

PREPARED BY



Technical Specifications

Secondary Clarifier #20 Rehabilitation

City of Plymouth, Wisconsin

September 2025



**CITY OF PLYMOUTH, WISCONSIN
INFORMATION FOR BIDDERS
PUBLIC CONSTRUCTION CONTRACTS**

BIDS will be received for the Plymouth Secondary Clarifier #20 Rehabilitation Project by the City of Plymouth (herein called the OWNER) at the Plymouth Utilities, 900 County Road PP, Plymouth, Wisconsin 53073 until **11:00 A.M., on Wednesday, October 8, 2025**. Bids will be publicly opened and read aloud.

Each BID must be in a sealed envelope and must be plainly marked on the outside as **“BID for Plymouth Secondary Clarifier #20 Rehabilitation Project”** and the envelope should bear on the outside the name of the BIDDER, his address, and his license number if applicable. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the Director of Public Works, Plymouth Utilities, 900 County Road PP, P.O. Box 277, Plymouth, Wisconsin 53073. The City of Plymouth is not responsible for BIDS not received by mail prior to the bid opening. BIDS received after the official bid closure time will be returned to the Bidder unopened.

All BIDS must be on the required BID form. All blank spaces for BID prices must be filled in, in ink, or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

PLAN DOCUMENTS may be obtained at Plymouth Utilities, 900 County Road PP for a non-refundable deposit of \$30 each to cover printing and handling. Plan documents can also be viewed at: <http://www.plymouthgov.com/public-works-city-engineer> . However, if bidding please contact Cathy Austin, Director of Public Works, to ensure you receive any addendums when issued.

CONTRACTORS bidding on the project must pre-qualify for the project. Pre-qualification forms can be obtained along with the bidding documents. Pre-qualification forms will also be available at <http://www.plymouthgov.com/public-works-city-engineer> and shall be submitted to the City Engineer five (5) days prior to the bid opening.

The OWNER may waive any informalities or minor defects or reject any or all BIDS. Any BID may be withdrawn prior to the above scheduled time before opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves to the accuracy of the project bid by examination of the site and a review of the drawings and specifications, including ADDENDA, if any. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the project scope or of the nature of the work to be done. Each BID must be accompanied by a BID BOND payable to the OWNER for five percent

(5%) of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the bonds of all except the three lowest responsible BIDDERS. When the AGREEMENT is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. A CERTIFIED CHECK may be used in lieu of the BID BOND.

A PERFORMANCE BOND and a PAYMENT BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the CONTRACT. The Bidder to whom the contract is awarded shall be required to furnish a performance bond and payment bond acceptable to the City of Plymouth for one hundred percent (100%) of the contract price.

Attorney-in-fact who signs BID BONDS or PAYMENT BONDS and PERFORMANCE BONDS must file with each bond a certified and effective dated copy of their power of attorney.

The party to whom the CONTRACT is awarded will be required to execute the AGREEMENT and obtain the PERFORMANCE BOND and PAYMENT BOND within ten calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary AGREEMENT and BOND FORMS. IN case of failure of the BIDDER to execute the AGREEMENT, the OWNER may at his option consider the BIDDER in default; in which case the BID BOND accompanying the proposal shall become the property of the OWNER.

The OWNER within 10 days of receipt of acceptable PERFORMANCE BOND, PAYMENT BOND and AGREEMENT signed by the party to whom the AGREEMENT was awarded shall sign the AGREEMENT and return to such party an executed duplicate of the AGREEMENT. Should the OWNER not execute the AGREEMENT within such period, the BIDDER may with written notice withdraw his signed AGREEMENT. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The NOTICE TO PROCEED shall be issued within 10 days of the execution of the AGREEMENT by the OWNER. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the NOTICE OF PROCEED has not been issued within the 10-day period or within the period mutually agreed upon, the CONTRACTOR may terminate the AGREEMENT without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER and the BIDDER is properly qualified to carry out the obligations of the AGREEMENT and to complete the WORK contemplated herein.

A conditional or qualified BID will not be accepted.

All applicable laws, ordinances, and the rules and regulations of all authorities that have jurisdiction over construction of the project shall apply to the CONTRACT throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

BID FORM

PLYMOUTH SECONDARY CLARIFIER #20 REHABILITATION PROJECT, CITY OF PLYMOUTH, WISCONSIN

BID OPENING: OCTOBER 8, 2025 at 11:00 A.M.

THIS BID IS SUBMITTED TO: , Plymouth Utilities, 900 County Road PP, P.O. Box 277,
Plymouth, Wisconsin 53073

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Advertisement and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 90 days after the day of Bid opening. BIDDER will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within fifteen days after the date of OWNER'S Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:
 - a. BIDDER has examined and carefully studied the Bidding Documents and the following Addenda receipt of all which is hereby acknowledged:

Addendum Number	Date
_____	_____
_____	_____
_____	_____

- b. BIDDER has visited the site and become familiar with and is satisfied as to the general, local and site conditions that may affect cost progress, performance and furnishings of the Work;
 - c. BIDDER is familiar with and is satisfied as to all Federal, State, and Local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.
 - d. BIDDER has carefully studied all reports of explorations and all drawings, pictures related to the project. BIDDER does not consider that any additional examinations, investigations, explorations, performance and furnishing of the Work in accordance with the times, price and other terms and conditions of the Contract Documents.

- e. BIDDER is aware of the general nature of Work to be performed by OWNER and others at the site relates to Work for which this Bid is submitted as indicated in the Contract Documents, if any.
 - f. BIDDER has correlated the information known to BIDDER, information and observations obtained from visits to the site, reports and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies and data with the Contract Documents.
 - g. BIDDER has given OWNER written notice of all conflicts, errors, ambiguities or discrepancies that BIDDER has discovered in the Contract or Plan Documents and the written resolution from the OWNER is acceptable to BIDDER, and the Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.
 - h. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other Bidder or over OWNER.
4. SUBSTANTIAL COMPLETION, FINAL COMPLETION, and FINAL PAYMENT BIDDER agrees that the Work will be completed by March 31, 2026, and ready for final payment.
5. BIDDER shall complete the Lump Sum work, as defined in these Contract Documents, and based upon the undersigned's own estimate of quantities and costs for the following Lump Sum Bid amount. The BIDDER agrees that the Lump Sum Bid amount represents a true measure of labor and materials required to perform the work, including all allowances for overhead and profit for the Lump Sum work called for in these Contractor Documents.

Lump Sum Bid Amount	(\$)	

6. The following documents are attached to and made a condition to the BID:
- a. Required Bid Bond
 - b. Completed Disclosure of Ownership Form
 - c. List of Subcontractors
 - d. Bidders Proof of Responsibility

7. BIDDER's CERTIFICATE

This Bid submitted on _____, 20____.

By:

Authorized Individual (signature): _____

Authorized Individual (print): _____

Title: _____

Business or Corporation: _____

Business or Corporation Address: _____

Phone No. _____

Fax No. _____

Form of Business (Circle One): Individual Partnership Corporation

Joint Venture

Note: Each joint venturer must sign. The manner of signing for each individual, partnership, and corporation that is a party to the joint venture should be in the manner indicated above. Attach additional certificates as necessary.

CORPORATE ATTEST

Notary Attest Subscribed and sworn to before me this _____ Day of __, 20_____

Signature: _____

Notary of Public – State of _____ (Corporate Seal)

My Commission expires: _____
(seal)

Signature: _____

Title: _____

State of Incorporation: _____

SUBCONTRACTOR LIST

The following subcontractors will be utilized for portions of the project work. Changes shall not be made subsequent to the bid unless the change(s) is approved by the OWNER.

[illegible]

Disclosure of Ownership

The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d), 66.0904(10)(d) and 103.49(7)(d), Wisconsin Statutes.

The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1) (m), Wisconsin Statutes].

- (1) On the date a contractor submits a bid to or completes negotiations with a state agency, local governmental unit, or developer, investor or owner on a project subject to Section 66.0903, 66.0904 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency, local governmental unit, or developer, investor or owner, the name of any "other construction business," which the contractor, or a shareholder, officer or partner of the contractor, owns or has owned within the preceding three (3) years.
- (2) The term "other construction business" means any business engaged in the erection, construction, remodeling, repairing, demolition, altering or painting and decorating of buildings, structures or facilities. It also means any business engaged in supplying mineral aggregate, or hauling excavated material or spoil as provided by Sections 66.0903(3), 66.0904(2), 103.49(2) and 103.50(2), Wisconsin Statutes.
- (3) This form must ONLY be filed, with the state agency project owner, local governmental unit project owner, or developer, investor or owner of a publicly funded private construction project that will be awarding the contract, if **both (A) and (B) are met**.
 - (A) The contractor, or a shareholder, officer or partner of the contractor:
 - (1) Owns at least a 25% interest in the "other construction business," indicated below, on the date the contractor submits a bid or completes negotiations; or
 - (2) Has owned at least a 25% interest in the "other construction business" at any time within the preceding three (3) years.
 - (B) The Wisconsin Department of Workforce Development (DWD) has determined that the "other construction business" has failed to pay the prevailing wage rate or time and one-half the required hourly basic rate of pay, for hours worked in excess of the prevailing hours of labor, to any employee at any time within the preceding three (3) years.

Other Construction Business

Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
Street Address or P O Box	City	State	Zip Code
Business Name			
Street Address or P O Box	City	State	Zip Code

I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.

Print the Name of Authorized Officer			
Authorized Officer Signature		Date Signed	
Corporation, Partnership or Sole Proprietorship Name			
Street Address or P O Box	City	State	Zip Code

If you have any questions call (608) 266-6861

AGREEMENT

THIS AGREEMENT is by and between the City of Plymouth (hereinafter called OWNER) and _____(hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

ARTICLE 1. WORK

1.01 CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

Rehabbing Secondary Clarifier #20 at the wastewater treatment plant.

1.02 CONTRACTOR shall repair or replace any work which is defective or not in conformity with this Contract at no cost to the OWNER for a period of one (1) calendar year after completion of the work.

ARTICLE 2. THE PROJECT

2.01 The Project for which the Work under the Contract Documents may be the whole or only a part is generally described as follows: **PLYMOUTH SECONDARY CLARIFIER #20 REHABILITATION PROJECT.**

ARTICLE 3. CONTRACT TIMES

3.01 Time of the Essence – All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.

3.02 Completion of Work and Final Payment – Work will be completed by March 31, 2026. All work will be completed and ready for final payment in accordance with contract payment provisions.

3.03 Should CONTRACTOR fail to timely complete Work, CONTRACTOR may be liable to OWNER in the amount of \$300.00 each and every day an inspection is performed by OWNER to inspect work.

3.04 The CONTRACTOR may request a Contract Deadline Extension from OWNER, in writing, prior to the deadline for Contract completion (Contract Deadline), where the progress of work was delayed and CONTRACTOR was not responsible for such delay. Should OWNER grant an extension, CONTRACTOR will not be liable for payment of inspection fees during the period of said extension. Should OWNER determine that work will not be completed by Contract Deadline through normal methods and that no request for a Contract Deadline extension has been requested, or if requested, such

request was not justified and denied, then OWNER shall provide CONTRACTOR with written notice requiring CONTRACTOR to take such extraordinary measures as may be required to complete work by Contract Deadline, or within a reasonable time. The failure of CONTRACTOR to take such extraordinary measures shall be grounds for OWNER to suspend work by CONTRACTOR and take such other measures as will assure completion of work within Contract Deadline, or if that is impossible, within a reasonable time. However, nothing herein contained shall prevent OWNER from stopping CONTRACTOR from proceeding with work where CONTRACTOR is unwilling or unable to meet Contract Deadline through the use of extraordinary means.

ARTICLE 4. CONTRACT PRICE

4.01 OWNER shall pay CONTRACTOR for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts approved by ENGINEER based on the percentage of Work completed.

TOTAL BASE PRICE CONTRACT: _____

TOTAL ALTERNATE BID AMOUNT: _____ (if needed)

TOTAL CONTRACT AWARD: _____

ARTICLE 5. PAYMENT PROCEDURES

5.01 Submittal and Processing of Payments – CONTRACTOR shall submit Applications for Payment to OWNER. OWNER will process all payments through the office of the City Administrator/Utilities Manager.

5.02 Progress Payments, Retainage – OWNER shall make progress payments on the basis of CONTRACTOR'S Applications for Payment once each month during performance of the Work. All such payments will be measured by the estimated value of Work completed as determined by ENGINEER. Retainage shall be set forth as 5% of the project until 50% of the work has been completed. At 50% completion, further partial payments will be made in full. However, if the CONTRACTOR work is not satisfactory additional retainage may be held by the OWNER. In the event work under this Contract is defaulted or not completed, Section 62.15(10), Wisconsin Statutes, shall apply.

5.03 Final Payment – Upon final completion and acceptance of the Work, OWNER shall pay the remainder Contract Price, including any remaining retainage.

ARTICLE 6. CONTRACTOR'S REPRESENTATIONS

6.01 In order to induce OWNER to enter in this Agreement CONTRACTOR makes the following representations:

A. CONTRACTOR has examined and carefully studied the Contract Documents and other related data identified in Bidding Documents.

B. CONTRACTOR has visited the Site and become familiar with and is satisfied as to

- the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- C. CONTRACTOR is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work.
 - D. CONTRACTOR has obtained and carefully studied (or assumes responsibility for having done so) all additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions at or contiguous to the Site which may affect cost, progress, or performance of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by CONTRACTOR, including the specific means, methods, techniques, sequences, and procedures of construction if any, expressly required by the Contract Documents and Plan Documents to be employed by CONTRACTOR, and safety precautions and programs incident thereto.
 - E. CONTRACTOR does not consider that any further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract Documents.
 - F. CONTRACTOR has correlated the information known to CONTRACTOR, information and observations obtained from visits to the Site, reports and drawings identified in the Contract and Plan Documents, and all additional examinations, investigations, explorations, tests, studies, and data.
 - G. CONTRACTOR has given OWNER written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract and/or Plan Documents, and the written resolution thereof by OWNER is acceptable to CONTRACTOR.
 - H. The Contract and Plan Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

ARTICLE 7. CONTRACT DOCUMENTS

7.01 The Contract and Plan Documents consist of the following:

- 1. Notice to Bidders
- 2. Information for Bidders
- 3. Bid Form
- 4. List of Subcontractors
- 5. Agreement
- 6. Bid Bond

7. Performance Bond
8. Payment Bond
9. Notice of Award
10. Notice to Proceed
11. Contract Change Order
12. General Conditions
13. Specifications and Plans
14. Addenda (if any)
15. Attachments or Exhibits shall include CONTRACTOR'S BID and other documentation submitted by CONTRACTOR.

ARTICLE 8. MISCELLANEOUS

8.01 Assignment of Contract – No assignment by a party hereto of any rights under or interests in the Contract will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consents (except to the extent that the effect of this restriction may be limited by Laws and Regulations), and unless specifically stated to the contrary in any written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

8.02 OWNER and CONTRACTOR each binds itself, its partners, successors, assigns, and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

8.03 Indemnity and Hold Harmless - CONTRACTOR shall indemnify and hold harmless OWNER, and its officers and employees from and against any and all claims, damages, losses, judgments, expenses and attorney fees which they may incur, pay or sustain as a result of any act or omission, whether negligent or otherwise, of CONTRACTOR which causes death, personal injury or property damage or loss to any person or party, or a violation of any right of any person or party protected by law. CONTRACTOR is not responsible for any acts or omissions of OWNER or OWNER'S officers and employees.

8.04 Severability – Any provision or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provision shall continue to be valid and binding upon OWNER and CONTRACTOR, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

8.05 IN WITNESS WHEREOF, OWNER and CONTRACTOR have signed this Agreement in duplicate. One counterpart each has been delivered to OWNER and CONTRACTOR. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or on their behalf.

This Agreement will be effective on date of OWNER'S signature (which is the Effective Date of the Agreement).

OWNER:

CITY OF PLYMOUTH

By: _____
Donald O. Pohlman

Date: _____

Attest: _____
Anna Voigt

Title: City Clerk

CONTRACTOR:

By: _____

Title: _____

Date: _____

Attest: _____

Title: _____

Address for giving notices:

Plymouth City Hall
P.O. Box 107
Plymouth, WI 53073

Address for giving notices:

This to certify that provisions have been made
To pay for the liability that will accrue under this
Contract.

Anna Voigt

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____
as Principal, and _____ as Surety,
are hereby held and firmly bound unto _____ as
Owner in the penal sum of _____
for the payment of which, well and truly to be made, we hereby jointly and severally bind
ourselves, successors and assigns.

Signed this _____ day of _____, 20____.

The Condition of the above obligation is such that whereas the Principal has submitted
to The City of Plymouth, Wisconsin, a certain Bid, attached hereto and hereby made a
part hereof to enter into a contract in writing, for the **Plymouth Secondary Clarifier #20
Rehabilitation Project – City of Plymouth.**

NOW, THEREFORE,

- (a) If said Bid shall be rejected, or in the alternate.
- (b) If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or finishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid.

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____(L.S.)
Principal

_____(Surety)
Surety

By:_____

IMPORTANT – Surety companies executing bonds must appear on the Treasury Department’s most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

a _____, hereafter called Principal, and
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto The City of Plymouth, Wisconsin,
128 Smith Street, Plymouth, Wisconsin 53073, hereinafter called Owner, in the penal sum of

_____ DOLLARS AND _____ CENTS.,

\$ (_____)

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

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a
certain contract with the Owner, dated the _____ day of _____, 2025
as copy of which is hereto attached and made a part hereof for the construction of: **Plymouth
Secondary Clarifier #20 Rehabilitation Project.**

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

PROVIDED, FURTHER, that the said surety, for value received hereby stipulates and agrees
that no change, extension of time, alteration or addition to the terms of the contract or the work
to be performed thereunder or the specifications accompanying the same shall in any wise
affect its obligation on this bond, and it does hereby waive notice of any such change, extension
of time, alteration or addition to the terms of the contract or to the work or the specifications.
PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall
abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in triplicate, each of which shall be deemed an original, this the ____day of _____,2025.

ATTEST:

Principal

(Principal) Secretary

BY: _____(S)

SEAL:

(Witness as to Principal)

(Address)

(Address)

(Surety)

ATTEST:

(Surety) Secretary

SEAL:

(Witness as to Surety)

BY _____
(Attorney-in-fact)

(Address)

(Address)

NOTE: Date of Bond must not be prior to date of Contract. If Contract is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

(Name of Contractor)

(Address of Contractor)

_____, hereinafter called Principal,
(Corporation, Partnership, or Individual)

(Name of Surety)

(Address of Surety)

hereinafter called Surety, and held and firmly bound unto the City of Plymouth, Wisconsin, 128 Smith Street, Plymouth, Wisconsin 53073, hereinafter called Owner, in the penal sum of _____dollars and _____cents, \$(_____)

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

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the Owner, dated the _____day of _____2025, a copy of which is hereto attached and made a part hereof for the construction of: **Plymouth Secondary Clarifier #20 Rehabilitation Project.**

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

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the specification accompanying the same shall in any wise affect its obligation on this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the specifications.

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

IN WITNESS WHEREOF, this instrument is executed in triplicate, each one of which shall be deemed an original, this the _____ day of _____ 20 _____.

ATTEST:

_____	_____
(Principal) Secretary	Principal
	BY: _____(S)

SEAL:

_____	_____
(Witness as to Principal)	(Address)
_____	_____
(Address)	
_____	_____
	(Surety)

ATTEST:

(Surety) Secretary

SEAL:

_____	BY _____
(Witness as to Surety)	(Attorney-in-fact)

NOTE: Date of Bond must not be prior to date of Contract.
If Contractor is Partnership, all partners should execute bond.

IMPORTANT: Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the project is located.

NOTICE OF AWARD

To:

PROJECT Description: Secondary Clarifier #20 Rehabilitation Project – City of Plymouth

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Notice to Bidders dated September 15, 2025, and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of

\$ _____

You are required by the Information for Bidders to execute the Agreement and furnish the required Contractor's Performance Bond and Payment Bond within ten calendar days from the date of this Notice to you.

If you fail to execute said Agreement within ten days from the date of this Notice, said OWNER will be entitled to reconsider your BID and contract with another firm.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

If you fail to execute said Agreement and to furnish said bonds within ten days from the date of this Notice, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your Bid Bond. The OWNER will be entitled to such other rights as may be granted by law.

Dated this _____ of ____ 2025

By: The City of Plymouth

Name: _____
Cathy Austin

Title: Director of Public Works / City Engineer

NOTICE TO PROCEED

To: _____

Date: _____

Project: Plymouth Secondary Clarifier #20 Rehabilitation Project

You are hereby notified to commence work in accordance with the Agreement dated _____, on or before _____ and you are to complete the WORK by **March 31, 2026**.

The City of Plymouth, Wisconsin

By: _____
Cathy Austin

Title: Director of Public Works / City Engineer

CHANGE ORDER NO.____

Date:_____

RE: Change Order No._____
PLYMOUTH SECONDARY CLARIFIER
#20 REHABILITATION PROJECT
City of Plymouth, Wisconsin

Dear _____:

The following changes are hereby made to the Agreement dated _____.

Justification:

\$ _____ Contract Price from Original Agreement
\$ _____ Adjustment to Contract Price from previously issued Change Orders
\$ _____ Adjustment by this Change Order
\$ _____ Revised Contract Price

Notes:

Approved by Contractor: _____ Dated: _____

Approved by Owner: _____ Dated: _____

Sincerely,

Cathy Austin
Director of Public Works / City Engineer

MANUAL SALES TAX EXEMPTION

New Sales and Use Tax Exemption Effective January 1, 2016- Building Materials That Become Part of a Local Government or Qualifying Nonprofit Facility Section 77.54(9m), Wis. Stats. (2013-14), as created by 2015 Wis. Act 126, provides an exemption from sales and use tax exemption for property sold to a construction contractor who, in fulfillment of a real property construction activity, transfers the property to a qualifying exempt entity, if the property becomes part of a facility in Wisconsin that is owned by the qualifying exempt entity. The Plymouth Wash Room will be owned by the City of Plymouth and sales tax should be deducted from the cost of this project. Attached is a summary of the law change from the Wisconsin Department of Revenue.

New Sales and Use Tax Exemption Effective January 1, 2016- Building Materials That Become Part of a Local Government or Qualifying Nonprofit Facility

Section 77.54(9m), Wis. Stats. (2013-14), as created by 2015 Wis. Act 126, provides an exemption from sales and use tax exemption for property sold to a construction contractor who, in fulfillment of a real property construction activity, transfers the property to a qualifying exempt entity, if the property becomes part of a facility in Wisconsin that is owned by the qualifying exempt entity. In order for the exemption to apply, the following criteria must be met:

1. The construction must be for a *qualifying exempt entity*;
2. The property must become *part of a facility* in Wisconsin that is owned by the exempt entity; and
3. The property must be *transferred to* the qualifying exempt entity.

1. What is a Qualifying Exempt Entity?

For purposes of this exemption, a qualifying exempt entity includes:

- Any county, city, village or town within Wisconsin
- Any public school district within Wisconsin
- A county-city hospital established under sec. 66.0927, Wis. Stats.
- A sewerage commission organized under sec. 28.1.43 (4), Wis. Stats.
- A metropolitan sewerage district organized under ss. 200.01 to 200.15 or 200.21 to 200.65, Wis. Stats.
- Any joint local water authority created under sec. 66.0823, Wis. Stats.
- Any nonprofit organization that holds a Wisconsin Certificate of Exempt Status (CES) number*
- A non-Wisconsin nonprofit organization if it is organized and operated exclusively for religious, charitable, scientific or educational purposes, or for the prevention of cruelty to children or animals (except hospital service insurance corporations), and no part of its net income inures to the benefit of any private stock- holder, shareholder, member, or corporation.

Note: A qualifying non-Wisconsin nonprofit organization is not required to obtain a Wisconsin CES number to be a qualifying exempt entity.

Additionally, a contractor's purchase of building materials used in a construction activity for any federally recognized American Indian tribe or band within Wisconsin is also exempt from sales and use tax if the construction activity occurs on the tribal reservation and the construction project will benefit the Tribe.

***CAUTION:** Not all nonprofit organizations that are exempt from federal income and franchise taxes are qualifying exempt entities for purposes of this exemption. Many fraternal, social, and civic organizations are not qualifying entities (e.g., Chambers of Commerce, volunteer fire departments, professional organizations, labor organizations). A contractor should request the Wisconsin nonprofit organization's CES number and retain this number in its records to verify that the organization is a qualifying exempt entity.

This exemption also does not apply to facilities constructed for the following entities, even if the entity holds a Wisconsin CES number:

- A non-Wisconsin county, city, village or town
- A non-Wisconsin public school district
- A public college, university or technical college (regardless of whether Wisconsin or non-Wisconsin)
- A state governmental unit (regardless of whether Wisconsin or non-Wisconsin)
- A federal governmental unit
- A Wisconsin nonprofit organization that does not hold a Wisconsin CES number
- Individual Native American Tribe members

2. What is a "Facility?"

The exemption applies to property that becomes part of a "facility" located in Wisconsin that is owned by a qualifying exempt entity. "Facility" means any building, shelter, parking lot, parking garage, athletic field, athletic park, storm sewer, water supply system, or sewerage and waste water treatment facility, but does not include a highway, street, or road.

3. Can a Subcontractor "Transfer" the Property to the Exempt Entity?

A subcontractor's purchase of property qualifies for exemption if the property becomes part of a facility located in Wisconsin owned by a qualifying exempt entity. Although the subcontractor is providing a real property construction activity under contract with the general contractor, the property is ultimately transferred to a qualifying exempt entity upon completion of the contract between the general contractor and the qualifying exempt entity.

How to Claim the Exemption

A contractor who makes purchases that qualify for this exemption must provide a fully completed exemption certificate to the seller. The contractor should check "other purchases exempted by law" on the certificate and enter "exempt under sec. 77.54(9m), Wis. Stats."

Note: A contractor who provides the seller an exemption certificate claiming an item will be used in this exempt manner, then uses it in a taxable manner, is liable for use tax on its purchase price of such items.

Documentation to Maintain

Retailers -The seller is not liable for Wisconsin sales tax on its sales of taxable products if, within 90 days of the sale, it receives a fully completed exemption certificate from the contractor indicating the contractor is using the items in an exempt manner. Sellers are required to maintain adequate records, including exemption certificates obtained from contractors, to identify that the sale is exempt.

Contractors- The contractor is required maintain records to verify that the exemption applies when the real property construction activity is performed on a facility owned by the qualifying exempt entity. This may be done by obtaining a nonprofit organization's CES number and maintaining contracts and invoices showing the work was for this qualifying exempt entity.

IMPORTANT: A contractor should request the Wisconsin nonprofit organization's CES number and retain this number in its records to verify that the organization is a qualifying exempt entity. Property used in a real property contract with a Wisconsin nonprofit organization that does not hold a Wisconsin CES number does not qualify for this exemption.

Although a qualifying *non-Wisconsin* nonprofit organization is not required to obtain a Wisconsin CES number to be a qualifying exempt entity, the contractor must be able to verify that the entity is organized and operated exclusively for religious, charitable, scientific or educational purposes, or for the prevention of cruelty to children or animals (except hospital service insurance corporations), and no part of its net income inures to the benefit of any private stockholder, shareholder, member, or corporation. For example, the non-Wisconsin qualifying organization may provide the contractor with a copy of its IRS 501(c) 3 exempt status determination letter.

CAUTION: Nonprofit organizations that the IRS exempts under another section of its code (e.g., 501(c) 6, 501(c) 7) are not qualifying exempt entities for purposes of this exemption. In addition, a Wisconsin state governmental unit that holds a CES number is not a qualifying exempt entity for purposes of this exemption.

For qualifying exempt entities that are not required to hold a CES number (e.g., a Wisconsin municipality), the contractor may retain the contract and invoices that indicate the work was performed for the qualifying exempt entity

Subcontractors - The same treatment applies to subcontractors as it does to contractors in the paragraphs above (i.e., provide exemption certificate to seller, maintain documentation). However, a subcontractor may not have a contract indicating the real property construction activity is for the qualifying exempt entity. A subcontractor will need to ensure it can identify the Wisconsin location, on a bill of sale or invoice to the general contractor, where it performed the real property construction activity and verify that the property became part of a facility in Wisconsin owned by a qualifying exempt entity.

Transitional Provisions

This law first applies to contracts entered into on January 1, 2016 and thereafter. The exemption does not apply if the contractor purchases property after January 1, 2016 for a contract that was entered into prior to January 1, 2016.

The date the contract was entered into between the contractor and a qualifying exempt entity is used in determining whether the exemption applies. A change order to a contract amends the original contract, but does not nullify the original contract or change the date that the contract was entered into. Therefore, if a contract between the contractor and the exempt entity was irrevocably entered into prior to January 1, 2016, the exemption does not apply to property purchased to fulfill the contract. If the contract was not irrevocable and the original contract is cancelled and a new contract is entered into on January 1, 2016 or thereafter, the property used to fulfill the new contract may qualify for exemption.

Tax Seminars- Wisconsin/Minnesota Sales and Use Tax Basics

The Wisconsin and Minnesota Departments of Revenue will present a series of free sales and use tax seminars in March and April 2016. The seminars will provide an overview of Minnesota and Wisconsin sales and use tax laws for companies that do business in both states. They are designed for business owners, bookkeepers, purchasing agents and accountants who need a working knowledge of each state's laws and how to meet their obligations. Topics covered will include:

- Who needs to register for sales and use taxes in Minnesota, Wisconsin or both states
- What cities, counties and other jurisdictions in each state have local taxes
- What's taxable in each state
- Exceptions to the general taxation rules and exemptions
- How and when to use or accept an exemption certificate

Seminar dates, times, and locations, as well as registration information, is available on the Wisconsin Department of Revenue's Sales and Use Tax Training web page.

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B	Insurance Requirements
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**Section 01010
SUMMARY OF WORK**

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Description of work.
- B. Work by owner.
- C. Contractor use of site.
- D. Work sequence.
- E. Field verification of drawing information.
- F. Archaeological finds.

1.2 DESCRIPTION OF WORK

- A. Work on the Project will be provided under a single prime contract.
- B. When completed, this project will provide the Owner with a secondary clarifier that supports the operation of the Plymouth WWTP.
- C. The major facilities or components of the Project include but are not limited to the following. To determine the full scope of the Project, refer to the entire Contract Documents:
 - 1. Removal and reinstallation of clarifier walkway.
 - 2. Removal, inspection, rehabilitation, and reinstallation of the clarifier drive assembly.
 - 3. Removal, inspection, rehabilitation, and reinstallation of the clarifier mechanism and structural components.
 - 4. Field testing of rehabilitated clarifier systems.

1.3 WORK BY OWNER

- A. Not used.

1.4 CONTRACTOR USE OF SITES

- A. Confine operations at sites to areas permitted by:
 - 1. Law.
 - 2. Ordinances.
 - 3. Permits.
 - 4. Contract Documents.

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- B. Owner will occupy the existing site to maintain necessary operations. Contractor shall coordinate construction operations to allow Owner continued operation of existing facility.
- C. Assume full responsibility for protection and safekeeping of material and products stored on or off premises.
- D. Move any stored material or products which interfere with operations of Owner or other Contractors.
- E. Obtain and pay for use of additional storage or work areas needed for operation.
- F. Time Restrictions for Performing Work: As stated in Section 01011 – Schedule and Sequence of Operations.

1.5 WORK SEQUENCE

- A. The Contractor is required to determine his own method of construction and detailed work sequence, within the terms of the Contract, so long as the constraints defined in Section 01011 – Schedule and Sequence of Operations, and those shown on the Plans are observed and the milestones and the overall project completion time are achieved.
- B. Certain equipment and components shall be tested and commissioned as a system in accordance with Section 01820 – System Demonstration.

1.6 FIELD VERIFICATION OF DRAWING INFORMATION

- A. The Contractor shall field verify the size and location of existing structures, equipment, and piping depicted on the Drawings. Information on the Drawings is based upon available plant record drawings. No attempt has been made to verify the accuracy of the record drawings. Notify Engineer immediately of any discrepancies between locations shown and actual locations.

1.7 ARCHAEOLOGICAL FINDS

- A. Not used.

PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

Section 01011
SCHEDULE AND SEQUENCE OF OPERATIONS

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Progress of the work
- B. Work Sequences and constraints
- C. Preconstruction conference
- D. Definitions
- E. Overall construction schedule
- F. Detailed network diagram
- G. Activities
- H. Contingency
- I. Float
- J. Submittal of schedules
- K. Project and progress review meetings
- L. Delays and recovery

1.2 PROGRESS OF THE WORK

- A. General: The work shall be performed at such times and in or on such parts of the project and with such forces, materials, and equipment to prevent any delay to the completion of the project within the time limits stated in the Contract and the conformance with the overall Construction Schedule specified herein, and in accordance with the sequences and constraints specified herein.
- B. Work Hours:
 - 1. The Contractor may, with written approval from the Owner and acquisition of all necessary permits, and at the Contractor's own expense carry on work outside regular hours of 7:00 a.m. to 5:00 p.m., Monday through Friday excluding holidays. To obtain Owner consideration of work outside the above-mentioned hours, or on Saturdays, Sundays or holidays, he shall submit a written request, with reasons, to the Engineer and shall allow 48 hours for written approval and satisfactory arrangements to be

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- made for observing the work in progress. The Contractor shall comply with all applicable requirements of the Owner.
2. Such permission, however, may be revoked if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work.

1.3 WORK SEQUENCES AND CONSTRAINTS

- A. Contractor shall be responsible for all temporary piping and pumping systems required to maintain service.
- B. Before any shutdown coordination takes place, verify that all equipment, materials, and other necessary items required for shutdown work are on-site and prepared for installation. Prefabricate as much of this work as possible for accurate and proper installation.
- C. The Contractor shall conduct a coordination meeting at least 7 days prior to any shutdown, tie-in, temporary pumping activity, bulkhead installation, or other activity that modifies or alters site operations.
- D. Any modifications to existing equipment, piping, electrical, etc. required to remove and/or install new equipment shall be approved by the Engineer and performed at the sole expense of the Contractor.
- E. The following Contractual Milestones, sequences, and constraints are those essential to maintaining facilities operation during construction and the completion of this project.
1. General:
- a. All submittals shall be made within 30 days of the notice to proceed.
 - b. Initial inspection and final inspection report shall be submitted in accordance with the requirements outlined in Section 11600 – Secondary Clarifier Equipment.
 - c. Refer to Section 01020 – Permits for permitting requirements that may affect scheduling of work.
 - d. Unless otherwise specified, the Contractor shall provide the Engineer with written notice a minimum of 14 days prior to the time when existing facilities are required to be taken out of service to complete work. The Contractor equipment items are on hand or on site at the time of the notice.
 - e. Unless specified otherwise, draining, cleaning, and dewatering of tanks, channels, conduits, piping, and other facilities shall be performed by Contractor as required to complete Work. Unless specified otherwise, Owner will not drain, clean, and dewater facilities to enable Contractor to complete Work.
 - f. The Contractor shall be fully responsible for providing all temporary piping, bulkheads and plugs to block flow, plumbing,

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electrical hook-ups, heating, ventilating, air conditioning, lighting, temporary structures, and related work to maintain wastewater collection system operations and storm water flows. All details of temporary piping and temporary construction are not necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to maintain collection and conveyance operations.

- g. Testing and commissioning of the Work shall be in accordance with the descriptions and requirements in Section 01010 – Summary of Work, and Section 01820 – System Demonstration.
 - h. Flood Protection: Contractor shall protect existing facilities from flooding at all times.
 - i. Erosion and sediment control practices shall be constructed or installed before land disturbing construction activities begin. See Section 01500 - Construction Facilities and Temporary Controls
- 2. Rehabilitate Secondary Clarifier #20 as indicated on the plans.
 - 3. Complete all site surface restoration not previously completed.
 - 4. Testing and Commissioning.
 - a. See Section 01820-System Demonstration.

1.4 PRECONSTRUCTION CONFERENCE

- A. Before beginning the work and after the Contract has been awarded, the Engineer will conduct a Preconstruction Conference to discuss construction schedules and procedures, development of a plan for utility protection and reconstruction, arrangements for orderly movement of traffic, Contractor's use of the site, Contractor's use of existing facilities, Owner's regulations, and other matters deemed relevant to the effective performance of the work.
- B. The conference shall be attended by:
 - 1. Contractor's Authorized Representative.
 - 2. Contractor's General Superintendent.
 - 3. Any subcontractor's or supplier's representatives whom the Contractor may desire to invite, or the Engineer may request.
- C. Representatives from the following agencies will also be invited to attend:
 - 1. The Owner.
 - 2. Local agencies.

1.5 DEFINITIONS

- A. Overall Schedule: Schedule of the entire project involving the work of all Contractors. The Overall Schedule is prepared by the Contractor based on information from all subcontractors engaged on this project.

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- B. Critical Path Method (CPM): The Critical Path Method (CPM) of schedule development and maintenance consists of a network diagram in either Precedence (PDM) or Arrow (ADM) and associated date calculations.

1.6 OVERALL CONSTRUCTION SCHEDULE

- A. The Overall Schedule shall show the sequence and interdependence of activities required for complete performance of all items of work. The Overall Schedule shall begin with the date the Owner issues the Notice to Proceed, conclude with the date of Final Completion of the Contract, and include all interface points between Contractors. Failure to submit the Contractor's schedule information will be considered cause for withholding of any partial payments otherwise due under the Contract in accordance with the GENERAL CONDITIONS.

1.7 DETAILED NETWORK DIAGRAM

- A. General:
 - 1. The Overall Schedule shall contain a time-scaled network diagram. The network diagram shall be in the Critical Path Method (CPM) format and shall show the description, duration in days, sequence and interdependence of activities required for complete performance of all items of work.
 - 2. Sufficient care shall be exercised to produce a legible and accurate diagram. The original schedules shall be drawn on 22-inch by 34-inch reproducible media.
 - 3. Activities related to a specific physical area of the project shall be differentiated from corresponding tasks for other specific physical areas of the project.

1.8 ACTIVITIES

- A. An activity is defined as a time and/or resource consuming element of work. The activities selected for inclusion in the Overall Schedule shall be discrete. All dependency relationships must be shown. When necessary, discrete activities shall be subdivided into smaller, discrete activities so that the dependency relationships may be shown. The level of detail shall be sufficiently fine to enable the Engineer to determine that the project has been adequately planned and to facilitate the determination of real progress as the work is prosecuted.
- B. Activity durations exclusive of those for "Submittal Preparation by the Contractor," "Review by the Engineer," and "Material Fabrication and Delivery," shall not be less than one or more than 21 days, unless otherwise approved by the Engineer. Allowance for inclement weather shall be factored into each activity where appropriate.

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- C. The schedules shall indicate the description, duration, sequence and interdependency of work activities. They shall include, but not be limited to, the following items, as appropriate to each Contract:
1. Mobilization and move in.
 2. Conferences and meetings.
 3. Excavation, backfill, grading, paving, seeding, and similar earthwork and surface restoration.
 4. Order, manufacture, delivery, and installation of critical material and major equipment.
 5. Concrete placement sequence.
 6. Structural steel, miscellaneous steel, masonry, equipment installation, piping work.
 7. Various demolition and related removals or relocations work.
 8. Construction of various facilities.
 9. All other major construction activities.
 10. Performance tests and supervisory service activities.
 11. All Contract stipulated milestone dates, substantial completion date, and final completion date.
 12. Final cleanup.

1.9 CONTINGENCY

- A. Any contingency within the schedule (i.e., a difference in time between the project's early completion and required Contract completion date and float in the Overall Schedule) will belong to the Project and not to any of the parties to the Contract.

1.10 FLOAT

- A. The Contractors shall not be permitted to sequester shared float through such strategies as extending duration estimates to consume available float time or extensive crew/resource sequencing, etc.

1.11 SUBMITTAL OF SCHEDULES

- A. Within 20 days after the Notice to Proceed, the Contractor shall submit the Overall Schedule to the Engineer for review and/or rejection as appropriate. After review, resubmit required revised data within 10 days. If rejected the Overall Schedule must be resubmitted until the review comments are resolved.
- B. Whenever under any Contract Documents the Engineer is given the right of review or rejection of Contractor's schedules or changes thereto, such right is for the benefit and protection of the Engineer and the Owner, and not a benefit for or service to the Contractor. Comments made by the Engineer on the schedule, or lack of such comments, or rejection or non-rejection of the Contractor's schedule does not relieve the Contractor from compliance with requirements of the Contract Documents, nor do they create any responsibility or duty for scheduling owed from the Owner or the Engineer to the Contractor. This review, whether

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accompanied by comments, rejection, or neither, is only for general conformance with the schedule concept of the project and general compliance with the information given in the Contract Documents.

- C. An electronic version of the Overall Schedule Detailed Network Diagrams shall be submitted to the Engineer's Procure.
- D. Failure to submit the Detailed Network Diagrams, or subsequent updates of the schedules shall be considered cause for withholding any partial payments otherwise due under the Contract, in accordance with the GENERAL CONDITIONS.

1.12 PROJECT AND PROGRESS REVIEW MEETINGS

- A. The Contractor will conduct Project Meetings as needed for the purpose of discussing and resolving matters concerning the various elements of the work.
- B. Prior to the Progress Review Meeting, the Contractor shall obtain from his subcontractors and staff, the necessary information as required to reflect progress to date. An updated Schedule shall be available for review at the meeting.
- C. Update status information shall be annotated on the Contractor's Overall Schedule in a manner that the Detailed Network Diagrams shall depict the current status of the work.

1.13 DELAYS AND RECOVERY

- A. Once the Contractor starts on any part of the work which affects public convenience, health, or safety, he shall diligently and expeditiously prosecute such work until it is no longer in any respect a public inconvenience, health or safety hazard.
- B. Whenever it becomes apparent from the current monthly progress evaluation and updated schedule data that any milestone interface completion dates and/or contract completion dates will not be met, the Contractor shall take actions necessary to return to the Overall Schedule.
- C. The addition of equipment or construction forces, increasing the working hours or any other method, manner, or procedure to return to the current Overall Schedule shall not be considered justification for a Change Order or treated as an acceleration order.

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PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

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Section 01020
PERMITS

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Permit responsibility.
- B. Construction permits.

1.2 RELATED SECTIONS

Not used.

1.3 PERMIT RESPONSIBILITY

- A. Licenses or permits of a temporary nature (such as dewatering well permits, NPDES Permits, and erosion control permits) shall be the responsibility of the Contractor. **The Contractor shall be responsible for all required temporary permits for construction. This section is not intended as an all inclusive list of the permits required, but to provide an example of types of permits required. Contractor shall make no claim on delays of work due to failure to obtain a necessary construction permit.**

1.4 CONSTRUCTION PERMITS

- A. The Contractor shall determine if any building, fence, demolition, excavation, or other permits are needed for the work occurring as part of the project.
- B. The Contractor shall contact the City of Plymouth Building Inspection Department at the address below.

City of Plymouth
128 Smith Street
Plymouth, WI 53073
Telephone: (920)-893-3741

PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

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Section 01200
PRICE AND PAYMENT PROCEDURES

PART 1 . GENERAL

1.1 SECTION INCLUDES

- A. Schedule of values.
- B. Applications for payment.
- C. Unit prices.

1.2 PAYMENT

- A. Payment for all work under this contract shall be on a lump sum basis.

1.3 SCHEDULE OF VALUES

- A. Provide a detailed breakdown of the contract Price showing amounts and quantities allocated to each of the various parts of the Work, as specified herein and as required by General Conditions.
- B. Upon request of Engineer, support amounts and quantities with data substantiating their correctness.
- C. Include the following:
 - 1. Project title.
 - 2. Project location.
 - 3. Owner.
 - 4. Engineer.
 - 5. Engineer's project number.
 - 6. Name and address of Contractor.
 - 7. Contract designation.
 - 8. Date.
- D. Identify installed value of Work in sufficient detail to serve as basis for computing values for progress payments during construction.
- E. Provide a separate listing of general items, such as bonds, insurance, mobilization, field supervision, construction facilities, allowances, and record documents.
- F. Follow Project Manual table of contents as format for listing component items.

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At a minimum, listing shall include material cost and total installed cost for each Specification Section for each structure as listed in this Section.

1. Identify each line item with number and title of respective Specification Division and Section.
2. Include directly proportional amount of Contractor's overhead and profit.
3. For items on which progress payments will be requested for stored materials, break down value into:
 - a. Cost of materials, delivered and unloaded.
 - b. Total installed value.

G. Sum of values listed shall equal total Contract Price.

1.4 APPLICATIONS FOR PAYMENT

A. See General Conditions.

B. For each item, provide a column for listing each of the following:

1. Item number.
2. Description of work.
3. Scheduled values.
4. Previous applications.
5. Work in place under this application.
6. Authorized change orders.
7. Total completed to date of application.
8. Percentage of completion.
9. Balance to finish.
10. Retainage.

C. Present required information in typewritten form or on electronic media printout.

D. Execute certification by signature of authorized officer.

E. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed.

F. List each authorized Change Order as an extension on Continuation Sheet, listing Change Order number and dollar amount as for an original item of Work.

G. Submit an updated construction schedule with each Application for Payment.

H. When Engineer requires substantiating information, submit data justifying dollar amounts in question.

1. Provide two copies of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

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2. When requested by the Owner include the following with the application:
 - a. Partial release of liens from major subcontractors and vendors.
 - b. Affidavits attesting to off-site stored products.
 - c. Construction progress schedule, revised and current as specified in Section 01011 – Schedule and Sequence of Operation.
- I. Prepare Application for Final Payment as specified in Section 01700 – Contract Closeout.

1.5 UNIT PRICES

- A. Unit Quantities: Quantities and measurements indicated in Bid Form are for contract purposes only. Quantities and measurements supplied or placed in the Work shall determine payment.
- B. Payment Includes: Full compensation for required labor, products, tools, equipment, plant and facilities, transportation, services and incidentals; erection, application, or installation of item of the Work; overhead and profit.
- C. Final payment for Work governed by unit prices will be made on basis of actual measurements and quantities accepted by Engineer multiplied by unit price for Work incorporated in or made necessary by the Work.

PART 2 . PRODUCTS

Not used.

PART 3 . EXECUTION

Not used.

END OF SECTION

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**Section 01300
SUBMITTALS**

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Shop drawings.
- D. Samples.
- E. Test reports.
- F. Certificates.
- G. Manufacturer's instructions.
- H. Manufacturer's field reports.
- I. Erection drawings.
- J. Request for Information.

1.2 RELATED SECTIONS

- A. Section 01011 – Schedule and Sequence of Operations.
- B. Section 01700 – Contract Closeout.

1.3 REFERENCES

- A. AGC (Associated General Contractors of America) publication "The Use of CPM in Construction – A Manual for General Contractors and the Construction Industry."

1.4 SUBMITTAL PROCEDURES

- A. All equipment and material submittals shall be made within 30 days of the notice to proceed.
- B. No equipment or material for which listings, drawings, or descriptive material are required shall be fabricated, purchased, or installed until the Engineer has on hand copies of such approved lists and the appropriately reviewed final shop drawings.

