

Johns Creek Environmental Campus

Design/Build
Request for Proposals
RFP #03RFP376K

Design/Build Services

Issued by:

FULTON COUNTY
DEPARTMENT OF PUBLIC WORKS



Fulton County Purchasing Department
130 Peachtree Street, S.W.
Atlanta, Georgia 30303



PARSONS PM TEAM

Parsons • PMCM International • USInfrastructure

VOLUME 3B
Appendix 16-23

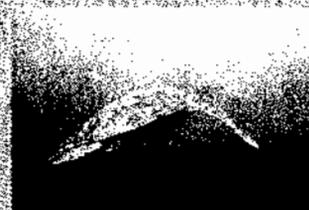
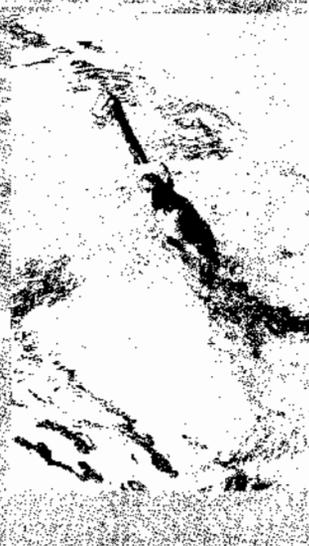
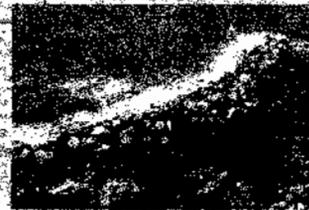


Table of Contents

1.0	Technical Approach	1
1.1	INTRODUCTION TO THE ZEEWEED [®] MBR PROCESS	1
1.2	OVERVIEW OF ZEEWEED [®] MBR SYSTEM FOR JCEC	4
1.2.1	Basis of the Design	5
1.3	P&ID DRAWINGS	8
1.4	MEMBRANE SYSTEM PROCESS EQUIPMENT	11
1.4.1	Permeate Pumps	11
1.4.2	CIP/Backpulse Pumps	12
1.4.3	Clean-In-Place/Backpulse Systems	13
1.4.4	Mixed Liquor Recirculation Pumps	13
1.4.5	Drain Pumps	14
1.4.6	Membrane Aeration Blowers	16
1.4.7	Air Compressors	17
1.4.8	Lifting Device	17
1.4.9	Turbidimeters	18
1.4.10	Staging Tank	18
1.4.11	Foam Removal System	18
1.5	CONTROL SYSTEM	20
1.5.1	General	20
1.5.2	ControlLogix-Based PLC System	21
1.5.3	Control System Components	22
1.5.4	Control Operation	24
1.5.5	HMI System	24
1.6	PROPOSED MBR CONTROL STRATEGY	26
1.6.1	Permeate Pumps	26
1.6.2	CIP/Backpulse Pumps	27
1.6.3	Mixed Liquor Recirculation Pumps	28
1.6.4	Membrane Tank Drain	29
1.6.5	Vacuum System	29
1.7	MEMBRANE CLEANING PROTOCOLS	30
1.7.1	Maintenance Cleaning	31
1.7.2	Recovery Cleaning	31
1.8	MEMBRANE INTEGRITY, TESTING, REPAIR AND REPLACEMENT	33
1.9	SHOP DRAWING PREPARATION	33
1.9.1	Shop Drawing – Cost and Scope of Supply	34
1.10	RECOMMENDED SPARE PARTS LIST	36
1.11	SUPPORT TO D/B COMPANY	38
1.12	EQUIPMENT COMMISSIONING – FIELD SERVICES	43
1.12.1	General	43
1.12.2	Equipment Off-Loading	43
1.12.3	Equipment Installation Assistance	44
1.12.4	Membrane Installation Assistance	45
1.12.5	Field Testing & Commissioning	45
1.12.6	Operator Training	46
1.12.7	Acceptance/Performance Testing	48
1.12.8	Summary Of Field Service Support for the D/B Company	49
1.13	POST-COMMISSIONING SERVICE AND SUPPORT TO JCEC	50
2.0	Technical Proposal Forms	51
3.0	Supplemental Information	52
3.1	EBO PLAN	52
3.2	COMMERCIAL TERMS	53
3.2.1	Pricing Validity	53
3.2.2	Payment Terms	53
3.2.3	Taxes & Duties	54
3.2.4	Bonds	54
3.2.5	Freight	54
3.2.6	Customer Caused Shipping Delays	54
3.2.7	Quality Basis	55
3.2.8	Indemnification	55
3.2.9	Equipment Warranties	56



3.2.10	<i>Disputes</i>	58
3.2.11	<i>Terms and Conditions</i>	59



List of Tables

Table 1: Operating Volume and Footprint of Process Tanks	5
Table 2: Design Influent Flow Rates	6
Table 3: ZeeWeed® Membrane System Design Parameters	7
Table 4: Summary of Training	48
Table 5: Summary of Field Service Support	49
Table 6: Post-Commissioning Services	50
Table 7: Guaranteed Flow Rates	56
Table 8: Guaranteed Effluent Quality	56
Table 9: Key Membrane System Operating Parameters	57
Table 10: Key Membrane System Acceptable Operating Values	58

List of Figures

Figure 1: ZW500d Cassette	2
Figure 2: ZW500 Membrane Trains	3
Figure 3: Distributed I/O Architecture	21



List of Appendices

Appendix A - P&ID's and Process Flow Diagrams

Appendix B - GA Drawings

Appendix C - Electrical One Line Diagrams

Appendix D - Block Diagram

Appendix E - EBO Plan

Appendix F - Membrane Warranty

Appendix G - EJCDC P-700 Standard General Terms



1.0 Technical Approach

Provide a description of the Membrane System and membranes themselves, augmenting data provided in the Technical Data Forms.

The Design/Build Company will complete the detailed design of the biological treatment process for the JCEC. As a Membrane System Supplier, ZENON will review and provide input to the proposed biological process, as it will affect the membrane system. As presented in Section 2, ZENON has significant design and operational experience with large scale MBR plants and will offer this technical support and know-how to Fulton County and the selected D/B Company.

As a start, the proposed ZeeWeed® MBR design includes a suggested layout of the four biological process trains with dedicated anoxic and aerobic zones. The design also includes the provision for the transfer and collection of any foam and scum in a common location and a unique method for the removal of foam and scum from the liquid surface (discussed in more detail later). The general arrangement drawings show the layout of the proposed system including the bioreactors and the provision for doubling the size of the plant by constructing a mirror image of the proposed system within the existing site boundaries.

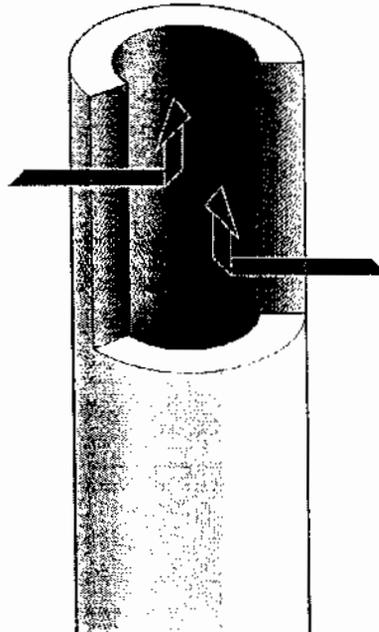
ZENON has significant design and operational experience with large scale MBR plants and will offer this technical support and know-how to Fulton County and the selected D/B Company.

The design also includes the provision for the transfer and collection of any foam and scum in a common location and a unique method for the removal of foam and scum from the liquid surface.

1.1 Introduction to the ZeeWeed® MBR Process

The ZeeWeed® MBR Process is a proprietary ZENON technology that consists of a suspended growth biological reactor integrated with an ultrafiltration membrane system, based on the patented ZeeWeed® hollow fiber membrane. Essentially, the ZeeWeed® membrane filtration system replaces the solids separation function of secondary clarifiers and tertiary sand filters in a conventional activated sludge system.

The ZeeWeed® 500 series membrane is a reinforced hollow fiber ultrafiltration membrane with a nominal pore size of 0.04 μm . The membrane fiber has a tensile strength close to 100 lbs and is highly resistant to chemicals, including acids, bases and chlorine, which are used for membrane cleaning. This membrane is designed specifically for high solids applications such as in



The ZeeWeed® 500 series membrane is a reinforced hollow fiber ultrafiltration membrane with a nominal pore size of 0.04 μm .

membrane bioreactors, but with the quality and integrity that it is also used for potable water applications.

The membrane is manufactured and assembled into discrete units called "modules". These are the basic building blocks of the membrane system that are manifolded together to create a "cassette". The ZW500d cassette (Figure 1), which is being proposed for Johns Creek Environmental Campus, can contain up to 48 modules. Each module has 340 ft² of membrane area, for a total membrane area of 16,320 ft² per ZW500d cassette. This cassette is ZENON's fourth generation of ZeeWeed® 500 membrane configuration and is specifically optimized for large plant applications such as JCEC. Detailed specifications of the membrane and the cassettes are given in Technical Proposal Form C.

In the ZeeWeed® MBR process, the membrane cassettes are immersed directly in the mixed liquor in the aeration tank or in separate membrane compartments. A series of cassettes connected to a common permeate header, which in turn is connected to the suction side of a duty pump via an air/liquid separator is called a membrane train (see Figure 2). The duty pump applies a small vacuum to the permeate header to draw treated water from the outside in through the hollow fiber membranes, leaving the mixed liquor solids on the outside of the membrane. The treated water passes through the air/liquid separator where entrained air is removed before entering the suction side of the pump. The pump then discharges the treated water to a common permeate collection header for downstream disinfection and discharge (or reuse).

Figure 1: ZW500d Cassette

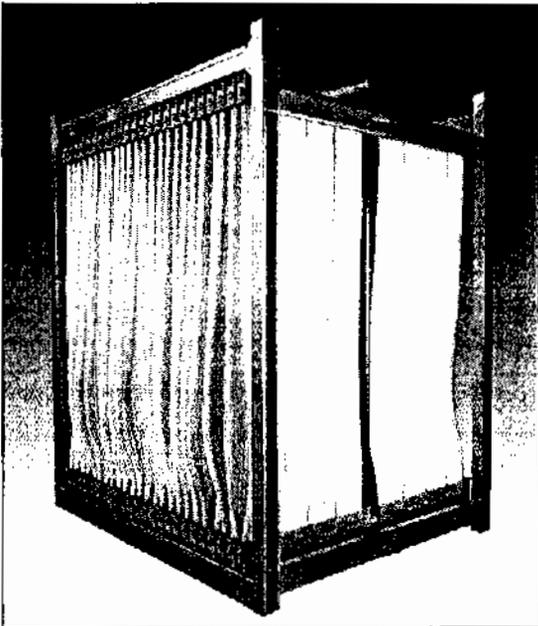
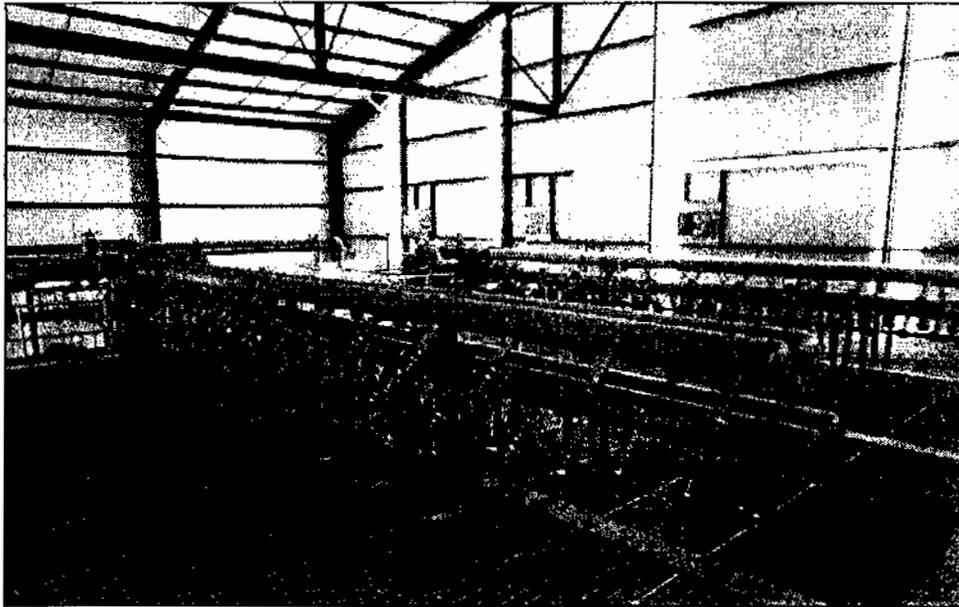


Figure 2: ZW500 Membrane Trains



Cauley Creek, Georgia
Membrane Floor

Specially designed and highly efficient coarse bubble aeration is used to scour the outside surface of the membrane and move mixed liquor solids away from the membrane fibers. This is accomplished by a ZENON patented cyclic aeration system that uses a factory installed coarse bubble aeration grid which is integrated into the base of each ZeeWeed[®] 500d cassette. The membrane aeration also provides a portion of the biological process oxygen requirements, with the remainder being provided by an efficient fine bubble diffused aeration system.

The slightly concentrated mixed liquor from the membrane compartment is recirculated back to the head of the bioreactor and combined with the incoming feed. Waste activated sludge is either pumped directly from the aeration tank or from a side stream off the recirculation line.

1.2 Overview of ZeeWeed® MBR System for JCEC

Reliability, flexibility and expandability of the Johns Creek Environmental Campus (JCEC) are critical to the long-term growth and environmental sustainability of Fulton County. Reliability is particularly critical as JCEC will be an end of pipe plant and therefore require to be operational at all times. The ZeeWeed® Membrane System being proposed for this facility incorporates all of ZENON's experience and is designed to meet or exceed these objectives and provide a system that is cost effective and easy to operate. The overall design of the ZeeWeed® MBR System is described in this section along with the features that address the design objectives outlined above.

The proposed ZeeWeed® MBR System will consist of a minimum of four (4) biological process trains (By D/B Company) and eight (8) ZeeWeed® membrane filtration trains. The membranes are installed in separate membrane compartments adjacent to the biological process tanks. As opposed to immersing the membranes directly in the activated sludge process tankage, separate membrane tanks results in an inherently more reliable and flexible integrated treatment process. The biological process tanks and the membrane tanks are hydraulically connected via the membrane tank distribution channel. This design effectively decouples the main biological and membrane processes and allows for any number of biological process trains to be operated with any number of membrane trains. Each process can be optimized independently while still operating as an integrated process.

Mixed liquor flows through the biological process trains by gravity from the anoxic zone to the aerobic zones and into the membrane tank distribution channel via a partially submerged outlet gate. The mixed liquor then flows by gravity into each membrane tank via fully submerged sluice gates, which are designed to ensure equal flow distribution to all the membrane tanks and the same water level in all the membrane tanks. The mixed liquor flows through the membrane tanks and is recycled, using a dedicated recirculation pump per train, to the head of the bioreactor, where it combines with the screened primary effluent. No additional mixed liquor screening between the biological process tanks and the membrane tanks is required for the ZENON membrane system.

To balance between the capital cost of the biological process tankage and the operating cost associated with the fine bubble process aeration, ZENON selected a design MLSS in the bioreactor of 9,000 mg/L. This results in an operating MLSS concentration in the membrane tank of between 11,000 and 12,000 mg/L. The operating volume and footprint of the biological process trains and membrane trains under these design conditions are summarised in Table 1.

Reliability, flexibility and expandability of the Johns Creek Environmental Campus (JCEC) are critical to the long-term growth and environmental sustainability of Fulton County.

Separate membrane tanks results in an inherently more reliable and flexible integrated treatment process.

No additional mixed liquor screening between the biological process tanks and the membrane tanks is required for the ZENON membrane system.



Table 1: Operating Volume and Footprint of Process Tanks

Parameters	Biological Process Tanks	Membrane Tanks
MLSS concentration (mg/L)	9,000	≤12,000
Total operating volume (MG)	4.0	0.55
Number of tanks	4	8
Operating volume of each process tank (MG)	1.0	0.069
Overall footprint (excluding channels)	181 ft x 154 ft	181 ft x 50 ft

The eight (8) ZeeWeed® membrane trains are identical. Each train is designed with a dedicated permeate pump, air/liquor separator, mixed liquor recirculation pump and turbidity meter. The permeate pumps discharge the treated water into a common permeate collection header for downstream disinfection and discharge. The recirculation pump draws mixed liquor from each membrane tank and discharges it to a common mixed liquor recirculation pipe which transfers the combined mixed liquor to the head of the bioreactor. A common pair of backpulse/Clean-In-Place (CIP) pumps (1 duty + 1 standby) is used to service all membrane trains. Similarly a dedicated pair of drain pumps (1 duty + 1 standby) is used for draining any membrane tank. Membrane aeration is provided by a common group of five blowers (4 duty + 1 standby) which discharges to a common air supply manifold that provides air to all membrane tanks. Common vacuum pumps and chemical dosing pumps with dedicated installed standby units are used to service all membrane trains. This design allows for maximum redundancy to ensure reliability, flexibility and expandability.

Each train is designed with a dedicated permeate pump, air/liquor separator, mixed liquor recirculation pump and turbidity meter.

1.2.1 Basis of the Design

The ZeeWeed® MBR design for JCEC is based on proven and responsible design parameters from actual operating plants and experience with the design of large scale municipal MBR plants. The ZeeWeed® Membrane System is designed to handle the influent flow rates up to the peak day average flow rate (QPKDY) specified in Table 2, with any one membrane train out of service and any one pump from each pumping system (mixed liquor or permeate) out of service. During non peaking conditions, the system is designed to operate with one or more membrane trains in standby mode to save on operating costs. This can be initiated by operator or implemented automatically by the ZENON supplied PLC. Under annual average conditions (QAVG), it is expected that up to two (2) membrane trains will be in standby mode, while below QAVG condition more than two (2) trains will be in standby mode.

The ZeeWeed® MBR design for JCEC is based on proven and responsible design parameters from actual operating plants.



This operation strategy will significantly reduce energy cost by shutting off the associated recirculation pumps, permeate pumps and a membrane blower as appropriate.

Table 2: Design Influent Flow Rates

Parameter	Flow Rate (MGD)
Annual Average Flow Rate (QAVG)	10.9
Maximum 30-Day Average Flow Rate (QMAX30)	15.0
Maximum 7-Day Average Flow Rate (QMAX7)	18.3
Peak Day Average Flow Rate (QPKDY)	24.7

A summary of the ZeeWeed® Membrane System design parameters including the conservative design fluxes and number of cassettes and modules is presented in Table 3 below, in addition to the information in Technical Proposal Form C. The system is designed with eight (8) membrane trains to provide maximum redundancy and flexibility. Each train is designed with spaces to accommodate up to 14 cassettes with 11 cassettes installed. Each cassette can accommodate up to 48 modules and as little as 24 modules. The net fluxes at QAVG and QMAX30 with all trains in service are 8.0 and 10.9 gfd respectively, while the corresponding net fluxes with one train off line are 9.1 and 12.5 gfd. Under QPKDY conditions the design net fluxes are 18.0 gfd with all trains in service and 20.6 gfd with one train off line for cleaning.

The system is designed with eight (8) membrane trains to provide maximum redundancy and flexibility.

The system can be operated with one membrane train off-line to save energy for flow rates up to QMAX30. Each membrane train is designed with spare space for up to three (3) additional cassettes. These spare spaces can be used for relocation of cassettes if a membrane train needs to be taken off-line for an extended period or for the addition of membranes in the unlikely event that the sludge characteristics change over time and result in a lower flux than the design.

The overall design philosophy is to provide a prudent, conservative design based on ZENON's extensive large-scale experience to ensure long-term reliability and ease of operation for Fulton County.

Table 3: ZeeWeed[®] Membrane System Design Parameters

Parameter	Membrane Trains		
	N Trains	N-1 Trains	
Net Flux @ Annual Average Flow (QAVG)	8.0	9.1	gfd
Net Flux @ Max 30-Day Flow (QMAX30)	10.9	12.5	gfd
Net Flux @ Max 7-Day Flow (QMAX7)	13.4	15.3	gfd
Net Flux @ Peak Day Flow (QPKDY)	18.0	20.6	gfd
Area of ZW500d Membrane Module	340	340	ft ²
Number of Membrane Trains	8	7	
Number of Cassette Spaces per Train	14	14	
Number of Cassettes Installed per Train	11	11	
Maximum Modules per Cassette	48	48	
Total Number of Modules Spaces	5376	4704	
Total Number of Modules Installed	4032	3528	
Fraction of Spare Spaces/Total Spaces	25	25	%

ZENON is committed to continuous development and invests continuously in research to develop higher performance membranes. For this reason ZENON may change the number of membranes in its design with the Owner's agreement, which will not be unreasonably withheld, if by way of membrane technology improvements the permeability or operating fluxes of the membranes have been improved. This does not change the warranty since ZENON guarantees the design flow capacity and the operational performance of the membrane system.



1.3 P&ID Drawings

Provide process and instrumentation diagram(s) (P&IDs) showing the proposed Membrane System, including related elements that will be required to be provided by the D/B Company. The P&IDs shall include everything between the mixed liquor supply pipe (from biological treatment), mixed liquor return pipe (to biological treatment), and permeate pipe (to UV disinfection).

The P&IDs shall show the following, as applicable: individual membrane tanks or racks, membrane subunits, mixed liquor pumps, mixed liquor screening equipment, permeate pumps, vacuum pumps, air separation tanks, and backwash/cleaning systems. Also show interconnecting piping and valves, indicating clearly which items will be provided by the D/B Company. Indicate material and size of pipes and valves larger than 2-inch diameter.

The P&IDs shall show all control valves and instrumentation that are part of the Membrane System Scope of Supply. Indicate the connection of field instruments to the Membrane System control system.

ZENON has included a table detailing the Scope of Supply By ZENON and By Others, in Appendix A. This Scope of Supply table should be reviewed with the following list of drawings which is also included in Appendix A:

- a complete set of P&IDs for the membrane filtration system,
- a preliminary process flow schematic for the entire MBR process (biological trains and membrane system),
- a preliminary hydraulic profile and simplified control diagram,
- suggested P&IDs for the biological process trains and a foam removal system using surface sludge wasting.

The P&IDs show ZENON's scope of supply and scope supplied By Others (e.g., D/B Company). In addition, the P&IDs also show some important optional items and notes, which may be considered by the County and/or the D/B Company to further enhance the reliability and redundancy of the overall system.

Note: Mixed liquor screening between the biological trains and the membrane trains is not required by ZENON.

- 2316A1-A-001 (Sheet 1 of 1) - Process Flow Schematic
- 2316A1-A-002 (Sheet 2 of 2) - Hydraulic Profile & Control Diagram
- 2316A1-L-001 (Sheet 1 of 1) - ISA Symbology Cover Sheet
- 2316A1-D-002(Sheet 1 of 1) - Membrane Aeration Blowers

- 2316A1-D-003(Sheet 1 of 1) - Bioreactor & Associated Equipment (By Others)
- 2316A1-D-004 (Sheet 1 of 1) – Membrane Tank & Associated Equipment
- 2316A1-D-005 (Sheet 1 of 1) – Permeate Pump & Associated Equipment
- 2316A1-D-006 (Sheet 1 of 1) – FOAM/WAS Removal System & Associated Equipment (By Others)
- 2316A1-D-007 (Sheet 1 of 1) – CIP/Backpulse Tank/Pumps & Associated Equipment
- 2316A1-D-008 (Sheet 1 of 1) – Drain Pumps & Associated Equipment
- 2316A1-D-009 (Sheet 1 of 1) – Vacuum Pumps & Associated Equipment
- 2316A1-D-010 (Sheet 1 of 1) – Recirculation Pumps & Associated Equipment
- 2316A1-D-011 (Sheet 1 of 1) – Cleaning Chemical Systems
- 2316A1-D-012 (Sheet 1 of 1) – Air Compressors & Associated Equipment
- 2316A1-D-013 (Sheet 1 of 1) – Common Permeate Discharge Header
- 2316A1-D-014 (Sheet 1 of 1) – Staging Tank, Pump & Associated Equipment
- 2316A1-D-015 (Sheet 1 of 1) – Turbidimeters & Associated Equipment

Provide general arrangement drawing(s) showing the configuration of the proposed membrane System, including related elements to be provided by the D/B Company (such as membrane tanks, major piping, and lifting devices). Include mixed liquor pumps, mixed liquor screening equipment, permeate pumps, vacuum pumps, air separation tanks, and backwash/cleaning systems. Indicate inside dimensions of the membrane building and the membrane tanks. Indicate the load requirements of lifting devices. Note that the membrane tanks and all Membrane System equipment will be located inside the building.

Provide sections showing, as a minimum, one membrane tank and its elevations relative to the permeate pumps and water surface elevation of the biological process.

Indicate on the general arrangement drawing a plan to expand the Membrane System to 30-MGD maximum 30-day average flow capacity.

The following drawings, included in Appendix B, show a suggested layout and section of the entire MBR process (biological tanks and membrane system) and how it fits onto the existing site. The drawings also show the required details in general arrangements and sections of the proposed ZeeWeed® Membrane System, including suggested dimensional layout of the membrane process building and sections of the membrane tanks. The proposed membrane system is designed with the flexibility to facilitate alternative layouts of the entire MBR process and integration with the biological process with very little modification, if required to accommodate specific constraints on the site for ease of constructability during the project. ZENON is prepared to discuss these alternatives and provide technical support as required.

The proposed membrane system is designed with the flexibility to facilitate alternative layouts of the entire MBR process.



- 2316A1-P-001 (Sheet 1 of 1) – Site Layout
- 2316A1-P-002 (Sheet 1 of 2) – MBR Plant Layout – Plan View
- 2316A1-P-002 (Sheet 2 of 2) – MBR Plant Layout – Vertical Cross Section
- 2316A1-P-003 (Sheet 1 of 4) – Process Building Layout – Plan View
- 2316A1-P-003 (Sheet 2 of 4) – Process Building Layout Section – Vertical Cross Section
- 2316A1-P-003 (Sheet 3 of 4) – Process Building Layout – ZW500d Cassette Detail
- 2316A1-P-004 (Sheet 1 of 2) – Current and Future Layout – MBR Plant
- 2316A1-P-004 (Sheet 2 of 2) – Current and Future Layout – Membrane and Equipment Arcas

Provide an electrical one-line diagram showing Membrane System motors and other electrical equipment. The D/B Company will provide power to a single location within the Membrane System. The Membrane System Supplier shall include a recommendation for that location, shown on a general arrangement drawing.

The following drawings, included in Appendix C, show the electrical one-line diagrams. These drawings show the details on the MCC for the motorized equipment associated with ZENON's scope for the membranc system.

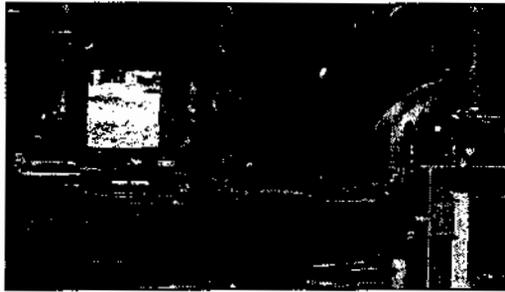
- JOHNS CREEK – E – 020 – MCC SINGLE LINE DIAGRAM
- JOHNS CREEK – E – 021 – MCC SINGLE LINE DIAGRAM
- JOHNS CREEK – E – 022 – MCC SINGLE LINE DIAGRAM

Describe Membrane System equipment, such as permeate pumps, mixed liquor screening equipment, mixed liquor pumps, vacuum pumps, air separation tanks, and backwash/cleaning systems, augmenting data provided on Technical Data Forms.

1.4 Membrane System Process Equipment

1.4.1 Permeate Pumps

The ZeeWeed® Membrane System is designed with one (1) dedicated end suction centrifugal pump per membrane train and a shelf spare for a total of nine (9) permeate pumps. Each membrane train is equipped with two separate permeate headers that are connected to one end of a common horizontal air separator. The suction side of each permeate pump is connected to the other end of the horizontal air separator. This design provides the flexibility to permeate from one half of a membrane train while backpulsing or relaxing the other half of the train. This also increases the system redundancy without increasing mechanical equipment.



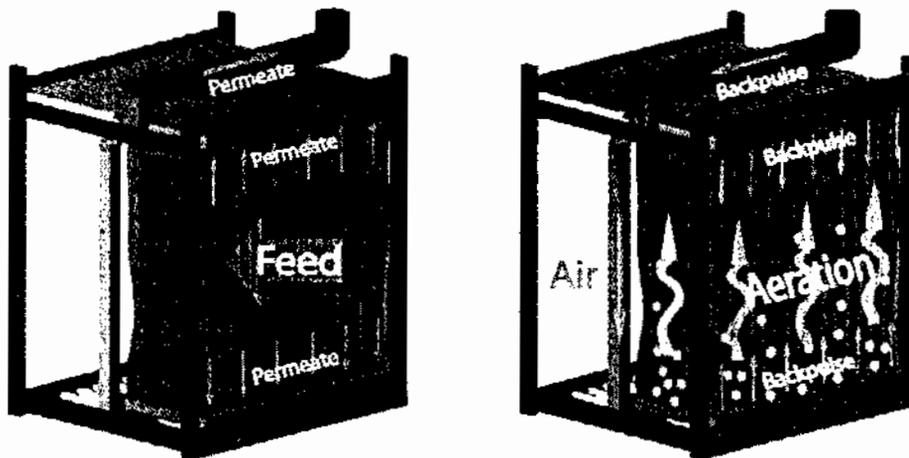
The permeate pumps are equipped with variable frequency drive (VFD) and downstream of each permeate pump is a dedicated magnetic flow meter (MAG) and a turbidimeter. The vacuum generated by the permeate pump draws clean water (or permeate) from the outside in through the membrane fibers and into the permeate headers. The permeate passes through the air separator where entrained air is removed by vacuum pumps before entering the permeate pumps. All permeate pumps discharge into a common permeate collection header for downstream disinfection and discharge.

The permeate pump selected for JCEC is a Goulds model 3180 end suction centrifugal pump.

1.4.2 CIP/Backpulse Pumps

The system is designed with common clean-in-place/backpulse pumps (one duty, one on-line stand-by) that service all the membrane trains. These pumps are used for dual functions: to backpulse the membrane if required (i.e. reverse permeate flow through membrane fibers from the inside out) and to deliver cleaning solutions to the membranes during membrane cleaning. This design greatly simplifies the piping and reduces the number of valves in the systems while increasing the flexibility and ease of operation of the process, as compared to using the permeate pumps for both permeation and backpulsing. The system is designed with the ability to backpulse one half of a membrane train while permeating from the other half of the train since each membrane train is designed with a split permeate header.

The system is designed with the ability to backpulse one half of a membrane train while permeating from the other half of the train.



The ZeeWeed® membrane system has the ability to operate in either relaxation or backpulse mode as described in Section 1.6.2. While relaxation is the normal mode of operation, from time-to-time there will be the need to backpulse the membrane by reversing the flow from the inside-out through the membrane. There is a significant advantage for a membrane system to have the capability and flexibility to backpulse since reversing the flow through the membrane (i.e., backpulse) results in more effective cleaning. The operation of the CIP/backpulse system is described in Section 1.6.2.

There is a significant advantage for a membrane system to have the capability and flexibility to backpulse.

The CIP/backpulse pump selected for JCEC is a Goulds model 3196 end suction centrifugal pump.

1.4.3 Clean-In-Place/Backpulse Systems

For improved reliability and flexibility, the CIP/backpulse system is a fully automated separate sub-system that services all membrane trains. Any membrane train can be backpulsed or undergo a chemical clean without impacting the operation of the other trains (other than increase flow to the other trains to maintain production). The CIP/backpulse system consists of a covered concrete CIP/backpulse tank, a pair of CIP/backpulse pumps (as described above), a magnetic flow meter (MAG), chemical metering stations and a common backpulse header. The common backpulse header is connected to each permeate header immediately upstream of the air separation tank via an automatic valve.

For improved reliability and flexibility, the CIP/backpulse system is a fully automated separate sub-system that services all membrane trains.

There is a separate chemical metering station for sodium hypochlorite and citric acid. Each metering station is equipped with an appropriate chemical holding tank, a pair of chemical dosing pumps (one duty, one on-line standby) and a calibration column. Air diaphragm metering pumps are used for chemical dosing. The chemical metering stations are designed to deliver chemical for the following functions:

- Sodium hypochlorite for membrane maintenance and recovery cleaning and to the CIP/backpulse tank to prevent contamination and biogrowth in the tank;
- Citric acid for membrane maintenance and recovery cleaning.

1.4.4 Mixed Liquor Recirculation Pumps

The membrane system is designed with a dedicated mixed liquor recirculation pump per membrane train and a shelf spare for a total of nine (9) pumps. These pumps transfer mixed liquor from the membrane tanks to a common mixed liquor recirculation header which conveys the mixed liquor to the bioreactor distribution channel or splitter box at the head of the biological process trains. The pumps selected for this application are dry pit axial flow pumps that are designed for high capacity and low lift.

The sizing of the recirculation pumps in a membrane bioreactor is dictated by two important factors:

- To deconcentrate the mixed liquor solids within the membrane tanks and ensure proper solids distribution between the biological process tanks and membrane tanks; and
- To achieve the require level of pre-denitrification and the target effluent nitrate concentration ($\text{NO}_3\text{-N} < 8 \text{ mg/L}$) by returning mixed liquor (and nitrate) to the anoxic zones at the head of the bioreactor.

In considering these two factors for JCEC, ZENON has designed the system with fixed speed recirculation pumps to achieve a recirculation rate of three (3) times the peak day flow rate (QPKDY) with all pumps (N) in service. The fixed speed, one pump per train design offers operational simplicity, and the flexibility to vary the recirculation rate and reduce energy by taking trains off-line during non-peaking conditions.

To provide further redundancy for the recirculation pumps, ZENON as an Option, has shown inlet crossover isolation valves (HV-3481) on P&ID drawing 2316A1-D-010. In the event that a recirculation pump requires servicing, the associated membrane train will be able to stay on-line with recirculation being maintained by the neighbouring trains recirculation pump. While this is not a long-term solution it will add more system flexibility.

While the proposed design by ZENON using dry pit axial flow pumps typically costs more than other designs such as end suction centrifugal pumps or submersible pumps, there are significant advantages to selecting this design and pumps for JCEC.

- One pump per train simplifies the piping, control and operation of the system.
- Dry pit pumps provide for easy operator maintenance and replacement of the pumps.
- Axial flow pumps offer significant energy savings because of their high capacity/low lift design.
- Fixed speed pumps provide higher reliability, including elimination of VFDs.
- A dedicated pump per train with a shelf spare, and the Optional crossover between adjacent pumps (see Drawing No. 2316A1-D-010) provides for a high level of redundancy and flexibility.

1.4.5 Drain Pumps

The system is designed with a dedicated pair of end suction centrifugal pumps (one duty, one on-line stand-by) that are used to drain the membrane tank in 30 minutes or less during cleaning. Any membrane tank can be isolated and drained without interrupting the operation of the other membrane trains. The drain line from each of the membrane tanks is connected to a common header via an automatic valve. The common drain header is connected to the suction side of the drain pumps. The system is designed with the ability to transfer the content of the membrane tank to either the mixed liquor recirculation header or to upstream of the primary

Any membrane tank can be isolated and drained without interrupting the operation of the other membrane trains.



clarifier. Typically, mixed liquor from the membrane tank will be transferred to the recirculation header, while spent chemical solution after recovery cleaning will be transferred to upstream of the primary clarifier.

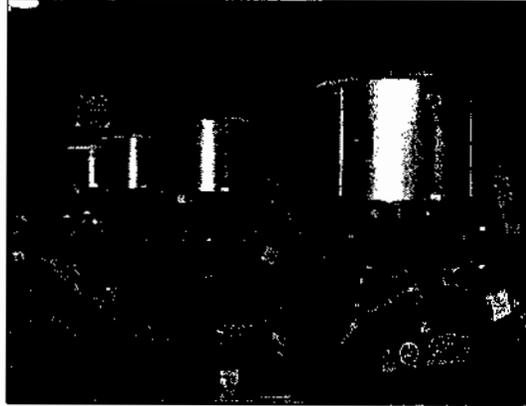
Since the drain pumps are used fairly infrequently for draining the membrane tank, they can be used for other functions that are currently within the D/B Company scope of supply. Other functions that these drain pumps can be used for include:

- 1) Transferring mixed liquor to the fine screen after the primary clarifier for mixed liquor re-screening during low flow periods;
and
- 2) Sludge wasting.

The drain pump selected for JCEC is a Goulds 3180 end suction centrifugal pump.

1.4.6 Membrane Aeration Blowers

The system is designed with a common group of centrifugal blowers (four duty, one on-line standby) that provides air to the ZeeWeed® membranes. All of the blowers discharge into a common membrane air manifold that is equipped with an air flowmeter. This air supply manifold delivers air to two air headers above each membrane tank (train). Each ZW500d cassette is equipped with two air connections; one air connection from each cassette is connected to one of two air headers above each membrane tank using 3" flexible hose and manual isolation valves.



For maximum reliability and flexibility, the membrane aeration blowers are sized to provide the required airflow rate for up to fourteen (14) completely filled ZW500d cassettes per train and for the maximum possible liquid level in the membrane tank (i.e., emergency overflow level). The blower airflow rate is then reduced using an intake flow control valve to provide the airflow rate required for the number of membrane cassettes initially installed. While this increases the size and cost of the blowers, it is a conservative design approach that provides:

- 1) The flexibility to add membranes (if required) without having to add blower capacity, and
- 2) To supply sufficient air to the membranes and keep them in production under the unlikely event that the liquid level in the membrane tanks exceeds the normal operating maximum level.

The ZeeWeed® Membrane System using the ZW500d cassette is designed with ZENON's patented cyclic aeration technology, which minimizes aeration energy cost, increases the effectiveness of membrane air scouring, and prevents plugging of the membrane aerator tubes with solids as is typical with continuous membrane aeration. The design has the capability of cycling air within each individual cassette or between adjacent membrane trains. The blowers are operated continuously at a fixed speed and cyclic aeration is achieved by cycling the airflow from one air header to the other using pneumatically actuated valves. Since one half of each cassette is connected to one air header, this enables cycling the air within each cassette (typically 10s ON/10s OFF).

The ZeeWeed® Membrane System using the ZW500d cassette is designed with ZENON's patented cyclic aeration technology, which minimizes aeration energy cost, increases the effectiveness of membrane air scouring, and prevents plugging of the membrane aerator tubes with solids as is typical with continuous membrane aeration.

1.4.7 Air Compressors

The system is design with a common group of air compressors (two duty, one on-line standby), each working with a dedicated receiver tank. There are also two common air dryers (one duty, one on-line standby) downstream of the compressors. The compressor and air dryer system is designed to deliver 80-psig of instrument air (after pressure regulating valve) to all pneumatic valve actuators and the chemical metering air diaphragm pumps.

1.4.8 Lifting Device

While the lifting devices are not within ZENON's scope of supply, the general arrangement drawings currently shows three (3) separate lifting devices: travelling bridge crane over membrane tanks, monorail over pumps, and monorail over blower. This is only one approach suggested by ZENON and the D/B Company may determined that other approaches are either more economical or results in easier constructability of the facility.

ZENON's suggested approach and recommended maximum weight loads for the three (3) lifting devices to move membrane cassettes and various pieces of equipment are as follows:

1) Travelling Bridge Crane (for membrane cassettes)

A travelling bridge crane to lift the membrane cassettes during installation, inspection and replacement. The bridge crane should be designed to span all membrane cassette spaces, the staging tank, and the membrane lay down transition area. The span of the bridge crane can be reduced and the building height increased, if the cassette is moved over the air headers rather than around the headers (see Drawing No. 2316A1-P-003). The maximum load on the crane will be a full, wet ZW500d cassette, which will have a maximum weight load of 9,000 lbs.

2) Monorail (for pumps)

Installation of a monorail for lifting the recirculation pumps, permeate pumps, CIP/backpulse pumps, and drain pumps will be the decision of the D/B Company. The maximum lifting load required for these pumps is 3,500 lbs.

3) *Monorail (for blowers)*

Installation of a monorail for lifting the membrane air scour blowers will be the decision of the D/B Company. The maximum lifting load required for these blowers is 8,380 lbs.

Alternatively, a forklift truck or a temporary crane may be used to lift pumps and blowers.

1.4.9 *Turbidimeters*

The system is equipped with a dedicated turbidimeter for each membrane train and a shelf spare (8 duty, 1 shelf spare). The turbidimeter is used to monitor membrane integrity by measuring the turbidity from each membrane train separately. A ½" line from each permeate header carries a continuous flow of permeate from each train to the turbidimeter on that train. The control system is set up with alarms to warn the operators if a membrane train exceeds a certain turbidity set point. Other set points can be set up to automatically shut down and isolate a train if turbidities increased above certain values.

The control system is set up with alarms to warn the operators if a membrane train exceeds a certain turbidity set point.

1.4.10 *Staging Tank*

The staging tank and associated equipment is used to provide additional flexibility for membrane handling and maintenance. The staging tank is sized to house one cassette and is primarily intended for special operations such as membrane cleaning optimization studies and membrane inspections/repair.

1.4.11 *Foam Removal System*

Although not specific to membrane bioreactor systems, ZENON recognizes that any aerated activated sludge system can generate a certain degree of foam. This is particularly true for biological nutrient removal (BNR) plants in the Greater Atlanta area, which have historically shown a higher tendency for generating foam. As aesthetics is an important objective for the JCEC, ZENON recommends including a foam control management system as part of the overall process design. The most reliable and proven method for foam control involves surface sludge wasting. ZENON has developed a unique surface sludge wasting system as part of the Cauley Creek expansion and is recommending a similar system for JCEC.

ZENON has developed a unique surface sludge wasting system as part of the Cauley Creek expansion and is recommending a similar system for JCEC.



The proposed system involves constructing a foam/waste activated sludge (WAS) sump at one or both ends of the membrane distribution channel. The membrane distribution channel, which hydraulically connects all biological process trains and membrane trains, serves to retain foam and floating materials (i.e. grease) within the channel. The foam/WAS sump is equipped with a downward opening weir gate that can be automatically adjusted based on liquid level to allow trapped foam and floating materials to cascade into the sump, while minimizing the amount of mixed liquor overflowing into the sump. Foam that cascades into the sump can be re-entrained via the mixed liquor spray system or foam-causing microorganisms can be suppressed by spraying chlorinated reuse-water. Surface wasting of sludge can be implemented by controlling the amount of mixed liquor overflowing into the sump and transferring the content of the sump to the sludge handling facility using dedicated submersible pumps and a magnetic flow meter.

The recommended foam control management system is shown By Others in this proposal.

Describe the Membrane System control system, including control system architecture, redundancy features, ultimate expansion capacity, operating controls and operator interfaces, report generation capabilities, historic data storage and analysis capabilities, self-diagnostic capabilities, alarm management features, maintenance support capabilities, integration of additional equipment, and power supplies. Include description of control system hardware and software, including control panels, remote terminal units, redundancy features, process failure alarms, and alarm features, and provisions for automatic shutdown. Include detailed block diagrams illustrating the complete control system. Proposals must describe the level of automation, monitoring, and control required for remote operation.

1.5 Control System

The ZeeWeed® membrane system will be supplied with a Programmable Logic Controller (PLC)-based control system. The PLC system will be an Allen-Bradley ControlLogix-based system.

A detailed block diagram illustrating ZENON's network architecture is included in Appendix D.

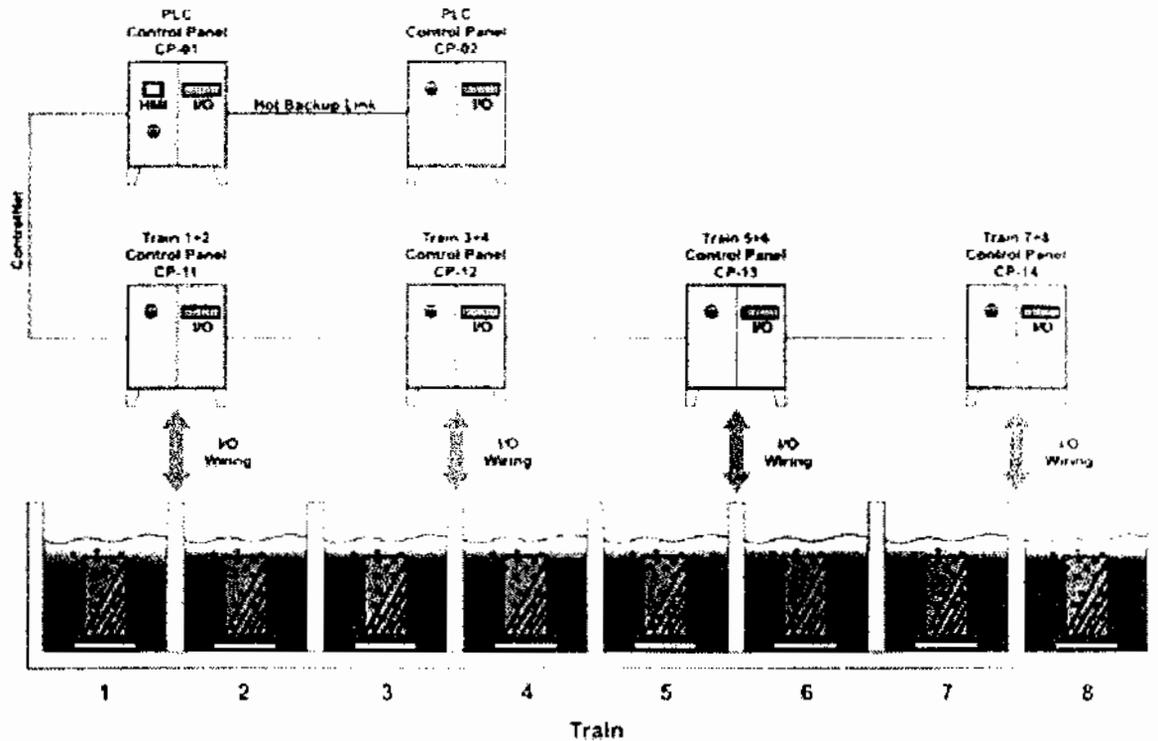
1.5.1 General

The ZeeWeed® membrane system will be supplied with an Allen-Bradley ControlLogix Programmable Logic Controller (PLC)-based control system. Allen-Bradley is the dominant PLC vendor in North America and the ControlLogix platform has proven to be a flexible and reliable platform. For increased reliability and redundancy, the PLC control system will incorporate a hot-backup CPU configuration with automatic switchover.

The PLC control system will incorporate a hot-backup CPU configuration with automatic switchover.

ZENON's PLC control system architecture will be predicated on a distributed I/O system that locates I/O as close as possible to the sensing devices to minimize wiring runs and separates I/O into process train groups to maximize redundancy. Figure 3 below illustrates the distributed I/O architecture and the included Network Architecture diagram provides greater detail.

Figure 3: Distributed I/O Architecture



1.5.2 ControlLogix-Based PLC System

The Allen-Bradley ControlLogix-based PLC system will consist of a single PLC CPU with distributed I/O. The PLC system will be equipped with an Ethernet module for communication to the ZENON Wonderware SCADA system and will be available for communication to other Plant PLC and SCADA systems.

The distributed I/O will be based on a ControlNet network. The CPU rack and each remote I/O rack will be equipped with a ControlNet communication module. Typically, common equipment I/O will be wired to the same enclosure as the CPU. I/O pertaining to a specific train will be wired to a remote I/O rack dedicated to that train. Pairs of trains will be housed in a double-door enclosure and will be located in close proximity to the train equipment. For the case of this 8-train system, there will be one (1) PLC control panel housing the CPU, typically located in an Electrical or Control Room, and four (4) remote control panels, one panel per two trains, typically located in the membrane tank process area. Expansion of this system can be easily accomplished by adding one (1) remote control panel for every two additional trains.

The proposed redundancy for the control system will consist of a hot-backup CPU configuration. The hot-backup CPU configuration will detect CPU, power supply, communication module, and rack failures on its respective rack and automatically switch control from the primary CPU and rack to the secondary CPU and rack. I/O control will switchover seamlessly as well as HMI functionality. HMI and SCADA devices will need to be installed with software to automatically detect switchovers and direct communication to the active CPU communication module.

To insure redundancy and resiliency in the Ethernet communication network, a Hirschmann Industrial Ethernet fiber-optic switch with HIPER-Ring feature will be supplied in the PLC control panel. Ethernet connections within the PLC control panel will be CAT5 copper.

Allen-Bradley ControlLogix modules will be of the following type:

ControlLogix CPU	A-B 1756-L55M23 (or M24)
Ethernet Communication Module	A-B 1756-ENBT
ControlNet Communication Module	A-B 1756-CNB
Digital Input: 16-point 120VAC	A-B 1756-IA16
Digital Output: 16-point 120VAC Triac	A-B 1756-OA16
Analog Input: 8-point differential 4-20mA	A-B 1756-IF16
Analog Output: 8-point 4-20mA	A-B 1756-OF8

Digital outputs for motor control will be isolated via plug-in interposing relays. Loop-powered analog inputs will be powered from a 24VDC power supply installed in the control panel.

