- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; threaded type, material to match conduit.

2.1 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

- A. Conduit: Flexible metal conduit with PVC jacket.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.2 PLASTIC CONDUIT FITTINGS

- A. Conduit: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

2.3 CONDUIT SUPPORTS

- A. Conduit Clamps, Straps, and Supports: Steel or malleable iron.

2.4 DUCTBANK HANDHOLES

- A. Handholes shall be of high density polyethylene (HDPE). Carson Industries Series 1730, or equal.

2.5 PRESSURE RATED SEALING GLAND FITTING

- A. Fittings shall be of stainless steel with teflon sealant. Conax catalog number PL-12-6.

3. EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

- A. Size conduit for conductor type installed 3/4-inch minimum size.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route exposed conduit parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum 6 inch clearance between conduit and piping. Maintain 12 inch clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- H. Support conduit at a maximum of 7 feet on center.

3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipecutter; de-burr cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of three 90-degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 2 inch size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Maximum Size Conduit in Slabs Above Grade: 3/4 inch.
- K. Install pressure rated sealing gland fittings to provide a leak proof installation at the condensate tank entrances.

- L. Use PVC-coated rigid steel factory elbows for bends in plastic conduit runs longer than 100 feet, or in plastic conduit runs which have more than two bends regardless of length.
- M. Wipe plastic conduit clean and dry before joining. Apply full, even coat of cement to entire area that will be inserted into fitting. Let joint cure for 20 minutes minimum.

3.3 UNDERGROUND DUCTBANK INSTALLATION

- A. Install top of duct bank minimum 18 inches below finished grade.
- B. Install conduit with minimum grade of 4 inches per 100 feet.
- C. Stagger conduit joints in concrete encasement 6 inches minimum vertically.
- D. Use suitable separators and chairs installed not greater than 4 feet on centers. Band conduit together with suitable banding devices. Securely anchor conduit to prevent movement during concrete placement.
- E. Provide two No. 4 steel reinforcing bars in top of bank under paved areas.

3.4 CONDUIT INSTALLATION OF SCHEDULE

- A. Underground Installations More than five feet from foundation wall: Schedule 40 plastic conduit.
- B. Installations In or Under Concrete Slab, or Underground Within Five Feet of Foundation Wall: Schedule 40 plastic conduit.
- C. In Slab Above Grade: Schedule 40 plastic conduit.
- D. Exposed Outdoor Locations: Rigid steel conduit.
- E. Wet Interior Locations: Rigid steel conduit.
- F. Concealed Dry Interior Locations: Rigid steel conduit.
- G. Exposed Dry Interior Locations: Electrical metallic tubing. Rigid steel conduit.

* * * END OF SECTION * * *

SECTION 16120
WIRE AND CABLE

1. GENERAL

1.1 WORK INCLUDED

- A. Building wire.
- B. Type TC power cables.
- C. Control cable.
- D. Type KX thermocouple extension wire.
- E. Wiring connections, terminations, and splices.
- F. Heat trace cable

1.2 REFERENCES

- A. NEMA WC 5 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

1.3 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 01340.

2. PRODUCTS

2.1 BUILDING WIRE

- A. Thermoplastic-insulated Building Wire: NEMA WC 5.
- B. Feeders and Branch Circuits Larger Than 6 AWG: Copper, stranded conductor, 600 volt insulation, THHN/THWN.
- C. Feeders and Branch Circuits 6 AWG and Smaller: Copper conductor, 600 volt insulation, THHN/THWN. 6 and 8 AWG, stranded conductor; smaller than 8 AWG, solid conductor.

- D. Control Circuits: Copper, stranded conductor 600 volt insulation, THW.

2.2 TYPE TC POWER CABLE

- A. Conductors: Soft drawn or annealed copper. Three insulated conductors and three bare ground wire.
- B. Insulation: Cross-linked polyethylene (XLP) on individual conductors.
- C. Jacket: Black, flame-retarding polyvinyl chloride (PVC).