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SECONDARY CLARIFIER #20 REHABILITATION

- C. Transmit each submittal via Engineer's email. Contractor shall designate a submittal coordinator to work with the Engineer to establish submittal procedures.
- D. Submit all items specified in a particular specification section at the same time.
- E. Schedule submittals to expedite the Project. Coordinate submission of related items. The completion of submittals is essential to the timing and completion of the overall work. Coordinate the submission of time critical submittals with the requirements of section 01011 - Schedule and Sequence of Operations.
- F. For each submittal for review, allow 21 calendar days.
- G. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- H. Identify product data sheets and product description literature with equipment tag numbers, specification section, paragraph, and sub-paragraph numbers.
- I. Clearly mark the selected product by use of arrows, underlines, highlighting, or circles where more than one product is shown.
- J. When revised for resubmission, identify all changes made since previous submission.
- K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
- L. Submittals not requested will not be recognized or processed.
- M. Delays caused by the need for resubmittals shall not constitute reason for an extension of Contract time.
- N. Comply with submittal procedures detailed in the Project Manual.

1.5 CONSTRUCTION PROGRESS SCHEDULES

- A. As specified in Section 01011 - Schedule and Sequence of Operations.

1.6 SHOP DRAWINGS

- A. Shop Drawings for Review:
 - 1. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.
- B. Shop Drawings for Information: Submitted for the Engineer's knowledge as contract administrator or for the Owner.

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- C. Shop Drawings for Project Close-out: Submitted for the Owner's benefit during and after project completion.
- D. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. Shop drawings shall be accurate, distinct, and complete, and shall contain all required information, including satisfactory identification of items, units, and assemblies in relation to the Contract Drawings and Specifications.
- F. Shop drawings shall be submitted only by the Contractor. The review of such shop drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details, and space requirements, or for deviations from the Contract Drawings or Specifications, unless the Contractor has called attention to such deviations in writing by a letter accompanying the shop drawings, and the Engineer approves the change or deviation in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings.
- G. Shop drawings include shop drawings, product data, and other submittals for both shop and field-fabricated items. Submit, as applicable, the following for all prefabricated or manufactured structural, mechanical, electrical, plumbing, process systems, and equipment:
 - 1. Shop drawings or equipment drawings, including dimensions, size and location of connections to other work, and weight of equipment.
 - 2. Catalog information and cuts, with the applicable, specific information clearly marked or underlined.
 - 3. Installation or placing drawings for equipment, drives, and bases.
 - 4. Supporting calculations for equipment and associated supports specified to be designed by equipment manufacturers or suppliers.
 - 5. Wiring and control diagrams of systems and equipment.
 - 6. Complete manufacturer's specifications, including materials description and paint system.
 - 7. List of special motor features being provided (i.e., space heaters, altitude corrections, thermal protectors, etc.).
 - 8. Complete motor rating for all motors 5 HP and larger, including motor no-load, starting, and full-load current at rated voltage; full-load speed and full-load current at 110 percent voltage; motor efficiency and power factor at 1/2, 3/4, and full load at rated voltage.
 - 9. Performance data and pump curves.
 - 10. Suggested spare parts list with current price information.
 - 11. List of special tools required for checking, testing, parts replacement, and maintenance (special tools are those which have been specially designed or adapted for use on parts of the equipment, and which are not customarily and routinely carried by maintenance mechanics).
 - 12. List of special tools furnished with the equipment.
 - 13. List of materials and supplies required for the equipment before and during start-up.

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14. List of materials and supplies furnished with the equipment.
15. Samples of finish colors for selection.
16. Special handling instructions.
17. Requirements for storage and protection before installation.
18. Requirements for routine maintenance required before plant start-up.
19. List of all requested exceptions to the Contract Documents.
20. Installation instructions.

- H. Each submittal will receive up to two reviews by the Engineer at no cost to the Contractor. If a given submittal fails to reach a completed status (reviewed and marked "No Exceptions Taken" or "Make Corrections Noted") on the second submittal, the Contractor shall have the costs associated with further reviews by the Engineer deducted from the Contract Amount. These costs will be computed based on \$150 per hour for Engineer review time.

1.7 TEST REPORTS

- A. Submit for the Engineer's knowledge as contract administrator or for the Owner.
- B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.8 CERTIFICATES

- A. When specified in individual specification sections, submit certification by the manufacturer to Engineer, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product but must be acceptable to Engineer.

1.9 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.10 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for the Engineer's benefit as contract administrator or for the Owner.
- B. Submit report within 30 days of observation to Engineer for information.

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- C. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.11 ERECTION DRAWINGS

- A. Submit drawings for the Engineer's benefit as contract administrator or for the Owner.
- B. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

1.12 REQUEST FOR INFORMATION

- A. All Requests for Information shall be submitted and responded to through the Engineer's email. Requests for Information received via fax or other will not be accepted or answered.

PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

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Section 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Temporary utilities.
- B. Barriers.
- C. Fencing.
- D. Protection of installed work.
- E. Progress cleaning and waste removal.
- F. Removal of utilities, facilities, and controls.
- G. Contractor staging area.

1.2 RELATED SECTIONS

- A. Section 01700 - Contract Closeout.

1.3 REGULATORY REQUIREMENTS

- A. Comply with the City of Plymouth ordinances.

1.4 TEMPORARY UTILITIES

- A. Temporary Electricity: By Contractor; provide and pay for power service required from Owner's existing power service. Provide temporary electric feeder from electrical service. Do not disrupt Owner's need for continuous service. Provide separate metering and pay utility company for cost of energy used. Provide main service disconnect and over-current protection at convenient location.
- B. Temporary Water: Contractor shall make arrangements and pay for temporary water service, if necessary.
- C. Temporary Sanitary Facilities: General Contractor shall provide sanitary facilities for use by all Contractors.

1.5 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for Owner's use of site, and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

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- B. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.6 FENCING

- A. Provide and maintain temporary fencing of design and type needed to prevent entry onto the site by the public.

1.7 PROTECTION OF INSTALLED WORK

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

1.8 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Collect and remove waste materials, debris, and rubbish from site and dispose off-site.
- C. Work areas shall be checked and cleared of construction debris at the end of each workday.

1.9 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Application for Payment inspection.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing and permanent facilities and site surface areas used during construction to original condition.

1.10 CONTRACTOR STAGING AREA

- A. Contractor shall maintain staging areas during construction in a manner that will not interfere with operations or obstruct vehicular or pedestrian traffic on public or private property. Work shall proceed in an orderly manner, maintaining construction site and staging areas free of debris and unnecessary equipment or materials.

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PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

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Section 01600
MATERIAL AND EQUIPMENT

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Transportation and handling.
- C. Storage and protection.
- D. Conflicts
- E. Product options.
- F. Substitutions.

1.2 RELATED SECTIONS

- A. Section Instructions to Bidders.

1.3 PRODUCTS

- A. Products include material, equipment, and systems.
- B. Comply with Specifications and referenced standards as minimum requirements.
- C. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- D. The use of local materials is strongly encouraged. Efforts should be made to use materials, including but not limited to steel, concrete, and lumber, originating within 500 miles of this project site.
- E. Components required to be supplied in quantity within a Specification section shall be the same and shall be interchangeable.
- F. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
- G. Provide interchangeable components of the same manufacture for components being replaced.

1.4 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions and by methods to avoid product damage.

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- B. Promptly inspect shipments to ensure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.5 STORAGE AND PROTECTION

- A. Store and protect Products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive Products in weather tight, climate controlled, enclosures in an environment favorable to Product.
- D. For exterior storage of fabricated Products, place on sloped supports above ground.
- E. Provide off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of Products.
- G. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of Products to permit access for inspection. Periodically inspect to verify Products are undamaged and are maintained in acceptable condition.
- J. Materials delivered for and equipment used by the Contractor are to be neatly and compactly placed at approved locations along or near the site in such a manner as to cause the least inconvenience to property owners and insure the safety of the general public.
- K. Storage sites shall be identified by the Contractor at the Pre-Construction Conference.
- L. Materials or equipment shall not be placed within 20 feet of any hydrant, pedestrian crossing or intersection.

1.6 CONFLICTS

- A. Should job conditions or specified requirements conflict with manufacturer's instructions, consult Engineer for further instructions.
- B. Do not proceed with work without written instructions.

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1.7 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named in accordance with the following article.

1.8 SUBSTITUTIONS

- A. Engineer will consider requests for Substitutions only within 30 days after date established in Notice to Proceed.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Contractor:
 - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
 - 2. Will provide the same warranty for the Substitution as for the specified Product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension which may subsequently become apparent.
 - 5. Will reimburse Owner for review or redesign services associated with re-approval by authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit shop drawings, product data, and certified test results attesting to the proposed Product equivalence. Burden of proof is on proposer.
 - 3. The Engineer will notify Contractor in writing of decision to accept or reject request.

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PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

Section 01610
MANUFACTURERS' SERVICES

PART 1. GENERAL

1.1 SCOPE

- A. This Section covers the services of manufacturers' representatives and special coordinating services required of the Contractor that shall apply during construction, facilities startup, and training of the Owner's personnel for facility operation.
- B. The Contractor shall inform all subcontractors, suppliers, and manufacturers of the requirements herein and include the following services in their costs for the work specified in these Contract Documents. Where a minimum amount of time is stated in the Specifications for manufacturers' services, any additional time required to perform the specified services shall be at no additional cost to Owner.

1.2 DEFINITIONS

- A. Construction Period: For the purposes of this Section, the "construction period" is defined as the time period from the Contractor's equipment purchase order date to the date of certification by the manufacturer that the equipment is installed correctly, inspected and is ready for startup and operation.
- B. Startup Period:
 - 1. The "Startup Period" of the facility is defined as including coordinated operation of the facilities by the Contractor, its subcontractors, the Owner's operating personnel, and manufacturer's representatives for equipment items and systems.
 - 2. Startup of the facility shall be considered complete when, in the opinion of the Engineer, the operation of the facility has been successfully demonstrated in accordance with Section 01820 - Systems Demonstration.

1.3 SUBMITTALS

- A. In accordance with Section 01300 – Submittals.

1.4 FULFILLMENT OF SPECIFIED MINIMUM SERVICES

- A. Only those manufacturers' services receiving prior approval by the Engineer shall act to fulfill the specified minimum mandatory requirements for such services. All requests for prior approval shall 1) be in writing; 2) be submitted not less than 10 days prior to the providing of the subject services; 3) state the service to be provided; and 4) state the reason(s) why the timing of the service is appropriate.

1.5 SERVICES DURING CONSTRUCTION

- A. General: Competent and experienced technical representatives shall represent the manufacturers of the respective equipment and systems as many days as may be necessary to resolve assembly or installation problems at the worksite which are attributable to, or associated with, the equipment furnished. This requirement applies to manufacturers of all equipment furnished, whether or not this technical representation is specifically set forth in the other Sections of the Specifications.

1.6 MANUFACTURER'S CERTIFICATE OF PROPER INSTALLATION

- A. Where a manufacturer's certificate is called for in the Specifications, the manufacturer's representative shall provide a certificate stating that the equipment or system has been installed in accordance with the manufacturer's recommendation and has been inspected by a manufacturer's authorized representative, that it has been serviced with the proper initial lubricants, that applicable safety equipment has been properly installed, that all couplings and drives have been properly aligned, and that the proper electrical and mechanical connections have been made. This certification shall be provided to the Engineer prior to start-up.

1.7 FUNCTIONAL TESTING ASSISTANCE

- A. Where functional (or run) testing is called for in the Specifications, the manufacturer's representative shall assist with the initial test, which shall include checking for proper rotation, alignment, speed, excessive vibration, and noisy operation. Initial equipment and system adjustment and calibrations shall be performed in the presence of and with the assistance of the manufacturer's representative. The previously specified Manufacturer's Certificate of Proper Installation shall include the statement that proper adjustments have been made and that the equipment or system is ready for Plant startup and operation.
- B. The Contractor, as applicable to the equipment furnished, shall state in writing that all necessary hydraulic structures, piping systems, and valves have been successfully tested; that all necessary equipment systems and subsystems have been checked for proper installation, started, and successfully tested to indicate that they are all operational; that the systems and subsystems are capable of performing their intended functions; and that the facilities are ready for startup and intended operation.
- C. Manufacturer shall demonstrate that the installed equipment has been aligned properly. Final acceptance of equipment will not be granted until manufacturer has demonstrated to the Engineer that acceptable alignment tolerances have been achieved.

1.8 PERFORMANCE TESTING AND PLANT STARTUP SERVICES

- A. Where performance testing and startup services are called for in the Specifications, or when technical assistance is necessary due to any malfunction of the equipment or system furnished, the manufacturer's representative shall provide such services. He shall also conduct and/or assist with final performance and demonstration testing, as required by the Specifications. These services shall continue until such times as the applicable equipment or system has been successfully tested for performance and has been accepted by the Owner for full-time operation.
- B. Start-up of equipment and plant shall be in accordance with Manufacturer's instruction and Section 01820 – System Demonstration.

1.9 CONTRACTOR RESPONSIBILITIES DURING PLANT STARTUP

- A. The Contractor shall designate and provide one or more persons to be responsible for coordinating and expediting his startup duties. The person or persons shall be present during all pre-startup meetings and shall be available to the Owner's personnel at all times during the startup period.
- B. When Plant startup has commenced, the Contractor shall schedule his remaining work so as not to interfere with or delay the completion of Plant startup. The Contractor shall support the startup activities with adequate staff to prevent delays, process upsets, and similar Plant impacting conditions. This staff shall include, but not be limited to, major equipment and system manufacturers' representatives, subcontractors, electricians, instrumentation personnel, millwrights, pipefitters, and plumbers.
- C. Where Plant startup services are called for in the Specifications, the Contractor shall supply and coordinate the specified manufacturers' services for the Plant startup period.
- D. The Contractor shall conduct equipment startup and field performance tests on all equipment, systems, and subsystems. These tests shall meet all requirements specified in other Sections of these Contract Documents.
- E. The Contractor shall be responsible for adjustments, repairs, and corrections necessary to complete Plant startup.
- F. After the Plant is operating, the Contractor shall continue the performance testing of those items of equipment, systems, and subsystems which could not be or were not adequately or successfully tested prior to the Plant startup.

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PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

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CERTIFICATE OF PROPER INSTALLATION

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the equipment supplier/manufacturer has inspected this equipment and that it has been properly installed, adjusted, and calibrated. I further certify this equipment may now be operated for test purposes and/or normal use.

MANUFACTURER'S REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

This form shall be completed and submitted to the Engineer prior to plant start-up.

END OF SECTION

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Section 01700
CONTRACT CLOSEOUT

PART 1. GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Testing and adjusting.
- E. Protecting installed construction.
- F. Project record documents.
- G. Operation and maintenance data.
- H. Spare parts and maintenance products.

1.2 RELATED SECTIONS

- A. Section 01500 - Construction Facilities and Temporary Controls.
- B. Section 01820 - System Demonstration.

1.3 CLOSEOUT PROCEDURES

- A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.
- B. Provide submittals to Engineer that are required by governing or other authorities.
- C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- D. Owner will occupy portions of the site prior to acceptance of entire work.

1.4 STARTING OF SYSTEMS

- A. Notify Engineer seven days prior to testing and/or start-up of systems.

1.5 TESTING AND ADJUSTING

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- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

1.6 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Prohibit traffic from landscaped areas.

1.7 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Provide spare parts, maintenance, and extra Products in quantities specified in individual specification sections.
- B. Deliver to Project site and place in location as directed; obtain receipt prior to final payment.

PART 2. PRODUCTS

Not used.

PART 3. EXECUTION

Not used.

END OF SECTION

Section 01820
SYSTEMS DEMONSTRATION

PART 1. GENERAL

1.1 DESCRIPTION

- A. Before Substantial Completion is considered, Contractor shall demonstrate satisfactory operation of specific equipment systems and their associated facilities.
- B. System Demonstration Prerequisites:
 - 1. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, control sequence, or other conditions which may cause damage.
 - 2. All manufacturers' certificates of proper installation must be submitted as required by detail specifications.
 - 3. Contractor shall provide services of qualified, certified representatives of Suppliers to be present at Project Site as necessary to successfully complete Systems Demonstrations.
- C. Coordination:
 - 1. Coordinate Systems Demonstrations with the requirements of Section 01011 – Schedule and Sequence of Operation.
 - 2. Designate representative of Contractor to be responsible for Systems Demonstrations.
 - 3. Contractor shall submit schedule and checklist of Systems Demonstrations for review by Engineer and Owner 30 days prior to Systems Demonstrations.
 - 4. Notify Engineer at least 7 days before Systems Demonstrations are to begin.

1.2 SUBMITTALS

- A. Reports:
 - 1. Prepare report for each system on results and activities encompassing system demonstration. Submit report within two working days of completion of System Demonstration.
 - 2. Report shall describe operational conditions; daily results of systems operation; dates and names of people involved and observing operation; and statement regarding system ability to meet operational criteria.
- B. Submit in accordance with Section 01300 – Submittals.

PART 2. PRODUCTS

Not Used.

PART 3. EXECUTION

3.1 GENERAL

- A. The Contractor(s) shall provide the following services.
 - 1. Provide the coordinated services of all subcontractors and equipment suppliers to correct any and all observed and experienced deficiencies in the specified services completed or yet to be performed.
 - 2. Complete equipment performance, field tests, and other tests approved by the Engineer on specified items, such as pumps, screens, other process equipment, and coordinate with the Owner's operation of such equipment.
- B. Temporary facilities and services are Contractor's responsibility. Contractor shall provide temporary facilities and services as required to complete testing and systems demonstrations.

3.2 SYSTEMS DEMONSTRATIONS

- A. For each system, Engineer will consider system demonstration successful and complete when system operates properly, as intended, without significant interruption due to failure or operational problems associated with the system components or controls.
- B. If, in Engineer's opinion, system is not operating properly at any time during System Demonstration, Contractor shall stop demonstration and adjust, calibrate, or replace material and equipment as required to correct problem. After corrections have been made, restart System Demonstration and operate system to demonstrate acceptable performance.

3.3 SUBSTANTIAL COMPLETION

- A. Owner will not consider Work substantially complete until Systems Demonstrations have been successfully completed and Secondary Clarifier #20 operates as intended.

END OF SECTION

**SECTION 09900
PAINTING**

PART 1. GENERAL

1.1 DESCRIPTION

- A. This section describes painting and protective coatings of exterior and interior surfaces.
- B. Painting, as used herein, includes application of paints, enamels, fillers, stains, varnishes, sealers, or other coatings required for use as prime, intermediate or finish coats, as specified herein under painting schedule.
- C. Unless specifically specified elsewhere, following surfaces are not to be painted.
 - 1. Concrete floors unless noted otherwise.
 - 2. Brick.
 - 3. Pipe, masonry, conduit, and ducts in concealed spaces or buried.
 - 4. Stainless steel and aluminum surface except as noted otherwise hereinafter.
 - 5. Glass, vitreous enamel, and chrome plated items.
 - 6. Brass, bronze, and copper.
 - 7. Rubber, plastic, and fiberglass.
 - 8. Conduit and ducts on unpainted surfaces.
 - 9. Galvanized metal except lintels and unless noted otherwise.
- D. Factory paint or prefinish all equipment as specified herein unless specifically stated otherwise under equipment item specification.
- E. Factory prefinish certain miscellaneous items as specified elsewhere or per approved manufacturer's standard; colors selected by Engineer.

1.2 QUALITY ASSURANCE REQUIREMENTS

- A. Include following on label of containers:
 - 1. Name of manufacturer.
 - 2. Manufacturer's stock name, type, and number.
 - 3. Color
- B. Include following on label of containers or furnish information with materials list in form that will readily relate it to material in container.
 - 1. Instructions for reducing, where applicable.

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2. Detailed pigment/vehicle ratios.
 3. Any special storage or application instructions.
- C. Provide 5-year unconditional, full repair warrantee covering defects in materials and workmanship where 100% polyurethane is specified exclusively hereinafter.

1.3 SUBMITTALS

A. Material List

1. Submit complete list of materials and painting schedule for all coats required for each type of surface; deliver no material to job site until list is reviewed by Engineer.
2. List in form permitting identification by container labels.
3. Note recommended dry film thickness, type system, finish and surface preparation for each coat and each system on list.
4. With list, furnish published current price list containing all grades of each type of paint specified and produced by manufacturer.
5. Submit complete catalog describing all painting systems and types available and proposed.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to job site in original unopened containers with labels intact.
- B. Store only acceptable materials at job site.
- C. When stored in structures under contract, protect floor and walls of storage area from spatter or discoloration.
- D. Store in well-ventilated area, away from excessive heat, sparks, flame, or direct sunshine; provide safeguards to prevent fire.

1.5 ENVIRONMENTAL CONDITIONS

- A. Comply with manufacturer's recommendations as to temperature, humidity, and surface conditions under which coating or coating system can be applied.
- B. Do not apply finish in areas where dust is being or likely to be generated.
- C. Do not apply paint on exterior surfaces exposed to hot sun or when surface temperature exceeds 105 °F.
- D. Apply all finishes under adequate illumination.

PART 2. PRODUCTS

2.1 MATERIALS

A. General

1. Finish materials: product of manufacturer who maintains laboratory under direction of qualified chemist and who maintains strict quality control.
2. Except where quality is established by definite criteria, finish materials must be best of their respective types produced by manufacturer.
3. Coating system for each surface type: product of single manufacturer.
4. Primer used to touch-up shop applied prime coat: same type as shop coat.
5. Coatings used to touch-up factory prefinished items: same type and factory's finish coating.
6. Thinning and tinting materials: as recommended by manufacturer of material to be thinned or tinted.

B. Gloss (paint and enamel): measured on Gardner-Hunter Reflectometer using 60° Calibrated Gloss Standard, the following apply:

1. Flat finish: 10° or less.
2. Eggshell finish: 10° to 35°
3. Semi-gloss finish: 35° to 70°
4. Gloss finish: 65° and up

2.2 COLORS

- #### **A. Color all coats as directed by Engineer.**
- #### **B. Color prime coats to contrast at least two shades on scale of ten with substrate being primed, except for enamels.**
- #### **C. Tint undercoats to approximate final color to assure uniform finish color, but with sufficient variation to distinguish.**

2.3 MIXING AND TINTING

- #### **A. Deliver paints and enamels ready-mixed to job site except where manufacturer recommends otherwise.**
- #### **B. Job tint and mix only when acceptable to Engineer.**
- #### **C. Use adequate means and take all precautions necessary to protect floor and adjacent wall surfaces during tinting and mixing operation.**

PART 3. EXECUTION

3.1 INSPECTION

- A. Examine surfaces scheduled to be painted for conditions that will adversely affect execution, performance, or quality of work and which cannot be corrected by normal cleaning, sanding, and filling of cracks and nail holes.
- B. Do not proceed with surface preparation or coating application until conditions are suitable; application of paint or other coating to surface constitute acceptance of that surface.

3.2 PREPARATION OF SURFACES

A. General

- 1. Remove foreign material and stains which will adversely affect adhesion or appearance of applied coating and make sure that surface is sufficiently dry; follow recommendations of paint manufacturer.
- 2. Roughen gloss on existing painted surfaces by sanding or etching to provide proper tooth for adhesion of paint.
- 3. Remove mold or mildew completely, wash surface with neutralizing solution, rinse and allow it to dry before painting.
- 4. Test to determine moisture content of surface to be painted.
- 5. Prior to coating existing surfaces, representative of paint supplier shall visit site to inspect condition of existing surfaces. Representative from paint suppliers, painting subcontractor, and Engineer shall view existing surface and discuss preparation procedures. Subsequent to site visit, paint supplier representative shall submit report listing recommended surface preparation procedures to Engineer for approval.

B. Metals

- 1. All workmanship for metal surface preparation as specified shall be in strict conformance with the current Steel Structures Painting Council (SSPC) Specifications.
- 2. All oil, grease, welding fluxes, and other surface contaminants shall be removed before blast cleaning. Pre-blast cleaning methods shall use steam, open flame, hot water, or cold water with appropriate detergent additives followed with clean water rinsing.
- 3. Small isolated areas shall be cleaned as above or solvent cleaned with suitable solvents and clean cloths.
- 4. The type of equipment and speed of travel shall be such that the specified degree of cleanliness is obtained. The type and size of abrasive shall be selected to produce a surface profile that meets the coating manufacturer's recommendations for the particular primer to be used. Only dry blast cleaning methods will be permitted. The abrasive shall not be reused.

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5. The Contractor shall comply with all applicable federal, state, and local, air pollution and environmental control regulations for blast cleaning, and disposition of spent aggregate and debris.
6. Alternatives to standard abrasive blast cleaning methods may be permitted for special circumstances subject to a review by the Engineer.
7. All surfaces shall be cleaned of all dust and residual particles of the cleaning operations by dry (no oil or water vapor) air blast cleaning or other method before painting.
8. Surfaces shall be painted the same day they are sandblasted. Surfaces that have started to rust before they are painted shall be re-blasted.

C. Concrete

1. Remove dirt, loose particulates, excess mortar, and any film left from form oil or curing compound.
2. Fill cracks and irregularities with Portland cement grout to provide uniform surface.
3. Test for dryness.

D. Masonry

1. Remove foreign matter, loose particles, and efflorescence.

3.3 APPLICATION

- A. Do not apply initial coat until moisture content of surface is within limitations recommended by paint manufacturer.
- B. Apply materials without thinning, adulteration, or change unless otherwise specified, recommended by manufacturer, or approved by Engineer.
- C. Apply by brush, roller, or spraying equipment; spray equipment application not permitted unless adequate precautions are taken to protect all items and surfaces not intended to be coated.
 1. Spread or flow each coat smooth and even to film thickness recommended by manufacturer, without runs, sags, skips, excessive brush marks, or other defects.
 2. Keep materials free from skins or lumps and well stirred during use.
 3. Keep equipment clean, free from contaminants and suitable for finish required.
- D. Comply with manufacturer's recommendations for drying time between coats; if not stated, dry for minimum 48 hours for exterior paint and minimum 24 hours for interior paint.
- E. Sand and dust between coats to remove defects visible from distance of 5'; for enamel, use fine sandpaper or steel wool and clean between coats to produce an even, smooth finish unless otherwise specified.

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- F. Joints must present uniform appearance after painting, either completely open or completely closed.
- G. Leave all parts of moldings clean and true to detail with no undue build-up of paint in corners.
- H. Make edges adjoining other materials or other colors clean and sharp with no overlapping.
- I. Where colors differ between adjoining rooms or spaces and where door frames are to match wall colors, change color at doors.
- J. Touch up suction or hot spots in first coat on concrete before applying second coat.
- K. Final coat must have solid hiding and/or uniform appearance.
- L. Strictly follow manufacturer's specifications for surface preparation and application.

3.4 FIELD QUALITY CONTROL

- A. Notify Engineer when surface preparation is complete and when each coat has been applied for inspection of work before succeeding specified coat is applied; if succeeding coat is applied without Engineer's approval, no credit will be given for applied coat and Contractor must recoat work in question.

3.5 PROTECTION AND CLEANING

- A. Carefully protect adjacent work and materials.
- B. Remove paint from floors, glass, or other surfaces not specified to receive paint.
- C. When painting is complete, remove from premises all debris that are result of painting operations.

3.6 PAINTING SCHEDULE

- A. Following general surface painting requirements and General Painting Schedule are not necessarily complete and do not limit scope of work.
- B. Once proposed materials list with complete painting schedule is received, Engineer will specify specific painting systems with number of coats, dry film thicknesses, and colors.
- C. Paint materials as manufactured by Tnemec, per General Painting Schedule. Paint materials of equal quality as manufactured by Sherwin-Williams area also acceptable.

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Surface	Manufacturer's System Numbers
Submerged Steel Surfaces	Surface Preparation: SSPC-SP10 Primer: Tnemec Series 1 Omnithane at 3.0 mils DFT Stripe Coat: Tnemec Series N69 Hi-Build Epoxoline II at 4.0 mils DFT Finish: Tnemec Series 141 Epoxoline at 14.0 mils DFT
All Other Steel Surfaces Above Water	Surface Preparation: SSPC-SP10 Primer: Tnemec Series 1 Omnithane at 3.0 mils DFT Stripe Coat: Tnemec Series N69 Hi-Build Epoxoline II at 4.0 mils DFT Intermediate: Tnemec Series 141 Epoxoline at 14.0 mils DFT Finish: Tnemec Series 1094 Endura-Shield at 2.5 mils DFT

END OF SECTION

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SECTION 11600
SECONDARY CLARIFIER REHABILITATION

PART 1. GENERAL

1.1 SCOPE

- A. This section describes the work necessary to furnish and install the labor and materials to inspect and overhaul identified components of Secondary Clarifier #20.
- B. Related work specified elsewhere:
 - 1. Section 01820 Systems Demonstration
 - 2. Section 01300 – Submittals
 - 3. Section 01600 – Material and Equipment
 - 4. Section 09900 – Painting
- C. At a minimum, provide the equipment, devices, and instrumentation herein and shown on the Plans, but in addition provide any other equipment, devices, instruments, features, or services that the equipment suppliers deem necessary for safe and reliable operation.
- D. Contractor shall refer to the clarifier Installation, Operation, and Maintenance Instructions included as Exhibit C for safe and proper disassembly and reassembly of the clarifier system.
- E. The inspection and overhaul of Secondary Clarifier #20 shall include the drive assembly and clarifier mechanism. An initial, letter inspection report detailing initial inspection results and overhaul recommendations shall be submitted and reviewed with a 1 – no exceptions taken or 2 – Make Corrections Noted disposition prior to the beginning of the overhaul work. A final inspection report detailing the findings and overhaul work performed shall be submitted upon completion of the overhaul work.
- F. All parts of the drive and clarifier mechanism specified herein shall be removed from the tank and taken off-site for inspection, overhaul work, and shop coating. Once all overhaul work and coating are complete, the Contractor shall reinstall the clarifier per the instructions in Exhibit C. Contractor shall make accommodations to insure the clarifier components are not damaged during transportation.
- G. Contractor shall disassemble and remove the bridge structure, grating, and handrails to allow for proper disassembly of the clarifier components. Contractor shall reinstall bridge structure, grating, and handrails after overhaul work is completed.

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- H. The Contractor shall disassemble and remove the drive assembly for inspection by the clarifier manufacturer and/or manufacturer's representative and submit the results of the inspection in the initial report indicated above before proceeding with overhaul work. Disconnect and reconnect all electrical devices as required for the inspection and overhaul work. Contractor shall replace all seals, bearings, and bearing strips related to the drive assembly as specified herein. Contractor shall polish shafts and hand dress gears to deburr. Refer to the parts list and assembly drawings in Exhibit C for details of the drive assembly. Contractor shall reinstall the drive assembly after overhaul work is completed.
- I. The Contractor shall replace the primary reduction unit and drive control/torque overload protection device as specified herein.
- J. The Contractor shall clean, disassemble, and remove the feed well, sludge collection box, upper cage, lower cage, influent column, rake arms, skimmer arm, and structural supports for inspection by the clarifier manufacturer and/or manufacturer's representative and submit results of the inspection in the initial report indicated above before proceeding with overhaul work.
- K. The Contractor shall replace the feed well and sludge collection box as specified herein. The new feed well and sludge collection box shall be fabricated to match the shape and pattern of the existing structures.
- L. Cast iron and carbon steel components of the drive assembly and clarifier mechanism shall be surface prepped and recoated per Section 09900 – Paintings, with the final color to be specified by the Owner.
- M. Upon completion of the overhaul work and prior to acceptance by the Owner, the Contractor shall perform functional and 7-day run tests as specified.
- N. The Contractor providing the work specified in this Section shall be, or shall retain, a clarifier manufacturer meeting the criteria outlined in this Section.

1.2 GENERAL

- A. See Exhibit A – GENERAL CONDITIONS and Division 1 – GENERAL REQUIREMENTS, which contain information and requirements that apply to the work specified herein and are mandatory for this project.
- B. Like items of equipment specified herein shall be the end product of one manufacturer in order to achieve standardization for appearance, operation, maintenance, spare parts, and manufacturer's service.
- C. Submittals during construction shall be made in accordance with Section 01300 – Submittals. The Contractor shall also submit the proposed non-destructive testing procedure as specified herein.

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1.3 EXPERIENCE REQUIREMENT

- A. Detailed inspection and overhauling of clarifier machinery cannot be accomplished without specialized knowledge of the equipment derived from relevant experience.
- B. The Contractor shall be, or shall retain, a clarifier manufacturer which is an organization regularly engaged in the design, fabrication, installation, and serving of clarifier machinery, and shall have been in a clarifier related business for a minimum of five (5) years. Manufacturer shall have previously designed, furnished, overhauled, and commissioned a minimum of ten (10) clarifier installations of similar or greater complexity.
- C. The manufacturer shall provide, on-site, a clarifier systems engineer for inspection of the clarifier prior to the overhaul work. This individual shall have commissioned no fewer than ten (10) projects involving clarifiers of similar or greater complexity.
- D. All parts and equipment furnished under this specification shall be supplied by a firm that has had a minimum of five (5) years experience in the design and manufacture of the equipment specified herein.
- E. Clarifier manufacturers meeting the above criteria:
 - 1. Ovivo USA, LLC
 - 2. Or equal

1.5 REFERENCED STANDARDS

- A. AISC: American Institute of Steel Construction
- B. ASTM: American Society of Testing and Materials
- C. ASCE: American Society of Civil Engineers
- D. AWS: American Welding Society
- E. OSHA: Occupational Safety and Health Administration
- F. SSPC: Steel Structures Painting Council

1.6 MANUFACTURER'S SERVICES

- A. Definitions
 - 1. A manufacturer is an organization regularly engaged in the design, fabrication, installation, and servicing of a specific piece of equipment.

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2. A manufacturer's representative is an organization authorized by an original equipment manufacturer to sell, service, or inspect their equipment.
- B. A clarifier manufacturer shall be present at the jobsite as required to perform a detailed inspection of each one of the clarifier components. In addition to the inspection time deemed necessary by the clarifier manufacturer, a manufacturer's representative shall also be present at the jobsite for the minimum man-days listed for services hereunder, travel time excluded:
 1. Two (2) man-days for overhauled clarifier installation assistance and certification of the installation.
 2. Two (2) man-days for equipment startup.
- C. The manufacturer or manufacturer's representative shall make separate trips for installation assistance and startup as required to fulfill the man-days listed above based on the sequence of work. The time specified above is in addition to the time required to complete the specified clarifier inspections prior to overhaul work.
- D. Startup services shall be at such times as requested by the Engineer. See Section 01610 – Manufacturers' Services for additional requirements.

1.7 MANUFACTURER'S CERTIFICATE

- A. Provide manufacturer's certificate of proper installation for the overhauled components in accordance with Section 01610 – Manufacturers' Services.

PART 2. PRODUCTS

2.1 GENERAL

- A. The following specifications shall be used to define individual components needed for overhaul work and to define components if a complete replacement is warranted.
- B. All components incorporated in the work shall be new and unused, free from defects and imperfections. Unless specifically identified otherwise, all components shall either be listed by a nationally recognized testing agency as complying with a recognized standard or shall be evaluated for a specific application as part of the equipment.
- C. All equipment shall be furnished complete and ready for operation. All necessary accessories or components, whether specified or not, shall be furnished in order to provide safe, durable, maintainable, and functional equipment.

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- D. The equipment shall be designed and constructed for continuous full-load duty at the specified operating conditions, see Exhibit C.

2.2 DRIVE ASSEMBLY

A. General

1. Drive mechanism consisting of primary gear reduction, intermediate worm gear reduction unit and enclosed final reduction unit consisting of internal spur gear and pinion in a turntable base shall be inspected and overhauled.
2. All replacement bearings shall be designed for a minimum B-10 life of 200,000 hours.
3. All hardware, fasteners, and piping shall be replaced with type 304 stainless steel or greater.

B. Primary Reduction Unit

1. Gearmotor shall be heavy duty rated in a cast housing and commercially available.
2. All bearings shall be anti-friction type running in oil.
3. Motor shall be totally enclosed, ball bearing type, and suitable for starting and continuously operating the drive mechanism without overloading.
4. Motor horsepower shall be 0.75 HP.
5. Motor to conform to NEMA standards and suitable for operation on 230/460 volt, 3 phase, 60 Hz current.
6. Primary reduction unit shall drive the final reduction unit through a chain and sprocket arrangement with #80L self-lubricating chain and non-corrosive OSHA approved removable chain guard.

C. Intermediate Reduction Unit

1. Intermediate reduction unit shall be worm gear style with grease and oil lubricated anti-friction type bears in cast iron housing securely bolted on the machined top face of the final reduction unit.
2. Worm gear shall be centrifugally cast, conforming to ASTM B271, SAE 430B, and ANSI/AGMA 2004-C08, high strength, manganese bronze.
3. Worm gear housing shall be complete with seals, oil fill, oil level sight gauge and drain plugs.
4. Align and maintain accurate centers with final reduction gearing.
5. The electro-mechanical drive control/torque overload protection device on the thrust end of the worm shaft shall consist of plate spring assembly, plunger, indicator dial, four (4) microswitches (all N.C.) and a terminal block, all enclosed in a NEMA 4X housing. The end thrust of the worm shaft against the plate spring shall actuate the plunger, which in turn shall

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move the indicator dial. The indicator shall have a maximum pointer to indicate maximum torque attained.

6. Microswitches shall be factory set to: (1) alarm when the load on the mechanism reaches 40% of the rated torque, 6,000 ft-lbs; (2) motor cut out when the load reaches 85% of the rated torque, 12,750 ft-lbs; (3) fail-safe motor cut out when the load reaches 100% of the rated torque, 15,000 ft-lbs. The fourth microswitch shall be used as a spare.
7. A shear pin shall be included for additional overload protection.

D. Final Reduction Unit

1. Final reduction unit consists of a full depth involute tooth design with ductile iron spur gear driven by a heat treated steel pinion from the slow speed shaft of the intermediate reduction unit. A cast iron turntable base with annular raceway is used to contain chrome alloy steel bearing balls upon which the internal gear rotates. The turntable base is bolted to the center column and designed to support the internal gear and rotating mechanism.
2. Bearings at top and bottom of pinion shall be replaced to ensure complete tooth contact between mating surfaces. Pinion and pinion shaft shall be furnished as a two-piece assembly for ease of maintenance.
3. Hardened steel liner strips shall be replaced and fitted into the turntable base and integral gear for balls to bear on vertically and horizontally.
4. Internal gear, pinion, and balls shall run in an oil bath and be protected by a seal and dust shield.
5. Provide oil filling, level and condensate removal pipes along with a drain plug and sight gauge.

2.3 CLARIFIER MECHANISM

A. General

1. The new feed well shall be constructed of 3/16" 304L stainless steel plate and shall incorporate steel stiffeners at top and bottom to maintain shape and rigidity. The feed well shall include scum ports that match the dimensions and orientation of the existing scum ports.
2. The new sludge collection box shall be constructed of 1/4" 304L stainless steel plate. The sludge collection box shall include suction piping ports that match the dimensions and orientation of the existing suction piping ports.
3. All stainless steel submerged plates and structural members shall conform to ASTM A276, 304L Stainless Steel.
4. All stainless steel components shall be passivated by immersion to remove surface iron and to create a surface oxide film, and welds shall be scrubbed with pickling paste, all according to ASTM A380. At no time shall carbon steel or iron tools directly touch stainless steel components.

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5. All other submerged plates and structural members shall conform to ASTM A36 and shall have a minimum steel thickness of 1/4".
6. A neoprene seal shall be provided at the sludge collection box and influent column connection.
7. All anchor bolts and assembly bolts shall be 304 stainless steel.
8. Rake arms shall require no tie-bars for support and should be of all welded construction.
9. All rake arm blades shall be fitted with adjustable stainless steel squeegees which project 1-1/2" below the bottom of the blade and are field adjusted to no more than 1/2" from the floor.
10. Provide isolation for connections of dissimilar metals by way of isolation sleeves and washers. Welding of dissimilar metals shall not be permitted unless approved by Engineer.

PART 3. EXECUTION

3.1 INSTALLATION

- A. Lubricate the equipment per manufacturer's recommendations before start-up.
- B. All welding and welder qualifications shall conform to the requirements of AWS D1.1-Steel. All filler materials shall be in accordance with AWS or ASTM standards. No weld containing a crack, regardless of size or shape shall be accepted. Rejectable weld defects shall be repaired or redone until sound weld metal has been deposited in accordance with the appropriate welding codes. The Contractor shall bear all costs for weld repair.
- C. All electrical work shall be in accordance with the latest edition of the National Electric Code and NFPA 70.
- D. At no time shall carbon steel or iron tools directly touch stainless steel components.
- E. For additional requirements, see Section 01600 – Material and Equipment.

3.2 EQUIPMENT STANDARDS

- A. Equipment and appurtenances shall be designed in conformity with Environmental Protection Agency, American National Standards Institute, American Society of Mechanical Engineers, Institute of Electrical and Electronic Engineers, National Electrical Manufacturers Association, Occupational Safety and Health Administration, and other generally accepted applicable Standards. Equipment and appurtenances shall withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operation. All bearings and moving parts shall be adequately protected against wear by bushings or other approved means.

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- B. Replacement equipment shall conform to the same standards and tolerances that the existing equipment was manufactured even if current, standard equipment does not meet these requirements, see Exhibit C. Machinery parts shall conform to the dimensions specified within allowable tolerances. Clearance shall be provided for repairs, inspection, and adjustment.
- C. Protruding members such as joints, corners, and gear covers shall be finished in appearance. All exposed welds shall be ground smooth, and the corners of structural shapes shall be rounded or chamfered.
- D. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANSI, OSHA, and any applicable local Codes.

3.3 INSPECTION

- A. In addition to inspecting the clarifier drive assembly and gearmotor specified above, the manufacturer's representative shall also inspect and assess the condition of the clarifier mechanism including, but not limited to, the influent column, upper and lower cage, sludge collection box, feed well, rake arms, skimmer arms, scum box, sludge suction pipes, and structural support members. The Contractor shall make minor weld repairs or other mechanical repairs to the clarifier mechanism equipment as necessary.

3.4 INSPECTION REPORTS

- A. Within three (3) days of the initial inspection of the specified components, the Contractor shall submit an interim letter summary describing the condition of the components and any repairs required beyond those specified herein. The initial inspection report will be reviewed and returned to the Contractor within seven (7) days of receipt of the report.
- B. The Owner reserves the right to inspect any equipment or parts identified by the Contractor for total replacement that were specified to be overhauled.
- C. Within fourteen (14) days of completing the overhaul work for the specified components, the Contractor shall submit a detailed, final inspection report for the clarifier describing the condition of the clarifier components and the overhaul work performed.
- D. The report shall be delivered via electronic PDF and shall contain a title page listing the following information:
 - 1. Project name
 - 2. Contractor name
 - 3. Contractor address and phone number
 - 4. Clarifier manufacturer performing the inspection
 - 5. Clarifier manufacturer address and phone number
 - 6. Plymouth equipment number for the clarifier inspected
 - 7. Report date

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- E. The report shall contain a summary section describing the existing condition of the clarifier prior to inspection, any notable characteristics of the clarifier, and any nomenclature used in the report. Following the summary section, the report shall contain a section describing the major clarifier components as follows:
 - 1. Drive assembly: including the primary, intermediate, and final reduction units.
 - 2. Clarifier mechanism: including the influent column, upper and lower cage, sludge collection box, feed well, rake arms, skimmer arms, scum box, sludge suction pipes, and structural support members
- F. Each section shall contain a description of the existing condition of the components prior to inspection, any relevant make and model numbers of the components, the results of the inspection, and specific details of the overhaul work performed.

3.5 PROTECTIVE COATINGS

- A. All machined surfaces and shafting shall be cleaned and protected from corrosion by the proper type and amount of coating necessary to ensure protection during shipment and prior to installation, as recommended by the Equipment Manufacturer.

Oil lubricated gearing, bearings, etc. are to be shipped with an oil soluble protective coating as recommended by the Equipment Manufacturer. The coating is to be selected to provide protection for a minimum of two (2) years.

3.6 PAINTING

- A. Painting of exposed metal surfaces after any repairs shall be completed as part of the scope of this Section in accordance with Section 09900 – Painting.

3.7 FIELD TESTS

- A. Torque Test
 - 1. Test by anchoring both sludge collector arms to tank wall or floor.
 - 2. Start collector drive to demonstrate the structure's ability to withstand load resulting from at least 120% of clarifier design torque.
 - 3. Demonstrate proper operation of high torque alarm and cut-off.
 - 4. A test log sheet shall be presented to the Engineer upon the completion of each test.
- B. Functional Test - Prior to clarifier startup, all equipment described herein shall be inspected for proper alignment, quiet operation, proper connection, and satisfactory performance by means of functional test. The objective of these tests is to demonstrate the clarifier is operating and complying with the specified performance requirements as detailed in the Secondary Clarifier #20 Operation and Maintenance (O&M) Manual. The Secondary Clarifier #20 O&M Manual is provided as Exhibit C.

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- C. The functional tests shall be witnessed by the Engineer and shall demonstrate that the equipment meets all the specification requirements. Proposed test procedures shall be submitted for approval prior to the testing, and the Engineer shall be notified of the test date two (2) weeks in advance.
- D. 7-Day Run Test – Startup of the clarifier shall be considered complete when, in the opinion of the Engineer, the clarifier has properly operated for 7 continuous days without significant interruption. This 7-day period is in addition to any field tests specified elsewhere.

END OF SECTION

EXHIBIT A GENERAL CONDITIONS

The Attachment
Is The Standard General Conditions
Of The Construction Contract

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SECONDARY CLARIFIER #20 REHABILITATION

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 Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by



Issued and Published Jointly by



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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents, a term printed with initial capital letters, including the term's singular and plural forms, will have the meaning indicated in the definitions below. 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*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument, executed by Owner and Contractor, that sets forth the Contract Price and Contract Times, identifies the parties and the Engineer, and designates the specific items that are Contract Documents.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Bid*—The offer of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 5. *Bidder*—An individual or entity that submits a Bid to Owner.
 6. *Bidding Documents*—The Bidding Requirements, the proposed Contract Documents, and all Addenda.
 7. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid Bond or other Bid security, if any, the Bid Form, and the Bid with any attachments.
 8. *Change Order*—A document which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, or other revision to the Contract, issued on or after the Effective Date of the Contract.
 9. *Change Proposal*—A written request by Contractor, duly submitted in compliance with the procedural requirements set forth herein, seeking an adjustment in Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; challenging a set-off against payments due; or seeking other relief with respect to the terms of the Contract.
 10. *Claim*—(a) A demand or assertion by Owner directly to Contractor, duly submitted in compliance with the procedural requirements set forth herein: seeking an adjustment of Contract Price or Contract Times, or both; contesting an initial decision by Engineer concerning the requirements of the Contract Documents or the acceptability of Work under the Contract Documents; contesting Engineer's decision regarding a Change Proposal; seeking resolution of a contractual issue that Engineer has declined to address; or seeking other relief with respect to the terms of the Contract; or (b) a demand or assertion by Contractor directly to Owner, duly submitted in compliance with the procedural requirements set forth herein, contesting Engineer's decision regarding a Change Proposal; or seeking resolution of a contractual issue that Engineer

has declined to address. A demand for money or services by a third party is not a Claim.