1.5.3 Control System Components

All remote control panels will be rated NEMA 4X Stainless Steel (one panel for every two trains). The main PLC control panel housing the CPU will be rated NEMA 12, as it will be located in an Electrical or Control Room.

To protect against lightning and transient voltage surges, each control panel will be protected at the incoming power by a multi-stage, hybrid transient surge suppressor located in the control panel. In addition, any discrete and analog I/O point where any part of the circuit is outside the building envelope will be individually protected by a surge suppressor.

Each control panel will be powered by an on-line UPS providing approximately 15 minutes of back-up time. A horn will be provided for alarm annunciation. A dry relay contact will be provided for remote/autodialer alarming.

Each control panel will be powered by an on-line UPS providing approximately 15 minutes of back-up time.

Field wiring of all the I/O to and from the control panels will be By Others in accordance with wiring diagrams provided by ZENON. Control panels will be designed to accommodate field wiring entering primarily from the bottom of the enclosure.

Junction boxes to facilitate field wiring will only be supplied for skid-mounted equipment. Design, supply, and installation of all other junction boxes will be By Others.

Control panel components will be of the following manufacturer, or equal:

Component	Manufacturer and Model	Description
Control Panels	Ralston	
Junction Boxes	Ralston	
Disconnect Switch	Sprecher & Schuh LE2-25	
Push Buttons	Allen-Bradley 800T	30.5mm NEMA4
Pilot Lights	Allen-Bradley 800T	30.5mm NEMA4
Horn	Federal Signal 350	
Surge Suppressor	Innovative Technologies IIS-P-SP	
UPS	Powerware 9120	1500VA On-Line
24VDC Power Supply	ABB	
Master Control Relays	Allen-Bradley 700	
Control Relays	Finder 40	
Power Distribution Block	Gould	
Fuse Holder (>10A)	Gould	
Fuse Holder (<=10A)	Wago 280	
Terminal Blocks	Wago 280	Spring-Clamp Style

The PLC control panel will be equipped with a LAN Modem with integrated 4-port Ethernet hub. This will provide ZENON the capability to optimize and/or troubleshoot the plant remotely. Please note that a dedicated phone line By Others will be required. LAN Modem will be 3Com OfficeConnect.

1.5.4 Control Operation

All valves and control devices will be interlocked through the PLC to allow smooth and continuous automatic operation. Valves will open, close and/or modulate, depending on signals from the PLC. These signals will be predetermined through PLC programming and allow the system to operate at optimal conditions. Variable speed pumps will also be controlled by the PLC and vary their vacuum/flow output based on level signals from the process tanks.

All operating parameters will be continuously monitored by the PLC. If an alarm or emergency condition occurs, the PLC program will instruct the various components to change operation conditions and/or shut down the system and alert the operator. The system control logic will be designed with the ability to shut down the system in the event of an alarm condition that could be detrimental to the equipment.

If an alarm or emergency condition occurs, the PLC program will instruct the various components to change operation conditions and/or shut down the system and alert the operator.

1.5.5 HMI System

The HMI will be an Allen-Bradley PanelView Plus 1250. It will be installed on the door of the PLC control panel. It will be programmed to provide the following features:

- Monitoring of the system and of individual devices
- Control of the system and of individual devices
- Adjustment of operating parameters
- Operator and Supervisor level passwords
- Current Alarm Summary
- Alarm History

All monitoring, control, and alarm logic will reside in the PLC CPU. Data points defined in the CPU will be communicated over the Ethernet network to provide the operator monitoring and control functionality at ZENON's PanelView Plus. These data points will be available to any device on the Ethernet network, such as the Plant SCADA System, to provide some or all of the operator functionality that is found on ZENON's PanelView Plus. ZENON recommends that the Plant SCADA System incorporate full operator functionality to act as a backup in the unlikely event of a PanelView Plus failure and to provide a more convenient location for operator interaction.

ZENON recommends that the Plant SCADA System incorporate full operator functionality to act as a backup.

Since the Plant SCADA System will have access to the data in ZENON's PLC CPU, features such as alarm annunciation and logging, data logging



and trending, and report generation can be easily implemented on the Plant SCADA System. The ZenoTrac[™] system, when it resides on the Plant SCADA System, will also require that the relevant performance data be logged at the Plant SCADA System.

Functionality from Owner's SCADA System

Background

ZENON's control systems are easily integrated to an Owner's SCADA system. For the Johns Creek Environmental Campus, ZENON recommends Full Control and Monitoring from the plant SCADA system.

Please note that the tag and screen quantities below are guidelines only based on ZENON's previous HMI and SCADA designs. Depending on the SCADA software and the features that are available and implemented, these quantities may vary dramatically.

Full Control and Monitoring

This level of functionality is typical of a SCADA system that is located in the control room of the membrane facility. The level of functionality is a duplicate of the full level of control and monitoring that is available at the ZENON HMI system. Allowing full control and monitoring of the membrane system at the plant SCADA adds another level of redundancy if problems arise with the ZENON HMI system.

Allowing full control and monitoring of the membrane system at the plant SCADA adds another level of redundancy.

The data points, or tags, that are to be defined in the plant SCADA system are exactly the same as those defined in the ZENON HMI system. Typically, the number of data points is approximately 1000 for the common equipment and 1000 for each train.

The number of screens typically required for this level of functionality is approximately 15 for the common equipment, 5 for each train, and 30 pop-up screens. A pop-up screen is defined as a screen "template" that makes use of placeholders or parameter files to allow one screen to be re-used at runtime to display different devices. If pop-up screens are not used, then the number of dedicated screens goes up dramatically.

Provide a narrative describing operation of the Membrane System, including startup, production, and all types of membrane cleaning, such as backwash (with and without chemicals), relax (i.e., membranes not producing permeate, with or without air scour), daily maintenance, and periodic chemical clean in place for permeability recovery.

1.6 Proposed MBR Control Strategy

1.6.1 Permeate Pumps

There are eight (8) permeate pumps in the design (one per train). The vacuum generated by the permeate pump draws permeate from the outside-in through the membranes and discharges it as final effluent after disinfection. These variable speed pumps are controlled by the PLC to maintain the permeate-flow demand point using PID (proportional, integral, derivative) control based on the liquid level in the aeration/membrane tanks. The PLC continuously runs a PID loop for Trans Membrane Pressure (TMP) while in production. The PLC uses the lower of the control outputs from the flow loop, the TMP loop, and the anti-cavitation PID loops to control the speed of each permeate pump. All permeate pumps will be controlled at the same flow set points. Maximum pump capacity is achieved at the highest design level in the above tanks. All pumps speed will gradually decrease as the liquid level in the process tanks decreases. If during low flow conditions this level drops below the design minimum, and the pumps cannot be slowed down any further, one or more trains will automatically go into standby mode.

With this control strategy, the system is expected to operate with two (2) trains in standby mode during average day flow conditions, and with one (1) train in standby mode during maximum month flow conditions. Above maximum month flow conditions, it is expected that all trains will be in service.

With this control strategy, the system is expected to operate with two (2) trains in standby mode during average day flow conditions.

Integrity of each train is monitored with on-line turbidimeter. In the event of high turbidity in the permeate an alarm will sound. The operator can set the turbidity alarm points above the maximum output for the instrument to override a shutdown alarm.

The alert and alarm turbidity values are set by the operator. An alert is issued if two, sequential 15 minute readings exceed the alert set point. If two sequential 15 minutes readings exceed the alarm set point, the process train is automatically shutdown.

All permeate pumps discharge into a common permeate collection header. From this header, permeate can be diverted to the CIP/backpulse pump if the level is low, or to disinfection before final discharge.

The plant output is a target net production flow set point, which is equivalent to the influent to the MBR system. The net production flow set point is used to calculate the instantaneous flow set point. The instantaneous flow is higher than the net flow, and it is used to increase the production, for the time that the unit is not producing water (i.e. backpulsing or relaxing). The instantaneous flow rate controls the speed of each permeate pump.

The membrane is operated with a repeated filtration cycle. The filtration cycle consist of permeating (or pulling) clean water from the outside-in through the membrane followed by a short period of backpulsing (reversing the flow through the membranes) or relaxation (no flow). During relaxation, the permeate pump stops, and the membranes are allowed to relax for a short period. The supervisor can adjust the permeate production cycle time from the HMI.

The brief permeate pump control summary is provided below:

- 1) The permeate pumps will be controlled to maintain a level between LYL and LYH in the membrane tanks
- 2) The 8 membrane tank LIT values will be averaged in the PLC
- 3) Based on the level in the membrane tanks a flow demand will be calculated (i.e. a specified flow at LYH level and no flow at LYL level)
- 4) The permeate flow per train will be calculated as follows – flow demand divided by the number of trains available (i.e. flow demand / 7 trains – flow rate per train for the scenario with 1 train down)
- 5) LYLL in the membrane tank – permeate pumps will turn off to protect membranes
- 6) LYHH in aerobic tank – the influent should turn off or emergency overflow should engage.

1.6.2 CIP/Backpulse Pumps

The water used to backpulse and clean the membranes is permeate. It is not required to add any chemicals to the permeate water used for backpulsing. A separate group of pumps (CIP/backpulse pumps P-88A/B, one duty and one standby) is used for reversing flow through membranes. The membranes are backpulsed using a separate backpulse header connected with a train permeate collection headers via automatic valves. To control the flow through this line, the CIP/backpulse pumps are complete with motor VFD control and discharge flow meter.

The PLC sets the motor VFD to achieve a design backpulse flux and flow rate.

ZENON operates many of its systems without backpulsing. However, ZENON systems do have the ability to backpulse if required, and backpulsing is particularly critical for maintenance and recovery cleaning. Without backpulse, deep chemical cleaning of membrane pores is impossible for any type of membranes, and can run the risk of membranes becoming deeply and irreversibly fouled with organic matter.

ZENON operates many of its systems without backpulsing.

During the backpulse mode of operation, the membranes are flushed from the inside out for 30-60 seconds every 10-15 minutes. The water used to backpulse the membranes is permeate stored in the backpulse tank.

During relaxation, backpulsing is not utilized. Instead, the membranes are aerated without drawing any permeate (relaxed) for 30-60 seconds every 10-15 minutes.

All ZeeWeed[®] MBR plants are designed with the capability to operate in either backpulse or relaxation mode.

The backpulse pumps and respective piping and valves are configured to backpulse half of a train (i.e.: one row of cassettes) at a time.

The maximum and minimum backpulse frequency and duration for all ZeeWeed[®] units can be set by the operator through the HMI. All the ZeeWeed[®] units operate with the same backpulse frequency and duration. The default backpulse frequency is 12 minutes, and duration is 30 seconds. The system staggers the backpulses throughout each production cycle.

During membrane maintenance or recovery cleaning, the cleaning chemicals are injected into the backpulse line by the chemical metering pumps. Each chemical metering air diaphragm pump has two air supply connections corresponding to two chemical solution flow rates (one for maintenance cleans, and one for recovery cleans).

1.6.3 Mixed Liquor Recirculation Pumps

One dedicated fixed speed recirculation pump is supplied per train. The pump is sized such that with all pumps in service, the recirculation rate will be three (3) times the peak day flow rate (QPKDY). The recirculation pump capacities will not change when a train goes out of service – the pump will simply shut down when the corresponding train is not in production mode. The recirculation pumps will operate at a fixed flow (no

VFD) at all times when the permeate pumps are operating in Automatic. These pumps do not contribute to any level change, as they discharge internally as much as they draw.

1.6.4 Membrane Tank Drain

Membrane tank draining is required for empty tank maintenance and/or recovery clean, therefore draining and subsequent filling is entirely automated.

Two drain pumps (one duty, one on-line standby) are supplied to service all membrane trains. When draining of a membrane tank is required, the contents of the tank will be pumped out by this pump either into the mixed liquor recirculation header (for mixed liquor) or upstream of the primary clarifiers (for waste cleaning chemicals). Drain lines and pump are sized to allow for a minimum drain time of 30 minutes.

To allow for the full tank drain, the level transmitter has to be installed at a depth of 2" to 3" off the membrane tank floor at the deeper end (installation in the drain sump is preferred).

1.6.5 Vacuum System

Due to high concentrations of dissolved air in treated effluent and the pressure difference across the membrane, there is a tendency for dissolved air to be released from the water. To prevent problems associated with air locks in the piping and pump system, which may cause the permeate pumps to lose their prime, an air removal system is incorporated into the permeate pumping system.

The air removal system consists of a horizontal air separator into which the permeate flows. Any air released from the water collects at the top of the vessel and is automatically removed from the system by continuously operated vacuum pumps (two duty and one standby). In the event that all the air is removed from the vessel, an air release valve automatically closes the vacuum line to prevent water from flooding the vacuum pump.

1.7 Membrane Cleaning Protocols

The following section describes the two methods for chemically cleaning the membranes. Relaxation and backpulsing are methods of cleaning the membranes without the use of chemicals and are discussed in Section 1.6.2.

1.7.1 Maintenance Cleaning

The goal of regularly scheduled maintenance cleanings is to increase the interval between recovery cleanings (see 1.7.2 below). The maintenance cleaning procedure is entirely automated and scheduled to occur during off-peak hours of the day.

For the maintenance cleaning procedure, the feed to the membrane tank is stopped, and the membrane train to be cleaned is isolated and drained below the membrane fibers. Over a one-hour period, approximately 500 mg/L of sodium hypochlorite (or 2 g/L of citric acid) is pumped through the membranes in regular pulses followed by a clean water flush at the end. The cleaning chemical remains in direct contact with the membranes and is not diluted by the mixed liquor in the process tank. This is normally conducted once per week with sodium hypochlorite. When Citric acid cleaning is employed, it is performed back-to-back with sodium hypochlorite cleans, after flushing the system with permeate. As there are two permeate headers per train, only half the cassettes in each train are backpulsed at a time.

When the maintenance cleaning procedure is complete, the tank is re-filled with mixed liquor and aerated to oxidize any residual chlorine.

1.7.2 Recovery Cleaning

A recovery cleaning is required to restore the permeability of the membrane once the membrane becomes fouled. A recovery clean should be initiated when permeability declines to less than 50% of initial stable permeability or below 4 gfd/psi, whichever comes first. This will generally occur when the trans-membrane pressure (TMP) consistently exceeds 3-4 psi (vacuum) under average flow conditions. The cleaning chemicals that are typically used are sodium hypochlorite (NaOCl) for the removal of organic foulants and citric acid for the removal of inorganic contaminants. The cassettes are cleaned in-situ, one train at a time. The train to be cleaned is isolated from the rest of the system, permeation from that train is suspended, but aeration is continued for a period of time to transfer solids away from the membrane bundles. The mixed liquor in the membrane tank is transferred to the mixed liquor distribution channel. The membrane tank is filled with permeate and drained to wash residual sludge from the tank. Cleaning chemicals are pumped into the tank through the membranes, and finally permeate is used to top up the membrane tank to fully submerge the membrane fibers. The membranes are then soaked in cleaning solution for a period of 6-12 hours.

The maintenance cleaning procedure is entirely automated and scheduled to occur during off-peak hours of the day.

After the recovery cleaning is complete, the level in the membrane tank will be 10-15 inches below the maximum operating level. The gate between the membrane tank distribution channel and the train is opened, allowing mixed liquor to enter, until the level in the membrane tank reaches the maximum operating level.

The train is then aerated for 10 minutes to allow the residual chemical to be consumed by the organics in the mixed liquor. Approximately 20 % of the tank volume is then transferred to upstream of the primary clarifier using the drain pump. This drain/wait cycle is repeated until the tank is completely drained and then the system is put back into normal operation.

Describe membrane integrity monitoring, membrane testing and repair, and membrane subunit replacement procedures.

1.8 Membrane Integrity, Testing, Repair and Replacement

In membrane bioreactor plants, the membrane integrity is monitored on-line by continuously measuring the turbidity of the permeate. The proposed system for JCEC is designed with a dedicated on-line turbidimeter per train. The membrane is a physical barrier and turbidity levels in the effluent are normally very low. An increase in turbidity indicates either a membrane breach or a leak in the piping system has allowed mixed liquor or air to enter the permeate stream. In the unlikely event that this should happen, the operator is immediately notified by a PLC alarm indicating a high turbidity measurement on a specific membrane train. Location of the compromised membrane cassette and/or fitting is done, with the membrane train in operation, by isolating each cassette separately within the membrane train until the on-line turbidity decreases. Once the cassette is located it can be removed and placed into the staging tank where it can be bubble tested to locate the cause of the increased turbidity. Increased turbidity can be caused by either solids or air entering the permeate stream via a leak in the membrane or in the fittings.

The membrane integrity is monitored on-line by continuously measuring the turbidity of the permeate.

1.9 Shop Drawing Preparation

Drawing submission, equipment shipment schedule and cost for preparation of shop drawings are indicated below.

Submission of GA Drawings: 8 to 10 weeks from notice to proceed

Drawing Approval: T.B.D by D/B Company Schedule

Equipment Shipment: 14 to 24 weeks from date of shop drawing approval (Provided acceptance of final equipment P.O.)

The above delivery schedule is presented based on current workload backlogs and production capacity. If a formal purchase order is not received within the period of validity of this proposal, the delivery schedule is subject to review and adjustment.

If specific project deadlines require a faster delivery schedule, partial shipments of critical items can often accommodate this schedule. However, some additional freight and duty costs will be incurred in such cases, for Purchaser's account.

1.9.1 Shop Drawing – Cost and Scope of Supply

The cost for preparation of shop drawings for the Johns Creek Environmental Campus will be:

\$221,533.00 USD.

The preliminary list of drawings that ZENON will be producing is as follows. This list may evolve over the course of the project. For references, ZENON's preliminary drawing numbers have been assigned.

- 1) Process Flow Diagram A-001
- 2) List of Symbols L-001
- 3) Process and Instrumentation Diagrams (P&IDs) - D-001 to D-011 (currently)
- 4) Plot Plans - P-001, sheets 1 to 3. - showing process tank in plan, elevation and section.
- 5) Membrane Cassette Assembly - G-001
- 6) Membrane Cassette Fabrication Details - F-001 to F-004.
- 7) Membrane Support Beam Drawings - F-005 to F-XXX
- 8) Air Separator Drawing - V-001
- 9) Back-pulse Tank Drawing - V-002
- 10) CIP Tank Drawing - V-003
- 11) Electrical Drawings E-001 to E-XXX

Including but not limited to:

- a. Drawing list
- b. Electrical Notes and Legend Index
- c. Motor Starter - Typical Wiring (1 Drawing)
- d. Power Supply Wiring Schematics - Including diagrams showing devices requiring 120 VAC, 24 DC, PLC input/output power, Main power etc..
- e. Digital Input/Output Wiring Schematics for each PLC/Remote I/O Card of this type.
- f. Analog Input/Output Wiring Schematics for each PLC/Remote I/O Card of this type.
- g. Front of Panel layouts - for all ZENON supplied control panels (1 drawing per panel)

- h. Back panel layouts - for all ZENON supplied control panels (1 drawing per panel)
 - i. Bill of Materials - Electrical items specific to this project
 - j. Bill of Materials - Standard ZENON stocked control panel components.
- 12) Detailed Bill of Material, that describes Model #s, capacities, sizes, materials, etc., for all components under ZENON scope of supply.
- 13) Cut-Sheet Binder with catalog cut-sheets from each of ZENON sub-vendors.

As the project details are worked out, ZENON will add or delete drawings depending on actual project requirements.

NOTE: General Arrangement Drawings include the following:

- General Arrangement Drawings, showing equipment dimensions and weights required for the equipment foundations (foundations by others) and the utility requirements for the process equipment being furnished by ZENON with the system being supplied.
- Standard sub-vendors' dimensional outline drawings for the items of major process equipment (e.g., pumps, blowers, air compressors), which are necessary for the Purchaser to complete its engineering and installation.
- Standard sub-vendors' equipment cut sheets for the major process equipment and other equipment items (major instruments and system components) shall be provided.
- Electrical Drawings including Single Line Diagrams, Control Panel Layouts and Interconnecting Wiring Diagrams.
- Assembly Drawings including General Equipment Layouts, deemed necessary by ZENON to be required for equipment installation.

Provide a list of spare parts (two-year supply), which will be provided as part of the Membrane System Scope of Supply.

1.10 Recommended Spare Parts List

ZENON's recommended two-year spare parts list provided with the Membrane System Scope of Supply is detailed in Table . For added redundancy and reliability the proposed membrane system for JCEC has included the following key on-line standby equipment:

- Membrane blower
- Backpulse pump
- Vacuum pump
- Sodium hypochlorite pump
- Citric acid pump
- Tank drain pump
- Hot backup PLC
- Air compressor
- Air dryer

Table 4: 2-year Spare Parts List

Description	Spares Qty
Pumps	
Shelf Spare Permeate Pump (P-35)	1
Shelf Spare Recirculation Pump (P-34)	1
Pump/Blower Spares	
Permeate Pump (P-35)	
Maintenance Kit	1
Ball Bearing	1
Roller Bearing	1
Mechanical Seal type 1 XF(50)1O(58)1	1
Recirculation Pump (P-34):	
O-Ring	1
Thrush Bearing (Set of 2)	1
Radial Bearing	1
Mechanical Seal	1
CIP/Backpulse Pump (P-88)	
J. Crane Flex-Mount 1 XF501O101 (ECN5868)	1
Pump Repair Kit – Oil Lube	1
Tank Drain Pump (P-38)	



Ball Bearing	1
Roller Bearing	1
Maintenance Kit	1
Mechanical Seal type 1 XF(50)1O(58)1	1
Membrane Aeration Blower (B-85)	
2-Sets of Filter Panels (8 elements/filter)	1
Maintenance Kit	1
Dosing Pumps	
Chemical Feed Pump Spares Kit (Citric Acid)	1
Chemical Feed Pump Spares Kit (Sodium Hypochlorite)	1
Valves	
Cyclic Aeration Valves	1
Instruments	
Turbidimeter Calibration Column	1
Turbidimeter Calibration Kit	1
Pressure Transmitter	1
Controls	
ControlLogix 5555 CPU, 2.5M	1
Control Relays	1
24VDC Power Supply	1
16 Pt Digital Input	2
16 Pt Digital Output	2
16 Pt Analog Input	2
8 Pt Analogue Output	2
Power Supply	1
Ethernet Module	1
ControlNet Module	1
Miscellaneous	
Spare Fuses, Miscellaneous	1
DispensGun - Fiber Repair Aid	1
Gaskets, O-Rings and Seals	1
Bubble Test Equipment	1
ZeeWeed [®] Fiber Repair Kit	1

Identify material of construction for all components to be provided by the Membrane System Supplier.



The material of construction for all components provided by ZENON for the ZeeWeed® Membrane System is detailed in Proposal Form D. The process piping schedule is also located in Proposal Form D, in the Piping and Valves Section.

Describe the assistance that the Membrane System Supplier will provide in support of the D/B Company during design, startup, training, construction, and testing, as detailed in the Appendices.

1.11 Support to D/B Company

ZENON Environmental is committed to providing extensive, dedicated, open, flexible and effective support to the Design/Build Company. ZENON is proactive at being involved in all aspects of project delivery from preliminary design through to final completion. We have in place the infrastructure to fully support the Design Build Process.

ZENON Environmental has significant experience in the participation and lead of Design/Build projects for membrane treatment facilities.

ZENON Environmental has significant experience in the participation and lead of Design/Build projects for membrane treatment facilities. We have utilized our infrastructure and resources on an effective basis on all of these projects. A partial list of ZENON's experience includes the following projects:

Municipal

- Nelson, NZ 13.7 MGD, ZW - Membrane System
- Waikato, NZ 11.9 MGD, ZW - Membrane System
- Brescia, Italy 11.1 MGD, ZW - MBR System
- Woodstock, GA, USA 1.5 MGD, ZW - MBR System
- Traverse City, MI, USA 7.1 MGD, ZW - MBR System
- Forsyth County, GA, USA 2.5 MGD, ZW - MBR System
- Corona, CA, USA 1.0 MGD, ZW - MBR System
- Cauley Creek, GA, USA 5.0 MGD, ZW - MBR System
- Crane Mountain, NB, CAN 0.046 MGD, ZW - MBR System

With exception of Crane Mountain and Brescia WWTP, ZENON was an equipment supplier working with the design/build team for all the municipal projects listed above. Not only can ZENON support a D/B team as an equipment supplier, ZENON was the lead General Contractor for Crane Mountain and the Brescia WWTP, the largest operating MBR in the world.

ZENON has extensive experience being the lead general contractor for industrial systems and below includes the D/B projects run by ZENON.

Currently ZENON is leading a challenging D/B Project for Southern Company in Georgia.

Industrial

- Basic American Foods, ID, USA 1.5 MGD ZW – MBR System
- Southern Company, GA, USA 0.9 MGD ZW – UF/RO/LX System.
- Southern Company, AL, USA 0.6 MGD ZW – UF/RO/LX System
- ATCO Power, AB, CAN 0.5 MGD ZW – UF/RO/LX System
- GM Windsor, ON, CAN 0.2 MGD Tubular MBR System
- Unifine Foods, ON, CAN 0.05 MGD ZW – MBR System
- Chrysler Lago, AB, CAN 0.04 MGD Tubular MBR System

In order to illustrate ZENON's commitment to the project team, ZENON has included a preliminary organizational chart for the engineering and field service team.

Successful projects are built on quality teams and communication. ZENON's standard project delivery method has been developed to deliver effectively in both areas. Our proven approach is to provide a ZENON team dedicated to the Johns Creek project that will provide daily, detailed project support from the design phase, through to the commissioning phase of the facility. This dedicated team will consist of the following individuals:

Project Manager

This individual will be experienced with the ZENON technology and will provide to the design build company both liaison with and leadership of the ZENON project team. The ZENON Project Manager is the primary contact and their role is to ensure that the Design Build Company's expectations are met through the delivery of milestones to the project, on time.

Process Engineer

This process specialist will bring process knowledge and ZENON technology experience to the team, to initially assist in the overall design of the membrane portion of the facility to ensure that it exceeds the treatment objectives set out in the specification. The other primary focus of this individual will be to provide on-site support during the process start-up of the facility to ensure that the membrane system is working as intended and operating at peak efficiency. The process engineer, with support of the wastewater process group will also be available for continued, on-going operations support.

Project Engineer

This individual will be responsible for the primary technical details of the project including all pump, valve and instrumentation selection, design of the layout of ZENON process tanks and other components within the scope of ZENON's supply. The project engineer will participate in a portion of the on-site activities including the construction phase of the project, to ensure that the design has been correctly implemented in the field and the commissioning process to ensure that facility operates as intended.

Electrical Engineer

This candidate will be responsible for the hardware design of the control system associated with the ZENON system.

Controls Engineer

A controls specialist will assist in the overall design of the ZENON system to ensure that the intricate detail of the control system integration with other plant processes occurs. This individual will take part in controls workshops with the D/B Company's system integrator to ensure that the ZENON system is integrated within the overall control philosophy of the Johns Creek facility.

Programmer

A programmer will be dedicated to writing and testing of the control system PLC code for the ZENON system. This programmer will also assist the D/B Company's system integrator with the inclusion of the ZENON controls in the overall plant SCADA system. This programmer will also be made available for site work during the commissioning phase of the project to ensure that the control system start-up is completed in a timely fashion.

Field Service Representatives (FSRs)

Based on the size of this facility, a group of FSRs will be dedicated to the Johns Creek project. In addition to the on-site start-up and commissioning activities for the project, these individuals will be involved in Factory acceptance testing of ZENON supplied instrumentation and control system bench testing at ZENON. This ensures that the FSRs have intimate knowledge of the project prior to arriving on-site. From experience, we have found that this greatly reduces the amount of on-site time required to start-up and commission the facility. This FSR team will be coordinated internally at ZENON by a dedicated Field Service Coordinator. The coordinator

provides internal communication and expediting to ensure that site issues that require support from headquarters will be dealt with as quickly as they arise.

Assisting this dedicated team will be the full resources of ZENON to ensure that all deliverables are met. This will include the participation of technical specialists, group managers, supervisors and Quality Assurance personnel at various stages of the project. This team of senior personnel will act as a technical liaison committee for the project and will provide dedicated support on an ad hoc basis as the need arises.

ZENON believes that effective communication is the key to the success of the project. As such we recommend that throughout the project a series of meetings are set up to accomplish a number goals. These meetings include:

- Project Kick-off Meeting
- Preliminary design meeting
- Design review meetings
- Controls Workshop
- On-site meetings during construction
- Start-up and commissioning planning meetings

ZENON recommends that at the initiation of the project, that there be a series of meetings designed to accomplish a number of key goals. First, the meetings will be designed to introduce the ZENON team to the rest of the D/B Company team. Second, roles and responsibilities will be defined along with establishing the correct routes of communication to ensure that ZENON provides the required support as expediently as possible. Third, and most important, is the aspect of team building. ZENON firmly believes that the method of delivering a successful project is to promote the value of a unified team both within ZENON and with external team members.

As part of the preliminary meetings, ZENON recommends that senior design staff (technical liaison committee) be involved as part of an initial design meeting with the external D/B team. Also, technical presentations on the ZENON system will be made to ensure that the D/B team is fully familiar with the ZENON system, how it operates and what design aspects are critical to a successful project. The benefit is to bring experience to the table, to assist in all design aspects of the project from layout through controls. This has worked effectively on numerous ZENON projects and it ensures that the knowledge that ZENON has developed is imparted to the D/B team early on in the design process. This greatly assists the D/B Company in their decision-making, ensuring that the design is developed



in an efficient manner. This experience also allows for ZENON to quickly assess innovative ideas that the D/B team members bring to the process, providing flexibility in the design.

ZENON believes in regular design meetings with the full D/B team to ensure that design progress is monitored and design challenges are dealt with quickly. This process would include multi-day meetings, video conference calls and weekly conference calls to ensure that design details are fully coordinated. At the early stages of the project ZENON is prepared to make available to the D/B team the ZENON team members at the DB Company's offices as technical resources to ensure that the design is initiated quickly. ZENON anticipates that this will be of benefit to the D/B team within the first 2 weeks of the project design initiation.

1.12 Equipment Commissioning – Field Services

1.12.1 General

Complete technical support service is provided by ZENON through all phases of the project from receipt of purchase order through drawing submission, equipment shipment, installation and plant operation.

Specific field service is included with the equipment supplied to provide the Customer with:

- Assistance with equipment off-loading
- Assistance with equipment installation
- Assistance with membrane installation
- Assistance with commissioning and start-up of the membrane system
- Operator training
- Assistance with acceptance testing of the system
- Post Start up Technical Assistance

1.12.2 Equipment Off-Loading

The equipment for this project is shipped loose as discrete components and sub assemblies that are delivered by truck, trailer or iso-container. A ZENON representative will be present at site during this time. The intent of the equipment off-loading is to assist the D/B Company in three ways:

- 1) Ensuring all equipment has been delivered in good order and that no damage has occurred during delivery.
- 2) Identification of discrepancies between the shipping lists and the equipment received.
- 3) Identification of all equipment to ensure all equipment is installed in its intended place.

ZENON has included five (5) days and one (1) trip to site for equipment off-loading.

Shipment of the membranes to site is normally made just prior to commissioning/wet testing of the ZENON membrane filtration system. ZENON representatives will be present when the membranes are delivered and will assist by advising the D/B Company on the details of installing the membrane cassettes within the membrane tanks.

1.12.3 Equipment Installation Assistance

It is ZENON's experience that time spent making sure the parties involved in the installation of the equipment are well briefed and guided on the correct installation of the equipment saves considerable time and money during the equipment commissioning and system start-up.

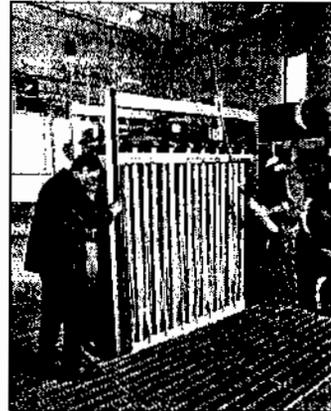
After the equipment supplied with the membrane filtration system has arrived at site and just prior to it being ready for installation, a ZENON field representative will be at the site to provide advice and answer any questions that the D/B Company's forces may have regarding the installation of the equipment. This is also to ensure that the D/B Company's forces are aware of the correct method for installation of certain items that are critical to the correct operation of the ZeeWeed® System. After the D/B Company's forces have been briefed on the installation of the ZeeWeed® Membrane Filtration System, the installation work may commence.

A second visit will be made upon request by the D/B Company. This visit is recommended once the installation of the ZENON is well underway, and the D/B Company has had sufficient opportunity to fully understand all the requirements to complete the installation. The ZENON representative will field questions, give direction on completing the installation, and resolve discrepancies with drawings.

ZENON has included fifteen (15) days and three (3) trips to site for installation assistance.

1.12.4 Membrane Installation Assistance

ZeeWeed® Membranes are normally shipped to site and installed just prior to the equipment being ready for wet testing/commissioning. A ZENON field representative will determine if the plant is sufficiently installed and the membrane tanks and connecting piping sufficiently clean to permit the safe installation of the ZeeWeed® membranes. It is recommended that the installation of the membranes for a given train take place within two weeks of commissioning that train.



ZENON Field Service Representative will be present during membrane installation to advise and provide direction to the D/B Company on the assembly, and installation of the ZeeWeed® membrane cassettes into the membrane tank. ZENON has prepared detailed instructions on ZeeWeed® membrane installation which will be given to the D/B Company prior to membrane installation.

Once the membranes are installed and connected to the permeate header pipe, the ZENON field representative will perform a bubble test (See Section 1.8 for description) to ensure that the membrane quality is the same as when tested at ZENON. Once completed, the ZENON plant is ready for wet commissioning.

ZENON has included twenty (20) days and two (2) trips to site for membrane installation assistance.

1.12.5 Field Testing & Commissioning

After the D/B Company's forces have completed the installation of all the membrane filtration system equipment and prior to the installation of the membranes and commissioning/wet testing of the equipment, a ZENON field representative will again visit the site. This visit is to ensure the installation work has been carried out correctly and has reached a degree of completion adequate to allow installation of the membranes and plant commissioning to proceed smoothly and without delays. The items to be completed include:

- Inspection of all ZENON supplied equipment
- Inspection of equipment By Others (providing it is necessary for the correct operation of the ZENON system)
- Inspection of all wiring to ZENON supplied equipment (I/O checks)

- Rotation checks on all ZENON supplied equipment
- Witness flushing of all piping using potable water for ZENON supplied equipment
- Witness correct operation of prescreening equipment
- Setup of ZENON supplied instrumentation
- Stroking ZENON supplied valves
- Testing operation of ZENON supplied pumps and blowers
- Establishing communication between ZENON supplied controls equipment and controls equipment supplied By Others

Upon completion of this work, ZeeWeed[®] membrane installation may commence. Please refer to Membrane Installation Assistance section.

Once membrane installation is complete, the ZENON representative will assist with further commissioning, which includes:

- Flushing glycerine solution from the membranes
- Testing the ZENON system operation on clean water
- Running chemical and cleaning systems
- Tuning ZENON system operation
- Seeding the ZENON system with activated sludge
- Introducing feed sewage gradually to build up the biological treatment system

Once operation on the feed water meets the design treated water quality, the treated water is suitable for discharge. This effectively completes the installation and commissioning of the equipment and at this time ZENON shall receive Notice of Substantial Completion from the Owner/Purchaser.

ZENON has included one hundred (100) days and four (4) trips for field testing and commissioning.

1.12.6 Operator Training

ZENON has developed numerous Operator Training Courses, each catered to the individual needs of its customers. The summary of the training included by ZENON for Fulton County will empower its staff to operate the ZENON system proficiently and confidently.

ZENON plans to develop an operator training program in collaboration with Fulton County at the Cauley Creek Wastewater Treatment facility.

With this program, Johns Creek plant management and plant operators will receive an introductory exposure to the theory and practice of the ZeeWeed® Membrane Bioreactor System operation and a direct exposure to the operation of a similar plant. The intended outcome of this pre-commissioning training is acquisition of a firm knowledge base for selected Johns Creek staff upon which to build the specific plant operating capabilities required for the future Johns Creek ZeeWeed® MBR prior to the beginning of commissioning.

ZENON has included this four (4) day course for six (6) Johns Creek personnel and one (1) trip for pre-commission training.

During the commissioning and startup of the Johns Creek ZENON system and for membrane installation, ZENON recommends that a Johns Creek representative shadow the ZENON Field Service Representative. Experience has shown that shadowing provides superior operator understanding and confidence in all aspects of ZENON system operation. ZENON's customer-focused Field Service Representatives will instruct a Johns Creek "shadow" over the course of startup and commissioning.

ZENON will conduct classroom and hands on training at the Johns Creek facility. ZENON recommends that this section of training is conducted prior to the completion of commissioning, but after the installation of membranes, so that the information learned is quickly put to practice on the Johns Creek system.

A ZENON training specialist will deliver the classroom training, covering the theory and hands-on practice required to operate a ZENON system. Group sizes of five (5) to ten (10) are optimal for classroom training, but up to twenty (20) people can be accommodated in one session. Material to be covered includes:

- 1) membrane application theory
- 2) performance monitoring
- 3) membrane cleaning theory
- 4) system controls theory

ZENON requires that Johns Creek provide a suitable classroom with associated teaching facilities and materials such as blackboards, overhead, projectors, pens, pencils, writing pads etc., for the duration of the course. ZENON prefers that where possible training is carried out at the plant where the equipment supplied is located, but if this is not possible in-class training can be provided at some other suitable location.

ZENON has included two (2) sessions of five (5) days each for classroom training to take place during commissioning.

Immediately following classroom training, both the ZENON training specialist and Field Service Representative will train Johns Creek personnel on hands on operation of the ZENON system. The material to be covered includes:

- 1) use of the computer operator interface
- 2) plant maintenance
- 3) instrumentation and equipment maintenance
- 4) membrane cleaning
- 5) troubleshooting

ZENON's experience in training has shown that groups for hands on training should be kept to five (5) or less.

ZENON has included two (2) sessions of three (3) days each for hands on training to take place during commissioning.

A summary of the training provided by ZENON is detailed in Table 4.

Table 4: Summary of Training

Task	Number of Trips	Allotted time (On-site person-days)
Pre-commissioning training	1	4
Onsite classroom training during commissioning	0	4
Onsite Hands On training during commissioning	0	10
Follow up training after performance testing	0	5
Total:	1	23

1.12.7 Acceptance/Performance Testing

Following completion of the Functional Test of the Membrane Filtration System, ZENON will assist the D/B Company with Acceptance and Performance Testing to ensure that treated water quality meets the design quantity and quality. This will take place using clean water, and once seeded, with wastewater. During this time, ZENON will also monitor system performance remotely, employing ZenoTrac™ to monitor system operation. **24/7/365 Technical Support** will be initiated during this time

to ensure that round the clock assistance for the Johns Creek operators is available. See Post Commissioning Support section for more information.

ZENON will provide five (5) additional days of training will be provided for the Johns Creek operators to take place after Performance Testing.

ZENON has included two (2) trips totaling thirty (30) onsite days for assistance during Acceptance and Performance Testing.

1.12.8 Summary Of Field Service Support for the D/B Company

The following is a summary of the Field/Technical Support Services provided by ZENON for the D/B Company as seen in Table 5.

Table 5: Summary of Field Service Support

Task	Number of Trips	Allotted time (On-site person-days)
Installation Assistance/equipment unloading/coordination meetings	4	20
Membrane Installation Assistance	2	20
Field Testing and Commissioning	4	100
Training activities	1	23
Acceptance Test (Clean water/Wastewater Test)	2	30
Total	13	193

Any additional days of Field Service required will be billed to the D/B Company at ZENON's Field Service Labor Rates specified below.

A person-day is an 8-hour workday or travel day of an individual ZENON staff member on any given day (business day, weekend, or holiday).

1.13 Post-Commissioning Service and Support To JCEC

ZENON is committed to the successful operation of Johns Creek membrane facilities long after the facility construction contractor has left the site. To fulfill this commitment to excellence, ZENON is proud to offer a multi-faceted, **reliability focused** approach, designed to deliver the following benefits to Fulton County:

- 1) Proactive resolution of issues thereby avoiding emergency situations
- 2) Responsive local support when emergency conditions arise
- 3) Reliable production of high quality effluent that exceeds all permit conditions
- 4) Optimization of energy and chemicals costs
- 5) Protection of Fulton County assets

To provide these benefits, ZENON offers the following services:

- 1) Process monitoring via ZenoTrac™
- 2) smart information sharing via **MyZENON.com**
- 3) **24/7/365 Technical Support** with rapid local response combined with the substance and reach of a global firm
- 4) training after commissioning
- 5) preventive maintenance support
- 6) planned and emergency site visits
- 7) strong management reporting

Details on the quantity and duration of these services are shown in Table 6.

Table 6: Post-Commissioning Services

Qty	Post-Commissioning Services Specified in RFP	Period
6 visits	Site Visits - 6 visits in first 6 months, each 16 hours on site	6 months
25 days	Site Visits - 25 days, 8 hours/day in 4.5 years	4.5 years
5	24/7 Emergency Technical Support, 5 years	5 years
20 reports	Quarterly Reports, 20 in 5 years	5 years
Additional Service Included by ZENON - ZenoTrac™		
	ZenoTrac™ Set-up - one time, 8 trains, WW	at start-up
	ZenoTrac™ - Monitor service, 5 years	5 years
	MyZENON.com	5 years

2.0 Technical Proposal Forms





Water for the World

TECHNICAL PROPOSAL FORM A PROPOSAL TRANSMITTAL LETTER

Date: November 19, 2003

Proposer: ZENON Environmental Corporation

Address: 3239 Dundas Street West, Oakville, Ontario -- L6M 4B2

Telephone: 905-465-3030

Contact Person: Jennifer Watt

Type of Business Entity and State of Organization (Corporation, Limited Liability Company, Partnership, Joint Venture, Other):

Corporation in the State of Michigan

In submitting this Proposal, the Proposer warrants and represents that:

- A. The Proposer has reviewed and understands the requirements of this Technology RFP and the addenda to this Technology RFP, and, if selected, will carry out the provisions of the Proposal including execution of the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company by the Contract Date, and the Proposer further guarantees that it will in no way deviate from the schedule, price and warranties or other terms and conditions contained in the proposal accepted by the County.
- B. "Proposer understands and guarantees that should it fail to execute the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company by the Contract Date, that it forfeits its membrane System Supplier Bid Bond and that the County will proceed on this bond. The Membrane System Supplier, if selected, guarantees and warrants that it will negotiate with the Design/Build Company in good faith."
- C. All information submitted in support of the Proposal is accurate and factual and is submitted fairly, and the Proposer represents that it will contract with the D/B Company for the D/B Company to provide the proposed Membrane System Scope of Supply on the terms and conditions set forth in its Proposal.

- D. All representations made regarding the Proposer's willingness to meet the required Performance Criteria, and the Proposer's concurrence with the proposed business arrangement, are true.
- E. The individuals who will be the Proposer's key technical and business representatives for this procurement are set forth below:

Name	Title	Address	Phone
<u>Steve Watzeck,</u>	<u>Vice President,</u>	<u>3239 Dundas St. W. Oakville, ON</u>	<u>905-465-3030 x: 3204</u>
<u>Jennifer Watt,</u>	<u>Regional Manager,</u>	<u>3239 Dundas St. W. Oakville, ON</u>	<u>905-465-3030 x: 3241</u>
<u>Dave Bingham,</u>	<u>Technical Support Manager,</u>	<u>3239 Dundas St. W. Oakville, ON</u>	<u>905-465-3030 x: 3234</u>
<u>Geoff Totten,</u>	<u>Technical Support,</u>	<u>3239 Dundas St. W. Oakville, ON</u>	<u>905-465-3030 x: 3215</u>

- F. The contact person who will serve as the interface between the County and the Proposer is:

NAME Jennifer Watt
 TITLE Regional Manager
 ADDRESS 3239 Dundas Street West, Oakville, Ontario – L6M 4B2
 PHONE 905-465-3030 x: 3241
 FAX 905-465-3050
 E-MAIL jwatt@zenon.com

2. The Proposal is submitted pursuant to due authorization by, and is in all respects binding upon, the Proposer.
3. The Proposer is duly organized and validly existing in good standing and is duly qualified to transact business in each and every jurisdiction where such qualification is required to enable the Proposer to perform its obligations. Neither the Proposer nor any and all of its proposed subcontractors have been debarred from contracting in the State of Georgia. The submittal of this Proposal has been authorized by all required action of the Proposer, including any action required by any charter, by-laws, partnership agreement, and/or operating agreement, as the case may be, and any Applicable Laws, which regulate the conduct of the Proposer's affairs. The performance of all obligations of the Proposer set forth in the Proposal do not conflict with and do not constitute a breach of or event of default under any charter, by-laws partnership agreement, and/or operating agreement, as the case may be, of the Proposer or any agreement, indenture, mortgage, contract or instrument to which the Proposer is a party or by which it is bound.
4. There is no action, suit or proceeding, at law or in equity, before or by any court or similar governmental body against the Proposer wherein an unfavorable decision, ruling or finding would materially adversely affect the performance by the Proposer of its obligations with the D/B Company under the Draft Design/Build Contract or the other transactions contemplated thereby, or which, in any way, would materially adversely

affect the validity or enforceability of the obligations proposed to be undertaken by the Proposer, or any agreement or instrument entered into by the Proposer in connection with the transaction contemplated hereby.

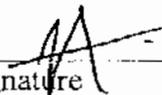
5. No corporation, partnership, individual or association, officer, director, employee, manager, parent company, subsidiary, affiliate or principal shareholder of the Proposer has been adjudicated to be in violation of any state or federal environmental law, or charged with or convicted of bribery, fraud, collusion, or any violation of any state or federal anti-trust or similar statute within the preceding five years, or previously adjudged in contempt of any court order enforcing such laws.
6. The Proposer certifies, under the penalties of perjury that to its best knowledge and belief, has filed all Georgia state tax returns and paid all Georgia state taxes and all other taxes required by law.
7. Proposer agrees that in the performance of the Membrane System Scope of Supply, Proposer will comply with all lawful agreements, if any, which the Proposer has made with any association, union, or other entity, with respect to wages, salaries, and working conditions, so as not to cause inconvenience, picketing, or work stoppage.

State Taxpayer Identification Number¹: 20014442305

Federal Taxpayer Identification Number¹: 38-254-9326

ZENON Environmental Corporation
Name of Proposer

Steve Watzeck
Name of Authorized Signatory


Signature

Vice President
Title

¹ The Proposer shall indicate if applied for.

**TECHNICAL PROPOSAL FORM B
NON-COLLUSION AFFIDAVIT
AND PRICING COMMITMENT**

STATE OF Province of Ontario

COUNTY OF City of Oakville

I, Steve Watzeck of the City of Oakville, in
the County of N/A and the State of Province of Ontario,
of full age, being duly sworn on oath depose and say that:

I am Vice President of the firm of ZENON Environmental Corporation, the
Proposer making the Proposal in response to the Fulton County, Georgia, Johns Creek
Environmental Campus Technology Request for Proposals ("The Technology RFP") and that
I executed the said Proposal with full authorization to do so; that said Proposer has not,
directly or indirectly, entered into any agreement, participated in any collusion, or otherwise
taken any action in restraint of free, competitive bidding in connection with the services; that
all statements contained in said Proposal and in this affidavit are true and correct, and made
with full knowledge that Fulton County (the "County") relies upon the truth of the
statements contained in this affidavit in selecting the Membrane System Supplier for the said
services.

I certify that this Proposal is made without prior understanding, agreement, or connection
with any corporation, firm or person submitting a proposal for the same work, labor or
service to be done or the supplies, materials or equipment to be furnished and is in all
respects fair and without collusion or fraud. I understand collusive bidding is a violation of
state and federal law and can result in fines, prison sentences, and civil damage awards. I
agree to abide by all conditions of this Proposal and certify that I am authorized to sign this
Proposal for the Proposer.

I understand the Technology RFP and have based the Proposal on the risk allocation
contained in the Draft Design/Build Contract. The Proposer has reviewed all the terms and
conditions contained in the Draft Design/Build Contract and will commit to signing a
contract to provide the Membrane System Scope of Supply with the selected D/B Company.

I have submitted all Proposal Forms, which are incorporated into this Proposal by
this reference.

I further certify:

- a: that the Proposer is not currently suspended or debarred from conducting business with any government entity;
- b: that the Proposer has reviewed all of its engagements and pending engagements and that, in making this Proposal, no potential for conflict of interest or unfair advantage exists; and
- c: that the information supplied by the Proposer in this Proposal is current, truthful, and complete.