2.3 THERMOCOUPLE EXTENSION WIRE (ANSI TYPE KX)

- A. Conductors: No. 14 AWG solid copper.
- B. Insulation: Polyvinyl chloride (PVC) on individual conductors and an overall PVC jacket.
- C. Wire Braid: Tinned copper.

2.4 SIGNAL CABLE

- A. Conductors: Stranded annealed copper.
- B. Insulation: Heat-stabilized polyethylene.
- C. Jacket: Black, flame-retarding polyvinyl chloride (PVC).

2.5 DUCTBANK CONSTRUCTION SPLICE INSULATION

- A. Heat Shrink Sleeves: Cross-lined polyolefin. 3M Cat. No. ITCSN, or equal.

2.6 HEAT TRACE CABLE

- A. Heat trace cable: Self-Regulating three watt per foot 120 volt heating cable with tinner-copper braid covering Chromolox SRL3-1CT, or equal.
- B. Heat trace cable connection accessories: Chromolox DL series, or equal.
- C. Ambient sensing thermostat: Chromolox catalog number RTAS, or equal.

3. EXECUTION

3.1 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet.
- C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.
- D. Splice only in junction or outlet boxes.
- E. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- F. Make Conductor lengths for parallel circuits equal.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling 4 AWG and larger wires and for pulling cables in ductbanks.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.

3.3 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Use solderless pressure connectors with insulating covers for copper wire splices and taps, 8 AWG and smaller. For 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full capacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.
- G. Use heat shrink sleeves to insulate splices in ductbank construction.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturer's recommended values.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

3.5 WIRE AND CABLE INSTALLATION SCHEDULE

- A. Concealed Interior Locations: Building wire in raceways.
- B. Exposed Interior Locations: Building wire in raceways.
- C. Wet or Damp Interior Locations: Building wire in raceway.
- D. Exterior Locations: Building wire in raceways. Thermocouple extension wire.
- E. Underground Locations: Building wire in raceways.
- F. Ductbank Installations: Type TC power cable. Signal cable.

3.6 HEAT TRACE CABLE

- A. Furnish and install heat trace cable to protect all above grade piping, tanks, and compressors at pump station VS-1

- B. Obtain the services of a factory approved designer to design the heat trace system to prevent freezing at -10°F ambient temperatures.

* * * END OF SECTION * * *

SECTION 16130

BOXES

1. GENERAL

1.1 WORK INCLUDED

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

1.2 REFERENCES

- A. ANSI/NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

2. PRODUCTS

2.1 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1; galvanized steel, with 1/2 inch male fixture studs where required.
- B. Cast Boxes: Cast fer alloy, deep type, gasketed cover, threaded hubs.

2.2 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: ANSI/NEMA OS 1; galvanized steel.
- B. Sheet Metal Boxes Larger Than 12 Inches in Any Dimension: Hinged enclosure in accordance with Section 16160.
- C. Cast Metal Boxes for Outdoor and Wet Location Installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

- D. Cast Metal Boxes for Underground Installations: NEMA 250; Type 4, outside flanged, recessed cover box for flush mounting, UL listed as raintight. Galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.

3. EXECUTION

3.1 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets prior to rough-in.
- C. Locate and install boxes to allow access.
- D. Locate and install to maintain headroom and to present a neat appearance.

3.2 OUTLET BOX INSTALLATION

- A. Provide knockout closures for unused openings.
- B. Support boxes independently of conduit, except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches of box.
- C. Use multiple-gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- D. Install boxes in walls without damaging wall insulation.
- E. Position outlets to locate luminaires as shown on reflected ceiling plans.
- F. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.

* * * END OF SECTION * * *

SECTION 16141
WIRING DEVICES

1. GENERAL

1.1 WORK INCLUDED

- A. Wall switches.
- B. Receptacles.
- C. Device plates and box covers.