11. *Constituent of Concern*—Asbestos, petroleum, radioactive materials, polychlorinated biphenyls (PCBs), hazardous waste, and any substance, product, waste, or other material of any nature whatsoever that is or becomes listed, regulated, or addressed pursuant to (a) the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. §§9601 et seq. (“CERCLA”); (b) the Hazardous Materials Transportation Act, 49 U.S.C. §§5501 et seq.; (c) the Resource Conservation and Recovery Act, 42 U.S.C. §§6901 et seq. (“RCRA”); (d) the Toxic Substances Control Act, 15 U.S.C. §§2601 et seq.; (e) the Clean Water Act, 33 U.S.C. §§1251 et seq.; (f) the Clean Air Act, 42 U.S.C. §§7401 et seq.; or (g) any other federal, state, or local statute, law, rule, regulation, ordinance, resolution, code, order, or decree regulating, relating to, or imposing liability or standards of conduct concerning, any hazardous, toxic, or dangerous waste, substance, or material.
12. *Contract*—The entire and integrated written contract between the Owner and Contractor concerning the Work.
13. *Contract Documents*—Those items so designated in the Agreement, and which together comprise the Contract.
14. *Contract Price*—The money that Owner has agreed to pay Contractor for completion of the Work in accordance with the Contract Documents. .
15. *Contract Times*—The number of days or the dates by which Contractor shall: (a) achieve Milestones, if any; (b) achieve Substantial Completion; and (c) complete the Work.
16. *Contractor*—The individual or entity with which Owner has contracted for performance of the Work.
17. *Cost of the Work*—See Paragraph 13.01 for definition.
18. *Drawings*—The part of the Contract that graphically shows the scope, extent, and character of the Work to be performed by Contractor.
19. *Effective Date of the Contract*—The date, indicated in the Agreement, on which the Contract becomes effective.
20. *Engineer*—The individual or entity named as such in the Agreement.
21. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but does not change the Contract Price or the Contract Times.
22. *Hazardous Environmental Condition*—The presence at the Site of Constituents of Concern in such quantities or circumstances that may present a danger to persons or property exposed thereto. The presence at the Site of materials that are necessary for the execution of the Work, or that are to be incorporated in the Work, and that are controlled and contained pursuant to industry practices, Laws and Regulations, and the requirements of the Contract, does not establish a Hazardous Environmental Condition.
23. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, statutes, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.

24. *Liens*—Charges, security interests, or encumbrances upon Contract-related funds, real property, or personal property.
25. *Milestone*—A principal event in the performance of the Work that the Contract requires Contractor to achieve by an intermediate completion date or by a time prior to Substantial Completion of all the Work.
26. *Notice of Award*—The written notice by Owner to a Bidder of Owner's acceptance of the Bid.
27. *Notice to Proceed*—A written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work.
28. *Owner*—The individual or entity with which Contractor has contracted regarding the Work, and which has agreed to pay Contractor for the performance of the Work, pursuant to the terms of the Contract.
29. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
30. *Project*—The total undertaking to be accomplished for Owner by engineers, contractors, and others, including planning, study, design, construction, testing, commissioning, and start-up, and of which the Work to be performed under the Contract Documents is a part.
31. *Project Manual*—The written documents prepared for, or made available for, procuring and constructing the Work, including but not limited to the Bidding Documents or other construction procurement documents, geotechnical and existing conditions information, the Agreement, bond forms, General Conditions, Supplementary Conditions, and Specifications. The contents of the Project Manual may be bound in one or more volumes.
32. *Resident Project Representative*—The authorized representative of Engineer assigned to assist Engineer at the Site. As used herein, the term Resident Project Representative or "RPR" includes any assistants or field staff of Resident Project Representative.
33. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and that establish the standards by which such portion of the Work will be judged.
34. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements for Engineer's review of the submittals and the performance of related construction activities.
35. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
36. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information that are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work. Shop Drawings, whether approved or not, are not Drawings and are not Contract Documents.

37. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements, and such other lands furnished by Owner which are designated for the use of Contractor.
38. *Specifications*—The part of the Contract that consists of written requirements for materials, equipment, systems, standards, and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable to the Work.
39. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work.
40. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
41. *Successful Bidder*—The Bidder whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.
42. *Supplementary Conditions*—The part of the Contract that amends or supplements these General Conditions.
43. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or a Subcontractor.
44. *Technical Data*—Those items expressly identified as Technical Data in the Supplementary Conditions, with respect to either (a) subsurface conditions at the Site, or physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) or (b) Hazardous Environmental Conditions at the Site. If no such express identifications of Technical Data have been made with respect to conditions at the Site, then the data contained in boring logs, recorded measurements of subsurface water levels, laboratory test results, and other factual, objective information regarding conditions at the Site that are set forth in any geotechnical or environmental report prepared for the Project and made available to Contractor are hereby defined as Technical Data with respect to conditions at the Site under Paragraphs 5.03, 5.04, and 5.06.
45. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including but not limited to those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, fiber optic transmissions, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
46. *Unit Price Work*—Work to be paid for on the basis of unit prices.
47. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction; furnishing, installing, and incorporating all materials and equipment into such construction; and may include related services such as testing, start-up, and commissioning, all as required by the Contract Documents.

48. *Work Change Directive*—A written directive to Contractor issued on or after the Effective Date of the Contract, signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work.

1.02 *Terminology*

- A. The words and terms discussed in the following paragraphs are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *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 Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the 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 is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Article 10 or any other provision of the Contract Documents.
- C. *Day:*
1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 15.03 or 15.04).
- E. *Furnish, Install, Perform, Provide:*
1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.

3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. If the Contract Documents establish an obligation of Contractor with respect to specific services, materials, or equipment, but do not expressly use any of the four words “furnish,” “install,” “perform,” or “provide,” then Contractor shall furnish and install said services, materials, or equipment complete and ready for intended use.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. *Bonds*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Contractor’s Insurance*: When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract), the certificates and other evidence of insurance required to be provided by Contractor in accordance with Article 6.
- C. *Evidence of Owner’s Insurance*: After receipt of the executed counterparts of the Agreement and all required bonds and insurance documentation, Owner shall promptly deliver to Contractor, with copies to each named insured and additional insured (as identified in the Supplementary Conditions or otherwise), the certificates and other evidence of insurance required to be provided by Owner under Article 6.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor four printed copies of the Contract (including one fully executed counterpart of the Agreement), and one copy in electronic portable document format (PDF). Additional printed copies will be furnished upon request at the cost of reproduction.
- B. Owner shall maintain and safeguard at least one original printed record version of the Contract, including Drawings and Specifications signed and sealed by Engineer and other design professionals. Owner shall make such original printed record version of the Contract available to Contractor for review. Owner may delegate the responsibilities under this provision to Engineer.

2.03 *Before Starting Construction*

- A. *Preliminary Schedules*: Within 10 days after the Effective Date of the Contract (or as otherwise specifically required by the Contract Documents), Contractor shall submit to Engineer for timely review:
 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract;
 2. a preliminary Schedule of Submittals; and

3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.04 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.03.A, procedures for handling Shop Drawings, Samples, and other submittals, processing Applications for Payment, electronic or digital transmittals, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit and receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.05 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference, attended by Contractor, Engineer, and others as appropriate, will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.03.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to the component parts of the Work.

2.06 *Electronic Transmittals*

- A. Except as otherwise stated elsewhere in the Contract, the Owner, Engineer, and Contractor may transmit, and shall accept, Project-related correspondence, text, data, documents, drawings, information, and graphics, including but not limited to Shop Drawings and other submittals, in electronic media or digital format, either directly, or through access to a secure Project website.
- B. If the Contract does not establish protocols for electronic or digital transmittals, then Owner, Engineer, and Contractor shall jointly develop such protocols.
- C. When transmitting items in electronic media or digital format, the transmitting party makes no representations as to long term compatibility, usability, or readability of the items resulting from the recipient's use of software application packages, operating systems, or

computer hardware differing from those used in the drafting or transmittal of the items, or from those established in applicable transmittal protocols.

ARTICLE 3 – DOCUMENTS: INTENT, REQUIREMENTS, REUSE

3.01 Intent

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents.
- C. Unless otherwise stated in the Contract Documents, if there is a discrepancy between the electronic or digital versions of the Contract Documents (including any printed copies derived from such electronic or digital versions) and the printed record version, the printed record version shall govern.
- D. The Contract supersedes prior negotiations, representations, and agreements, whether written or oral.
- E. Engineer will issue clarifications and interpretations of the Contract Documents as provided herein.

3.02 Reference Standards

- A. Standards Specifications, Codes, Laws and Regulations
 - 1. Reference in the Contract Documents to standard specifications, manuals, reference standards, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard specification, manual, reference standard, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Contract if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 - 2. No provision of any such standard specification, manual, reference standard, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the part of the Contract Documents prepared by or for Engineer. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the part of the Contract Documents prepared by or for Engineer.

3.03 Reporting and Resolving Discrepancies

- A. *Reporting Discrepancies:*
 - 1. *Contractor's Verification of Figures and Field Measurements:* Before undertaking each part of the Work, Contractor shall carefully study the Contract Documents, and check and verify pertinent figures and dimensions therein, particularly with respect to applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy that Contractor discovers, or has actual knowledge of, and shall not proceed with any Work affected thereby until the conflict,

error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.

2. *Contractor's Review of Contract Documents:* If, before or during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) actual field conditions, (c) any standard specification, manual, reference standard, or code, or (d) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 7.15) until the conflict, error, ambiguity, or discrepancy is resolved, by a clarification or interpretation by Engineer, or by an amendment or supplement to the Contract Documents issued pursuant to Paragraph 11.01.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the part of the Contract Documents prepared by or for Engineer shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between such provisions of the Contract Documents and:
 - a. the provisions of any standard specification, manual, reference standard, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference as a Contract Document); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Requirements of the Contract Documents*

- A. During the performance of the Work and until final payment, Contractor and Owner shall submit to the Engineer all matters in question concerning the requirements of the Contract Documents (sometimes referred to as requests for information or interpretation—RFIs), or relating to the acceptability of the Work under the Contract Documents, as soon as possible after such matters arise. Engineer will be the initial interpreter of the requirements of the Contract Documents, and judge of the acceptability of the Work thereunder.
- B. Engineer will, with reasonable promptness, render a written clarification, interpretation, or decision on the issue submitted, or initiate an amendment or supplement to the Contract Documents. Engineer's written clarification, interpretation, or decision will be final and binding on Contractor, unless it appeals by submitting a Change Proposal, and on Owner, unless it appeals by filing a Claim.
- C. If a submitted matter in question concerns terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work under the Contract Documents, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, then Engineer will promptly give written notice to Owner and Contractor that Engineer is unable to provide a decision or interpretation. If Owner and Contractor are unable to agree on resolution of such a matter in question, either party may pursue resolution as provided in Article 12.

3.05 *Reuse of Documents*

A. Contractor and its Subcontractors and Suppliers shall not:

1. have or 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 editions, or reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer; or
2. have or acquire any title or ownership rights in any other Contract Documents, reuse any such Contract Documents for any purpose without Owner's express written consent, or violate any copyrights pertaining to such Contract Documents.

B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

ARTICLE 4 – COMMENCEMENT AND PROGRESS OF THE WORK

4.01 *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 Contract 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 Contract. 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 Contract, whichever date is earlier.

4.02 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to such date.

4.03 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.05 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.05) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times.

2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 11.
- B. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, or during any appeal process, except as permitted by Paragraph 16.04, or as Owner and Contractor may otherwise agree in writing.

4.05 *Delays in Contractor's Progress*

- A. If Owner, Engineer, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Times and Contract Price. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delay, disruption, or interference caused by or within the control of Contractor. Delay, disruption, and interference attributable to and within the control of a Subcontractor or Supplier shall be deemed to be within the control of Contractor.
- C. If Contractor's performance or progress is delayed, disrupted, or interfered with by unanticipated causes not the fault of and beyond the control of Owner, Contractor, and those for which they are responsible, then Contractor shall be entitled to an equitable adjustment in Contract Times. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays, disruption, and interference described in this paragraph. Causes of delay, disruption, or interference that may give rise to an adjustment in Contract Times under this paragraph include but are not limited to the following:
 1. severe and unavoidable natural catastrophes such as fires, floods, epidemics, and earthquakes;
 2. abnormal weather conditions;
 3. acts or failures to act of utility owners (other than those performing other work at or adjacent to the Site by arrangement with the Owner, as contemplated in Article 8); and
 4. acts of war or terrorism.
- D. Delays, disruption, and interference to the performance or progress of the Work resulting from the existence of a differing subsurface or physical condition, an Underground Facility that was not shown or indicated by the Contract Documents, or not shown or indicated with reasonable accuracy, and those resulting from Hazardous Environmental Conditions, are governed by Article 5.
- E. Paragraph 8.03 governs delays, disruption, and interference to the performance or progress of the Work resulting from the performance of certain other work at or adjacent to the Site.
- F. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for any delay, disruption, or interference if such delay is concurrent with a delay, disruption, or interference caused by or within the control of Contractor.

- G. Contractor must submit any Change Proposal seeking an adjustment in Contract Price or Contract Times under this paragraph within 30 days of the commencement of the delaying, disrupting, or interfering event.

ARTICLE 5 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS

5.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work.
- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which permanent improvements are to be made and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

5.02 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

- 1. Contractor shall confine construction equipment, temporary construction facilities, the storage of materials and equipment, and the operations of workers to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and such other adjacent areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for (a) damage to the Site; (b) damage to any such other adjacent areas used for Contractor's operations; (c) damage to any other adjacent land or areas; and (d) for injuries and losses sustained by the owners or occupants of any such land or areas; provided that such damage or injuries result from the performance of the Work or from other actions or conduct of the Contractor or those for which Contractor is responsible.
- 2. If a damage or injury claim is made by the owner or occupant of any such land or area because of the performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible, Contractor shall (a) take immediate corrective or remedial action as required by Paragraph 7.12, or otherwise; (b) promptly attempt to settle the claim as to all parties through negotiations with such owner or occupant, or otherwise resolve the claim by arbitration or other dispute resolution proceeding, or at law; and (c) to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claim, and against all costs, losses, and damages (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 claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused directly or indirectly, in whole or in part

by, or based upon, Contractor's performance of the Work, or because of other actions or conduct of the Contractor or those for which Contractor is responsible.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work the Contractor shall keep the Site and other adjacent areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site and adjacent areas all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.
- D. *Loading of Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent structures or land to stresses or pressures that will endanger them.

5.03 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or adjacent to the Site;
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities); and
 - 3. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely upon the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions, or information.

5.04 *Differing Subsurface or Physical Conditions*

- A. *Notice by Contractor:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed at the Site either:
1. is of such a nature as to establish that any Technical Data on which Contractor is entitled to rely as provided in Paragraph 5.03 is materially inaccurate; or
 2. is of such a nature as to require a change in the Drawings or Specifications; or
 3. differs materially from that shown or indicated in the Contract Documents; or
 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except with respect to an emergency) until receipt of a written statement permitting Contractor to do so.

- B. *Engineer's Review:* After receipt of written notice as required by the preceding paragraph, Engineer will promptly review the subsurface or physical condition in question; determine the necessity of Owner's obtaining additional exploration or tests with respect to the condition; conclude whether the condition falls within any one or more of the differing site condition categories in Paragraph 5.04.A above; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the subsurface or physical condition in question and the need for any change in the Drawings or Specifications; and advise Owner in writing of Engineer's findings, conclusions, and recommendations.
- C. *Owner's Statement to Contractor Regarding Site Condition:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the subsurface or physical condition in question, addressing the resumption of Work in connection with such condition, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations, in whole or in part.
- D. *Possible Price and Times Adjustments:*
1. Contractor shall be entitled to an equitable adjustment in Contract Price or Contract Times, or both, to the extent that the existence of a differing subsurface or physical condition, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must fall within any one or more of the categories described in Paragraph 5.04.A;
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03; and,

- c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times with respect to a subsurface or physical condition if:
 - a. Contractor knew of the existence of such condition at the time Contractor made a commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract, or otherwise; or
 - b. the existence of such condition reasonably could have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas expressly required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 5.04.A.
- 3. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
- 4. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the subsurface or physical condition in question.

5.05 *Underground Facilities*

- A. *Contractor's Responsibilities:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or adjacent to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
 - 1. Owner and Engineer do not warrant or guarantee the accuracy or completeness of any such information or data provided by others; and
 - 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all information and data regarding existing Underground Facilities at the Site;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents as being at the Site;
 - c. coordination of the Work with the owners (including Owner) of such Underground Facilities, during construction; and
 - d. the safety and protection of all existing Underground Facilities at the Site, and repairing any damage thereto resulting from the Work.
- B. *Notice by Contractor:* If Contractor believes that an Underground Facility that is uncovered or revealed at the Site was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, then Contractor shall, promptly after

becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 7.15), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer.

- C. *Engineer's Review:* Engineer will promptly review the Underground Facility and conclude whether such Underground Facility was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy; obtain any pertinent cost or schedule information from Contractor; prepare recommendations to Owner regarding the Contractor's resumption of Work in connection with the Underground Facility in question; determine the extent, if any, to which a change is required in the Drawings or Specifications to reflect and document the consequences of the existence or location of the Underground Facility; and advise Owner in writing of Engineer's findings, conclusions, and recommendations. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
- D. *Owner's Statement to Contractor Regarding Underground Facility:* After receipt of Engineer's written findings, conclusions, and recommendations, Owner shall issue a written statement to Contractor (with a copy to Engineer) regarding the Underground Facility in question, addressing the resumption of Work in connection with such Underground Facility, indicating whether any change in the Drawings or Specifications will be made, and adopting or rejecting Engineer's written findings, conclusions, and recommendations in whole or in part.
- E. *Possible Price and Times Adjustments:*
 - 1. Contractor shall be entitled to an equitable adjustment in the Contract Price or Contract Times, or both, to the extent that any existing Underground Facility at the Site that was not shown or indicated in the Contract Documents, or was not shown or indicated with reasonable accuracy, or any related delay, disruption, or interference, causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated the existence or actual location of the Underground Facility in question;
 - b. With respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraph 13.03;
 - c. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times; and
 - d. Contractor gave the notice required in Paragraph 5.05.B.
 - 2. If Owner and Contractor agree regarding Contractor's entitlement to and the amount or extent of any adjustment in the Contract Price or Contract Times, or both, then any such adjustment shall be set forth in a Change Order.
 - 3. Contractor may submit a Change Proposal regarding its entitlement to or the amount or extent of any adjustment in the Contract Price or Contract Times, or both, no later than 30 days after Owner's issuance of the Owner's written statement to Contractor regarding the Underground Facility in question.

5.06 *Hazardous Environmental Conditions at Site*

- A. *Reports and Drawings*: The Supplementary Conditions identify:
1. those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at or adjacent to the Site; and
 2. Technical Data contained in such reports and drawings.
- B. *Reliance by Contractor on Technical Data Authorized*: Contractor may rely upon the accuracy of the Technical Data expressly identified in the Supplementary Conditions with respect to such reports and drawings, but such reports and drawings are not Contract Documents. If no such express identification has been made, then Contractor may rely on the accuracy of the Technical Data (as defined in Article 1) contained in any geotechnical or environmental report prepared for the Project and made available to Contractor. Except for such reliance on Technical Data, Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any Technical Data or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for removing or remediating any Hazardous Environmental Condition encountered, uncovered, or revealed at the Site unless such removal or remediation is expressly identified in the Contract Documents to be within the scope of the Work.
- D. Contractor shall be responsible for controlling, containing, and duly removing all Constituents of Concern brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible, and for any associated costs; and for the costs of removing and remediating any Hazardous Environmental Condition created by the presence of any such Constituents of Concern.
- E. If Contractor encounters, uncovers, or reveals a Hazardous Environmental Condition whose removal or remediation is not expressly identified in the Contract Documents as being within the scope of the Work, or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, then Contractor shall immediately: (1) secure or otherwise isolate such condition; (2) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 7.15); and (3) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 5.06.F. If Contractor or anyone for whom Contractor is responsible created the Hazardous Environmental Condition in question, then Owner may remove and remediate the Hazardous Environmental Condition, and impose a set-off against payments to account for the associated costs.

- F. Contractor shall not resume Work in connection with such Hazardous Environmental Condition or in any affected area until after Owner has obtained any required permits related thereto, and delivered written notice to Contractor either (1) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (2) specifying any special conditions under which such Work may be resumed safely.
- G. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, then within 30 days of Owner's written notice regarding the resumption of Work, Contractor may submit a Change Proposal, or Owner may impose a set-off.
- H. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work, following the contractual change procedures in Article 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 8.
- I. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (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 a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition (1) was not shown or indicated in the Drawings, Specifications, or other Contract Documents, identified as Technical Data entitled to limited reliance pursuant to Paragraph 5.06.B, or identified in the Contract Documents to be included within the scope of the Work, and (2) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.H shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- J. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (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 the failure to control, contain, or remove a Constituent of Concern brought to the Site by Contractor or by anyone for whom Contractor is responsible, or to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 5.06.J shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- K. The provisions of Paragraphs 5.03, 5.04, and 5.05 do not apply to the presence of Constituents of Concern or to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 6 – BONDS AND INSURANCE

6.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish a performance bond and a payment bond, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all of Contractor's obligations under the Contract. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 15.08, whichever is later, except as provided otherwise by Laws or Regulations, the Supplementary Conditions, or other specific provisions of the Contract. Contractor shall also furnish such other bonds as are required by the Supplementary Conditions or other specific provisions of the Contract.
- B. All bonds shall be in the form prescribed by the Contract except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (as amended and supplemented) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. A bond signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed the accompanying bond.
- C. Contractor shall obtain the required bonds from surety companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds in the required amounts.
- D. If the surety on a bond furnished by Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in any state or jurisdiction where any part of the Project is located, or the surety ceases to meet the requirements above, then Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the bond and surety requirements above.
- E. If Contractor has failed to obtain a required bond, Owner may exclude the Contractor from the Site and exercise Owner's termination rights under Article 16.
- F. Upon request, Owner shall provide a copy of the payment bond to any Subcontractor, Supplier, or other person or entity claiming to have furnished labor or materials used in the performance of the Work.

6.02 *Insurance—General Provisions*

- A. Owner and Contractor shall obtain and maintain insurance as required in this Article and in the Supplementary Conditions.
- B. All insurance required by the Contract to be purchased and maintained by Owner or Contractor shall be obtained from insurance companies that are duly licensed or authorized, in the state or jurisdiction in which the Project is located, to issue insurance policies for the required limits and coverages. Unless a different standard is indicated in the Supplementary Conditions, all companies that provide insurance policies required under this Contract shall have an A.M. Best rating of A-VII or better.
- C. Contractor shall deliver to Owner, with copies to each named insured and additional insured (as identified in this Article, in the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Contractor has obtained and is

maintaining the policies, coverages, and endorsements required by the Contract. Upon request by Owner or any other insured, Contractor shall also furnish other evidence of such required insurance, including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Contractor may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.

- D. Owner shall deliver to Contractor, with copies to each named insured and additional insured (as identified in this Article, the Supplementary Conditions, or elsewhere in the Contract), certificates of insurance establishing that Owner has obtained and is maintaining the policies, coverages, and endorsements required of Owner by the Contract (if any). Upon request by Contractor or any other insured, Owner shall also provide other evidence of such required insurance (if any), including but not limited to copies of policies and endorsements, and documentation of applicable self-insured retentions and deductibles. Owner may block out (redact) any confidential premium or pricing information contained in any policy or endorsement furnished under this provision.
- E. Failure of Owner or Contractor to demand such certificates or other evidence of the other party's full compliance with these insurance requirements, or failure of Owner or Contractor to identify a deficiency in compliance from the evidence provided, shall not be construed as a waiver of the other party's obligation to obtain and maintain such insurance.
- F. If either party does not purchase or maintain all of the insurance required of such party by the Contract, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage.
- G. If Contractor has failed to obtain and maintain required insurance, Owner may exclude the Contractor from the Site, impose an appropriate set-off against payment, and exercise Owner's termination rights under Article 16.
- H. Without prejudice to any other right or remedy, if a party has failed to obtain required insurance, the other party may elect to obtain equivalent insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and the Contract Price shall be adjusted accordingly.
- I. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor or Contractor's interests.
- J. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner and other individuals and entities in the Contract.

6.03 *Contractor's Insurance*

- A. *Workers' Compensation:* Contractor shall purchase and maintain workers' compensation and employer's liability insurance for:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts.
 - 2. United States Longshoreman and Harbor Workers' Compensation Act and Jones Act coverage (if applicable).
 - 3. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees (by stop-gap endorsement in monopolist worker's compensation states).

4. Foreign voluntary worker compensation (if applicable).
- B. *Commercial General Liability—Claims Covered:* Contractor shall purchase and maintain commercial general liability insurance, covering all operations by or on behalf of Contractor, on an occurrence basis, against:
 1. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees.
 2. claims for damages insured by reasonably available personal injury liability coverage.
 3. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom.
- C. *Commercial General Liability—Form and Content:* Contractor's commercial liability policy shall be written on a 1996 (or later) ISO commercial general liability form (occurrence form) and include the following coverages and endorsements:
 1. Products and completed operations coverage:
 - a. Such insurance shall be maintained for three years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured (as identified in the Supplementary Conditions or elsewhere in the Contract) evidence of continuation of such insurance at final payment and three years thereafter.
 2. Blanket contractual liability coverage, to the extent permitted by law, including but not limited to coverage of Contractor's contractual indemnity obligations in Paragraph 7.18.
 3. Broad form property damage coverage.
 4. Severability of interest.
 5. Underground, explosion, and collapse coverage.
 6. Personal injury coverage.
 7. Additional insured endorsements that include both ongoing operations and products and completed operations coverage through ISO Endorsements CG 20 10 10 01 and CG 20 37 10 01 (together); or CG 20 10 07 04 and CG 20 37 07 04 (together); or their equivalent.
 8. For design professional additional insureds, ISO Endorsement CG 20 32 07 04, "Additional Insured—Engineers, Architects or Surveyors Not Engaged by the Named Insured" or its equivalent.
- D. *Automobile liability:* Contractor shall purchase and maintain automobile liability insurance against claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle. The automobile liability policy shall be written on an occurrence basis.
- E. *Umbrella or excess liability:* Contractor shall purchase and maintain umbrella or excess liability insurance written over the underlying employer's liability, commercial general liability, and automobile liability insurance described in the paragraphs above. Subject to industry-standard exclusions, the coverage afforded shall follow form as to each and every one of the underlying policies.
- F. *Contractor's pollution liability insurance:* Contractor shall purchase and maintain a policy covering third-party injury and property damage claims, including clean-up costs, as a result

of pollution conditions arising from Contractor's operations and completed operations. This insurance shall be maintained for no less than three years after final completion.

- G. *Additional insureds:* The Contractor's commercial general liability, automobile liability, umbrella or excess, and pollution liability policies shall include and list as additional insureds Owner and Engineer, and any individuals or entities identified in the Supplementary Conditions; include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds; and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby (including as applicable those arising from both ongoing and completed operations) on a non-contributory basis. Contractor shall obtain all necessary endorsements to support these requirements.
- H. *Contractor's professional liability insurance:* If Contractor will provide or furnish professional services under this Contract, through a delegation of professional design services or otherwise, then Contractor shall be responsible for purchasing and maintaining applicable professional liability insurance. This insurance shall provide protection against claims arising out of performance of professional design or related services, and caused by a negligent error, omission, or act for which the insured party is legally liable. It shall be maintained throughout the duration of the Contract and for a minimum of two years after Substantial Completion. If such professional design services are performed by a Subcontractor, and not by Contractor itself, then the requirements of this paragraph may be satisfied through the purchasing and maintenance of such insurance by such Subcontractor.
- I. *General provisions:* The policies of insurance required by this Paragraph 6.03 shall:
 - 1. include at least the specific coverages provided in this Article.
 - 2. be written for not less than the limits of liability provided in this Article and in the Supplementary Conditions, or required by Laws or Regulations, whichever is greater.
 - 3. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed, or renewal refused until at least 10 days prior written notice has been given to Contractor. Within three days of receipt of any such written notice, Contractor shall provide a copy of the notice to Owner, Engineer, and each other insured under the policy.
 - 4. remain in effect at least until final payment (and longer if expressly required in this Article) and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work as a warranty or correction obligation, or otherwise, or returning to the Site to conduct other tasks arising from the Contract Documents.
 - 5. be appropriate for the Work being performed and provide protection from claims that may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable.
- J. The coverage requirements for specific policies of insurance must be met by such policies, and not by reference to excess or umbrella insurance provided in other policies.

6.04 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 6.03, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.
- B. Owner's liability policies, if any, operate separately and independently from policies required to be provided by Contractor, and Contractor cannot rely upon Owner's liability policies for any of Contractor's obligations to the Owner, Engineer, or third parties.

6.05 *Property Insurance*

- A. *Builder's Risk:* Unless otherwise provided in the Supplementary Conditions, Contractor shall purchase and maintain builder's risk insurance upon the Work on a completed value basis, in the amount of the full insurable replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 - 1. include the Owner and Contractor as named insureds, and all Subcontractors, and any individuals or entities required by the Supplementary Conditions to be insured under such builder's risk policy, as insureds or named insureds. For purposes of the remainder of this Paragraph 6.05, Paragraphs 6.06 and 6.07, and any corresponding Supplementary Conditions, the parties required to be insured shall collectively be referred to as "insureds."
 - 2. be written on a builder's risk "all risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire; lightning; windstorm; riot; civil commotion; terrorism; vehicle impact; aircraft; smoke; theft; vandalism and malicious mischief; mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; flood; collapse; explosion; debris removal; demolition occasioned by enforcement of Laws and Regulations; water damage (other than that caused by flood); and such other perils or causes of loss as may be specifically required by the Supplementary Conditions. If insurance against mechanical breakdown, boiler explosion, and artificially generated electric current; earthquake; volcanic activity, and other earth movement; or flood, are not commercially available under builder's risk policies, by endorsement or otherwise, such insurance may be provided through other insurance policies acceptable to Owner and Contractor.
 - 3. cover, as insured property, at least the following: (a) the Work and all materials, supplies, machinery, apparatus, equipment, fixtures, and other property of a similar nature that are to be incorporated into or used in the preparation, fabrication, construction, erection, or completion of the Work, including Owner-furnished or assigned property; (b) spare parts inventory required within the scope of the Contract; and (c) temporary works which are not intended to form part of the permanent constructed Work but which are intended to provide working access to the Site, or to the Work under construction, or which are intended to provide temporary support for the Work under construction, including scaffolding, form work, fences, shoring, falsework, and temporary structures.
 - 4. cover expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects).

5. extend to cover damage or loss to insured property while in temporary storage at the Site or in a storage location outside the Site (but not including property stored at the premises of a manufacturer or Supplier).
 6. extend to cover damage or loss to insured property while in transit.
 7. allow for partial occupation or use of the Work by Owner, such that those portions of the Work that are not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
 8. allow for the waiver of the insurer's subrogation rights, as set forth below.
 9. provide primary coverage for all losses and damages caused by the perils or causes of loss covered.
 10. not include a co-insurance clause.
 11. include an exception for ensuing losses from physical damage or loss with respect to any defective workmanship, design, or materials exclusions.
 12. include performance/hot testing and start-up.
 13. be maintained in effect, subject to the provisions herein regarding Substantial Completion and partial occupancy or use of the Work by Owner, until the Work is complete.
- B. *Notice of Cancellation or Change:* All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 6.05 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 10 days prior written notice has been given to the purchasing policyholder. Within three days of receipt of any such written notice, the purchasing policyholder shall provide a copy of the notice to each other insured.
- C. *Deductibles:* The purchaser of any required builder's risk or property insurance shall pay for costs not covered because of the application of a policy deductible.
- D. *Partial Occupancy or Use by Owner:* If Owner will occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 15.04, then Owner (directly, if it is the purchaser of the builder's risk policy, or through Contractor) will provide notice of such occupancy or use to the builder's risk insurer. The builder's risk insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy; rather, those portions of the Work that are occupied or used by Owner may come off the builder's risk policy, while those portions of the Work not yet occupied or used by Owner shall remain covered by the builder's risk insurance.
- E. *Additional Insurance:* If Contractor elects to obtain other special insurance to be included in or supplement the builder's risk or property insurance policies provided under this Paragraph 6.05, it may do so at Contractor's expense.
- F. *Insurance of Other Property:* If the express insurance provisions of the Contract do not require or address the insurance of a property item or interest, such as tools, construction equipment, or other personal property owned by Contractor, a Subcontractor, or an employee of Contractor or a Subcontractor, then the entity or individual owning such property item will be responsible for deciding whether to insure it, and if so in what amount.

6.06 *Waiver of Rights*

- A. All policies purchased in accordance with Paragraph 6.05, expressly including the builder's risk policy, shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any insureds thereunder, or against Engineer or its consultants, or their officers, directors, members, partners, employees, agents, consultants, or subcontractors. Owner and Contractor waive all rights against each other and the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Engineer, its consultants, all Subcontractors, all individuals or entities identified in the Supplementary Conditions as insureds, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner or Contractor as trustee or fiduciary, or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial occupancy or use pursuant to Paragraph 15.04, after Substantial Completion pursuant to Paragraph 15.03, or after final payment pursuant to Paragraph 15.06.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 6.06.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, or the officers, directors, members, partners, employees, agents, consultants, or subcontractors of each and any of them.
- D. Contractor shall be responsible for assuring that the agreement under which a Subcontractor performs a portion of the Work contains provisions whereby the Subcontractor waives all rights against Owner, Contractor, all individuals or entities identified in the Supplementary Conditions as insureds, the Engineer and its consultants, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by builder's risk insurance and any other property insurance applicable to the Work.

6.07 *Receipt and Application of Property Insurance Proceeds*

- A. Any insured loss under the builder's risk and other policies of insurance required by Paragraph 6.05 will be adjusted and settled with the named insured that purchased the

policy. Such named insured shall act as fiduciary for the other insureds, and give notice to such other insureds that adjustment and settlement of a claim is in progress. Any other insured may state its position regarding a claim for insured loss in writing within 15 days after notice of such claim.

- B. Proceeds for such insured losses may be made payable by the insurer either jointly to multiple insureds, or to the named insured that purchased the policy in its own right and as fiduciary for other insureds, subject to the requirements of any applicable mortgage clause. A named insured receiving insurance proceeds under the builder's risk and other policies of insurance required by Paragraph 6.05 shall distribute such proceeds in accordance with such agreement as the parties in interest may reach, or as otherwise required under the dispute resolution provisions of this Contract or applicable Laws and Regulations.
- C. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the money so received applied on account thereof, and the Work and the cost thereof covered by Change Order, if needed.

ARTICLE 7 – CONTRACTOR'S RESPONSIBILITIES

7.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

7.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours, Monday through Friday. Contractor will not perform Work on a Saturday, Sunday, or any legal holiday. Contractor may perform Work outside regular working hours or on Saturdays, Sundays, or legal holidays only with Owner's written consent, which will not be unreasonably withheld.

7.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start up, and completion of the Work, whether or not such items are specifically called for in the Contract Documents.
- B. All materials and equipment incorporated into the Work shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and

guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

7.04 "Or Equals"

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the Contract Price has been based upon Contractor furnishing such item as specified. The specification or description of such an item 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, Contractor may request that Engineer authorize the use of other items of material or equipment, or items from other proposed suppliers under the circumstances described below.
 - 1. If Engineer in its sole discretion determines that an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, Engineer shall deem it an "or equal" item. For the purposes of this paragraph, a proposed item of material or equipment will 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 materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole;
 - 3) it has a proven record of performance and availability of responsive service; and
 - 4) it is not objectionable to Owner.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
 - B. *Contractor's Expense:* Contractor shall provide all data in support of any proposed "or equal" item at Contractor's expense.
 - C. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each "or-equal" request. Engineer may require Contractor to furnish additional data about the proposed "or-equal" item. Engineer will be the sole judge of acceptability. No "or-equal" item will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an "or-equal", which will be evidenced by an approved Shop Drawing or other written communication. Engineer will advise Contractor in writing of any negative determination.

- D. *Effect of Engineer's Determination:* Neither approval nor denial of an "or-equal" request shall result in any change in Contract Price. The Engineer's denial of an "or-equal" request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents.
- E. *Treatment as a Substitution Request:* If Engineer determines that an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item, Contractor may request that Engineer consider the proposed item as a substitute pursuant to Paragraph 7.05.

7.05 Substitutes

- A. Unless the specification or description of an item of material or equipment required to be furnished under the Contract Documents contains or is followed by words reading that no substitution is permitted, Contractor may request that Engineer authorize the use of other items of material or equipment under the circumstances described below. To the extent possible such requests shall be made before commencement of related construction at the Site.
 - 1. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is functionally equivalent to that named and an acceptable substitute therefor. Engineer will not accept requests for review of proposed substitute items of material or equipment from anyone other than Contractor.
 - 2. The requirements for review by Engineer will be as set forth in Paragraph 7.05.B, as supplemented by the Specifications, and as Engineer may decide is appropriate under the circumstances.
 - 3. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - a. shall certify that the proposed substitute item will:
 - 1) perform adequately the functions and achieve the results called for by the general design,
 - 2) be similar in substance to that specified, and
 - 3) be suited to the same use as that specified.
 - b. will state:
 - 1) the extent, if any, to which the use of the proposed substitute item will necessitate a change in Contract Times,
 - 2) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - 3) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty.
 - c. will identify:
 - 1) all variations of the proposed substitute item from that specified, and

- 2) available engineering, sales, maintenance, repair, and replacement services.
- d. shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including but not limited to changes in Contract Price, shared savings, costs of redesign, and claims of other contractors affected by any resulting change.
- B. *Engineer's Evaluation and Determination:* Engineer will be allowed a reasonable time to evaluate each substitute request, and to obtain comments and direction from Owner. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No substitute will be ordered, furnished, installed, or utilized until Engineer's review is complete and Engineer determines that the proposed item is an acceptable substitute. Engineer's determination will be evidenced by a Field Order or a proposed Change Order accounting for the substitution itself and all related impacts, including changes in Contract Price or Contract Times. Engineer will advise Contractor in writing of any negative determination.
- C. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- D. *Reimbursement of Engineer's Cost:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- E. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute at Contractor's expense.
- F. *Effect of Engineer's Determination:* If Engineer approves the substitution request, Contractor shall execute the proposed Change Order and proceed with the substitution. The Engineer's denial of a substitution request shall be final and binding, and may not be reversed through an appeal under any provision of the Contract Documents. Contractor may challenge the scope of reimbursement costs imposed under Paragraph 7.05.D, by timely submittal of a Change Proposal.

7.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor may retain Subcontractors and Suppliers for the performance of parts of the Work. Such Subcontractors and Suppliers must be acceptable to Owner.
- B. Contractor shall retain specific Subcontractors, Suppliers, or other individuals or entities for the performance of designated parts of the Work if required by the Contract to do so.
- C. Subsequent to the submittal of Contractor's Bid or final negotiation of the terms of the Contract, Owner may not require Contractor to retain any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against which Contractor has reasonable objection.
- D. Prior to entry into any binding subcontract or purchase order, Contractor shall submit to Owner the identity of the proposed Subcontractor or Supplier (unless Owner has already deemed such proposed Subcontractor or Supplier acceptable, during the bidding process or otherwise). Such proposed Subcontractor or Supplier shall be deemed acceptable to Owner unless Owner raises a substantive, reasonable objection within five days.

- E. Owner may require the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work. Owner also may require Contractor to retain specific replacements; provided, however, that Owner may not require a replacement to which Contractor has a reasonable objection. If Contractor has submitted the identity of certain Subcontractors, Suppliers, or other individuals or entities for acceptance by Owner, and Owner has accepted it (either in writing or by failing to make written objection thereto), then Owner may subsequently revoke the acceptance of any such Subcontractor, Supplier, or other individual or entity so identified solely on the basis of substantive, reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity.
- F. If Owner requires the replacement of any Subcontractor, Supplier, or other individual or entity retained by Contractor to perform any part of the Work, then Contractor shall be entitled to an adjustment in Contract Price or Contract Times, or both, with respect to the replacement; and Contractor shall initiate a Change Proposal for such adjustment within 30 days of Owner's requirement of replacement.
- G. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of the right of Owner to the completion of the Work in accordance with the Contract Documents.
- H. On a monthly basis Contractor shall submit to Engineer a complete list of all Subcontractors and Suppliers having a direct contract with Contractor, and of all other Subcontractors and Suppliers known to Contractor at the time of submittal.
- I. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions.
- J. Contractor shall be solely responsible for scheduling and coordinating the work of Subcontractors, Suppliers, and all other individuals or entities performing or furnishing any of the Work.
- K. Contractor shall restrict all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work from communicating with Engineer or Owner, except through Contractor or in case of an emergency, or as otherwise expressly allowed herein.
- L. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- M. All Work performed for Contractor by a Subcontractor or Supplier shall be pursuant to an appropriate contractual agreement that specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer.
- N. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by the particular Subcontractor or Supplier.

O. Nothing in the Contract Documents:

1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other individual or entity; nor
2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any money due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.

7.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (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 of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (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 of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents.

7.08 *Permits*

- A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of the submission of Contractor's Bid (or when Contractor became bound under a negotiated contract). Owner shall pay all charges of utility owners for connections for providing permanent service to the Work

7.09 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

7.10 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work or takes any other action knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all resulting costs and losses, and shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (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 such Work or other action. It shall not be Contractor's responsibility to make certain that the Work described in the Contract Documents is in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Owner or Contractor may give notice to the other party of any changes after the submission of Contractor's Bid (or after the date when Contractor became bound under a negotiated contract) in Laws or Regulations having an effect on the cost or time of performance of the Work, including but not limited to changes in Laws or Regulations having an effect on procuring permits and on sales, use, value-added, consumption, and other similar taxes. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times resulting from such changes, then within 30 days of such notice Contractor may submit a Change Proposal, or Owner may initiate a Claim.

7.11 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one printed record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, written interpretations and clarifications, and approved Shop Drawings. Contractor shall keep such record documents in good order and annotate them to show changes made during construction. These record documents, together with all approved Samples, will be available to Engineer for reference. Upon completion of the Work, Contractor shall deliver these record documents to Engineer.

7.12 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - 1. all persons on the Site or who may be affected by the Work;

2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, other work in progress, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify Owner; the owners of adjacent property, Underground Facilities, and other utilities; and other contractors and utility owners performing work at or adjacent to the Site, when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property or work in progress.
 - C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
 - D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
 - E. All damage, injury, or loss to any property referred to in Paragraph 7.12.A.2 or 7.12.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor at its expense (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
 - F. Contractor's duties and responsibilities for safety and protection shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 15.06.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).
 - G. Contractor's duties and responsibilities for safety and protection shall resume whenever Contractor or any Subcontractor or Supplier returns to the Site to fulfill warranty or correction obligations, or to conduct other tasks arising from the Contract Documents.

7.13 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

7.14 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or

exchanged between or among employers at the Site in accordance with Laws or Regulations.

7.15 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

7.16 *Shop Drawings, Samples, and Other Submittals*

A. *Shop Drawing and Sample Submittal Requirements:*

- 1. Before submitting a Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated the Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials and equipment offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
- 2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review of that submittal, and that Contractor approves the submittal.
- 3. With each submittal, Contractor shall give 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 set forth in a written communication separate from the Shop Drawings or Sample submittal; and, in addition, in the case of Shop Drawings by a specific notation made on each Shop Drawing submitted to Engineer for review and approval of each such variation.

- B. *Submittal Procedures for Shop Drawings and Samples:* Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals. Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Contractor shall submit the number of copies required in the Specifications.
- b. 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 Contractor proposes to

provide and to enable Engineer to review the information for the limited purposes required by Paragraph 7.16.D.

2. *Samples:*

- a. Contractor shall submit the number of Samples required in the Specifications.
- b. Contractor shall clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 7.16.D.

3. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Other Submittals:* Contractor shall submit other submittals to Engineer in accordance with the accepted Schedule of Submittals, and pursuant to the applicable terms of the Specifications.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction or to safety precautions or programs incident thereto.
3. Engineer's review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
4. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 7.16.A.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer will document any such approved variation from the requirements of the Contract Documents in a Field Order.
5. Engineer's review and approval of a Shop Drawing or Sample shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 7.16.A and B.
6. Engineer's review and approval of a Shop Drawing or Sample, or of a variation from the requirements of the Contract Documents, shall not, under any circumstances, change the Contract Times or Contract Price, unless such changes are included in a Change Order.
7. Neither Engineer's receipt, review, acceptance or approval of a Shop Drawing, Sample, or other submittal shall result in such item becoming a Contract Document.

8. Contractor shall perform the Work in compliance with the requirements and commitments set forth in approved Shop Drawings and Samples, subject to the provisions of Paragraph 7.16.D.4.

E. *Resubmittal Procedures:*

1. Contractor 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. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.
2. Contractor shall furnish required submittals with sufficient information and accuracy to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing a fourth or subsequent submittal of a Shop Drawings, sample, or other item requiring approval, and Contractor shall be responsible for Engineer's charges to Owner for such time. Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges.
3. If Contractor requests a change of a previously approved submittal item, Contractor shall be responsible for Engineer's charges to Owner for its review time, and Owner may impose a set-off against payments due to Contractor to secure reimbursement for such charges, unless the need for such change is beyond the control of Contractor.

7.17 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 4. use or occupancy of the Work or any part thereof by Owner;
 5. any review and approval of a Shop Drawing or Sample submittal;
 6. the issuance of a notice of acceptability by Engineer;
 7. any inspection, test, or approval by others; or
 8. any correction of defective Work by Owner.

- D. If the Contract requires the Contractor to accept the assignment of a contract entered into by Owner, then the specific warranties, guarantees, and correction obligations contained in the assigned contract shall govern with respect to Contractor's performance obligations to Owner for the Work described in the assigned contract.

7.18 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, and in addition to any other obligations of Contractor under the Contract or otherwise, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (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 the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 7.18.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 7.18.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors 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.

7.19 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable Laws and Regulations.
- B. If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, and other submittals prepared by such professional. Shop

Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.

- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy, and completeness of the services, certifications, or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this paragraph, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 7.16.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria specified by Owner or Engineer.