Having carefully examined the project documents comprising the Technology RFP and all other documents bound therewith, together with all Addenda thereto, all information made available by the County, and being familiar with the Membrane System Scope of Supply and the various conditions affecting the Membrane System Scope of Supply, the undersigned hereby offers to furnish all the labor, materials, supplies, equipment, and other things necessary or proper or incidental to the Membrane System Scope of Supply as required by and in strict accordance with the applicable provisions of this Technology RFP and of all Addenda issued by the County and mailed to the undersigned prior to the Proposal Submission Date, whether received by the undersigned or not, for the Fixed Membrane System Price stated in the Proposal as elected to be implemented by the County and at the County's sole discretion.

I acknowledge receipt of addenda:

<u>No.</u>	<u>Date</u>
<u>Addendum No. 1</u>	<u>October 17, 2003</u>
<u>Addendum No. 2</u>	<u>October 28, 2003</u>
<u>Addendum No. 3</u>	<u>November 7, 2003</u>
<u>Addendum No. 4</u>	<u>November 10, 2003</u>
<u> </u>	<u> </u>
<u> </u>	<u> </u>

I further warrant that no person or selling agency has been employed or retained to solicit or secure such Membrane System upon an agreement or understanding for a commission, percentage, brokerage or contingent fee, except bona fide employees or bona fide established commercial or selling agencies maintained by ZENON Environmental Corporation.



FULTON COUNTY PURCHASING DEPARTMENT

Winner 2000 - 2003 Achievement of Excellence in Procurement Award -
National Association of Purchasing Management
Jerome Noble, Director

ADDENDUM NO. 1 Request for Bid Number 03RFP375K Johns Creek Environmental Campus Membrane System

October 17, 2003

Dear Vendor:

This addendum is in reference to Request for Proposal Number 03RFP375K
Johns Creek Environmental Campus Membrane System.

**Please note: The submittal date for the Request for Proposal listed above
has been changed to October 30, 2003 at 11 am.**

A second Addendum to address vendor questions and requests for information
will be forthcoming. Except as provided herein, all terms and conditions in the
RFB referenced above remain unchanged and in full force and effect.

For additional information regarding this addendum, please contact Nancy
Harrison, CPPB, Assistant Purchasing Agent at (404) 730-4201.

Sincerely,

Nancy Harrison, CPPE
Assistant Purchasing Agent



FULTON COUNTY PURCHASING DEPARTMENT

Winner 2000 - 2003 Achievement of Excellence in Procurement Award -
National Association of Purchasing Management
Jerome Noble, Director

ADDENDUM NO. 2 Request for Proposal Number 03RFP375K Johns Creek Environmental Campus Membrane System

October 28, 2003

Dear Vendor:

This addendum is in reference to Request for Proposal Number 03RFP375K
Johns Creek Environmental Campus Membrane System.

**Please note: The submittal date for the Request for Proposal listed above
has been changed to November 13, 2003 at 11 am.**

I apologize for any hardship this delay may cause. Every effort is being made to
address vendor concerns and requests for information as quickly as possible.

Except as provided herein, all terms and conditions in the RFB referenced above
remain unchanged and in full force and effect.

For additional information regarding this addendum, please contact Nancy
Harrison, CPPB, Assistant Purchasing Agent at (404) 730-4201.

Sincerely,

Nancy Harrison, CPPB
Assistant Purchasing Agent



FULTON COUNTY PURCHASING DEPARTMENT
Winner 2000-2003 Achievement of Excellence in Procurement Award
National Association of Purchasing Management

JEROME NOBLE, DIRECTOR

ADDENDUM NO. 3
Request for Proposal Number 03RFP375K
Johns Creek Environmental Campus Membrane System

November 7, 2003

Dear Vendors:

This addendum is in reference to Request for Proposals, 03RFP375K, Johns Creek Environmental Campus Membrane System.

Change to the RFP: Please make the following specific changes

1. On page 4-1 change the RFP number to: (#03RFP375K)
2. Replace table A2-2, page Appendix 2-2 with Attachment 1.

There has been an inquiry requesting clarification with regard to participation as a sub-contractor on a team during both, the Phase I, membrane system supplier procurement and Phase II the Design/Build Company procurement. Fulton County clarification is as follows:

3. Add the following paragraph to page 2-3.

2.5 Phase I and II Participation Restrictions:

Participation as a member of a joint venture or any form of partnering or by an entity during phase I (Technology RFP) of the procurement precludes participation as a member of a joint venture or any form of partnering by that entity during Phase II (Design/Build RFP) of the D/B project of the project. With regard to sub-contractors, suppliers of material, equipment, or other items specified by either procurement are allowed to participate as material or equipment suppliers in either or both phase's procurements as opportunities arise. Sub-contractors supplying services, such as design, engineering, consulting or like services are limited to participation in one phase of the Design/Build project only

4. In Section 3.2, COUNTY RIGHTS AND OPTIONS, add the following:
 - Any award of work, contract, or service for any portion of the Design/Build Project will be conditional and subject to Fulton County obtaining financing through the issuance of water and sewer revenue bonds where the proceeds from such bonds are in an amount sufficient

Sincerely,

Nancy Harrison, CPPB
Assistant Purchasing Agent

Acknowledgment of Addendum No. 3

Johns Creek Environmental Campus Membrane System

Failure to include a signed copy of this acknowledgment with your proposal documents could render your proposal non-responsive. Except as provided herein, all terms and conditions in the RFP referenced above remain unchanged and in full force and effect.

Company Name: ZENON ENVIRONMENTAL CORPORATION Signature: [Signature]
Name: DAVE BINGHAM Title: MANAGER Date: NOV 10/03



FULTON COUNTY PURCHASING DEPARTMENT
Winner 2000-2003 Achievement of Excellence in Procurement Award
National Association of Purchasing Management

JEROME NOBLE, DIRECTOR

ADDENDUM NO. 4
Request for Proposal Number 03RFP375K
Johns Creek Environmental Campus Membrane System

November 10, 2003

Dear Vendors:

This addendum is in reference to Request for Proposals, 03RFP375K, Johns Creek Environmental Campus Membrane System.

Please note: The submittal date for the Request for Proposal listed above has been changed to November 20, 2003 at 11 am.

Attachment 1 to this addendum is the Design/Build Contract.

Make the following changes to the RFP: Please make the following specific changes:

1. In "Definitions," delete the definition for "Membrane System Supplier Bid Bond" and insert the following:

"Surety in penal sum of 5% of Membrane System Proposer's Fixed Membrane System Price submitted in each proposal to the County, that proposer will forfeit to the County, should it fail to enter into the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with D/B Company by the Contract Date, along with other conditions for forfeiture contained in the Technology RFP."

2. In "Definitions," delete the definition for "D/B Bid Bond" and replace it with the following:

"Surety in penal sum of 5% of the Fixed Design/Build Price submitted in each proposal to the County, that the D/B Company will forfeit to the County should it fail to enter into the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Membrane System Supplier by the Contract Date, along with the other conditions of forfeiture contained in the D/B RFP. Also identified as Design/Build Bid Bond."

3. In Section I, Introduction, Subsection 1.1, Overview, in the second paragraph, delete the second to last sentence in its entirety and insert the following:

"The successful Membrane System Supplier selected during phase one of the Design/Build Project pursuant to the Technology RFP, will be required to enter into the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company

selected in phase two of the Design/Build Project, by the Contract Date. The "Subcontract For The Membrane System For Johns Creek Environmental Campus" is provided as an attachment hereto."

4. In Section I, Introduction, Subsection 1.1, Overview, page 1-2, replace the second paragraph on that page with the following:
"The Membrane System Supplier will be required by Form A- I, Section 6, to guarantee that it will enter into the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company by the Contract Date. This guarantee will be secured by the Membrane System Supplier Bid Bond."

5. In Section I, Introduction, Subsection 1.1, Overview, page 1-3, replace the first paragraph on that page with the following:

"If the proposer withdraws its proposal from the competition after the selection of its proposal for a reason not authorized by Georgia law, or if the successful proposer fails to execute the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company by the Contract Date, the County will proceed on the Membrane System Supplier Bid Bond."

6. In Section 4, Proposal Requirements, Subsection 4.3, Technical Proposal Format and Content, Section 1 – Executive Summary, on page 4.3, replace the second paragraph on that page with the following:

"If the proposer withdraws its proposal from the competition after the selection of its proposal for a reason not authorized by Georgia law, or if the successful proposer fails to execute the "Subcontract For The Membrane System For Johns Creek Environmental Campus" with the Design/Build Company by the Contract Date, the County will proceed on the Membrane System Supplier Bid Bond."

7. **Payment and Performance Bonds**, please insert in Section 4 of the Technology RFP, the following:

PAYMENT AND PERFORMANCE BONDS REQUIRED. *"Prior to the Contract Date, the Membrane System Supplier must provide a Payment Bond and a Performance Bond, with good and sufficient surety, payable to, in favor of, and for the protection of the selected Design/Build Company. The Payment Bond and the Performance Bond shall each be in the amount equal to at least one-hundred (100%) percent of the Fixed Membrane System Price. Surety companies executing such Bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State of Georgia. Attestation for a corporation must be by the corporate officer; for a partnership by another partner; for an individual by a notary with the corporate seal."*

8. In section 6 of the Technology RFP remove Form A and insert attachment 2 as new Form A.

Sincerely,

Nancy Harrison, CPPB
Assistant Purchasing Agent

Acknowledgment of Addendum No. 4

Johns Creek Environmental Campus Membrane System

Failure to include a signed copy of this acknowledgment with your proposal documents could render your proposal non-responsive. Except as provided herein, all terms and conditions in the RFP referenced above remain unchanged and in full force and effect.

Company Name: ZENON ENVIRONMENTAL CORPORATION Signature: [Handwritten Signature]
Name: DAVE BINGHAM Title: TECHNICAL SUPPORT Date: NOV 13/03

ZENON Environmental Corporation

Name of Proposer

Steve Watzeck

Name of Authorized Signatory

Signature

3239 Dundas Street West, Oakville, Ontario - L6M 4B2

Address

Vice President

Title

Note: If this Proposal is being submitted by a corporation, the Proposal shall be executed in the corporate name by the president or other corporate officer, and attested to by the clerk. A certificate of the clerk of the corporation evidencing the officer's commission to execute the Proposal shall be attached.

If this Proposal is being submitted by a joint venture, it shall be executed by all joint venture partners, and any partner that is a corporation shall follow the requirements for execution by a corporation as set forth above.

R. H.
(Notary Public)

Robert Martin Haire, Notary Public,
Regional Municipality of Halton, limited
to the attestation of instruments and
the taking of affidavits, for Zenon
Environmental Inc.
Expires September 19, 2004.

State of Province of Ontario
County of City of Oakville

On this Nineteenth day of November, 2003 before me appeared Steve Watzeck, personally known to me to be the person described in and who executed this Bid Form and acknowledged that (she/he) signed the same freely and voluntarily for the uses and purposes therein described.

In witness thereof, I have hereunto set my hand and affixed my official seal the day and year last written above.

R. H.
Notary Public in and for the State of Province of Ontario

(seal)

Rob Haire
(Name Printed)

Residing at Mississauga, Ontario

My Appointment Expires September 19, 2004

TECHNICAL PROPOSAL FORM C MEMBRANE SYSTEM

Membrane Configuration

Membrane System Supplier	ZENON Environmental Inc.
Manufacturer's membrane designation	ZW500d
Number of independently isolatable trains in proposed design	8
Name of large membrane subunits (e.g., cassette or block)	Cassette
Number of large membrane subunits per train	11
Spaces per train for additional future large subunits	3
Name of small membrane subunit (e.g., element or module)	Module
Number of small membrane subunits per large membrane subunit	48 in 80 cassettes 24 in 8 cassettes
Spaces in each large membrane subunit for additional (future) small membrane subunits	0 (See Note 1)
Feed side wetted membrane surface area per small membrane subunit (square feet)	340
Type of membrane (e.g., hollow fiber or flat sheet)	Hollow Fiber

Proposer-Specified Activated Sludge Process Design Parameters

Maximum 30-day average mixed liquor suspended solids (MLSS) concentration in Membrane System feed (mg/L)	9,000
Corresponding MLSS concentration in mixed liquor recycle (MLR) (mg/L)	11,083
Maximum 7-day average MLSS concentration in Membrane System feed (mg/L)	9,000
Corresponding MLSS concentration in MLR (mg/L)	11,224
Maximum daily average MLSS concentration in Membrane System feed (mg/L)	9,000 (See Note 2)
Corresponding MLSS concentration in MLR (mg/L)	12,000
Minimum biological process solids retention time (days)	12 (max month)
Maximum opening size of secondary influent fine screen (millimeter)	2
Type of flow from activated sludge tankage to Membrane System (pumped or gravity)	Gravity
Maximum mixed liquor flow rate from activated sludge tankage to Membrane System (MGD)	98.8

Type of flow from Membrane System to activated sludge tankage (pumped or gravity)	Pumped
Maximum mixed liquor flow rate from Membrane System to activated sludge tankage (MGD)	74.1

Membranes

Membrane material	PVDF (polyvinylidene fluoride)
Support/backing material	Polyester
Other material (specify part)	Potting cavities (ABS)
Number of fibers or sheets per small membrane subunit (defined above)	4928
Hollow fiber inside diameter (millimeter)	0.8
Hollow fiber outside diameter (millimeter)	1.9
Flat sheet thickness (millimeter)	n/a
Effective pore size (micron)	0.04
Acceptable pH range during normal operation	5 - 9.5
Acceptable pH range during cleaning	2 - 11
Free chlorine tolerance (ppm-hours)	1,000,000

Air Scour

Use air scour during normal operation? (yes or no)	yes
Fully automated? (yes or no)	yes
Membrane grouping independently receiving air scour (e.g., one cassette)	One half of a cassette
Total length of operating cycle (minutes)	0.333 (20 seconds)
Portion of operating cycle with air on (minutes)	0.167 (10 seconds)
Air flow rate to independent membrane group during air scour (scfm)	285

Backwash

Use backwash? (yes or no)	yes (See Note 3)
Fully automated? (yes or no)	yes
Membrane grouping independently receiving backwash (e.g., one train)	One half of a train
Portion of operating cycle in backwash (minutes or seconds)	30 seconds
Backwash interval (minutes)	12 minutes
Backwash duration (minutes)	0.5 (30 seconds)

Source of backwash water (e.g., permeate)	Permeate
Volume of spent backwash water (gallons per million gallons permeate)	NA (See Notes 3&4)
Volume of spent backwash water (gallons per backwash event)	NA (See Notes 3&4)
Chemical(s) added to backwash water (e.g., sodium hypochlorite or none)	None (See Notes 4&5)
Concentration of chemical(s) in spent backwash water	NA (See Note 4)
Temperature of backwash water ("NA" for no adjustment, degrees Fahrenheit)	NA
Relax (Time Not Producing Permeate)	
Use relax? (yes or no)	yes (See Note 3)
Fully automated? (yes or no)	yes
Portion of operating cycle in relax (minutes)	0.5 (30 seconds)
Maintenance Clean	
Use maintenance clean? (yes or no)	yes
Fully automated? (yes or no)	yes
Duration of maintenance clean (minutes)	120 (See Note 6)
Maintenance clean interval at maximum 30-day average flow (QMAX30) (days)	7
Maintenance clean interval at maximum 7-day average flow (QMAX7) (days)	7
Source of water for maintenance clean (e.g., permeate)	permeate
Membrane grouping independently receiving maintenance clean (e.g., one train)	one train
Volume of spent cleaning solution per maintenance clean (gallons)	None (See Note 7)
Chemical(s) use during maintenance clean	NaOCl & Citric Acid
Concentration of chemical(s) in cleaning solution	500mg/L & 2000 mg/L
Temperature of maintenance clean water ("NA" for no Adjustment, degrees Fahrenheit)	NA
Recovery Clean	
Fully automated? (yes or no)	yes
Duration of recovery clean (minutes)	960
Recovery clean interval at QMAX30 (days)	121.7 (See Note 8)

Recovery clean interval at QMAX7 (days)	<u>121.7 (See Note 8)</u>
Source of water for recovery clean (e.g., permeate)	<u>permeate</u>
Membrane grouping independently receiving recovery clean (e.g., one train)	<u>one train</u>
Volume of spent cleaning solution per recovery clean (gallons)	<u>52,226 (See Note 8)</u>
Chemical(s) use during recovery clean	<u>NaOCl & Citric Acid</u>
Concentration of chemical(s) in cleaning solution	<u>500 mg/L & 2000 mg/L</u>
Temperature of recovery clean water ("NA" for no adjustment, degrees Fahrenheit)	<u>NA</u>

Notes for Technical Proposal Form C:

1. The design includes 11 cassettes per train. 10 of the cassettes will be filled to capacity (ie: 48 modules per cassette). One cassette per train will be half filled to 24 modules, with room for an additional 24 modules.
2. The system is designed to maintain the same MLSS concentration in the Membrane System feed by operating at a constant recirculation rate, however it is acceptable for the MLSS in the feed to the Membrane System to reach concentrations greater than 9,000 mg/L for short periods of time.
3. The ZeeWeed MBR system is designed to operate in either backpulse or relax mode. Under normal operation, the system will operate in relax mode only. However, under certain fouling conditions and sludge characteristics, the ability to backpulse the membrane is essential to maintaining a clean membrane.
4. During backwash, only permeate is used, with no chemicals added. The backwash water remains in the membrane tank and does not need to be sent anywhere for additional treatment. As the downtime for backwash has already been taken into account in the design net flux, the volume of backwash water will have no impact on net plant production, and as such is not considered as "spent".
5. Although no chemicals are added to the backwash or CIP/Backpulse tank during routine operation, the CIP/backpulse tanks should be shock chlorinated with 5 mg/L of NaOCl once per week to prevent biological growth within the tanks.
6. The time of 120 minutes is provided for back-to-back maintenance cleaning with sodium hypochlorite and citric acid, each clean taking approximately 60 minutes. Please refer to the notes attached to Form C explaining the conditions requiring citric acid maintenance cleaning.
7. During maintenance cleans, low concentrations of chemicals are used, and the backwash water remains in the membrane tank and does not need to be sent anywhere for additional treatment. As the downtime for maintenance cleaning has already been taken into account, the volume of water used for maintenance cleaning will have no impact on net plant production, and as such is not considered as "spent".
8. Spent cleaning solution from recovery cleaning will be returned upstream of the primary clarifiers at a low rate, after having been partially neutralized by mixing with small amounts of mixed liquor in the membrane tank at the end of a recovery clean. (see Section 3.8 of the Technical Proposal)



**TECHNICAL PROPOSAL FORM D
MOTOR-DRIVEN EQUIPMENT**

General Information	Proposer-Specific Information
Permeate Pumps	
Manufacturer	Goulds
Tag No.	P-35-1 to 8
Model No.	3180
Size	8x10-16/5V L
Number of Units	8 installed and 1 shelf spare
Design / Operating Parameters	
Capacity Range	945 – 2870 gpm
Minimum Flow	945 gpm
Motor Control	VFD
Discharge Pressure	17 psig
Rated Efficiency	85% at 882 rpm
Motor Horsepower	40 hp at 900 rpm
Power Requirements	460 Volt / 3 phase / 60 Hz
Motor Enclosure	TEFC premium efficiency
Materials of Construction	
Casing, Sideplate, Stuffing Box Cover	Cast iron rated for 154 psig
Impeller, Shaft Sleeve, Gland	316SS
Shaft	Steel 4340
Baseplate	Fabricated steel
Other Features	
Lubrication	Flood oil
Seal Chamber	Standard non cooled
Sealing Method	Mechanical seal – John Crane, single
Flanges	125# flat face
Weight With / Without Crating	3408 / 2920 lbs
Dimensional Information	
Baseplate Footprint Size	88.75 x 31.50 inch
Suction / Discharge Flange Size	10 / 8 inch
Flush Water Connection	Not applicable

**TECHNICAL PROPOSAL FORM D
MOTOR-DRIVEN EQUIPMENT**

General Information	Proposer-Specific Information
Recirculation Pumps	
Manufacturer	Goulds
Tag No.	P-34-1 to 6
Model No.	AF
Size	14x14-14
Number of Units	8 installed and 1 shelf spare
Design / Operating Parameters	
Capacity	6,435 gpm
Motor Control	Single Speed
Discharge Pressure	4.3 psig
Rated Efficiency	64.5% at 917 rpm
Motor Horsepower	30 hp at 1800 rpm
Power Requirements	460 Volt / 3 phase / 60 Hz
Motor Enclosure	TEFC premium efficiency
Materials of Construction	
Casing, Impeller	Cast iron rated for 154 psig
Shaft Sleeve, Gland	316SS
Shaft	Steel AISI 1045
Baseplate	Fabricated steel
V-belt Drive (direct coupling optional)	Wood's single speed
Other Features	
Lubrication	Flood oil
Seal Chamber	Taper bore
Sealing Method	Mechanical seal -- John Crane, single
Flanges	150# flat face
Weight Without Crating	3450 lbs
Dimensional Information	
Baseplate Footprint Size	72.50 x 62.00 inch
Suction / Discharge Flange Size	14 / 14 inch
Flush Water Connection	Not applicable

**TECHNICAL PROPOSAL FORM D
MOTOR-DRIVEN EQUIPMENT**

General Information	Proposer-Specific Information
Staging Tank Pump	
Manufacturer	Goulds
Tag No.	P-80
Model No.	3196
Size	3x4-7 MTX
Number of Units	1 installed
Design / Operating Parameters	
Capacity	170 gpm
Motor Control	Single speed
Discharge Pressure	6.9 psig
Rated Efficiency	44.5% at 1750 rpm
Motor Horsepower	3 hp at 1800 rpm
Power Requirements	460 Volt / 3 phase / 60 Hz
Motor Enclosure	TEFC premium efficiency
Materials of Construction	
Casing, Stuffing Box Cover	316SS rated for 275 psig
Impeller, Shaft Sleeve, Gland	316SS
Shaft	SAE 4140
Baseplate	Cast iron
Other Features	
Lubrication	Flood oil
Seal Chamber	Taper bore
Sealing Method	Mechanical seal – John Crane, single
Flanges	150# flat face
Weight With / Without Crating	501 / 426 lbs
Dimensional Information	
Baseplate Footprint Size	45.00 x 12.00 inch
Suction / Discharge Flange Size	4 / 3 inch
Flush Water Connection	Not applicable

**TECHNICAL PROPOSAL FORM D
MOTOR-DRIVEN EQUIPMENT**

General Information	Proposer-Specific Information
Membrane Aeration Blowers	
Manufacturer	Lamson
Tag No.	B-85A/B/C/D/E
Model No.	1405
Size	18" / 16"
Number of Units	5 installed (4 duty and 1 standby)
Design / Operating Parameters	
Capacity Range	5550 – 7570 scfm
Motor Control	Single speed – Influent flow control valve used
Discharge Pressure	4.7 - 6.5 psig
Blower Rated Efficiency	56.3% at 40°C; 49.3% at 15°C
Motor Horsepower	300 hp at 3600 rpm
Power Requirements	460 Volt / 3 phase / 60 Hz
Motor Enclosure	TEFC
Materials of Construction	
Casing, Sideplate, Stuffing Box Cover	Cast iron ASTM #25
Impeller, Shaft Sleeve, Gland	Cast aluminum alloy
Shaft	High grade hot rolled shaft steel
Baseplate	Fabricated steel
Other Features	
Lubrication	Splash lubricated
Seal Chamber	Standard non cooled
Sealing Method	Labyrinth
Flanges	125# flat face
Weight With / Without Crating	8870 / 8380 lbs
Dimensional Information	
Baseplate Footprint Size	142.25 x 31.75 inch
Suction / Discharge Flange Size	18 / 16 inch
Flush Water Connection	Not applicable

**TECHNICAL PROPOSAL FORM D
MOTOR-DRIVEN EQUIPMENT**

General Information	Proposer-Specific Information
Chemical Solution Mixer	
Manufacturer	ProMinent
Tag No.	MX-6505
Model No.	7818592
Size	To 300 gal
Number of Units	1 installed
Design / Operating Parameters	
Capacity	N/a
Motor Control	Single speed, Local pushbutton
Motor Horsepower	1/4 hp at 1725 rpm
Power Requirements	115 Volt / 1 phase / 60 Hz
Motor Enclosure	TEFC
Materials of Construction	
Impeller	316 SS
Shaft	316 SS
Other Features	
Weight Without Crating	27 lbs
Miscellaneous Equipment	Mounting bracket with bolt holes
Dimensional Information	
Shaft Length	34"

**TECHNICAL PROPOSAL FORM D
ELECTRICAL EQUIPMENT AND SYSTEMS**

General Information	Proposer-Specific Information
VFD	
Manufacturer	Cutler-Hammer
Model No.	SV9000
Product Specifications	
Rectifier	6-Pulse
Input Voltage	460 VAC
Input Frequency Range	45 to 66 Hz
Output Voltage	0 to Rated Voltage
Output Current	110% of Rated Output
Output Frequency	0 to 500 Hz
Control Voltage	24 VDC
Digital Inputs	6 Programmable
Digital Outputs	2 Programmable Form-C, 1 Programmable Open Collector
Analog Inputs	0-10 VDC, 4-20 mA, External Potentiometer
Analog Outputs	1 Programmable 0-20 mA
Environmental Conditions	
Operating Temperature	-10 to 40 C
Storage Temperature	-40 to 60 C
Relative Humidity	95 % non-condensing
Vibration	0.5 g
Shock	8 g
Harmonic Mitigation	
	Due to the high ratio of linear loads versus non-linear loads, ZENON is proposing standard 6-pulse VFDs with input line filters. ZENON's preliminary analysis of the ZENON-only loads indicates that they will conform to IEEE519 guidelines. However, the electrical distribution design and other loads in the facility will ultimately dictate if the overall system conforms to IEEE519 guidelines.
Additional Features	
	Control Panel with Backlit 4-Line LCD Display
	Optional Network Communication
	Internal Line Reactors
	dvdt Load Filters
	Hand-Off-Auto Selector Switch
	Speed Potentiometer for Hand Control
	Elapsed Time Meter

**TECHNICAL PROPOSAL FORM D
ELECTRICAL EQUIPMENT AND SYSTEMS**

General Information	Proposer-Specific Information
PLC - CPU	
Manufacturer	Allen-Bradley
Model No.	ControlLogix 1756-L55M24
Product Specifications	
User Memory	3.5 MB RAM
Non-Volatile Memory	3.5 MB Flash RAM
I/O Memory	208 KB
Programming Software	RSLogix 5000
Thermal Dissipation	19.4 BTU/hr
Environmental Conditions	
Operating Temperature	0 to 60 C
Storage Temperature	-40 to 85 C
Relative Humidity	5 to 95 % non-condensing
Hot Backup Configuration	
Redundancy Module	1757-SRM
Switchover	Automatic on CPU, Power Supply, and Communication Module Failure
Redundancy Module Cable	1757-SRC
Cable Media	ST-type Fiber-Optic
Additional Features	
	Battery Backup
	RS-232 Programming Port

**TECHNICAL PROPOSAL FORM D
ELECTRICAL EQUIPMENT AND SYSTEMS**

General Information	Proposer-Specific Information
PLC – Discrete Input Module	
Manufacturer	Allen-Bradley
Model No.	ControlLogix 1756-IA16
Product Specifications	
Type	120 VAC Input
Number of Points	16
On-State Voltage Range	74-132 VAC, 47-63 Hz
On-State Current	5 mA @ 74 VAC minimum 13 mA @ 132 VAC maximum
Maximum Off-State Voltage	20 V
Maximum Off-State Current	2.5 mA
Thermal Dissipation	18.41 BTU/hr
Environmental Conditions	
Operating Temperature	0 to 60 C
Storage Temperature	-40 to 85 C
Relative Humidity	5 to 95 % non-condensing

**TECHNICAL PROPOSAL FORM D
ELECTRICAL EQUIPMENT AND SYSTEMS**

General Information	Proposer-Specific Information
PLC – Analog Input Module	
Manufacturer	Allen-Bradley
Model No.	ControlLogix 1756-IF16
Product Specifications	
Type	4-20 mA
Number of Points	8 Differential
Resolution	16-Bit
Data Format	Integer, Floating Point IEEE 32-Bit
Thermal Dissipation	13.30 BTU/hr
Environmental Conditions	
Operating Temperature	0 to 60 C
Storage Temperature	-40 to 85 C
Relative Humidity	5 to 95 % non-condensing

**TECHNICAL PROPOSAL FORM D
ELECTRICAL EQUIPMENT AND SYSTEMS**

General Information	Proposer-Specific Information
HMI	
Manufacturer	Allen-Bradley
Model No.	PanelView Plus 1250
Product Specifications	
Display	12.1" 800x600 Active Matrix TFT
Operator Input	Touch
Memory	128 MB Flash RAM, 128 MB User RAM
Input Voltage	18-32 VDC
Power Consumption	40 Watts
Communication	Ethernet, RS-232, 2 USB
Programming Software	RSView Studio for Machine Edition
Rating	NEMA 4X
Environmental Conditions	
Operating Temperature	0 to 55 C
Storage Temperature	-25 to 70 C
Relative Humidity	5 to 95 % non-condensing
Additional Features	
	Real Time Clock

Process Piping Schedule

P&ID No.	System	Service	Material	Interior Lining	Maximum Operating Pressure, psig
D-002	Membrane Aeration	Air	In blower room: All sizes sch 40 Carbon Steel	N/a	6.5
D-004	Membrane Aeration	Air	In pump gallery: 30" sch 10 304L SS 14" sch 10S 316L SS 1" sch 40S 316L SS	N/a	6.5
D-004	Tank Fill	Permeate	10" sch 10S 304L SS	N/a	17.3
D-004	Permeate Headers and Interconnecting Pipes	Permeate	10" sch 10S 316L SS	N/a	10.0
D-004	Recirc Pump Suction	Mixed Liquor	18" sch 10S 316L SS, DI optional	N/a	3.9
D-004	Drain	Spent chemicals & mixed liquor	12" sch 10S 316L SS	N/a	3.9
D-005	Permeate Extraction (between FV-3561 and air separator)	Permeate	10" sch 10S 316L SS	N/a	Negative
D-005	Permeate Extraction (air separator)	Permeate	32" 304L SS	N/a	Negative
D-005	Permeate Pump Suction	Permeate	14" sch 10S 316L SS	N/a	Negative
D-005	Permeate Pump Discharge	Permeate	10" sch 10S 304L SS	N/a	17.3
D-007	Tank Fill	Permeate	8" sch 10S 304L SS	N/a	17.3
D-007	Tank Overflow	Permeate	10" sch 10S 304L SS	N/a	Gravity
D-007	CIP/Backpulse Pump Suction	Permeate	10" sch 10S 304L SS	N/a	Negative
D-007	CIP/Backpulse Pump Discharge	Permeate	Upstream of chemical injection: 8" sch 10S 304L SS Downstream of chemical injection: 8" sch 80 CPVC	N/a	10.0

**TECHNICAL PROPOSAL FORM D
PIPING AND VALVES**

Valves

General Information	Proposer-Specific Information
Ball Valves	
Manufacturer	United Alloys (SS) or Chemline (Plastic)
Tag No.	Various
Style	Threaded or Socketweld
Process Connection Size	Various
Design / Operating Parameters	
Service	Air/Water/Chemical
Pressure Rating - SS - Plastic	1000 psig – 14.7 to 230 psig
Temperature Range - SS - Plastic	– 20 to 220°C 0 to 100°C depending on type of material
Materials of Construction	
Body/Ball SS	316SS
Body/Ball Plastic	PVC, CPVC, PP, PVDF all available
Other Features	
Actuator	Various – supplier dependant
Limit Switches	Various – supplier dependant
Solenoid	Various – supplier dependant

**TECHNICAL PROPOSAL FORM D
PIPING AND VALVES**

General Information	Proposer-Specific Information
Cyclic Valves	
Manufacturer	Stealth
Tag No.	Various
Type/Style	Damper/Wafer
Process Connection Size	Various
Design / Operating Parameters	
Service	Air
Class	Bubble Tight
Pressure Rating	15-psi bi-directional shutoff
Temperature Range	- 40 to 121°C for EPDM seat
Cyclic Life	Minimum 1,000,000 cycles
Materials of Construction	
Body	Aluminum
Seat	EPDM
Disc	316SS
Stem	316SS
Other Features	
Actuator	Valbia Double Acting Pneumatic
Limit Switches	FSYB-5T20 Box w/proximity switches
Solenoid	4-Way NEMA 4 120/1/60

TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS

General Information	Proposer-Specific Information
Flow Transmitter Air	
Manufacturer	E&H
Tag No.	FE/FIT-8520
Model No.	AT70
Number of Units	1
Design / Operating Parameters	
Service	Air
Pressure Rating	300 psig
Temperature Range (Service Fluid)	-10 to 100°C
Accuracy	+/- 2% on Calibrated Gas
Power Requirements/Connection	20 to 30 VDC / ½ " NPT
Housing Rating	NEMA 4X
Materials of Construction	
Sensor	316L SS
Housing	Cast Aluminum, painted
Other Features	
Integral LCD	Yes
Dimensional Information	
Process Connection Size	Insertion probe ½"
Pipe Size Range	3" to 39"

**TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS**

<u>General Information</u>	<u>Proposer-Specific Information</u>
Level Switch – Proximity Capacitance	
Manufacturer	Carlo Gavazzi
Tag No.	LSH-9202A/B
Model No.	EC 3025
Number of Units	2
<u>Design / Operating Parameters</u>	
Service	Liquid
Temperature Range (Service Fluid)	-25 to 80°C
Accuracy	+/- 5%
Power Requirements/Connection	20 to 250 VAC / ½" NPT
<u>Materials of Construction</u>	
Body	Thermoplastic polyester
Cable	Polyester
<u>Other Features</u>	
Alarm	Adjustable set-point
<u>Dimensional Information</u>	
Process Connection Size	1/8" Typical

**TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS**

General Information	Proposer-Specific Information
Level Switch – Non Chemical Service	
Manufacturer	ITT Flygt
Tag No.	Various
Model No.	ENM-10
Number of Units	18
Design / Operating Parameters	
Service	Liquid
Pressure Rating	Up to 50m depth
Temperature Range (Service Fluid)	30 to 60°C
Power Requirements/Connection	30 VDC / ½ “ NPT
Materials of Construction	
Body	Polypropylene
Cable	PVC compound or CPE rubber
Other Features	
Alarm	Adjustable set-point
Dimensional Information	
Process Connection Size	¾” Typical

**TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS**

<u>General Information</u>	<u>Proposer-Specific Information</u>
Pressure Gauges	
Manufacturer	Ashcroft
Tag No.	Various
Model No.	1008S
Number of Units	46
<u>Design / Operating Parameters</u>	
Service	Various
Pressure Rating	Various with model selection
Temperature Range (Service Fluid)	- 25 to 75°C
Accuracy	Grade B 3-2-3% ASME rating
<u>Materials of Construction</u>	
Body	304 SS
Internal	Glycerin or Silicon Filled
<u>Other Features</u>	
Diaphragm Seal Supplied	On lines where solids may be issue – also Ashcroft, model varies
<u>Dimensional Information</u>	
Process Connection Size	¼” or ½” Typical bottom or back mounted
Dial Size	2 ½” or 4” Typical

**TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS**

General Information	Proposer-Specific Information
Pressure Switch Air	
Manufacturer	United Electric
Tag No.	PSL-9107, PSL-9108
Model No.	H100
Number of Units	2
Design / Operating Parameters	
Service	Air
Pressure Rating	- 14.7 to 5000 psig depending on selection
Temperature Range (Service Fluid)	- 115 to 340°C
Accuracy	+/- 1%
Power Requirements/Connection	15 A 125/250/480 VAC / ½ " NPT
Housing Rating	NEMA 4X
Materials of Construction	
Process Connection	316L SS
Housing	Aluminum
Other Features	
Integral LCD	No
Dimensional Information	
Process Connection Size	¼" or ½" depending on model

TECHNICAL PROPOSAL FORM D
INSTRUMENTATION, CONTROL, PROCESS MONITORING, COMMUNICATION
SYSTEMS

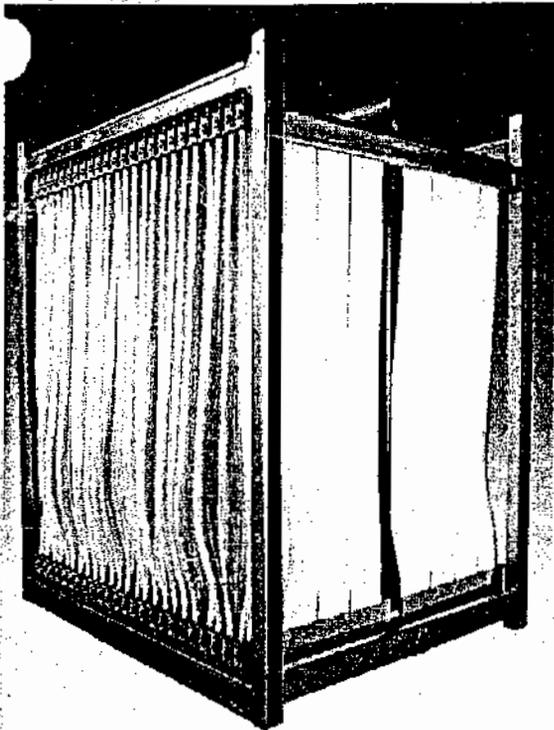
General Information	Proposer-Specific Information
Temperature Transmitter	
Manufacturer	E&H
Tag No.	TE/TIT-3523-1 to 8
Model No.	
Number of Units	8
Design / Operating Parameters	
Service	Liquid
Pressure Rating	Up to 725 psig depending on temperature
Temperature Range (Service Fluid)	- 50 to 600°C depending on RTD
Accuracy	+/- 0.2%
Power Requirements/Connection	24 VDC / ½ " NPT
Housing Rating	NEMA 4X
Materials of Construction	
Process Connection	316L SS
Housing	Aluminum coated
Other Features	
Integral LCD	Optional
Dimensional Information	
Process Connection Size	¾" Typical

**TECHNICAL PROPOSAL FORM D
TANKS AND METERING PUMPS**

General Information	Proposer-Specific Information
Air Diaphragm Pumps	
Manufacturer	ProMinent
Tag No.	P-66A/B, P-65A/B
Model No.	Duodos 25 PVDF; Duodos 15 PP respectively
Number of Units	4 installed, 1 duty & 1 standby per group
Design / Operating Parameters	
Capacity Range	0-45.0 gpm for 25 PDVF 0-13.7 gpm for 15 PP
Temperature Range	-13 to 93°C for PVDF 5 to 65°C for PP
Motor Control	Air Driven
Discharge Pressure	Variable
Materials of Construction	
Body	PVDF and PP respectively
Diaphragms	PTFE or Santoprene
Other Features	
Suspended Solids Handling Size	Up to 6mm
Weight	64 lbs for 25 PVDF 19.8 lbs for 15 PP
Dimensional Information	
Baseplate Footprint Size	5.6 x 17.6 inches for 25 PVDF 4.06 x 10.2 inches for 15 PP
Suction / Discharge Connection Sizes	2" / 2" NPT for 25 PP 1" / 1" NPT for 15 PP

Immersed Hollow Fibre Filtration Cassette

ZeeWeed[®] 500d-48



Cassette Specifications

Permeate connection size	4" pipe vertical branch or 8" pipe horizontal
Typical cassette shipping weight	1201 kg (2648 lb)
Typical cassette shipping weight including crate	1561 kg (3442 lb)
Typical wet cassette weight †	1450 kg (3197 lb)
Displaced volume during MIT	290 L (77 gal)
Standard cassette configuration is 48 modules. Number of modules may be reduced in increments of 4. Frame size remains unchanged	

† Wet cassette weight does not include any accumulation of solids during operation

Aeration Specifications

Maximum air temperature 65°C (150°F)

The aeration manifold consists of two parallel channels which can be operated alternately with 2 x 3" pipe connection for intra-cassette cycling or simultaneously with 1 x 4" pipe connection for whole cassette cycling.

Air connection size	Sequential (within cassette)	Cyclic (whole cassette)
	2 x 3" pipe	1 x 4" socket
Maximum instantaneous air flow*	425 dm ³ /hr (250 dcfm)	850 dm ³ /hr (500 dcfm)
Minimum instantaneous air flow*	270 dm ³ /hr (160 dcfm)	540 dm ³ /hr (320 dcfm)
Aerator pressure loss @ maximum air flow (excluding hydraulic head)	0.05 bar 0.8 psig	0.05 bar 0.8 psig

*Air flow depends on application consult design manual for specific requirement

dcfm = cubic feet per minute at point of discharge (aerator submergence)

dm³/hr = cubic meters per hour at point of discharge.

Operating Specifications

Maximum permeation transmembrane pressure	83 kPa (12 psig)
Typical operating transmembrane pressure	7-70 kPa (1 to 10 psig)
Maximum backpulse transmembrane pressure	69 kPa (10 psig)
Maximum operating temperature	40°C (104 °F)



Water for the World

**TECHNICAL PROPOSAL FORM E
DISCLAIMER STATEMENT**

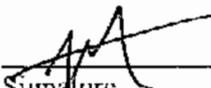
The information contained in this Technology RFP has been prepared by the County and while such information is believed to be accurate and reliable, the County makes no representation as to such accuracy or reliability. In no way shall any such information constitute a representation or warranty by the County or any of its officials, employees, agents, consultants, attorneys, representatives, contractors, and subcontractors (the "County Representatives") whatsoever. By submittal of this Proposal, the Proposer releases and forever discharges the County and the County Representatives from any and all claims, demands, causes of action of any kind or nature, known or unknown, which such Proposer has, had or may hereafter have arising out of any information contained in this Technology RFP or produced by the County in connection with this Technology RFP.

ZENON Environmental Corporation

Name of Proposer

Steve Watzeck

Name of Authorized Signatory



Signature

Vice President

Title

**TECHNICAL PROPOSAL FORM F
INFORMATION CERTIFICATION**

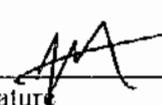
The undersigned execution officer of the Proposer hereby certifies, under oath, that the information contained in this Proposal is true and accurate. Without limiting the foregoing, the undersigned hereby certifies that the information provided to the County with respect to the Proposer's previous performance on projects of comparable magnitude, the Proposer's environmental compliance record, and any civil or criminal penalties incurred by the Proposer during the last five years is true and accurate.

ZENON Environmental Corporation

Name of Proposer

Steve Watzeck

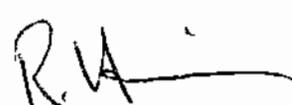
Name of Execution Officer


Signature

Vice President

Title

*Robert Martin, Notary Public,
Regional Municipality of Halton, limited
to the attestation of Instruments and
the taking of affidavits, for Zenon
Environmental Inc.
Expires September 19, 2004.*


(Notary Public)

State of Province of Ontario
County of City of Oakville

On this 19th day of November, 2003 before me appeared Steve Watzeck, personally known to me to be the person described in and who executed this Bid Form and acknowledged that (he/she) signed the same freely and voluntarily for the uses and purposes therein described.

In witness thereof, I have hereunto set my hand and affixed my official seal the day and year last written above.

TECHNICAL PROPOSAL FORM G
TECHNICAL REQUIREMENTS CERTIFICATION

By submitting this Technical Proposal Form, the Proposer certifies that it has read and agrees to meet the Process Design and Performance Criteria, the Minimum Technical Requirements, the Equipment and Start-Up Testing Requirements, and the Acceptance Testing Requirements, as set forth in the Appendices. In addition, the Proposer certifies that the costs specified in Price Proposal Form A – Fixed Membrane System Price - fully encompass and reflect the technical requirements contained in the aforementioned appendices.

Proposer should attach a summary explaining any and all exceptions to the Technical Requirements the Proposer wishes to make.

ZENON Environmental Corporation
Name of Proposer

Steve Watzeck
Name of Authorized Signatory


Signature

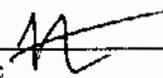
Vice President
Title

**TECHNICAL PROPOSAL FORM H
PROMISE OF NONDISCRIMINATION**

By submitting this Technical Proposal Form, the Proposer shall not practice discrimination during execution of the Membrane System Scope of Work.

ZENON Environmental Corporation
Name of Proposer

Steve Watzeck
Name of Authorized Signatory


Signature

Vice President
Title

**TECHNICAL PROPOSAL FORM H
PROMISE OF NONDISCRIMINATION
NON-DISCRIMINATION PROVISIONS**

1.1 Compliance Procedures

In order to be compliant with the intent and provisions of the Non-Discrimination Ordinance, which provides for non-discrimination in purchasing and contracting in Fulton County, all Proposers shall, as part of their Proposal, complete and submit the following exhibits:

- Promise of Non-Discrimination (Exhibit A)
- Employment Report (Exhibit B)
- Joint Venture Disclosure Affidavit (Exhibit F), if applicable.

The following completed documents shall be submitted only following Contract Award. The appropriate document(s) must be submitted prior to issuance of the Notice to Proceed:

- Schedule of Intended Subcontractor Utilization (Exhibit C)
- Letter of Intent to Perform As A Subcontractor Or Provide Materials Or Services (Exhibit D)
- Declaration Regarding Subcontractor Practices (Exhibit E)

The following document shall be completed as instructed following Contract Award:

- Prime Contractor's Subcontractor Utilization Report (Exhibit G)

EXHIBIT A – PROMISE OF NON-DISCRIMINATION

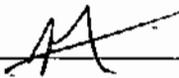
I/WE (Steve Watzeck),
Name
(Vice President) ZENON Environmental Corporation

Title

Firm Name

Hereinafter "Company"), in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

- 1) No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin or gender in connection with any bid submitted to Fulton County for the performance of any resulting therefrom,
- 2) That it is and shall be the policy of this Company to provide equal opportunity to all businesses seeking to contract or otherwise interested in contracting with this Company without regard to the race, color, gender or national origin of the ownership of this business,
- 3) That the promises of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption,
- 4) That the promise of non-discrimination as made and set forth herein shall be made a part of, and incorporated by reference into, any contract or portion thereof which this Company may hereafter obtain,
- 5) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the Board to declare the contract in default and to exercise any and all applicable rights and remedies, including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and/or forfeiture of compensation due and owing on a contract; and
- 6) That the bidder shall provide such information as may be required by the Director of Contract Compliance pursuant to Section 4.4 of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance.

SIGNATURE: 

ADDRESS: 3239 Dundas Street West, Oakville, Ontario - L6M 4B2

TELEPHONE NUMBER: 905-465-3030

EXHIBIT B – EMPLOYMENT REPORT

The demographic employment make-up for the bidder **must** be identified and submitted with this bid. In addition, if subcontractors will be utilized by the bidder to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
	M	F	M	F	M	F	M	F	M	F	M	F
Male/Female												
Mgmt/Official											39	5
Professional (Arch., P.E., etc.)											140	80
Supervisors											43	2
Office/Sales Clerical	3								12	3	132	80
Craftsmen											-	1
Laborers	1										393	100
Others (Specify)											-	-
TOTALS	4	0							12	3	747	268

FIRM'S NAME: ZENON Environmental Corporation

ADDRESS: 3239 Dundas Street West, Oakville, Ontario - L6M 4B2

TELEPHONE NUMBER: 905-465-3030

This completed form is for (Check one) Bidder Subcontractor

Date Completed: November 10, 2003

EXHIBIT B – EMPLOYMENT REPORT

The demographic employment make-up for the bidder must be identified and submitted with this bid. In addition, if subcontractors will be utilized by the bidder to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
	M	F	M	F	M	F	M	F	M	F	M	F
Male/Female												
Mgmt/Official												
Professional (Arch., P.E., etc.)							1		2	1		
Supervisors												
Office/Sales Clerical										1		
Craftsmen												
Laborers												
Others (Specify)							1		1			
TOTALS							2		3	2		

FIRM'S NAME: McKenzie MacGregor Incorporated

ADDRESS: 1582 Walthall Court NW
Atlanta, GA 30318

TELEPHONE NUMBER: 678-546-9450

This completed form is for (Check one) Bidder Subcontractor

Date Completed: 11/11/03

EXHIBIT B - EMPLOYMENT REPORT

The demographic employment make-up for the bidder must be identified and submitted with this bid. In addition, if subcontractors will be utilized by the bidder to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
	M	F	M	F	M	F	M	F	M	F	M	F
Male/Female												
Mgmt/Official			4	1					2	1		
Professional (Arch., P.E., etc.)	1		9	2	1		1		27			
Supervisors									3			
Office/Sales Clerical			3	3						3		
Craftsmen												
Laborers												
Others (Specify)												
TOTALS	1		16	6	1		1		32	4		

FIRM'S NAME: S. L. King & Associates, Inc.

ADDRESS: 225 Peachtree Street NE, Suite 1600 Atlanta, GA 30303

TELEPHONE NUMBER: 404.524.5800

This completed form is for (Check one) Bidder Subcontractor

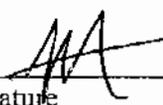
Date Completed: 11/18/03

TECHNICAL PROPOSAL FORM I ROYALTY AND LICENSE FEES

By submitting this Technical Proposal Form, the Proposer certifies that it has included in its Fixed Membrane System Price any royalty and/or license fees that the County or D/B Company must pay. The Proposer certifies that the County will not be charged additional royalty and/or license fees for the continued use of the Membrane System if and when the County should decide to expand the facility beyond the capacity of the current Membrane System Scope of Supply.