1.2 REFERENCES

- A. NEMA WD 1 - General-Purpose Wiring Devices.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

2. PRODUCTS

2.1 WALL SWITCHES

- A. Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP: NEMA WD 1; AC general use snap switch with toggle handle, rated 20 amperes and 120-277 volts AC. Handle: Ivory plastic.

2.2 RECEPTACLES

- A. Convenience and Straight-blade Receptacles: NEMA WD 1.
- B. Convenience Receptacle Configuration: NEMA WD 1; Type 5-20 R, ivory plastic face.

2.3 WALL PLATES

- A. Decorative Cover Plate: Smooth stainless steel.
- B. Weatherproof Cover Plate: Gasketed cast metal with hinged gasketed device covers.

3. EXECUTION

3.1 INSTALLATION

- A. Install wall switches 48 inches above floor, OFF position down.
- B. Install convenience receptacles 24 inches above floor, grounding pole on bottom.
- C. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- D. Install devices and wall plates flush and level.

* * * END OF SECTION * * *

SECTION 16160

CABINETS AND ENCLOSURES

1. GENERAL

1.1 WORK INCLUDED

- A. Hinged cover enclosures.
- B. Cabinets.
- C. Terminal blocks and accessories.
- D. Wiring ducts.

1.2 REFERENCES

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- B. ANSI/NEMA ICS 1 - Industrial Control and Systems.
- C. ANSI/NEMA ICS 4 - Terminal Blocks for Industrial Control Equipment and Systems.
- D. ANSI/NEMA ICS 6 - Enclosures for Industrial Control Equipment and Systems.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, wiring diagram, outline drawing and construction diagram as described in ANSI/NEMA ICS 1.

2. PRODUCTS

2.1 HINGED COVER ENCLOSURES

- A. Construction: NEMA 250; steel.

- B. Finish: Manufacturer's standard enamel finish.
- C. Covers: Continuous hinge, held closed by flush latch operable by key.
- D. Panel for Mounting Terminal Blocks or Electrical Components: 12 gage steel.
- E. PLC Enclosure: Hoffman Cat. No. A-604808LP, or equal.
- D. Remote Equipment Indication Panel: Hoffman Cat. No. E16PB, or equal.

2.2 TERMINAL BLOCKS AND ACCESSORIES

- A. Terminal Blocks: ANSI/NEMA ICS 4; UL listed.
- B. Power Terminals: Unit construction type, closed-back type, with tubular pressure screw connectors, rated 600 volts.
- C. Signal and Control Terminals: Pass & Seymour Cat. No. 37060, or equal.

2.3 FABRICATION

- A. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.
- B. Provide conduit hubs on exterior located enclosures and knockouts on interior located enclosures.
- C. Provide protective pocket inside front cover with schematic diagram, connection diagram, and layout drawing of control wiring and components within enclosure.

3. EXECUTION

3.1 INSTALLATION

- A. Install cabinets and enclosures plumb; anchor securely to wall and structural supports at each corner, minimum.

- B. Provide accessory feet for free-standing equipment enclosures.
- C. Install trim plumb.

* * * END OF SECTION * * *

SECTION 16190
SUPPORTING DEVICES

1. GENERAL

1.1 WORK INCLUDED

- A. Conduit and equipment supports.
- B. Fastening hardware.

1.2 RELATED WORK

- A. Section 03300, Cast in Place Concrete. Concrete equipment pads.

1.3 COORDINATION

- A. Coordinate size, shape and location of concrete pads with Section 03300, Cast in Place Concrete.

1.4 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

2. PRODUCTS

2.1 MATERIAL

- A. Support Channel: Galvanized steel.
- B. Hardware: Corrosion resistant.

3. EXECUTION

3.1 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using precast insert system, preset inserts, beam clamps, or spring steel clips.
- B. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- C. Do not use powder-actuated anchors.
- D. Do not drill structural steel members.
- E. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- F. In wet locations, install free-standing electrical equipment on concrete pads.
- G. Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch off wall.