ARTICLE 8 – OTHER WORK AT THE SITE

8.01 *Other Work*

- A. In addition to and apart from the Work under the Contract Documents, the Owner may perform other work at or adjacent to the Site. Such other work may be performed by Owner's employees, or through contracts between the Owner and third parties. Owner may also arrange to have third-party utility owners perform work on their utilities and facilities at or adjacent to the Site.
- B. If Owner performs other work at or adjacent to the Site with Owner's employees, or through contracts for such other work, then Owner shall give Contractor written notice thereof prior to starting any such other work. If Owner has advance information regarding the start of any utility work at or adjacent to the Site, Owner shall provide such information to Contractor.
- C. Contractor shall afford each other contractor that performs such other work, each utility owner performing other work, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, and provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected.
- D. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 8, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

8.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work at or adjacent to the Site, to perform other work at or adjacent to the Site with Owner's employees, or to arrange to have utility owners perform work at or adjacent to the Site, the following will be set forth in the Supplementary Conditions or provided to Contractor prior to the start of any such other work:
 - 1. the identity of the individual or entity that will have authority and responsibility for coordination of the activities among the various contractors;
 - 2. an itemization of the specific matters to be covered by such authority and responsibility; and
 - 3. the extent of such authority and responsibilities.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

8.03 *Legal Relationships*

- A. If, in the course of performing other work at or adjacent to the Site for Owner, the Owner's employees, any other contractor working for Owner, or any utility owner causes damage to the Work or to the property of Contractor or its Subcontractors, or delays, disrupts, interferes with, or increases the scope or cost of the performance of the Work, through actions or inaction, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor must submit any Change Proposal seeking an equitable adjustment in the Contract Price or the Contract Times under this paragraph within 30 days of the damaging, delaying, disrupting, or interfering event. The entitlement to, and extent of, any such equitable adjustment shall take into account information (if any) regarding such other work that was provided to Contractor in the Contract Documents prior to the submittal of the Bid or the final negotiation of the terms of the Contract. When applicable, any such equitable adjustment in Contract Price shall be conditioned on Contractor assigning to Owner all Contractor's rights against such other contractor or utility owner with respect to the damage, delay, disruption, or interference that is the subject of the adjustment. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- B. Contractor shall take reasonable and customary measures to avoid damaging, delaying, disrupting, or interfering with the work of Owner, any other contractor, or any utility owner performing other work at or adjacent to the Site. If Contractor fails to take such measures and as a result damages, delays, disrupts, or interferes with the work of any such other contractor or utility owner, then Owner may impose a set-off against payments due to Contractor, and assign to such other contractor or utility owner the Owner's contractual rights against Contractor with respect to the breach of the obligations set forth in this paragraph.
- C. When Owner is performing other work at or adjacent to the Site with Owner's employees, Contractor shall be liable to Owner for damage to such other work, and for the reasonable direct delay, disruption, and interference costs incurred by Owner as a result of Contractor's failure to take reasonable and customary measures with respect to Owner's other work. In response to such damage, delay, disruption, or interference, Owner may impose a set-off against payments due to Contractor.

- D. If Contractor damages, delays, disrupts, or interferes with the work of any other contractor, or any utility owner performing other work at or adjacent to the Site, through Contractor's failure to take reasonable and customary measures to avoid such impacts, or if any claim arising out of Contractor's actions, inactions, or negligence in performance of the Work at or adjacent to the Site is made by any such other contractor or utility owner against Contractor, Owner, or Engineer, then Contractor shall (1) promptly attempt to settle the claim as to all parties through negotiations with such other contractor or utility owner, or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law, and (2) indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against any such claims, and against all costs, losses, and damages (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 such damage, delay, disruption, or interference.

ARTICLE 9 – OWNER'S RESPONSIBILITIES

9.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

9.02 *Replacement of Engineer*

- A. Owner may at its discretion appoint an engineer to replace Engineer, provided Contractor makes no reasonable objection to the replacement engineer. The replacement engineer's status under the Contract Documents shall be that of the former Engineer.

9.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

9.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in the Agreement.

9.05 *Lands and Easements; Reports, Tests, and Drawings*

- A. Owner's duties with respect to providing lands and easements are set forth in Paragraph 5.01.
- B. Owner's duties with respect to providing engineering surveys to establish reference points are set forth in Paragraph 4.03.
- C. Article 5 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of conditions at the Site, and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

9.06 *Insurance*

- A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 6.

9.07 *Change Orders*

- A. Owner's responsibilities with respect to Change Orders are set forth in Article 11.

9.08 *Inspections, Tests, and Approvals*

- A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 14.02.B.

9.09 *Limitations on Owner's Responsibilities*

- A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

9.10 *Undisclosed Hazardous Environmental Condition*

- A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 5.06.

9.11 *Evidence of Financial Arrangements*

- A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents (including obligations under proposed changes in the Work).

9.12 *Safety Programs*

- A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed.
- B. Owner shall furnish copies of any applicable Owner safety programs to Contractor.

ARTICLE 10 – ENGINEER'S STATUS DURING CONSTRUCTION

10.01 *Owner's Representative*

- A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract.

10.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 10.08. Particularly, but without limitation, during

or as a result of Engineer's visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

10.03 *Project Representative*

- A. If Owner and Engineer have agreed that Engineer will furnish a Resident Project Representative to represent Engineer at the Site and assist Engineer in observing the progress and quality of the Work, then the authority and responsibilities of any such Resident Project Representative will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 10.08. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent, or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

10.04 *Rejecting Defective Work*

- A. Engineer has the authority to reject Work in accordance with Article 14.

10.05 *Shop Drawings, Change Orders and Payments*

- A. Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, are set forth in Paragraph 7.16.
- B. Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, are set forth in Paragraph 7.19.
- C. Engineer's authority as to Change Orders is set forth in Article 11.
- D. Engineer's authority as to Applications for Payment is set forth in Article 15.

10.06 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor as set forth in Paragraph 13.03.

10.07 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will render decisions regarding the requirements of the Contract Documents, and judge the acceptability of the Work, pursuant to the specific procedures set forth herein for initial interpretations, Change Proposals, and acceptance of the Work. In rendering such decisions and judgments, Engineer will not show partiality to Owner or Contractor, and will not be liable to Owner, Contractor, or others in connection with any proceedings, interpretations, decisions, or judgments conducted or rendered in good faith.

10.08 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 10 or under any other provision of the Contract, nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer, shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.

- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 15.06.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 10.08 shall also apply to the Resident Project Representative, if any.

10.09 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives will comply with the specific applicable requirements of Owner's and Contractor's safety programs (if any) of which Engineer has been informed.

ARTICLE 11 – AMENDING THE CONTRACT DOCUMENTS; CHANGES IN THE WORK

11.01 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended or supplemented by a Change Order, a Work Change Directive, or a Field Order.
 - 1. *Change Orders:*
 - a. If an amendment or supplement to the Contract Documents includes a change in the Contract Price or the Contract Times, such amendment or supplement must be set forth in a Change Order. A Change Order also may be used to establish amendments and supplements of the Contract Documents that do not affect the Contract Price or Contract Times.
 - b. Owner and Contractor may amend those terms and conditions of the Contract Documents that do not involve (1) the performance or acceptability of the Work, (2) the design (as set forth in the Drawings, Specifications, or otherwise), or (3) other engineering or technical matters, without the recommendation of the Engineer. Such an amendment shall be set forth in a Change Order.
 - 2. *Work Change Directives:* A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the modification ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order, following negotiations by the parties as to the Work Change Directive's effect, if any, on the Contract Price and Contract Times; or, if negotiations are unsuccessful, by a determination under the terms of the Contract Documents governing adjustments, expressly including Paragraph 11.04 regarding change of Contract Price. Contractor must submit any Change Proposal seeking an

adjustment of the Contract Price or the Contract Times, or both, no later than 30 days after the completion of the Work set out in the Work Change Directive. Owner must submit any Claim seeking an adjustment of the Contract Price or the Contract Times, or both, no later than 60 days after issuance of the Work Change Directive.

3. *Field Orders*: Engineer may authorize minor changes in the Work if the changes do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Such changes will be accomplished by a Field Order and will be binding on Owner and also on Contractor, which shall perform the Work involved promptly. If Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, then before proceeding with the Work at issue, Contractor shall submit a Change Proposal as provided herein.

11.02 *Owner-Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such changes shall be supported by Engineer's recommendation, to the extent the change involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters. Such changes may be accomplished by a Change Order, if Owner and Contractor have agreed as to the effect, if any, of the changes on Contract Times or Contract Price; or by a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved; or, in the case of a deletion in the Work, promptly cease construction activities with respect to such deleted Work. Added or revised Work shall be performed under the applicable conditions of the Contract Documents. Nothing in this paragraph shall obligate Contractor to undertake work that Contractor reasonably concludes cannot be performed in a manner consistent with Contractor's safety obligations under the Contract Documents or Laws and Regulations.

11.03 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents, as amended, modified, or supplemented, except in the case of an emergency as provided in Paragraph 7.15 or in the case of uncovering Work as provided in Paragraph 14.05.

11.04 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Price shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment of Contract Price shall comply with the provisions of Article 12.
- B. An adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, then by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 13.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, then by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and the parties do not reach mutual agreement to a lump sum, then on

the basis of the Cost of the Work (determined as provided in Paragraph 13.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 11.04.C).

- C. *Contractor's Fee*: When applicable, the Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 13.01.B.1 and 13.01.B.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 13.01.B.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 11.01.C.2.a and 11.01.C.2.b is that the Contractor's fee shall be based on: (1) a fee of 15 percent of the costs incurred under Paragraphs 13.01.A.1 and 13.01.A.2 by the Subcontractor that actually performs the Work, at whatever tier, and (2) with respect to Contractor itself and to any Subcontractors of a tier higher than that of the Subcontractor that actually performs the Work, a fee of five percent of the amount (fee plus underlying costs incurred) attributable to the next lower tier Subcontractor; provided, however, that for any such subcontracted work the maximum total fee to be paid by Owner shall be no greater than 27 percent of the costs incurred by the Subcontractor that actually performs the work;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 13.01.B.4, 13.01.B.5, and 13.01.C;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 11.04.C.2.a through 11.04.C.2.e, inclusive.

11.05 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Change Proposal for an adjustment in the Contract Times shall comply with the provisions of Paragraph 11.06. Any Claim for an adjustment in the Contract Times shall comply with the provisions of Article 12.
- B. An adjustment of the Contract Times shall be subject to the limitations set forth in Paragraph 4.05, concerning delays in Contractor's progress.

11.06 *Change Proposals*

- A. Contractor shall submit a Change Proposal to Engineer to request an adjustment in the Contract Times or Contract Price; appeal an initial decision by Engineer concerning the requirements of the Contract Documents or relating to the acceptability of the Work under the Contract Documents; contest a set-off against payment due; or seek other relief under

the Contract. The Change Proposal shall specify any proposed change in Contract Times or Contract Price, or both, or other proposed relief, and explain the reason for the proposed change, with citations to any governing or applicable provisions of the Contract Documents.

1. *Procedures:* Contractor shall submit each Change Proposal to Engineer promptly (but in no event later than 30 days) after the start of the event giving rise thereto, or after such initial decision. The Contractor shall submit supporting data, including the proposed change in Contract Price or Contract Time (if any), to the Engineer and Owner within 15 days after the submittal of the Change Proposal. The supporting data shall be accompanied by a written statement that the supporting data are accurate and complete, and that any requested time or price adjustment is the entire adjustment to which Contractor believes it is entitled as a result of said event. Engineer will advise Owner regarding the Change Proposal, and consider any comments or response from Owner regarding the Change Proposal.
 2. *Engineer's Action:* Engineer will review each Change Proposal and, within 30 days after receipt of the Contractor's supporting data, either deny the Change Proposal in whole, approve it in whole, or deny it in part and approve it in part. Such actions shall be in writing, with a copy provided to Owner and Contractor. If Engineer does not take action on the Change Proposal within 30 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of Engineer's inaction the Change Proposal is deemed denied, thereby commencing the time for appeal of the denial under Article 12.
 3. *Binding Decision:* Engineer's decision will be final and binding upon Owner and Contractor, unless Owner or Contractor appeals the decision by filing a Claim under Article 12.
- B. *Resolution of Certain Change Proposals:* If the Change Proposal does not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters, then Engineer will notify the parties that the Engineer is unable to resolve the Change Proposal. For purposes of further resolution of such a Change Proposal, such notice shall be deemed a denial, and Contractor may choose to seek resolution under the terms of Article 12.

11.07 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders covering:
1. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive;
 2. changes in Contract Price resulting from an Owner set-off, unless Contractor has duly contested such set-off;
 3. changes in the Work which are: (a) ordered by Owner pursuant to Paragraph 11.02, (b) required because of Owner's acceptance of defective Work under Paragraph 14.04 or Owner's correction of defective Work under Paragraph 14.07, or (c) agreed to by the parties, subject to the need for Engineer's recommendation if the change in the Work involves the design (as set forth in the Drawings, Specifications, or otherwise), or other engineering or technical matters; and
 4. changes in the Contract Price or Contract Times, or other changes, which embody the substance of any final and binding results under Paragraph 11.06, or Article 12.

- B. If Owner or Contractor refuses to execute a Change Order that is required to be executed under the terms of this Paragraph 11.07, it shall be deemed to be of full force and effect, as if fully executed.

11.08 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

ARTICLE 12 – CLAIMS

12.01 *Claims*

- A. *Claims Process:* The following disputes between Owner and Contractor shall be submitted to the Claims process set forth in this Article:
 - 1. Appeals by Owner or Contractor of Engineer's decisions regarding Change Proposals;
 - 2. Owner demands for adjustments in the Contract Price or Contract Times, or other relief under the Contract Documents; and
 - 3. Disputes that Engineer has been unable to address because they do not involve the design (as set forth in the Drawings, Specifications, or otherwise), the acceptability of the Work, or other engineering or technical matters.
- B. *Submittal of Claim:* The party submitting a Claim shall deliver it directly to the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto; in the case of appeals regarding Change Proposals within 30 days of the decision under appeal. The party submitting the Claim shall also furnish a copy to the Engineer, for its information only. The responsibility to substantiate a Claim shall rest with the party making the Claim. In the case of a Claim by Contractor seeking an increase in the Contract Times or Contract Price, or both, Contractor shall certify that the Claim is made in good faith, that the supporting data are accurate and complete, and that to the best of Contractor's knowledge and belief the amount of time or money requested accurately reflects the full amount to which Contractor is entitled.
- C. *Review and Resolution:* The party receiving a Claim shall review it thoroughly, giving full consideration to its merits. The two parties shall seek to resolve the Claim through the exchange of information and direct negotiations. The parties may extend the time for resolving the Claim by mutual agreement. All actions taken on a Claim shall be stated in writing and submitted to the other party, with a copy to Engineer.
- D. *Mediation:*
 - 1. At any time after initiation of a Claim, Owner and Contractor may mutually agree to mediation of the underlying dispute. The agreement to mediate shall stay the Claim submittal and response process.
 - 2. If Owner and Contractor agree to mediation, then after 60 days from such agreement, either Owner or Contractor may unilaterally terminate the mediation process, and the Claim submittal and decision process shall resume as of the date of the termination. If the mediation proceeds but is unsuccessful in resolving the dispute, the Claim

submittal and decision process shall resume as of the date of the conclusion of the mediation, as determined by the mediator.

3. Owner and Contractor shall each pay one-half of the mediator's fees and costs.
- E. *Partial Approval*: If the party receiving a Claim approves the Claim in part and denies it in part, such action shall be final and binding unless within 30 days of such action the other party invokes the procedure set forth in Article 17 for final resolution of disputes.
- F. *Denial of Claim*: If efforts to resolve a Claim are not successful, the party receiving the Claim may deny it by giving written notice of denial to the other party. If the receiving party does not take action on the Claim within 90 days, then either Owner or Contractor may at any time thereafter submit a letter to the other party indicating that as a result of the inaction, the Claim is deemed denied, thereby commencing the time for appeal of the denial. A denial of the Claim shall be final and binding unless within 30 days of the denial the other party invokes the procedure set forth in Article 17 for the final resolution of disputes.
- G. *Final and Binding Results*: If the parties reach a mutual agreement regarding a Claim, whether through approval of the Claim, direct negotiations, mediation, or otherwise; or if a Claim is approved in part and denied in part, or denied in full, and such actions become final and binding; then the results of the agreement or action on the Claim shall be incorporated in a Change Order to the extent they affect the Contract, including the Work, the Contract Times, or the Contract Price.

ARTICLE 13 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

13.01 Cost of the Work

- A. *Purposes for Determination of Cost of the Work*: The term Cost of the Work means the sum of all costs necessary for the proper performance of the Work at issue, as further defined below. The provisions of this Paragraph 13.01 are used for two distinct purposes:
 1. To determine Cost of the Work when Cost of the Work is a component of the Contract Price, under cost-plus-fee, time-and-materials, or other cost-based terms; or
 2. To determine the value of a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price. When the value of any such adjustment is determined on the basis of Cost of the Work, Contractor is entitled only to those additional or incremental costs required because of the change in the Work or because of the event giving rise to the adjustment.
- B. *Costs Included*: Except as otherwise may be agreed to in writing by Owner, costs included in the Cost of the Work shall be in amounts no higher than those prevailing in the locality of the Project, shall not include any of the costs itemized in Paragraph 13.01.C, and shall include only the following items:
 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, and vacation and holiday pay applicable

thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.

2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates, and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 13.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof, whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 6.05), provided such losses and damages have resulted from causes

other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as communication service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance that Contractor is required by the Contract Documents to purchase and maintain.

C. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 13.01.B.1 or specifically covered by Paragraph 13.01.B.4. The payroll costs and other compensation excluded here are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 13.01.B.

D. *Contractor's Fee:* When the Work as a whole is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order, Change Proposal, Claim, set-off, or other adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 11.04.C.

E. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to this Article 13, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

13.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

- B. *Cash Allowances*: Contractor agrees that:
 - 1. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - 2. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance*: Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

13.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Payments to Contractor for Unit Price Work will be based on actual quantities.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of the following paragraph.
- E. Within 30 days of Engineer's written decision under the preceding paragraph, Contractor may submit a Change Proposal, or Owner may file a Claim, seeking an adjustment in the Contract Price if:
 - 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement;
 - 2. there is no corresponding adjustment with respect to any other item of Work; and
 - 3. Contractor believes that it is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price, and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 14 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

14.01 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and authorities having jurisdiction will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

14.02 *Tests, Inspections, and Approvals*

- A. Contractor shall give Engineer timely notice of readiness of the Work (or specific parts thereof) for all required inspections and tests, and shall cooperate with inspection and testing personnel to facilitate required inspections and tests.
- B. Owner shall retain and pay for the services of an independent inspector, testing laboratory, or other qualified individual or entity to perform all inspections and tests expressly required by the Contract Documents to be furnished and paid for by Owner, except that costs incurred in connection with tests or inspections of covered Work shall be governed by the provisions of Paragraph 14.05.
- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging, obtaining, and paying for all inspections and tests required:
 - 1. by the Contract Documents, unless the Contract Documents expressly allocate responsibility for a specific inspection or test to Owner;
 - 2. to attain Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work;
 - 3. by manufacturers of equipment furnished under the Contract Documents;
 - 4. for testing, adjusting, and balancing of mechanical, electrical, and other equipment to be incorporated into the Work; and
 - 5. for acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

Such inspections and tests shall be performed by independent inspectors, testing laboratories, or other qualified individuals or entities acceptable to Owner and Engineer.

- E. If the Contract Documents require the Work (or part thereof) to be approved by Owner, Engineer, or another designated individual or entity, then Contractor shall assume full responsibility for arranging and obtaining such approvals.
- F. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation. Such uncovering shall be at Contractor's expense unless Contractor had given Engineer timely notice of Contractor's intention to

cover the same and Engineer had not acted with reasonable promptness in response to such notice.

14.03 *Defective Work*

- A. *Contractor's Obligation*: It is Contractor's obligation to assure that the Work is not defective.
- B. *Engineer's Authority*: Engineer has the authority to determine whether Work is defective, and to reject defective Work.
- C. *Notice of Defects*: Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor.
- D. *Correction, or Removal and Replacement*: Promptly after receipt of written notice of defective Work, Contractor shall correct all such defective Work, whether or not fabricated, installed, or completed, or, if Engineer has rejected the defective Work, remove it from the Project and replace it with Work that is not defective.
- E. *Preservation of Warranties*: When correcting defective Work, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.
- F. *Costs and Damages*: In addition to its correction, removal, and replacement obligations with respect to defective Work, Contractor shall pay all claims, costs, losses, and damages arising out of or relating to defective Work, including but not limited to the cost of the inspection, testing, correction, removal, replacement, or reconstruction of such defective Work, fines levied against Owner by governmental authorities because the Work is defective, and the costs of repair or replacement of work of others resulting from defective Work. Prior to final payment, if Owner and Contractor are unable to agree as to the measure of such claims, costs, losses, and damages resulting from defective Work, then Owner may impose a reasonable set-off against payments due under Article 15.

14.04 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner prefers to accept it, Owner may do so (subject, if such acceptance occurs prior to final payment, to Engineer's confirmation that such acceptance is in general accord with the design intent and applicable engineering principles, and will not endanger public safety). Contractor shall pay all claims, costs, losses, and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness), and for the diminished value of the Work to the extent not otherwise paid by Contractor. If any such acceptance occurs prior to final payment, the necessary revisions in the Contract Documents with respect to the Work shall be incorporated in a Change Order. If the parties are unable to agree as to the decrease in the Contract Price, reflecting the diminished value of Work so accepted, then Owner may impose a reasonable set-off against payments due under Article 15. If the acceptance of defective Work occurs after final payment, Contractor shall pay an appropriate amount to Owner.

14.05 *Uncovering Work*

- A. Engineer has the authority to require special inspection or testing of the Work, whether or not the Work is fabricated, installed, or completed.

- B. If any Work is covered contrary to the written request of Engineer, then Contractor shall, if requested by Engineer, uncover such Work for Engineer's observation, and then replace the covering, all at Contractor's expense.
- C. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, then Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, and provide all necessary labor, material, and equipment.
 - 1. If it is found that the uncovered Work is defective, Contractor shall be responsible for all claims, costs, losses, and damages arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and pending Contractor's full discharge of this responsibility the Owner shall be entitled to impose a reasonable set-off against payments due under Article 15.
 - 2. If the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, then Contractor may submit a Change Proposal within 30 days of the determination that the Work is not defective.

14.06 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, then Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

14.07 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, then Owner may, after seven days written notice to Contractor, correct or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 14.07, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this paragraph.
- C. All claims, costs, losses, and damages incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 14.07 will be charged against Contractor as set-offs against payments due under Article 15. Such claims, costs, losses and damages will

include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 14.07.

ARTICLE 15 – PAYMENTS TO CONTRACTOR; SET-OFFS; COMPLETION; CORRECTION PERIOD

15.01 *Progress Payments*

- A. *Basis for Progress Payments:* The Schedule of Values established as provided in Article 2 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed during the pay period, as determined under the provisions of Paragraph 13.03. Progress payments for cost-based Work will be based on Cost of the Work completed by Contractor during the pay period.
- B. *Applications for Payments:*
1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens, and evidence that the materials and equipment are covered by appropriate property insurance, a warehouse bond, or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
 2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
 3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.
- C. *Review of Applications:*
1. Engineer will, within 10 days after receipt of each Application for Payment, including each resubmittal, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
 2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 13.03, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the money paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 15.01.C.2.
6. Engineer will recommend reductions in payment (set-offs) necessary in Engineer's opinion to protect Owner from loss because:
- a. the Work is defective, requiring correction or replacement;
 - b. the Contract Price has been reduced by Change Orders;
 - c. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible; or

- e. Engineer has actual knowledge of the occurrence of any of the events that would constitute a default by Contractor and therefore justify termination for cause under the Contract Documents.

D. *Payment Becomes Due:*

- 1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

E. *Reductions in Payment by Owner:*

- 1. In addition to any reductions in payment (set-offs) recommended by Engineer, Owner is entitled to impose a set-off against payment based on any of the following:
 - a. claims have been made against Owner on account of Contractor's conduct in the performance or furnishing of the Work, or Owner has incurred costs, losses, or damages on account of Contractor's conduct in the performance or furnishing of the Work, including but not limited to claims, costs, losses, or damages from workplace injuries, adjacent property damage, non-compliance with Laws and Regulations, and patent infringement;
 - b. Contractor has failed to take reasonable and customary measures to avoid damage, delay, disruption, and interference with other work at or adjacent to the Site;
 - c. Contractor has failed to provide and maintain required bonds or insurance;
 - d. Owner has been required to remove or remediate a Hazardous Environmental Condition for which Contractor is responsible;
 - e. Owner has incurred extra charges or engineering costs related to submittal reviews, evaluations of proposed substitutes, tests and inspections, or return visits to manufacturing or assembly facilities;
 - f. the Work is defective, requiring correction or replacement;
 - g. Owner has been required to correct defective Work in accordance with Paragraph 14.07, or has accepted defective Work pursuant to Paragraph 14.04;
 - h. the Contract Price has been reduced by Change Orders;
 - i. an event that would constitute a default by Contractor and therefore justify a termination for cause has occurred;
 - j. liquidated damages have accrued as a result of Contractor's failure to achieve Milestones, Substantial Completion, or final completion of the Work;
 - k. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - l. there are other items entitling Owner to a set off against the amount recommended.
- 2. If Owner imposes any set-off against payment, whether based on its own knowledge or on the written recommendations of Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and the specific amount of the reduction, and promptly pay Contractor any amount

remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, if Contractor remedies the reasons for such action. The reduction imposed shall be binding on Contractor unless it duly submits a Change Proposal contesting the reduction.

3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 15.01.C.1 and subject to interest as provided in the Agreement.

15.02 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment furnished under the Contract will pass to Owner free and clear of (1) all Liens and other title defects, and (2) all patent, licensing, copyright, or royalty obligations, no later than seven days after the time of payment by Owner.

15.03 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete and request that Engineer issue a certificate of Substantial Completion. Contractor shall at the same time submit to Owner and Engineer an initial draft of punch list items to be completed or corrected before final payment.
- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a preliminary certificate of Substantial Completion which shall fix the date of Substantial Completion. Engineer shall attach to the certificate a punch list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the preliminary certificate during which to make written objection to Engineer as to any provisions of the certificate or attached punch list. If, after considering the objections to the provisions of the preliminary certificate, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the preliminary certificate to Owner, notify Contractor in writing that the Work is not substantially complete, stating the reasons therefor. If Owner does not object to the provisions of the certificate, or if despite consideration of Owner's objections Engineer concludes that the Work is substantially complete, then Engineer will, within said 14 days, execute and deliver to Owner and Contractor a final certificate of Substantial Completion (with a revised punch list of items to be completed or corrected) reflecting such changes from the preliminary certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of receipt of the preliminary certificate of Substantial Completion, Owner and Contractor will confer regarding Owner's use or occupancy of the Work following Substantial Completion, review the builder's risk insurance policy with respect to the end of the builder's risk coverage, and confirm the transition to coverage of the Work under a permanent property insurance policy held by Owner. Unless Owner and Contractor agree otherwise in writing, Owner shall bear responsibility for security, operation, protection of the Work, property insurance, maintenance, heat, and utilities upon Owner's use or occupancy of the Work.

- E. After Substantial Completion the Contractor shall promptly begin work on the punch list of items to be completed or corrected prior to final payment. In appropriate cases Contractor may submit monthly Applications for Payment for completed punch list items, following the progress payment procedures set forth above.
- F. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the punch list.

15.04 *Partial Use or Occupancy*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. At any time Owner may request in writing that Contractor permit Owner to use or occupy any such part of the Work that Owner believes to be substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 15.03.A through E for that part of the Work.
 - 2. At any time Contractor may notify Owner and Engineer in writing that Contractor considers any such part of the Work substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 15.03 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 6.05 regarding builder's risk or other property insurance.

15.05 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work, or agreed portion thereof, is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

15.06 *Final Payment*

- A. *Application for Payment:*
 - 1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of

inspection, annotated record documents (as provided in Paragraph 7.11), and other documents, Contractor may make application for final payment.

2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents;
 - b. consent of the surety, if any, to final payment;
 - c. satisfactory evidence that all title issues have been resolved such that title to all Work, materials, and equipment has passed to Owner free and clear of any Liens or other title defects, or will so pass upon final payment.
 - d. a list of all disputes that Contractor believes are unsettled; and
 - e. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of the Work, and of Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 15.06.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (a) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (b) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien, or Owner at its option may issue joint checks payable to Contractor and specified Subcontractors and Suppliers.

B. *Engineer's Review of Application and Acceptance:*

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of final payment and present the Application for Payment to Owner for payment. Such recommendation shall account for any set-offs against payment that are necessary in Engineer's opinion to protect Owner from loss for the reasons stated above with respect to progress payments. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable, subject to the provisions of Paragraph 15.07. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. *Completion of Work:* The Work is complete (subject to surviving obligations) when it is ready for final payment as established by the Engineer's written recommendation of final payment.

D. *Payment Becomes Due:* Thirty days after the presentation to Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation,

including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

15.07 *Waiver of Claims*

- A. The making of final payment will not constitute a waiver by Owner of claims or rights against Contractor. Owner expressly reserves claims and rights arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 15.05, from Contractor's failure to comply with the Contract Documents or the terms of any special guarantees specified therein, from outstanding Claims by Owner, or from Contractor's continuing obligations under the Contract Documents.
- B. The acceptance of final payment by Contractor will constitute a waiver by Contractor of all claims and rights against Owner other than those pending matters that have been duly submitted or appealed under the provisions of Article 17.

15.08 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents, or by any specific provision of the Contract Documents), any Work is found to be defective, or if the repair of any damages to the Site, adjacent areas that Contractor has arranged to use through construction easements or otherwise, and other adjacent areas used by Contractor as permitted by Laws and Regulations, is found to be defective, then Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. correct the defective repairs to the Site or such other adjacent areas;
 - 2. correct such defective Work;
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. Contractor shall pay all claims, costs, losses, and damages (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 such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others).
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

- E. Contractor's obligations under this paragraph are in addition to all other obligations and warranties. The provisions of this paragraph shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

ARTICLE 16 – SUSPENSION OF WORK AND TERMINATION

16.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any Change Proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

16.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will constitute a default by Contractor and justify termination for cause:
 - 1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule);
 - 2. Failure of Contractor to perform or otherwise to comply with a material term of the Contract Documents;
 - 3. Contractor's disregard of Laws or Regulations of any public body having jurisdiction; or
 - 4. Contractor's repeated disregard of the authority of Owner or Engineer.
- B. If one or more of the events identified in Paragraph 16.02.A occurs, then after giving Contractor (and any surety) ten days written notice that Owner is considering a declaration that Contractor is in default and termination of the contract, Owner may proceed to:
 - 1. declare Contractor to be in default, and give Contractor (and any surety) notice that the Contract is terminated; and
 - 2. enforce the rights available to Owner under any applicable performance bond.
- C. Subject to the terms and operation of any applicable performance bond, if Owner has terminated the Contract for cause, Owner may exclude Contractor from the Site, take possession of the Work, incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and complete the Work as Owner may deem expedient.
- D. Owner may not proceed with termination of the Contract under Paragraph 16.02.B if Contractor within seven days of receipt of notice of intent to terminate begins to correct its failure to perform and proceeds diligently to cure such failure.
- E. If Owner proceeds as provided in Paragraph 16.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds the cost to complete the Work, including all related claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals) sustained by Owner, such excess will be paid to Contractor. If the cost to complete the Work including such related claims, costs, losses,

and damages exceeds such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

- F. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor or any surety under any payment bond or performance bond. Any retention or payment of money due Contractor by Owner will not release Contractor from liability.
- G. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 6.01.A, the provisions of that bond shall govern over any inconsistent provisions of Paragraphs 16.02.B and 16.02.D.

16.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
 - 1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 - 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses; and
 - 3. other reasonable expenses directly attributable to termination, including costs incurred to prepare a termination for convenience cost proposal.
- B. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

16.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for

expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

ARTICLE 17 – FINAL RESOLUTION OF DISPUTES

17.01 *Methods and Procedures*

- A. *Disputes Subject to Final Resolution:* The following disputed matters are subject to final resolution under the provisions of this Article:
 - 1. A timely appeal of an approval in part and denial in part of a Claim, or of a denial in full; and
 - 2. Disputes between Owner and Contractor concerning the Work or obligations under the Contract Documents, and arising after final payment has been made.
- B. *Final Resolution of Disputes:* For any dispute subject to resolution under this Article, Owner or Contractor may:
 - 1. elect in writing to invoke the dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agree with the other party to submit the dispute to another dispute resolution process; or
 - 3. if no dispute resolution process is provided for in the Supplementary Conditions or mutually agreed to, give written notice to the other party of the intent to submit the dispute to a court of competent jurisdiction.

ARTICLE 18 – MISCELLANEOUS

18.01 *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:
 - 1. delivered in person, by a commercial courier service or otherwise, to the individual or to a member of the firm or to an officer of the corporation for which it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the sender of the notice.

18.02 *Computation of Times*

- A. When any period of time is referred to in the Contract 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 will be omitted from the computation.

18.03 *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. 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.

18.04 *Limitation of Damages*

- A. With respect to any and all Change Proposals, Claims, disputes subject to final resolution, and other matters at issue, neither Owner nor Engineer, nor any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, shall be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

18.05 *No Waiver*

- A. A party's non-enforcement of any provision shall not constitute a waiver of that provision, nor shall it affect the enforceability of that provision or of the remainder of this Contract.

18.06 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract, as well as all continuing obligations indicated in the Contract, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

18.07 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

18.08 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

EXHIBIT B INSURANCE REQUIREMENTS

CITY OF PLYMOUTH, WISCONSIN
SECONDARY CLARIFIER #20 REHABILITATION

**CITY OF PLYMOUTH, WISCONSIN
INSURANCE REQUIREMENTS**

CONTRACTOR'S INSURANCE REQUIREMENTS

The Contractor shall not commence work until proof of insurance required has been provided to the applicable department before the contract or purchase order is considered for approval by the City of Plymouth, Wisconsin.

It is hereby agreed and understood that the insurance required by the City of Plymouth is primary coverage and that any insurance or self-insurance maintained by the City of Plymouth its officers, council members, agents, employees or authorized volunteers will not contribute to a loss. All insurance shall be in full force prior to commencing work and remain in force until the entire job is completed and the length of time that is specified, if any, in the contract or listed below whichever is longer.

1. INSURANCE REQUIREMENTS FOR CONTRACTOR

- A. Commercial General Liability coverage at least as broad as Insurance Services Office Commercial General Liability Form, including coverage for Products Liability, Completed Operations, Contractual Liability, and Explosion, Collapse, Underground coverage with the following minimum limits and coverage:
- | | | |
|----|--|-------------|
| 1. | Each Occurrence limit | \$1,000,000 |
| 2. | Personal and Advertising Injury limit | \$1,000,000 |
| 3. | General aggregate limit (other than Products–Completed Operations) per project | \$2,000,000 |
| 4. | Products–Completed Operations aggregate | \$2,000,000 |
| 5. | Fire Damage limit — any one fire | \$50,000 |
| 6. | Medical Expense limit — any one person | \$5,000 |
| 7. | Watercraft Liability, (Protection & Indemnity coverage)“if” the project work includes the use of, or operation of any watercraft, then Watercraft Liability insurance must be in force with a limit of \$1,000,000 per occurrence for Bodily Injury and Property Damage. | |
| 8. | Products – Completed Operations coverage must be carried for two years after acceptance of completed work. | |
- B. Automobile Liability coverage at least as broad as Insurance Services Office Business Automobile Form, with minimum limits of \$1,000,000 combined single limit per accident for Bodily Injury and Property Damage, provided on a Symbol #1– “Any Auto” basis.
- C. Workers’ Compensation as required by the State of Wisconsin, and Employers Liability insurance with sufficient limits to meet underlying Umbrella Liability insurance requirements. If applicable for the work coverage must include Maritime (Jones Act) or Longshore & Harbor Workers Compensation Act coverage.
- D. Umbrella Liability providing coverage at least as broad as the underlying Commercial General Liability, Watercraft Liability (if required), Automobile Liability and Employers Liability, with a minimum limit of \$2,000,000 each occurrence and \$2,000,000 aggregate, and a maximum self-insured retention of \$10,000. The umbrella must be primary and non-contributory to any insurance or self-insurance carried by City of

Plymouth. Products – Completed Operations coverage must be carried for two years after acceptance of completed work.

- E. Aircraft Liability, “if” the project work includes the use of, or operation of any aircraft or helicopter, then Aircraft Liability insurance must be in force with a limit of \$3,000,000 per occurrence for Bodily Injury and Property Damage including Passenger liability and including liability for any slung cargo.
- F. Unmanned Aircraft Liability – if the project work includes the use of, or operation of any unmanned aircraft then unmanned aircraft liability insurance must be carried with a limit of \$1,000,000 per occurrence for bodily injury liability, property damage liability and invasion of privacy liability.
- G. Contractor’s Equipment or Property – The contractor is responsible for loss and coverage for these exposures. The City of Plymouth will not assume responsibility for loss, including loss of use, for damage to property, materials, tools, equipment, and items of a similar nature which are being either used in the work being performed by the contractor or its subcontractors or are to be built, installed, or erected by the contractor or its subcontractors. This includes but not limited to property owned, leased, rented, borrowed, or otherwise in the care, custody or control of the contractor or sub-contractor of any tier.
- H. Also, see requirements under Section 3.

2. INSURANCE REQUIREMENTS FOR ALL SUBCONTRACTOR(S)

All subcontractors shall be required to obtain Commercial General Liability (if applicable Watercraft liability), Automobile Liability, Workers’ Compensation and Employers Liability, (if applicable Aircraft liability or unmanned Aircraft liability) insurance. This insurance shall be as broad and with the same limits and coverages (including waivers of subrogation) as those required per Contractor requirements.

3. APPLICABLE TO CONTRACTORS / SUBCONTRACTORS / SUB-SUB CONTRACTORS

- A. Primary and Non-contributory requirement – all insurance must be primary and non-contributory to any insurance or self-insurance carried by the City of Plymouth.
- B. Acceptability of Insurers – Insurance is to be placed with insurers who have an *A.M. Best* rating of no less than A- and a Financial Size Category of no less than Class VII, and who are authorized as an admitted insurance company in the state of Wisconsin.
- C. Additional Insured Requirements – The following must be named as **additional insureds on all Liability Policies** for liability arising out of project work - **City of Plymouth, and its officers, council members, agents, employees and authorized volunteers. On the Commercial General Liability Policy, the additional insured coverage must be ISO form CG 20 10 07 04 and also include Products – Completed Operations additional insured coverage per ISO form CG 20 37 07 04 or their equivalents for a minimum of 2 years after acceptance of work. This does not apply to Workers Compensation Policies.**

- D. Waivers of Subrogation in favor of City of Plymouth must be endorsed onto the contractors and sub-contractor(s) of all tiers Worker's Compensation, Commercial General Liability, Automobile Liability, Umbrella Liability, and Property coverages.
- E. Deductibles and Self-Insured Retentions – Any deductible or self-insured retention must be declared to the City of Plymouth.
- F. Evidences of Insurance – Prior to execution of the agreement, the Contractor shall file with the City of Plymouth a certificate of insurance (Acord Form or equivalent for all coverages) signed by the insurer's representative evidencing the coverage required by this agreement. In addition form CG 20 10 07 04 for ongoing work exposure and form CG 20 37 07 04 for products-completed operations exposure must also be provided or its equivalent on the Commercial General Liability coverage.

EXHIBIT C
EXISTING CLARIFIER #20 OPERATION
AND MAINTENANCE MANUAL

CITY OF PLYMOUTH, WISCONSIN
SECONDARY CLARIFIER #20 REHABILITATION



EIMCO

Process
Equipment
Company

**INSTALLATION, OPERATION AND MAINTENANCE
INSTRUCTIONS**

**EIMCO C3S CLARIFIER 55' DIA.
WITH C30LT DRIVE UNIT**

Serial No. 24666-01-A

For

**PLYMOUTH WWTP
PLYMOUTH, WISCONSIN**

J.F. AHERN COMPANY

Purchase Order No. 56753

Eimco Order No. 24666-01

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FOREWORD

To ensure complete warranty coverage of the equipment, thoroughly read and familiarize yourself with the instructions in this manual.

It is Eimco's sincere desire that this equipment will give dependable, efficient and economical operation throughout the entire period of service. To achieve this kind of performance and ensure full warranty coverage, it is important to thoroughly read and understand the contents of this manual before the unit is installed, adjusted, or operated.

The equipment, including the accessory equipment furnished but not built by Eimco, must be stored, installed, operated and maintained according to these instructions to ensure the warranty coverage.

The instructions in this manual are based on information available at the time of issue of this manual, the right is reserved to make subsequent changes to the instructions without obligation to replace existing copies.

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PRE-ERECTION ASSISTANCE	02-AX6 (3/84) 2

BEFORE YOU ERECT IT YOUR WAY

LET US SHOW YOU OUR WAY-

READ THE INSTRUCTIONS

These instructions are based on years of field experience. We selected the best procedures from that experience and put them together to give you our best method of erection. Consider them. They will save you time and money.

But -

- If you believe you have a better way, call us first anyway.
- If you want assistance or a pre-erection conference before you start, call us.
- If problems should occur, call us at once.

CALL your Eimco Representative. Look for his address at the back of this manual.

SPECIAL INSTRUCTIONS TO EQUIPMENT ERECTORS	01-AA1 (3/92) 3

Eimco PEC does not anticipate problems with the erection of this equipment. However, due to the nature of fabricated steel equipment, a certain amount of fit-up and adapting work may be required by the erector which is considered to be a normal part of erection, as well as the use of such tools as come-alongs, welding and cutting torches, and drift pins. But in case of problems, the following will apply:

- A. The AISC "Code of Standard Practice" Section 5-180 specifically states that cutting, reaming and use of drift pins are a part of standard erection practice:

"Corrections of minor misfits by the moderate use of drift pins, and a moderate amount of reaming, chipping or cutting are considered a part of erection. Any errors which prevent the proper assembly of parts by these measures, or which require correction or adjustment, must be immediately reported to the fabricator and erector to enable whoever is responsible either to correct the error or to approve the most efficient and economic method of correction to be used by others."

- B. Should a problem develop because of fabrication or engineering errors, Eimco will not accept back charges unless they are authorized in advance and in writing by your Eimco PEC Project Manager. Before work is started, the erector must obtain an Eimco Field Work Order which must include a cost limitation. Payment may be refused for corrective work that is done without the above authorization.

Authorized charges will be paid only on the basis of standard direct field labor hours, material, and variable overhead. Other charges will not be allowed.

- C. Drawings and erection or installation instructions must be followed. The drawings will govern in case of minor discrepancies. In the event of major discrepancies, notify your Eimco Representative immediately, referring to the addresses at the back of this manual.

RECEIVING AND INSPECTION	01-AA2 (4/91) 4

RECEIVING AND INSPECTION

Although all possible precautions are taken to protect the equipment against damage or losses during shipment, before accepting the shipment check all items against the packing list for shortages; and watch for evidence of physical damage. In either case, immediately notify the carrier. Notify Eimco within 7 days (maximum) in case of shortages or discrepancies in the amounts received according to the packing list. If not notified, Eimco will not be responsible for replacing those items.

Keep a record of all claims and correspondence. Photographs are recommended.

PACKING BOXES AND COVERS

Do not remove protective covers unless there are indications of damage. Boxes opened for inspection should be carefully repacked to ensure protection of the contents or else the parts should be packaged and stored in a safe place. Examine all packing boxes, wrappings and covers for items attached to them, especially if they are to be discarded. Refer to the Storage Instructions.

SHIPPING BRACES AND BARS

All braces, bars, etc., that are required for shipment, but are not a part of the mechanism, should not be removed until necessary for installation or removal from the carrier. Shipping braces are marked "SHIPPING BRACE ONLY" with white painted letters or they are painted purple.

STORAGE

When the equipment is not to be installed immediately, refer to the storage instructions. These are important to ensure warranty protection.

ERECTION BOLTS

Check these against the packing lists to avoid shortages later in assembly.

STORAGE PRECAUTIONS	02-AX1 (8/91) 5

Equipment stored or out of use more than 30 days must be protected against corrosion and damage.

ACCESSORY EQUIPMENT

For storage and maintenance of equipment furnished but not built by Eimco, refer to the manufacturer's instructions at the back of this manual.

EIMCO DRIVE EQUIPMENT

FAILURE TO COMPLY WITH THESE STORAGE INSTRUCTIONS WILL VOID EIMCO'S WARRANTY.

DRIVE SHIPPED FROM FACTORY

Eimco drives received in shipment can be stored as long as 24 months, taking into account the in transit time. No special precautions are required other than those listed below.

Note: All drive unit machined surfaces are coated with LPS #3 which is a rust inhibitive agent good for approximately 24 months storage. No storage oil is required and, in fact, must not be used since LPS #3 will dissolve in oil or most other petroleum based products. Therefore, do not add oil etc. to the drive unit until it will be operated. If storage time is to exceed 24 months, contact Eimco PEC for long term storage information.

1. Store the drive(s) in normal operating position. If possible, store the drive(s) indoors in a dry, well ventilated place with a relatively constant temperature. Do not add oil. See note above.
2. When drive equipment is not installed, but must be stored outdoors:
 - a. Use wooden blocks to elevate above ground, arranged for even and firm support. Shipping crates or skids will often do. Make certain storage area is not where water can collect.
 - b. If protective covers have been removed or damaged, cover with canvas or protective tarpaulin, but allow adequate ventilation. Do not use space heaters.

STORAGE PRECAUTIONS	02-AX1 (8/91) 6

- c. Whenever possible, store in a shaded area protected against the sun and wind. This should also be an area away from moving equipment.

DRIVE INSTALLED-LONG TERM STORAGE

FAILURE TO COMPLY WITH THESE STORAGE INSTRUCTIONS WILL VOID EIMCO'S WARRANTY.

The following precautions cover non-operation or shutdown periods that exceed two months. They apply to the Eimco or accessory mechanical drive equipment that has been installed and operated. Keep records and schedules to ensure compliance with instructions.

Note: As LPS #3 will dissolve in and is compatible with oil, it is not necessary to remove it using solvents before adding oil.

Plan #1 - Power Available

When power is available, lubricate and operate the equipment about five minutes, or run it through a complete cycle once each week. Remove accumulated water from drives each month at drain plugs. Refer to the accessory equipment manufacturer's instructions for additional information.

WARNING: In climates where snow and ice might accumulate in the tank, do not operate the drive. Follow Plan #2.

Plan #2 - No Power Available

Fill housing and gear cases with clean oil to maximum level. A rust inhibitive agent is recommended for adding to the oil. Check that all greased bearings are well lubricated. Cover seals, screws, chains and guides with heavy grease and cover breather caps with tape. Cover with tarpaulins, but allow ventilation. Space heaters or dehumidifiers should operate continuously.

Once each month open drain plugs to remove accumulated water and return oil to maximum level. Check all greased items monthly for adequate covering. On variable speed drives, make certain condensate plugs are removed from the speed housing.

When the storage period extends into seasonable warm or cold weather, drain all gear housings and flush them with oil to remove residual water after the storage period. Do not flush with solvents. Refill with oil up to normal operating level.

STORAGE PRECAUTIONS	02-AX1 (8/91) 7

WARNING: Before the drive equipment is put into operation after storage, drain all oil and lubricate according to instructions. Relubricate all greased bearings and pump out old grease. Check motor windings. Refer to accessory equipment manufacturer's instructions.