ZENON Environmental Corporation
Name of Proposer

Steve Watzeck
Name of Authorized Signatory



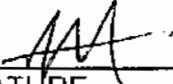
Signature

Vice President
Title

**TECHNICAL PROPOSAL FORM J
CERTIFICATION REGARDING DEBARMENT**

- (1) THE BIDDER CERTIFIES, BY SUBMISSION OF THIS BID OR PROPOSAL THAT NEITHER IT OR ITS SUBCONTRACTORS IS PRESENTLY DEBARRED, SUSPENDED, PROPOSED FOR DEBARMENT, DECLARED INELIGIBLE, OR VOLUNTARILY EXCLUDED FROM PARTICIPATION IN THE TRANSACTION BY THE FULTON COUNTY GOVERNMENT.
- (2) WHERE THE VENDOR IS UNABLE TO CERTIFY TO ANY OF THE STATEMENTS IN THIS CERTIFICATION, SUCH VENDOR OR SUBCONTRACTOR SHALL ATTACH AN EXPLANATION TO THIS BID OR PROPOSAL.

Steve Watzeck


SIGNATURE

November 19, 2003

DATE

INSTRUCTIONS FOR CERTIFICATION

- (1) BY SIGNING AND SUBMITTING THIS PROPOSAL, THE BIDDER IS PROVIDING THE CERTIFICATION SET OUT BELOW.
- (2) THE CERTIFICATION IN THIS CLAUSE IS A MATERIAL REPRESENTATION OF FACT UPON WHICH RELIANCE WILL BE HEREIN PLACED IN AWARDING A CONTRACT. IF IT IS LATER DETERMINED THAT THE PROSPECTIVE VENDOR KNOWINGLY RENDERED AN ERRONEOUS CERTIFICATION, IN ADDITION TO OTHER REMEDIES AVAILABLE TO FULTON COUNTY, THE DEPARTMENT WITH WHICH THE TRANSACTION ORIGINATED MAY PURSUE AVAILABLE REMEDIES, INCLUDING SUSPENSION AND/OR DEBARMENT, FOR WITHDRAWAL OF AWARD OR TERMINATION OF A CONTRACT.
- (3) THE BIDDER SHALL PROVIDE IMMEDIATE WRITTEN NOTICE TO THE PURCHASING AGENT TO WHOM THIS BID/PROPOSAL IS SUBMITTED IF AT ANYTIME THE BIDDER LEARNS THAT ITS CERTIFICATION WAS ERRONEOUS WHEN SUBMITTED OR HAS BECOME ERRONEOUS BY REASON OF CHANGED CIRCUMSTANCES.

(FC CODE SEC. 2-322. DEBARMENT). (A) AUTHORITY TO SUSPEND. AFTER REASONABLE NOTICE TO THE ENTITY INVOLVED AND REASONABLE OPPORTUNITY FOR THAT ENTITY TO BE HEARD, THE PURCHASING AGENT, AFTER CONSULTATION WITH USER DEPARTMENT, THE COUNTY MANAGER AND THE COUNTY ATTORNEY SHALL HAVE THE AUTHORITY TO SUSPEND AN ENTITY FOR CAUSE FROM CONSIDERATION FOR AWARD OF COUNTY CONTRACTS. AS USED IN THIS SECTION, THE TERM ENTITY MEANS ANY BUSINESS ENTITY, INDIVIDUAL, FIRM, CONTRACTOR, SUBCONTRACTOR OR BUSINESS CORPORATION, PARTNERSHIP, LIMITED LIABILITY CORPORATION, OR JOINT VENTURE, HOWEVER DESIGNATED OR STRUCTURED; PROVIDED, FURTHER, THAT ANY SUCH ENTITY SHALL ALSO BE SUBJECT TO SUSPENSION UNDER THIS SECTION IF ANY OF ITS CONSTITUENTS, MEMBERS,

SUBCONTRACTORS AT ANY TIER OF SUCH ENTITY'S CONSTITUENTS OR MEMBERS, IS FOUND TO HAVE COMMITTED ANY ACT CONSTITUTING A CAUSE FOR SUSPENSION AND THE ENTITY, OR ANY CONSTITUENT OR MEMBER, KNEW OR SHOULD HAVE KNOWN OF THE COMMISSION OF THE ACT. THE SUSPENSION SHALL BE FOR A PERIOD NOT TO EXCEED THREE YEARS UNLESS CAUSE IS BASED ON A FELONY CONVICTION FOR AN OFFENSE RELATED OR ASSOCIATED WITH FRAUDULENT CONTRACTING OR MISAPPROPRIATION OF FUNDS WHEREIN THE SUSPENSION SHALL NOT EXCEED SEVEN YEARS.

(B) CAUSES FOR SUSPENSION. THE CAUSES FOR SUSPENSION INCLUDE:

(1) CONVICTION FOR COMMISSION OF A CRIMINAL OFFENSE AS AN INCIDENT TO OBTAIN OR ATTEMPTING TO OBTAIN A PUBLIC OR PRIVATE CONTRACT OR SUB-CONTRACT, OR IN PERFORMANCE OF SUCH CONTRACT OR SUB-CONTRACT;

(2) CONVICTION OF STATE OR FEDERAL STATUTES OF EMBEZZLEMENT, THEFT, FORGERY, BRIBERY, FALSIFICATION OR DESTRUCTION OF RECORDS, RECEIVING STOLEN PROPERTY OR OTHER OFFENSE INDICATING A LACK OF BUSINESS INTEGRITY OR BUSINESS HONESTY WHICH CURRENTLY, SERIOUSLY AND DIRECTLY AFFECTS RESPONSIBILITY AS A COUNTY CONTRACTOR;

(3) CONVICTION OF STATE OR FEDERAL ANTI-TRUST STATUTES ARISING OUT OF THE SOLICITATION AND SUBMISSION OF BIDS AND PROPOSALS;

(4) VIOLATION OF CONTRACT PROVISIONS, AS SET FORTH BELOW, OF A CHARACTER WHICH IS REGARDED BY THE PURCHASING AGENT TO BE SO SERIOUS AS TO JUSTIFY SUSPENSION ACTION;

A. FAILURE TO PERFORM IN ACCORDANCE WITH THE SPECIFICATIONS WITHIN A TIME LIMIT PROVIDED IN A COUNTY CONTRACT;

B. A RECENT RECORD OF FAILURE TO PERFORM OR UNSATISFACTORY PERFORMANCE IN ACCORDANCE WITH THE TERMS OF ONE OR MORE CONTRACTS; PROVIDED, THAT FAILURE TO PERFORM OR UNSATISFACTORY PERFORMANCE CAUSED BY ACTS BEYOND THE CONTROL OF THE CONTRACTOR SHALL NOT BE CONSIDERED TO BE BASIS FOR SUSPENSION;

C. MATERIAL MISREPRESENTATION OF THE COMPOSITION OF THE OWNERSHIP OR WORKFORCE OR BUSINESS ENTITY CERTIFIED TO THE COUNTY AS A MINORITY BUSINESS ENTERPRISE; OR

D. FALSIFICATION OF ANY DOCUMENTS.

(5) COMMISSION OR SOLICITATION OF ANY ACT THAT WOULD CONSTITUTE A VIOLATION OF THE ETHICAL STANDARDS SET FORTH IN FULTON COUNTY CODE OF ETHICS.

(6) KNOWING misrepresentation to the county, of the use which a majority owned contractor intends to make a minority business enterprise (a business entity at least 51 percent of which is owned and controlled by minority persons, as defined in Fulton County Code Chapter 6, Article B, Minority Business Enterprise Affirmative Action Program and certified as such by the county), as a sub-contractor or a joint venture partner, in performing work under contract with the county.

3.0 Supplemental Information

3.1 EBO Plan

As a Membrane System Equipment Supplier, ZENON Environmental has participated in Equal Business Opportunity Plans on previous projects and realizes the importance of this plan to Fulton County. ZENON has prepared an EBO plan, included in Appendix E, which incorporates local businesses and identifies potential opportunities within our scope of work. Further to this plan ZENON will work with the Design/Build Company to fulfill Fulton County's EBO requirement.

3.2 Commercial Terms

3.2.1 Pricing Validity

The pricing quoted within the Pricing Proposal remains open for acceptance until February 20, 2005, 15 month after the bid submission date, expiring on midnight of the last day. If a formal purchase order is not received within the validity period, both the pricing and delivery schedule are subject to review and adjustment.

3.2.2 Payment Terms

The pricing quoted in this proposal is based on the terms outlined in the Request for Proposal (RFP) document as follows:

The Terms of payment stated below will take precedence over those stated within ZENON's Standard Terms and Conditions.

- 5% on submission of General Arrangement Drawings
- 45% on shipment of equipment or notification that equipment is ready to ship (partial shipments permitted)
- 35% on shipment of membranes or notification that membranes are ready to ship (partial shipments permitted)
- 5% Start of Commissioning
- 5% Completion of Commissioning (Substantial Completion)
- 5% Holdback (As Per Specification)

Payment for the equipment described in this proposal is to be by Confirmed Irrevocable Letter of credit drawn on a Canadian Chartered International Bank acceptable to ZENON against shipping documents.

ZENON may delay delivery of Product with concurrence by the OWNER in the event the D/B Company fails to make prompt payment, or in the event of an arrearage in D/B's account with ZENON. ZENON hereby retains a security interest in the Product furnished until D/B Company has made payment in full in accordance with the terms herein. The D/B Company shall cooperate fully with ZENON to execute such documents and to accomplish such filings and/or recordings thereof as ZENON may deem necessary for the protection of ZENON's interest in the Products furnished.

3.2.3 Taxes & Duties

Sales tax for the state of Georgia in the amount of 7% has been included in the Pricing Proposal. The 7% Tax has been applied to all equipment/materials. All services (engineering, start-up/commissioning and training) have not been taxed.

When taxes, duties and other levies are paid by Supplier, Buyer shall adjust the Contract Price if taxes, duties and other levies are changed between the date 28 days before the submission of bids for the Contract and the date of the Final Completion certificate. The adjustment shall be the change in the amount of tax payable by Supplier.

With the proposed shipping schedule no duties have been included in the Fixed Membrane System Price, however, if partial shipments are desired then additional shipping costs and duties may be applicable for the account of the Purchaser.

3.2.4 Bonds

ZENON has included the cost of a Performance and Labor and Material Payment Bonds as per addendum.

3.2.5 Freight

The equipment is quoted F.C.A. Project Site. Delivery to the project site is conditional upon provision of access roads of a nature that will permit access by tractor-trailers to the project site. Off-loading and positioning of equipment at the job-site is not included.

3.2.6 Customer Caused Shipping Delays

Where ZENON has procured the equipment, including membranes, in accordance with the Customer's purchase order and the equipment is being stored at the ZENON production facility and is ready for shipment to the project site on the "shipping date", and where the Customer is not ready to receive the equipment or does not have adequate facilities for properly storing the equipment at the project site, the Customer shall provide written notification to ZENON, at least 15 calendar days before the scheduled shipment date, advising that there shall be a Customer caused shipping delay, and on or before the scheduled shipment date, send a representative to the ZENON production facility, at the Customer's expense, to jointly inspect the equipment with a ZENON representative and to certify that the materials are now ready for shipment, and provide the ZENON representative with a payment of the amount due to ZENON upon shipment and delivery of the equipment.

As ZENON receives the payment of the amount due to ZENON upon shipment and delivery of the equipment, ZENON shall issue the Customer a Lien Waiver and Warehouse Receipt, whereby the Customer takes ownership of the materials and ZENON agrees to store the materials in a secured facility, for a storage fee of warehouse floor area occupied (amount to be negotiated), until such time as the Customer provides ZENON with written notification that the project site is ready to receive the materials and written instruction is given to ZENON to deliver the materials to the project site.

Please also be advised that the membranes are not shipped until they are required at the plant site, as identified in the original production schedule. If this shipping date does not correspond with the original production schedule and ZENON is forced to store the membranes, the storage fee as outlined in the Commercial section of our proposal will apply.

3.2.7 Quality Basis

For the purposes of establishing a quality basis for equipment included as part of the membrane filtration system being supplied, reference is made to the equipment provided by certain manufacturers. In most cases, two or more possible equipment manufacturers are named however in certain circumstances it may not be possible to use the equipment of the manufacturers named for various reasons which may include such things as delivery, lack of local service support or various other reasons. The term "or equal" where used herein is intended to permit the supply of equipment by other manufacturers than those named in this proposal for these cases where either better equipment or faster delivery can be obtained from an alternative supplier. ZENON therefore reserves the right to substitute equipment that ZENON considers to be of equal quality and suitability for the intended application from alternative manufacturers to those named herein.

3.2.8 Indemnification

ZENON's liability for damages shall not exceed the payment, if any, received by ZENON for the materials or services furnished or to be furnished, as the case may be, which is the subject of claim or dispute. In no event will ZENON be liable for incidental, consequential or special damages, of any kind, however caused, arising out of, or in any way connected with, the materials or services furnished by ZENON to the customer.

3.2.9 Equipment Warranties

ZENON provides the following warranties with the purchase of the ZeeWeed® Membrane Filtration System.

Material and Workmanship Warranty

The mechanical warranty is only applicable on equipment supplied by ZENON. The Warranty Period is twelve (12) months from the date of commissioning of the equipment, that is, from the date of Substantial Performance for the ZENON supplied equipment, or eighteen (18) months from shipment, whichever is sooner.

ZENON takes no liability for any damage to equipment caused by inadequate storage, handling, or by defective or sub-standard workmanship or materials provided by the D/B Company or any other third party responsible for handling, storing and installing the equipment.

Membrane Warranty

The membrane warranty will be as per the specifications Appendix 16. A ten (10) year pro-rated membrane warranty is offered on the membrane modules themselves. A detailed description of this warranty is included in Appendix F of this Proposal.

The membrane warranty is based on processing the design flows and providing the effluent quality for TSS and turbidity as specified in Table 7 and Table 8 below:

Table 7: Guaranteed Flow Rates

Parameter	Design Flow Rates (MGD)	Accepted Operating Range (MGD)
Annual Average Flow Rate (QAVG)	10.9	≤10.9
Maximum 30-Day Average Flow Rate (QMAX30)	15.0	≤15.0
Maximum 7-Day Average Flow Rate (QMAX7)	18.3	≤18.3
Peak Day Average Flow Rate (QPKDY)	24.7	≤24.7

Table 8: Guaranteed Effluent Quality

Parameter	30-day Average Effluent Quality
TSS ¹	≤1 mg/L
Turbidity	≤0.2 NTU at least 95% of the time

¹ ZENON guarantees the required effluent TSS provided that an acceptable and reliable Standard Method is available to accurately measure TSS concentrations below 1 mg/L.

Another requirement is that the Membrane System permeate shall not contain a concentration of any permitted effluent parameter greater than the soluble concentration of that parameter in the Membrane System feed.

- ZENON will guarantee these concentrations, except for nitrate-N (NO₃-N) if it is a permitted effluent parameter.
- The reason for this exception is that the Membrane System compartment is also a fully aerobic bioreactor. Therefore if the Membrane System feed contains any residual concentration of ammonia-N (NH₃-N), a portion of it will be oxidized to nitrate-N (NO₃-N) due to nitrification. This cannot be prevented in any aerated membrane system. However, since the concentration of ammonia-N (NH₃-N) in the Membrane System feed is expected to be very low (≤ 0.5 mg/L), the corresponding increase in nitrate-N (NO₃-N) will be very small.

The membrane warranty is contingent upon operation of the treatment process according to the ZENON Operations Manual. Operation of the system not in accordance with the ZENON Operations Manual or the following operating parameters will void the membrane warranty.

For warranty purposes, the key operating parameters are detailed in Table 9 and Table 10 below:

Table 9: Key Membrane System Operating Parameters

Parameter	Design Value ¹	Accepted Operating Range ²	Units
Net Flux @ QAVG	8.0	≤ 9.1	gfd
Net Flux @ QMAX30	10.9	≤ 12.5	gfd
Net Flux @ QMAX7	13.4	≤ 15.3	gfd
Net Flux @ QPKDY	18.0	≤ 20.6	gfd
Instantaneous Membrane Airflow per Cassette	280	240 – 335	SCFM

¹Design values for net flux refers to all membrane trains in service and at end of membrane life.

²Accepted operating range for net flux refers to one (1) train off-line up to QMAX30 conditions to save energy, and one (1) membrane train off-line for maintenance or membrane cleaning at higher flow rates (up to QPKDY).



Table 10: Key Membrane System Acceptable Operating Values

Parameter	Accepted Operating Values ¹	Units
Membrane Tank MLSS Concentration	≤12,000	mg/L
Minimum SRT	≥12	Days
pH	6.5 – 8.0	
Membrane Tank Dissolved Oxygen	≥2	ppm
Minimum Wastewater Temperature	≥12.8	°C

¹Accepted operating range for net flux refers to one (1) train off-line up to QMAX30 conditions to save energy, and one (1) membrane train off-line for maintenance or membrane cleaning at higher flow rates (up to QPKDY).

The membrane warranty is also contingent on operation of the system with proper fccd pre-treatment and screening equipment installed and operated at all times as approved by ZENON. Failure to comply with the requirements from this section will void the membrane warranty.

The use of any polymers, flocculants or coagulants in the process that may come in contact with the ZeeWeed® membranes must be approved by ZENON prior to its use. This includes chemicals used in the sludge thickening process, if the filtrate is to be returned to the ZeeWeed® MBR system. Once approval is received for the use of these chemicals, all reasonable efforts to ensure that they are introduced to the ZeeWeed® MBR system as far upstream in the process from the membranes as possible and that the concentration at the membrane surface is minimized must be taken. Failure to comply with these requirements may void the membrane warranty.

3.2.10 Disputes

None

3.2.11 Terms and Conditions

ZENON Environmental has included the EJCDC P-700 Standard General Conditions for procurement contracts revised 2000, as well as Supplemental Conditions in Appendix G. ZENON Environmental has reviewed the conditions associated with the RFP and herein agrees to these terms. Should there be any conflict between the EJCDC P-700 Standard General Conditions for procurement contracts revised 2000 and the conditions in the RFP, the RFP will govern.

As ZENON Environmental's contract will be with the D/B Company that has yet been determined, ZENON requests that the Terms & Conditions herein agreed to be integral to the D/B Company Bid Specifications. This is to ensure that the Terms and Conditions of a contract that ZENON Environmental enters into with the D/B Company are those that have already been agreed to.



Appendix A – P&ID's and Process Flow Diagrams

Scope of Supply

The following sections should be read in conjunction with the P&ID drawings provided with this proposal. The P&ID's define ZENON's scope of supply and that provided by the D/B Company (By Others).

Scope By ZENON

The main equipment included with the ZeeWeed[®] MBR System is listed below.

Technical information and materials of construction are included in the detailed description of ZENON supplied equipment in Technical Proposal Form D in Section 6 of this proposal.

In case of conflict, P&ID's take precedence for ZENON supplied equipment and devices.

NOTE: Optional Equipment is not shown in either Scope by ZENON or By Others.

Membrane Aeration Blower System Equipment incl.			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Inlet/Discharge Filter-Silencers	N/A	5	✓	
Inlet Flow Control Valves	FCV-8563	5	✓	
Membrane Aeration Blowers	B-85	5	✓	
Discharge Pressure Gauge c/w Isolation Valve	PI/HV-8540	5	✓	
Discharge Check Valves	CV-8585	5	✓	
Discharge Isolation Valve	HV-8580	5	✓	
Blower Discharge Low Flow Switch	FSL-8506	5	✓	
Air Flow Meter	FE/FIT-8520A	1	✓	
Header Isolation Valve	HV-8588	3	(Optional)	
Air Flow Meter	FE/FIT-8520B	1	(Optional)	
Other valves & items generally as denoted on DWG: 2316A1-D-002 (1 of 1)	Various	Lot		✓

Bioreactor Equipment incl.			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Anoxic Zone Tank	TK-74	4		✓
Aerobic Zone Tank	TK-73	4		✓
Anoxic Zone Inlet Sluice Gate	HV-7490	4		✓
Anoxic Zone Mixer	MX-74	8		✓
Diffused Aeration System (aerobic zone) (2	N/A	8		✓

Level Transmitter	LE/LIT-7326	4	✓
Dissolved Oxygen Sensor	AE/AIT-7338	4	✓
Level Switch	LSH-7301	4	✓
Air Line Cyclic/Isolation Valves	FV-7375	4	✓
Air Line Cyclic/Isolation Valves	FV-7376	4	✓
Distribution Channel Inlet Sluice Gate	HV-7398	4	✓
Mixed Liquor Recirculation Isolation Valve	HV-7398	3	✓
Other valves & items generally depicted on DWG: 2316A1-D-003 (1 of 1)	Various	Lot	✓

Membrane Tanks & Associated Equipment.			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Membrane Tank	TK-34	8		✓
Permeate Fill Isolation Valve	FV-3473	8	✓	
Membrane Tank Inlet Sluice Gate	FV-3470	8		✓
Air Isolation Valves	HV-3493	16	✓	
Cyclic Aeration Valves	FV-3475	8	✓	
	FV-3476	8	✓	
ZeeWeed® Membrane Cassettes	ZW500d	96	✓	
Membrane Cassette Support Beams (304 SS) (Anchor Bolts not included)	N/A	128	✓	
Permeate Collection Header Pipes within the Membrane Tanks	N/A	16	✓	
Cassette – Permeate Header Connection Hardware incl. camlock connectors, hoses, hose clamps	N/A	96 Sets	✓	
Permeate Header Cassette Isolation Valve	HV-3482	112	✓	
Membrane Air Scour Header Pipes within the Membrane Tanks	N/A	16	✓	
Air Header Cassette Isolation Valve	HV-3483	112	✓	
	IIV-3484	112	✓	
Cassette – Air Header Connection Hardware incl. camlock connectors, hoses, hose clamps	N/A	196 Sets	✓	
316SS Fasteners for ZENON supplied header piping (excludes fasteners at points where piping connects to piping that will be supplied By Others)	N/A	Lot	✓	
Membrane Tank Level Switches	LSL-3403	8	✓	

	LSLL-3404	8	✓	
Membrane Tank Liquid Level Transmitters	LE/LIT-3426-1	8	✓	
Membrane Tank Drain Valve	FV-3475	8	✓	
Permeate Pressure Transmitter	PE/PIT-3523	16	✓	
Other valves & items generally as denoted on DWG: 2316A1-D-004 (1 of 1)	Various	Lot		✓

Permeate Pump System Equipment incl.			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Backpulse/CIP Line Isolation Valves	FV-8860	16	✓	
Permeate Line Isolation Valve	FV-3561	16	✓	
Air Separator	TK-35	8	✓	
Air Separator Sight Glass c/w Isolation Valves	LG-3545 IIV-3545	8 16	✓ ✓	
Vacuum Line Air Release Valve	AV-3594	8	✓	
Vacuum Line Isolation Valve	HV-3595	8	✓	
Pump Inlet & Discharge Pressure Gauges & Gauge Cock	PI-3540/3541 HV-3450/3541	8 8	✓ ✓	
Inlet & Discharge Drain Valves	HV-3586 HV-3587	8 8	✓ ✓	
Permeate Pump	P-35	8	✓	
Permeate Pump Discharge Check Valve	CV-3585	8	✓	
Permeate Flow Meters	FE/FIT-3520	8	✓	
Permeate Discharge Isolation Valves	FV-3560	8	✓	
Permeate Sample Line Isolation Valve	FV-3598	8	✓	
Other valves & items generally as denoted on DWG: 2316A1-D-005 (1 of 1)	Various	Lot		✓

FOAM/WAS Removal System & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
FOAM/WAS Tank	TK-71	1		✓
Mixed Liquor Spray Line Isolation Valves	HV-3997 HV-3996 HV-3988	1 1 2		✓ ✓ ✓
Sodium Hypochlorite Line Isolation and Check Valve	HV-5191 CV-5185 HV-5192	1 1 1		✓ ✓ ✓
Spray Service Water Isolation Valve	HV-5190	1		✓

Distribution Channel Weir Gate	FCV-7170	1	✓
Level Switches	LSH-7101	1	✓
	LSSL-7104	1	✓
FOAM/WAS Pump	P-39	2	✓
Level Transmitter	LE/LIT-7126	1	✓
FOAM/WAS Pump Discharge Check Valves	CV-3985	2	✓
FOAM/WAS Pump Discharge Isolation Valves	HV-3980	2	✓
FOAM/WAS Pump Discharge Flow Meter	FE/FIT-3920	1	✓
Discharge to Sludge Handling Isolation Valve	HV-3983	1	✓
Mixed liquor Spray Nozzles	N/A	4	✓
Other valves & items generally as denoted on DWG: 2316A1-D-006 (1 of 1)	Various	Lot	✓

CIP/Backpulse Tank/Pumps & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Backpulse Tank	TK-88	1		✓
Sodium Hypochlorite Line Isolation and Check Valves	HV-5491	1	✓	
	CV-5485	1	✓	
	HV-5492	1	✓	
Backpulse Tank Air Vent Filter	F-88	1	✓	
Backpulse Tank Drain Valve	HV-8895	1	✓	
Backpulse Tank Strainer	STR-88	1	✓	
Permeate Inlet Isolation Valve	FV-8870	1	✓	
Potable Water Isolation Valve	HV-8891	1	✓	
Level Transmitter	LE/LIT-8826	1	✓	
Backpulse Pump Inlet and Discharge Isolation Valves	HV-8881	2	✓	
	HV-8880	2	✓	
Inlet & Discharge Pressure Indicators	HV/PI-8841	2	✓	
	HV/PI-8840	2	✓	
Backpulse Pumps	P-88	2	✓	
Backpulse Pump Discharge Check Valves	CV-8885	2	✓	
Backpulse Flow Meter	FE/FIT-8820	1	✓	
Backpulse Pressure Switches	PSH-3507	2	✓	
Citric Acid Injection Line Isolation and Check Valves	HV-6591	1	✓	
	CV-6585	1	✓	
	HV-6592	1	✓	
Sodium Hypochlorite Injection Line	HV-6691	1	✓	

Isolation and Check Valves	HIV-6685	1	✓
	HV-6692	1	✓
Other valves & items generally as denoted on DWG: 2316A1-D-007 (1 of 1)	Various	Lot	✓

Membrane Tank Drain Pumps & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Pump Inlet and Discharge Pressure Indicator c/w Isolation Valves	PI/HV-3841	1	✓	
	PI/HV-3840	2	✓	
Drain Pump Inlet and Discharge Isolation Valves	HV-3881	2	✓	
	HV-3880	2	✓	
Drain Pump Inlet and Discharge Drain Valves	HV-3886	2	✓	
	HV-3887	2	✓	
Drain Pumps	P-97	2	✓	
Drain Pump Check Valve	CV-3885	2	✓	
Tank Drain Valve	FV-9775	1	✓	
	FV-9776	1		
Mixed Liquor Re-screening Valve	FV-3477	1		(Optional)
Mixed Liquor Re-screening Flow Meter	FE/FIT-3420	1		(Optional)
Other valves & items generally depicted on DWG: 2316A1-D-008 (1 of 1)	Various	Lot		✓

Vacuum Pumps & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Liquid Reservoir Inlet Isolation Valve	FV-9262	2	✓	
Vent Isolation Valve	FV-9265	2	✓	
Liquid Reservoir & Associated Equipment	TK-92	2	✓	
	CV-9295	2	✓	
	LSH-9202	2	✓	
Liquid Reservoir Discharge Isolation Valve	FV-9260	2	✓	
Pressure Indicator c/w Isolation Valve	PI/HV-9241	2	✓	
Vacuum Pump Inlet Isolation Valve	FV-9261	3	✓	
Vacuum Pump	P-92	3	✓	
Other valves & items generally depicted on DWG: 2316A1-D-009 (1 of 1)	Various	Lot		✓

Recirculation Pumps & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Inlet Crossover Isolation Valve	HV-3481	4	✓	
Recirculation Pump Inlet and Discharge Isolation Valve	FV-3464	8	✓	
	HV-3480	8	✓	
Recirculation Pump Inlet and Discharge Pressure Indicator	PI/HV-3441	8	✓	
	PI/HV-3440	8	✓	
Recirculation Pump Inlet and Discharge Drain Valves	HV-3486	8	✓	
	HV-3487	8	✓	
Recirculation Pumps	P-34	8	✓	
Recirculation Pump Discharge Check Valves	CV-3485	8	✓	
RAS Line Equipment:				
Flow Meter	FE/FIT-3420	1		✓
Drain Valve	HV-3498	1		✓
Discharge Isolation Valve	HV-3499	1		✓
Other valves & items generally depicted on DWG: 2316A1-D-010 (1 of 1)	Various	Lot		✓

CIP- Sodium Hypochlorite Solution Feed System Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Compressed Air Control Valve	HCV-6692	1	✓	
	HCV-5192	1	✓	
Compressed Air Pressure Regulator	PRV-6683	1	✓	
	PRV-5183	1	✓	
Compressed Air Solenoid Valves	FV-6600	2	✓	
	FV-5100	2	✓	
Sodium Hypochlorite Solution Tank	TK-51	1	✓	
Tank Level Switch	LSL-5103	1	✓	
Sodium Hypochlorite Feed Pump	P-51	2	✓	
Pump Inlet and Discharge Isolation Valves	HV-5181	2	✓	
	HV5180	2	✓	
Pump Pressure Relief Valve	PSV-5182	2	✓	
Pump Calibration Column	FQMI-5148	1	✓	
Calibration Column Isolation Valves	HV-5186	2	✓	
	HV-5187	2	✓	
Sodium Hypochlorite Line Back Pressure Valves	BPV-5183	1	✓	
	BPV-5483	1	✓	
Hypochlorite Line Isolation Valves	FV-5160	1	✓	
	FV-5460	1	✓	

Compressed Air Control Valve	HCV-6092	1	✓	
	HCV-6592	1	✓	
Compressed Air Pressure Regulator	PRV-6083	1	✓	
	PRV-6583	1	✓	
Compressed Air Solenoid Valves	FV-6000	2	✓	
	FV-6500	2	✓	
Citric Acid Tank Service Water Fill Isolation Valve	HV-6090	1		✓
Citric Acid Solution Tank	TK-60	1	✓	
Tank Level Switch	LSL-6003	1	✓	
Mixer	M-6005	1	✓	
Citric Acid Feed Pump	P-60	2	✓	
Pump Inlet and Discharge Isolation Valves	HV-6081	2	✓	
	HV-6080	2	✓	
Pump Pressure Relief Valve	PSV-6082	2	✓	
Pump Calibration Column	FQMI-6048	1	✓	
Calibration Column Isolation Valves	HV-6086	2	✓	
	HV-6087	2	✓	
Citric Acid Line Back Pressure Valve	BPV-6083	1	✓	
Citric Acid Line Isolation Valves	FV-6060	1	✓	
Other valves & items generally as denoted on DWG: 2316A1-D-011(1 of 1)	Various	Lot		✓

<i>Air Compressors and Associated Equipment incl.</i>			<i>Supply by</i>	
<i>Equipment</i>	<i>Tag #</i>	<i>Qty</i>	<i>ZENON</i>	<i>Others</i>
Air Receivers	TK-91	3	✓	
Air Compressors	AC-91	3	✓	
Pressure Safety Valve	PSV-9182	3	✓	
Automatic Drain Valve	FV-9165	3	✓	
Low Pressure Switch	PSL-9100	3	✓	
Pressure Indicator	PI-9140	3	✓	
Discharge Isolation Valve	HV-9180	2	✓	
Refrigerated Air Drier c/w Auto Drain	DR-9104	2	✓	
Refrigerated Air Drier Isolation Valves	HV-9181	1	✓	
	HV-9180	1	✓	
Pressure Regulator Valves	PRV-9183	1	✓	
	PRV-9184	1	✓	
Low Pressure Switch c/w Isolation Valve	PSL/HV-9107	1	✓	
	PSL/HV-9108	1	✓	

Drain Valve	HV-9187	1	✓	
Distribution Valves	HV-9190	1	✓	
	HV-9188	1	✓	
	IIV-9189	1	✓	
	HV-9199	1	✓	
	HV-9197	1	✓	
Other valves & items generally as denoted on DWG: 2316A1-D-012 (1 of 1)	Various	Lot		✓

Permeate Collection Header			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Temperature Indicator/Thermowell	TE/TIT-7530	1	✓	
	TW-7530	1	✓	
Vacuum Breaker	VB-7599	1		✓
Other valves & items generally as denoted on DWG: 2316A1-D-013 (1 of 1)	Various	Lot		✓

Staging Tank, Pump & Associated Equipment			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Permeate Fill Line Isolation Valve	HV-8090	1	✓	
Sodium Hypochlorite Dosing Line Isolation and Check Valves	HV-5192	1	✓	
	CV-5185	1	✓	
	HV-5191	1	✓	
Citric Acid Dosing Line Isolation and Check Valves	HV-6592	1	✓	
	CV-6585	1	✓	
	HV-6591	1	✓	
Blower Air Isolation Valve	IIV-8084	1	✓	
Staging Tank	TK-80	1		✓
Staging Tank Drain/Recirculation Isolation Valve	HV-8095	1	✓	
Staging Tank Pump Inlet Pressure Indicator c/w Isolation Valve	PI/HV-8041	1	✓	
Drain Valves	HV-8086	1	✓	
	HV-8087	1	✓	
Staging Tank Pump	P-80	1	✓	
Manual Flow Control Valve	HCV-8083	1	✓	
Flow Indicator	FI-8043	1	✓	
Staging Tank Pump Discharge Isolation Valve	HV-8096	1	✓	

Vacuum Line Isolation Valves	HV-8080	1	✓
	HV-8098	1	✓
Vacuum Line Air Vent	AV-8094	1	✓
Waste Cleaning Solution Discharge Check Valve	CV-8085	1	✓
Waste Cleaning Solution Discharge Isolation Valve	HV-8097	1	✓
Other valves & items generally as denoted on DWG: 2316A1-D-014 (1 of 1)	Various	Lot	✓

Turbidimeter			Supply by	
Equipment	Tag #	Qty	ZENON	Others
Turbidimeter Inlet Isolation Valve	HV-3598	8	✓	
Solenoid Valve	FV-3537	8	✓	
Inlet Check Valve	CV-3537	8	✓	
Flow Control Valve	IICV-3537	8	✓	
Turbidimeter	AE/AIT-3537	8	✓	
Other valves & items generally as denoted on DWG: 2316A1-D-015	Various	Lot		✓

Control System Equipment incl.			Supply by	
Equipment	Tag #	Qty	ZENON	Others
PLC system c/w HMI for equipment integral to the ZeeWeed® Membrane Filtration System. PLC System shall be Allen Bradley Control Logix with remote station. Included will be One (1) Main PLC Enclosure, NEMA 12 and Four (4). Remote stations (1 per 2 trains), NEMA 4X.	n/a	1	✓	
Hot Backup PLC	n/a	1	✓	
Equipment Junction Boxes	n/a	Lot		✓
Motor Control Center	n/a	1	✓	
SCADA System	n/a	1		✓

General	Supply by	
	ZENON	Others
Equipment General Arrangement and Layout Drawings	✓	
2 year Spare Parts	✓	
Operating & Maintenance Manuals	✓	
Field Service	✓	
Equipment delivery F.C.A. Project Site	✓	

Scope of Supply - By Others

The following items are for supply By Others and will include but are not limited to:

- Overall plant design
- Review of Equipment Drawings and Specifications
- Raw Wastewater Screening/Grit Removal Facilities - Raw wastewater screening/grit removal facilities must be capable of removing particles down to 2 mm in size for operation of a ZeeWeed® Membrane Bioreactor System
- Raw Wastewater Flow Measurement
- Civil works, provision of main plant tank structures, buildings, equipment foundation pads etc. including but not limited to:
- Raw wastewater influent flow splitting box (or other chosen method to provide even flow to each process train)
- Bioreactor process tanks, piping wall spools for the various process pipe connections into the bioreactor for sludge wasting, permeate pumping, sludge recirculation etc.
- Building for housing ZENON supplied equipment including permeate pumps, sludge recirculation pumps, blowers, chemical feed systems etc. Note: electrical equipment including the PLC may require air-conditioned rooms to prevent overheating of sensitive electronic equipment depending on local climatic conditions
- Supply and installation of baffle wall within bioreactor tank to create anoxic zone
- Equipment access platforms, walkways, stairs etc.
- Receiving and safe storage of equipment at site until ready for installation
- Equipment installation
- Facilities for collection and disposal of the influent raw wastewater screenings

- Process and utilities piping, pipe supports, hangers, valves etc. including but not limited to:
- All interconnecting piping including pump and blower piping manifolds (ZENON has included supply of all the system valves that would normally fall within ZENON's scope of supply for a skidded system)
- Electrical wiring, conduit and other appurtenances required to provide power connections as required from the electrical power distribution panel to the MCC and from MCC to the various items of electrical equipment, motors, instrumentation & control equipment included with the ZeeWeed[®] MBR
- Instrumentation wiring, conduit and other appurtenances required for wiring connections between the ZENON supplied instrumentation and the ZENON supplied PLC Control Panel.
- Installation materials for instrumentation and automatic pneumatic valves including but not limited to; air/sample line tubing, fittings, isolating valves & mountings
- Equipment anchor bolts
- Raw materials, chemicals, and utilities during equipment start-up and operation
- Bulk Chemical Storage Facilities
- Laboratory Services, Operating and Maintenance Personnel during equipment Checkout, Start-Up and Operation
- Any on-site painting or touch-up painting of equipment supplied
- Monorail & pulley/hoist above the bioreactor tanks for installation and removal of the membrane cassettes
- Anoxic Mixers
- Fine Bubble Diffused Aeration System
- Scada System, as defined in RFP
- Process Blowers Sludge wasting pumps
- Membrane Tank Coatings
- Any disposal requirement for Glycerine purged from the membranes

Preliminary Drawing Set For

ZeeWeed[®]-MBR Wastewater Treatment System

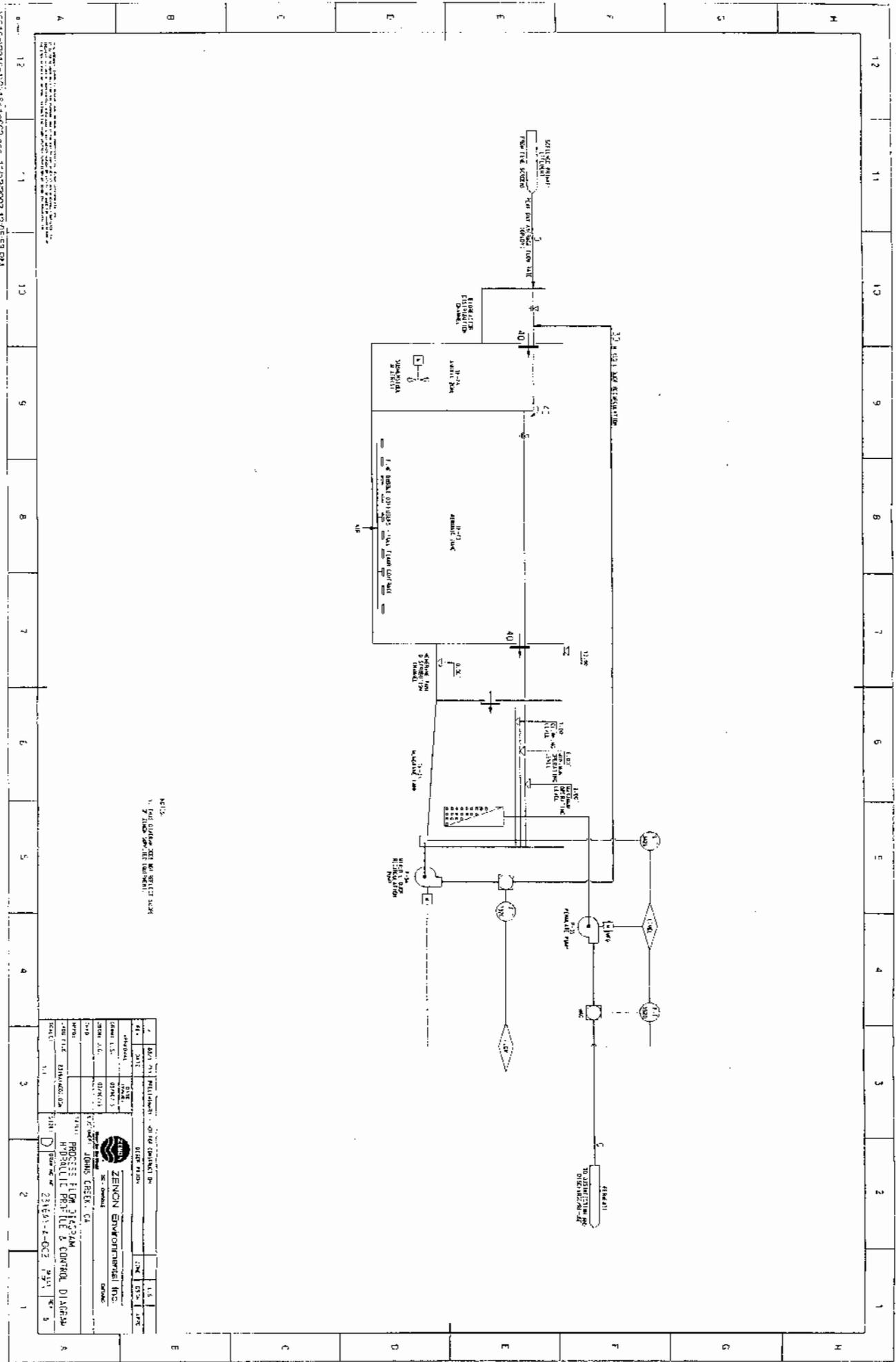
CLIENT: Johns Creek Environmental Campus
LOCATION: Fulton County, GA



ZENON Environmental Inc.
OAKVILLE

ONTARIO, CANADA

Zenon Project Number: 2316A1



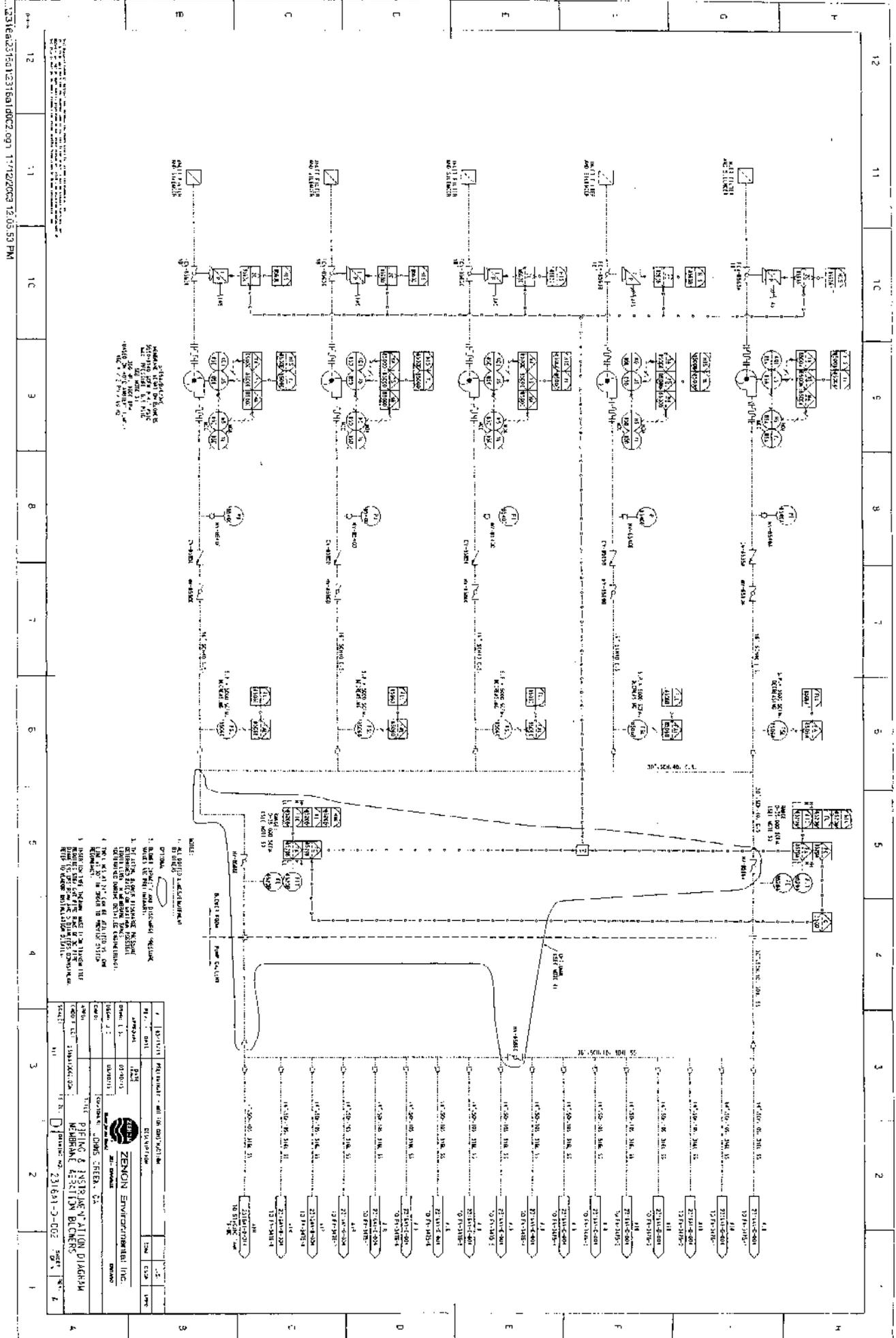
NOTE:
 1. THIS DRAWING IS NOT TO SCALE
 2. ALL DIMENSIONS ARE IN FEET UNLESS NOTED OTHERWISE

DATE	11/11/2003	BY	ALBINO
REVISION		BY	
NO.		DATE	
1		11/11/2003	ALBINO

ZENON ENVIRONMENTAL INC.	
20000 ALBINO DRIVE, SUITE 100	
MOUNTAIN VIEW, CALIFORNIA 92654	
TEL: 949.440.1000 FAX: 949.440.1001	
WWW.ZENONENV.COM	

PROJECT	PROJECT # 231451-4-DCZ
CLIENT	ALBINO
DATE	11/11/2003
SCALE	AS SHOWN

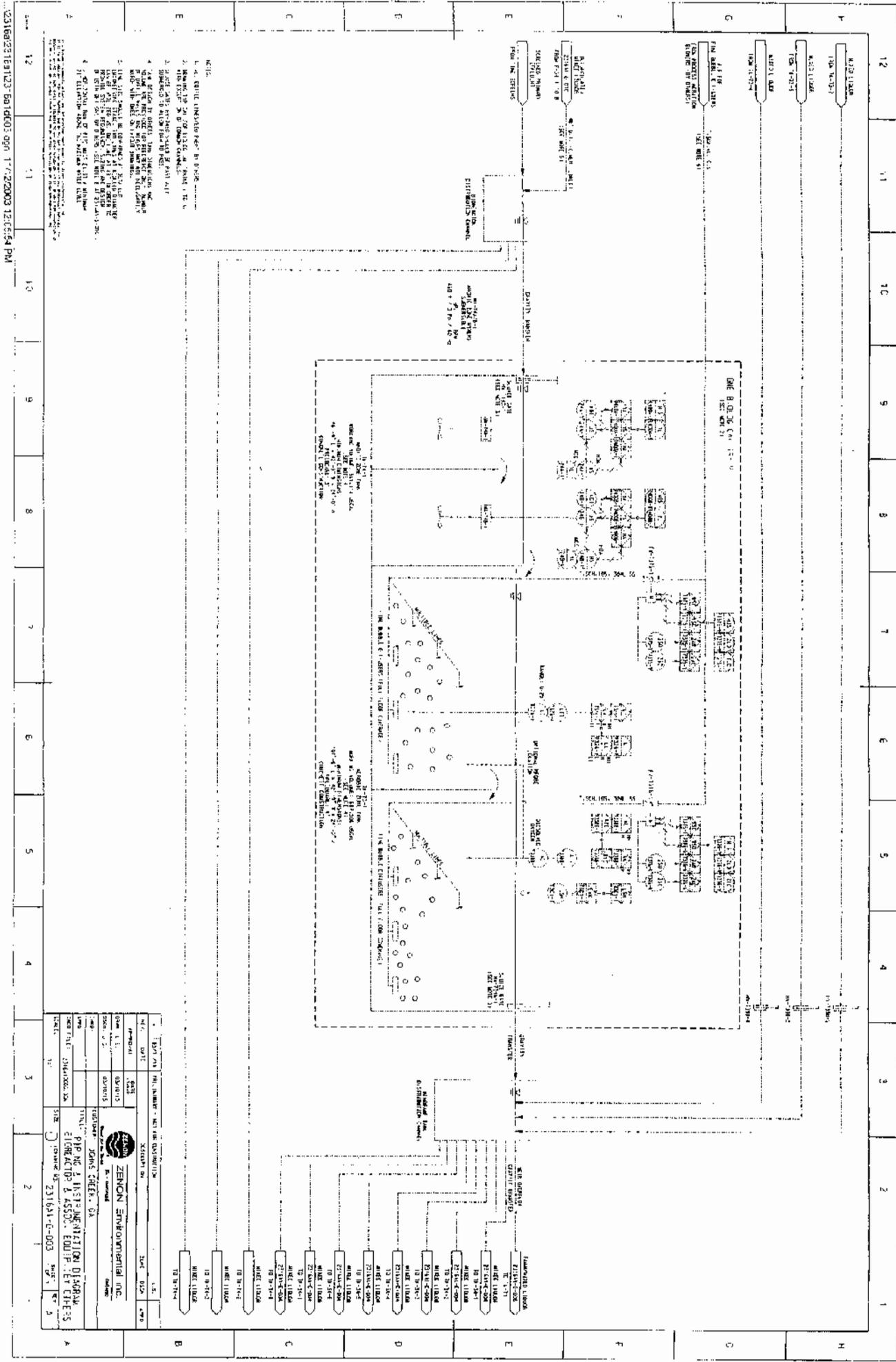
153 00231451-4-DCZ.dwg 11/22/2003 12:05:53 PM



- NOTES:
1. All piping is steel/unlined.
 2. All tanks are stainless steel.
 3. All vessels are stainless steel.
 4. All piping is stainless steel.
 5. All tanks are stainless steel.
 6. All vessels are stainless steel.
 7. All piping is stainless steel.
 8. All tanks are stainless steel.
 9. All vessels are stainless steel.
 10. All piping is stainless steel.
 11. All tanks are stainless steel.
 12. All vessels are stainless steel.