* * * END OF SECTION * * *

SECTION 16195

ELECTRICAL IDENTIFICATION

1. GENERAL

1.1 WORK INCLUDED

- A. Nameplates and tape labels.
- B. Wire and cable markers.

1.2 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Include schedule for nameplates and tape labels.

2. PRODUCTS

2.1 MATERIALS

- A. Nameplates: Engraved three-layer laminated plastic, black letters on a white background.
- B. Tape Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.
- C. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

3. EXECUTION

3.1 INSTALLATION

- A. Degrease and clean surfaces to receive nameplates and tape labels.
- B. Install nameplates and tape labels parallel to equipment lines.

- C. Secure nameplates to equipment fronts using screws, rivets, or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.

3.2 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring.

3.3 NAMEPLATE ENGRAVING SCHEDULE

- A. Provide nameplates to identify all electrical distribution and control equipment, and loads served. Letter Height: 1/8 inch for individual switches and loads served, 1/4 inch for distribution and control equipment identification.

* * * END OF SECTION * * *

SECTION 16420

SERVICE ENTRANCE

1. GENERAL

1.1 WORK INCLUDED

- A. Arrangement with Utility Company for permanent electric service, including payment of utility company charges for service.
- B. Underground service entrance.

1.2 SYSTEM DESCRIPTION

- A. System Voltage: 277/480 volts, three phase, four-wire, 60 Hertz.

1.3 QUALITY ASSURANCE

- A. Utility Company: Portland General Electric, Portland, Oregon.
- B. Install service entrance in accordance with Utility Company's rules and regulations.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Submit Utility Company prepared drawings.

2. PRODUCTS

2.1 METERING EQUIPMENT

- A. Meter: Furnished by Utility Company.
- B. Meter Base: As specified by Utility Company.
- C. Current Transformers: Furnished by Utility Company.
- D. Current Transformers Enclosure: As specified by Utility Company.

E. Wood Power Poles: As specified by Utility Company.

3. EXECUTION

3.1 INSTALLATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project. Contact Mr. Jim Van Kleek or William Ferguson at (503) 464-7739.
- B. Underground: Install service entrance conduits from Utility Company's terminal pole to service entrance equipment. Utility Company will connect service lateral conductors to service entrance conductors.

* * * END OF SECTION * * *

SECTION 16450

SECONDARY GROUNDING

1. GENERAL

1.1 WORK INCLUDED

- A. Power system grounding.
- B. Communication system grounding.
- C. Electrical equipment and raceway grounding and bonding.

1.2 SYSTEM DESCRIPTION

- A. Ground the electrical service system neutral at service entrance equipment to grounding electrodes.
- B. Ground each separately-derived system neutral to service grounding electrodes.
- C. Provide communications system grounding conductor at point of service entrance and connect to nearest effectively grounded building structural steel member.
- D. Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

1.3 SUBMITTALS

- A. Submit shop drawings under provisions of Section 01340.
- B. Indicate location of system grounding electrode connections, and routing of grounding electrode conductor.

2. PRODUCTS

2.1 MATERIALS

- A. Ground Rods: Copper-encased steel, 3/4 inch diameter, minimum length 10 feet.

3. EXECUTION

3.1 INSTALLATION

- A. Provide a separate, insulated equipment grounding conductor in feeder and branch circuits. Terminate each end on a grounding lug, bus, or bushing.
- B. Connect grounding electrode conductors to metal methane and condensate piping using a suitable ground clamp.
- C. Supplementary Grounding Electrode: Use driven ground rod on exterior of building. Install ground rod in suitable recessed well; fill with gravel after connection is made.
- D. Use minimum 6 AWG copper conductor for communications service grounding conductor. Leave 10 feet slack conductor at terminal cabinet.
- E. Provide grounding and bonding at Utility Company's metering equipment and pad-mounted transformer in accordance with Section 16420.

3.2 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point using suitable ground testing equipment. Resistance shall not exceed 10 ohms.