STORAGE PRECAUTIONS - STRUCTURAL

1. Inspect painted surfaces for deterioration of paint. Apply finish coats as soon as possible. When this is not possible, remove rust or corrosion and paint, as necessary.
2. For shop primed steel equipment, refer to the special "Paint Durability" precautions below.

NOTE: **SHOP PRIMER PAINT DURABILITY**

Shop primer paints are intended to serve only as a bonding coat between metal surfaces and protective finish or seal coats and act as a minimal protective finish. Eimco will not be responsible for condition of primed or finish painted surfaces after equipment leaves its shops. Purchasers are invited to inspect painting in shops for proper preparation and application prior to shipment. Eimco assumes no responsibility for field surface preparation or touch up of shipping damage to paint. Painting of fasteners and other touch up to painted surfaces will be by Purchaser's painting contractor after mechanism erection.

3. Identification tags that are removed for painting prior to assembly must be reattached to the original components for correct identification. Assistance from Eimco will be charged at the normal service rate.

WARNING	02-AX4 (6/92) 8

Failure to heed these warnings will void the drive warranty!

LUBRICATION WARNING

The drive unit is shipped from the factory without operating lubricant.

SANDBLASTING WARNING

The Eimco main drive unit and motor drive must be fully covered or sealed off to protect against sand and dust when sandblasting in their vicinity. All external openings, including vents and oil fill plugs and the space between the rotating main gears and stationary bases on the main drive, should be taped closed, covered with polyethylene film, or stuffed with oakum or rag waste. After sandblasting and before start-up, drain a portion of oil from the drive through nylon stocking to be sure grit has not penetrated the drive. Remove all covers.

Sand, dust and other foreign material must not enter into the drive mechanism or lifting device (if furnished).

WELDING WARNING

Use the piece being welded as the ground to prevent the electrical circuit passing through the drive.

DRIVE DIRECTION OF ROTATION

The drive must rotate the direction specified on the drawings, unless a reverse rotation is specifically allowed.

LIFTING PRECAUTIONS -STRUCTURAL- AND SHIPPING BRACES	02-AX8 (4/91) 9

WARNING DO NOT PULL, DRAG, PUSH OR DUMP THE STRUCTURAL COMPONENTS OFF THE CARRIER.

All structural components should be lifted and handled as covered below. Proper handling is necessary to protect special coatings or coverings and to ensure ease of assembly during equipment installation.

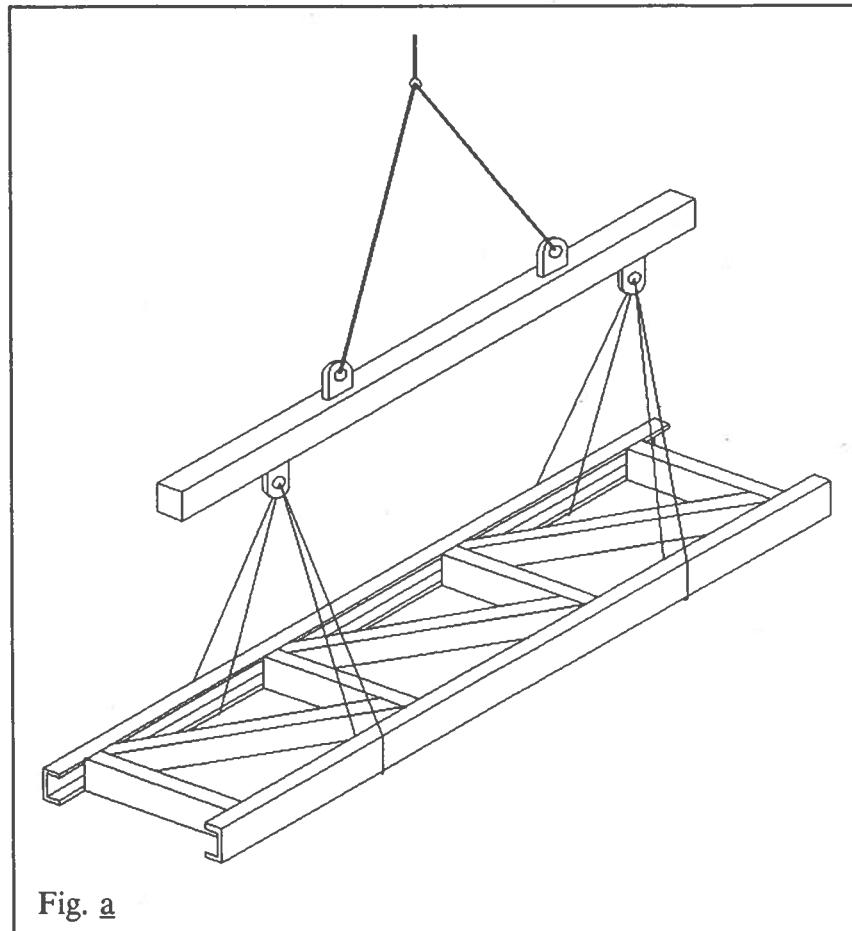
Eimco will not accept charges for repair or replacement of equipment or materials damaged due to improper handling.

LIFTING RECOMMENDATIONS AND CAUTIONS

Observe these precautions when lifting or handling structural components furnished by Eimco:

WARNING: STAND CLEAR AS THE EQUIPMENT IS LIFTED.

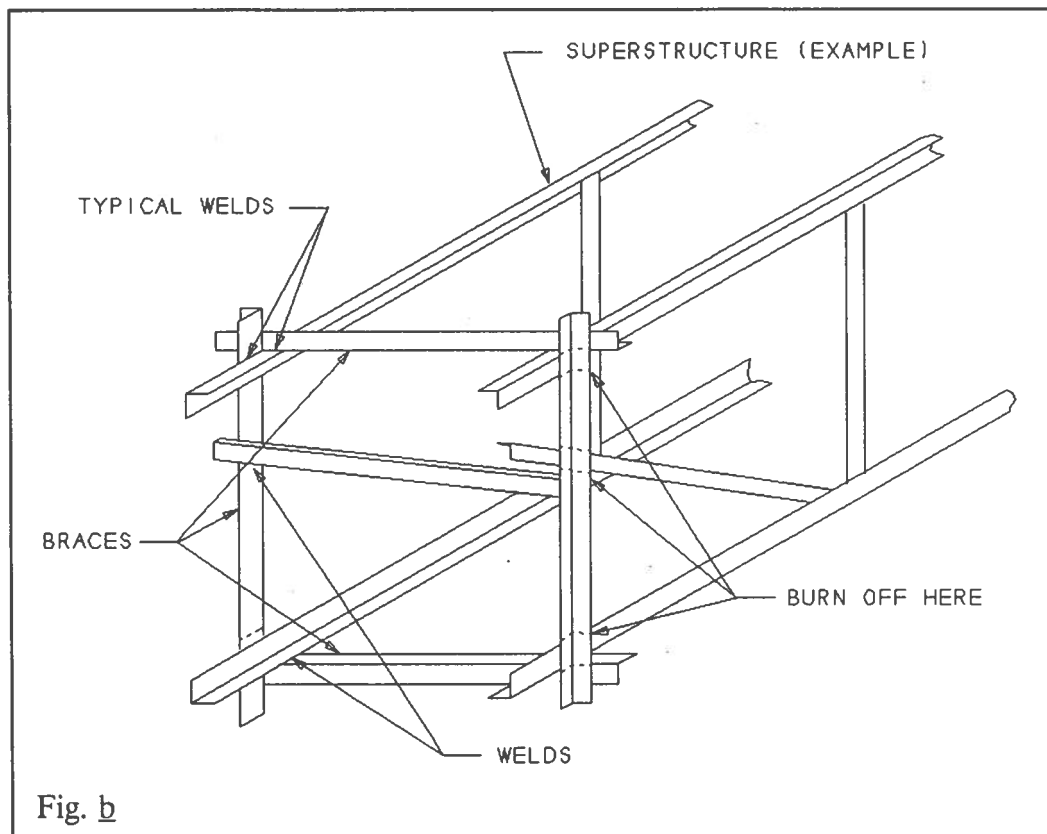
1. Make sure the equipment being lifted or the lifting equipment cannot come into contact with overhead electrical cables, etc.
2. Make sure the rigging and hoist equipment are of adequate capacity. Weights for major components are listed in the parts list.
3. All rigging and lifting should be done by experienced personnel.
4. Before the equipment is removed from the carrier, check to be sure the blocking, bracing and banding securing it to the carrier have been removed and it is ready for moving.
5. Use multiple point lifting whenever possible.



6. When lifting structural members of this equipment, such as rake arms, cages, superstructures, etc., avoid twisting or bending the members, especially components that are galvanized. Use spreader beams, as necessary, to fully support the pieces as they are lifted.
7. Make sure shop provided camber (if furnished) is maintained when lifting rake arms and superstructures.
8. Lift the equipment an inch or two off the carrier to be sure it is free to be moved and balanced correctly. Adjust as necessary.
9. Never move the equipment suddenly or in jerks and never allow it to strike the ground, tank or other equipment.
10. When lifting components that are rubber or neoprene covered or special painted, use rubber belting, burlap or other padding between the lifting cables and the equipment to prevent damage to the protective covering.

SHIPPING BRACES (if used)

1. Shipping braces may be used to protect, segmented superstructures, rake arms and cages from damage during shipping. Shipping braces are marked "SHIPPING BRACE ONLY" in white painted letters or they are painted purple. This bracing must be removed.



2. Burn the braces from the chords, angle braces or structural members, as shown in Figure b. DO NOT attempt to scarf braces as this may cause weakening of structural members.

INSTALLATION SEQUENCE OUTLINE	03-CL11 - 6/93 24666-01 X 12

<u>Sequence</u>	<u>Page No.</u>
1. Inspect the tank	14
2. Install the sludge discharge pipe and influent column	16
3. Place the cage and sludge collection drum around the column	19
4. Install the drive unit	21
5. Lubricate the drive and connect temporary wiring	24
6. Connect the cage to the drive	25
7. Install the collection arms. Do not install the squeegees	26
8. Check and final level the drive unit	28
9. Final plumb the cage	31
10. Install the sludge collection drum seal and sludge controls	32
11. Install the feedwell	36
12. Install the walkway and drive platform	39
13. Connect the electrical wiring and check motor drive rotation	41
14. Check the collection arms for equal clearance with the tank bottom	44
15. Mechanical check by an Eimco PEC Serviceman may be advisable	45
16. Grout under the column	46
17. Grout the bottom of the tank	47
18. Install the skimming device	52

INSTALLATION SEQUENCE OUTLINE	03-CL11 - 6/93 24666-01 X 13

<u>Sequence</u>	<u>Page No.</u>
19. Install the weirs, baffles and scum box	55
20. Install the scum box flushing system	56
21. Check the arms for final level	58
22. Install the squeegees	59
23. Install the sludge draw-off piping	60
24. A final mechanical check of the equipment by an Eimco Serviceman	62
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CHECK THE TANK

04-CL2
(11/78)b
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TANK

The tank must conform to specifications in order to accommodate the mechanism. If the tank fails to meet these specifications, requiring any modifications of the equipment, Eimco will not accept charges. Check the tank as follows:

CHECK the elevation at the walkway mounting surfaces at (A) only.

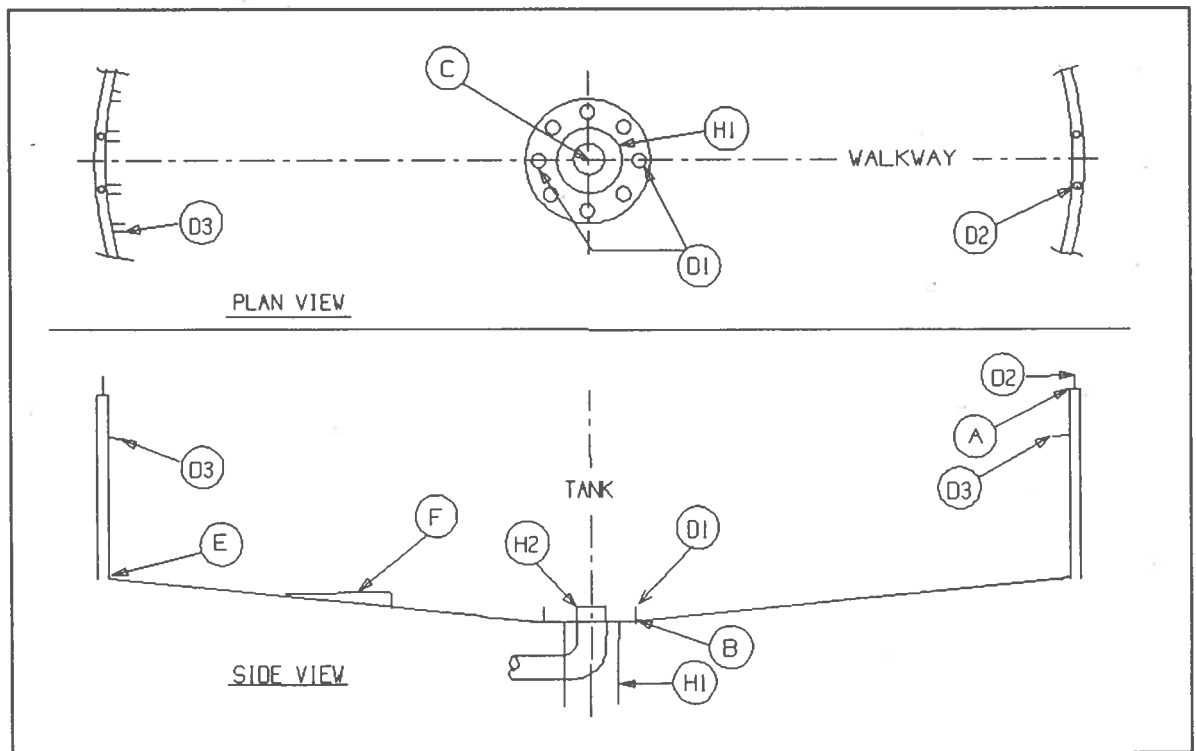
CHECK the elevation at the center column base at (B).

CHECK for true center at (C) in order to check the anchor bolts at the (D) locations and the wall circumference at (E).

CHECK that 2 anchor bolts for the center column at (D1) are on the center line of the walkway and that the anchor bolts are concentric with true center at specified radius.

NOTE: If an anchor bolt template is furnished by Eimco, it must be used to locate the anchor bolts.

CHECK all anchor bolts at (D) Locations for proper size, projection, elevation and orientation. Wall bolts at (D3), if furnished, should be on a radial line with true center.



CHECK THE TANK	04-CL2 (11/78)b 15

CHECK the tank bottom for specified diameter all around at (E) and for specified slope (F) at approximate 90° locations around the tank.

CHECK the influent opening (H1) for proper diameter and the incoming sludge discharge pipe (H2), not by Eimco, for correct size and projection.

INSTALL THE SLUDGE DISCHARGE PIPE AND INFLUENT COLUMN	05-CL10 (1/89) 16

The influent column serves as (1) a support for the drive and (2) a central tank inlet for the influent. The sludge discharge pipe is located inside the column. The sludge flow through the discharge pipe is separated from the influent by a seal at the bottom and seal welding at the top of the pipe.

A. Install the Sludge Discharge Pipe

1. Place the packing retainer end plate (A) (for the pipe sleeve packing) over the stub of the incoming discharge pipe (not by Eimco). Refer to Figure a.
2. Place the flanged end of sludge discharge pipe (B) over the incoming stub pipe and block it firmly in an upright position.
3. Caulk the space between the stub pipe and the discharge pipe with packing (C), such as nylon rope or other specified similar packing. Do not use oakum. Tamp the caulking firmly in place. Then mount and tighten the packing retainer end plate against the packing.

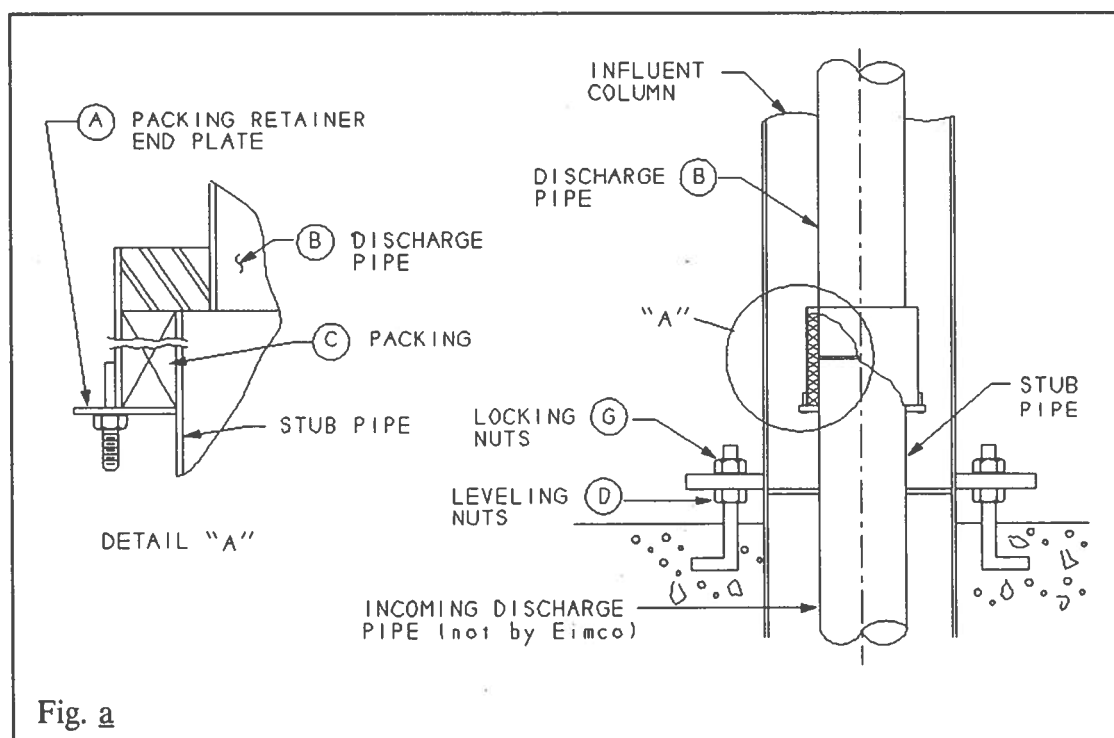


Fig. a

4. CHECK the discharge pipe for plumb.

INSTALL THE SLUDGE DISCHARGE PIPE AND INFLUENT COLUMN

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(1/89)
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B. Install the Influent Column

1. Install the column leveling nuts (D) with top faces of the nuts set for the specified elevation of the bottom of the column.
2. CHECK all nuts for level with a combination straight edge and machinist's level. Readjust if necessary.
3. Construct a temporary dam (E1) for the grout (E) around the influent opening to hold back the grout during the grouting of the column.
4. Lower the column (F) carefully over the discharge pipe to rest on the leveling nuts, orienting the V-notch in the column with the centerline (CL) of the walkway. The sludge pipe will fit into the upper ring of the column.
5. Snug the leveling nuts (D) against the flange. Install the upper locking nuts (G) and tighten by slugging with a slug wrench.

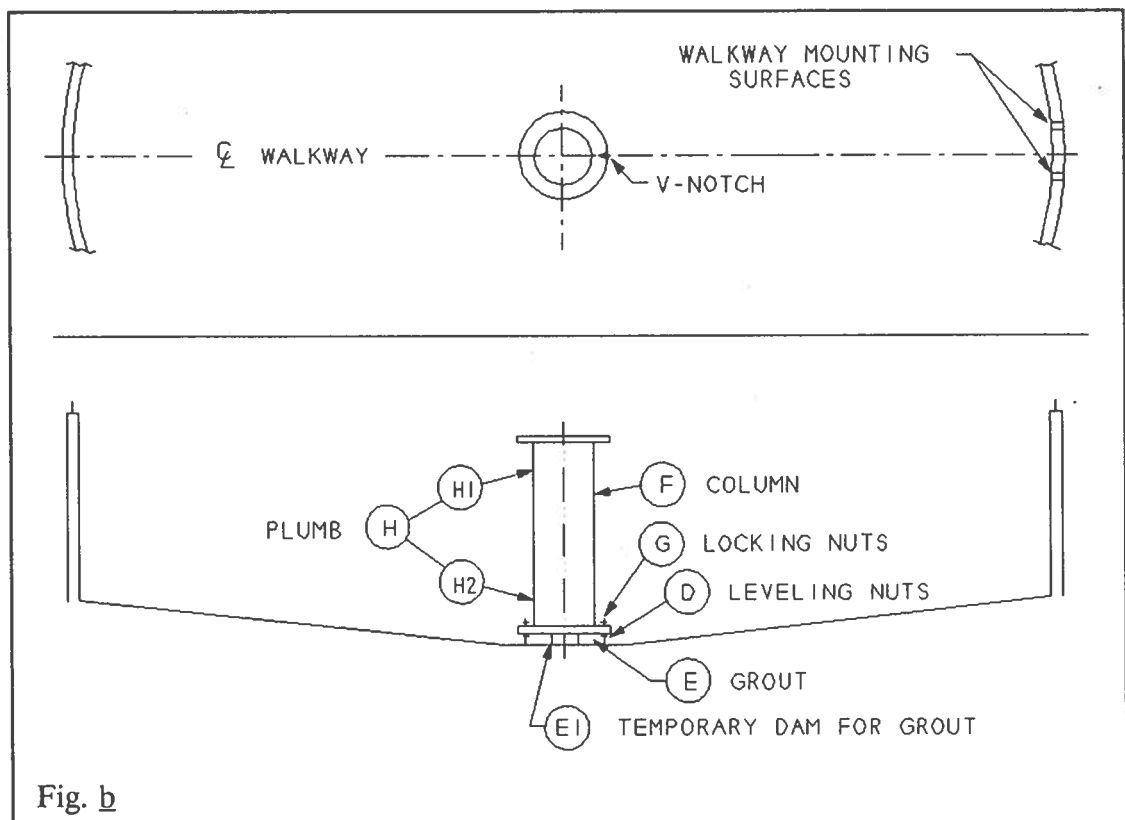


Fig. b

6. CHECK the column for plumb (H). Reasonable allowance is 1/8 inch in 10'-0" overall, that is (H1) minus (H2).

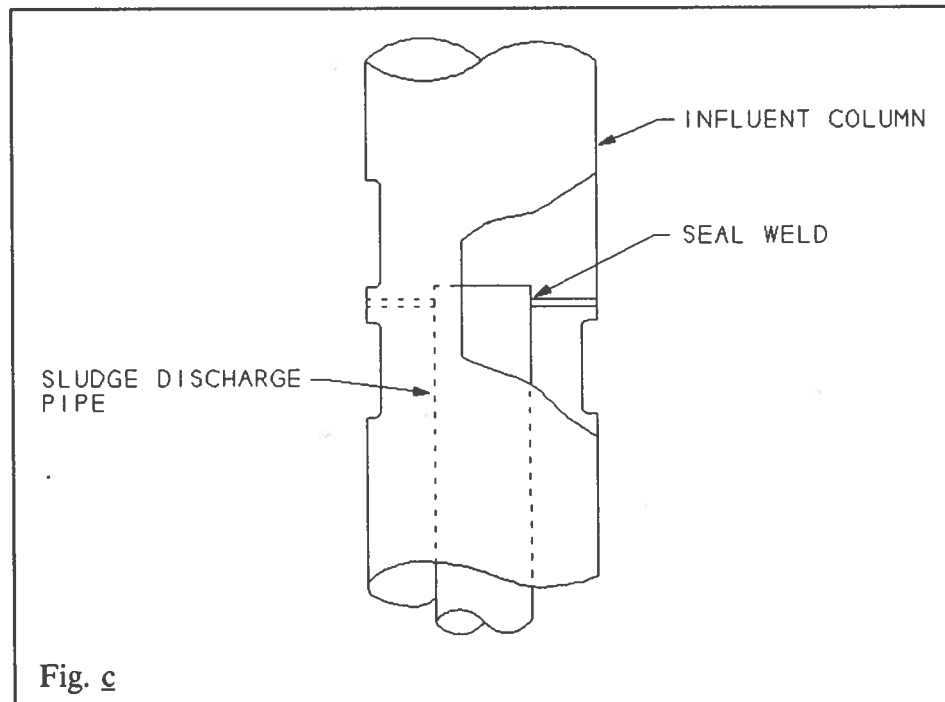
INSTALL THE SLUDGE DISCHARGE PIPE AND INFLUENT COLUMN	05-CL10 (1/89) 18

NOTE: Checking and adjustment must be done when the center column is a uniform temperature, such as the early morning or an overcast day.

7. Adjust for plumb with the leveling nuts (D). Make sure the upper nuts (G) are slugged after each adjustment.

NOTE: Do not grout under the column. This will be done following final leveling of the drive.

8. Seal weld the sludge discharge pipe (B) to the influent column (F), referring to the General Erection drawing and Figure c.

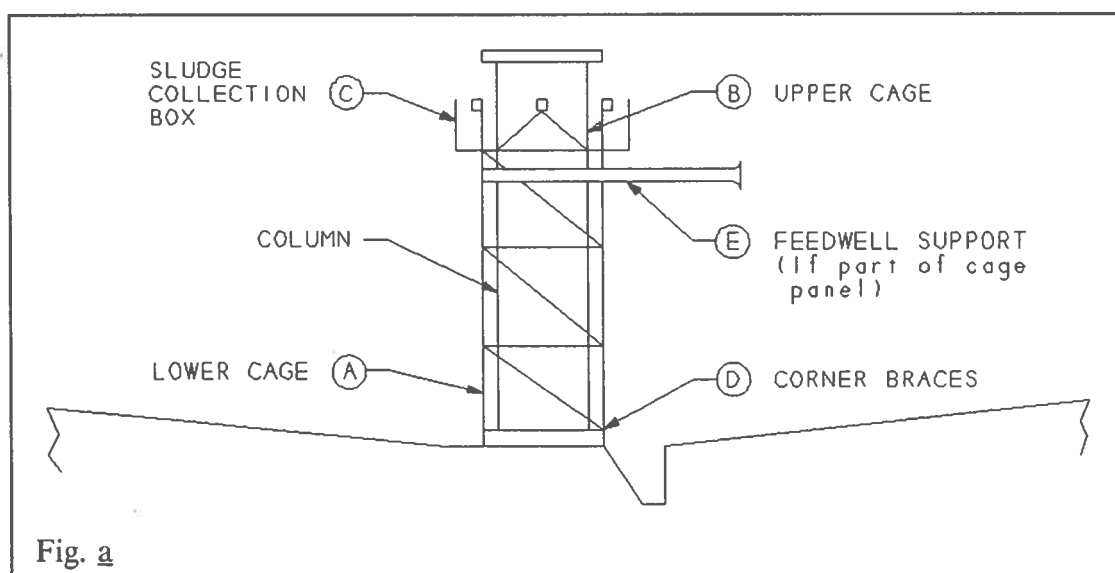


The sludge collection box (drum) (C) fits between and is assembled with the upper cage (B) and lower cage (A) sections. Since the collection box and cage sections are furnished in single pieces, they must be in place around the column before the drive is installed.

The cage and box can be assembled either (1) in place around the column or (2) separately from the column, as follows.

A. Follow one of the two methods of assembly:

- (1) If the cage and sludge collection box are to be assembled around the column, start with the bottom cage section and work upwards:
 - a. Set the lower cage (A) over the column, without the corner braces (D) installed, and allow it to sit on the column base.
 - b. Connect the upper cage (B) temporarily to the collection box (C). Then set the assembly in place on the lower cage (A).
 - c. The cage sections can be (a) joined and mounted as a unit to the drive, after the drive is installed, or (b) installed one at a time, starting with the upper cage. Check orientation of the sludge piping connections with the connections on the cage. See the "Note" below.



CAGE AND SLUDGE COLLECTION BOX ASSEMBLY	08-CL25 (3/85) 20

- d. If the feedwell supports (E) also serve as the cage panel members, install the supports either before or after the cage has been placed around the column, but install them before the rake arms are installed. Do not weld (if specified) the supports to the cage at this time.

----OR----

- (2) If the cage and sludge collection box are to be assembled separately from the column, assemble the cage sections with the sludge box sandwiched between.
 - a. Assemble the cage sections with the sludge box being sure to orient the box sludge piping connections with the connections on the lower cage. Refer to the "Note" below.
 - b. Install the assembly over the column, allowing it to sit on the column base. Do not install the corner braces (D) before the cage is set in place.
 - c. If the feedwell supports (E) also serve as the cage panel members, install the supports either before or after the cage has been placed around the column, but install them before the rake arms are installed. Do not weld (if specified) the supports to the cage at this time.

NOTE: Make sure the rotary valve openings, in the bottom of the box, line up properly with the suction arm connections on the cage. Refer to the General Arrangement Drawing for orientation.

Use High Strength Bolts as specified, but do not tighten them as specified in the instructions for the Turn-of-Nut-Method until all adjustments for cage alignment are completed. Note that all connecting structural surfaces (torqued surfaces) should be clean and unpainted where High Strength Bolts are used.

B. Check the Cage for Alignment

Check for alignment of the cage, preferably using a transit.

Adjust the cage sections and sludge box, if necessary, by shimming between the sludge box and the flanges of the cage sections.

DRIVE UNIT INSTALLATION

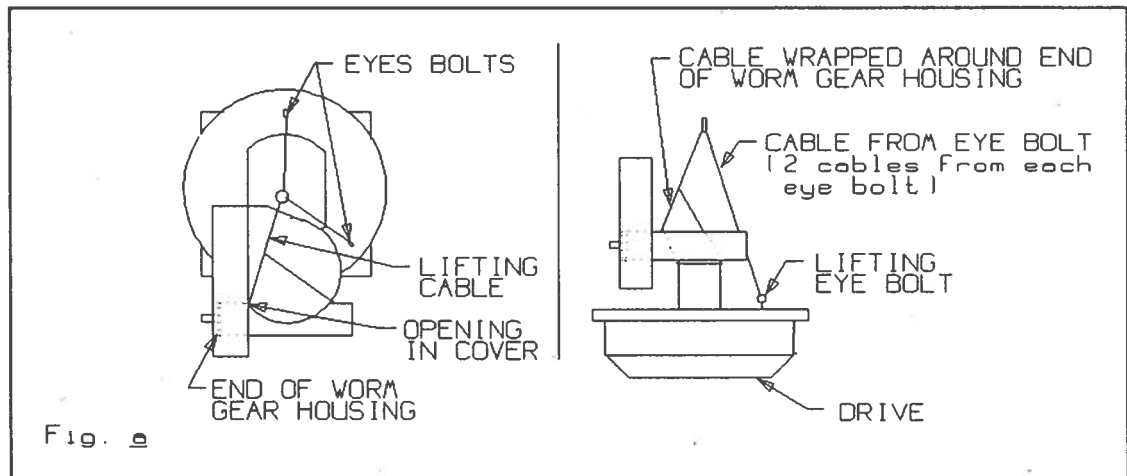
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Reference Drawings: General Arrangement, Drive Unit Package and General Erection

The drive unit is shipped fully assembled, including the drive control (overload cutout device). The main drive housing, to which the cage attaches, is on the bottom and the worm drive assembly is on top.

1. LIFT THE DRIVE UNIT

Lift and install the drive as a complete assembly, using the two eye bolts and wrapping a 3rd lifting cable around the worm gear housing, through the opening in the drive cover, as shown in Fig. a. Do not allow the cable to contact the drive control.



2. INSTALL THE DRIVE

CHECK the mounting surface of the drive housing for foreign matter and the column mounting flange for spatter or other foreign matter. Remove as necessary for a clean flat surface.

Place the drive unit on the column, orienting as shown on the General Arrangement drawing.

3. MOUNTING BOLTS

Insert but do not tighten the drive mounting bolts. Note that some drives have (2) tapped mounting holes, one on each side of the pinion pocket, due to inaccessibility of the bolts and nuts for installation. If the holes are tapped,

DRIVE UNIT INSTALLATION

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(10/86)
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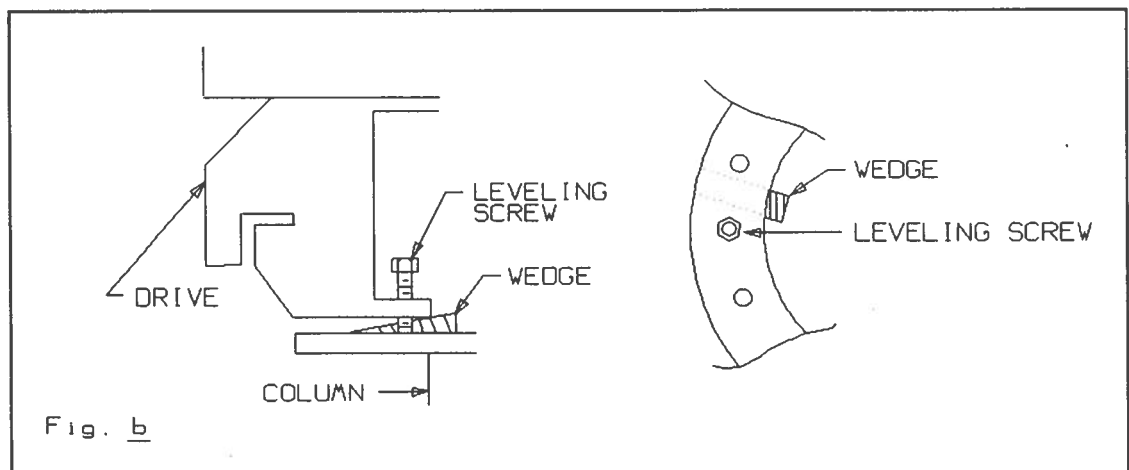
install the mounting bolts by running them up through the flange of the column, then into the threaded holes in the drive base. Only these 2 holes are tapped. The other mounting holes use nuts and bolts, which are installed by running them down through the drive base and through the column flange. (Nuts are not required at tapped holes.)

4. LEVEL THE DRIVE

At this point in the erection the drive will be adjusted for near level, using a carpenter's level and the leveling jack screws. After installation of the arms and cage, the drive will be adjusted for final level by shimming.

CHECK the drive for level, using a 4' carpenter's level placed on the leveling surface of the main drive cover. Check in two directions (90°).

- a. Remove, clean and lubricate the jack screws in the drive base, then reinstall the jack screws.
- b. Adjust for level using the jack screws.
- c. After leveling, support the drive using wedges at the jack screws.
- d. Install the drive hold-down bolts and snug tighten only. Do not torque.
- e. Final leveling of the drive will follow installation of the rake arms.



LUBRICATION WARNING:

The drive is shipped from the factory without operating lubricant.

DRIVE UNIT INSTALLATION	07-CX11 (10/86) 23

SANDBLASTING WARNING:

The Eimco main drive unit and motor drives must be fully covered or sealed off to protect against sand and dust when sandblasting in their vicinity. All external openings, including vents and oil fill plugs and the space between the rotating main gears and stationary bases on the main drive, should be taped closed, covered with polyethylene film, or stuffed with oakum or rag waste. After sandblasting and before start-up, drain a portion of oil from the drive through nylon stocking to be sure grit has not penetrated the drive. Remove all covers.

Failure to observe this warning will void the drive warranty.

DRIVE LUBRICATION AND ROTATION WARNINGS	07-BC21 (2/93) 24

1. LUBRICATION WARNING

The drives are shipped from the factory without lubricating oil and/or grease.

Refer to the "Lubrication" instructions in this manual. Refer to the Table Of Contents for lubrication instructions page numbers.

2. DRIVE ROTATION WARNING

Incorrect rotation of the drive, and in some cases rotation of the drive without electrical power, will cause serious damage to the drive and possibly a dangerous build up of torque.

Refer to the "Lubrication, Electrical Wiring, Drive Rotation and Drive Controls" instructions on a following page.

DO NOT attempt to operate or rotate the drive (rake arms) before you read those instructions.

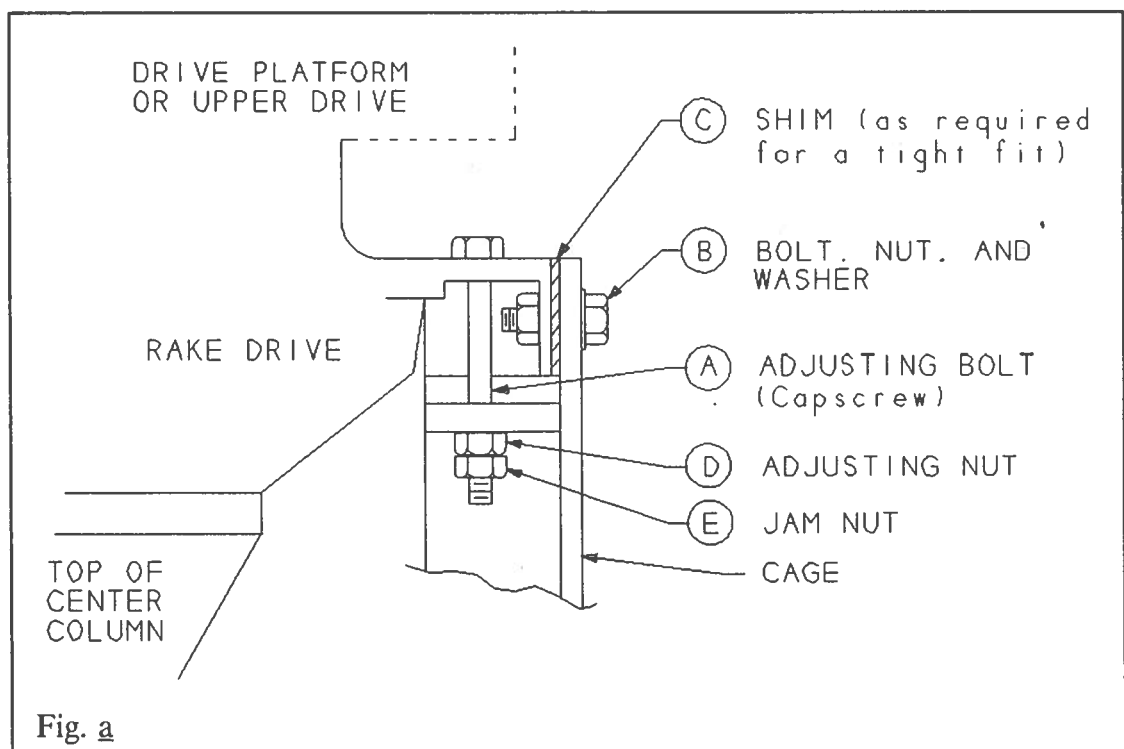
CONNECTION OF CAGE TO THE DRIVE

08-CA9
(8/88)
25

1. Referring to Figure a, attach the cage to the drive unit, using the vertical adjusting bolts (A) and nuts (D).
2. Loosely install the bolts and nuts (B), including the washers. Shim between the drive and cage for a snug fit and concentricity (centering) about the drive. (Shims not by Eimco.)
3. Using the adjusting bolts (A) and adjusting nuts (D), raise the cage to its highest position. In some cases it may be necessary to raise the cage with jacks.
4. Check the cage for plumb, using a carpenter's level.

Note: Final check for plumb and centering will follow drive leveling.

5. Adjust the cage for plumb using the adjusting nuts (D), then secure the bolts (B). Do not torque the bolts (B). Secure the jam nuts (E).



INSTALL THE RAKE ARMS	08-CL17 (8/88) 26

To prevent misalignment or damage to the cage, install the arms as a pair and support the arms with blocking arranged so that the connection to the cage will not be forced.

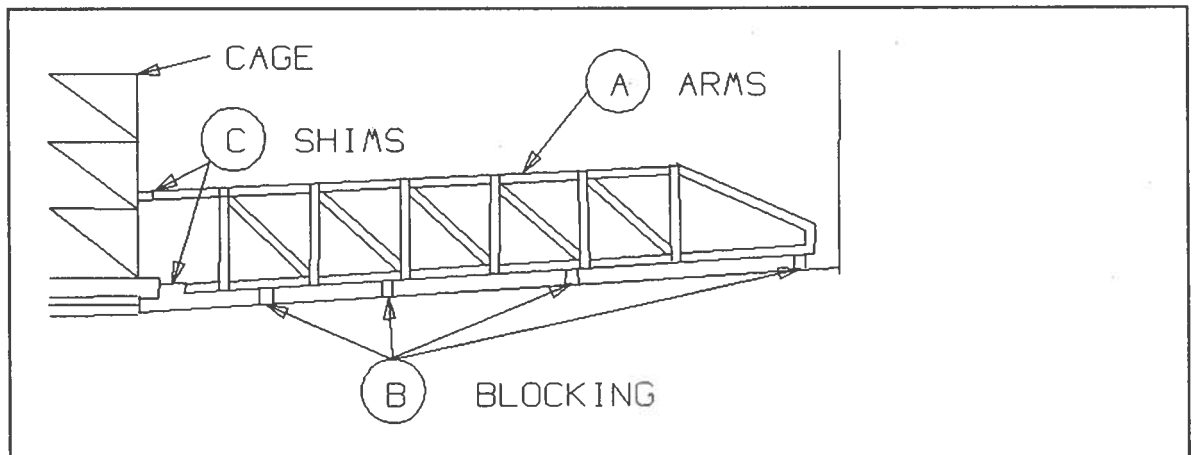
1. Set the arms (A) in position at the cage, supported by blocking (B) for the specified clearance with the tank bottom. Pull the arms up square with the cage and with the arm connections adjacent their matching fittings at the cage.

Make sure the arms are straight and square with the center line of the arm. If necessary, pull them into square alignment, before the blades are installed.

2. Install the blades according to the part numbers, if specified, use the High Strength Bolts, and tighten them by the Turn-of-Nut Method. Make sure the arms remain square during the installation.
3. Shim (C) at the two lower connections as necessary for arm alignment. Install the bolts and draw them up snug. If there is a gap at one of the two upper connections, shim (C) as necessary for a tight fit (shim only one). Tighten all bolts, but do not force a connection in order to close a gap since this will put a twist in the arm. Close the gap by shimming at the cage to arm connections.

NOTE: Do not weld at this time. Welding will be done after final adjustment.

4. Remove the blocking (B) equally from each arm, beginning at the cage and working outward. Check the arm blades for clearance with the tank bottom to be sure they do not touch. (Final arm level will be checked later.)



INSTALL THE RAKE ARMS	08-CL17 (8/88) 27

5. If arm adjustment is necessary, use jacks placed near the outer ends of the arms for lifting. Shim equally at either the bottom or top connections to adjust for elevation.
6. The squeegees will be installed after tank grouting. If furnished with pickets, do not install them until after final arm leveling.

Leveling Adjustment

If it is necessary to level the arms, adjust them as a pair, or adjust one arm while supporting the opposite arm with blocking. This is to maintain equal weight on the cage.

CHECK FOR LEVEL

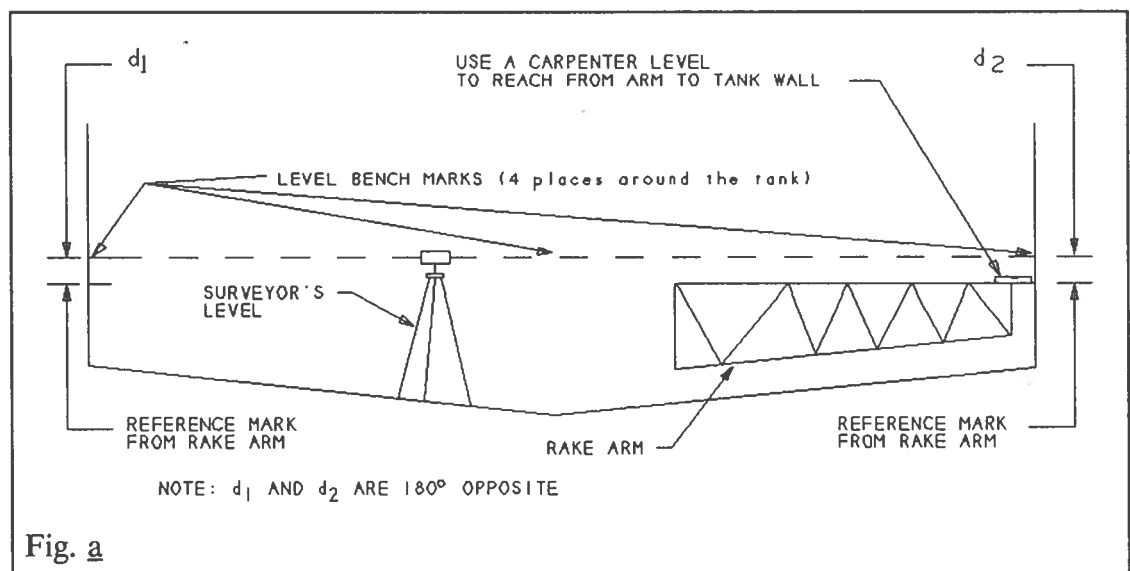
The main bearing of the rake drive must be level for proper operation of the mechanism and maximum bearing life.

The drive will be checked for level by measuring the level of the drive at the end of a rake arm, at various points around the tank. It will then be shimmed for level.

The drive must be leveled within a maximum out-of-level tolerance of .005 inch [0.127 mm] in 12 inches [304.8 mm] distance. This tolerance will be measured on a large scale using the rake arm, rather than the relatively small area of the drive cover.

1. Set up a surveyor's level near the center of the tank. Using the instrument, mark four level bench marks on the tank wall at the same height and spaced approximately 90° apart. Refer to the illustration below.
2. Rotate the drive and stop one (and the same) long arm at each of the four level points marked around the tank, and using a carpenter's level as an extension from that arm to the tank wall, make the second marks. These are shown as the "Reference Marks" in the illustration.

WARNING: Refer to the "Warnings" on drive rotation and lubrication on a following page under "Lubrication, Electrical Wiring, drive Rotation and Drive Controls."



NOTE: Checking and leveling must be done when the center column is a uniform temperature, such as the early morning or an overcast day.

FINAL LEVEL THE DRIVE	09-CX10 (5/91) 29

- Referring to the illustration, compare the difference in dimensions between the level marks and the rake arm reference marks at diametrically opposite sides of the tank.
- The difference between the two observed dimensions (d1 minus d2) must not exceed the maximum out-of-level dimension below:

<u>Mechanism Diameter</u>	<u>Maximum Out-of-Level Tolerance (d1 minus d2)</u>
50' [15,240 mm] or less	1/4" [6.35 mm]
100' [30,480 mm] or less	1/2" [12.70 mm]
150' [45,720 mm] or less	3/4" [19.05 mm]
200' [60,960 mm] or less	1-0" [25.70 mm]
250' [76,200 mm] or less	1-1/4" [32.05 mm]

SHIM FOR LEVEL

Shimming may be necessary to level the drive. Maximum bearing life of the drive unit main bearing is dependent on proper leveling and shimming. Perfect final leveling is not practical; however, it should be as accurate as possible. As the diameter of the mechanism increases, it becomes increasingly difficult to obtain an accurate adjustment.