NO.	DESCRIPTION	DATE	BY	CHKD.
1	DESIGN	01/01/01	J. SMITH	J. SMITH
2	REVISION	02/01/01	J. SMITH	J. SMITH
3	REVISION	03/01/01	J. SMITH	J. SMITH
4	REVISION	04/01/01	J. SMITH	J. SMITH
5	REVISION	05/01/01	J. SMITH	J. SMITH
6	REVISION	06/01/01	J. SMITH	J. SMITH
7	REVISION	07/01/01	J. SMITH	J. SMITH
8	REVISION	08/01/01	J. SMITH	J. SMITH
9	REVISION	09/01/01	J. SMITH	J. SMITH
10	REVISION	10/01/01	J. SMITH	J. SMITH
11	REVISION	11/01/01	J. SMITH	J. SMITH
12	REVISION	12/01/01	J. SMITH	J. SMITH

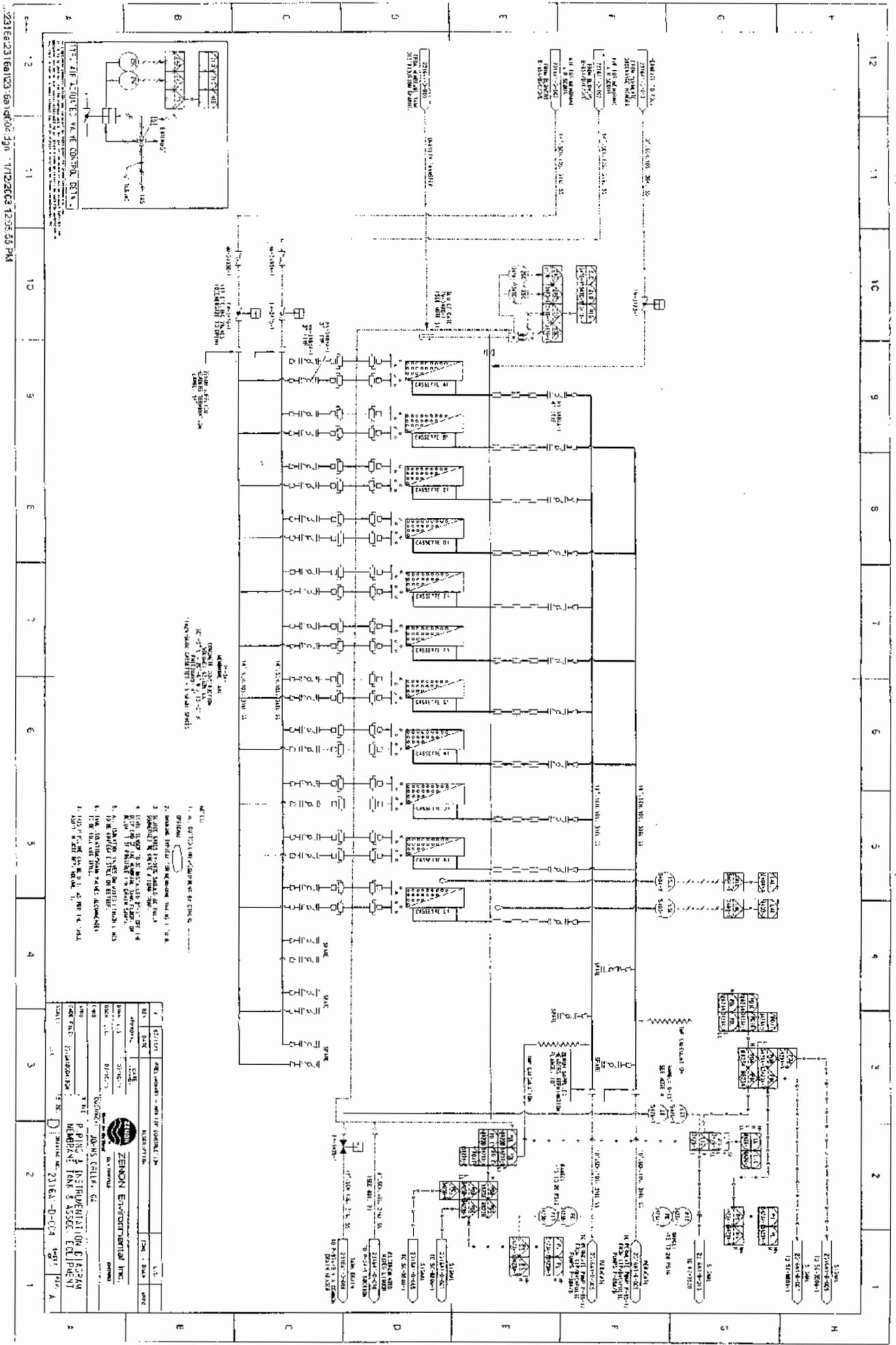
2316A0315612316A1002.dwg 11/12/2003 12:05:50 PM



- LEGEND:
1. ALL OTHER DIMENSIONS PER DRAWING
 2. DIMENSIONS TO CENTERLINE UNLESS NOTED OTHERWISE
 3. DIMENSIONS TO FACE UNLESS NOTED OTHERWISE
 4. DIMENSIONS TO CENTERLINE UNLESS NOTED OTHERWISE
 5. DIMENSIONS TO FACE UNLESS NOTED OTHERWISE
 6. DIMENSIONS TO CENTERLINE UNLESS NOTED OTHERWISE
 7. DIMENSIONS TO FACE UNLESS NOTED OTHERWISE
 8. DIMENSIONS TO CENTERLINE UNLESS NOTED OTHERWISE

NO.	DATE	DESCRIPTION	BY	CHKD.
1	11/11/11	ISSUED FOR CONSTRUCTION	J. J. [Signature]	[Signature]
2	11/11/11	REVISION	J. J. [Signature]	[Signature]
3	11/11/11	REVISION	J. J. [Signature]	[Signature]
4	11/11/11	REVISION	J. J. [Signature]	[Signature]
5	11/11/11	REVISION	J. J. [Signature]	[Signature]

23168231681237 6a1d003 09n 17:2003 12:05:54 PM



- NOTE:
1. ALL SWITCHES TO BE OPERATED BY CONTROL PANEL.
 2. ALL RELAYS TO BE OPERATED BY CONTROL PANEL.
 3. ALL LAMPS TO BE OPERATED BY CONTROL PANEL.
 4. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 5. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 6. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 7. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 8. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 9. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 10. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 11. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 12. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.

REV.	DATE	DESCRIPTION	BY	CHKD.
1	10/10/71	ISSUED FOR CONSTRUCTION	J. S. GILLY	J. S. GILLY
2	11/10/71	REVISIONS	J. S. GILLY	J. S. GILLY
3	12/10/71	REVISIONS	J. S. GILLY	J. S. GILLY
4	01/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
5	02/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
6	03/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
7	04/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
8	05/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
9	06/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
10	07/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
11	08/10/72	REVISIONS	J. S. GILLY	J. S. GILLY
12	09/10/72	REVISIONS	J. S. GILLY	J. S. GILLY

ZENON ENVIRONMENTAL INC.
 1000 W. 10th St.
 Anchorage, Alaska 99501
 Phone: (907) 562-1111
 Telex: 211633 ZENON
 Cable: ZENON INC

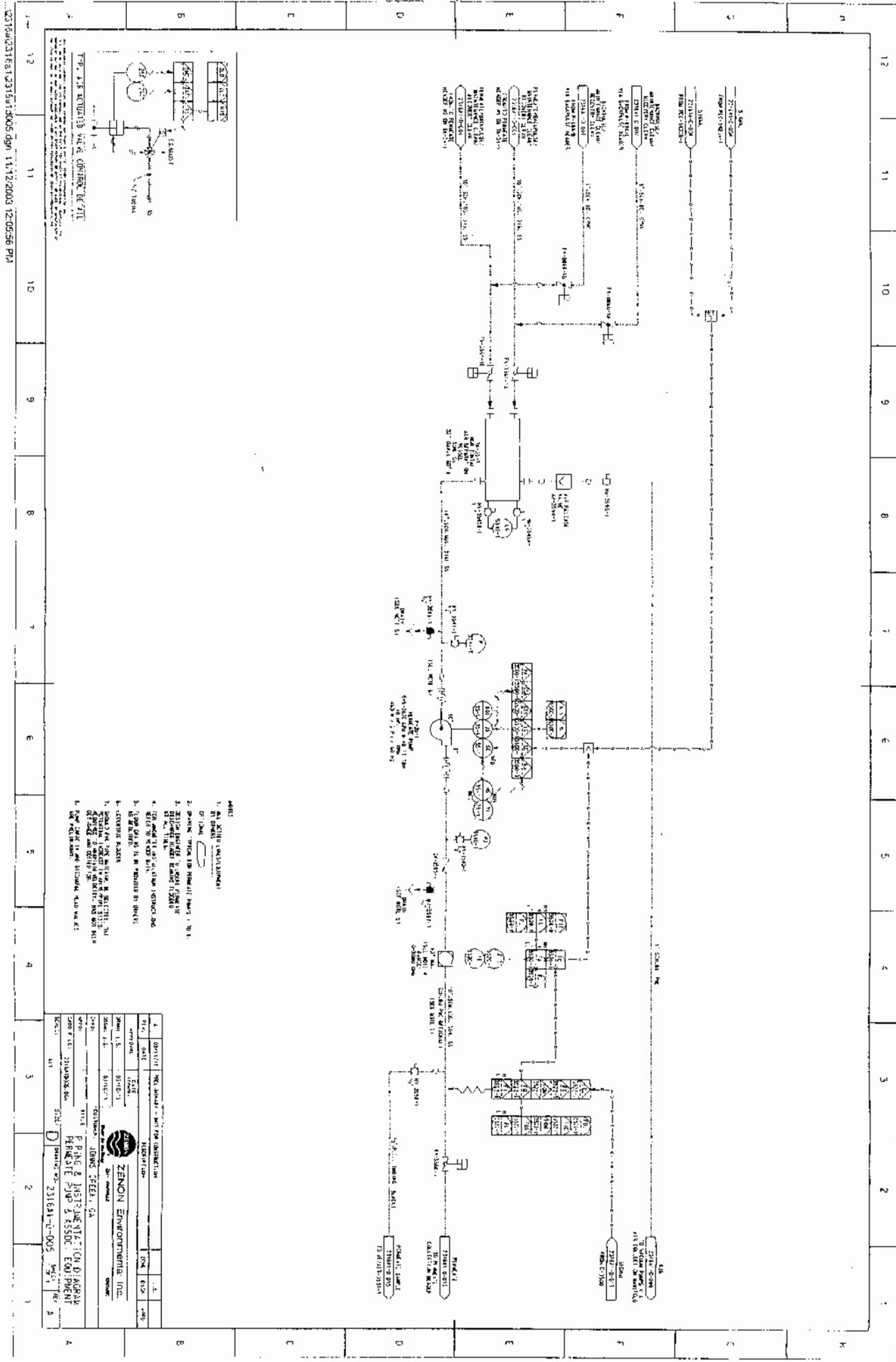
PROJECT: JOHNS GILLY - 62
PRINTING INFORMATION FOR CLIENT
MEMBER: ENK & ASSOC. ENR 100
 DRAWING NO. 211633-0-10-A
 SHEET NO. 10 OF 10

DATE: 10/10/71
 DRAWN BY: J. S. GILLY
 CHECKED BY: J. S. GILLY
 APPROVED BY: J. S. GILLY

SCALE: AS SHOWN
 TITLE: ELECTRICAL SCHEMATIC
 PROJECT: JOHNS GILLY - 62

REVISIONS:
 1. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 2. ALL RELAYS TO BE OPERATED BY CONTROL PANEL.
 3. ALL LAMPS TO BE OPERATED BY CONTROL PANEL.
 4. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 5. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 6. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 7. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 8. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 9. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 10. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 11. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 12. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.

NOTES:
 1. ALL SWITCHES TO BE OPERATED BY CONTROL PANEL.
 2. ALL RELAYS TO BE OPERATED BY CONTROL PANEL.
 3. ALL LAMPS TO BE OPERATED BY CONTROL PANEL.
 4. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 5. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 6. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 7. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 8. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 9. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 10. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 11. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.
 12. ALL CIRCUITS TO BE OPERATED BY CONTROL PANEL.



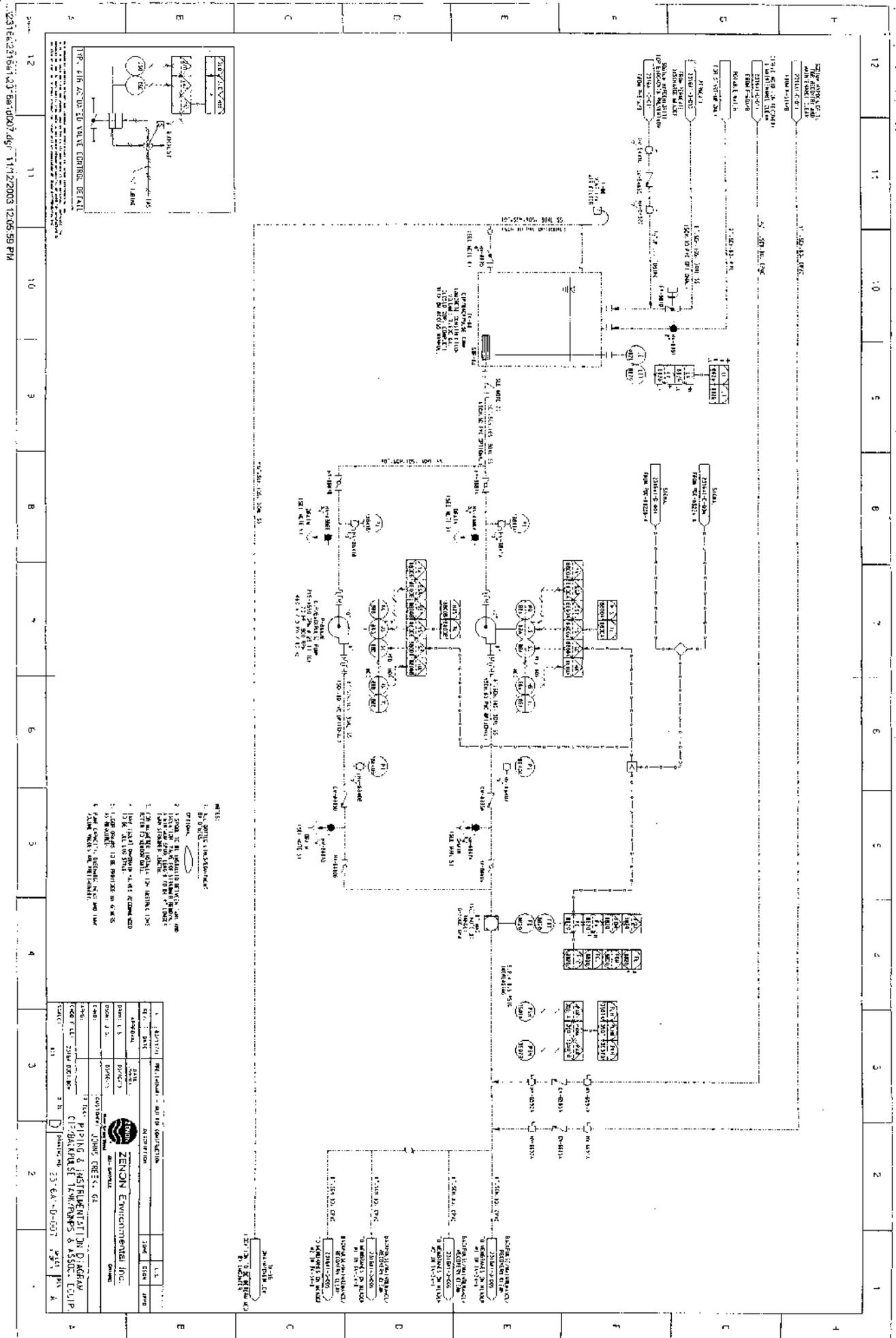
- NOTE:
1. ALL WIRING ENCLOSURE
 2. PUMPING TRUCK TO BE INSTALLED IN THE
 3. ALL WIRING TO BE INSTALLED IN THE
 4. ALL WIRING TO BE INSTALLED IN THE
 5. ALL WIRING TO BE INSTALLED IN THE
 6. ALL WIRING TO BE INSTALLED IN THE
 7. ALL WIRING TO BE INSTALLED IN THE
 8. ALL WIRING TO BE INSTALLED IN THE

DATE	REVISION	BY	REASON
01/11/05	1	J. J. JONES	INITIAL DESIGN
02/01/05	2	J. J. JONES	REVISED FOR FIELD
03/15/05	3	J. J. JONES	REVISED FOR FIELD
04/01/05	4	J. J. JONES	REVISED FOR FIELD
05/01/05	5	J. J. JONES	REVISED FOR FIELD
06/01/05	6	J. J. JONES	REVISED FOR FIELD
07/01/05	7	J. J. JONES	REVISED FOR FIELD
08/01/05	8	J. J. JONES	REVISED FOR FIELD
09/01/05	9	J. J. JONES	REVISED FOR FIELD
10/01/05	10	J. J. JONES	REVISED FOR FIELD
11/01/05	11	J. J. JONES	REVISED FOR FIELD
12/01/05	12	J. J. JONES	REVISED FOR FIELD

ZENON ENVIRONMENTAL, INC.
 1100 W. 10TH AVE. SUITE 100
 DENVER, CO 80202
 TEL: 303.733.1100
 FAX: 303.733.1101
 WWW.ZENONENV.COM

P. PANG & ASSOCIATES, INC. DIAGRAM
 REFRIGERATE PUMP & ASSOC. EQUIPMENT

23164\31641\31641.dwg 11/12/2005 12:05:56 PM



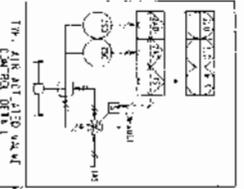
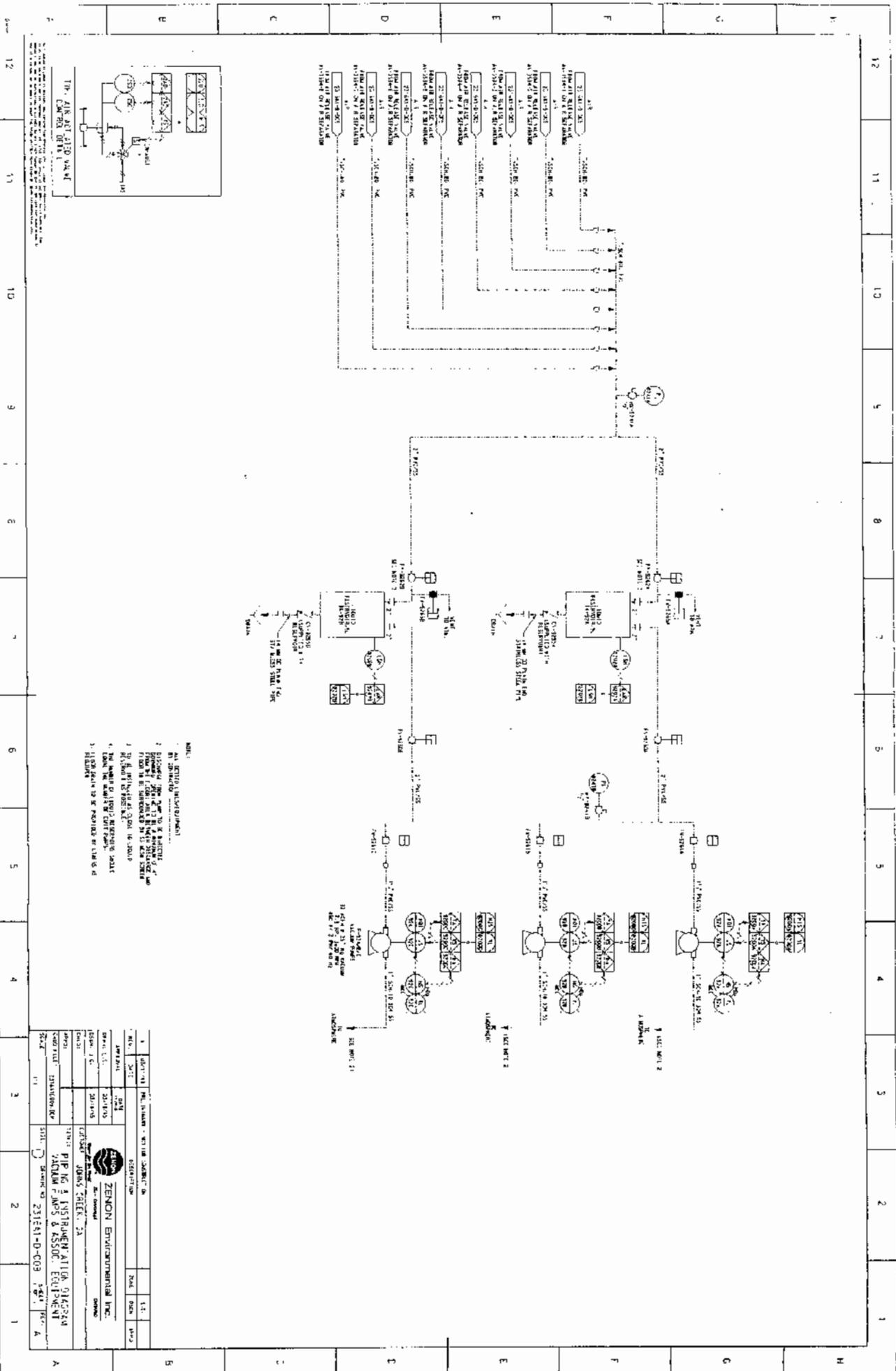
- NOTES:
1. SEE SPECIFICATIONS FOR MATERIALS.
 2. SEE SPECIFICATIONS FOR MATERIALS.
 3. SEE SPECIFICATIONS FOR MATERIALS.
 4. SEE SPECIFICATIONS FOR MATERIALS.
 5. SEE SPECIFICATIONS FOR MATERIALS.
 6. SEE SPECIFICATIONS FOR MATERIALS.
 7. SEE SPECIFICATIONS FOR MATERIALS.
 8. SEE SPECIFICATIONS FOR MATERIALS.
 9. SEE SPECIFICATIONS FOR MATERIALS.
 10. SEE SPECIFICATIONS FOR MATERIALS.
 11. SEE SPECIFICATIONS FOR MATERIALS.
 12. SEE SPECIFICATIONS FOR MATERIALS.

REV.	DATE	DESCRIPTION	BY	CHKD.
1	10/10/03	INITIAL DESIGN	J. JONES	J. JONES
2	11/10/03	REVISED DESIGN	J. JONES	J. JONES
3	12/10/03	FINAL DESIGN	J. JONES	J. JONES

ZENON ENGINEERING INC.
 11111 111th Ave. S.E.
 Bellevue, WA 98004
 (206) 835-1111
 FAX: (206) 835-1112
 WWW.ZENON-ENG.COM

PROJECT: TANK CONTROL SYSTEM
 DRAWING NO: TANK-001
 SHEET NO: 1 OF 1

DATE: 11/10/03 12:05:59 PM

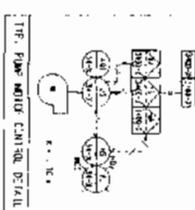
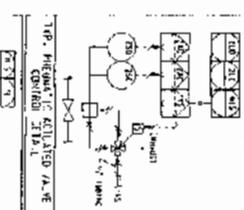
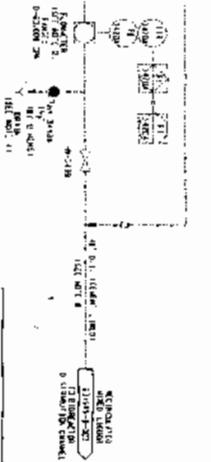
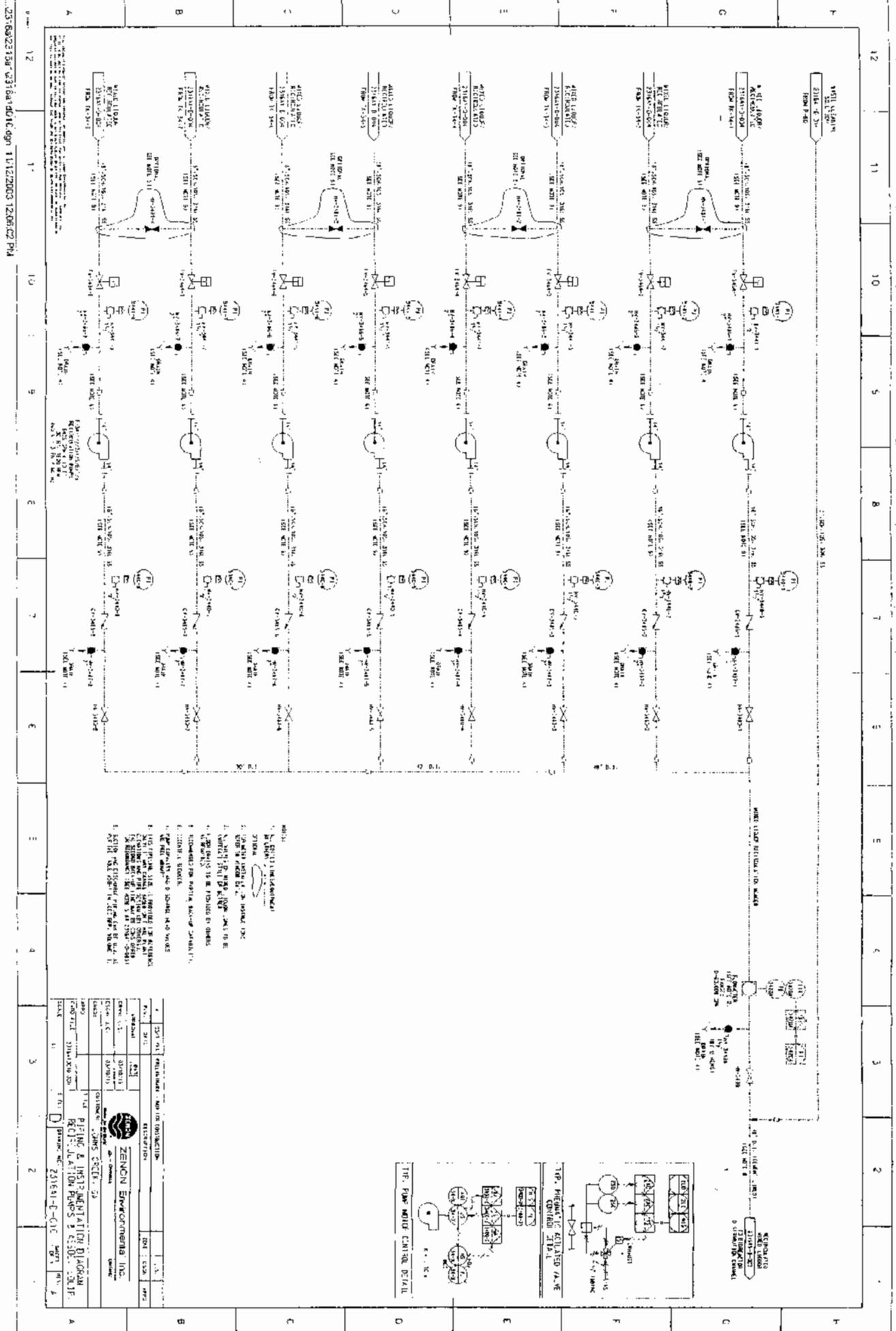


THE AIR AT 1150 GAL/H

- NOTE:
1. ALL INSTRUMENTATION IS TO BE PROVIDED BY THE CLIENT.
 2. THE SYSTEM IS TO BE DESIGNED TO TREAT 1.5 MGD OF WATER TO A QUALITY OF 100 GPM OF WATER PER HOUR TO BE SUPPLIED TO THE CLIENT.
 3. THE SYSTEM IS TO BE DESIGNED TO TREAT 1.5 MGD OF WATER TO A QUALITY OF 100 GPM OF WATER PER HOUR TO BE SUPPLIED TO THE CLIENT.
 4. THE SYSTEM IS TO BE DESIGNED TO TREAT 1.5 MGD OF WATER TO A QUALITY OF 100 GPM OF WATER PER HOUR TO BE SUPPLIED TO THE CLIENT.
 5. THE SYSTEM IS TO BE DESIGNED TO TREAT 1.5 MGD OF WATER TO A QUALITY OF 100 GPM OF WATER PER HOUR TO BE SUPPLIED TO THE CLIENT.

NO.	DATE	REVISION	BY	CHKD.
1	2011	1	J. JONES	J. JONES
2	2012	2	J. JONES	J. JONES
3	2013	3	J. JONES	J. JONES
4	2014	4	J. JONES	J. JONES
5	2015	5	J. JONES	J. JONES
6	2016	6	J. JONES	J. JONES
7	2017	7	J. JONES	J. JONES
8	2018	8	J. JONES	J. JONES
9	2019	9	J. JONES	J. JONES
10	2020	10	J. JONES	J. JONES

23162819121210110005.dgn 11/12/2003 2:08:13 PM

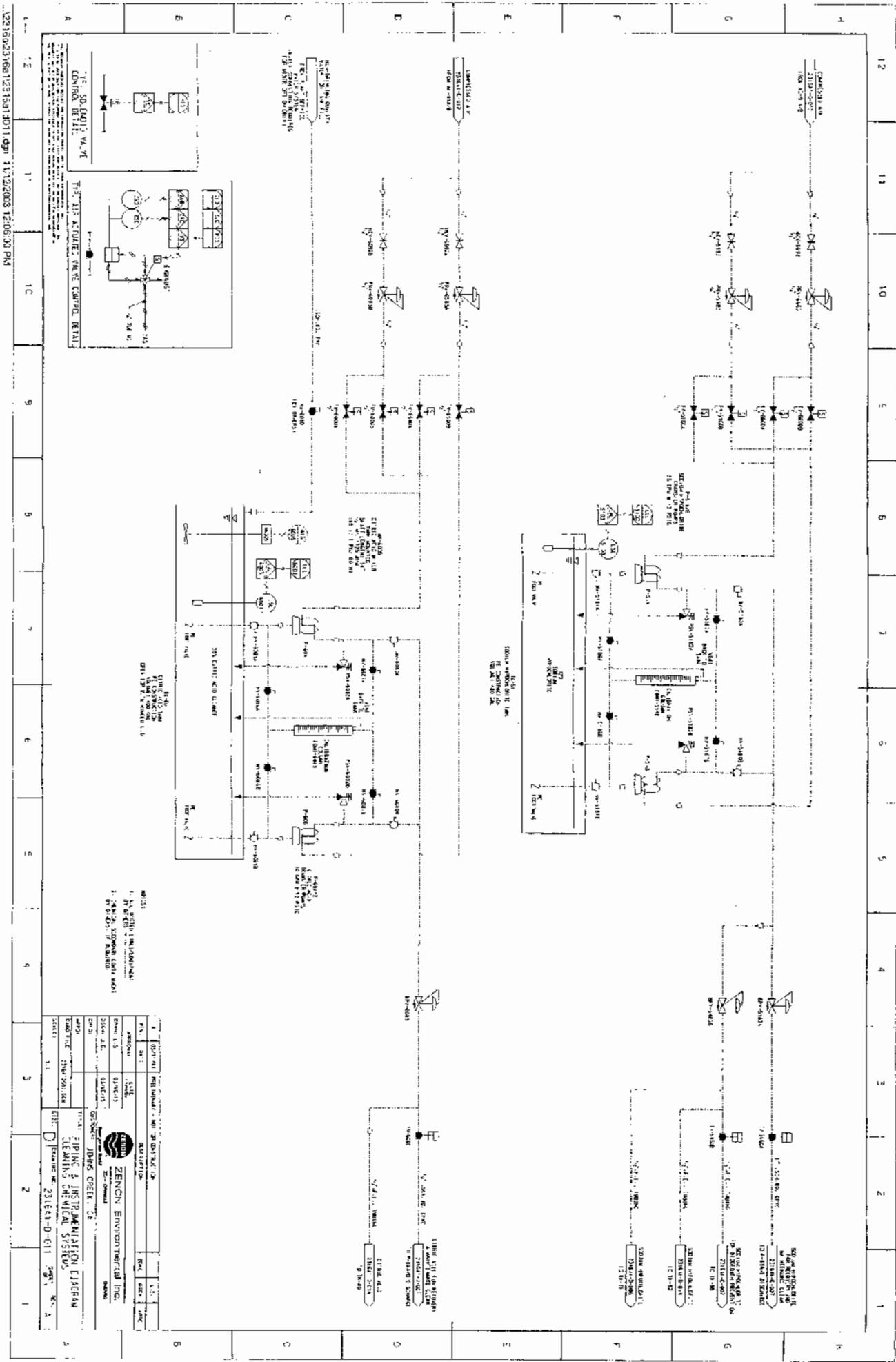


- NOTES:
1. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 2. CONTROL VALVES TO BE SUPPLIED BY OTHERS.
 3. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 4. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 5. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 6. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 7. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 8. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 9. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 10. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 11. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.
 12. ALL INSTRUMENTATION TO BE SUPPLIED BY OTHERS.

NO.	DESCRIPTION	UNIT	QTY
1	CONTROL VALVE	CV	1
2	PUMP	P	1
3	TANK	T	1
4	PIPE	PIP	1
5	FLANGE	F	1
6	VALVE	V	1
7	ACTUATOR	A	1
8	STEM	S	1
9	VALVE BODY	VB	1
10	ACTUATOR	A	1
11	STEM	S	1
12	VALVE BODY	VB	1

25-692215P-0316A.dwg 11/12/2003 12:06:02 PM

ZENON ENGINEERING INC.
 PIPING & INSTRUMENTATION DIAGRAM
 RECTIFICATION PAGES 2 & 3 OF 201P
 PROJECT: ZIMMERMAN
 DRAWING NO: 2516A1-E-01C
 SHEET NO: 2



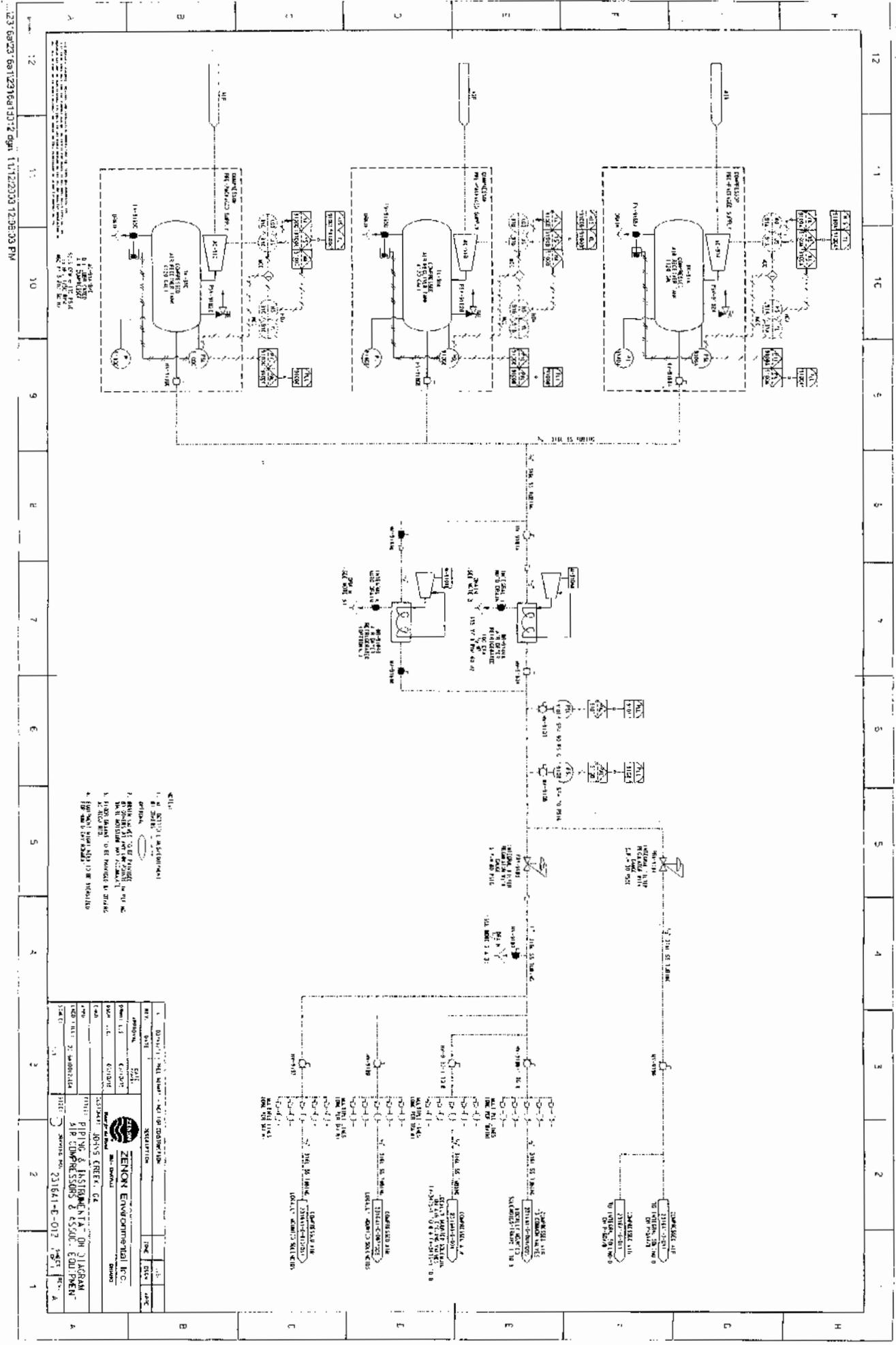
- NOTES:
1. ALL PUMPS TO BE INSTALLED IN THE MOUNTAIN SIDE.
 2. ALL PUMPS TO BE INSTALLED IN THE MOUNTAIN SIDE.
 3. ALL PUMPS TO BE INSTALLED IN THE MOUNTAIN SIDE.

NO.	DESCRIPTION	REVISION	DATE	BY	CHKD.
1	ISSUED FOR PERMIT				
2	REVISED PER COMMENTS				
3	REVISED PER COMMENTS				
4	REVISED PER COMMENTS				
5	REVISED PER COMMENTS				

PROJECT NO.	211641-D-011
DATE	11/11/2003
SCALE	AS SHOWN

CLIENT	JOHNS CREEK, CA
DESIGNER	ZENON ENVIRONMENTAL INC.
ENGINEER	ALAN J. HARRIS
DATE	11/11/2003

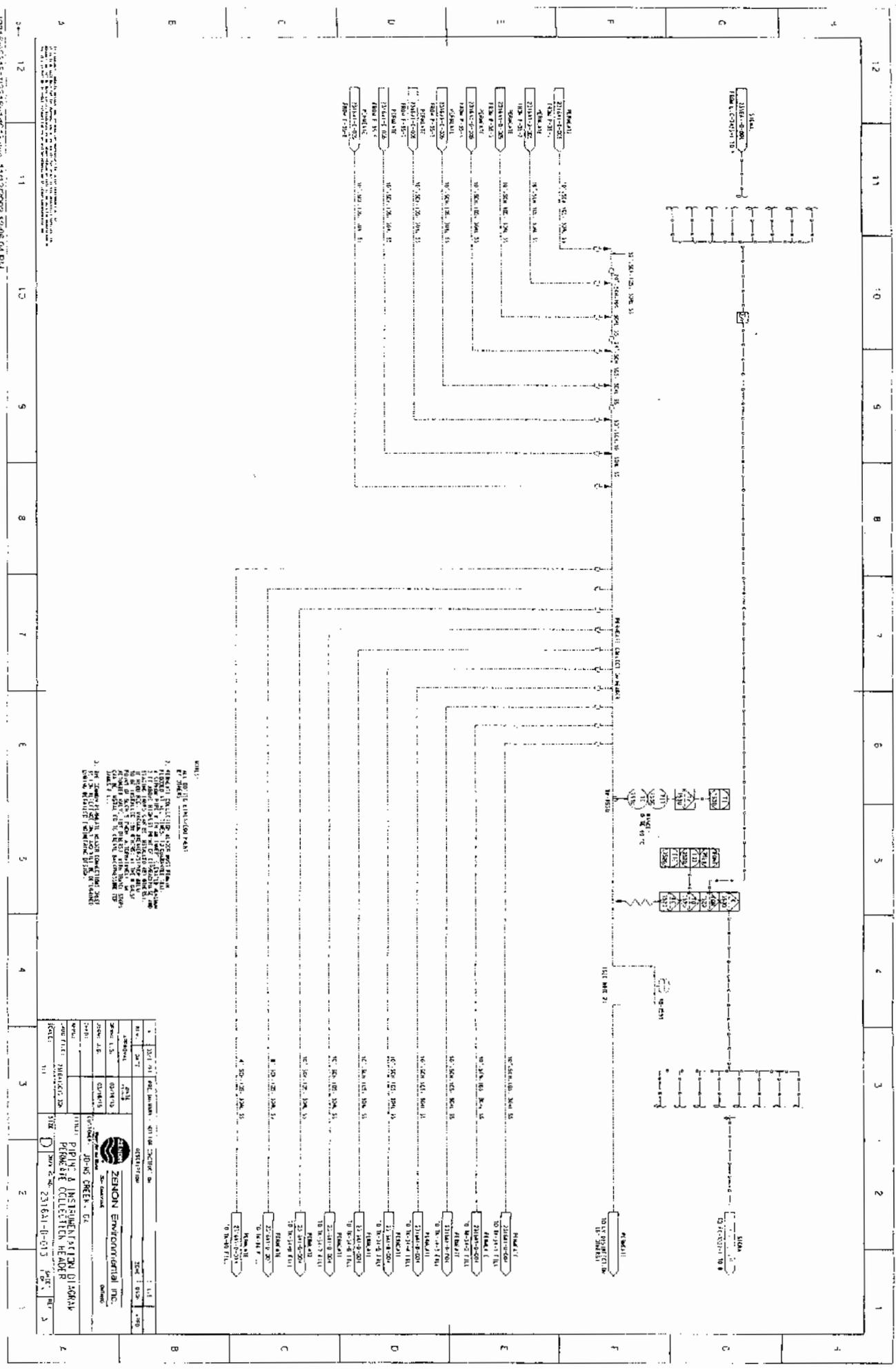
211641-D-011.dwg 11/11/2003 12:06:30 PM



1. 1-1100 - 1-1109
 2. 1-1110 - 1-1119
 3. 1-1120 - 1-1129
 4. 1-1130 - 1-1139
 5. 1-1140 - 1-1149
 6. 1-1150 - 1-1159
 7. 1-1160 - 1-1169
 8. 1-1170 - 1-1179
 9. 1-1180 - 1-1189
 10. 1-1190 - 1-1199

NO.	DATE	DESCRIPTION	BY	CHKD.
1	01/11/2003	REVISION	...	...
2	02/11/2003	...	...	...
3	03/11/2003	...	...	...
4	04/11/2003	...	...	...
5	05/11/2003	...	...	...
6	06/11/2003	...	...	...
7	07/11/2003	...	...	...
8	08/11/2003	...	...	...
9	09/11/2003	...	...	...
10	10/11/2003	...	...	...
11	11/11/2003	...	...	...
12	12/11/2003	...	...	...

12/11/2003 08:12:21:611317.dgn 11/12/2003 12:05:03 PM

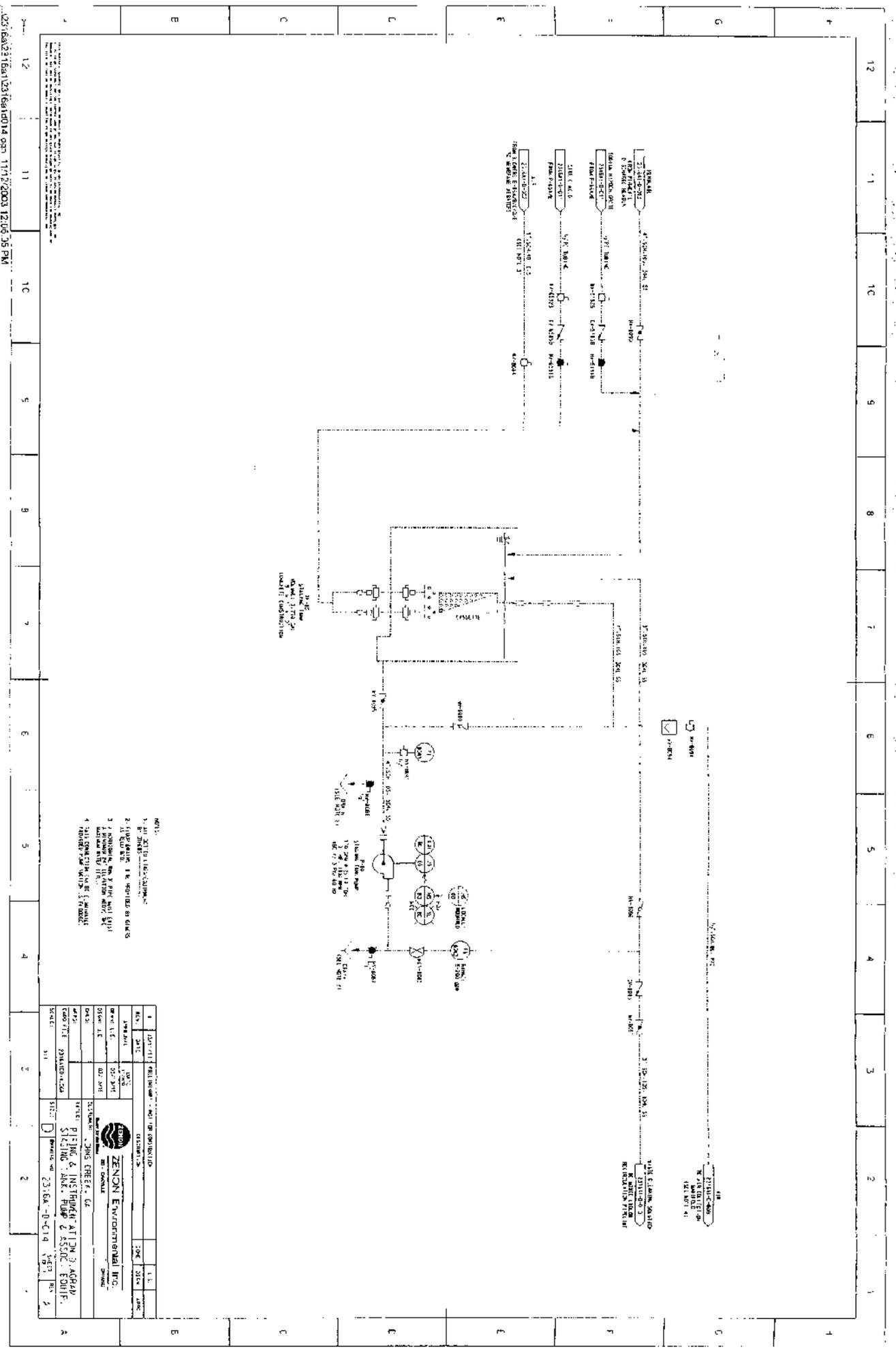


NOTE:
 1. ALL DIMENSIONS ARE IN METERS.
 2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 6. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 7. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 8. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 11. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.
 12. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.