* * * END OF SECTION * * *

SECTION 16470

PANELBOARDS

1. GENERAL

1.1 WORK INCLUDED

- A. Service and distribution panelboards.**
- B. Lighting and appliance branch circuit panelboards.**

1.2 REFERENCES

- A. NEMA AB 1 - Molded Case Circuit Breakers.**
- B. NEMA PB 1 - Panelboards.**
- C. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.**

1.3 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 01340.**
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.**

1.4 SPARE PARTS

- A. Keys: Furnish 2 each to Metro.**

2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PANEBOARDS AND LOAD CENTERS

- A. Square D.**
- B. General Electric.**

- C. Westinghouse.
- D. Substitutions: Under provisions of Section 01600.

2.1 MAIN AND DISTRIBUTION PANELBOARDS

- A. Panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1. Cabinet size: 6 inches deep; 20 inches wide.
- C. Provide cabinet front with screw cover and hinged door with flush lock. Finish in manufacturer's standard gray enamel.
- D. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- E. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or as shown on Drawings.
- F. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

2.2 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB1; circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1.
- C. Cabinet Size: 6 inches deep; 20 inches wide.
- D. Provide surface cabinet front with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- E. Provide panelboards with copper bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- F. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; 14,000 amperes rms symmetrical for 480 volt panelboards, or as shown on Drawings.

- G. Molded Case Circuit Breakers: NEMA AB 1; bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits.
- H. Power Conditioner: Isatrol Cat. No. I-415, or equal.

3. EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb, in conformance with NEMA PB 1.1.
- B. Height: 6 ft.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- E. Install power conditioner inside the panelboard to be protected.

3.2 FIELD QUALITY CONTROL

- A. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20 percent, rearrange circuits in the panelboard to balance the phase loads within 20 percent. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

* * * END OF SECTION * * *

SECTION 16475

PACKAGE POWER SUPPLY

1. GENERAL

1.1 WORK INCLUDED

- A. Package power supply units.

1.2 REFERENCES

- A. ANSI/NEMA ST 20 - Dry Type Transformers for General Applications.
- B. NEMA AB 1 - Molded Case Circuit Breakers.

1.3 SUBMITTALS

- A. Submit shop drawings for equipment and component devices under provisions of Section 01340.
- B. Include outline and support point dimensions, dimensions, unit weight, voltages, kVA, and circuit breaker arrangement and sizes.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store in a warm, dry location with uniform temperature.
- B. Handle only using lifting eyes provided for that purpose.

2. PRODUCTS

2.1 PACKAGE POWER SUPPLY:

- A. 480-volt primary, 120/240-volt secondary, 6-pole, 5-kVA, with two 5% full capacity taps. Square D Cat. No. MPZ554OF, or equal.

3. EXECUTION

3.1 INSTALLATION

- A. Install package power supply plumb and level.
- B. Height: 6 ft.
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed or neatly handwritten circuit directory for each branch circuit panelboard.

3.2 FIELD QUALITY CONTROL

- A. Check for damage and torque electrical connections to factory specifications before energizing.
- B. Measure primary and secondary voltages and make appropriate tap adjustments.
- C. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding.

* * * END OF SECTION * * *

SECTION 16476

ENCLOSED CIRCUIT BREAKERS

1. GENERAL

1.1 SECTION INCLUDES

- A. Enclosed Molded Case Circuit Breakers.

1.2 REFERENCES

- A. NEMA AB 1 - Molded Case Circuit Breakers.

1.3 REGULATORY REQUIREMENT

- A. Use circuit breakers listed by Underwriter's Laboratories, Inc., and suitable for specific application.

2. PRODUCTS

2.1 MANUFACTURERS

- A. Square D
- B. Westinghouse
- C. General Electric

2.2 MOLDED CASE CIRCUIT BREAKER

- A. Circuit Breaker: NEMA AB 1

2.3 CONFIGURATION

- A. Configuration: Inverse time automatic tripping.