In making a final shimming adjustment, care should be taken to tighten the drive mounting bolts equally and to support each drive mounting bolt, as necessary, with the proper thickness of shim material. Uneven tightening and shimming may cause deformation of the bearing race, causing shortened bearing life.

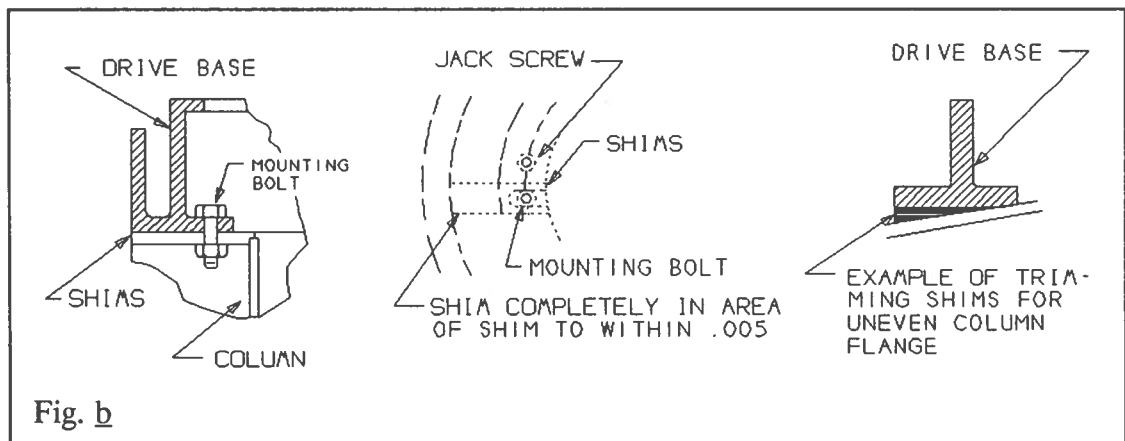
Shims

Use only the stainless steel shims furnished by Eimco and attached to the drive unit. They are provided in sizes and quantities to satisfy most requirements. If more shims are needed, contact the Eimco Parts Service Dept., referring to the telephone number in this manual, and refer to the parts list for the quantity and thickness.

Shimming

- Use the jack screws provided in the drive base to level the drive. Be sure to release the drive mounting bolts.
- Check clearances between the drive base and column with a feeler gauge at each of the drive mounting bolts. Mark clearances on the drive base for ready reference.

3. Shim at the mounting bolts, using the Eimco furnished shims and referring to Fig. b. Since the shims insure the level of the drive for optimum service life of the main bearing, use only these stainless steel shims provided by Eimco. Do not use any other type of shims or shim material.
4. Back off the jack screws so the drive is supported only by the shims. Recheck the level of the drive by rotating the arm to the level marks. Adjust as necessary until the drive is within specified level tolerance.
5. Tighten the drive mounting bolts. Make sure that no jack screws are supporting the drive.



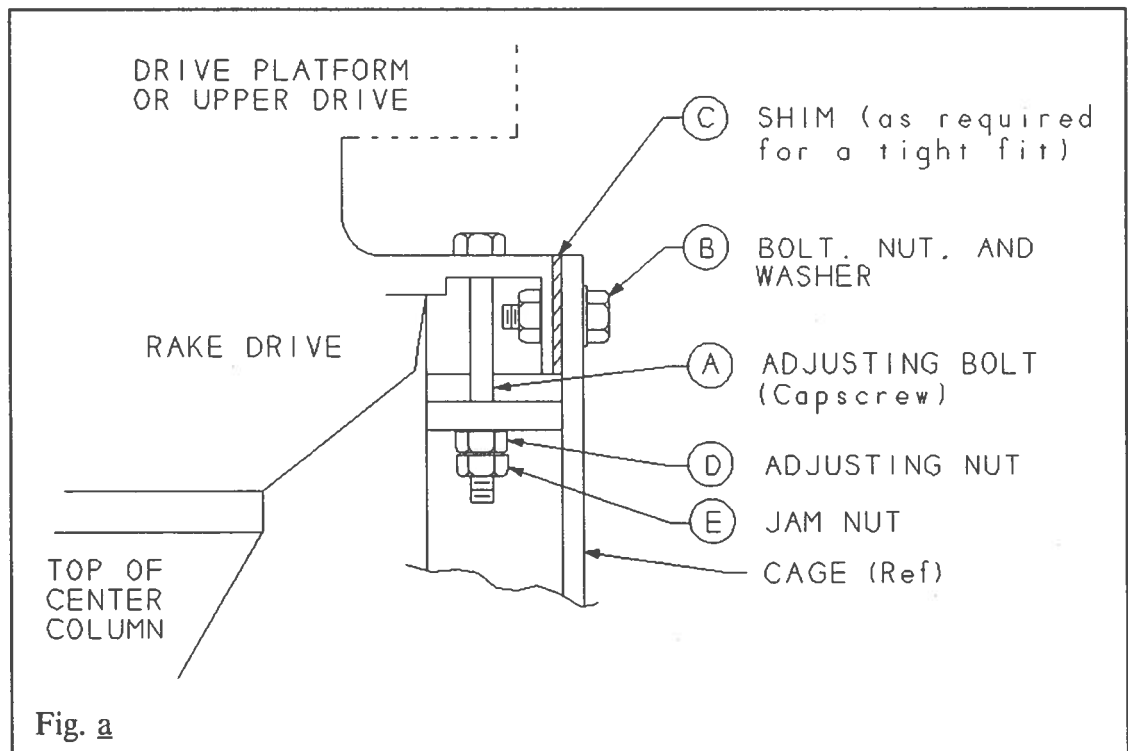
CHECK THE CAGE FOR
FINAL PLUMB

09-CA15
(9/87)
31

1. Check the cage for plumb with a surveyor's instrument.

NOTE: Checking and adjustment must be done when the steel is a uniform temperature, such as early morning or an overcast day.

2. To adjust for plumb, release the nuts and bolts (B) and jam nuts (E), then turn the adjusting nuts (D) to correct for plumb. Lower the side of the cage to bring it into plumb, do not attempt to raise the cage with the nuts.
3. Shim (C) if necessary between the drive and cage for a tight fit and for cage centering around the drive (shims not by Eimco).
4. Check the cage for centering around the drive.
5. Secure the jam nuts (E) on the take-up bolts when the cage is plumb.
6. Secure the bolts at (B), but do not torque.



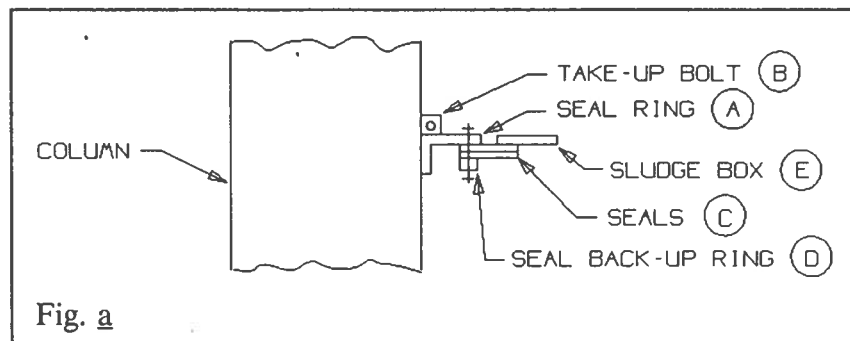
SLUDGE COLLECTION BOX SEAL AND ROTARY OUTLETS INSTALLATION

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(4/89)
32

Install the Sludge Collection Box Seal

1. Mount the seal ring (A) in place around the column by clamping the sections together with the bolts (B) at the take-up brackets on top of the ring. See Fig. a.

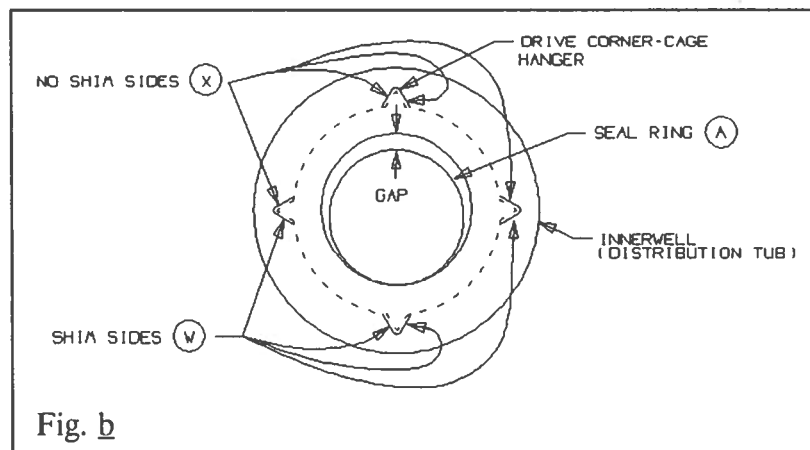
Do not weld at this time.



2. Check the sludge box (E) for concentricity with the seal ring (A) by rotating the cage. A minimum 1/4" clearance is required all around between the sludge box and seal ring. Note that a gap that rotates as the cage rotates indicates the cage is not plumb.

NOTE: Checking and adjustment must be done when the steel is a uniform temperature, such as the early morning or an overcast day.

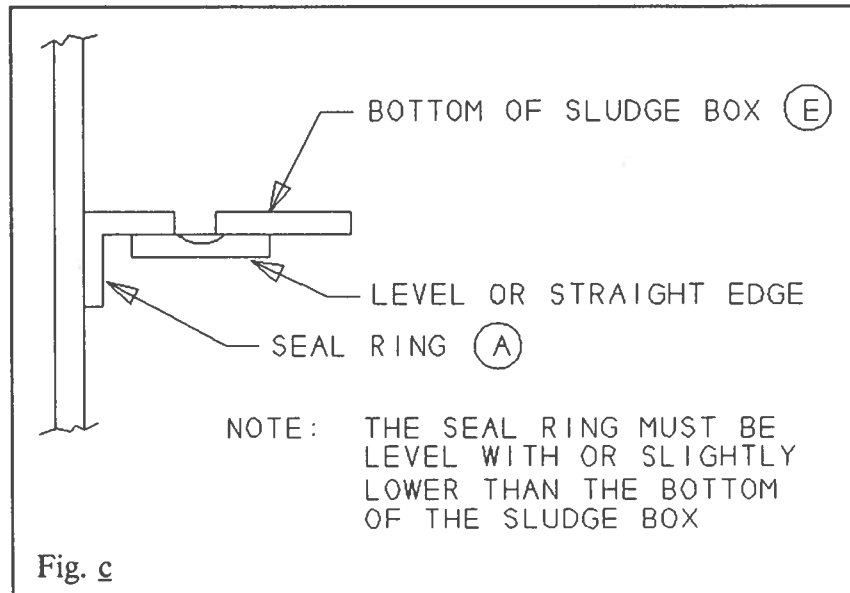
3. Adjust the sludge box for concentricity by shimming between the cage connections and the drive on the side with the least clearance and removing shims, if any, on the opposite sides (no shims). See Fig. b. For example, shim at drive corners "W" and remove shims from drive corners "X". Note: Maximum adjustment is 3/8" by shimming.



SLUDGE COLLECTION BOX SEAL
AND ROTARY OUTLETS
INSTALLATION

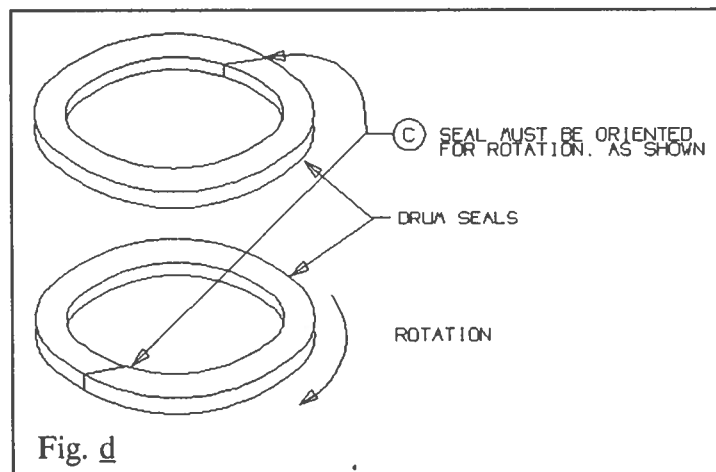
08-CL26
(4/89)
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4. Check the seal ring (A) for alignment with the bottom of the sludge box (E) using a level or straight edge, as shown in Figure c. The bottom of the seal ring must be level or slightly lower than the bottom of the sludge box, all around.



5. Adjust the ring (A) for alignment with the bottom of the sludge box. Then secure the take-up bolts (B).
6. Seal weld the seal ring (A) to the column as specified on the drawing. Tack and then skip weld to prevent warpage. Refer to Figure c. See the Welding Warning.

WELDING WARNING: Do not use the cage, collection drum or any attachments to them as a ground. This will damage the drive bearing through electrical circuit contact.



SLUDGE COLLECTION BOX SEAL
AND ROTARY OUTLETS
INSTALLATION

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7. Assemble the seals (C) with the seal back-up ring (D), being sure to orient the seal with the cuts 180° apart, as shown in Figure d. Mount the seals (C) and back-up ring (backup bar) sections (D) to the seal ring (A). Refer to Figure a.

NOTE: The seals will leak if they are painted. Cover them in case of any field painting.

Install the Rotary Valve and Adjustable Outlet Assemblies

1. Using silicone type caulking (not by Eimco) between the outlet assemblies and the control box, set the adjustable outlet assemblies in place inside the control box. The openings in the adjustable outlets must be facing inside, towards the column. See Figure e. If used, install the filler plates on each side of the outlet assemblies, making sure the assemblies are centered in the control box openings before securing the mounting bolts.

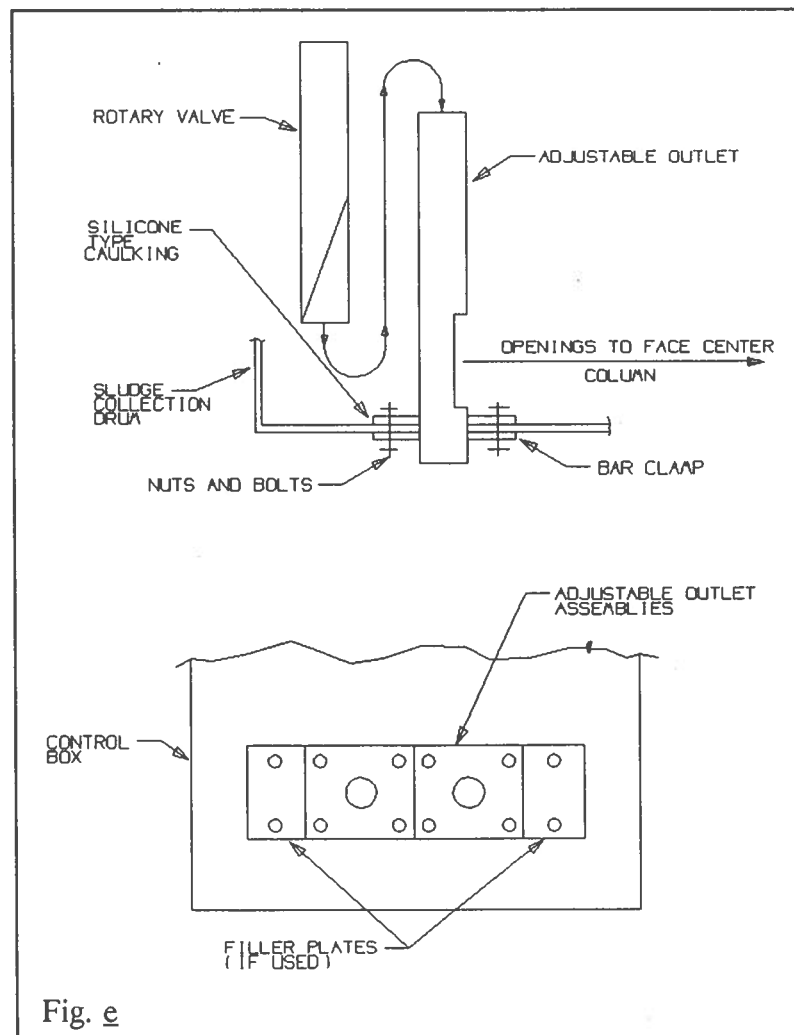


Fig. e

SLUDGE COLLECTION BOX SEAL AND ROTARY OUTLETS INSTALLATION	08-CL26 (4/89) 35

2. Secure the adjustable outlet assemblies (and filler plates, if used) using the bar clamps and nuts and bolt specified.
3. Install the rotary valves in the adjustable outlets.

1. Level the feedwell supports within the same plane.

NOTE: The feedwell supports should have been installed when the cage was installed.

2. Assemble the feedwell on a level surface, orienting the pieces as shown on the drawing. When lifting the feedwell sections, care must be taken to prevent changing the radius (curve) of the sections. Lift the feedwell sections as follows:
 - a. If separate lifting lugs are provided, mount them to the predrilled holes located just below the rim angle at approximately $\frac{1}{4}+$ the total length of the feedwell section from each end of the section. Refer to figure a. If lifting lugs are not provided, attach the lifting cables or chains with lifting clamps to the feedwell section at the rim angle at this same distance ($\frac{1}{4}+$) from each end of the feedwell section.

CAUTION: Do not attach the lifting cables or chains to the ends of the feedwell section. This will cause bending of the rim angle and feedwell plate, changing the radius and preventing proper fit-up of the sections.

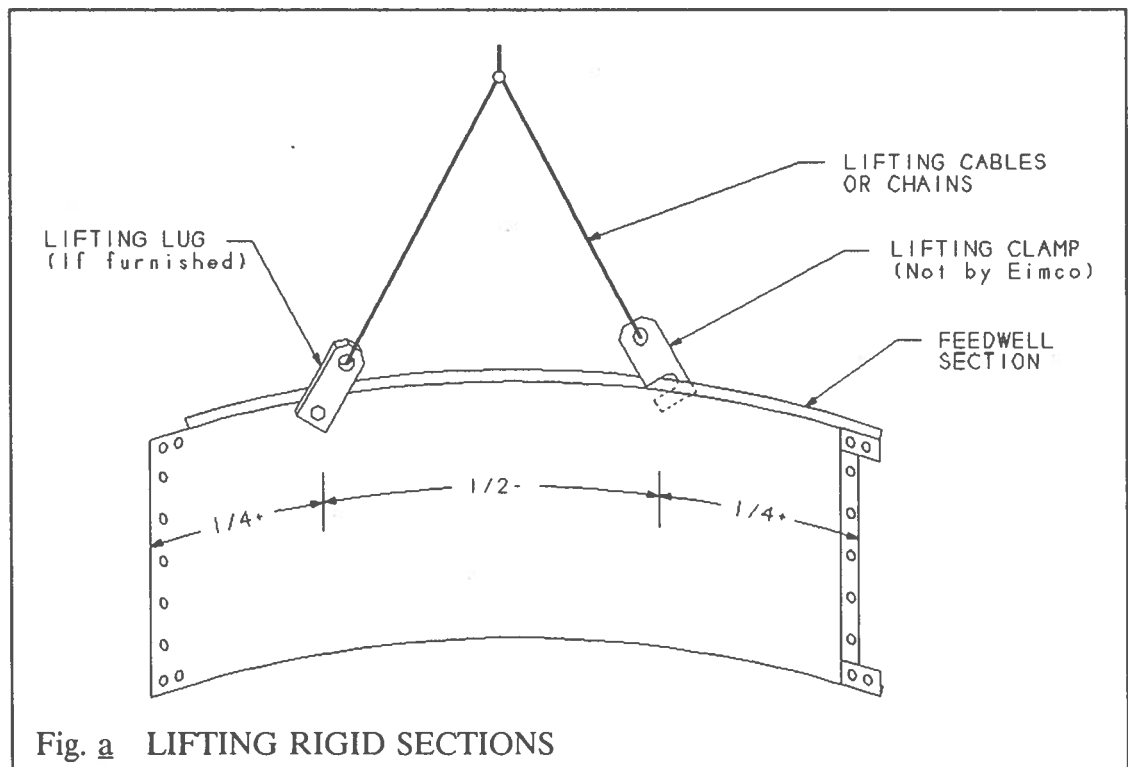
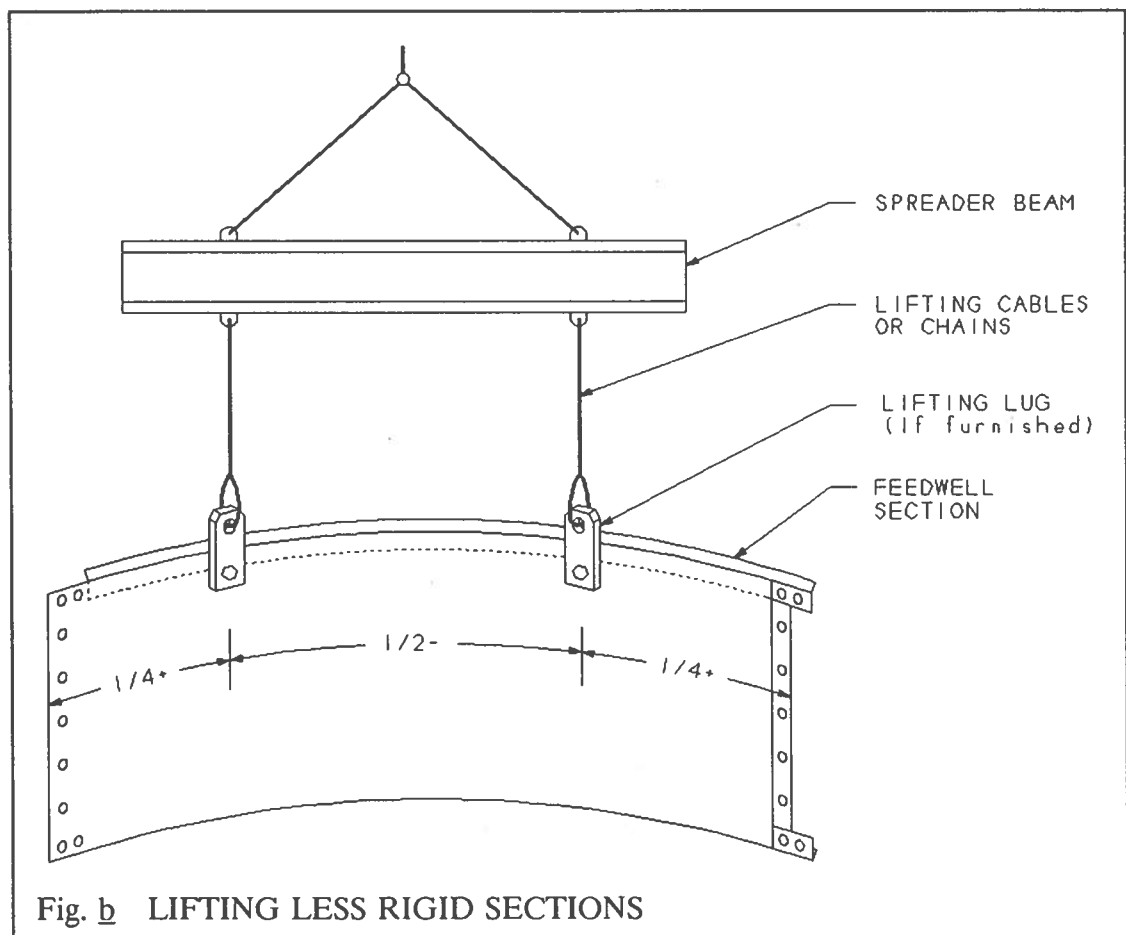


Fig. a LIFTING RIGID SECTIONS

- b. When lifting large, less rigid, feedwell sections, a spreader beam (shown in figure b) should be used to provide a vertical lift.
- c. Remove the lifting lugs, if used, after the feedwell section is in place. The mounting holes for the lifting lugs may be closed, if desired, using round headed bolts and nuts (the bolt heads must be on the outside of the feedwell), or by plug welding and grinding (not by Eimco) for a smooth surface (both sides).

Note: Leaving the holes open will not affect the process performance of this equipment.



3. Adjust for alignment of the sections and upper rim. Secure all fasteners and weld the splices, if specified.
4. Lift the feedwell, using multi-point lifting, lower it into place over the drive unit and onto the feedwell supports. Install the fasteners connecting the feedwell to the supports.

FEEDWELL INSTALLATION	06-CX17 (1/93) 38

5. Check the feedwell for elevation and all around level. Adjust, if necessary, and resecure all fasteners. Weld the feedwell supports to the cage, if specified.

WELDING WARNING: When welding on the feedwell, do not use the superstructure or platform as a ground and vice versa to prevent electrical current from passing through the drive and damaging the drive unit bearings.

6. Install the scum deflector (or scum gate assembly, if furnished) to the feedwell at the scum outlet opening. The bottom of the scum outlet opening should not be higher than the bottom of the weir V-notches.

WALKWAY INSTALLATION

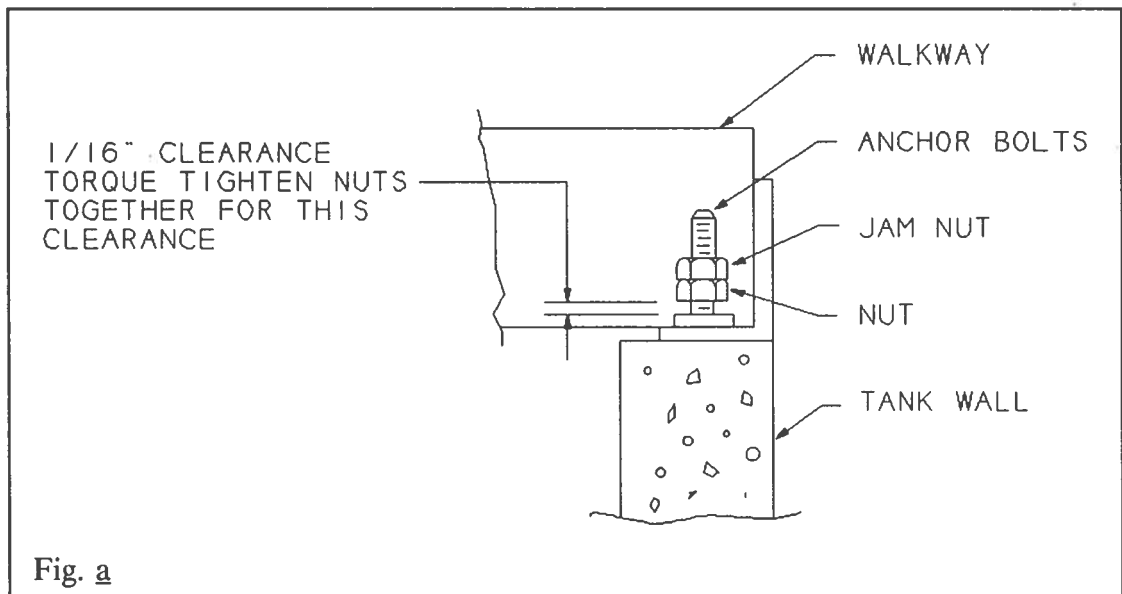
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1. If mounting plates are required, set them in place as called for in the drawings.
2. CHECK the walkway for camber, as specified in the General Erection drawing. If the walkway is not cambered, as specified, notify your Eimco representative immediately.
3. Mount the walkway in place on the tank and drive. Do not force the connection. If necessary, elongate the mounting holes on the tank end of the walkway section. Secure the anchor fasteners at the drive end and tighten the nuts together on the tank end, leaving a gap, as shown in Fig. a.

The 1/16" (approximately) clearance between the walkway and nuts, shown in Fig. a, allows for contraction and expansion of the walkway during temperature changes.

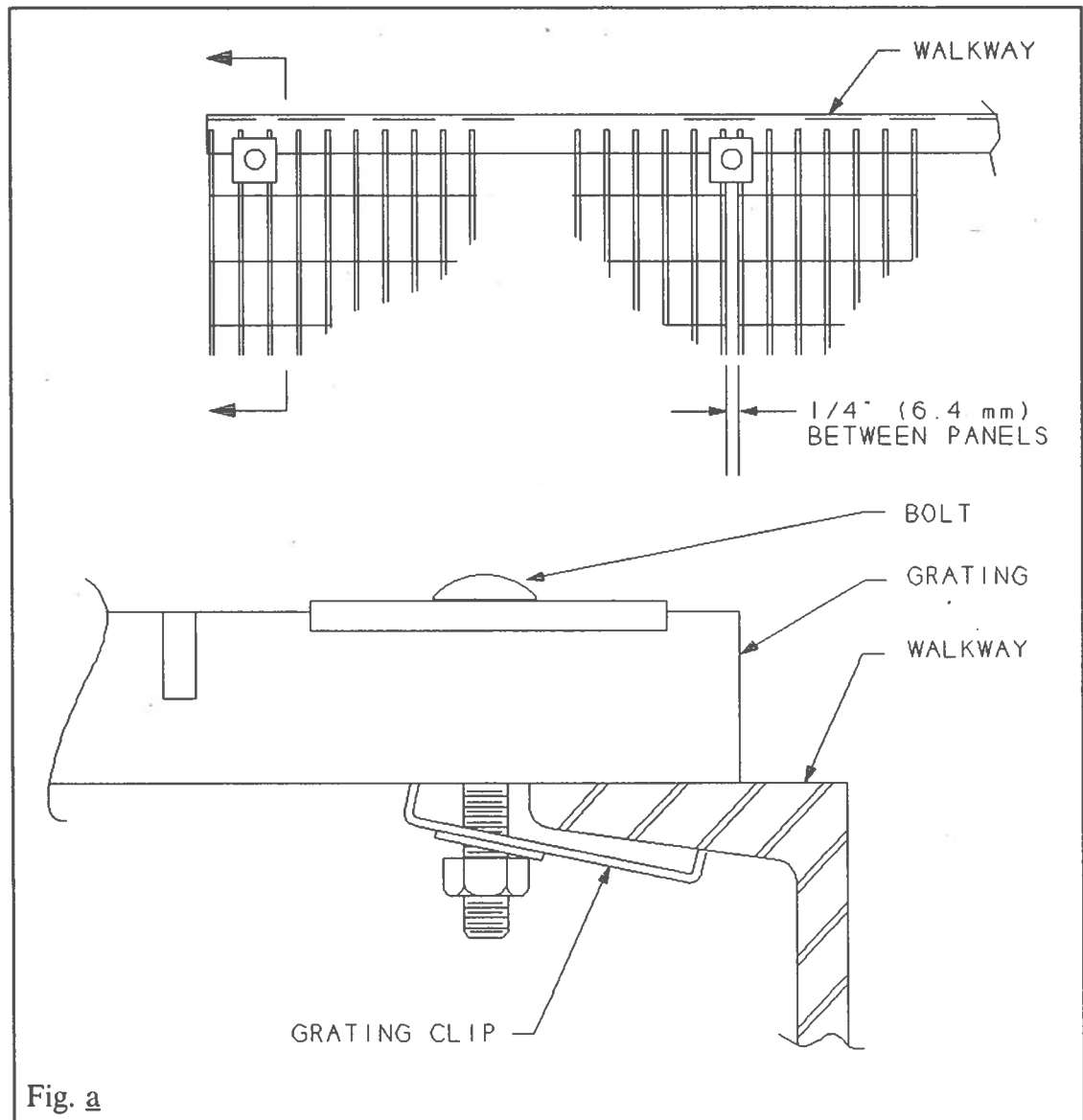
4. Mount the platform in place on the drive, bolting it to the drive and walkway, as specified.
5. Install the floor plates or grating and the handrails, as used.

Note: If specified, use Bi-Metallic adhesive backed neoprene tape at all aluminum to steel connections to protect components from galvanic action.



TYPICAL CLIP ASSEMBLY

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1. LUBRICATION WARNING

The drive is shipped from the factory without lubricating oil and/or grease.

Refer to the "Lubrication" instructions. Refer to the Table of Contents for page number of lubrication instruction.

2. CONNECT ELECTRICAL WIRING

Refer to the drawings for connection of the wiring to the motor drive, drive control, and, as furnished, alarm, control panel, torque recorder, etc. Eimco does not furnish, locate or install the interconnecting wiring, control panels, etc. All interconnecting wiring must meet local electrical codes.

Note that the drive motor must be wired so an automatic restarting of the motor cannot occur after a drive control shutdown, following a torque load.

3. CAUTION when no power is available:

To rotate the rake arms for final leveling when no electricity is available, observe the following warnings:

- a. Direction of rotation - The worm shaft (driven sprocket or sheave) must be turned the direction of the rotation "arrow" on the cover guard and the rake arms must turn clockwise, when viewed from above. (It is necessary to ensure warranty coverage.) An air ratchet or hand crank can be used to turn the shaft, but it should be protected against damage.
- b. Torque build up - Watch the drive control arrow, during the rotation, to make sure it does not go above zero "0". If it does, immediately stop the rotation and refer to the "Drive Maintenance Warning" in the maintenance section.

4. CHECK DRIVE ROTATION

The drive motor must be connected for the direction of rotation specified on the drawing and shown by the arrow on the chain or belt guard. If it is not, that will void the drive warranty and Eimco will not pay for damage.

CHECK the motor drive for direction of rotation without the drive chain or belts installed. Refer to the directional "arrow" on the cover guard or the reference drawing. Reinstall the chain or belts. (Caution: If the motor drive includes a shaft mounted reducer, do not disconnect the torque arm for this check.)

LUBRICATION, WIRING, ROTATION AND DRIVE CONTROL	07-BC19 (3/93) 42

5. CHECK ALIGNMENT OF A FIELD INSTALLED MOTOR DRIVE

If the motor drive was shipped separately from the main drive, install and align the sprockets or sheaves as follows:

Set the driven sprocket or sheave on the worm shaft outward 5/16" (7.9 mm) from true alignment (with the drive sprocket or sheave). *(See note). This is necessary since the worm shaft will move inward 5/8" (15.9 mm) under maximum running load. So this initial 5/16" (7.9 mm) setting will be closer to true alignment with the displacement that occurs under normal load.

Adjust the chain or belts for tension, referring to the instructions under Drive Maintenance.

*NOTE: If the motor mounts to the top of a worm shaft mounted reducer, the sheaves should be in true alignment since the motor and reducer will move together with the shaft.

6. CHECK THE DRIVE CONTROL FOR OPERATION

Refer to the parts list page "Drive and Motor Package" for the switch settings in checking the drive control. (Electricity is required for this check.)

- a. Start the motor drive. (Check the tank for obstructions or do this check while the chain or belt is removed.)
- b. Remove the cylindrical switch housing, unscrewing it from the base. Then manually actuate the cam switches by turning the cam shaft (and pointer) with the set collar (end of cam shaft). Slowly turn the pointer through a complete range to 100. This will simulate a mechanism full load condition. At the set points the alarm (if furnished) should sound and the drive motor should stop.
- c. If the drive control does not react correctly, check each switch individually. If none of the cam switches actuate, recheck the wiring to the drive control. Refer to the wiring diagrams. If the wiring is correct, check the cams for proper setting and the cam shaft for alignment. Contact your Eimco Representative in case of a problem.
- d. Replace the switch housing cover, being sure it goes on straight to avoid cross threading and to ensure a tight seal. Tighten the cover a minimum 1/2 turn after contacting the O-ring.

LUBRICATION, WIRING, ROTATION AND DRIVE CONTROL	07-BC19 (3/93) 43

Drive Control Caution: The drive control is an overload cut out device to protect the drive. Since it is installed and adjusted at the factory for proper operation, do not tamper with it. If the original cam settings are not satisfactory for the conditions, contact your Eimco Representative before attempting any adjustments. And the motor must not be able to restart automatically after a torque overload; see Electrical Wiring, above.

WARNING: IF THE DRIVE UNIT STOPS DUE TO AN OVERLOAD, DO NOT ATTEMPT TO RESTART IT UNTIL THE CAUSE OF THE OVERLOAD HAS BEEN LOCATED AND CORRECTED. REFER TO THE "DRIVE MAINTENANCE WARNING" INSTRUCTIONS IN THIS MANUAL.

7. TRI-MATIC RELEASE (if furnished)

A torque arm reducer may be furnished with a Tri-Matic Overload Release, which is part of the torque arm. This release is adjusted to stop the drive motor in case of drive overload while operating in reverse direction. **CAUTION:** Refer to the Tri-Matic Release cautions in the "Operation" section of this manual.

CHECK THE ARMS FOR EQUAL CLEARANCE WITH THE TANK BOTTOM	08-CX15 (3/86) 44

The arms will be checked at this time for equal clearance with the tank bottom. It is not necessary, at this time, that the arms be set at the specified elevation, but both arms must sweep in the same plane.

1. CHECK the arms for equal setting or clearance with the tank bottom, using a reference device on the tank bottom, such as piles of sand.
2. Adjust the arms for equal sweep by rotating the arms over the reference device and adjusting them as necessary for the same alignment.

When adjusting one arm, always support the opposite arm with blocking. And use jacks to lift the arms. Do not attempt to lift them any other way.

MECHANICAL CHECK	02-AA2 (6/85) 45

MECHANICAL CHECK

At this stage in the erection or installation of the equipment, before the center column or tank is grouted, a field mechanical check of the equipment by an Eimco Representative may be advisable. It could prevent expensive, difficult adjustments later.

Be aware, however, that this may be an additional paid service call, since a final mechanical check is required to ensure warranty coverage.

CALL YOUR SERVICE REPRESENTATIVE

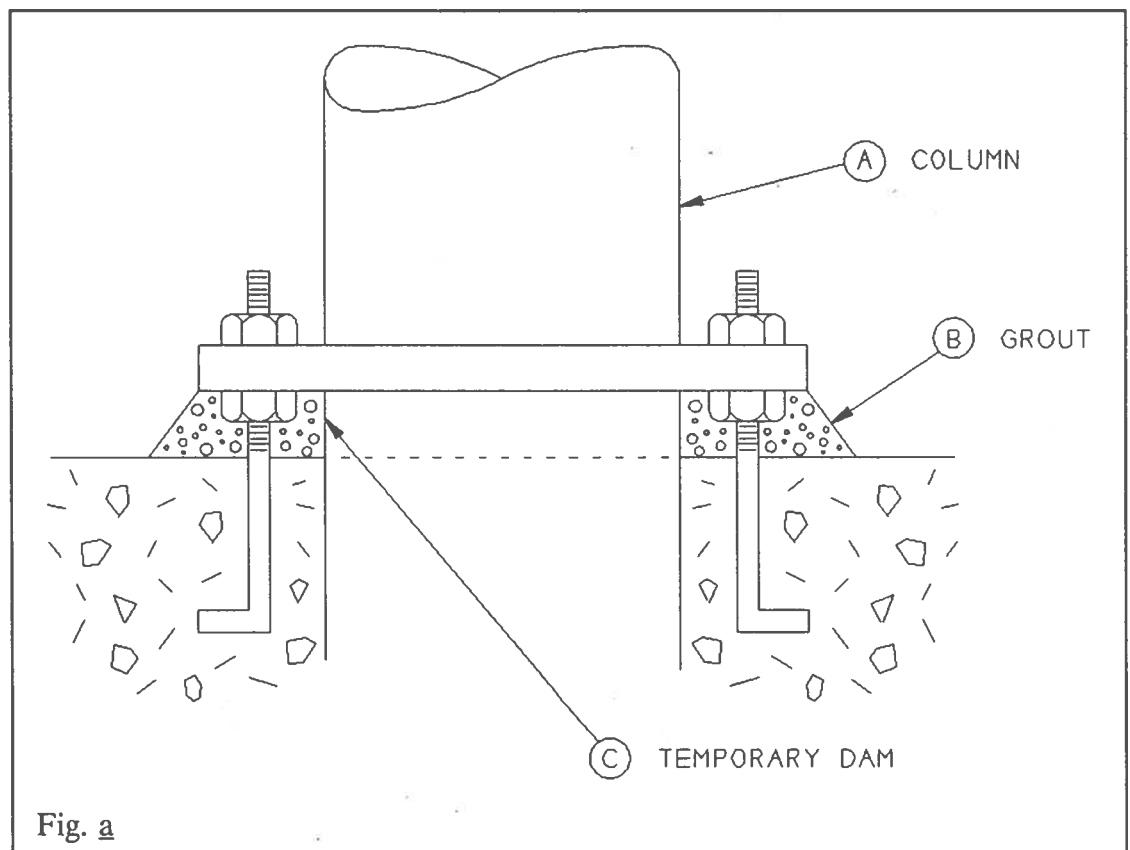
Discuss this with your Eimco Service Representative, who is experienced with this particular equipment and who will help you decide if a check should be made now, as well as later. Call your Eimco Representative referring to the addresses page at the end of this manual.

Arrangements for a service call must be made at least two weeks in advance.

GROUT UNDER THE COLUMN

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1. A temporary dam (C) should be constructed around the influent opening to hold back the grout during the grouting of the column, if not already constructed.
2. Grout under the column (A) using a non-shrinking type grout (B). Pack the grout by tamping. (Grout not by Eimco.)



SUGGESTED TANK GROUTING PROCEDURE

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Reference Drawings: General Arrangement and General Arrangement Details (if furnished)

GROUTING RESPONSIBILITY

Eimco is not responsible for grouting the tank, grouting specifications of material, depth or accuracy of placement. Grouting specifications and final approval of the grouted tank are solely the responsibility of the user, or his agent.

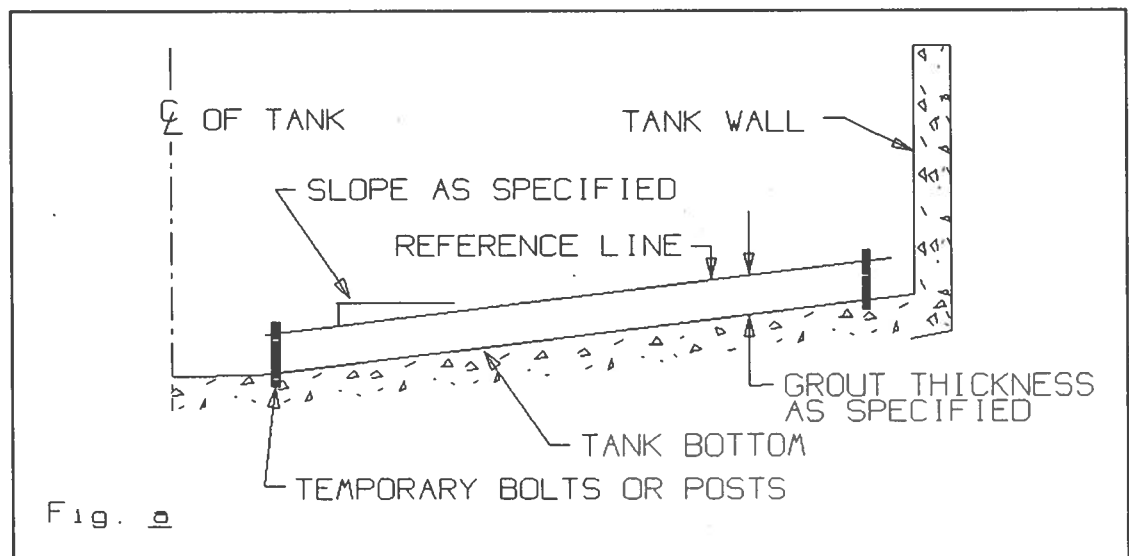
This suggested procedure is offered only as a guide to assist those responsible for grouting.

PURPOSE OF GROUTING

Grout is added to a tank bottom to provide a bottom surface with controlled contour variation. Such variation, if not specified on contract documents, is usually intended to be $\pm 1/4"$ (6.4 mm), and allows setting rake arm blades, via adjustable squeegees, 0 to $1/2"$ (12.7 mm). Clearance of the adjusted squeegee to local low spots may be allowed up to $3/4"$ (19.1 mm). The clearances provided herein do not supersede contract documents governing equipment installation.

DETERMINE GROUT ELEVATION

Refer to the reference drawing for the specified elevation of grout. Then, using a surveyor's instrument, mark the elevation on bolts or posts secured to the tank bottom radially from center of the tank, referring to Fig. a. String a reference line or wire between the posts or bolts, set for the surveyed elevation. This line will be used to set the screed boards for correct grout elevation and slope.



<u>SUGGESTED TANK</u> GROUTING PROCEDURE	10-CA1 (3/93) 48

HEAT DISTORTION

Heat distortion, by the sun, can cause the column and arms to distort unevenly during screed board construction or grouting, which will cause an unevenly grouted tank bottom.

Heat distortion of the column can be controlled by mounting sheets of cardboard, styrofoam, etc. to the sides of the cage, or by grouting in the early morning or on an overcast day.

On mechanisms over 50' (15.2 mm) dia., heat distortion of the arms can also be a problem. It can be controlled by grouting in the late afternoon or on an overcast day, or by covering the arms. But, if the tank must be grouted during the hot part of the day and the arms are not covered, the amount of distortion should be considered.

1. During the early morning hours measure the distance from the bottom of the arm to the tank bottom at the outer end of the arm.
2. Next, during the hottest part of the day, again measure the clearance between the arm and tank bottom at the same point measured in early morning.
3. The difference between these two measurements (1 and 2 above) is the amount of heat distortion that must be considered during grouting. Remember that the arms will distort downward at the tips; so, for example, if grouting is started in early morning and it runs into noon, the outer tips of the arms will sag and cut into the outer circle of grout. For that reason it would be better to start in the afternoon.

Note: During operation, heat distortion is not a problem as both the arms and column are under water and equal temperature.

SCREED BOARD CONSTRUCTION

1. Bolt 2 x 4 boards to each steel blade on one of the arms or both long arms (see note below) with the boards extending about 2" (50.8 mm) in front of the blades, as shown in Fig. b. At the leading edges of the boards, cut the ends parallel with the arm so that the screed board will run parallel to the arm when it is nailed to the boards. Round off the lower edges of the screed board.

Note: Make up a screed board for one arm only when the tank is less than 50' (15.2 mm) diameter and two screed boards for two arms when the tank is 50' (15.2 mm) diameter or larger.