NO.	REVISION	DATE	BY	CHKD.	APP.
1	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
2	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
3	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
4	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
5	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
6	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
7	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
8	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
9	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
10	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
11	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.
12	ISSUE FOR CONSTRUCTION	01/10/2010	J. J. J.	J. J. J.	J. J. J.

23/01/2010 11:17:00 AM

4



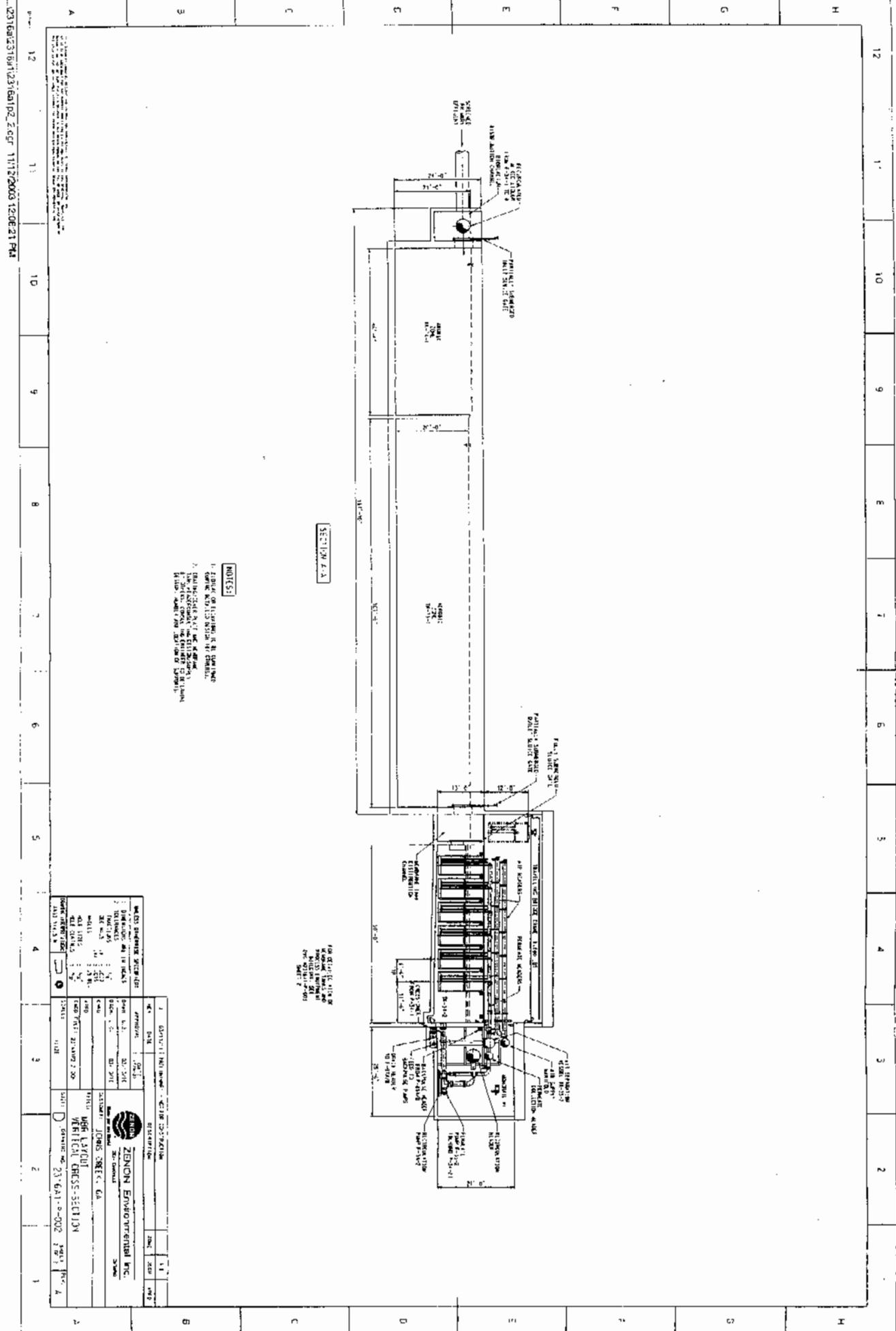
- NOTES:
1. ALL SIZES TO BE CONFIRMED BY THE CLIENT.
 2. FLOW RATES TO BE CONFIRMED BY THE CLIENT.
 3. ALL INSTRUMENTATION TO BE PROVIDED BY THE CLIENT.
 4. ALL INSTRUMENTATION TO BE PROVIDED BY THE CLIENT.

REV.	DATE	DESCRIPTION	BY	CHKD.
1	10/10/11	ISSUED FOR CONSTRUCTION		
2	10/10/11	ISSUED FOR CONSTRUCTION		
3	10/10/11	ISSUED FOR CONSTRUCTION		
4	10/10/11	ISSUED FOR CONSTRUCTION		
5	10/10/11	ISSUED FOR CONSTRUCTION		
6	10/10/11	ISSUED FOR CONSTRUCTION		
7	10/10/11	ISSUED FOR CONSTRUCTION		
8	10/10/11	ISSUED FOR CONSTRUCTION		
9	10/10/11	ISSUED FOR CONSTRUCTION		
10	10/10/11	ISSUED FOR CONSTRUCTION		
11	10/10/11	ISSUED FOR CONSTRUCTION		
12	10/10/11	ISSUED FOR CONSTRUCTION		

10/10/11 10:14:14 AM 11/17/2003 12:06:36 PM

Appendix B – GA Drawings





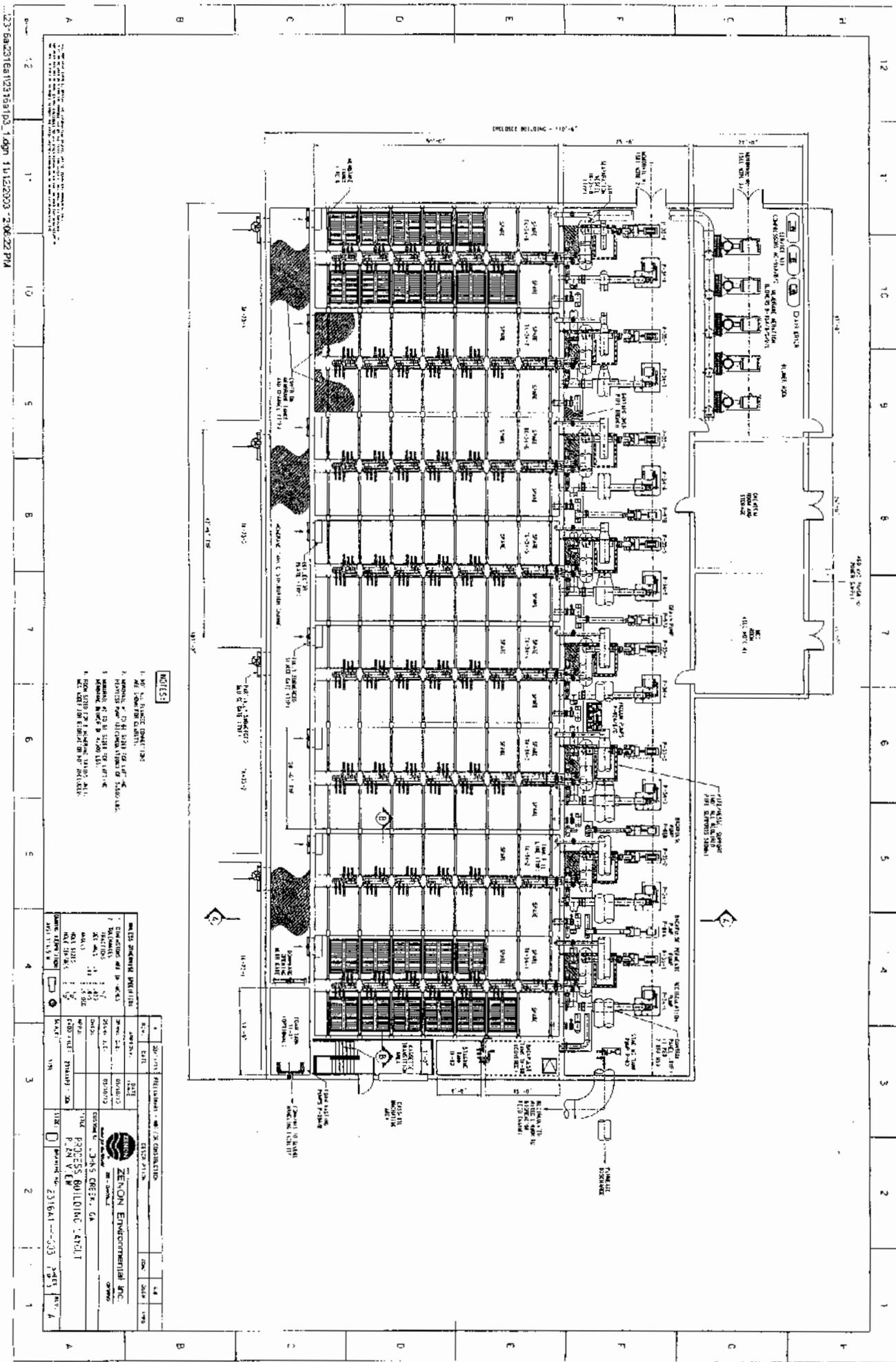
NOTES

1. FLOOR ON EXISTING IN ALL AREAS.
2. EXISTING AND PROPOSED WORK TO BE SHOWN.
3. ALL DIMENSIONS UNLESS OTHERWISE NOTED.
4. ALL WORK TO BE DONE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE BUILDING CODES AND SPECIFICATIONS.

SECTION A-A

FOR SECTION A-A SEE SHEET 7

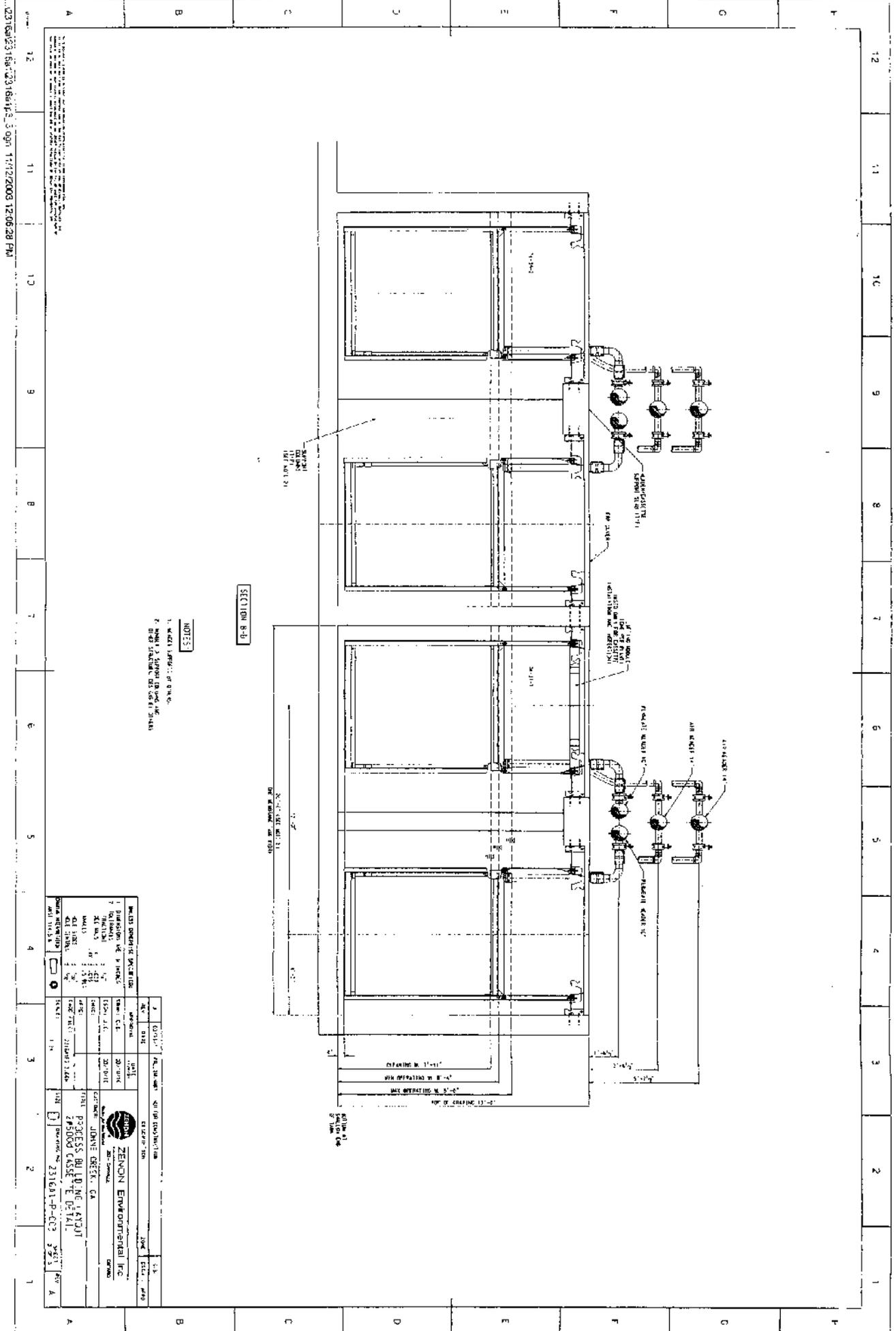
ZENION Environmental Inc. 2000 JONES STREET, GA ATLANTA, GA 30309 TEL: 404.525.1234 FAX: 404.525.1234 WWW: www.zenion.com		DATE: 11/12/2009 TIME: 12:08:21 PM PROJECT: 23.6A1-S-002 SHEET: A
1. APPROVAL: [Signature] 2. DATE: 11/12/2009 3. TIME: 12:08:21 PM	4. DRAWN BY: [Signature] 5. CHECKED BY: [Signature]	6. SCALE: AS SHOWN 7. SHEET: A OF A



- NOTES**
1. SEE ALL FINISH SCHEDULES.
 2. ALL WORK TO BE COMPLETED BY 10/15/03.
 3. ALL WORK TO BE COMPLETED BY 10/15/03.
 4. ALL WORK TO BE COMPLETED BY 10/15/03.
 5. ALL WORK TO BE COMPLETED BY 10/15/03.
 6. ALL WORK TO BE COMPLETED BY 10/15/03.
 7. ALL WORK TO BE COMPLETED BY 10/15/03.
 8. ALL WORK TO BE COMPLETED BY 10/15/03.
 9. ALL WORK TO BE COMPLETED BY 10/15/03.
 10. ALL WORK TO BE COMPLETED BY 10/15/03.
 11. ALL WORK TO BE COMPLETED BY 10/15/03.
 12. ALL WORK TO BE COMPLETED BY 10/15/03.

NO.	DESCRIPTION	DATE	BY
1	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
2	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
3	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
4	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
5	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
6	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
7	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
8	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
9	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
10	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
11	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER
12	ISSUED FOR PERMITS	08/20/03	JANIS DREXLER

23-ba2c16a1231a1d3_1.dgn 11/12/2003 2:06:22 PM



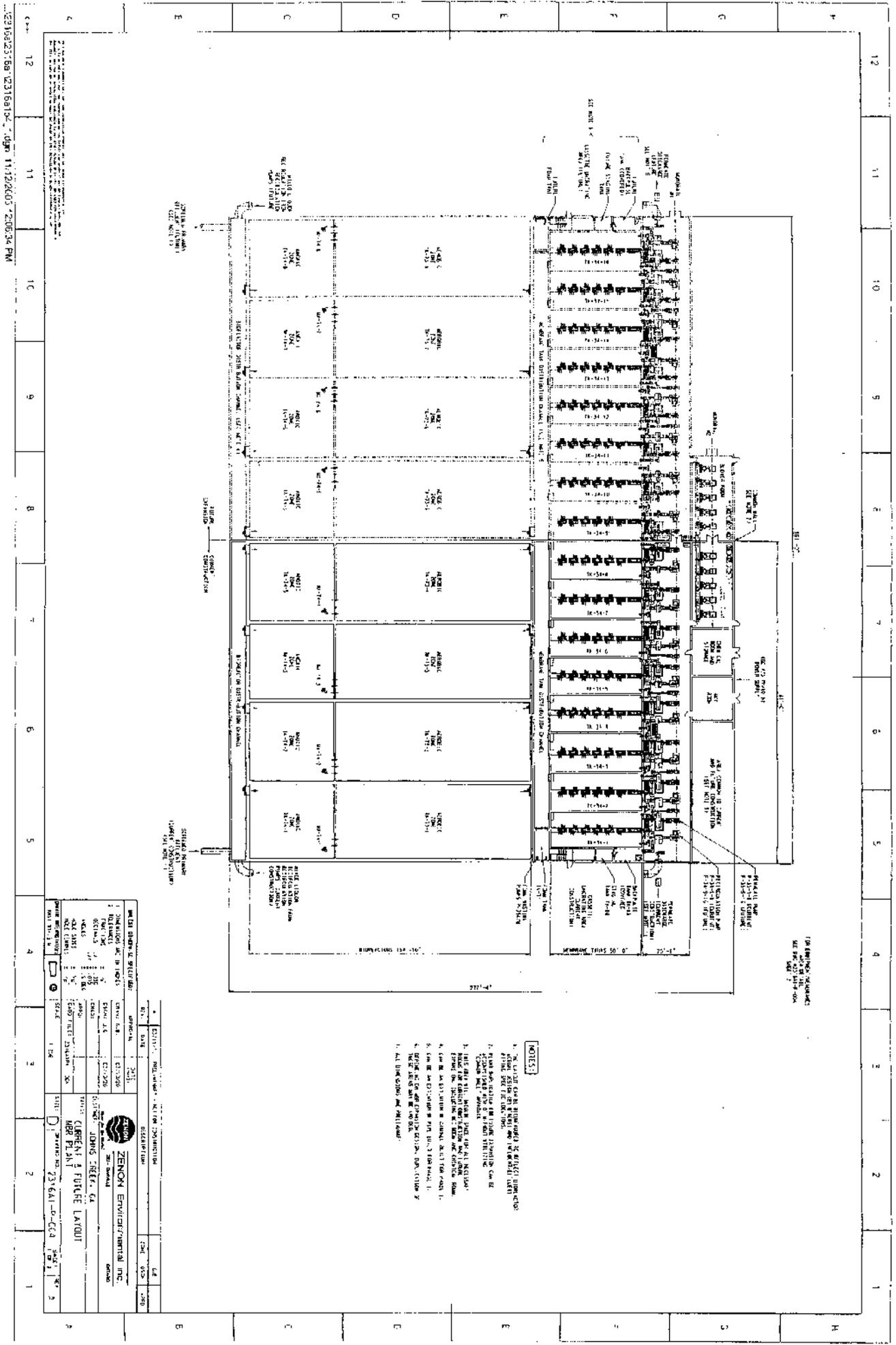
- NOTES:**
1. MATCH SECTION 8-010.
 2. MATCH 2. SECTION 8-010 AND 8-011.
 3. SEE SECTION 8-010 FOR DETAILS.

SECTION 8-0

NO.	DATE	BY	DESCRIPTION
1	01/11/11	J.M.	ISSUED FOR PERMIT
2	01/11/11	J.M.	ISSUED FOR PERMIT
3	01/11/11	J.M.	ISSUED FOR PERMIT
4	01/11/11	J.M.	ISSUED FOR PERMIT
5	01/11/11	J.M.	ISSUED FOR PERMIT
6	01/11/11	J.M.	ISSUED FOR PERMIT
7	01/11/11	J.M.	ISSUED FOR PERMIT
8	01/11/11	J.M.	ISSUED FOR PERMIT
9	01/11/11	J.M.	ISSUED FOR PERMIT
10	01/11/11	J.M.	ISSUED FOR PERMIT
11	01/11/11	J.M.	ISSUED FOR PERMIT
12	01/11/11	J.M.	ISSUED FOR PERMIT

PROJECT INFORMATION	CLIENT	DATE
PROGRESS BUILDING GROUP	PROGRESS BUILDING GROUP	01/11/11
DESIGNER	PROJECT NO.	PROJECT NAME
ZENON ENVIRONMENTAL INC.	2316A1-P-023	PROGRESS BUILDING GROUP
ARCHITECT	ENGINEER	DATE
J.M.	J.M.	01/11/11
SCALE	PROJECT NO.	PROJECT NAME
1/8" = 1'-0"	2316A1-P-023	PROGRESS BUILDING GROUP

2316A1-P-023.dwg 11/11/2009 12:06:28 PM

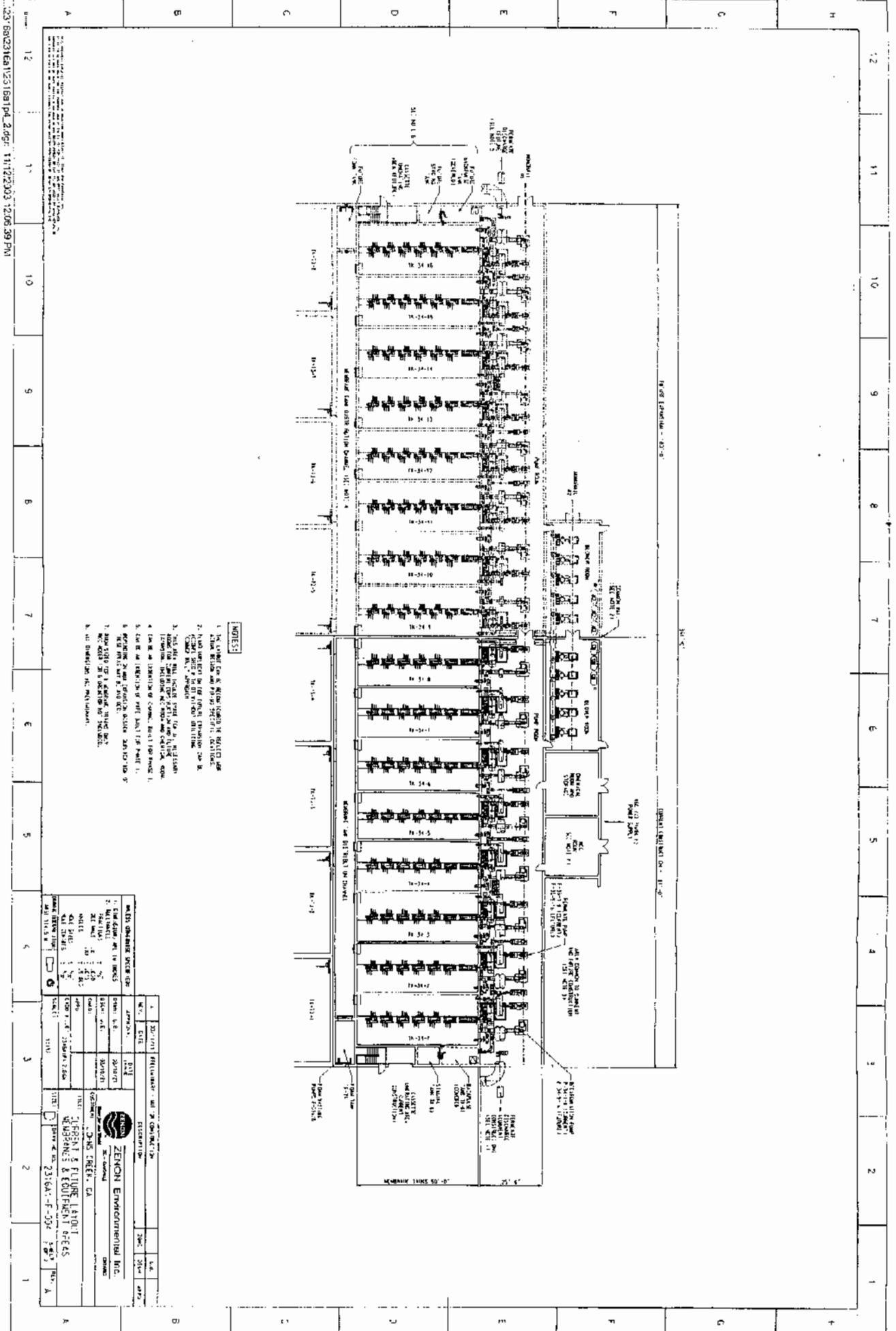


10' DIMENSIONS SHOWN
 UNLESS OTHERWISE NOTED
 SEE PLAN FOR DIMENSIONS

- NOTES:**
1. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE NOTED.
 2. ALL WALLS ARE 1/2" THICK UNLESS OTHERWISE NOTED.
 3. ALL DOORS ARE 3'0" WIDE UNLESS OTHERWISE NOTED.
 4. ALL WINDOWS ARE 6'0" WIDE UNLESS OTHERWISE NOTED.
 5. ALL FLOORS ARE 4" CONCRETE ON 8" GRAVEL UNLESS OTHERWISE NOTED.
 6. ALL CEILING ARE 8'0" HIGH UNLESS OTHERWISE NOTED.
 7. ALL ROOF ARE 4" POLYSTYRENE INSULATION ON 12" CONCRETE UNLESS OTHERWISE NOTED.
 8. ALL EXTERIOR WALLS ARE 16" THICK UNLESS OTHERWISE NOTED.
 9. ALL EXTERIOR FLOORS ARE 4" CONCRETE ON 8" GRAVEL UNLESS OTHERWISE NOTED.
 10. ALL EXTERIOR ROOF ARE 4" POLYSTYRENE INSULATION ON 12" CONCRETE UNLESS OTHERWISE NOTED.

ZENON Environmental/Vertical Inc. 23761-10-004 23761-10-004	
PROJECT: CLERICAL & OFFICE LAYOUT DRAWING: MEP PLAN 1	DATE: 11/20/03 SCALE: 1/8" = 1'-0"
CLIENT: JOHN DEERE, CA ADDRESS: 10000 N. DEERE DRIVE, MESA, AZ 85207	DRAWN BY: ... CHECKED BY: ...
PROJECT NO: 23761-10-004 DRAWING NO: MEP PLAN 1	SHEET NO: 1 OF 2

11/20/03 11:20:03 2:06:34 PM



NOTES:

1. CONSULT FOR & REVIEW/VERIFY ALL EXISTING AND PROPOSED CONDITIONS.
2. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS.
3. ALL WORK SHALL BE IN ACCORDANCE WITH ALL APPLICABLE CONTRACT DOCUMENTS.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS AND APPROVALS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL EXISTING UTILITIES AND STRUCTURES.
6. ALL WORK SHALL BE COMPLETED WITHIN THE SPECIFIED TIME FRAME.
7. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL AREAS AT ALL TIMES.
8. ALL MATERIALS AND METHODS SHALL BE APPROVED BY THE ARCHITECT.

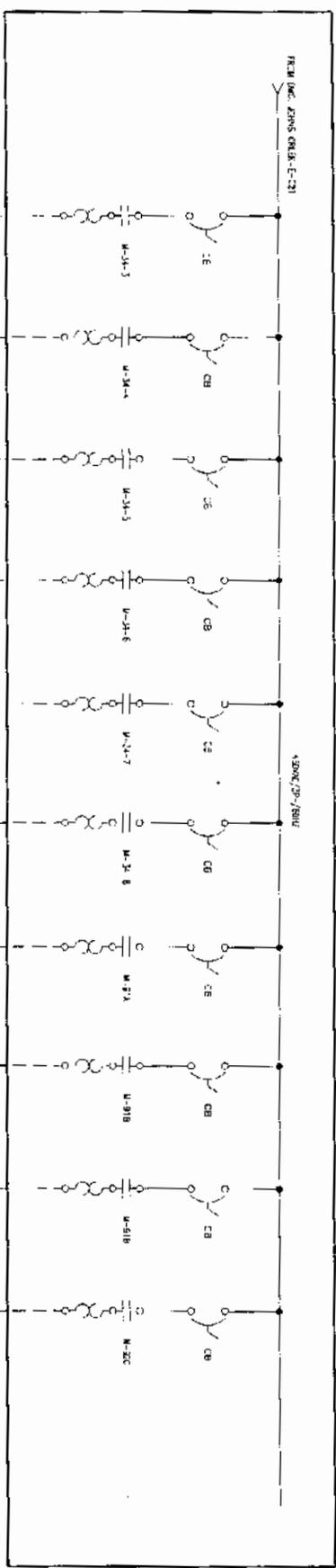
NO.	DATE	DESCRIPTION	BY	CHKD	APPD
1	02/11/11	REVISIONS - SEE 'R' COLUMN FOR DETAILS	J. J. JONES	J. J. JONES	J. J. JONES
2	02/11/11	REVISIONS - SEE 'R' COLUMN FOR DETAILS	J. J. JONES	J. J. JONES	J. J. JONES
3	02/11/11	REVISIONS - SEE 'R' COLUMN FOR DETAILS	J. J. JONES	J. J. JONES	J. J. JONES
4	02/11/11	REVISIONS - SEE 'R' COLUMN FOR DETAILS	J. J. JONES	J. J. JONES	J. J. JONES

<p>ZENON Environmental Inc. 2405 S. 10th Street, Suite 100 Tulsa, Oklahoma 74106 Phone: (918) 438-1111 Fax: (918) 438-1112 www.zenonenv.com</p>	<p>PROJECT: FUTURE LEADERS ADDRESS: 2316A-F-202 DATE: 02/11/11 DRAWN BY: J. J. JONES CHECKED BY: J. J. JONES APPROVED BY: J. J. JONES</p>
--	---

Appendix C – Electrical One Line Diagrams



MOX BR ZENON



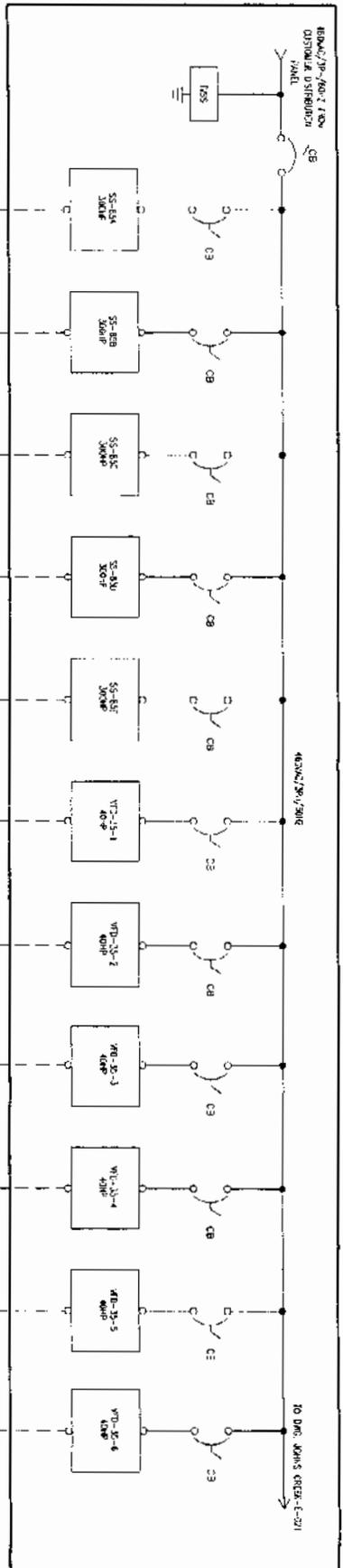
NO.	DESCRIPTION	REV	DATE	BY	CHKD	APPD	DATE	BY	CHKD	APPD	DATE	BY	CHKD	APPD
1	REGULATOR													
2	REGULATOR													
3	REGULATOR													
4	REGULATOR													
5	REGULATOR													
6	REGULATOR													
7	REGULATOR													
8	REGULATOR													
9	REGULATOR													
10	REGULATOR													

- NOTES:
1. FIELD CHECK FOR SCALE, SIZE, T AND MODEL, REPORTING/READING SHOULD BE ON THE ELECTRONIC SYSTEM.
 2. ON THE FIELD, THE USER IS RESPONSIBLE FOR THE CORRECTNESS OF THE INFORMATION PROVIDED BY THE USER.
 3. DESIGN AND CONSTRUCTION SHOULD BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT.
 4. 55 - 1/2" DIA. TYPICAL.
 5. 1/2" - VARIABLE FREQUENCY DRIVE.
 6. 1/2" - BLOCK, SPOOL PANEL.

REV	DATE	DESCRIPTION	ISSN	CHND	APPD	DATE	BY	CHKD	APPD	DATE	BY	CHKD	APPD
A	01/10/17	FIELD INSTALLY											

CONTRACT NO. JONES CRK E
 SCALE: NTS
 DRAWING NO. JONES CRK E-122
 TITLE: MCD SINGLE LINE DIAGRAM
 CUSTOMER: JONES CRK E, CA
 JOB NO. CRK E-122
 DATE: 02/21/17

ZENON ENVIRONMENTAL LTD.
Water for the World
 4850 MC/3RD AVE
 JONES CRK E, CA 94551
 TEL: 925-942-1000
 FAX: 925-942-1001
 WWW.ZENON-ENV.COM



NOTES:

- FIELD CONTRACTOR SHALL VERIFY AND VERIFY REINSTALLATION REQUIRED FOR THE SIGNOR EPIPE.
- AS REQUIRED BY LOCAL ELECTRICAL AUTHORITIES AND REGULATIONS.
- CONTRACTOR SHALL VERIFY AND VERIFY REINSTALLATION REQUIRED FOR THE SIGNOR EPIPE.
- CONTRACTOR SHALL VERIFY AND VERIFY REINSTALLATION REQUIRED FOR THE SIGNOR EPIPE.
- CONTRACTOR SHALL VERIFY AND VERIFY REINSTALLATION REQUIRED FOR THE SIGNOR EPIPE.
- CONTRACTOR SHALL VERIFY AND VERIFY REINSTALLATION REQUIRED FOR THE SIGNOR EPIPE.

REV	DATE	DESCRIPTION	DESIGN	CHKD	APPD	DRWN	DATE
A	03/10/17	DESIGN				JT	03/10/17

CONTRACT NO: JOHN'S CREEK

SCALE: AS SHOWN

DRAWING NO: 020 NEW C21

CUSTOMER: JOHN'S CREEK, CA

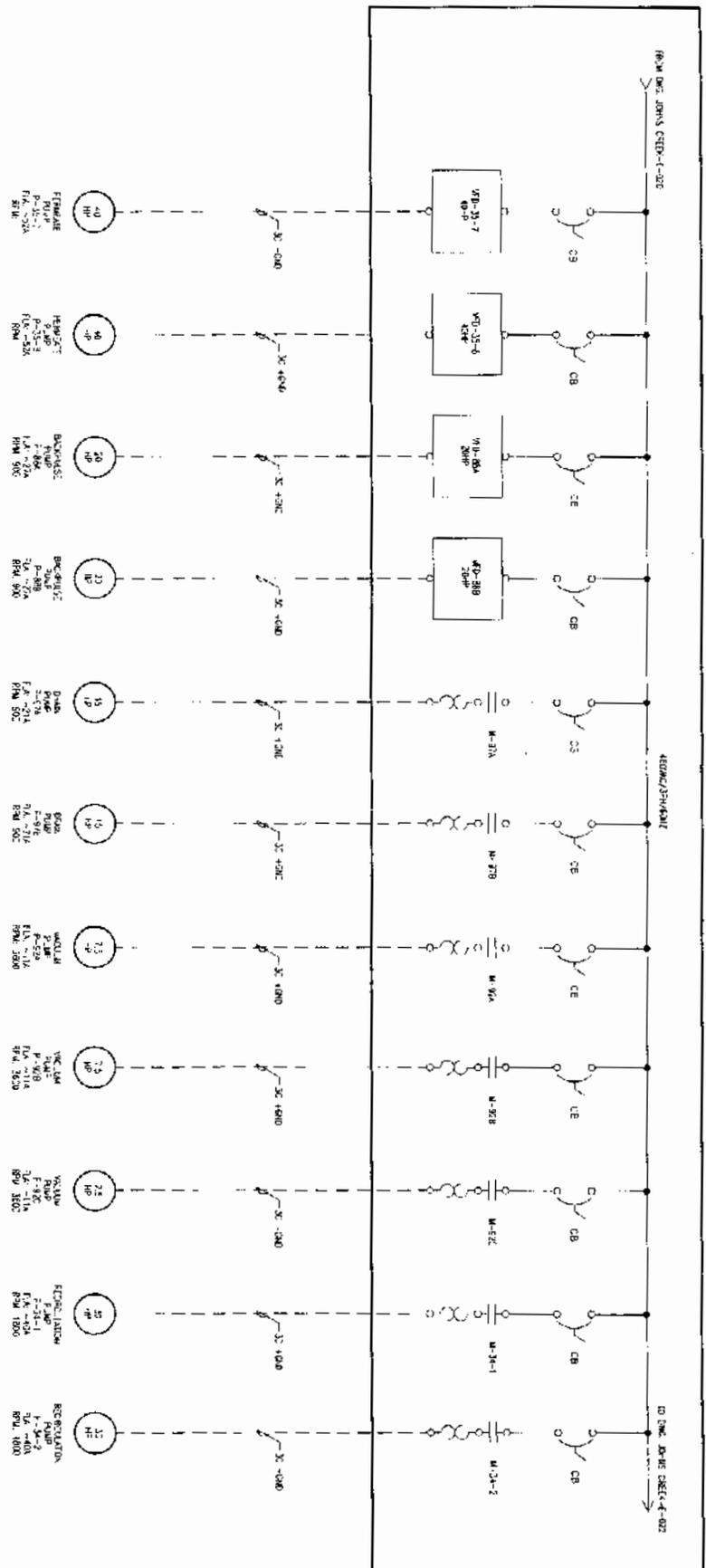
TITLE: MCC SINGLE LINE DIAGRAM

450V/200A/SPH/ROH2

JOHN'S CREEK - C20

ZENION ENVIRONMENTAL INC.
Water for the World
CARROLL OREGON

WATER AT ALTOUR



- NOTES:
1. FIELD CONTROLLER SHALL VERIFY AND TEST ALL STANDARDS/TESTING FOR ALL GPM HAS TEST-COMPLIANT
 2. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 3. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 4. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 5. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 6. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 7. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 8. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 9. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 10. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 11. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS
 12. ALL ELECTRICAL WORK SHALL BE DONE IN ACCORDANCE WITH LOCAL AND STATE REGULATIONS

REV	DATE	DESCRIPTION	ISSUE	BY	APP	DATE	REV	DESCRIPTION
A	03/07/17	ISSUE FOR CONSTRUCTION	05/16/17	J. JONES		03/16/17	A	ISSUE FOR CONSTRUCTION

CONTRACT NO. JONES CREEK
 CAD FILE
 SCALE: NTS
 DRAWING NO. JONES CREEK T-021
 07' NPT 022

ZENON EDWICOMMERIAL INC.
Water for the World
 46000/25000 GPM
 JONES CREEK T-021
 JOHN S. JONES
 46000/25000 GPM

Appendix D – Block Diagram

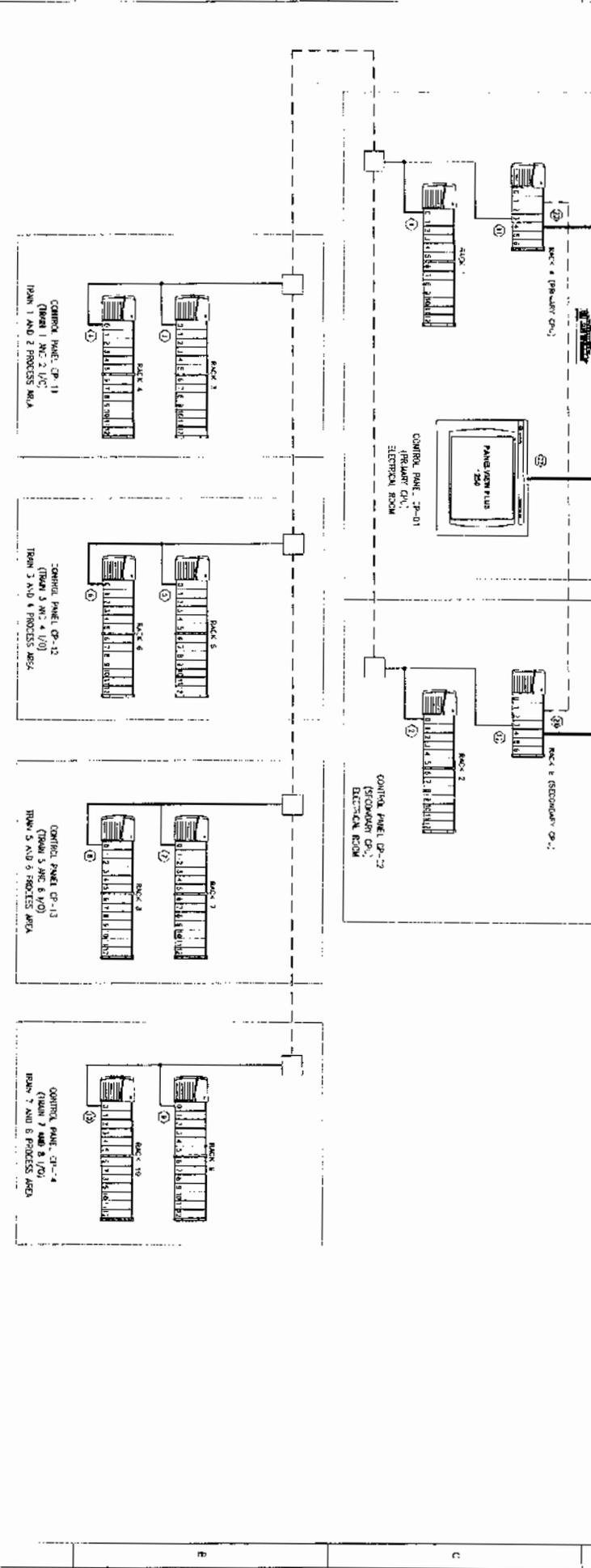


COMMUNICATION	COLETYPE	FLORIAN AND WINTERBEEK	BY BROWN	BY OTHERS
DATE	NO. & Q. NO. SHEET	DATE	BY	BY
11-11-07	10-000-0000-0000	11-11-07		
11-11-07	10-000-0000-0000	11-11-07		
11-11-07	10-000-0000-0000	11-11-07		



REV	DATE	DESCRIPTION	DSGN	CHKD	APPR	ENR'D	JI	DATE	BY
A	03/07/17	2nd REVISION					JI	03/07/17	JI
B	03/07/17	3rd REVISION					JI	03/07/17	JI

NO.	DESCRIPTION	QUANTITY	UNIT	DATE	BY
1	10-PLANT ETHERNET RING NETWORK	1	LOT		
2	CONTROL PANEL CP-1	1	UNIT		
3	CONTROL PANEL CP-2	1	UNIT		
4	CONTROL PANEL CP-3	1	UNIT		
5	CONTROL PANEL CP-4	1	UNIT		
6	CONTROL PANEL CP-5	1	UNIT		
7	CONTROL PANEL CP-6	1	UNIT		
8	CONTROL PANEL CP-7	1	UNIT		
9	CONTROL PANEL CP-8	1	UNIT		
10	CONTROL PANEL CP-9	1	UNIT		
11	CONTROL PANEL CP-10	1	UNIT		



NOTES:	1. DESIGNER SHALL VERIFY ALL MATERIALS, EQUIPMENT, AND METHODS TO BE USED ARE APPROVED BY THE CLIENT.
	2. FIELD AND ADDRESS TO BE SUPPLIED BY CLIENT.
	3. CABLES AND CONNECTORS TO BE NETWORK STANDARD SPECIFICATIONS TO BE SUPPLIED AND INSTALLED BY OTHER/EXTERNAL CONTRACTOR.

ZENON ENVIRONMENTAL INC.
Water for the World
 10000 W. 10th Ave., Suite 100, Denver, CO 80202
 303.751.1000
 www.zenonenv.com

JOHN S. CREEK, CO.
 INTERCONNECTING DIAGRAM
 NETWORK ARCHITECTURE

JOHN S. CREEK-3-050

Appendix E – EBO Plan





Equal Business Opportunity Plan

ZENON is committed to incorporating local expertise and achieving diversity and equality in procurement and contracting opportunities. We will:

1. Enhance the utilization of diverse racial, gender, and ethnic groups,
2. Identify, encourage and solicit small, minority and female business enterprises, and
3. Identify, establish and promote procurement and contracting opportunities for small, minority and female business enterprises.

Through ZENON's due diligence and proposal preparation for the John's Creek Environmental Campus Project, we have already identified the following partner as follows:

- The structural engineering review of membrane cassette support beams, site co-ordination assistance and some process/mechanical commissioning assistance will be completed by McKenzie MacGregor Incorporated, a female business enterprise registered in Fulton County. As per Exhibits C and D, contained in our bid submission, McKenzie MacGregor, Inc., will be contracted to a value of \$20,000, which represents 0.17% of the tendred contract price.

The profiles and qualifications of this firm for the John's Creek Environmental Campus Project are attached. ZENON has reviewed and selected this firm based on their qualifications and ability to provide value added services to the project execution. The firm is ready to proceed.

ZENON has experience implementing Equal Business Opportunity Plan's on other projects and remains open to exploring additional opportunities in the execution of the project once selected. ZENON's recruitment is based on qualifications and value added.

Specifically, ZENON's Equal Business Opportunity Plan includes the following:

- A. Use of McKenzie MacGregor Inc. as above
- B. The active identification, encouragement and solicitation of qualified small, minority or female business enterprises to participate in services and procurement opportunities and to encourage their involvement
- C. Active coordination with the contract compliance departments of various entities to identify such businesses

ZENON Environmental Corporation

3239 Dundas St. W., Oakville, Ontario, Canada L6M 4B2 Tel: (905) 465-3030 Fax: (905) 465-3050

- D. Contacting small, minority or female businesses to discuss potential teaming and/or mentoring opportunities
- E. Building relationships with appropriate small, minority or female business

ZENON Environmental Corporation

3239 Dundas St. W., Oakville, Ontario, Canada L6M 4B2 Tel: (905) 465-3030 Fax: (905) 465-3050



Environmental quality... one project at a time...

MMI Qualifications for the Johns Creek Membrane Project

McKenzie MacGregor Incorporated (MMI) is a civil/environmental engineering firm specializing in water, wastewater, and stormwater services. Our mission is to provide the highest value for quality engineering design and consulting services received by any government, business, or the public at large.

We have the capability to follow a project from the study/report phase to the design phase and on through to completion of the construction to start-up and operations. We are committed to completing all projects on time and within the established scope of work and budget. Our approach is to work with our client as a team, assuring that the client is involved in all decisions made during the course of the project.

MMI is an employee owned corporation registered in the State of Georgia and certified by the Board of Registration of Professional Engineers and Land Surveyors to provide engineering services to the public. We are a certified Female Business Enterprise (FBE).

Our design capabilities include the use of AutoCad 2002, a full size HP color plotter, and ESRI GIS software. MMI utilizes HEC-RAS, HEC-HMS, WaterCad, SewerCad, and StormCad.

Our ability to assist on the Johns Creek Membrane Equipment Project includes the following:

- Fulton County certified FBE
- Fulton County staff coordination (management, engineering, operations, elected officials)
- Coordination with DB team
- Engineering design support
- Local staff for meetings, site inspections, construction or operations support
- Operations and Maintenance Manual preparation
- Construction support
- Operations support

See next page for past experience working with Fulton County and other wastewater treatment plant projects.

Our staff have successfully worked with Fulton County since 1988 on the following projects:

- 10 to 13-mgd Camp Creek WPCP Expansion – Fast-track expansion involving process modification and piping changes without new structures. Resulted in an incremental cost of \$0.17 per mgd, designed and constructed in 6 months. Won WEF George Bradley Gascoigne Medal for published paper.
- Miscellaneous Improvements – Prepared design-build documents for miscellaneous plant improvements to maintain permit compliance at Camp Creek WPCP.
- 24-mgd Camp Creek WPCP Expansion – Engineer in responsible charge for design concepts and permitting. Extensive regulatory coordination and negotiations led to issuance of the permit without challenge.
- Water Resources Management Program – Led technical team of engineers and scientists on a watershed assessment of streams in highly urbanized Sandy Springs area. Work included data collection, base flow and storm sampling, stormwater infrastructure inventory, water quality and hydraulic modeling, watershed and stormwater management planning, as well as public participation.
- 2020 Water and Wastewater Master Plan – Responsible for evaluation of existing facilities, 20-year flow projections, future regulatory needs, recommendations of needed capital improvements to meet future demands and regulatory requirements.
- Series 1998 Bond Report – Prepared Engineers Report and technical documentation for \$273 million Series 1998 Water and Wastewater Revenue Bonds. Prepared material for and participated in presentations to Bond Rating Agencies resulting in improved ratings.