2.4 RATINGS

- A. Ratings: NEMA AB 1; as scheduled.

2.5 TERMINAL LUGS

- A. Size: NEMA AB 1.

2.6 ENCLOSURE

- A. Enclosure: NEMA AB 1:
- B. Fabricate enclosure from steel.
- C. Finish using manufacturer's standard enamel finish, gray color.

3. EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify field measurements are as shown on Drawings.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.

3.2 INSTALLATION

- A. Install enclosed circuit breakers where shown on Drawings, in accordance with manufacturer's instructions.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test each circuit breaker to NEMA AB 1.
- B. Inspect visually and perform several mechanical ON-OFF operations on each circuit breaker.
- C. Verify circuit continuity on each pole in closed position.
- D. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.

* * * END OF SECTION * * *

SECTION 16480

MOTOR CONTROL

1. GENERAL

1.1 WORK INCLUDED

- A. Magnetic motor starters.
- B. Motor control centers.
- C. Duplex motor controllers.
- D. Float Switches
- E. Intrinsically Safe Relays

1.2 RELATED WORK

- A. Section 16190 - Supporting Devices: Housekeeping pads.

1.3 REFERENCES

- A. ANSI/NEMA ICS 6 - Enclosures for Industrial Controls and Systems.
- B. ANSI/IEEE 344 - Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
- C. NEMA AB 1 - Molded Case Circuit Breakers.
- D. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 01340.
- B. Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time-current curves of all equipment and components.

- C. Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.
- D. Submit manufacturers' instructions under provisions of Section 01340.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 01700 or 01730.
- B. Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Deliver in 60 inch maximum width shipping splits, individually wrapped for protection, and mounted on shipping skids.
- C. Store and protect products under provisions of Section 01600.
- D. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- E. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

2. PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - MOTOR STARTERS

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Substitutions: Under provisions of Section 01600.

2.2 MAGNETIC MOTOR STARTERS

- A. Magnetic Motor Starters: NEMA ICS 2; AC general-purpose Class A magnetic controller for induction motors rated in horsepower.
- B. Full Voltage Starting: Non-reversing type.
- C. Coil Operating Voltage: 120 volts, 60 Hertz.
- D. Size: NEMA ICS 2; size as shown on Drawings.
- E. Overload Relay: NEMA ICS 2; bimetal.
- F. Enclosure: NEMA ICS 6; Type 1.
- G. Combination Motor Starters: Combine motor starters with molded case circuit breaker disconnect in common enclosure. Combine motor starters with disconnecting means, type as scheduled.
- H. Auxiliary Contacts: NEMA ICS 2; 4 field convertible contacts in addition to seal-in contact.
- I. Pushbuttons: NEMA ICS 2; START/STOP in front cover.
- J. Indicating Lights: NEMA ICS 2; RUN: green in front cover.
- K. Selector Switches: NEMA ICS 2; HAND/OFF/AUTO in front cover.
- L. Relays: NEMA ICS 2.
- M. Transient Suppression Module: NEMA ICS 2, Square D Class 9999, Type ST, or equal.

2.3 CONTROLLER OVERCURRENT PROTECTION AND DISCONNECTING MEANS

- A. Molded Case Protector: NEMA AB 1; circuit breakers with integral instantaneous magnetic trip in each pole.

2.4 ACCEPTABLE MANUFACTURERS - MOTOR CONTROL CENTER

- A. Square D.
- B. General Electric.
- C. Westinghouse.
- D. Substitutions: Under provisions of Section 01600.