SUGGESTED TANK GROUTING PROCEDURE

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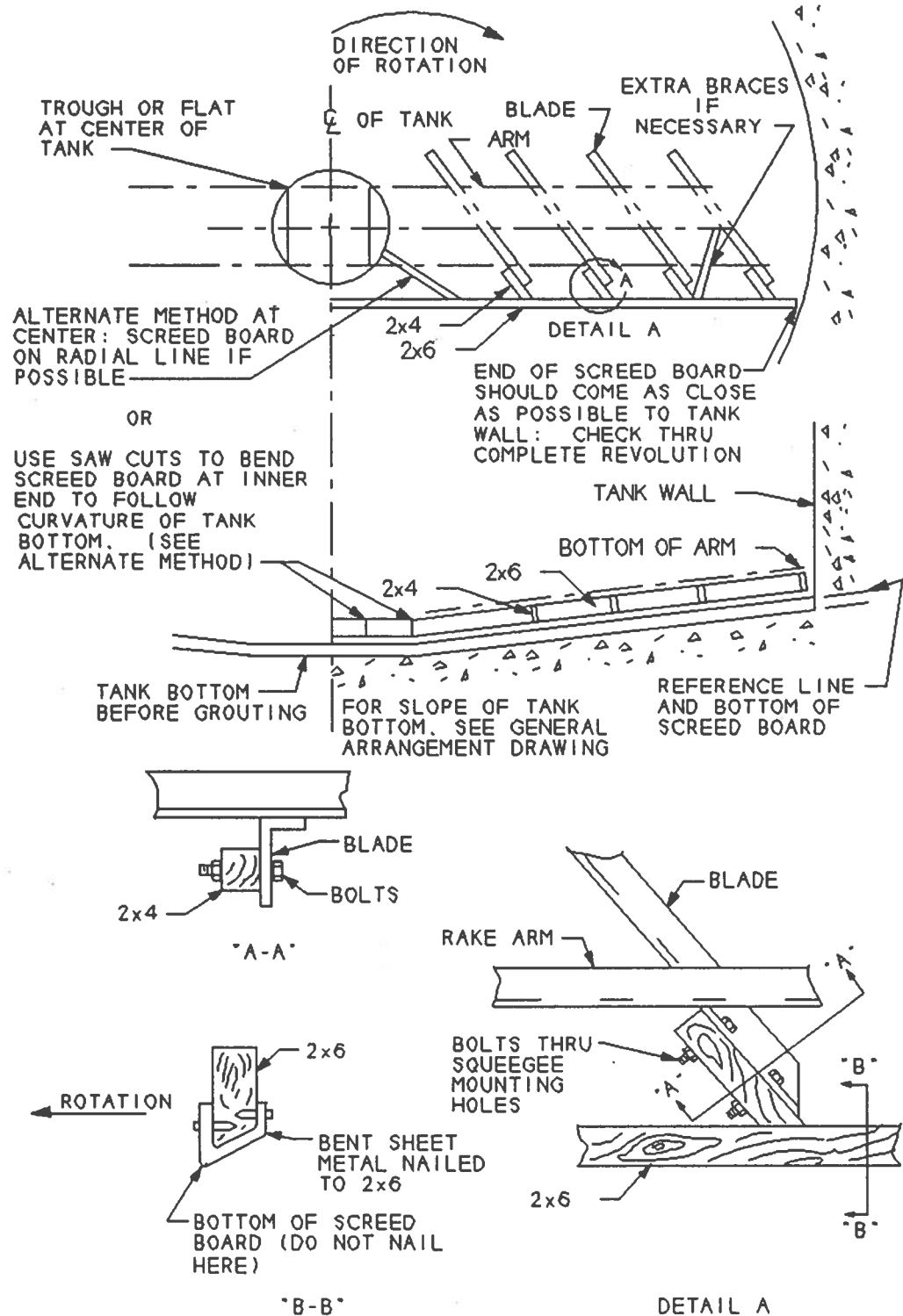


Fig. b

<u>SUGGESTED TANK</u> GROUTING PROCEDURE	10-CA1 (3/93) 50

2. Nail a strip of bent sheet metal across the bottom of the 2 x 6 board that will be used for the screed, as shown in Fig. b. Note that the sheet metal for the screeding surface on the bottom must be straight and smooth. Nail only to the sides of the boards.
3. Nail the 2 x 6 screed board to the ends of the 2 x 4 boards. The bottom of the screed board must just touch and run parallel with the reference line. At no point should the grout thickness be less than 1 inch to avoid cracking. (Take note of "Heat Distortion" above.)

Note: (a) On tie rod supported arms, place about 50 to 100 lbs. (22.7 to 45.4 kg) of temporary ballast on the end of each arm to prevent the grouting arm from rising in case of accumulations of grout in front of the screed board.

(b) When two rake arms are used for grouting, place piles of sand under the screeds of the first arm, then level the screeds on the second arm according to the heights of the sand piles. This is to ensure that all corresponding screeds are of equal height.

4. Since the center of the tank may be flat, sloped or cone shaped, a diagonal or bent inner screed board may be required or it may be grouted by hand. Whether it is grouted flat or sloped, be sure a constant depth of grout not less than 1" (25.4 mm) is maintained.

Prepare a form around the trough or cone, as required, to keep out the grout.

SUGGESTED GROUTING PROCEDURE

WARNING: The drive control (torque indicator) must be connected before starting the grouting. This is a protective device for the drive unit and mechanism. Bypassing it will void the warranty.

1. Usually, grout of the following proportions will be satisfactory: 3 parts sand by weight, 1 part cement by weight and clear water, enough to permit reasonable slump for ease of equipment distribution (about the consistency of mortar). Do not use gravel.
2. Start a ring of grout which can be worked by a crew, usually 2' (0.6 m) wide, [2 rings, one for each arm on units over 50' (15.2 mm) diameter] at the outer edge of the tank. This ring can be gradually widened as it approaches the center of the tank. The grout should not be allowed to build up in front of the screed.

<u>SUGGESTED</u> TANK GROUTING PROCEDURE	10-CA1 (3/93) 51

Continue the outer ring in a spiraling pattern, working towards the center of the tank. Cement finishers should work just ahead of the screed arm(s) to be certain the grout is proper thickness to cover the area and to prevent excessive loads accumulating in front of the screed board. Also wet down the concrete floor ahead of the grout to ensure a good bond.

When a load of grout is placed in front of a moving arm, it should be wide enough for the cement finishers to work it at the rate of arm travel. Never stand or put weight on an arm during grouting.

Do not stop the mechanism once grouting has started. Restarting will result in screed jerking and digging in the grout. If an area to be grouted must be missed, return to it later. DO NOT WAIT.

3. When grouting is complete, rotate the mechanism 2 to 3 times to pick up any grout that may have sloughed toward the center. If sloughing occurs, it will be necessary to remove the excess and fill in the low areas with fresh grout. Watch for rocks or dried pieces of grout during this procedure, which may catch under the screeds and gouge the surface. The ungrouted area at the center of the tank can be filled in by the cement finishers working from the arms.

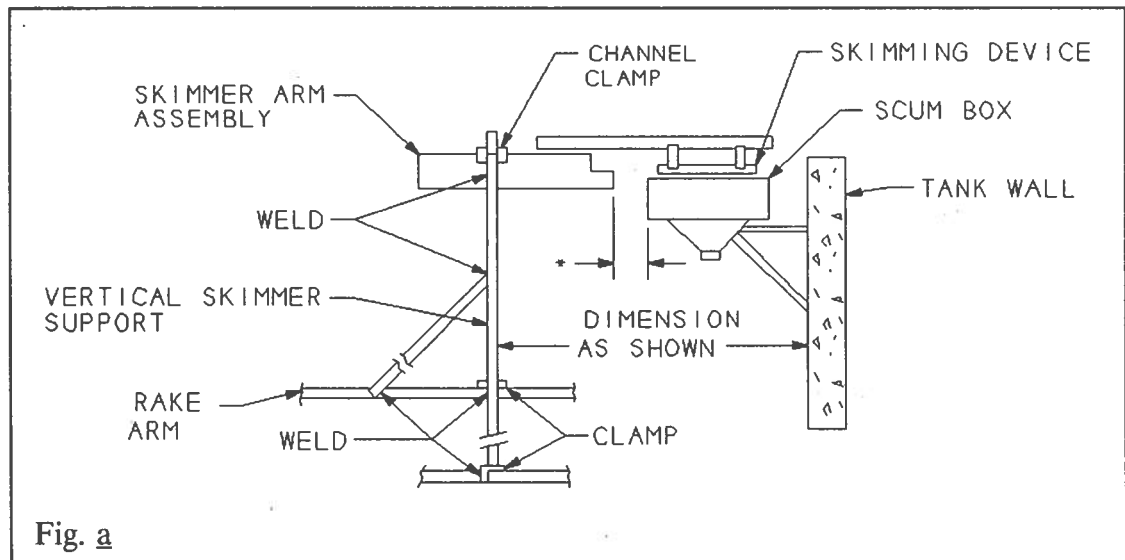
Careful grouting should produce a finished bottom that is uniform within a $\pm 1/4"$ (6.4 mm) of the specified depth.

4. Remove the screeds after the grout has dried.

INSTALL THE SKIMMING DEVICE

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1. Place temporary blocking under the rake arms for support.
2. Mount the vertical skimmer support to the rake arm using the clamps, as shown on the drawings. Do not weld at this time.
3. Mount the counterbalance box on the arm opposite from the skimming device. Refer to the welding warning below.
4. Adjust the skimmer support for position on the rake arm referring to the Skimming Mechanism Erection drawing for dimensions. Adjust the skimmer support for plumb, shimming as required (shims not by Eimco). Then secure the clamps.

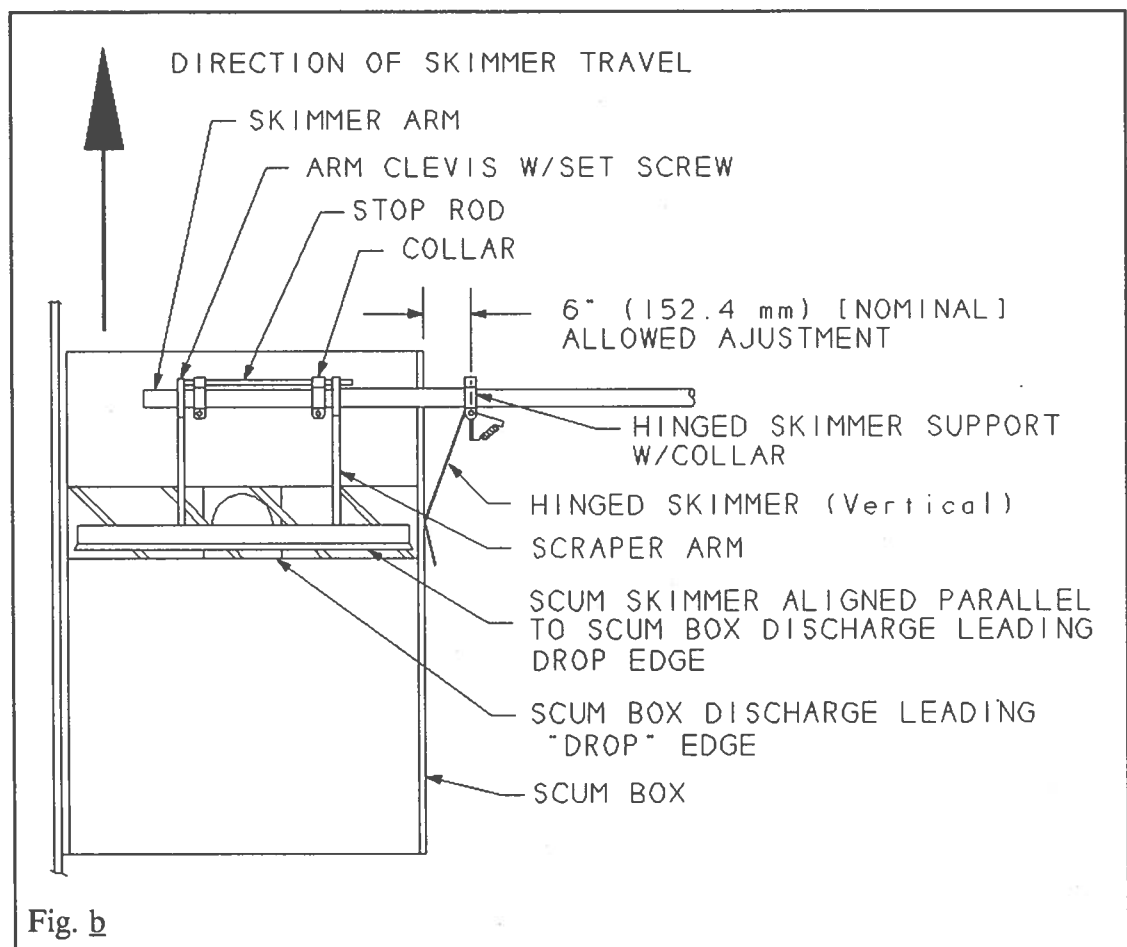


The distance from the scum box to the skimmer (dimension) is approximately 4" (101.6 mm) $\pm$.

5. Mount the skimming device parts to the skimmer arm referring to the assembly drawings.
6. Mount the skimmer arm assembly (with skimmer device) to the vertical skimmer support using the channel clamps. The skimmer arm must be parallel to the rake arm centerline. Position the skimming device on the arm so the end wiper is just touching the baffles and so that the bottom wiper is approximately 3" (76.2 mm) below water level.
7. Weld the skimmer support and clamps to the rake arm, as specified on the drawings. Field locate and install the skimmer support brace, welding as specified. Observe the welding warning.

WELDING WARNING: Use the piece being welded as the ground to prevent the electrical circuit passing through the drive.

8. Adjust the skimmer arm for level, and elevation if necessary, using the U-bolt. Adjust the skimmer arm alignment, as required, to align the scum skimmer parallel to the scum box discharge leading drop edge, as shown in Fig. b. Then weld the skimmer arm to the vertical support.
9. Install and tension the springs as specified on the skimming device assembly.

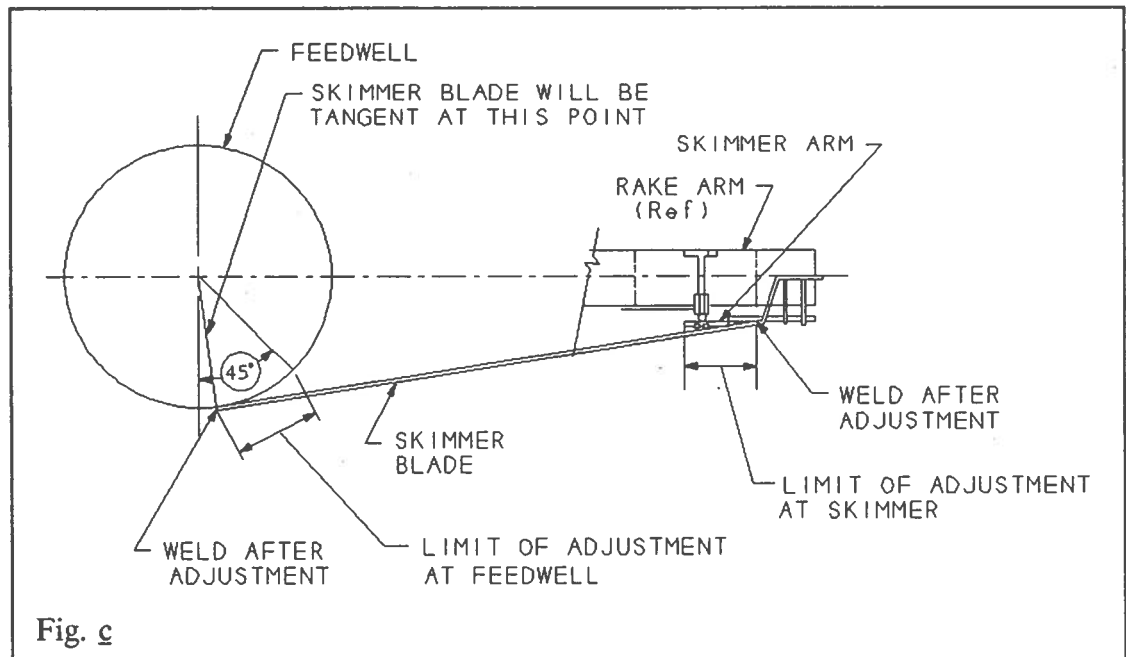


10. Check the rake arms for final level before the skimmer blade is installed. Refer to the rake arm final adjustment instructions.
11. Install the skimmer blade referring to the erection drawings and Fig. c. Adjust the skimmer blade for level at the elevation specified and for allowable contact at the feedwell connection angle. Weld, as specified, referring to the welding warning. If necessary, trim the blade where it extends past the feedwell connection (Fig. c).

INSTALL THE SKIMMING DEVICE

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Note: At this point in the skimmer erection, further adjustment to the skimmer arm is no longer possible.



12. If a midspan skimmer brace is used, install it at this time referring to the drawings.
13. Refer to the Skimmer Arm Assembly Maintenance and Adjustment instructions for final adjustment and maintenance procedures.

INSTALLATION OF WEIRS, BAFFLES AND SCUM BOX	04-BC6 (2/86) 55

Start the installation of the weirs, scum baffle and scum box, completing the installations during the erection of the mechanism.

WEIRS (not by Eimco)

Apply a mastic sealer between the weirs and mounting surface, during or after installation. This is to prevent leakage and improper flow. Weirs must be level.

BAFFLES (not by Eimco)

Make sure the inside face of the baffle is free of projections, such as welds, offset, etc.

When the skimming device is installed, revolve the scum skimmer to the position where it is over the scum box. Measure the horizontal distance from the end of the support pipe to the scum baffle. Then revolve the skimmer and adjust the baffle assemblies for this same horizontal measurement. Adjust the baffles as necessary.

NOTE: Eimco cannot be responsible for the fitting of those pieces furnished by others.

SCUM BOX (by Eimco)

In most cases the baffles should be installed ahead of the scum box, but the adjustments should be made at the same time.

Mount the scum box supports to the anchor bolts, then mount the scum box to the supports.

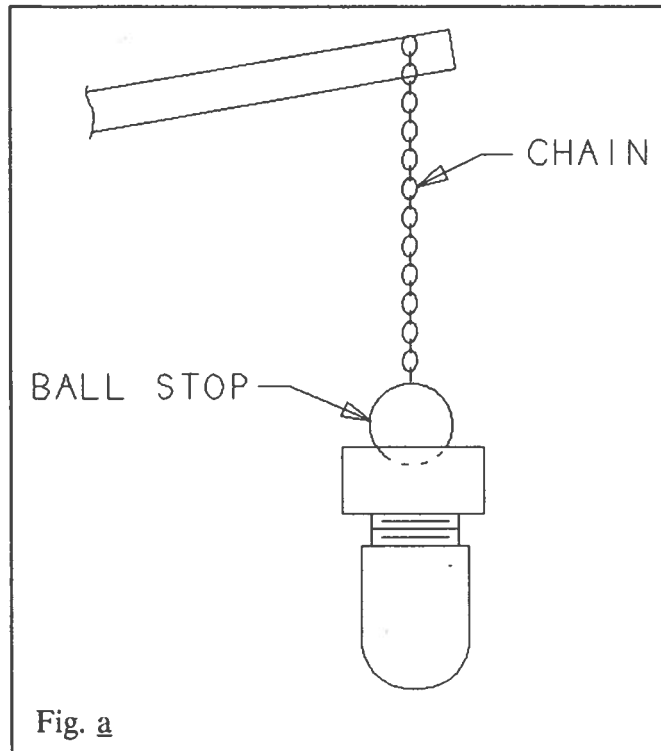
Adjust the scum box for elevation and level referring to the drawings. When the skimming device is installed, adjust the box for concentricity with the device and recheck elevation and level. Adjust the scum box as follows:

Radial Adjustment:	Slots in scum box
Vertical Adjustment:	Slots in supports
Level Adjustment:	Shim between scum box supports and wall

If the mounting holes in the baffles were not precut, field drill them using the scum box as a template. Then, connect the scum box to the baffle using the bolts, nuts and washers specified.

Secure all fasteners. Then connect scum box nozzle, with flexible coupling, clamps, or welding, to the discharge piping, as specified.

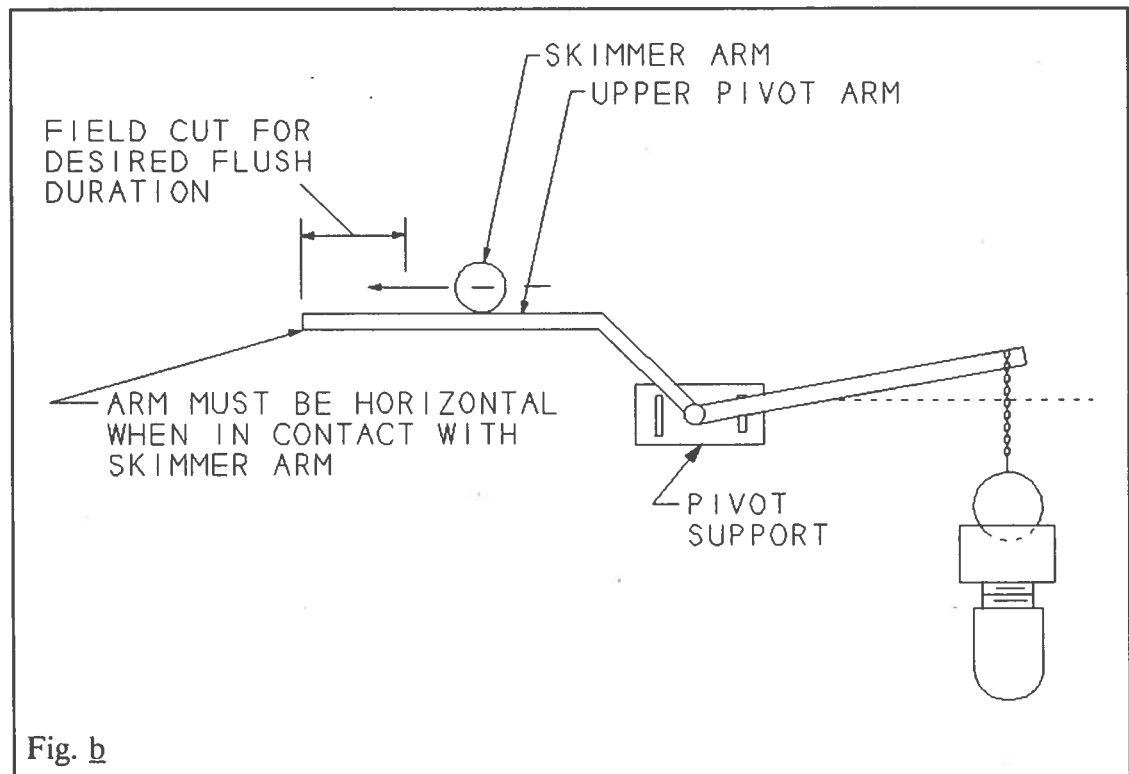
SCUM BOX FLUSHING SYSTEM INSTALLATION	04-BC32 24666-01 C 56



1. Field locate and drill the pivot support mounting screw holes in the baffle, as specified on the Scum Box Flushing System Assembly drawing. Counter sink the holes, as specified, for the flat headed mounting screws.
2. Mount the pivot support to the baffle.
3. Rotate the skimmer arm into position, as shown on the Scum Box Flushing System Assembly drawing. Then mount the pivot arm on the pivot support, using the nut provided.
4. Adjust the upper pivot arm for contact with the skimmer arm and for horizontal level by adjusting the position of the pivot support, using the slotted mounting holes. Secure the pivot support mounting screws.
5. Install the flush piping to the scum box:
 - a. Field drill two holes in the scum box, using the flush piping as a template. Refer to drawing 24666C57 for proper location and orientation.
 - b. Weld the 1½" couplings at the drilled holes in the scum box.
 - c. Connect the flush piping at the couplings.

SCUM BOX FLUSHING SYSTEM INSTALLATION	04-BC32 24666-01 C 57

6. Install the ball stop with chain. The ball stop must be raised $\frac{3}{4}$ " (19.1 mm) from the closed position when the upper pivot arm is held in the horizontal position. Adjust the chain length, as required.
7. Rotate the skimmer arm over the scum box several times and check for smooth operation of the pivot arm, and proper opening and closing of the ball stop. Make adjustments, if necessary.
8. Field cut the upper pivot arm, as shown on the assembly drawing, for desired flush duration. If required, bend the upper pivot arm as shown on the drawing.



ADJUST THE ARMS

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The purpose of this adjustment is to ensure that all arms have proper and equal clearance with the tank bottom so that each arm is loaded equally, thus preventing unbalanced loading on the mechanism.

This adjustment must follow final leveling of the drive unit.

CAUTION: Checking and leveling must be done when the steel is at a uniform temperature such as the early morning or an overcast day.

1. CHECK the arms or blades for clearance with the tank bottom around the center of the mechanism, as specified on the drawings. Vertical adjustments are made by raising or lowering the cage by means of the take-up studs and slotted connector between the drive and cage. Use jacks under the cage to raise or lower it for adjustments. After adjustments are made, recheck the cage for plumb.
2. CHECK that the arms or blades sweep at the clearance specified with the tank bottom and in the same plane. Checking is done by means of reference devices on the tank bottom such as a pile(s) of sand. Adjust or mark the device for the clearance of the arms from the tank floor specified. Do this at each "break" in arms that are shipped in multiple sections.
3. Rotate each arm to the place of the checking device and adjust the arm for the required clearance. Use a jack to lift the arms to assist in this adjustment. Add or remove shims equally at both connections as necessary to achieve equal arm level. Block under the opposite arm before the arm being adjusted is raised or lowered.
4. Secure all arm connections. Install the cage corner braces, if required. Recheck alignment.
5. Weld splices and connections, if specified.

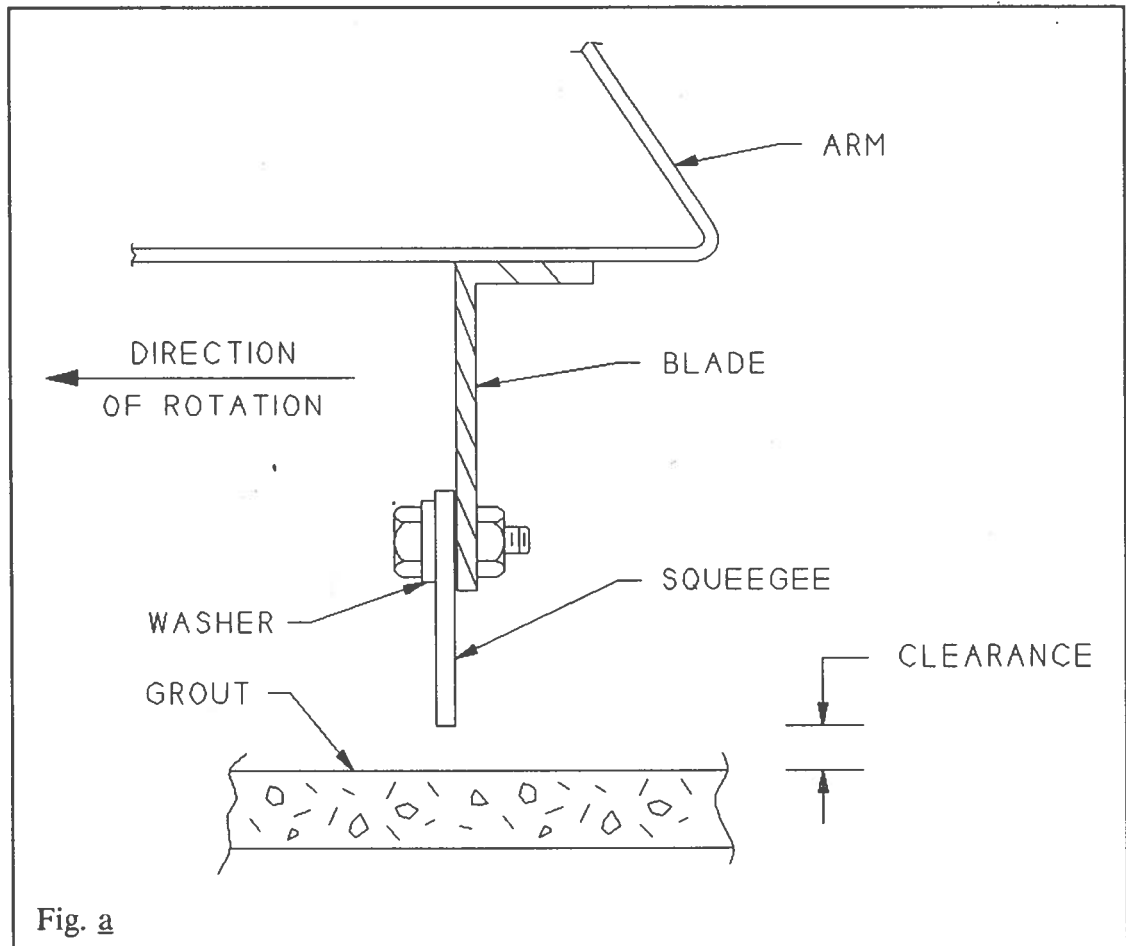
WELDING WARNING: When welding on the rake arms or cage, do not use the superstructure or platform as a ground and vice versa. This is to prevent damage to the drive unit bearings due to electrical circuit contact.

6. If shims are used, weld must be enlarged so that the load will be transferred from the rake arms to the cage, not from arms to shims.
7. Install the pickets (if furnished) referring to the part numbers on the drawings. Refer to the above welding warning.

SQUEEGEE INSTALLATION AND ADJUSTMENT

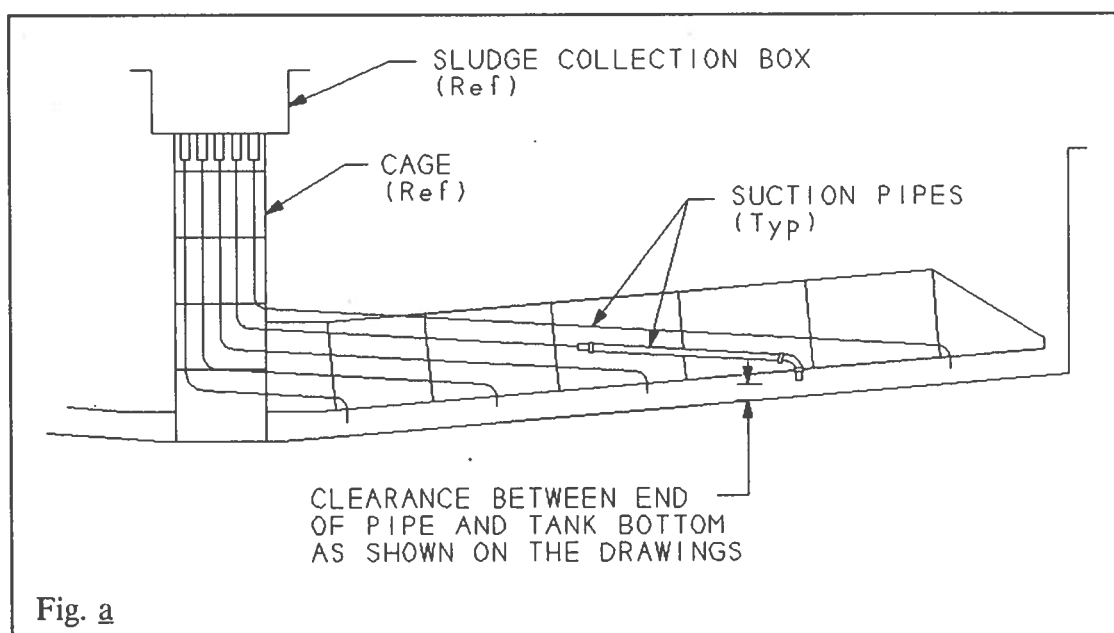
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1. After the tank has been grouted, install the squeegees, referring to the part numbers in the drawing. The squeegees must be installed on the side of the blade facing the direction of arm rotation, as shown in the illustration below.
2. Adjust each squeegee for minimum clearance with the bottom of the tank: Clearance of the squeegee from the grouted bottom will be from 0 (touching at the highest point in the sweep of the arm) to $\frac{1}{2}$ " (12.7 mm), with possible $\frac{3}{4}$ " (19.1 mm) clearance at a few local low spots. This will be possible if grouting was done properly.
3. CHECK squeegee clearance around the tank by rotating the arms.



SLUDGE SUCTION PIPING INSTALLATION	08-CL23 (7/92) 60

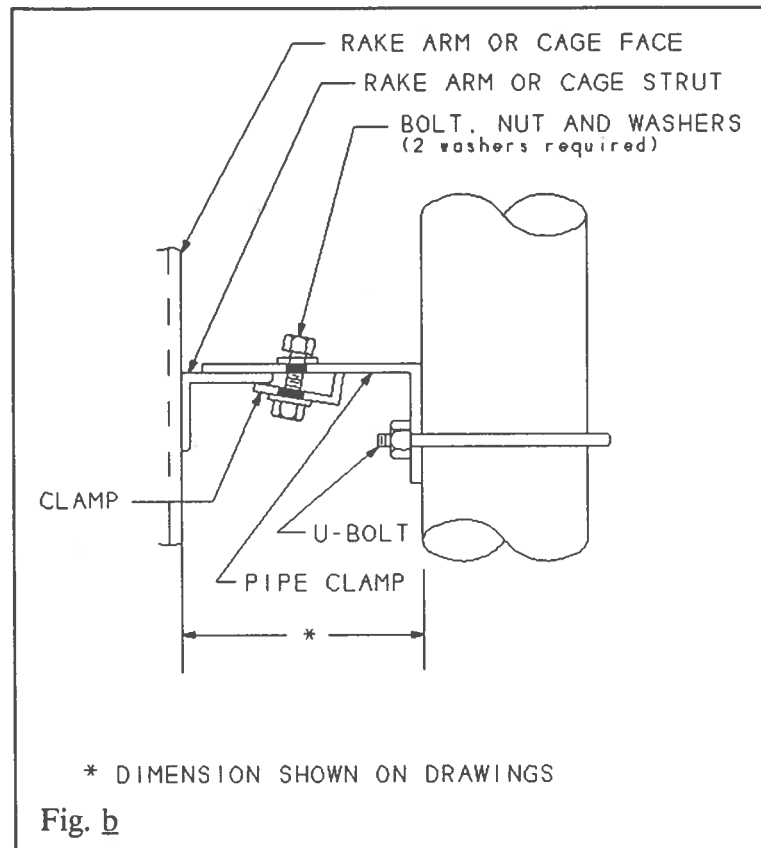
1. During the installation of the suction piping make sure the piping slopes upwards towards the cage as specified on the Rake Arm and Piping Erection drawings and as shown on Fig. a.
2. Mount the suction piping to the rake arms or cage with the pipe clamps and U-Bolts, referring to Fig. b.
3. It will be necessary to cut the pipe to size, but use complete lengths of pipe whenever possible. In cutting the pipe, keep the cuts as square as possible, using a hand or power saw. Then bevel the cut end of the pipe.
4. Assemble the pipe as follows:
 - a. Clean and dry the inside of the bell or elbow, particularly the seal groove.
 - b. Set the rubber seal ring in place in the groove so that the color coded side of the seal will be visible. That is, the color coded side will be facing the installer.
 - c. Clean and dry the beveled end (spigot end) of the pipe and lubricate it with a thin film of soap and water.



- d. Making sure the pipes are in alignment, push the beveled end of the pipe into the bell or elbow end of the connecting pipe. Continue pushing until the spigot end bottoms in the bell or elbow.

SLUDGE SUCTION PIPING INSTALLATION

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MECHANICAL CHECK	02-AA1 (6/85) 62

FINAL MECHANICAL CHECK

A final, field mechanical check of the equipment is required by an Eimco PEC Service Representative at the completion of erection or installation of the equipment. Unless accepted and signed-off by the Service Representative at the completion, the warranty will not be in effect.

Previous inspections will not count towards final acceptance unless a sign-off is obtained in writing from the Service Representative. Also depending on any previous inspections, this final check may be an additional paid service call.

ARRANGEMENTS FOR SERVICE

Arrangements for field mechanical check should be made at least two weeks in advance with your Eimco Representative. Refer to the address page to contact him.

DO NOT FILL THE TANK WITH WATER

The mechanical check cannot be done if the tank is filled with water. In this case if the check cannot be performed, an additional paid service day will be charged.

TORQUE TEST WARNINGS	10-BC11 (2/88) 63

Refer to the "Torque Test Instructions" drawing for test procedures.

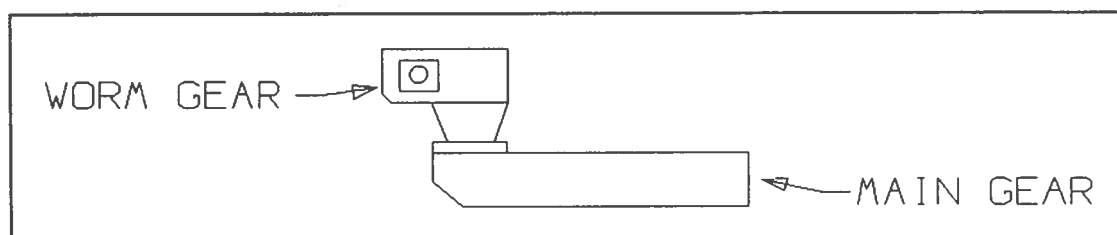
WARNING: For the protection of personnel during the torque test, the following precautions must be taken:

1. Anyone entering the area of this equipment must be wearing adequate safety equipment such as safety glasses, safety shoes, hard hat, etc.
2. Check the torque test kit before use to be sure the cable slings and other components are in good condition.
3. Make sure the cinch anchors (not by Eimco) used to anchor the test equipment are specified size and properly installed.
4. Limit the number of personnel inside the tank to those necessary to perform the test.
5. Stay away from the rake arms while the test is in progress. Do not stand in front of the leading side of the arm(s) while they are under tension during the test.
6. Do not exceed the maximum indicated load (read on the linear scale) specified on the "Torque Test Instructions" drawing.
7. Anyone who will be entering the area of this equipment during the torque test must be informed of these precautions prior to starting the test.

DRIVE LUBRICATION	11-BC7 (4/93) 64

LUBRICATION

The drive is a combination of Eimco manufactured drive components and gear motors purchased from others. These instructions apply only to the Eimco manufactured components. **Note: Eimco drives are shipped without oil.**



PART	METHOD	MINERAL LUBRICANT*	AGMA NO.	SYNTHETIC LUBRICANT**
Worm Gear	Oil Bath	Mobilgear 632	6EP	Mobil SHC 630
Main Gear	Oil Bath	Mobilgear 632	6EP	Mobil SHC 630

1. **CHECK the oil levels weekly.** Stop the drive and wait 30 minutes before checking to allow the oil to settle.

At first until the oil settles, little or no oil may show in the gauge, so oil added up to the level mark will simply overflow. This is because the gears are only partly submerged in oil when the drive is at rest, but during operation the pumping action of the teeth lifts the oil up onto the gears. (See Item 6.)

* Although Mobil products are specified, any equivalent product can be used. Refer to the Lubricant Equivalents List in this manual.

** Synthetic oil is recommended for year round use, or when ambient temperatures are below 20° F.

DRIVE LUBRICATION	11-BC7 (4/93) 65

2. **DRAIN condensate from each housing once a month to keep the oil free of water.**
Do this during an oil level check.

Refill with fresh oil to operating level.

3. **The vent opening located in the top screw plug of each sight glass must be kept clean.**

If the vent opening is clogged or dirty, the glass will not show the correct oil level and may not show a level at all.

4. **Replace the oil once a year.** Drain the housings and refill with fresh oil of the type or AGMA No. specified on the preceding page.

Replacement of the oil more often than once a year may be required if operating under adverse conditions.

5. **For lubrication of other equipment** (motors, pumps, etc.) supplied but not built by Eimco, refer to the manufacturer's instructions at the end of this manual.

Drive chain - Mobilgear 632 oil, monthly.

6. **Replacement Sight Glasses** - If an oil level sight glass is replaced, it must be notched to show the oil level. Proper oil level is shown on the Drive Assembly drawing. Note: Some drives may be shipped without the oil level notched; in that case refer to the Drive Assembly drawing for level.

DRIVE LUBRICATION

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DRIVE OIL QUANTITIES IN APPROXIMATE U.S. GALLONS

<u>MODEL</u>	<u>WORM GEAR</u>	<u>MAIN GEAR</u>
B-33	1-1/4	1-3/4
B-40	3	2-1/2
B-50	3	3-1/2
C-30	1-1/4	1-1/4
C-30LT	1-1/4	4-1/4
C-30HT	1-1/4	4-1/4
C-40	3	2-1/2
C-40LT	3	7
C-40HT	3	7
C-54	3	3-1/4
C-54B2	3 ea.(2 worm gears)	3-1/4
C-54HT	3	11-1/2
C-60HT	3	20
C-60LT	3	20
C-60R	3	18
C-72	3	6
C-80	3-1/2	23

LUBRICANT EQUIVALENTS LIST

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PETROLEUM BASED 2EP - 5EP

MANUFACTURER	PETROLEUM BASED OILS		
	AGMA EQUIVALENT NUMBER/VISCOSITY cSt AT 40°C		
	2EP/ISO 68	4EP/ISO 150	5EP/ISO 220
MOBIL	Mobilgear 626	Mobilgear 629	Mobilgear 630
AMOCO	Permagear EP #68	Permagear EP #150	Permagear EP #220
EXXON	Spartan EP-68	Spartan EP 150	Spartan EP 220
GULF OIL	EP Lubricant H.D. 68	EP Lubricant H.D. 150	EP Lubricant H.D. 220
TEXACO	Meropa 68	Meropa 150	Meropa 220
PHILLIPS PET	Philube APGO	Philube APGO 8QW	Philube APGO 85W-90
SHELL	Omala 68	Omala 150	Omala 220
STANDARD OF CALIFORNIA CHEVRON USA	Chevron Gear Compound NL68	Chevron Gear Compound NL150	Chevron Gear Compound NL220
SUN OIL	Sunep 68	Sunep 150	Sunep 220
KEYSTONE	Zeniplex - 2	Keygear 90	Keygear 110
LUBRICATION ENGINEERS	Monolec 300	Almasol 604	Almasol 607

PETROLEUM BASED 6EP - 8EP

MANUFACTURER	PETROLEUM BASED OILS		
	AGMA EQUIVALENT NUMBER/VISCOSITY cSt AT 40°C		
	6EP/ISO 320	7EP/ISO 460	8EP/ISO 680
MOBIL	Mobilgear 632	Mobilgear 634	Mobilgear 636
AMOCO	Permagear EP #320	Permagear EP #460	Permagear EP #680
EXXON		Spartan EP 460	Spartan EP 680
GULF OIL	EP Lubricant H.D. 320	EP Lubricant H.D. 460	EP Lubricant H.D. 680
TEXACO	Meropa 320	Meropa 460	Meropa 680
PHILLIPS PET		Philube ARGO 140	
SHELL	Omala 320	Omala 460	Omala 680
STANDARD OF CALIFORNIA CHEVRON USA	Chevron Gear Compound NL320	Chevron Gear Compound NL460	Chevron Gear Compound NL690
SUN OIL	Sunep 320	Sunep 460	
KEYSTONE	None	Keygear 140	None
LUBRICATION ENGINEERS	Almasol 605	Almasol 608	Almasol 609

LUBRICANT EQUIVALENTS LIST	11-AA1 (4/93) 68

SYNTHETIC 2 SYN - 5 SYN

MANUFACTURER	SYNTHETIC OILS		
	AGMA EQUIVALENT NUMBER/VISCOSITY cSt AT 40°C		
	2 SYN/ISO 68	4 SYN/ISO 150	5 SYN/ISO 220
MOBIL	*SHC 626	*SHC 629	*SHC 630
KEYSTONE	KSL 366 (Diester)		
TRIBOL		800/150	800/220

* Synthesized hydrocarbon

SYNTHETIC 6 SYN - 8 SYN

MANUFACTURER	SYNTHETIC OILS		
	AGMA EQUIVALENT NUMBER/VISCOSITY cSt AT 40°C		
	6 SYN/ISO 320	7 SYN/ISO 460	8 SYN/ISO 680
MOBIL	*SHC 632	*SHC 634	*SHC 638
KEYSTONE		None	None
TRIBOL	800/320	800/460	800/680

* Synthesized hydrocarbon

GREASE

MANUFACTURER	GREASE	MANUFACTURER	GREASE
	NLGI No. 2 EQUIVALENT		NLGI No. 2 EQUIVALENT
MOBIL	Mobilith AW-2	SHELL	Darina EP2
AMOCO	Rykon #2	STANDARD OF CALIFORNIA CHEVRON USA	RPM Multimotive #2
EXXON	Ronnex MP		
GULF OIL	High Temperature Grease	SUN OIL	Sunaplex 992 EP
TEXACO	Multipak EP2	KEYSTONE	81 EP-2
PHILLIPS PET	Philube 2 EP	LUBRICATION ENGINEERS	Alma-Gard 3752

MAINTENANCE AND OPERATION WARNINGS	01-AA8 (4/87) 69

WARNING: Use extreme care when working around rotating or other moving parts, to prevent injuries to yourself or others. Also, anyone entering the area of this equipment must be wearing adequate safety equipment such as safety glasses, safety shoes, hard hat, etc.

WARNING: Keep foreign objects, hands, etc. away from moving parts (belts, sheaves). Do not operate equipment if guards have been removed.

WARNING: Lock out power from electrical equipment using a manual breaker or disconnect switch before starting any work or maintenance on the equipment. Lock and tag disconnect switch so it cannot be closed.

WARNING: Before attempting any maintenance or adjustments on the drive, refer to the "Drive Maintenance Warning".

Warnings and Cautions are included throughout the instruction manual. These warnings and cautions must be read and understood by those installing, maintaining or operating the equipment.

PRE-START-UP CHECK	12-CL7 (11/88) 70

CHECK POINTS BEFORE START-UP

NOTE: The drive and mechanism must be level and checked by an authorized Eimco Representative before start-up.

1. Remove any foreign matter from inside the tank and suction pipes. And remove any blocking or shoring used in the erection of the equipment. Make sure all piping and seals are secure.
2. CHECK the oil levels in the main drive. Refer to Lubrication Instructions. Check the motor drives referring to the manufacturer's instructions.
3. Make sure the drive control was checked for proper operation referring to "The Drive Control" instructions under drive maintenance.
4. Make sure the drive platform and walkway are clean and free of oil, debris and tools. Make sure all drive cover guards are in place.
5. Rotate the arms for at least 4 or 5 revolutions. Make all observations from outside the tank.

This procedure should be conducted when distortion from sunlight would be at a minimum, such as, early morning or an overcast day.

6. Watch for clearance of the rake arm blades and/or squeegees with the tank bottom. Check for loose parts, bolts and nuts.
7. Watch the scum skimmer, if furnished, to be sure it is working efficiently and adjusted for alignment with the scum box. Check wipers and hinges for proper operation. Refer to the Skimmer Maintenance Instructions.