Other wastewater treatment plant projects completed by MMI include:

- Big Haynes Creek WRF, Snellville, GA – Gwinnett County selected MMI to assess the Big Haynes Creek WRF to determine why the plant was not able to effectively treat its permitted capacity of 500,000 gpd. Elements assessed included a pump station, aeration basin, clarifiers, filtration, and disinfection. MMI performed a process analysis to determine plant limitations and performed hydraulic analysis to determine bottlenecks. Alternatives evaluated included minor repairs, plant replacement, and membrane technology. Findings centered around poor filter performance causing excess recycle within the plant. The study saved the County large capital costs by facilitating a decision to expedite plant decommissioning based on cost-effectiveness and scheduling of repairs.
- Ultraviolet Disinfection Design, No Business Creek WRF, Lilburn, GA – MMI designed a new ultraviolet disinfection system for the 1.0 mgd No Business Creek WRF with a peak flow of 2.5 mgd. Detailed hydraulic calculations were developed to add the UV facility and 200 feet of new piping into the plant hydraulic profile between existing effluent filters and step aerator. An alternatives analysis was performed to compare equipment manufacturers. MMI's services included Basis of Design Report, all discipline design drawings and specifications, bid services, and construction services.
- Effluent Filter Design, Beaver Run WRF, Gwinnett County, GA – MMI designed a new traveling bridge effluent filter for the 4.5 mgd Beaver Run WRF. The plant's peak capacity is 12 mgd with three filter beds and post aeration. The project included the design of over 600 feet of gravity lines avoiding existing plant pipe without disrupting plant operations. The project included mechanical, structural, electrical, and site work drawings and specifications. Services provided by MMI included Basis of Design Report, design drawings and specifications, bid services, and construction services.



3455 Lawrenceville-Suwanee Road, Suite A
Suwanee, Georgia 30024
Phone: (678) 546-9450 Fax: (678) 546-9451

Appendix F – Membrane Warranty





Water for the World

Pro-rated Membrane Module Warranty

This schedule sets out the warranties with respect to Zenon Membrane Modules. NO OTHER WARRANTIES, EXPRESSED OR IMPLIED ARE MADE IN CONNECTION WITH THE SALE OF THESE PRODUCTS, INCLUDING WITHOUT LIMITATION WARRANTIES AS TO FITNESS FOR ANY PARTICULAR PURPOSE OR USE OR MERCHANTABILITY OF THESE PRODUCTS. THE WARRANTY PROVIDED HEREIN SHALL BE THE EXCLUSIVE AND SOLE REMEDY OF CUSTOMER, AND IN NO EVENT SHALL ZENON BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT OR CONSEQUENTIAL DAMAGES.

1. Models

All generations of Zenon Membrane Modules.

2. Definitions

2.1 Customer & Project Reference

"Customer" -means Fulton County

"Project Reference" – means Johns Creek Environmental Campus

"Contract of Sale" – means the sales contract dated November 13, 2003 for the Project Reference

2.2. Membrane Module Replacement Price ("MMRP")

The Membrane Module Replacement Price shall be the value provided in the Price Proposal Form D.

2.3. Module Failure

Module Failure means a situation where, as a result of faulty materials or workmanship, the membrane modules fail to produce permeate according to the water quality and overall flow specifications described in the Contract of Sale.

2.4. Module Failure Date

The Module Failure Date shall be the date that written notification of the alleged module failures is received by Zenon as described in Section 4.5.

2.5. Warranty Term

Except as otherwise provided herein, the warranty period is one hundred and twenty-six (126) months from the date of shipment of the Membrane Modules by Zenon, or one hundred and twenty (120) months from the date the of Substantial Completion.

3. Warranties and Liabilities

3.1. Scope of Warranty

Zenon warrants that its membrane module(s) will be free of mechanical defects, due to faulty materials or errors in manufacturing workmanship, which cause the system in which the membrane modules are installed to fail to produce permeate which meets the water quality and overall flow specifications, described in the Contract of Sale. All claims under the herein warranty must specify the claimed defect in materials or construction or manufacturing workmanship giving rise to such claim as well as the serial number of the relevant membrane module(s). All claims must be submitted to Zenon in writing within thirty (30) days following the expiry of the Warranty Term.

3.1.1. Zenon Liability

In full satisfaction of any valid claim hereunder, Zenon, at its sole discretion, shall repair or replace any membrane module(s) that satisfy the conditions of Module Failure conditions described in Section 2.3.

3.1.2. Satisfaction of Claims

Zenon shall have the right to satisfy valid claims under this warranty in a flexible manner in order to restore performance to contractually specified levels of flow and permeate quality. Such flexibility may include the repair of existing membrane modules or by upgrading failed membrane modules with newer membrane module(s) that may embody design and efficiency improvements. Customer acknowledges that, by virtue of ongoing advances in Zenon's technology and design, fewer compatible replacement membrane modules may, in the future, be required in a given installation to meet contractually specified flow and permeate quality levels. Provided that all contractually specified flow and permeate quality levels are met, should Zenon so

proscribe, Customer consents to the replacement of membrane modules pursuant to this Warranty with a compatible embodiment of Zenon's membrane module technology.

3.2. Price for Zenon Membrane Modules to Replace Modules Originally Shipped with the System

The Customer shall pay Zenon for membrane modules supplied under the terms of this Warranty to replace modules originally shipped as part of the Project Reference system. The amount to be paid by the Customer to Zenon shall be determined in accordance with the following price calculation formula:

$$\text{Price} = \frac{\text{number of whole months elapsed between Module Failure Date -- Warranty Start Date}}{\text{Term}} \times (\text{MMRP})$$

3.3. Price for Modules to Replace Replacement Zenon Membrane Modules During the Term

The supplied shall provide replacement membranes at no cost to the customer

3.4. Maximum Term of Warranty

The maximum term of warranty of any replacement module shall not exceed the remaining portion of the Warranty Term at the time of replacement.

4. Conditions of Warranty

4.1. Limitations of Warranties

Occurrence of any of the following as determined by Zenon shall void all warranties hereunder:

- 4.1.1. Physical abuse or misuse of membrane modules;
- 4.1.2. Faulty installation of membrane modules;
- 4.1.3. Unauthorized alteration of any parts originally supplied by Zenon with membrane modules;
- 4.1.4. Failure to strictly and exclusively adhere to Zenon specified membrane module cleaning procedures, including the use of anything other than Zenon-approved membrane module cleaning agents;
- 4.1.5. Failure to adhere to feedwater specifications defined in the Contract of Sale at all times;
- 4.1.6. Failure to install and maintain any contractually defined agreed Zenon remote data connection to monitor overall plant and membrane module status;
- 4.1.7. Failure to strictly adhere to a Zenon designed or approved maintenance program as presented in the Zenon Operations manual and updated by Zenon from time to time during the Warranty Term;
- 4.1.8. Failure to maintain complete and accurate operating data at all times as described in Section 4.5 below.

4.2. Standard Guidelines

This Warranty is conditional upon the shipping, storage, system design, installation, operation and maintenance of the membrane modules in strict accordance with the Zenon membrane module operations and maintenance guidelines as presented in the Zenon Operations manual and updated by Zenon from time to time. Customer authorizes Zenon to conduct any reasonable review of system design or to inspect facilities where membrane modules are installed upon reasonable notice to the Customer. Such reviews and/or inspections are intended to assist Zenon and the Customer in detection of system faults and to optimize the care and operation of the membrane modules.

4.3. Additional Equipment

Zenon assumes no liability for any additional equipment not authorized by Zenon that may be installed in or connected to the plant after operation has begun.

4.4. Warranty Maintenance

To maintain the warranty described herein, plant operating records from initial start-up date until claim must be maintained and made available to Zenon upon request. Such documentation must be provided in detail as specified in 4.5 below in order to: a) verify uninterrupted compliance with guidelines; and b) establish liability for module(s) replaced or repaired under warranty. **IT IS AGREED AND UNDERSTOOD THAT THE CUSTOMER SHALL NOT BE ENTITLED TO MAKE ANY CLAIMS UNDER THIS WARRANTY IF THE MEMBRANE MODULES HAVE NOT BEEN OPERATED IN STRICT ACCORDANCE WITH THE ZENON MEMBRANE MODULE OPERATIONS AND MAINTENANCE GUIDELINES AS PRESENTED IN THE ZENON OPERATIONS MANUAL AND UPDATED BY ZENON FROM TIME TO TIME.** Customer must measure and maintain records to establish that the membrane module(s) have been operated in accordance with such guidelines, failing which all warranties and rights of the customer shall be null and void.

4.5. Notification of Performance Deficiency

All claims filed hereunder shall be made in writing within thirty (30) days of identifying a defect in materials or workmanship and shall present a detailed analysis of the system and individual module data showing the

performance deficiency, and must include: The serial number(s) of the module(s) involved, and the individual membrane module(s) operating data, system operating data or defect in materials or workmanship upon which the claim is based. Operating data must include regular information on: flow, transmembrane pressure, contractually specified feedwater quality parameters and temperature, and elapsed time since start-up (days). Zenon reserves the right to require additional data as necessary to validate claims filed. The Module Failure Date shall be the date that written notification of the alleged module failure(s) is received by Zenon.

4.6 Verification of Performance Deficiency

After receipt of notice of warranty claim, Zenon will promptly undertake such investigations as, in Zenon's opinion are necessary to verify whether a deficiency exists and to establish liability for and an appropriate remedy of any deficiency. Customer may, in course of these investigations, be requested to return module(s) to Zenon for examination. Zenon may also conduct reasonable tests and inspections that are standard in the industry ("Tests") at end-user's or at Customer's premises. If the results of the investigation do not substantiate the deficiency claimed, or if the results indicate a deficiency has occurred, but the deficiency was not caused by a mechanical defect due to faulty materials or errors in manufacturing workmanship, Customer shall reimburse ZENON for all reasonable costs and expenses associated with said investigation, including all inspections, Tests, and applicable travel expenses.

4.7 Return Procedure

In the event that the return of a membrane module(s) is required pursuant to this Warranty, Customer shall first obtain a Return Goods Authorization (RGA) number from Zenon. Membrane module(s) shipped to Zenon for warranty examination must be shipped freight prepaid. If Customer desires temporary replacement membrane module(s) to replace those alleged to be defective and returned to Zenon for warranty examination, Customer is responsible for the cost associated with any such replacements until examination of the returned membrane modules pursuant to this Warranty is complete. Membrane module(s) examined as part of a warranty claim which are subsequently found by Zenon to be performing as warranted will be returned to Customer, freight collect.

***Appendix G – EJCDC P-700 Standard General Terms
and Supplemental Conditions***



This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the Controlling Law.

STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE
and

Issued and Published Jointly By



PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
a practice division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

AMERICAN COUNCIL OF ENGINEERING COMPANIES

AMERICAN SOCIETY OF CIVIL ENGINEERS

This document has been approved and endorsed by

The Associated General Contractors of America



and the

Construction Specifications Institute



EJCDC No. P-700 (2000 Edition)

EJCDC P-700 Standard General Conditions for Procurement Contracts
Copyright ©2000, National Society of Professional Engineers for EJCDC. All rights reserved.
00700-1

These Standard General Conditions For Procurement Contracts have been prepared for use with the Suggested Instructions to Bidders For Procurement Contracts (EJCDC No. P-200 2000 Edition), the Suggested Form of Agreement Between Buyer and Seller For Procurement Contracts (EJCDC No. P-520, 2000 Edition), and the Guide to Preparation of Supplementary Conditions For Procurement Contracts (EJCDC No. P-800, 2000 Edition). Their provisions are interrelated and a change in one may necessitate a change in the others. Additional information concerning the use of the EJCDC Procurement Documents may be found in the Commentary on Procurement Documents (EJCDC No. P-001).

© Copyright 2000

National Society of Professional Engineers
1420 King Street, Alexandria, VA 22314

American Council of Engineering Companies
1015 - 15th Street N.W., Washington, D.C. 20005

American Society of Civil Engineers
1801 Alexander Bell Drive, Reston, VA 20191-4344

NOTE:

EJCDC publications may be ordered from any of the three sponsoring organizations above and from CSI headquarters at 99 Canal Center Plaza, Suite 300, Alexandria, VA 22314.

**JOHNS CREEK
ENVIRONMENTAL CAMPUS
ZEEWEED® MEMBRANE BIOREACTOR SYSTEM EQUIPMENT**

GENERAL CONDITIONS

TABLE OF CONTENTS

	<u>Page</u>
ARTICLE 1 - DEFINITIONS AND TERMINOLOGY	00700-5
1.01 <i>Defined Terms</i>	00700-5
1.02 <i>Terminology</i>	00700-6
ARTICLE 2 - PRELIMINARY MATTERS	00700-7
2.01 <i>Delivery of Bonds</i>	00700-7
2.02 <i>Copies of Documents</i>	00700-7
2.03 <i>Commencement of Contract Times; Notice to Proceed</i>	00700-7
2.04 <i>Designated Representatives</i>	00700-7
2.05 <i>Before Starting Fabrication/Assembly of Goods</i>	00700-7
2.06 <i>Progress Schedule</i>	00700-7
2.07 <i>Preliminary Conference</i>	00700-7
ARTICLE 3 - CONTRACT DOCUMENTS; INTENT AND AMENDING	00700-7
3.01 <i>Intent</i>	00700-7
3.02 <i>Laws and Regulations, Standards, Specifications and Codes</i>	00700-8
3.03 <i>Reporting and Resolving Discrepancies</i>	00700-8
3.04 <i>Amending and Clarifying Contract Documents</i>	00700-8
ARTICLE 4 - BONDS AND INSURANCE	00700-8
4.01 <i>Bonds</i>	00700-8
4.02 <i>Insurance</i>	00700-8
ARTICLE 5 - SELLER'S RESPONSIBILITIES	00700-9
5.01 <i>Supervision and Superintendence</i>	00700-9
5.02 <i>Labor, Materials and Equipment</i>	00700-9
5.03 <i>Compliance with Laws and Regulations, Standards, Specifications and Codes</i>	00700-9
5.04 <i>Or Equals</i>	00700-9
5.05 <i>Taxes</i>	00700-9
5.06 <i>Shop Drawings and Samples</i>	00700-9
5.07 <i>Continuing Performance</i>	00700-10
5.08 <i>Seller's Warranties and Guarantees</i>	00700-10
5.09 <i>Indemnification</i>	00700-11
ARTICLE 6 SHIPPING AND DELIVERY	00700-11
6.01 <i>Shipping</i>	00700-11
6.02 <i>Delivery</i>	00700-11
6.03 <i>Risk of Loss</i>	00700-11
ARTICLE 7 - CHANGES: SCHEDULE AND DELAY	00700-12
7.01 <i>Changes in the Goods and Special Services</i>	00700-12
7.02 <i>Changes in Laws and Regulations</i>	00700-12

7.03	<i>Changing Contract Price or Contract Times</i>	00700-12
ARTICLE 8 - BUYER'S RIGHTS		
8.01	<i>Inspections and Testing</i>	00700-12
8.02	<i>Non-Conforming Goods or Special Services</i>	00700-13
8.03	<i>Correction Period</i>	00700-14
ARTICLE 9 - ROLE OF ENGINEER		
9.01	<i>Duties and Responsibilities</i>	00700-14
9.02	<i>Clarifications and Interpretations</i>	00700-14
9.03	<i>Authorized Variations</i>	00700-14
9.04	<i>Rejecting Non-Conforming Goods and Special Services</i>	00700-14
9.05	<i>Decisions on Requirements of Contract Documents</i>	00700-14
9.06	<i>Claims and Disputes</i>	00700-14
ARTICLE 10 - PAYMENT		
10.01	<i>Applications for Progress Payments</i>	00700-15
10.02	<i>Review of Applications for Progress Payments</i>	00700-15
10.03	<i>Amount and Timing of Progress Payments</i>	00700-15
10.04	<i>Suspension of or Reduction in Payment</i>	00700-16
10.05	<i>Final Application for Payment</i>	00700-16
10.06	<i>Final Payment</i>	00700-16
10.07	<i>Waiver of Claims</i>	00700-16
ARTICLE 11 - CANCELLATION, SUSPENSION, AND TERMINATION		
11.01	<i>Cancellation</i>	00700-16
11.02	<i>Suspension of Performance by Buyer</i>	00700-16
11.03	<i>Suspension of Performance by Seller</i>	00700-17
11.04	<i>Breach and Termination</i>	00700-17
ARTICLE 12 - LICENSES AND FEES		
12.01	<i>Intellectual Property and License Fees</i>	00700-17
12.02	<i>Seller's Infringement</i>	00700-17
12.03	<i>Buyer's Infringement</i>	00700-18
12.04	<i>Reuse of Documents</i>	00700-18
ARTICLE 13 - DISPUTE RESOLUTION		
13.01	<i>Dispute Resolution Method</i>	00700-18
ARTICLE 14 - MISCELLANEOUS		
14.01	<i>Giving Notice</i>	00700-18
14.02	<i>Controlling Law</i>	00700-18
14.03	<i>Computation of Time</i>	00700-19
14.04	<i>Cumulative Remedies</i>	00700-19
14.05	<i>Survival of Obligations</i>	00700-19

EJCDC STANDARD GENERAL CONDITIONS FOR PROCUREMENT CONTRACTS

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

A. Whenever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to the singular or plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.

1. *Addenda*--Those written or graphic instruments issued prior to the opening of Bids in accordance with the Bidding Requirements which clarify or change the Bidding Requirements or the proposed Contract Documents.

2. *Agreement*--The written instrument signed by both Buyer and Seller covering the Goods and Special Services and which lists the Contract Documents in existence on the Effective Date of the Agreement.

3. *Application for Payment*--The form acceptable to Buyer which is used by Seller in requesting progress and final payments and which is accompanied by such supporting documentation as is required by the Contract Documents.

4. *Bid*--An offer or proposal submitted on the prescribed form setting forth the prices for the Goods and Special Services to be provided.

5. *Bidder*--A person who submits a Bid directly to Buyer.

6. *Bidding Documents*--The Bidding Requirements and the proposed Contract Documents (including all Addenda).

7. *Bidding Requirements*--The Advertisement or Invitation to Bid, Instructions to Bidders, Form of Bid security, if any, and Bid Form with any supplements.

8. *Buyer*--The person or public entity purchasing the Goods and Special Services.

9. *Change Order*--A document recommended by Engineer which is signed by Seller and Buyer and authorizes an addition, deletion, or revision to the Contract Documents or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.

10. *Claim*--A written demand or assertion by Buyer or Seller seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract.

11. *Contract*--The entire and integrated written agreement between Buyer and Seller concerning the Goods and Special Services. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*--Those items listed in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Files in electronic media format of text, data, graphics, and the like are not Contract Documents, and may not be relied on by Seller. Approved Shop Drawings and other Seller's submittals are not Contract Documents.

13. *Contract Price*--The moneys payable by Buyer to Seller for furnishing the Goods and Special Services in accordance with the Contract Documents as stated in the Agreement.

14. *Contract Times*--The times stated in the Agreement by which the Goods must be delivered and Special Services must be furnished.

15. *Drawings*--That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, intent, and character of the Goods and Special Services to be furnished by Seller.

16. *Effective Date of the Agreement*--The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

17. *Engineer*--The person designated as such in the Agreement.

18. *Field Order*--A written order issued by Engineer which requires minor changes in the Goods or Special Services but which does not involve a change in the Contract Price or Contract Times.

19. *General Requirements*--Sections of Division 1 of the Specifications. The General Requirements pertain to all sections of the Specifications.

20. *Goods*--The tangible and movable personal property that is described in the Contract Documents.

regardless of whether the property is to be later attached to realty.

21. *Laws and Regulations; Laws or Regulations*--Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

22. *Milestone*--A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to the Contract Times.

23. *Notice of Award*--The written notice by Buyer to the apparent Successful Bidder stating that upon timely compliance by the apparent Successful Bidder with the conditions precedent listed therein, Buyer will sign and deliver the Agreement.

24. *Notice to Proceed*-- A written notice given by Buyer to Seller fixing the date on which the Contract Times commence to run and on which Seller shall start to perform under the Contract.

25. *Point of Destination* --The specific address of the location where delivery of the Goods shall be made as stated in the Agreement.

26. *Project*--The total undertaking of which the Goods and Special Services to be provided under the Contract are a part.

27. *Project Manual*--The bound documentary information prepared for bidding and furnishing the Goods and Special Services. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.

28. *Samples*--Physical examples of materials, equipment, or workmanship that are representative of some portion of the Goods and which establish the standards by which such portion of the Goods or Special Services will be judged.

29. *Seller*--The person furnishing the Goods and Special Services.

30. *Shop Drawings*--All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Seller and submitted by Seller to illustrate some portion of the Goods or Special Services.

31. *Special Services*--Services associated with the Goods to be furnished by Seller as required by the Contract Documents.

32. *Specifications*--That part of the Contract Documents consisting of written technical descriptions of materials, equipment, systems, standards and workmanship as applied to the furnishing of the Goods and Special Services, and certain administrative details applicable thereto.

33. *Successful Bidder*--The lowest responsible Bidder submitting a responsive Bid, to whom Buyer makes an award.

34. *Supplementary Conditions*--That part of the Contract Documents which amends or supplements these General Conditions.

35. *Written Amendment*--A written statement modifying the Contract Documents, signed by Buyer and Seller on or after the Effective Date of the Agreement and normally dealing with the administrative aspects of the Contract Documents.

1.02 Terminology

A. *Intent of Certain Terms or Adjectives*

1. The Contract Documents include the terms "as allowed," "as approved," "as ordered," "as directed" or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives "reasonable," "suitable," "acceptable," "proper," "satisfactory," or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Goods or Special Services. It is intended that such exercise of professional judgment, action or determination will be solely to evaluate, in general, the Goods or Special Services for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing of Goods or Special Services or any duty or authority to undertake responsibility contrary to any other provision of the Contract Documents.

2. Unless stated otherwise in the Contract Documents, words or phrases which have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

3. The word "non-conforming" when modifying the words "Goods" or "Special Services", refers to Goods or Special Services that fail to conform to the Contract Documents.

4. The word "receipt" when referring to the Goods, shall mean the physical taking and possession by the Buyer under the conditions specified in Paragraph 8.01.B.3.

B. Day

1. The word "day" shall constitute a calendar day of 24 hours measured from midnight to the next midnight.

ARTICLE 2 - PRELIMINARY MATTERS

2.01 Delivery of Bonds

A. When Seller delivers the executed Agreements to Buyer, Seller also shall deliver such bonds as Seller may be required to furnish.

2.02 Copies of Documents

A. Buyer shall furnish Seller up to five copies of the Contract Documents. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 Designated Representatives

A. Buyer and Seller shall each designate its representative at the time the Agreement is signed. Each representative shall have full authority to act on behalf of and make binding decisions in any matter arising out of or relating to the Contract.

2.05 Before Starting Fabrication/Assembly of Goods

A. *Seller's Review of Contract Documents:* Before commencing performance of the Contract, Seller shall carefully study and compare the Contract Documents and check and verify pertinent requirements therein and, if specified, all applicable field measurements. Seller shall promptly report in writing to Buyer and Engineer any conflict, error, ambiguity or discrepancy which Seller may discover and shall obtain a written interpretation or

clarification from Engineer before proceeding with any work affected thereby.

2.06 Progress Schedule

A. Within 15 days after the Contract Times start to run, Seller shall submit to Buyer and Engineer an acceptable progress schedule of activities, including at a minimum, Shop Drawing and Sample submittals, tests, and deliveries as required by the Contract Documents. No progress payment will be made to Seller until an acceptable schedule is submitted to Buyer and Engineer.

B. The progress schedule will be acceptable to Buyer and Engineer if it provides an orderly progression of the submittals, tests, and deliveries to completion within the specified Milestones and the Contract Times. Such acceptance will not impose on Buyer or Engineer responsibility for the progress schedule, for sequencing, scheduling, or progress of the work nor interfere with or relieve Seller from Seller's full responsibility therefor. Such acceptance shall not be deemed to acknowledge the reasonableness and attainability of the schedule.

2.07 Preliminary Conference

A. Within 20 days after the Contract Times start to run, a conference attended by Seller, Buyer, Engineer and others as appropriate will be held to establish a working understanding among the parties as to the Goods and Special Services and to discuss the schedule referred to in Paragraph 2.06.A., procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT AND AMENDING

3.01 Intent

A. The Contract Documents are complementary; what is called for by one is as binding as if called for by all.

B. Any labor, documentation, services, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be provided, whether or not specifically called for, at no additional cost to Buyer.

C. Clarifications and interpretations of, or notifications of minor variations and deviations in, the Contract Documents, will be issued by Engineer as provided in Article 9.

3.02 Laws and Regulations, Standards, Specifications and Codes

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws and Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws and Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

B. No provision of any such standard, specification, manual or code, or any instruction of a supplier shall be effective to change the duties or responsibilities of Buyer or Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract Documents, nor shall any such provision or instruction be effective to assign to Buyer or Engineer, or any of their consultants, agents, or employees any duty or authority to supervise or direct the performance of Seller's obligations or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 Reporting and Resolving Discrepancies

A. *Reporting Discrepancies:* If, during the performance of the Contract, Seller discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any Law or Regulation applicable to the performance of the Contract or of any standard, specification, manual or code, or of any instruction of any supplier, Seller shall promptly report it to Buyer in writing for Engineer's review. Seller shall not proceed with the furnishing of the Goods or Special Services affected thereby until an amendment to or clarification of the Contract Documents has been issued. Seller shall not be liable to Buyer or Engineer for failure to report any such conflict, error, ambiguity, or discrepancy unless Seller knew or reasonably should have known thereof.

B. *Resolving Discrepancies:* Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

1. the provisions of any standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2. the provisions of any Laws or Regulations applicable to the furnishing of the Goods and Special Services (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 Amending and Clarifying Contract Documents

A. The Contract Documents may be amended to provide for additions, deletions, and revisions to the Goods or Special Services or to modify the terms and conditions thereof by a Written Amendment or a Change Order.

B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Goods or Special Services not affecting Contract Price or Contract Times may be authorized, by one or more of the following ways: 1) a Field Order; 2) Engineer's approval of a Shop Drawing pursuant to Paragraph 5.06.D.2; or 3) Engineer's written interpretation or clarification.

ARTICLE 4 - BONDS AND INSURANCE

4.01 Bonds

A. Seller shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price, to Buyer. The bonds shall be delivered in accordance with Paragraph 2.01 and shall remain in effect at least one year after the date final payment is due, except as provided otherwise by Laws or Regulations.

B. The bonds shall be issued in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations and shall be executed by a surety named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

C. If the surety on a bond is declared bankrupt or becomes insolvent or its right to do business is terminated in the state where the Project is located or it ceases to meet the requirements of Paragraph 4.01.B, Seller shall provide another bond and surety which comply with those requirements within 20 days, at Seller's expense.

4.02 Insurance

A. Seller shall provide insurance of the types and coverages and in the amounts stipulated in the Supplementary Conditions.

ARTICLE 5 - SELLER'S RESPONSIBILITIES

5.01 Supervision and Superintendence

A. Seller shall be solely responsible for the means, methods, techniques, sequences, and procedures used in performing its obligations. Seller shall be responsible to see that the completed Goods and Special Services conform to the Contract Documents.

5.02 Labor, Materials and Equipment

A. Seller shall provide competent, qualified and trained personnel in all aspects of its performance of the Contract.

B. All equipment, products and material incorporated into the Goods shall be as specified, or if not specified, shall be new, of good quality and protected, assembled, used, connected, applied, cleaned and conditioned in accordance with the original manufacturer's instructions, except as otherwise may be provided in the Contract Documents.

5.03 Compliance with Laws and Regulations, Standards, Specifications and Codes

A. Seller shall comply with all Laws and Regulations applicable to the furnishing of the Goods and Special Services.

5.04 Or Equals

A. Whenever an item of material or equipment to be incorporated into the Goods is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular supplier or manufacturer, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item is permitted, other items of material or equipment or material or equipment of other suppliers or manufacturers may be submitted to Buyer for Engineer's review.

1. If in Engineer's sole discretion, such an item of material or equipment proposed by Seller is functionally equal to that named and sufficiently similar so that no change in related work will be required, it may be considered by Engineer as an "or-equal" item.

2. For the purposes of this paragraph, a proposed item of material or equipment may be considered functionally equal to an item so named if:

a. in the exercise of reasonable judgment, Engineer determines that: 1) it is at least equal in

quality, durability, appearance, strength, and design characteristics; and 2) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole; and

b. Seller certifies that: 1) there is no increase in any cost including capital, installation or operating to Buyer; and 2) the proposed item will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

B. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraph 5.04.A. Engineer will be the sole judge of acceptability. No "or-equal" will be ordered, manufactured or utilized until Engineer's review is complete, which will be evidenced by an approved Shop Drawing. Engineer will advise Buyer and Seller in writing of any negative determination. Notwithstanding Engineer's approval of an "or-equal" item, Seller shall remain obligated to comply with the requirements of the Contract Documents.

C. *Special Guarantee:* Buyer may require Seller to furnish at Seller's expense a special performance guarantee or other surety with respect to any such proposed "or-equal."

D. *Data:* Seller shall provide all data in support of any such proposed "or-equal" at Seller's expense.

5.05 Taxes

A. Seller shall be responsible for all taxes and duties arising out of the sale of the Goods and the furnishing of Special Services. All taxes are included in the Contract Price.

5.06 Shop Drawings and Samples

A. Seller shall submit Shop Drawings and Samples to Buyer for Engineer's review and approval in accordance with the schedule required in Paragraph 2.06.A. All submittals will be identified as required and furnished in the number of copies specified in the Contract Documents. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Seller proposes to provide.

B. Where a Shop Drawing or Sample is required by the Contract Documents, any related work performed prior to Engineer's approval of the pertinent submittal will be at the sole expense and responsibility of Seller.

C. Submittal Procedures

1. Before submitting each Shop Drawing or Sample, Seller shall have determined and verified:

a. all field measurements (if required), quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto; and

b. that all materials are suitable with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the furnishing of Goods and Special Services.

2. Seller shall also have reviewed and coordinated each Shop Drawing or Sample with the Contract Documents.

3. Each submittal shall include a written certification from Seller that Seller has reviewed the subject submittal and confirmed that it is in compliance with the requirements of the Contract Documents. Both Buyer and Engineer shall be entitled to rely on such certification from Seller.

4. With each submittal, Seller shall give Buyer and Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both in a written communication separate from the submittal and by specific notation on each Shop Drawing or Sample.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples.

2. Engineer's approval of Shop Drawings or Samples will be subject to the standard of Paragraph 1.02.A.1. Engineer's approval will not relieve Seller from responsibility for any variation from the requirements of the Contract Documents unless Seller has in writing called Engineer's attention to each such variation at the time of each submittal as required by Paragraph 5.06.C.1. and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval.

E. Resubmittal Procedures

1. Seller shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples

for review and approval. Seller shall direct specific attention in writing to any revisions other than the corrections called for by Engineer on previous submittals.

5.07 Continuing Performance

A. Seller shall adhere to the progress schedule established in accordance with Paragraph 2.06.A., and the Goods shall be delivered and the Special Services furnished within the Contract Times specified in the Agreement.

B. Seller shall carry on the work and adhere to the progress schedule during all disputes or disagreements with Buyer. No work shall be delayed or postponed pending resolution of any disputes or disagreements.

5.08 Seller's Warranties and Guarantees

A. Seller warrants and guarantees to Buyer that the title to the Goods conveyed shall be proper, its transfer rightful, and free from any security interest, lien, or other encumbrance.

B. Seller warrants and guarantees to Buyer that all Goods and Special Services will conform with the Contract Documents, including any Samples approved by Engineer, and the Goods will be of merchantable quality. Engineer shall be entitled to rely on representation of Seller's warranty and guarantee.

C. Seller's warranty and guarantee hereunder excludes defects or damage caused by:

1. abuse, improper modification or improper maintenance or operation by persons other than Seller, or
2. normal wear and tear under normal usage.

D. Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Goods or Special Services that are non-conforming, or a release of Seller's obligation to furnish the Goods and Special Services in accordance with the Contract Documents:

1. observations by Buyer or Engineer;
2. recommendation by Engineer or payment by Buyer of any progress or final payment;
3. use of the Goods by Buyer;
4. any acceptance by Buyer (subject to the provisions of Paragraph 8.02.D.1) or any failure to do so;

5. the issuance of a notice of acceptance by Buyer pursuant to the provisions of Article 8;

6. any inspection, test or approval by others; or

7. any correction of non-conforming Goods or Special Services by Buyer.

E. Buyer shall within a reasonable time notify Seller of any breach of Seller's warranties or guarantees. If Buyer receives notice of a suit or claim as a result of such breach, Buyer also may give Seller notice in writing to defend such suit or claim. If Seller fails to defend such suit or claim, Seller will be bound in any subsequent suit or claim against Seller by Buyer by any factual determination in the prior suit.

5.09 Indemnification

A. To the fullest extent permitted by Laws and Regulations, Seller shall indemnify and hold harmless Buyer, Engineer, and their officers, directors, shareholders, partners, employees, agents, consultants, contractors and subcontractors from any and all claims, costs, losses, and demands or judgments for damages for claims (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) caused by, arising out of or relating to a negligent act or omission or the breach of any obligation under this Contract by Seller, or its officers, directors, shareholders, partners, employees, agents, consultants, contractors or subcontractors, or anyone for whom Seller is responsible, provided that any such claim, cost, loss, or damage;

1. is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Goods or Special Services themselves), including the loss of use resulting therefrom; and

2. is caused in whole or in part by any negligent act or omission of Seller or any individual or entity directly or indirectly employed to furnish any of the Goods or Special Services or anyone for whose acts Seller may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

B. The indemnification obligations of Seller under paragraph 5.09.A shall not extend to the liability of Engineer and Engineer's consultants or to the officers, directors, partners, employees, agents, and other

consultants and subcontractors of each and any of them arising out of:

1. the preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

ARTICLE 6 - SHIPPING AND DELIVERY

6.01 Shipping

A. Seller shall select the carrier and bear all costs of packaging, transportation, insurance, special handling and any other costs associated with shipment and delivery.

6.02 Delivery

A. Seller shall deliver the Goods F.O.B. the Point of Destination in accordance with the Contract Times set forth in the Agreement, or other date agreed to by Buyer and Seller.

B. Seller shall provide written notice to Buyer at least 15 days before shipment of the manner of shipment and the anticipated delivery date. The notice shall also include any instructions concerning special equipment or services required at the Point of Destination to unload and care for the Goods. Seller shall also require the carrier to give Buyer at least 24 hours notice by telephone prior to the anticipated hour of delivery.

C. Buyer will be responsible and bear all costs for unloading the Goods from carrier.

D. Buyer will assure that adequate facilities are available to receive delivery of the Goods during the Contract Times set forth in the Agreement, or another date agreed by Buyer and Seller.

E. No partial deliveries shall be allowed, unless permitted or required by the Contract Documents or agreed to in writing by Buyer.

6.03 Risk of Loss

A. Risk of loss and insurable interests transfer from Seller to Buyer upon Buyer's receipt of the Goods.

B. Notwithstanding the provisions of Paragraph 6.03.A, if Buyer rejects the Goods as non-conforming, the risk of loss on such Goods shall remain with Seller until Seller corrects the non-conformity or Buyer accepts the Goods.

ARTICLE 7 - CHANGES: SCHEDULE AND DELAY

7.01 Changes in the Goods and Special Services

A. Buyer may at any time, without notice to any surety, make changes in the Contract Documents within the general scope of the Contract.

B. If any such change or action by Buyer affects the Contract Price or Contract Times, Seller shall notify Buyer within 15 days after the occurrence of the event giving rise thereto, and written supporting data will be submitted to Buyer within 45 days after such occurrence. If Seller fails to do so, Seller waives any Claim for such adjustment.

C. Seller shall not suspend performance while Buyer and Seller are in the process of making such changes and any related adjustments.

7.02 Changes in Laws and Regulations

A. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of furnishing the Goods and Special Services shall be the subject of an adjustment in Contract Price or Contract Times. If Buyer and Seller are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 9.06.A.

7.03 Changing Contract Price or Contract Times

A. The Contract Price or Contract Times may only be changed by:

1. a Change Order;
2. a Written Amendment; or
3. a written unilateral order of Buyer, in which case Seller shall be entitled to an equitable adjustment in Contract Price or Contract Times for any reasonable and necessary costs or delays incurred by Seller to accommodate such a change.

B. If Seller is prevented from delivering the Goods or performing the Special Services within the Contract Times for any unforeseen reason beyond its control and not attributable to its actions or inactions, then Seller shall be entitled to an adjustment of the Contract Times to the extent attributable to such reason. Such reasons include fire, floods, epidemics, abnormal weather conditions, acts of God, acts of war, directions by government authority, and other like matters. If such an event occurs and delays Seller's performance, Seller shall notify Buyer in writing

within 15 days of the beginning of the event causing the delay, stating the reason therefor.

C. Contract Times will not be modified for delays within the control of Seller, including labor strife, transportation shortages or delays at Seller's facilities. Delays attributable to and within the control of Seller's subcontractors or suppliers shall be deemed to be delays within the control of Seller.

D. If Seller is prevented from delivering the Goods or furnishing the Special Services within the Contract Times due to the actions or inactions of Buyer, Seller shall be entitled to any reasonable and necessary additional costs arising out of such delay to the extent directly attributable to Buyer.

E. Neither Buyer nor Seller shall be entitled to any damages arising from delays which are beyond the control of both Buyer and Seller, including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, acts of war, direction by government authority, and other like matters.

ARTICLE 8 - BUYER'S RIGHTS

8.01 Inspections and Testing

A. General

1. Buyer shall have the right to perform, or cause to be performed, reasonable inspections and require reasonable tests of the Goods at Seller's facility, and at the Point of Destination. Seller shall allow Buyer a reasonable time to perform such inspections or tests.

2. Seller shall bear all expenses, except for travel, lodging and subsistence expenses of Buyer's representatives, for inspections and tests at Seller's facility, but Buyer shall be entitled to reimbursement from Seller of travel, lodging and subsistence expenses of Buyer's representatives if the Goods are non-conforming.

3. Buyer shall bear all expenses, except for travel, lodging and subsistence expenses of Seller's representatives, for inspections and tests at the Point of Destination, but Buyer shall be entitled to reimbursement from Seller for Buyer's expenses for reinspection or retesting if, on the basis of an initial inspection or testing, the Goods are determined to be non-conforming.

4. Seller shall provide Buyer 30 days written notice of the readiness of the Goods for all inspections, tests, or approvals which the Contract Documents specify are to be observed by Buyer prior to shipment.

5. Buyer will give Seller timely notice of all specified tests, inspections and approvals of the Goods which are to be conducted at the Point of Destination.

6. If, on the basis of any inspections or testing, the Goods appear to be conforming, Buyer will give Seller prompt notice thereof. If on the basis of said inspections or testing, the Goods appear to be non-conforming, Buyer will give Seller prompt notice thereof and will advise Seller of the remedy Buyer elects under the provisions of Paragraph 8.02.

7. Neither payments made by Buyer to Seller prior to any tests or inspections, nor any tests or inspections shall constitute acceptance of non-conforming Goods, or prejudice Buyer's rights under the Contract.

B. Inspection on Delivery

1. Buyer or Engineer will inspect the Goods upon delivery solely for purposes of identifying the Goods and general verification of quantities and observation of apparent condition in order to provide a basis for a progress payment. Such inspection will not be construed as final or as receipt of any Goods and Special Services that, as a result of subsequent inspections and tests, are determined to be non-conforming.

2. Within ten days of such inspection, Buyer shall provide Seller with written notice of Buyer's determination regarding conformity of the Goods. In the event Buyer does not provide such notice, it will be presumed that the Goods appear to be conforming.

3. If, on the basis of the inspection specified in Paragraph 8.01.B.1, the Goods appear to be conforming, Buyer's notice thereof to Seller will acknowledge receipt of the Goods.

C. Final Inspection

1. After all of the Goods have been incorporated into the Project, tested in accordance with such testing requirements as are specified, and are functioning as intended, Buyer or Engineer will make a final inspection.

2. If, on the basis of the final inspection, the Goods are conforming, Buyer's notice thereof will constitute Buyer's acceptance of the Goods.

3. If, on the basis of the final inspection, the Goods are non-conforming, Buyer will identify the non-conformity in writing.

8.02 Non-Conforming Goods or Special Services

A. If, on the basis of inspections and testing prior to delivery, the Goods appear to be non-conforming, or if at any time after Buyer has acknowledged receipt of delivery and before the expiration of the correction period described in Paragraph 8.03, Buyer determines that the Goods are non-conforming, Seller shall promptly, without cost to Buyer and in response to written instructions from Buyer, either correct such non-conforming Goods, or, if rejected by Buyer, remove and replace the non-conforming Goods with conforming Goods, including all work required for reinstallation.

B. Buyer's Rejection of Non-Conforming Goods

1. If Buyer elects to reject the Goods in whole or in part, Buyer's notice to Seller will describe in sufficient detail the non-conforming aspect of the Goods. If Goods have been delivered to Buyer, Seller shall promptly, and within the Contract Times, remove and replace the rejected Goods.

2. Seller shall bear all costs, losses and damages attributable to the removal and replacement of the non-conforming Goods as provided in Paragraph 8.02.E.

3. Upon rejection of the Goods, Buyer retains a security interest in the Goods or to the extent of any payments made and expenses incurred in their testing and inspection.

C. Remedying Non-Conforming Goods or Special Services

1. If Buyer elects to permit the Seller to modify the Goods to remove the non-conformance, Seller shall promptly provide a schedule for such modifications and shall make the Goods conforming within a reasonable time.

2. If Buyer notifies Seller in writing that any of the Special Services are non-conforming, Seller shall promptly provide conforming services acceptable to Buyer. If Seller fails to do so, Buyer may delete the Special Services and reduce the Contract Price a commensurate amount.

D. Buyer's Acceptance of Non-Conforming Goods

1. Instead of requiring correction or removal and replacement of non-conforming Goods discovered either before or after final payment, Buyer may accept the non-conforming Goods. Seller shall bear all costs, losses, and damages attributable to Buyer's evaluation of and determination to accept such non conforming Goods as provided in Paragraph 8.02.E.

E. Seller shall pay all claims, costs, losses, and damages, including but not limited to all fees and charges for re-inspection, retesting and for any engineers, architects, attorneys and other professionals, and all court or arbitration or other dispute resolution costs arising out of or relating to the non-conforming Goods or Special Services, including the correction or removal and replacement of the non-conforming Goods and the replacement of property of Buyer and others destroyed by the correction or removal and replacement of the non-conforming Goods, or the obtaining of conforming Special Services from others.

8.03 *Correction Period*

A. Seller's responsibility for correcting all non-conformities in the Goods will extend for a period of one year after the earlier of the date on which Buyer has placed the Goods in continuous service or the date of final payment, or for such longer period of time as may be prescribed by Laws or Regulations or by the terms of any specific provisions of the Contract Documents.

ARTICLE 9 - ROLE OF ENGINEER

9.01 *Duties and Responsibilities*

A. The duties and responsibilities and the limitations of authority of Engineer are set forth in the Contract Documents.

9.02 *Clarifications and Interpretations*

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the Contract Documents as Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. Such written clarifications and interpretations will be binding on Buyer and Seller. If either Buyer or Seller believes that a written clarification or interpretation justifies an adjustment in the Contract Price or Contract Times, either may make a Claim therefor.

9.03 *Authorized Variations*

A. Engineer may authorize minor deviations or variations in the Contract Documents by: 1) issuance of approved Shop Drawings when such change or deviation was duly noted by Seller as required in Paragraph 5.06.C.4, or 2) a Field Order.

9.04 *Rejecting Non-Conforming Goods and Special Services*

A. Engineer will have the authority to disapprove or reject Goods or Special Services which Engineer believes to be non-conforming.

9.05 *Decisions on Requirements of Contract Documents*

A. Engineer will be the initial interpreter of the Contract Documents and judge of the acceptability of the Goods and Special Services. Claims, disputes and other matters relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to Seller's performance will be referred initially to Engineer in writing with a request for a formal decision in accordance with this paragraph.

B. When functioning as interpreter and judge under this Paragraph 9.05, Engineer will not show partiality to Buyer or Seller and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Engineer pursuant to this Paragraph 9.05 with respect to any such Claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 10.07) will be a condition precedent to any exercise by Buyer or Seller of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such Claim, dispute, or other matter.

9.06 *Claims and Disputes*

A. *Notice:* Written notice of each Claim, dispute or other matter relating to the acceptability of the Goods and Special Services or the interpretation of the requirements of the Contract Documents pertaining to Seller's performance shall be delivered by the claimant to Engineer and the other party to the Agreement within 15 days after the occurrence of the event giving rise thereto, and written supporting data will be submitted to Engineer and the other party within 45 days after such occurrence unless Engineer allows an additional period of time to ascertain more accurate data.

B. *Engineer's Decision:* Engineer will render a decision in writing within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any. Engineer's written decision on such Claim, or dispute, or other matter will be final and binding upon Buyer and Seller unless:

1. an appeal from Engineer's decision is made within the time limits and in accordance with the dispute resolution procedures set forth in Article 13; or

2. If no such dispute resolution procedures have been set forth, a written notice of intention to appeal is delivered by Buyer or Seller to the other and to Engineer within 30 days after the date of such decision, and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction within 60 days after the date of such decision (unless otherwise agreed to in writing by Buyer and Seller), to exercise such rights or remedies as the appealing party may have with respect to such Claim, dispute, or other matter in accordance with applicable Laws and Regulations.

C. If Engineer does not render a formal decision in writing within the time stated in Paragraph 9.06.B., a decision denying the Claim in its entirety shall be deemed to have been issued 31 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any.

ARTICLE 10 - PAYMENT

10.01 Applications for Progress Payments

A. Seller shall submit to Buyer for Engineer's review Applications for Payment filled out and signed by Seller and accompanied by such supporting documentation as is required by the Contract Documents and also as Buyer or Engineer may reasonably require. The timing and amounts of progress payments shall be as stipulated in the Agreement.

1. The first application for Payment will be submitted after review and approval by Engineer of all Shop Drawings and of all Samples required by the Contract Documents.

2. The second Application for Payment will be submitted after receipt of the Goods has been acknowledged in accordance with Paragraph 8.01.B and will be accompanied by a bill of sale, invoice or other documentation satisfactory to Buyer warranting that Buyer has rightfully received good title to the Goods from Seller and that the Goods are free and clear of all liens. Such documentation will include releases and waivers from all parties with viable lien rights. In the case of multiple deliveries of Goods, additional Applications for Payment accompanied by the required documentation will be submitted as Buyer acknowledges receipt of additional items of the Goods.

10.02 Review of Applications for Progress Payments

A. Engineer will, within ten days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Buyer, or return the Application to Seller indicating in writing Engineer's reasons for refusing to recommend

payment. In the latter case, Seller may make the necessary corrections and resubmit the Application.

1. Engineer's recommendation of payment requested in the first Application for Payment will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data, that the Shop Drawings and Samples have been reviewed and approved as required by the Contract Documents and Seller is entitled to payment of the amount recommended.

2. Engineer's recommendation of payment requested in the Application for Payment submitted upon Buyer's acknowledgment of receipt of the Goods will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data Seller is entitled to payment of the amount recommended. Such recommendation will not constitute a representation that Engineer has made a final inspection of the Goods, that the Goods are free from non-conformities, acceptable or in conformance with the Contract Documents, that Engineer has made any investigation as to Buyer's title to the Goods, that exhaustive or continuous inspections have been made to check the quality or the quantity of the Goods beyond the responsibilities specifically assigned to Engineer in the Contract Documents or that there may not be other matters or issues between the parties that might entitle Seller to additional payments by Buyer or Buyer to withhold payment to Seller.

3. Engineer may refuse to recommend that all or any part of a progress payment be made, or Engineer may nullify all or any part of any payment previously recommended if, in Engineer's opinion, such recommendation would be incorrect or if on the basis of subsequently discovered evidence or subsequent inspections or tests Engineer considers such refusal or nullification necessary to protect Buyer from loss because the Contract Price has been reduced, Goods are found to be non conforming, or Seller has failed to furnish acceptable Special Services.

10.03 Amount and Timing of Progress Payments

A. Subject to Paragraph 10.02.A., the amounts of the progress payments will be as provided in the Agreement. Buyer shall within 30 days after receipt of each Application for Payment with Engineer's recommendation pay Seller the amount recommended; but, in the case of the Application for Payment upon Buyer's acknowledgment of receipt of the Goods, said 30-day period may be extended for so long as is necessary (but in no event more than 60 days) for Buyer to examine the bill of sale and other documentation submitted therewith. Buyer shall notify

Seller promptly of any deficiency in the documentation and shall not unreasonably withhold payment.

10.04 Suspension of or Reduction in Payment

A. Buyer may suspend or reduce the amount of progress payments, even though recommended for payment by Engineer, under the following circumstances:

1. Buyer has reasonable grounds to conclude that Seller will not furnish the Goods or the Special Services in accordance with the Contract Documents,

2. Buyer has requested in writing assurances from Seller that the Goods or Special Services will be delivered or furnished in accordance with the Contract Documents, and Seller has failed to provide adequate assurances within ten days of Buyer's written request.