2.5 MOTOR CONTROL CENTER

- A. Motor Control Centers: NEMA ICS 2; Class I, Type A.
- B. Motor Starters: As scheduled.
- C. Feeder Tap Units: Molded case thermal-magnetic circuit breakers.
- D. Voltage Rating: 480 volts, three phase, three wire, 60 Hertz.
- E. Horizontal Bussing: Copper, with a continuous current rating of 600 amperes. Include copper ground bus entire length of control center.
- F. Vertical Bussing: NEMA ICS 2; copper.
- G. Integrated Equipment Short Circuit Rating: 10,000 amperes rms symmetrical at 480 volts.
- H. Configuration: Units front mounting only, accessible from the front only.
- I. Enclosure: ANSI/NEMA ICS 6; Type 1.
- J. Finish: Manufacturer's standard gray enamel.
- K. Provide phase loss protection relay with contacts to de-energize each motor starter in control center.
- L. Seismic Requirements: ANSI/IEEE 344; Class I.

2.6 DUPLEX MOTOR CONTROLLER

- A. Manufacturer: Square D Class 8941, or equal

- B. Electrical Characteristics: 480 volts, 3-phase, 60 hertz.
- C. Enclosure: NEMA 4 at outdoor locations and NEMA 12 at indoor locations.
- D. Furnish with thermal overload relays and circuit breakers for each motor.
- E. Furnish with operating handles to indicate on and off positions. Handles to be capable of being locked in the off position.

2.7 FLOAT SWITCH ASSEMBLIES

- A. Float switch assemblies shall be 316 stainless steel stems with 316 stainless steel floats and ABS plastic junction box. Transamerica Delaval Gems LS-800 series, or equal.
- B. Intrinsically safe relays shall be Transamerica Delaval Gems Cat. No. 22445, or equal.

3. EXECUTION

3.1 INSTALLATION

- A. Install motor control equipment in accordance with manufacturer's instructions.
- B. Select and install heater elements in motor starters to match installed motor characteristics.
- C. Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.
- D. Install float switch assemblies plumb and as specified by the manufacturer.
- E. Adjust float switches to operate at the liquid levels specified by the Engineer.

* * * END OF SECTION * * *

**SECTION 16510
LIGHTING FIXTURES**

1. GENERAL

1.1 WORK INCLUDED

- A. Interior luminaires and accessories.
- B. Exterior luminaires and accessories.
- C. Lamps.
- D. Ballasts.
- E. Photocell Relays.

1.2 REFERENCES

- A. ANSI C82.1 - Specification for Fluorescent Lamp Ballasts.
- B. ANSI C82.4 - Specifications for High-Intensity-Discharge Lamp Ballasts (Multiple Supply Type.)
- C. FS W-F-414 - Fixture, Lighting (Fluorescent, Alternating-Current, Pendant Mounting.)
- D. NEMA LE 2 - H-I-D Lighting System Noise Criterion (LS-NC) Ratings.

1.3 SUBMITTALS

- A. Submit product data under provisions of Section 01340.
- B. Include outline drawings, lamp and ballast data, support points, weights, and accessory information for each luminaire type.
- C. Submit manufacturer's installation instructions under provisions of Section 01340.

2. PRODUCTS

2.1 EXTERIOR LUMINAIRES AND ACCESSORIES

- A. Enclosures: Complete with gaskets to form weatherproof assembly.
- B. Provide low temperature ballasts, with reliable starting to 0 degrees F.

2.2 LAMPS

- A. Fluorescent Lamps: Cool white; all by same manufacturer. See Lighting Fixture Schedule on Drawings for Type 'A' lamp.
- B. Incandescent lamps: clear, rough service type. See Lighting Fixture Schedule on Drawings for Type 'B' lamp.

2.3 HID BALLASTS

- A. HID Ballast: ANSI C82.4; selected by luminaire manufacturer.
- B. LS-NC Rating: NEMA LE 2; equal to or less than ratings listed in Table C-1.

2.4 PHOTOCELL RELAY

- A. Photocell relay shall be Hubble Cat. No. PTL-1, or equal.

3. EXECUTION

3.1 INSTALLATION

- A. Install lamps in luminaires and lampholders.
- B. Support surface-mounted luminaires directly from building structure.

3.2 RELAMPING

- A. Relamp luminaires which have failed lamps at completion of Work.

3.3 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Touch up luminaire finish at completion of work.

* * * END OF SECTION * * *