B. If Buyer refuses to make payment of the full amount recommended by Engineer, Buyer will provide Seller and Engineer immediate written notice stating the reason for such action and promptly pay Seller any amount remaining after deduction of the amount withheld. Buyer shall promptly pay Seller the amount withheld when Seller corrects the reason for such action to Buyer's satisfaction.

10.05 Final Application for Payment

A. After Seller has corrected all non-conformities to the satisfaction of Buyer and Engineer, furnished all Special Services, and delivered all documents required by the Contract Documents, Engineer will issue to Buyer and Seller a notice of acceptability. Seller may then make application for final payment following the procedure for progress payments. The final Application for Payment will be accompanied by all documentation called for in the Contract Documents, a list of all unsettled claims and such other data and information as Buyer or Engineer may reasonably require.

10.06 Final Payment

A. If, on the basis of the review of the final Application for Payment and accompanying documentation, Engineer is satisfied that the Goods and Special Services have been furnished in accordance with the Contract Documents, and that Seller's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, recommend in writing final payment subject to the provisions of Paragraph 10.07 and present the Application to Buyer. Otherwise, Engineer will return the Application to Seller, indicating the reasons for refusing to recommend final payment, in which case Seller shall make the necessary corrections and resubmit the Application. If the Application and accompanying documentation are

appropriate as to form and substance, Buyer shall, within 30 days after receipt thereof, pay Seller the amount recommended by Engineer.

10.07 Waiver of Claims

A. The making and acceptance of final payment will constitute:

1. a waiver of all Claims by Buyer against Seller, except Claims arising from unsettled liens and Claims, from non-conformities in the Goods or Special Services appearing after final payment, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Seller's continuing obligations under the Contract Documents; and

2. a waiver of all Claims by Seller against Buyer other than those previously made in accordance with the requirements herein and expressly noted in writing by Seller as still unsettled in its final Application for Payment.

ARTICLE 11 - CANCELLATION, SUSPENSION, AND TERMINATION

11.01 Cancellation

A. Buyer has the right to cancel the Contract, without cause, at any time prior to delivery of the Goods by written notice. Cancellation pursuant to the terms of this paragraph shall not constitute a breach of contract by Buyer. Upon cancellation:

1. Buyer shall pay Seller for Goods, specially manufactured for the Project, plus any documented reasonable direct and indirect costs incurred by Seller in producing such Goods not recovered by payment for the reasonable value of the Goods.

2. For Goods which are not specially manufactured for the Project, Seller shall be entitled to a restocking charge of 10 percent of the unpaid Contract Price of such Goods.

11.02 Suspension of Performance by Buyer

A. Buyer has the right to suspend performance of the Contract, without cause, by written notice. Upon suspension under this paragraph, Seller shall be entitled to an increase in the Contract Times and Contract Price caused by the suspension, provided that performance would not have been suspended or delayed for causes attributable to Seller.

11.03 Suspension of Performance by Seller

A. Subject to the provisions of Paragraph 5.07.B, Seller may suspend the furnishing of the Goods and Special Services only under the following circumstance:

1. Seller has reasonable grounds to conclude that Buyer will not perform its future payment obligations under the Contract. ("Reasonable grounds" shall not include a pending dispute or disagreement with Buyer) and,
2. Seller has requested in writing assurances from Buyer that future payments will be made in accordance with the Contract, and Buyer has failed to provide such assurances within ten days of Seller's written request.

11.04 Breach and Termination

A. Buyer's Breach

1. Buyer shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including but not limited to:

- a. wrongful rejection or revocation of Buyer's acceptance of the Goods,
- b. failure to make payments in accordance with the Contract Documents, or
- c. wrongful repudiation of the Contract.

2. Seller shall have the right to terminate the Contract for cause by declaring a breach should Buyer fail to comply with any material provisions of the Contract. Upon termination, Seller shall be entitled to all remedies provided by Laws and Regulations.

- a. In the event Seller believes Buyer is in breach of its obligations under the Contract, Seller shall provide Buyer with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Buyer shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Seller may grant in writing) within which to cure the alleged breach.

B. Seller's Breach

1. Seller shall be deemed in breach of the Contract if it fails to comply with any material provision of the Contract Documents, including, but not limited to:

- a. failure to deliver the Goods or perform

the Special Services in accordance with the Contract Documents,

- b. wrongful repudiation of the Contract, or

- c. delivery or furnishing of non-conforming Goods or Special Services.

2. Buyer may terminate Seller's right to perform the Contract for cause by declaring a breach should Seller fail to comply with any material provision of the Contract Documents. Upon termination, Buyer shall be entitled to all remedies provided by Laws and Regulations.

- a. In the event Buyer believes Seller is in breach of its obligations under the Contract, and except as provided in Paragraph 11.04.B.2.b, Buyer shall provide Seller with reasonably prompt written notice setting forth in sufficient detail the reasons for declaring that it believes a breach has occurred. Seller shall have seven days from receipt of the written notice declaring the breach (or such longer period of time as Buyer may grant in writing) within which to cure the alleged breach.

- b. If and to the extent that Seller has provided a performance bond under the provisions of Paragraph 4.01, the notice and cure procedures of that bond, if any, shall supersede the notice and cure procedures of Paragraph 11.04.B.2.a.

ARTICLE 12 - LICENSES AND FEES

12.01 Intellectual Property and License Fees

A. Unless specifically stated elsewhere in the Contract Documents, Seller is not transferring any intellectual property rights, patent rights, or licenses for the Goods delivered. However, in the event the Seller is manufacturing to Buyer's design, Buyer retains all intellectual property rights in such design.

B. Seller shall pay all license fees and royalties and assume all costs incident to the use or the furnishing of the Goods, unless specified otherwise by the Contract Documents.

12.02 Seller's Infringement

A. Subject to Paragraph 12.01.A, Seller shall indemnify and hold harmless Buyer, Engineer and their officers, directors, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court

or arbitration or other dispute resolution costs) arising out of or relating to any infringement or alleged infringement of any United States or foreign patent or copyright by any of the Goods delivered hereunder.

B. In the event of suit or threat of suit for intellectual property infringement, Buyer will notify Seller within a reasonable time of receiving notice thereof.

C. Upon written demand from Buyer, Seller shall be given the opportunity to defend the claim or suit, including negotiating a settlement. Seller shall have control over such claim or suit, provided that Seller agrees to bear all expenses and to satisfy any adverse judgment thereof.

1. If Seller fails to defend such suit or claim after written demand by Buyer, Seller will be bound in any subsequent suit or claim against Seller by Buyer by any factual determination in the prior suit or claim.

2. If Buyer fails to provide Seller the opportunity to defend such suit or claim after written demand by Seller, Buyer shall be barred from any remedy against Seller for such suit or claim.

D. If a determination is made that Seller has infringed upon intellectual property rights of another, Seller may obtain the necessary licenses for Buyer's benefit, or replace the Goods and provide related design and construction as necessary to avoid the infringement at Seller's own expense.

12.03 Buyer's Infringement

A. Buyer shall indemnify and hold harmless Seller, and its officers, directors, partners, employees, agents, consultants, contractors, and subcontractors from and against all claims, costs, losses, damages, and judgments (including but not limited to all fees and charges of engineers, architects, attorneys and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement or alleged infringement of any United States or foreign patent or copyright caused by Seller's compliance with Buyer's design of the Goods or Buyer's use of the Goods in combination with other materials or equipment in any process (unless intent of such use was known to Seller and Seller had reason to know such infringement would result).

B. In the event of suit or threat of suit for intellectual property infringement, Seller must within a reasonable time after receiving notice thereof notify Buyer.

C. Upon written demand from Seller, Buyer shall be given the opportunity to defend the claim or suit, including negotiating a settlement. Buyer shall have control over

such claim or suit, provided that Buyer agrees to bear all expenses and to satisfy any adverse judgment thereof.

1. If Buyer fails to defend such suit or claim after written demand by Seller, Buyer will be bound in any subsequent suit or claim against Buyer by Seller by any factual determination in the prior suit or claim.

2. If Seller fails to provide Buyer the opportunity to defend such suit or claim after written demand by Buyer, Seller shall be barred from any remedy against Buyer for such suit or claim.

12.04 Reuse of Documents

A. Neither Seller nor any other person furnishing any of the Goods or Special Services under a direct or indirect contract with Seller shall: (1) acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions; or (2) reuse any of such Drawings, Specifications, other documents, or copies thereof on any other project without written consent of Buyer and Engineer and specific written verification or adaptation by Engineer. This prohibition will survive termination or completion of the Contract. Nothing herein shall preclude Seller from retaining copies of the Contract Documents for record purposes.

ARTICLE 13 - DISPUTE RESOLUTION

13.01 Dispute Resolution Method

A. Disputes between Buyer and Seller will be resolved as set forth in the Supplementary Conditions. If no method and procedure has been set forth, and subject to the provisions of Paragraphs 9.05 and 9.06, Buyer and Seller may exercise such rights or remedies as they have under Controlling Law.

ARTICLE 14 - MISCELLANEOUS

14.01 Giving Notice

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

14.02 Controlling Law

A. This Contract is to be governed by the law of the state in which the Point of Destination is located.

14.03 Computation of Time

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day shall be omitted from the computation.

14.04 Cumulative Remedies

A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

14.05 Survival of Obligations

A. All representations, indemnifications, warranties and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Goods or Special Services and termination or completion of the Agreement.

JOHNS CREEK ENVIRONMENTAL CAMPUS
ZEEWEED® MEMBRANE BIOREACTOR SYSTEM EQUIPMENT

**Supplementary Conditions to EJCDC P-700 Standard General Conditions for
Procurement Contracts Revised 2000.**

SC5.07B Replace entire article with the following:

Seller shall carry on the work and adhere to the progress schedule during all disputes or disagreements with Buyer with the exception of disputes over payments approved by Engineer that remain overdue.

SC5.08.F Add a new article that reads as follows:

For warranties on Goods supplied by Supplier to remain in effect, any replacement or addition of Goods to the system must be made using Goods approved in writing by Supplier.

SC5.08.G Add a new article that reads as follows:

Implied warranties,, including but not limited to warranties of fitness for particular purpose, use or application, and all other obligations or liabilities on the part of Supplier, unless such warranties, obligations or liabilities are expressly agreed to in writing by Supplier, are null and void.

SC5.09.A.2 Replace entire article with the following:

Only to the extent such damage is caused in whole or in part by any negligent act of Seller or any individual or entity directly or indirectly employed to furnish any of the Goods or Special Services or anyone for whose acts Seller may be liable, regardless of whether or not caused in part by any negligence or omission of an individual or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such individual or entity.

SC6.02.A Replace entire article with the following:

Seller shall deliver the Goods F.C.A. the Point of Destination, or as otherwise specified in the Purchase Agreement for this contract, in accordance with the Contract Times set forth in the Agreement, or other date agreed to by Buyer and Seller.

SC6.02.E Replace entire article with the following:

Partial deliveries and payments for partial deliveries shall be permitted.

SC6.02.F Add a new article as follows:

Where shipment of Goods is delayed by Buyer, Buyer shall pay Seller a reasonable storage fee plus a delay in payment charge to be determined by Seller. Alternatively, Buyer may purchase Goods and Seller shall issue Buyer a Lien Waiver and Warehouse Receipt upon receipt of payment.

SC6.03.A Replace entire article with the following:

Risk of loss and insurable interests transfer from Seller to Buyer upon delivery of the Goods to the Buyer's Point of Destination.

SC7.01.B Replace entire article with the following:

Buyer shall give Seller a minimum of fifteen (15) days notice of any changes in the Goods and Special Services ordered by Buyer. If any such change or action by Buyer affects the Contract Price, Contract Times or Seller's warranties to Buyer, Seller shall notify Buyer within 15 days after the occurrence of the event giving rise thereto, and written supporting data will be submitted to Buyer within 45 days after such occurrence. If Seller fails to do so, Seller waives any Claim for such adjustment.

SC8.01.A.1 Replace entire article with the following:

Buyer shall have the right to perform, or cause to be performed, reasonable inspections, excluding inspection of proprietary membrane production, and require reasonable tests of the Goods at Seller's facility, and at the Point of Destination. Seller shall allow Buyer a reasonable time to perform such inspections or tests.

SC8.02.B.2 Replace entire article with the following:

Seller shall bear all costs for direct damages attributable to the removal and replacement of the non-conforming Goods as provided in Paragraph 8.02.E.

SC8.02.D.1 Replace entire article with the following:

Instead of requiring correction or removal and replacement of non-conforming Goods discovered either before or after final payment, Buyer may accept the non-conforming Goods.

SC8.02.E Replace entire article with the following:

Seller shall pay all claims and costs for direct damages, including the correction or removal and replacement of the non-conforming Goods and the replacement of property of Buyer and others destroyed by the correction or removal and replacement of the non-conforming Goods, or the obtaining of conforming Special Services from others.

SC10.01.A Replace articles 1. and 2. with the following:

1. Payment terms shall be as specified on the Purchase Agreement for this contract.
2. All payments shall be due in full thirty (30) days from the date of invoice.
3. Past due balances shall be subject to a service charge of 1½% per month (18% per annum) but not more than the amounts allowed by law.
4. Partial shipments will be allowed and invoiced in accordance with the above terms.
5. Charges by Supplier related to delays in delivery requested by Buyer, and subsequent storage of Goods by Supplier, shall be as detailed in Supplier's as-sold proposal to Buyer.

6. Supplier may cancel or delay delivery of Goods and Services in the event Buyer fails to make prompt payment therefore, or in the event of an arrearage in Buyer's account with Supplier.

SC10.02.1 Replace entire article with the following:

Engineer's recommendation of payment requested for submittal of Shop Drawings and Samples for Payment will constitute a representation by Engineer, based on Engineer's review of the Application for Payment and the accompanying data, that the Shop Drawings and Samples have been reviewed and approved as required by the Contract Documents and Seller is entitled to payment of the amount recommended.

SC11.02.A Replace entire article with the following:

Buyer has the right to suspend performance of the Contract for up to 90 calendar days, without cause, by written notice. Upon suspension under this paragraph, Seller shall be entitled to an increase in the Contract Times and Contract Price caused by the suspension, provided that performance would not have been suspended or delayed for causes attributable to Seller.

SC11.04.C Add a new article that reads as follows:

Seller may terminate the Contract if Buyer suspends performance of the Contract for more than 90 calendar days.

SC12.01.A Replace entire article with the following:

Unless specifically stated elsewhere in the Contract Documents, Seller is not transferring any intellectual property rights, patent rights, or licenses for the Goods delivered.

SC12.01.C Add a new article that reads as follows:

Seller grants Buyer a non-exclusive royalty free license to use any process or apparatus claimed in any patent owned by Seller but only to the extent that this license is required by buyer to build and operate the Membrane System described in this contract using ZeeWeed membrane modules supplied by Supplier. All other rights are reserved.

SC12.04.A Replace entire article with the following:

Neither Seller nor any other person furnishing any of the Goods or Special Services under a direct or indirect contract with Seller shall acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media versions.

SC12.04.B Add a new article that reads as follows:

Buyer shall not reuse any Drawings, Specifications, other documents, or copies thereof produced by Seller for this project on any other project without written consent of Seller.

SC12.04.C Add a new article that reads as follows:

The prohibition in SC12.04.A and SC12.04.B will survive termination or completion of the Contract. Nothing herein shall preclude Buyer or Seller from retaining copies of the Contract Documents for record purposes.

APPENDIX 17

MEMBRANE HANDLING AND STORAGE REQUIREMENTS

The purpose of this document is to provide the general contractor with a summary of the equipment and membrane handling and storage requirements, as well as an outline of the commissioning field service representative (FSR) activities on site.

Section 1: Equipment Receiving, Handling and Storage

The following instructions are a general guideline to handling and offloading of equipment. Specific details are dependant on the facilities available to the general contractor (at their disposal) on site. Once shipped to site, the general contractor assumes full responsibility for unloading, handling and storage of the equipment.

1.1 *Equipment Receiving and Unloading*

- The general contractor is responsible for the prompt unloading of all equipment and materials received into his custody and shall pay any demurrage / wait time resulting from failure to do so. Items of mechanical equipment supplied by ZENON can include pumps, blowers, compressed air equipment, valves, instrumentation, piping, ZW membrane cassettes, membrane support frames as well as other miscellaneous equipment as detailed in the bill of materials.
- The general contractor is responsible for confirmation of the mode of transportation and schedule of equipment deliveries with the ZENON project manager before mobilizing manpower and committing expenses towards unloading and handling the equipment. ZENON will give the general contractor a minimum 24-48 hours notice of incoming deliveries. This will be deemed sufficient time for the general contractor to make necessary arrangements for unloading and handling the equipment. ZENON will make all efforts to give the general contractor as much advance notice as possible.
- The general contractor assumes responsibility for the equipment once unloading has commenced at the job site and must ensure that adequate insurance (Builders All Risk Insurance) for the full replacement value of all ZENON supplied equipment is maintained. It is suggested that ZENON be named as an “Additional Insured” as part of the overall project.



- The general contractor shall check off the materials or equipment received and acknowledge written receipt of all items per supplied bills of lading. The general contractor shall take immediate custody of all materials and equipment received in good condition and shall thereafter be solely responsible for any damage or shortage until final acceptance of the general contractor's work. The damage for which the general contractor will be responsible shall include incidental damage and damage caused by negligence of other general contractors or by any other means. It shall be the general contractor's responsibility alone to obtain settlement of damages caused by others.
- The general contractor shall inspect for defects, damages and shortages of all the equipment upon taking possession, custody or control of the same. Any non-conformance in the equipment shall be immediately reported to the ZENON project manager.
- The equipment delivery will be checked for content and any damage by representatives from ZENON, by the general contractor and the owner's agent (consultant or engineer). Once the equipment shipment has been checked, a document provided by ZENON as an "Equipment Acceptance Certificate and Checklist" will be completed and signed off by all parties (a copy of this document is provided with the final package). It will remain the responsibility of ZENON to rectify any deficiencies or shortages highlighted. Title to the equipment is passed from the general contractor to the owner upon final inspection of the equipment.
- The general contractor shall replace all materials and equipment that are lost or damaged while in the custody of the general contractor. Replacement materials and equipment shall be of a type and quality equal to the original materials and equipment, shall be acceptable to ZENON and to the owner, and shall be obtained expeditiously to prevent delay of the work. Extensions of time will not be granted for delays caused by failure to receive replacement materials and equipment at the time required for their installation.
- The general contractor shall handle all equipment and materials carefully to prevent damage or loss, shall store them in an orderly manner, shall keep adequate and convenient records of their location, and shall keep a continuously accurate inventory record.
- All handling of ZENON supplied stainless steel spools shall be completed utilizing slings not carbon steel chains so as to avoid any contamination of the stainless steel with carbon steel residue(s).



- The general contractor shall handle and load all returnable packing boxes, special handling devices, membrane cassette crates and cable reels for the materials and equipment. The general contractor shall prepare shipping papers for their return shipment, if required. All such materials shall be returned as promptly as possible.
- If it is necessary to return any materials to ZENON, it is imperative to obtain a “returned goods authorization” (RGA) number prior to shipping. Please contact ZENON for additional information on the necessary procedures.

1.2 Equipment Storage

- The general contractor shall provide all facilities and services required for the storage, maintenance, protection and security of the mechanical equipment and materials delivered by ZENON.
- Equipment and materials shall be stored in assigned lay-down areas.
- Stored equipment and materials shall be adequately supported and protected to prevent damage. Equipment shall be moved into the permanent building or onto its permanent foundation as soon as construction will permit.
- Stored materials and mechanical equipment shall not be allowed to contact the ground. In warehouses that do not have dry concrete or suspended floors, materials, and equipment shall be stored on platforms or shoring.
- Mechanical dehydrators provided in control panels shall be maintained in operation from the date of receipt of equipment until the equipment is fully installed and operational.
- All openings in equipment and piping not stored under weatherproof covers shall be closed to prevent entrance of dirt or moisture during storage.
- All platforms, enclosures, shoring, and weatherproof coverings supplied by the general contractor for storage use shall remain the property of the general contractor and shall be removed upon completion of the work.
- Indoor storage furnished by the general contractor shall consist of suitable construction trailers or portable enclosures and shall be weather-tight, well ventilated, and secure against theft and vandalism. Equipment and materials shall be placed on shoring to permit air circulation under the stored items. Access doors shall be adequate to accommodate the movement and handling of materials and equipment to be stored and shall be equipped with secure locks.
- Except as otherwise specified, the storage method to be used for various materials and mechanical equipment shall be determined as follows:

- Equipment and materials which incorporate electrical components or which have painted surfaces, and other items which would be damaged by outdoor exposure, shall be stored indoors. When such storage would present an unreasonable building space or volume requirement, the equipment or materials may, when acceptable to ZENON and to the owner, be stored under weatherproof coverings on shoring platforms. The coverings shall cover the top and sides of the equipment, shall be lapped to shed water, and shall be fastened securely around the base of the equipment.
- All other equipment and materials shall be stored on open platforms or shoring.
- All rotating equipment must be rotated and maintained while stored as per the provided manufacturers instructions and data sheets for the specific equipment. Note the contractor is responsible for providing appropriate lubricants for rotating mechanical components that comply with manufacturers instructions and data sheets for the specific equipment.
- All storage methods & practices / procedures shall be acceptable to ZENON and to the Owner.

1.3 Equipment Locating and Placement

- The general contractor will establish one set of horizontal and vertical control lines and levels for the equipment. The general contractor shall be responsible for the preservation of all survey reference points as set or established. This forms part of the overall contract documentation and will be as specified by the consultant or engineer to ensure that all elevations for equipment are as per the overall design drawings.
- The general contractor shall lay out the equipment from the aforementioned control lines and levels and shall assume all responsibility for the correctness of the control lines. The general contractor shall supply, establish and maintain at its expense all additional survey reference points, work lines and work levels necessary to perform the work as part of the overall contract specifications.
- The general contractor is responsible for all moving equipment required for the off loading, moving of equipment, and setting of equipment in the proper location. As well as the proper placement, height adjustment, levelling, bolting, and grouting of equipment as shown in the attached drawings and as called out by supplemental information provided by the equipment manufacturer.
- The general contractor is responsible for the design, supply and installation of all anchor bolts, piping and/or equipment supports required for equipment identified in the contract drawings.



- The ZENON supplied stainless steel permeate headers piping must be level to avoid any highpoints where air could collect in the piping system.
- All handling and placement of ZENON supplied stainless steel spools shall be completed utilizing slings not carbon steel chains so as to avoid any contamination of the stainless steel with carbon steel residue(s).
- The general contractor shall ensure that at no time is any grinding, welding or surface polishing of carbon steel equipment allowed to occur near any ZENON supplied stainless steel piping. This is to ensure that ferric contamination is avoided.
- The general contractor is responsible for supplying epoxy grout and polypropylene shims as required to level any supplied equipment skids. Polypropylene shims can be used up to 3/4" height. For tall shims epoxy grout will be used to level the equipment skids. The epoxy grout must be compatible to the floor coating system.
- The general contractor shall also provide engineering, drafting, materials and fabrication as required to properly support all interconnecting piping. The designs of all pipe supports must be in accordance with applicable codes and industry standards and will comply with the consultants or engineers design details as called out in the contract drawings.
- Inside surfaces of equipment and piping shall be inspected and any rust or foreign matter removed. Care shall be exercised to keep the interior of the piping, tanks and pumps clean during erection and these components shall be inspected before being put into service. Cleaning and flushing of interconnecting piping is the general contractor's responsibility.



Section 2: Membrane Handling and Installation

The general contractor is responsible for providing all necessary equipment for the handling and installation of the membrane cassettes. Given the significant value of this equipment, damage to the membranes will result in costly claims for replacement. No tolerance for work conducted on, near or around the membranes contrary to the information provided in this document is permitted.

1.0 Membrane Shipment

ZENON shall provide a membrane cassettes detailed shipment schedule to the **CONTRACTOR** upon receipt of Approved Shop Drawing Package

To protect against drying out of the membranes due to prolonged storage, these will be shipped separately to the rest of the equipment. The membrane modules will be shipped wrapped in sealed plastic wrapping and must remain sealed in their wrapping until immediately before they are ready for installation. Proper project coordination will be required to ensure membrane installation occurs immediately prior to plant wet testing and/or to wet testing of the tanks. Under no circumstances must the membranes be permitted to remain dry.

The ZeeWeed® membranes are preserved in a glycerin solution. This solution is not meant to protect against freezing conditions but to ensure that the membranes once flushed with water will operate within their design specifications. Ensure that during transport and handling membranes are not exposed to temperatures below 0°C (32°F). Winter transportation requires the use of heated trailers.

Each membrane cassette is equipped with a temperature/freeze/heat/tilt indicator that will be inspected by ZENON upon site storage and during installation.

If damage to the membrane cassettes occurs while in control of the **CONTRACTOR**, the **CONTRACTOR** will be responsible for re-crating, shipping back to ZENON and replacing the damaged membrane cassettes at current market value at no cost to ZENON or the OWNER.

1.0 Membrane Handling

Membrane cassettes are shipped in a plywood crate. The cassette itself is sealed in a plastic bag to retain moisture. Crates are not designed to be stacked. Damage incurred during equipment off-loading, needs to be reported to ZENON's project manager immediately.

A ZW500d cassette of 48 elements is packaged in a crate with cassette lying on its side. The dimensions on this crate are:104" Long * 88" Wide * 82" High (2.64 m Long * 2.24 m Wide * 2.08 m High). The weight of this crate is approximately 2800 lb (1270 kg).



1.0 Membrane Storage

In addition to the equipment storage procedures the following storage procedures are specific for the membrane cassettes:

Cassettes must be stored in a sheltered area, protected from freezing, direct sunlight or extreme heat, and sealed as shipped until ready for use. Storage should be in a dark, dry, level area, out of direct sunlight and at a temperature of 0 to 40°C (32 to 104°F). It is recommended that the cassettes not be stored longer than necessary prior to installation. Coordinate with ZENON for appropriate shipment times. Maximum storage duration of a cassette is eight months from the date of shipment.

2.4 Preparation of tanks/feed piping for membrane installation

Inside surfaces of piping shall be inspected and any rust or foreign matter removed. Care shall be exercised to keep the interior of the piping, tanks and pumps clean during erection and these components shall be inspected before being put into service including flushing of all piping at design flow rates and verification of removal of all residual debris from construction. Cleaning and flushing of interconnecting piping will be the Contractor's responsibility.

The membrane tanks must be hydrostatically tested and cleaned to remove all debris larger than the influent screen. On drinking and waste water plants this is 2mm. The most efficient method of cleaning the tank is to flush, drain and use a vacuum truck. Cleaned tanks are to be covered with a continuous plastic barrier protected by plywood sheets.

All piping associated with the plant is to be flushed at design flow rates prior to membrane installation. This includes, but is not limited to feed, blower, permeate, and chemical piping systems.

Ensure that GAC backwash piping is not terminated in the membrane tank. These fines can cause damage to the membrane.

Prevention of debris contamination

It is critical to ensure that no debris capable of damaging membranes enters the ZeeWeed® tank at any time. Possible contamination pathways include:

- Feed water laden with debris;
- Debris being blown or falling into the tank during maintenance or repairs over the membranes;
- Residue from piping or process equipment.

A clean membrane tank needs to be protected from contamination by debris, especially debris larger than 2mm. If debris is allowed to enter the tank, irreversible damage can be caused to the membranes. Examples of common materials that cause damage include (but are not limited to):

- Cable ties;
- Plastic turnings from drilling;
- Pieces of wire;
- Broken measuring tapes;
- Weld slag and metal debris from grinding;
- Twigs;
- Leaves;
- Shells;
- Fish;
- Etc...

To ensure that no construction debris enter the tank after membrane installation, cleaned tanks are to be covered with a continuous plastic barrier protected by plywood sheets. General housekeeping practices are recommended.

1.4 Membrane Installation

A qualified ZENON FSR must supervise all initial membrane installation work, however adequate notice must be provided to schedule site visit. Also, the membrane installation process is not to begin until the site has been deemed ready and suitable inspections by the ZENON FSR and the consultant or engineer have been completed. The inspections will include but are not limited to: confirmation of removal of all foreign debris in the membrane tanks, all process lines and tanks have been flushed and cleaned prior to membrane installation, including blower piping.

Membranes are not to be uncrated if any of the following activities are being completed in the area:

- Painting;
- Roofing;
- Tin work;
- Pipe flushing;
- Grinding;
- Welding;
- Sandblasting;
- Drilling;
- All power tools that discharge debris (including carpentry);
- Wiring and terminations,

The typical installation of a single cassette requires approximately six man-hours from opening of the crate to being ready to bubble test the membranes. The general membrane installation procedure is as follows.

0. Delivery and off-loading of cassettes,

A separate document detailing the ZW 500D Cassette Uncrating and Installation procedures will be provided prior to Installation.

The cassette crates must be set on a solid level floor area that is free of direct sunlight, not subject to moisture (rain) or extremes of temperature. The crate lids are removable and the interior of the crates are lined with plastic to extend the period of time that they may be stored in this fashion. It is critical that membranes are not allowed to freeze.

0. Assembly of cassette support cages:

Membrane cassette support brackets must be fastened to each cassette as noted. The cassette support brackets and mounting hardware are supplied by ZENON. Wall anchors for the brackets are not included in the ZENON scope of supply. The cassettes are then removed from the crates using the ZENON supplied lifting bracket and an overhead crane or hoist (provided by the Contractor) and are installed into the membrane water treatment tank on the pre-installed support beams / frame assemblies. It is important that the membranes be installed in water within four hours of their removal from the crate.

0. Cassette leveling:

Following installation, the cassettes must be individually leveled to a tolerance of +/- 1/8" per cassette. All cassettes must be within +/- 1/4" level tolerance of one another. The cassette support design in the water treatment tank includes adjustable pins to provide fine-tuning of the cassette levels. Use of a laser level is recommended to ensure the required tolerances are achieved.

0. Installation of permeate and air connections:

Once cassette leveling has been verified, the final piping connections must be made.

0. Membrane integrity (bubble) testing:

Bubble testing of the membranes is required to ensure that no damage has occurred to the fibers during the installation and to test the permeate connections that were completed during installation. After the system has been running for a minimum of 24-hours, the water treatment tank is flooded with water to cover all of the cassettes and fitting connections. Oil free compressed air at a minimal fixed pressure as defined by the membrane integrity test procedure is applied to the cassette and the system is inspected for leaks, which are manifested as air bubbles. The ZENON FSR will perform the bubble test and identify any areas of

concern to the general contractor. The general contractor is responsible for assisting the ZENON staff with the repair of any identified leaks. Please note that membrane repairs may require a crane to remove and reinstall the affected membrane cassettes.

1. Flushing:

All membrane modules are shipped in a glycerin solution that has a pH of 3.5 to 4.5 to protect the membrane. This solution is not suitable for direct discharge to surface water or drinking water. The general contractor is responsible for disposal of wastewater generated as a result of flushing the membrane after installation. Please note that pending the status of the wastewater plant, dilute glycerine may be processed therein, however, refer to local regulations and guidelines prior to disposition/disposal.



APPENDIX 18

GUARANTEES/WARRANTIES AND RISK ALLOCATION

18.1 General

The County desires that each proposer evaluates the required D/B Guarantees and risk allocation associated to the John Creek Environmental Campus project and detail in the technical approach the proposer's plan to mitigate the risk and ensure that the guarantees are achieved.

It is the County's intent in providing the information in this appendix to give the proposers a better understanding of the County's overall goals and objectives for the JCEC operational and performance guarantees and equipment warranties. It is not the intention of the County to provide information on all risks associated in the D/B Project. If the information in this appendix is in conflict with the terms and conditions of the D/B Contract, the D/B Contract shall govern.

The Johns Creek Environmental Campus is a Design/Build delivery project which is performance based. However, contained in the D/B RFP, the D/B Contract and Appendices are specific process, equipment and material specifications which the owner has dictated will be used in the Design. The D/B Company shall be responsible to seek clarification of any specification contained in the D/B RFP, the D/B Contract and the Appendices that precludes achieving the expected performance.

18.2 JCEC Effluent Quality Performance Guarantee

The D/B Company shall be responsible for the Design and Construction of the JCEC to meet any and all permit, regulatory and County requirements relating to the JCEC's effluent quality. The Effluent Quality Performance Guarantee is shown in Table A2-5. Failure to meet the Effluent Quality Performance Guarantee will result in the D/B Company obligations set forth in the D/B Contract, including, but not limited to, paying any fines levied by the regulatory agencies during the 120 day Whole Plant Acceptance Test Period. Additionally, during the first year of operations the D/B Company shall supply engineering services and corrective action to correct any material condition that is responsible for causing an NPDES permit violation. Failure to provide timely correct action will result in the County using funds from the \$1,000,000 letter of credit to contract the necessary corrective action.

Expected Plant effluent limits are specified in Draft National Pollutant Discharge Elimination System (NPDES) Permit No. GA0030686, issued by Georgia Environmental Protection Division (EPD) and shown in Table A2-3. Both the draft and current NPDES permits are provided on the Data CD-ROM.

18.3 Odor Control Guarantee

Odor control systems shall treat odorous air in order to meet the following performance criteria under the design conditions described below:

- Goal - Prevent odor complaints from the public by reducing concentrations of hydrogen sulfide, amines, ammonia, mercaptans, and other sulfur-containing compounds such that they are undetectable. For both aesthetic and odor eliminating reasons Fulton County is requiring that all processes be covered. It is Fulton County's goal that there be no detectable odors outside the buildings. The specific requirement is that with all doors to building closed that within 25 feet from any building that no odors be detectable..
- Requirement - A maximum odor concentration standard of 5 dilution-to-threshold (D/T) shall be applied at a line 25 feet from any structure of the JCEC. D/T is as defined in ASTM E-679: *Standard of Practice for Determination of Odor and Taste Thresholds by a Forced-Choice Ascending Concentration Series Method of Limits*.
- Requirement—With all access to the facility buildings closed there shall be no odors within 25 feet of any building or building opening.

Failure of the Odor Guarantee, (i.e. odor complaints from the neighborhood or detectable odors outside the build within the first year of operation) will require the D/B Company to provide engineering services and corrective action to eliminate the odors. Failure to provide timely correct action will result in the County using funds from the \$1,000,000 letter of credit to contract the necessary corrective action

18.4 Noise Guarantee

The D/B Company shall take action to minimize the noise created during construction of the Design/Build Work and the noise from operation of the permanent equipment installed at the Plant.

Background noise levels were measured at two points beyond the Plant envelope, where the public has access and where people are living or engaging in recreational activities. The data, collected over three 24-hour periods, were measured with a noise meter set with A weighting, slow response, and a 5-dB exchange rate. The average value for each monitoring point listed in the table A2-7 in Appendix 2 will be used as the benchmark for the required performance criteria regarding noise.

During the 120 day Whole Plant Acceptance Testing the D/B Company shall verify by taking noise meter readings at two locations on the property line at four individual times during any four 24-hour periods and substantiating that the background noise levels are

equal to or below the values of in Table A2-6. Once this has been demonstrated successfully by the D/B Company the Guarantee has been met.

18.5 Operational Cost Guarantee

Fulton County requires a guarantee of operational cost. In accordance with Appendix 15, the D/B Company will fulfill the requirements of Whole Plant Acceptance Testing and will operate the JCEC for a period of 120 days. During this 120 day period the D/B Company will collect routine operating data to demonstrate that the operational cost of operating the plant in the selected areas of electrical power consumption, process chemical cost, odor control chemical cost and sludge disposal cost are met as Guaranteed Operational Cost provided on Technical Proposal Form 10 (TPF10)

The operational costs guarantees provided on TPF10 will be summed into a total Operation Cost value. The D/B Company is required to demonstrate that the total monthly operational cost for the areas of concern are equal to or less than the total of the operational cost guarantees provided on TPF10. These calculations shall be done as indicated in Table A18-1, Operational Cost Calculations Worksheet. Failure of the D/B Company to demonstrate that the monthly operational costs are equal to or less than the values provided on TPF10 will result in the County deducting from the final payment a sum equal to 24 times the value of the positive variance for operational cost from the next invoice submitted by the D/B Company. The D/B Company may demonstrate operational cost during any of the four months of acceptance testing. If operational cost cannot be demonstrated by the end of the fourth month then the lowest operational cost for any single month shall be used to calculate the total operational cost. All four values (power consumption, chemical cost, sludge disposal cost and chemical cost for odor control) of operational cost substantiation must come from the same month.

If variance is positive then 24 times the variance will be deducted from the next invoice submitted by the D/B Company.

If variance is zero or negative the D/B Company has demonstrated that operational cost of the JCEC are equal to or less than the proposed cost and the Operational Cost Guarantees have been met.

Regardless of the outcome of the operational cost data collection once the 120 day Whole Plant Acceptance Test is complete the D/B Company has no further operational cost guarantee.

18.6 Risk

18.6.1 Equipment Operations and JCEC 12-Month Operations.

The County desires the D/B Company and all its subcontractors recognize the considerable risk involved with the design/construction and operations of the JCEC. This will be the

largest capacity application of membrane bioreactor technology for the treatment of municipal wastewater in the world. Fulton County has required this plant to operate with no NPDES Permit violations, no odor generations outside of the facility, and no increase in ambient noise. To this end Fulton County desires that all equipment and processes be Guarantee to operate as proposed for at least a period of 12 months.

Technical Proposal Forms 4 & 14 (TPF14) requires that the period of warranty or guarantee be provided for all major pieces of equipment and processes. The D/B Company will provide a letter of credit for \$1,000,000, which will remain in effect from the date of substantial completion for a period of one year. This \$1,000,000 letter of credit shall provide surety that all major pieces of equipment and processes will operate as proposed for that period or that all warranties for equipment will be honored for the cost of replacement and installation. Failure of the provider of any warranty during this one-year period to provide the services of the warranty for equipment or process failure will then result in the D/B Company taking action to correct any discrepancy at no additional cost to the County. Failure of the D/B Company to provide this timely correct action (timely corrective actions is defined as within 30 days) for equipment failure and/or failure of warranty conditions will result in the County using funds from the \$1,000,000 letter of credit to contract the necessary corrective action

18.6.2 Fixed Design/Build Price

Fulton County has requested proposals for the Design and Construction of the Johns Creek Environmental Campus (JCEC). This is a new 15 MGD Wastewater Treatment Plant that will utilize a membrane bioreactor system as the major process technology for the treatment of the wastewater. The method of project delivery is **Design/Build**. In the D/B RFP, the D/B Contract and the Appendices, Fulton County has indicated the technical requirements, performance guarantees, and level of effort required for this D/B Project. The County requires that the Fixed Design/Build Price from each proposer be the total compensation for the design, construction, and acceptance of the D/B Work in accordance with the D/B Contract. The risk associated with this project is detailed in this D/B RFP and the D/B Contract. The proposer will evaluate this risk, provide detailed technical explanation of its plans to mitigate the risk and to successfully complete the JCEC. Each proposer shall assume the total of the risk as detailed in the D/B RFP, D/B Contract and the Appendices and will propose a Fixed Design/Build Price that reflects all the risk.

Based upon the redundancy and reliability standards, technical specifications, and requirements of the D/B RFP and the associated risk of the JCEC project, the D/B Company shall, using PPF1 submit to the County a Fixed Design/Build Price for performing all the D/B Work associated with this the JCEC.

18.6.3 Subsurface Risk

The County makes no representation or warranty with respect to the Site. Based on its inspections of the Site, and other inquiries and investigations made by the D/B Company prior to the Contract Date, which the Company acknowledges to be

sufficient for this purpose, the D/B Company assumes the risk of the adequacy and sufficiency of the "as-is" condition of the Site

It is specifically understood that the D/B Company's assumption of the "as-is" risk of the condition of the Site shall not extend to Pre-Existing Environmental Conditions. No other Uncontrollable Circumstance, however, shall relieve or limit the D/B Company's assumption of the "as-is" risk.

8.0 Security

The D/B Company will be required to provide the following forms of Surety for this project in accordance with the D/B Contract:

- Design/Build Bid Bond—equal to 5% of the Fixed Design/Build Price
- Performance Bond—equal to 100% of the Fixed Design/Build Price
- Payment Bond—equal to 100% of the Fixed Design/Build Price
- Guarantor—the guarantor shall guarantee the project for 100% of the Fixed Design/Build Price
- Warranties—all major pieces of equipment, processes and facilities shall be warranted for a period of not less than 1 year by the manufacturer of the equipment or the D/B Company. The D/B Company shall assign all warranties for any equipment or process to the County.
- Letter of Credit—a \$1,000,000 letter of credit shall be in place from Substantial Completion for a period of one year.

Table A18-1 Operational Cost Calculations Worksheet

Section 1 Operational Cost Estimate

	Lower Value From TPF1G	Actual Flow for the 30 day period (MG)	Operational Cost Estimate for 30 day period
Power Consumption (kw-hr/MG)			
Chemical Cost Process (US \$/MG)			
Sludge Disposal Cost (US \$/MG)			
Chemical Cost Odor Control (US \$/MG)			
TOTAL (1)	*****	*****	\$

Section 2 Actual Operational Cost Calculations for each day of 30 day period

	Units of Usage/30 day period	Cost per Unit from Section 5 (\$)	Cost per 30 day period (\$)	Actual Flow for 30 day period (MG)	Actual Operational cost for 30 day Period
Power Consumption (kw-hr/30 day period)					
Chemical Cost Process (Unit of usage /30 day period)					
Sludge Disposal Cost (tons of produced/30 day period)					
Chemical Cost Odor Control (Unit of usage/30 day period)					
Total (2)	*****	*****	*****	*****	\$

Section 3 Variance

Total 2 – Total 1 = Variance

If variance is negative or zero then the Operational Cost Guarantee has been met. If the variance is positive the Operational Cost Guarantee has failed.

APPENDIX 19

PUBLIC EDUCATION AND COMMUNITY OUTREACH PLAN

To ensure the smooth and successful completion of the Johns Creek Environmental Campus, the Design/Build Company is to develop and implement a comprehensive public communications plan. This public communications plan is to include four components:

1. public awareness
2. education
3. information (including media relations)
4. involvement.

The Design/Build Company is to provide a clear and concise plan that summarizes the goals of the plan and the specific strategies that will be undertaken in order to achieve these goals.

The goal of the public communication plan is to provide strategies to proactively communicate with stakeholders and at the same time answer questions and identify and resolve issues and problems that may arise; determine methods that will be used to educate the community about the benefits of the project; and involve the community in the decision-making process as needed.

The Design/Build Company will be expected to utilize a variety of methods to communicate with and educate the public, including use of the current online newsletter, bill inserts, a project website, and news releases. These elements provide a consistent flow of information and controlled messages. The public communications plan must be flexible and modifiable.

The following elements are recommended:

- **Stakeholders List** - A list of stakeholders (anyone who is impacted by or interested in the project), including neighborhood associations should be compiled so that news releases and articles on the Project can be provided directly to these individuals and groups.
- **Newsletters (CIP c-Notes) and bill inserts** – The current online newsletter can be used to provide status details on the Project. The newsletter is used to keep stakeholders and the community informed. There are to be bi-monthly updates provided in the newsletter. Bill inserts are a vehicle that may be used to communicate with customers.
- **Media Involvement** – Regular news releases will provide status details on the Project to the general public. All news releases are to be approved by the Water Services Division, the Fulton County Information Officer and would be issued from the Fulton County Communications Department.

- **Presentations to Organizations** - A PowerPoint presentation explaining the Project could be developed and made available to Fulton County homeowner associations and local organizations. This presentation would explain the benefits of the new Johns Creek Environmental campus and water reclamation. The presentation should be on the Project website.
- **Project Website** – A project website should be developed that would provide project status and details. This website should also allow the community to ask questions
- **Public Service Announcements** - A public service announcement that provides an overview of the project and its benefits could be developed to air on Fulton County Government Television (FGTV). Television reaches all households in Fulton County that have service through Comcast Cable.
- **Public Meetings** - Public meetings are recommended if any wide-spread concern from the community is identified and needs to be addressed.
- **Community contact** – the community is to be provided with a 24-hour point of contact. A phone number as well as e-mail address is to be provided.

The Design/Build Company is to conduct regular coordination meetings with the PM Team Construction Manager, PM Team Public Information Manager, and the representative from the Fulton County Communications Department.

Appendix 20 ALLOWANCES

1. Allowances: Allowances are defined as sums of monies within the Contract Sum which may, at Owner's option and under terms established in the Contract, be utilized at the Owner's discretion to supplement corresponding basic requirements of Contract Documents.

2. Owner allowances are exclusively for the cost of materials, delivery to the site and associated installation. The total allowance amount is exclusively for Owner use, and shall include no markup by the D/B Company or by its sub-contractors.

3. Allowances:
 - a. Membrane System Supply Scope of Supply: Amount: \$12,400,421. This allowance is for the Scope of Supply contained in Appendix 16.
 - b. Contingency Funds: Amount: \$500,000. This allowance is to be used at the sole discretion of the County.
 - c. Educational Furnishings Allowance: Amount: \$150,000. this allowance is to be used for the purchase of furnishings for the educational facility including, tables, chairs, desk, lab equipment, computers,
 - d. Furnishings for non-operational spaces: Amount: \$200,000 This allowance is to be used to purchase furnishing for the non-operational spaces such as: desk, chairs, cabinets, tables, refrigerator, microwave, lab equipment, etc.

APPENDIX 21

CONSTRUCTION MILESTONES AND DRAWDOWN SCHEDULE

13.1 FIXED DESIGN/BUILD PRICE

The items listed in Table A13-1 and Exhibit 13-1, drawdown schedule and construction milestones respectively, are included in the Fixed Design/Build Price. Table A13-1 constitutes the maximum drawdown payments that will be made for each major milestone. This payment will include retainage which will then be withheld by the County in accordance with Section _____ of the D/B Contract

Table A13-1 Drawdown Schedule

Construction Month	Maximum Cumulative Percentage of the Fixed Design Build Price	Calculated Maximum Cumulative Drawdown Amount
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		

Construction Month	Maximum Cumulative Percentage of the Fixed Design Build Price	Calculated Maximum Cumulative Drawdown Amount
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		

The milestone completion dates as presented in Exhibit 13-1 are based on an assumed Design/Build Date of _____. The actual scheduled completion dates can be calculated by adding the number of days between _____ and the actual Contract Date to the dates presented in Exhibit 13-1.

13.2 SUBMITTALS

Within thirty (30) days of the Contract Date and prior to the Design/Build Date, the D/B Company shall submit to the County a detailed Design/Build Schedule of intermediate milestone events and a schedule of values. These intermediate milestone events and schedule of values shall substantially conform to the preliminary Design/Build Schedules submitted with the D/B Company's proposal and attached hereto and shall be satisfactory in form and substance to the County. The intermediate milestones shall include price components aggregating to each major milestone and shall subdivide the Design/Build Work into component parts in sufficient detail to serve as the basis for progress payments during construction. There will not be any drawdowns prior to the Design/Build Date.

13.3 MONTHLY PAYMENTS

All monthly payments invoiced by the Company to the County shall be based upon the completion of milestones and events, each of which represents a specific percentage of the Fixed Design/Build Price and the terms of any applicable Change Orders. The value of each milestone and determination of satisfactory achievement of each milestone shall be as specified in Exhibit 13-1 of this Appendix 13.

13.4 NOT-TO-EXCEED SCHEDULE

Notwithstanding the provisions of the percentage of the preceding paragraph, the D/B Company shall not be entitled to apply for payment of a cumulative percentage draw down amount (including retainage) of the Fixed Design/Build Price in excess of the maximum cumulative percentage draw down amount specified in Table 13-1 of this Appendix.

13.5 PAYMENT FOR CHANGES IN THE WORK

The amount and timing of agreed upon payments for changes in the D/B Company's scope of work shall be determined as provided in the D/B Contract.

13.6 RETAINAGE

The County shall withhold a retainage amount of each monthly payment otherwise due and payable to the Company in the amount of 10 percent. Such holdbacks shall continue until the Company satisfactorily completes 50 percent of the value of the Design/Build Work. The County may, however, withhold additional retainage after 50 percent of the work is complete pursuant to the Service Contract. The retained amounts shall be released upon Acceptance except for amounts equal to 200 percent of the value of any outstanding Design/Build Work.

Appendix 22

Minimum Financial Criteria

The term "Minimum Financial Criteria" as used in the Draft Design/Build Contract means any one of the following with respect to the D/B Company, the Guarantor or other entity as applicable:

Criteria I: Investment grade rating by Standard & Poor's Ratings Services and/or Moody's Investor's Service on long-term debt.

Criteria II: In the event that the Guarantor does not have long-term senior debt outstanding or such debt is not rated by either Rating Service, the credit standing of the Guarantor shall be sufficient to support an investment grade credit rating by either Rating service on the long-term senior debt of the Guarantor, whether or not any such debt is outstanding.

Criteria III: [Meet specified financial criteria relating to financial strength which criteria shall be determined following selection]



Fulton County Purchasing Department

130 Peachtree Street, S.W.

Atlanta, Georgia 30303

(404) 730-4200

fax (404) 730-5571

<http://www.co.fulton.ga.us>