**DRIVE UNIT
MAINTENANCE SUMMARY**

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<u>Check & Maintenance</u>	<u>Frequency</u>	<u>Lubricant (if applicable)</u>	<u>Comments/References</u>
<u>Bimco Drive:</u>			
Check oil level in both worm gear & main gear housings	Weekly	Oil (Mobilgear 632)	Add oil as necessary
Drain condensate from the main gear & worm gear housings	Monthly	Oil (Mobilgear 632)	Refill with oil as necessary
Check drive chains for tension	Monthly		
Lubricate drive chain	Monthly	Oil (Mobilgear 632)	Coat as necessary
Change drive oil.	Yearly	Oil (Mobilgear 632)	Replace oil more often if necessary; it must be kept clean. Refer to the Lubrication Instructions
Check drive control	Monthly or as recommended	None	Refer to the "General Drive Maintenance" Instructions for frequency and method
Replace leaking worm shaft oil seals	Check monthly and replace when oil is replaced		Refer to the drive maintenance instructions
Inspect gears & bearings for wear	Yearly		Refer to the drive maintenance instructions
<u>Clarifier Mechanism:</u>			
Keep drive platform & walkway clean of oil debris & tools. Make sure all guards are in place	Weekly		Refer to the maintenance instructions
Check that the skimmer is properly adjusted & working efficiently. Check wipers for damage or wear	Weekly	None	Refer to the skimmer maintenance instructions
Check that the scum box flushing system is working properly	Weekly	None	Adjust as necessary
Check discharge at each sludge control valve	Weekly		Backflush pipes that have experienced plugging
Check for excessive water bubbling up around the column in the sludge collection drum, indicating drum seal wear	Weekly		Replace the seals in case of wear or deterioration, referring to the Installation Instructions
Check for loose bolts & nuts	Monthly		

**DRIVE UNIT
MAINTENANCE SUMMARY**

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<u>Maintenance Operation</u>	<u>Frequency</u>	<u>Lubricant</u> <u>(if applicable)</u>	<u>Comments/References</u>
Check connections between the cage & main gear	Monthly		Refer to the cage installation instructions
Drain tank & remove algae, rust or badly corroded steel members. Paint as necessary	Yearly		
Check suction piping flexible connectors for damage, loose connections or disconnected section	Yearly		Refer to the sludge piping installation instructions for disconnected sections
Check connections between the rake arms & cage	Yearly		Refer to the Rake Arm Installation Instructions
Check the squeegees for wear & replace, if necessary	Yearly		Refer to the squeegee installation instructions
<u>Gearmotor:</u> Inspect gearmotor to be sure unit is clean & ventilation openings are clear of dust, dirt or other debris	Weekly		Refer to the manufacturer's instructions
Fill gear case with oil	Before beginning operation	EP Oil. Refer to name plate on unit for specified lubricant for ambient (surrounding) temperature	Refer to name plate mounted on unit
Check oil level & refill, as necessary	Weekly	EP Oil. Refer to name plate on unit for specified lubricant for ambient (surrounding) temperature	Refer to name plate mounted on unit

CHECK DRIVE ROTATION

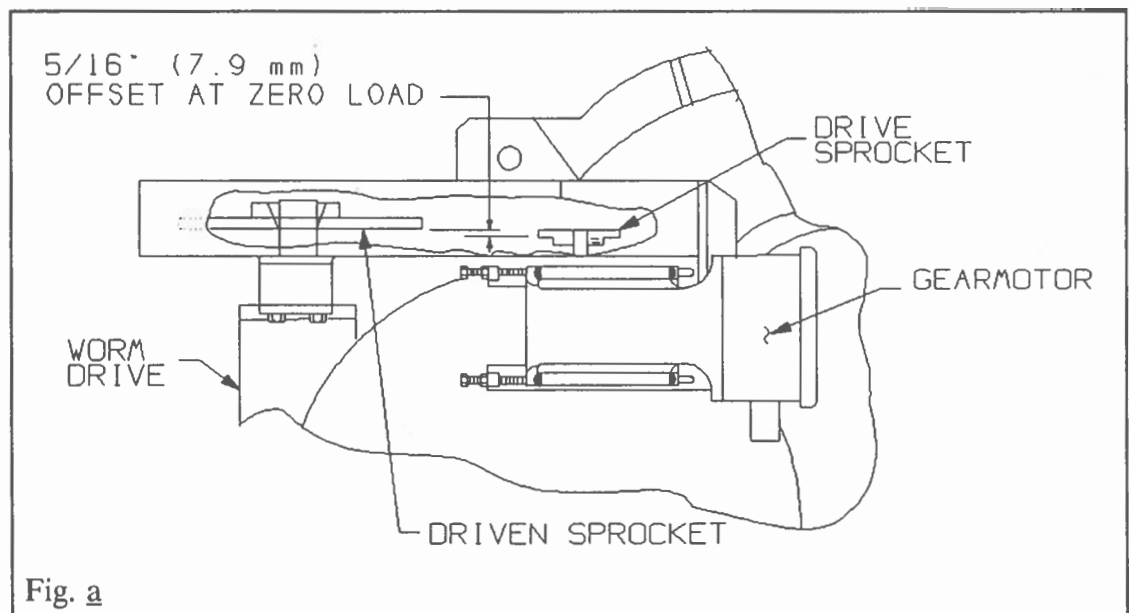
Reference Drawing: Drive Unit Package (Drive and Motor Package)

CHECK a new gear motor for direction of rotation before the drive chain is installed. Refer to the directional "arrow" on the drive cover, chain guard or reference drawing for direction of rotation.

If the drive unit is not turning proper direction of rotation, the drive unit warranty will be void and Eimco will not accept costs for drive damage.

CHECK DRIVE SPROCKET ALIGNMENT

Since the worm shaft will be displaced inward under load, the drive sprocket on the worm shaft should be offset $5/16"$ (7.9 mm) from true alignment, as shown in Fig. a. This initial setting, then, will allow for near true alignment with the displacement that occurs under normal running load. Adjust the chain for tension, as recommended by the manufacturer. Refer to the reference drawing for correct setting of the driven sprocket.



THE DRIVE UNIT

These drive units consist of a main gear on the bottom which is the main driving unit for the rake arms and a worm assembly on top that drives the main gear with a pinion.

The worm gear drive is designed with a worm shaft that moves axially under loaded conditions of the drive unit. This movement is made possible by a thrust bearing with a sliding bearing seat arrangement on the loaded side of the worm.

The sliding bearing seat is held in place by a spring, and the compression of that spring, when the drive is under load, indicates the torque on the drive unit. When the spring compresses, its movement is transmitted by the movement of the bearing seat against an actuating pin screwed into the drive control actuator pointer. (The spring is calibrated for load at the factory.)

THE DRIVE CONTROL

The drive control, which mounts to the worm housing, protects the drive unit and mechanism in case of overload, such as an excessive solids load on the rake arms.

Basically the drive control consists of the actuating pin in the actuator pointer, the scale, a cam shaft and cams and switches. The actuating pin, which connects to the sliding bearing seat in the worm drive assembly, rotates the actuator pointer which rotates the cam shaft, as the sliding seat moves when load is applied to the mechanism.

The cams rotate with the cam shaft and they actuate the switches at various load settings as they rotate. At the same time, the amount of torque on the drive is shown by the pointer on the scale which is graduated into percents from 0 to 100.

CHECK THE DRIVE CONTROL once a year for condition and operation, as follows below:

Note: In areas with wide variations in temperature, at first check the drive control once a month for condensation and for operation until a reasonable inspection frequency can be determined.

- a. Start the gear motor drive.
- b. Remove the cylindrical switch housing, unscrewing it from the base. Then manually actuate the cam switches by turning the cam shaft (and pointer) with the set collar (end of cam shaft). Slowly turn the pointer through a complete range to 100. This will simulate a mechanism full load condition. At the set points the alarm should sound and the drive motor should stop.
- c. If the drive control does not react correctly, check each switch individually.

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- d. If none of the cam switches actuate, as stated above, recheck the wiring to the drive control (not by Eimco). Refer to the wiring diagrams.
- e. If the wiring is correct, check the cams for proper setting and check the actuation pin to be sure it is in position and not bent. Contact your Eimco Representative if the problem cannot be determined.
- f. Replace the switch housing cover, being sure it goes on straight to ensure a tight seal. Tighten the switch housing cover a minimum of ½ turn after contacting the O-ring.

Drive Control Caution: The drive control is the overload cut-out device for the drive. Since it is installed and adjusted at the factory for proper operation, do not tamper with it. If the original cam settings are not considered satisfactory for the operating conditions, contact your Eimco Representative before attempting any adjustment.

WARNING: IF THE DRIVE UNIT STOPS DUE TO AN OVERLOAD DO NOT ATTEMPT TO RESTART THE UNIT UNTIL THE CAUSE OF THE OVERLOAD HAS BEEN LOCATED AND CORRECTED. REFER TO THE "DRIVE MAINTENANCE WARNING" INSTRUCTION IN THIS MANUAL.

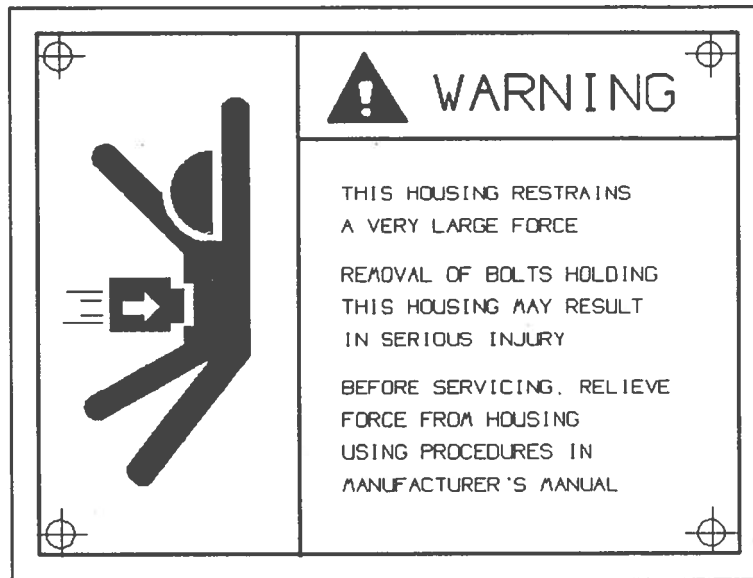
ELECTRICAL EQUIPMENT AND ENCLOSURES

Electrical enclosures for the motor, control panels, etc. are listed on the drawings and Eimco Parts List, if those items are furnished by Eimco.

If any electrical equipment, including motors, is to be replaced, it must be of equal or better rating. Refer to the latest edition of the NEMA ICS (National Electrical Manufacturer's Association Industrial Control Standards) and NEMA MG 1 (N.E.M.A. Motors and Generators) for a description of those enclosure designations.

DRIVE MAINTENANCE
WARNING

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This warning plate on the drive unit has an important purpose!
It is there to warn you of possible danger before you service the drive.
This is the. . .

... DRIVE HIGH TORQUE SHUTDOWN WARNING

When a raking mechanism drive shuts down due to high torque load, it may likely have stored spring force energy. This energy can be **dangerous** to those who service the drive unit in returning it to operation, if the energy is not relieved in a safe way.

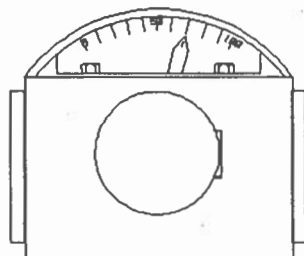
The stored energy is most likely in two areas: (1) the torque control spring which is located in the worm drive housing and (2) the elastic deformation of the rake arms and rake cage, which is caused by the torsional load.

How to check for stored energy:

Check the drive control. If the arrow indicates any torque above zero "0" as illustrated in Figure a, next page, it has stored energy. That is dangerous and must be relieved as covered on the next page.

**DRIVE MAINTENANCE
WARNING**

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DRIVE CONTROL (right hand shown)

This illustrates stored energy in the amount of 70%.

Fig. a

How to relieve stored energy:

The only safe way to relieve stored energy is to use the motor to reverse the drive unit. Other methods are hazardous.

Reversing the motor will require temporary alteration of the wiring so the motor can be jogged in reverse:

1. Exchange two of the motor leads.

Note: The customer is responsible for altering his own plant wiring.
2. Close the torque control circuit.
3. Disconnect the "hold-in" circuit in the motor starter so that only jogging can be done.
4. The push button used for jogging should be located where the operator can watch the drive control.
5. Actual reversing of the motor should be done in jogs of only 1 second duration, to avoid drive damage. Watch the drive control indicator movement and progress towards relaxing the stored energy. Discontinue reverse jogging immediately when the Drive Control indicates zero torque, since a drive can damage itself and other components when it is running in reverse without torque control protection.
6. Restore wiring to its previous condition after energy release.

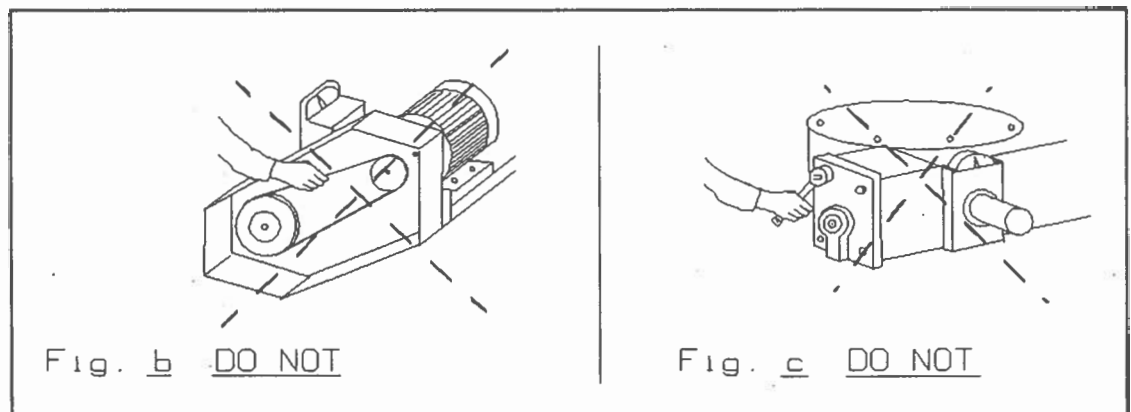
**DRIVE MAINTENANCE
WARNING**

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DANGEROUS METHODS to relieve stored energy:

DO NOT attempt to reverse the drive unit to relieve stored energy by pulling the chain backwards, or, disconnecting the roller chain, as shown in Fig. b. The worm shaft may spin suddenly, pulling in fingers and hands, or if a wrench or pry bar is used, it may be ejected violently.

DO NOT disassemble a drive unit while there is stored energy, as shown in Fig. c. Parts of it may release suddenly, when some of the fasteners are loosened, causing serious injuries and machine damage. This danger is greatest at the worm drive end cap where the spring is housed, which can burst away from the worm housing if the fasteners are unscrewed.

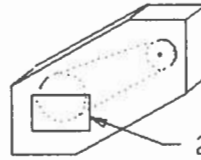


SAFETY SIGNS

Two signs are installed on the drive unit to warn personnel in safe practices: (1) "Caution" sign 204181A or 203422A on chain guards cautions the personnel to follow the manufacturer's instructions. And, the (2) "Warning" sign 49045A on the torque control spring end cap (shown previously) warns about relieving the spring energy before attempting to remove the end cap.

DRIVE MAINTENANCE
WARNING

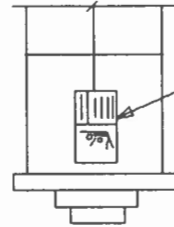
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SIGN
204181A
OR
203422A

CAUTION SIGN INSTALLATION

Typical for chain guard



SIGN
49045A

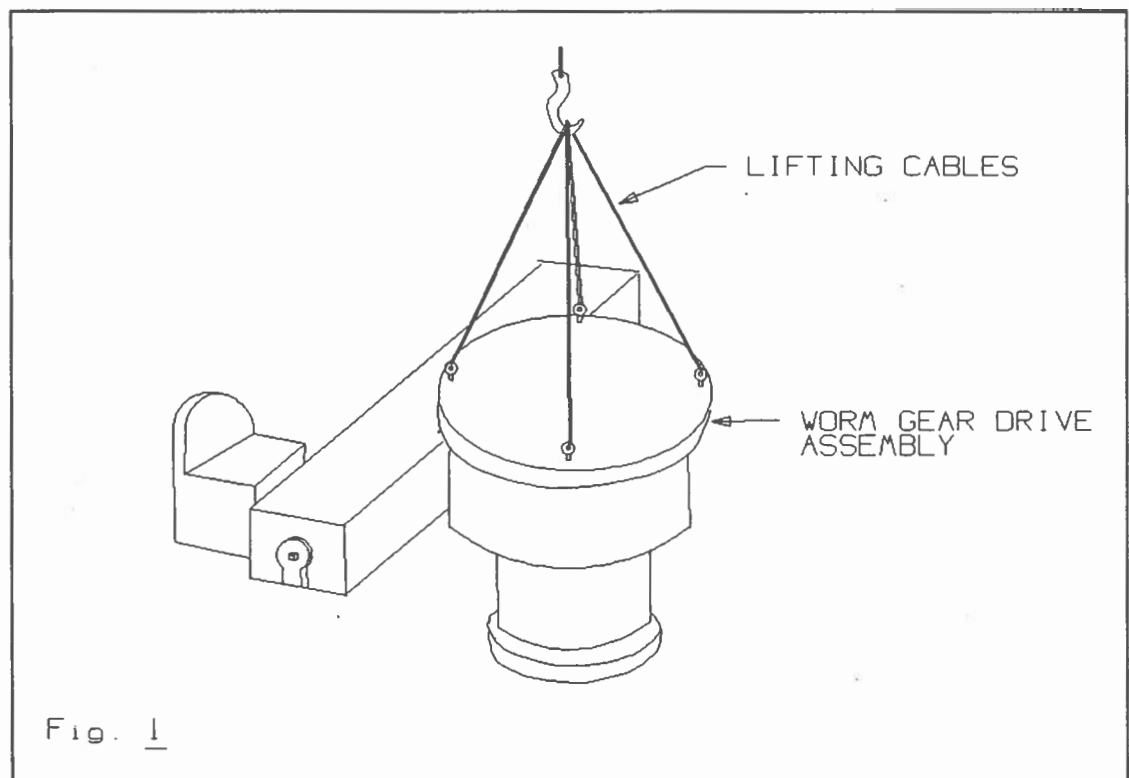
WARNING SIGN INSTALLATION

Most common end cap style shown

WARNING: CHECK THE DRIVE FOR TORQUE, REFERRING TO THE PRECEDING "DRIVE MAINTENANCE WARNING" BEFORE STARTING DISASSEMBLY. ALSO MAKE SURE THE POWER TO THE DRIVE HAS BEEN DISCONNECTED OR LOCKED OUT TO PREVENT THE DRIVE FROM BEING ACCIDENTALLY STARTED.

A. REMOVAL OF THE WORM DRIVE

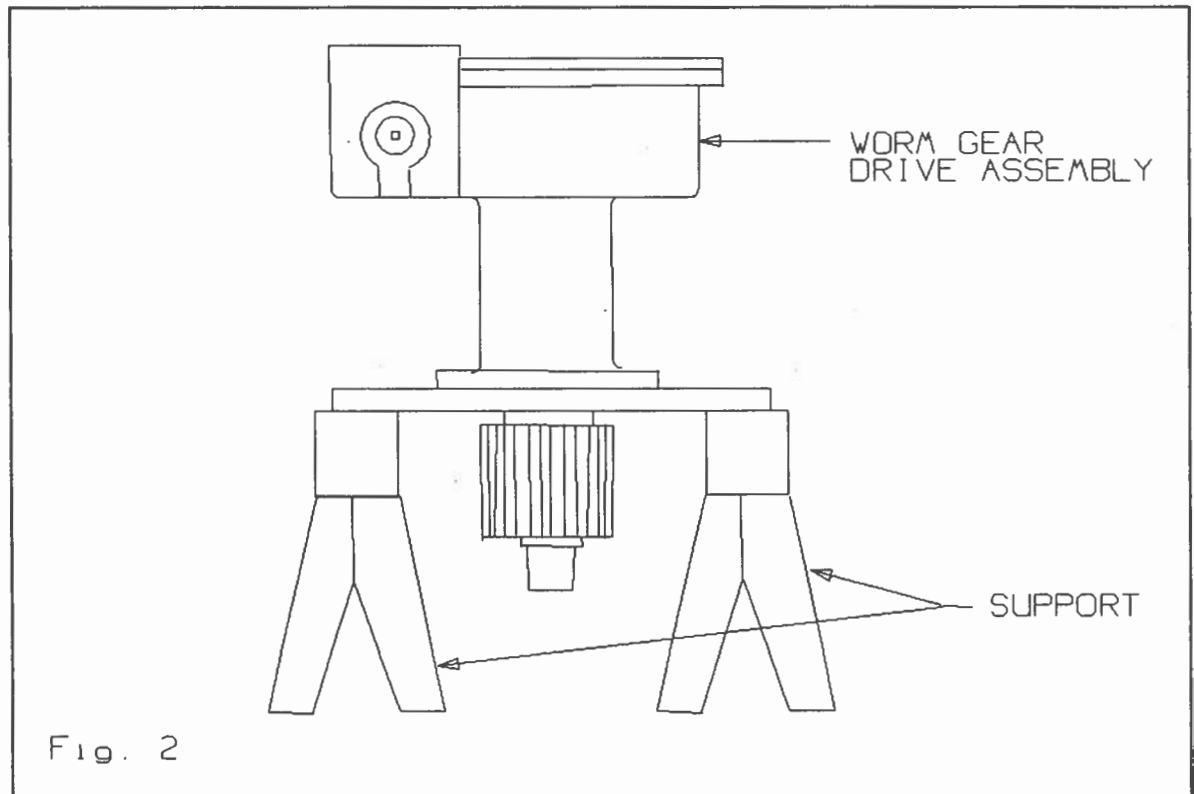
1. Remove the guards, disconnect all belts, chains or sheaves and motors. If furnished with shaft mounted reducers, remove the reducers and torque arms and refer to the Caution in the "Drive Maintenance" instructions.
2. Drain the oil from the worm housing.
3. Remove the capscrews (A), connecting the worm housing (B) to the main drive (refer to Fig. 3).



4. Lift the worm gear assembly from the drive, referring to the lifting illustration. See Fig. 1. Place four (4) eye bolts symmetrically through the upper cover screw holes into the housing and lift with cables. If shims are in place between the worm housing and lower drive, match mark them so they can be returned to their original positions.

CAUTION: Use care when removing the unit from the main gear to prevent damage to the drive control, pinion, main gear and bearings.

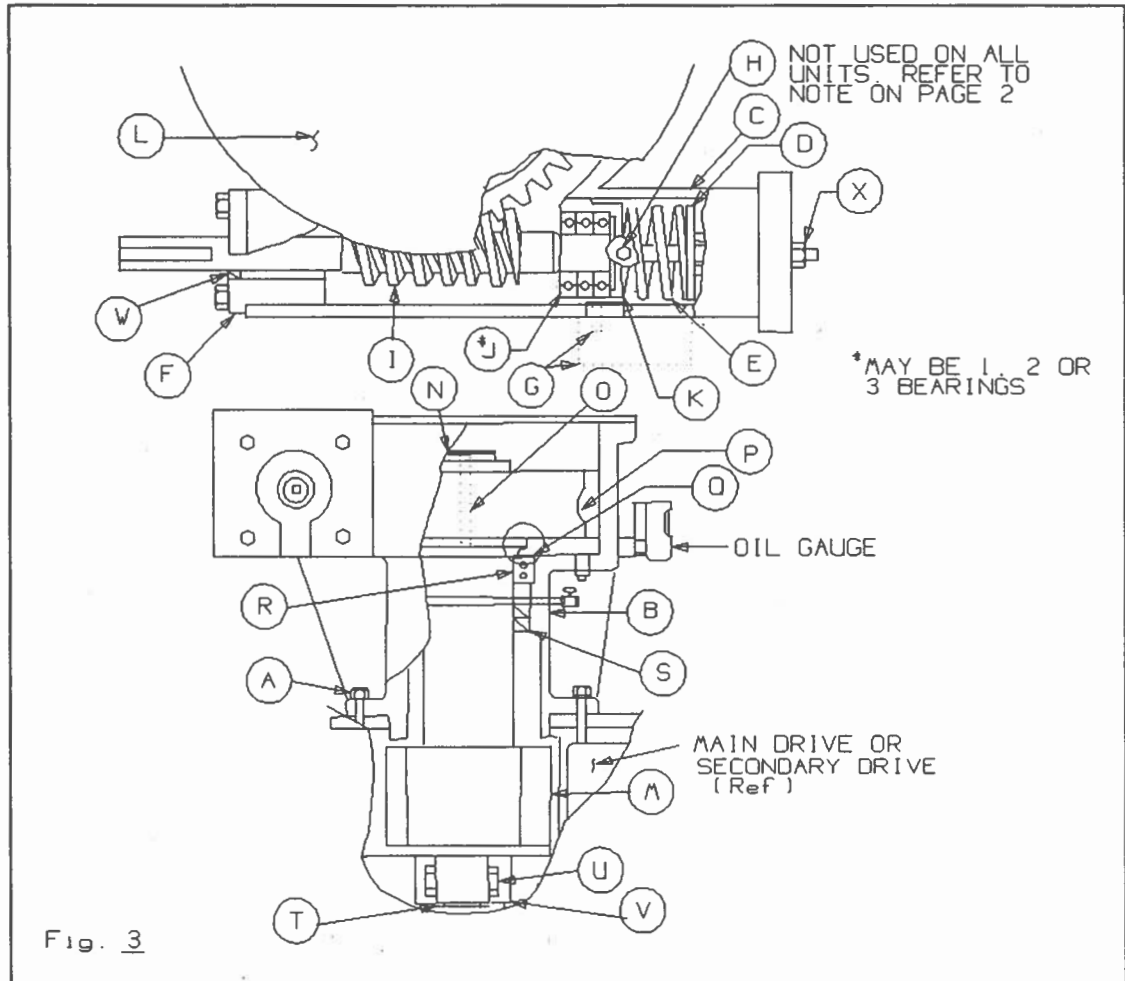
5. Place the worm gear unit on supports as shown in Fig. 2. Make sure this device will support the weight of the worm gear unit.



B. DISASSEMBLY OF THE WORM DRIVE

1. Remove the drive control and drive control pin (G).
2. Remove the capscrews and end cap (C). Remove the spring seat (D) and the spring (E).

3. Remove the capscrews and bushing housing assembly (F).



4. Remove the anti-rotation pin (H). Refer to note below. Then remove the worm shaft (I) and bearing(s) (J) with the sliding bearing seat (K) by turning the worm shaft so that the worm moves to the non drive end (spring end).

Note: Some units do not use an anti-rotation pin (H). If the pin is not used, the pin mounting hole in the worm gear housing will be sealed with a pipe plug.

Also, note that drives may be furnished with 1, 2 or 3 bearings (J).

5. Remove the housing capscrews and cover (L).

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6. Place blocking under the pinion (M) to prevent it from falling out of the drive when the retaining ring (N) is removed from the gear. Then remove the retaining ring (N), and the key (O). Remove the worm gear (P).
7. Support the pinion (M) (using an eyebolt in the top of the pinion) and lower it down through the housing as the blocking is removed.
8. Remove the pinion upper bearing retaining ring (Q). Then remove the bearing (R) using a puller. Remove the oil seals (S).
9. Remove the pinion lower bearing retaining ring (T) and the bearing inner race (U) from the end of the pinion. Then remove the outer bearing race (V) from the bottom of the main gear housing.
10. Remove the sliding bearing seat (K), and bearing(s) (J) from the worm shaft (I). Use a bearing puller if necessary.

C. INSPECTION

1. Inspect the teeth of the worm gear and pinion and the worm for the following:
 - a. **ABRASIVE WEAR:** Wear will show at random spacing across the gear teeth and worm. This is normally caused by dirt or other foreign material in the lube oil.
 - b. **SCORING:** This is shown by vertical scratches and/or grooves running from the pitch line (approx. center of tooth or worm) to the top of the tooth or worm. It can result from improper lubrication or abrasive materials in the lubricant.
 - c. **PITTING:** It is evident in large or numerous pits in the gear teeth and worm. Note that small pits may occur during run-in of a new gear, but these will smooth out as the gear wears in. It is caused by overload, poor lubrication or improper lubricant.
 - d. **GALLING:** This condition appears as numerous deep grooves or gouges and it is caused by overload of gearing for the lubricant used.
 - e. **NORMAL WEAR:** Eventually all gears and worms wear out due to long use and/or prolonged overload. Replacement should be considered based on the condition of the gearing and extent of the wear.

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2. Depending on the condition of the worm and gear, replacement may be required depending on the severity of the condition and the affect that a breakdown would have on the operation. Small scratches can be removed by repolishing the surface but if the scratches are large or deep, such as galling, replacement of the worm may be necessary, since the operating life would be limited. Would failure cause damage to the components? Cause production stoppage?
3. Inspect the bearing balls for pitting or scoring. If there is any question about the condition of a bearing, it should be replaced.
4. All parts should be cleaned with a solvent, then coated with a light oil for inspection. Never rotate a dry bearing.

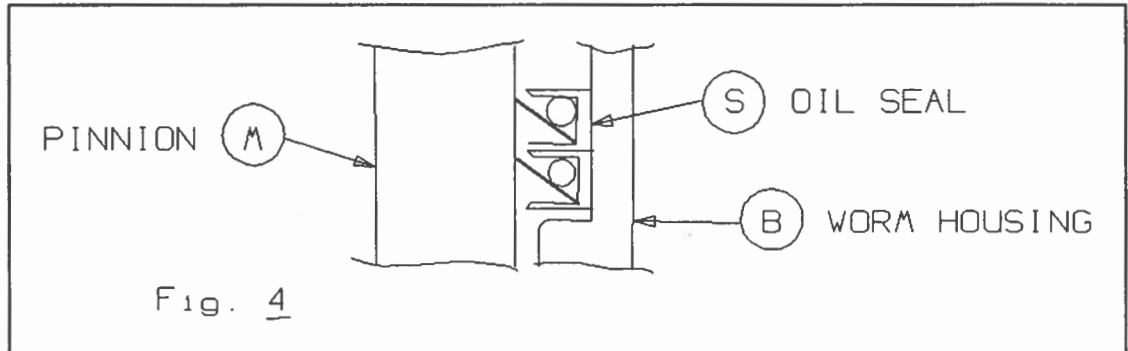
D. REASSEMBLY OF THE WORM DRIVE

NOTES:

- (a) Take care to prevent dirt or foreign matter from getting into the worm assembly. All parts must be cleaned with a solvent before reassembly and blown dry. Coat the bearings and seals with a film of oil.
 - (b) Inspect all parts for damage or wear and replace as necessary.
 - (c) Check all bearings for pitting, roughness of rotation or scoring. Replace all bearings on a shaft if one is defective.
 - (d) Coat all bearings and bushings liberally with grease or oil before they are installed.
 - (e) Oil seals are subject to deterioration and should be replaced with new seals when the unit is reassembled, even though the deterioration may not show.
1. Mount the pinion bearing inner race (U) on the pinion shaft (M) and install the retaining ring (T). Install the outer race (V) inside the main drive housing bearing packet.
 2. Install the oil seals (S) inside the worm housing (B), referring to Fig. 4. The oil seals must be installed as shown with the lips facing upwards.

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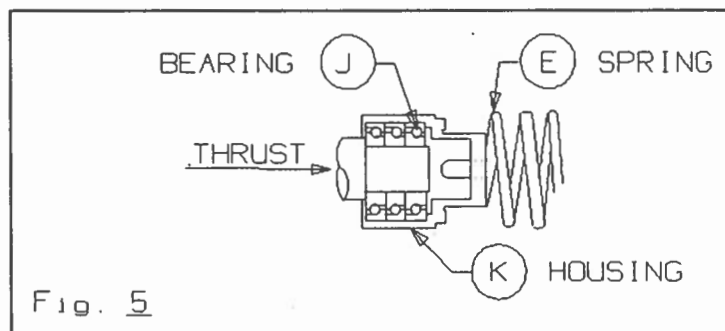


3. Pull the pinion (M) up through the worm housing (B) with an eye bolt and cable and support the pinion from below with blocking. (First, cover the keyway with tape to prevent it from cutting the seals.)
4. Install the bearing (R) over the shaft. Tap the bearing (R) in as necessary to seat, using a tubular driver. Then install the retaining ring (Q).
5. Mount the worm gear (P) on the pinion shaft and install the keys (O). Using a hammer and block of wood, drive the worm gear down until the retaining ring groove is exposed. Then install the retaining ring (N).

NOTE: DO NOT drive directly on the worm gear, use a block of wood.

6. Place the bearings (J) in the sliding bearing seat (K), as shown in Fig. 5.
NOTE: Worm Drives can have either 1, 2 or 3 thrust bearings. Refer to the Drive Assembly drawing for the number of bearings provided.

CAUTION: The bearings must be installed as shown to take the thrust towards the spring. Improper assembly will cause bearing failure.



WORM GEAR DISASSEMBLY
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7. Mount the sliding bearing seat (K) and bearings (J) on the worm shaft (I). The bearing must seat against the worm shoulder. Use a tubular driver or place the end of the worm on a block of wood and drive on the bearing housing, using a block of wood and hammer.
8. Insert the worm into the gear housing (from the non-drive end) turning it as necessary to mesh with the worm gear threads. (Coat the worm with oil.)
9. Coat both ends of the worm housing with Ultra Blue RTV-Silicone. Then place the spring (E) over the shaft and install the spring seat (D) and end cap (C). Secure the bolts. **DO NOT** turn the spring adjusting screw plug or nut (X).
10. Place the bushing housing (F) over the shaft and install the capscrews. Turn the bolts equally when tightening.

NOTE: If the bushing was replaced, make sure it is flush with the inside face of the housing.

11. Install the oil seal (W) as shown in Fig. 6. First, cover the keyway with tape to prevent the seal being cut.
12. Install the anti-rotation pin (H), if used.
13. If removed, screw the actuating pin into the drive control assembly, referring to Fig. 3. Torque the pin to 20-25 ft. lbs.

NOTE: On older drives, the drive control pin fits in the slot of the sliding bearing seat.

14. Install the drive control, referring to "E. Drive Control Installation" on a following page.

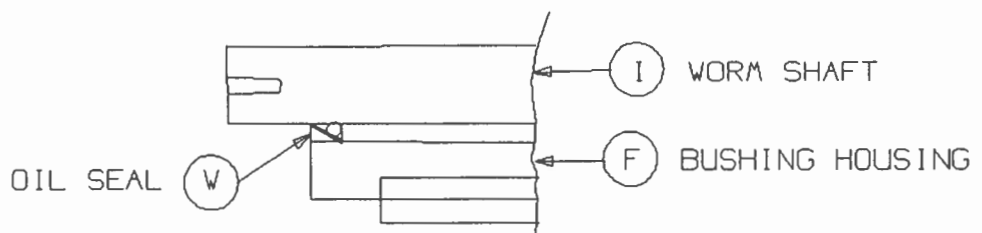


Fig. 6

WORM GEAR DISASSEMBLY AND REASSEMBLY INSTRUCTIONS	13-CX11 (11/90) 87

15. Turn the worm by hand to be sure all parts are properly installed and rotate freely.
16. Apply Ultra Blue RTV-Silicone to the worm gear housing lower mounting face. Lift the worm gear assembly, referring to the lifting instructions, and set it in position on the drive. Align the gear housing with the bottom drive referring to the Drive Assembly drawing for orientation.

NOTE: If shims were used between the worm housing and the drive, return them to their original positions.

17. Install the cover (L) using Ultra Blue RTV-Silicone between the cover and housing. Secure the capscrews.
18. Lubricate the drive referring to the Lubrication Instructions.
19. Install motors, etc. and guards.

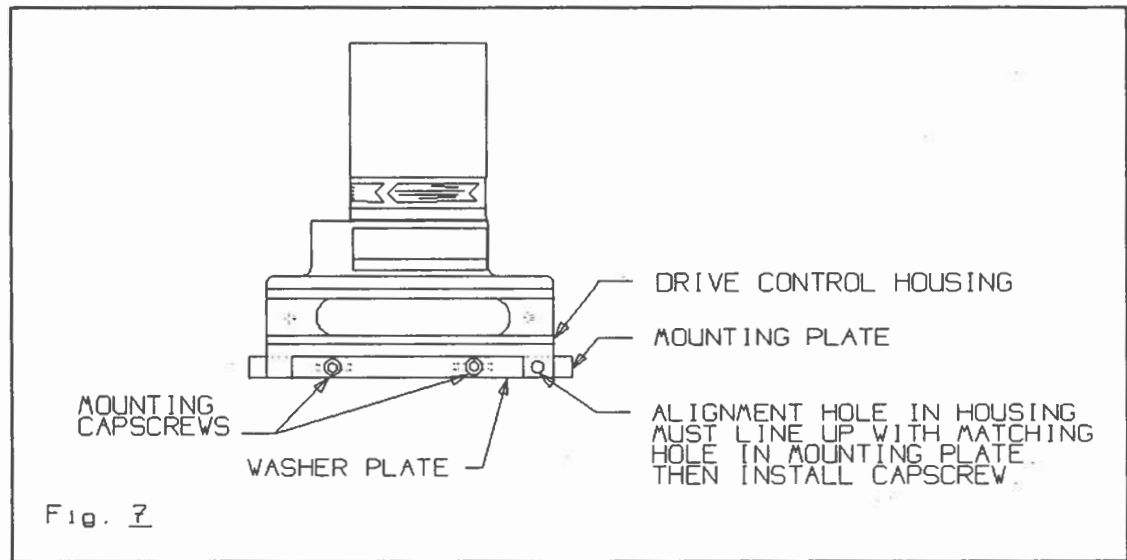
CAUTION: If provided with shaft mounted reducer(s), the motor/reducer assembly must be blocked in position until the torque arm is installed.

20. Reconnect the electrical wiring and check for proper drive rotation.

E. DRIVE CONTROL INSTALLATION

1. Run a bead of Ultra Blue RTV-silicone around the pin slot in the worm housing. Install the mounting plate, using the capscrews specified, centering the slot in the mounting plate over the slot in the worm housing. Torque the capscrews to 50-60 ft. lbs.

2. Set the drive control in place on the mounting plate, then install (but do not secure) the drive control mounting capscrews with washer plates.



3. Adjust the drive control by sliding it until the alignment hole in the drive control housing lines up with the matching hole in the mounting plate. Refer to Fig. 7. The drive control pointer should indicate "zero". Install the alignment capscrew in the alignment hole(s). Then, secure the drive control mounting capscrews.
4. Check the drive control for activation, referring to the Drive Maintenance Instructions.

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No Special tools are required for maintenance or repair of this equipment.

WARNING: CHECK THE DRIVE FOR TORQUE, REFERRING TO THE PRECEDING "DRIVE MAINTENANCE WARNING" BEFORE STARTING DISASSEMBLY. ALSO MAKE SURE THE POWER TO THE DRIVE HAS BEEN DISCONNECTED OR BLOCKED OUT TO PREVENT THE DRIVE FROM BEING ACCIDENTALLY STARTED.

1. Disconnect or block out all electrical power to the drive.
2. Support the rake arms in position on blocking. If the unit has a scum skimmer, additional support must be used to keep it upright. Disconnect the arms from the cage.

SUCTION CLARIFIERS ONLY: Disconnect all suction at the elbows prior to lowering the cage.

3. Disconnect the cage from the drive unit and lower the cage to the tank bottom.
4. Remove the walkway. Retain the slide plates and mounting plates, if furnished, and match mark for return to original positions.

A **DISASSEMBLY OF THE MAIN GEAR**

The drive base must not be removed from the column during the disassembly of the drive.

1. Remove the worm gear assembly, referring to the worm gear disassembly and reassembly instructions.
2. Remove the main gear cover.

NOTE: Some drive units are a seal that is held around the main gear cover with a clamp. If used, remove the seal and clamp. Reinstall the seal after the drive has been reassembled.

3. Remove the main gear from the drive base, using lifting bolts (not by Eimco) at each of the four (4) cage take-up stud mounting holes on the gear.

NOTE: Do not remove the drive base from the column.

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4. Place the main gear on blocking, upside down, allowing adequate room for inspection of the main gear teeth and bearing strips.

B. INSPECTION

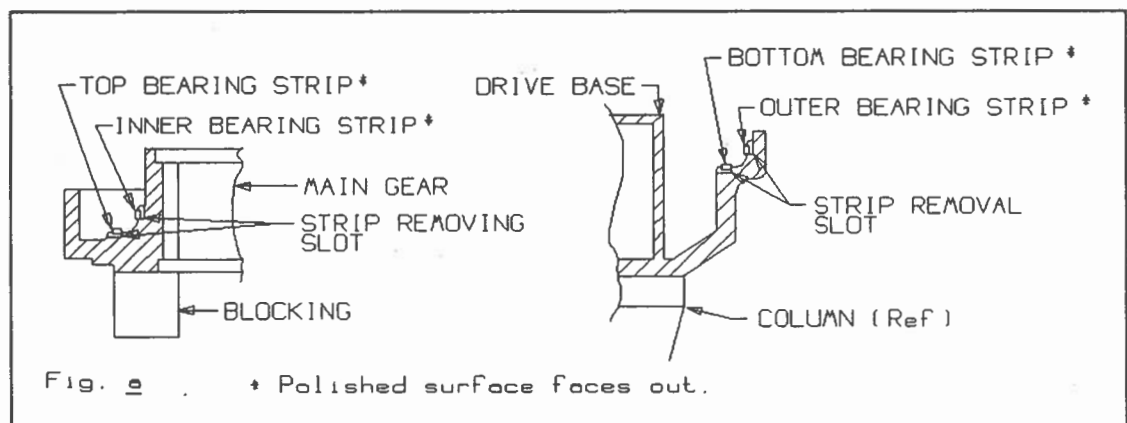
1. Inspect the teeth of the main gear for the following:
 - a. **ABRASIVE WEAR:** The wear on the teeth will show at random spacing across the teeth. This is normally caused by dirt or other foreign material in the lube oil.
 - b. **SCORING:** This is shown by vertical scratches and/or grooves running from the pitch line (approx. center of tooth) to the top of the tooth. It can result from improper lubrication or abrasive materials in the lubricant.
 - c. **PITTING:** It is evident in large or numerous pits in the gear teeth. Note that small pits may occur during run-in of a new gear, but these will smooth out as the gear wears in. It is caused by overload on gear, poor lubrication or improper lubricant.
 - d. **GALLING:** This condition appears on the gear teeth as numerous deep grooves or gouges and it is caused by overload of the gear for the lubricant used.
 - e. **NORMAL WEAR:** Eventually all gears wear out due to long use and/or prolonged overload. Replacement should be considered based on the condition of the gearing and extent of the wear.
2. Replace the gear, as necessary, depending on the severity and extent of these conditions.
3. Clean the bearing balls and strips with solvent or kerosene and coat them with light oil.
4. Carefully inspect all bearing balls for pitting or scoring. Check the balls for uneven wear, using a micrometer. refer to the Parts List for specified ball diameter.
5. Inspect the bearing strips on the main gear and drive base for wear and pitting and replace, if necessary. Refer to the bearing strip replacement instructions on a following page.

C. BEARING STRIP REPLACEMENT

NOTE: All bearing strips on the main gear and the drive base should be replaced at the same time. The following procedure covers installation of a bearing strip on the main gear, but it is typical for all four (4) bearing strips on the drive unit.

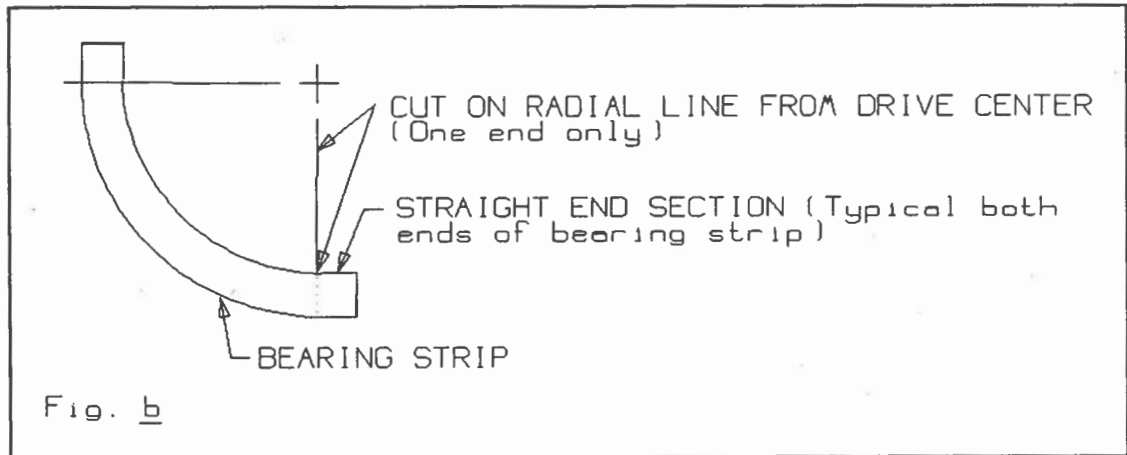
1. Place the main gear upside down on blocking for access to the bearing strips. See Figure a.
2. Using the strip removal slot, carefully pry one end of the bearing strip out of the mounting groove. Then, starting at the free end of the strip, pull the rest of the bearing strip out of the mounting groove.

CAUTION: CARE MUST BE TAKEN TO AVOID DAMAGING THE MOUNTING GROOVE.



3. Clean the mounting groove with solvent and blow dry.
4. Trim off one straight end section of bearing strip only, as shown in Figure b. The cut should be made on a radial line from the drive center to provide the proper angle at the joint. Note that the polished surface of the new strip will be facing out.

CAUTION: DO NOT USE A CUTTING TORCH TO TRIM THE BEARING STRIP.



Note: Polished surface of the bearing strip must face out.

5. Start the trimmed end of the bearing strip (polished surface facing out) into the mounting groove approximately 2" away from the removal slot on the inner and outer strips and 3" away from the removal slot on the upper and lower strips. Use a brass bar (not by Eimco) and hammer, as shown in Figure c.

CAUTION: DO NOT HAMMER DIRECTLY ON THE BEARING STRIP, AS THIS WILL DAMAGE THE SURFACE OF THE STRIP.

6. Work the bearing strip gradually down into the groove, while working around the strip. Take care to avoid gouging metal off the drive base or main gear into the mounting groove, as this will prevent the bearing strip from seating in the groove.

NOTE: The bearing strip must be worked gradually into the groove all around the circumference of the strip. Force seating the bearing strip, as shown in Figure d, will bend or deform the strip, making it impossible to properly seat the bearing strip in the mounting groove.

7. Referring to Figure f, mark and field trim the trailing end of the bearing strip where it overlaps the leading end.

CAUTION: DO NOT USE A CUTTING TORCH TO TRIM THE BEARING STRIP.

DRIVE UNIT AND MAIN GEAR DISASSEMBLY AND REASSEMBLY

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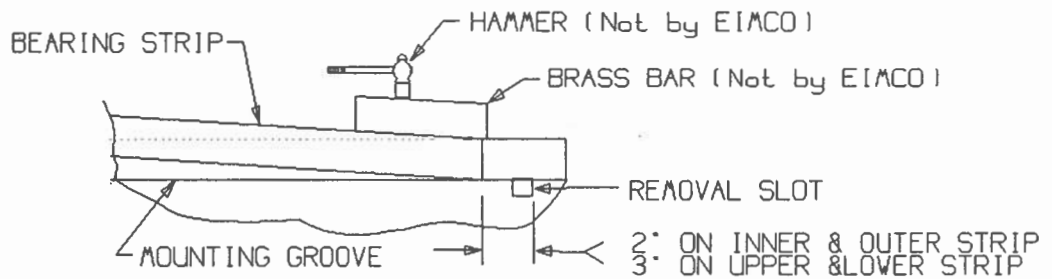


Fig. c

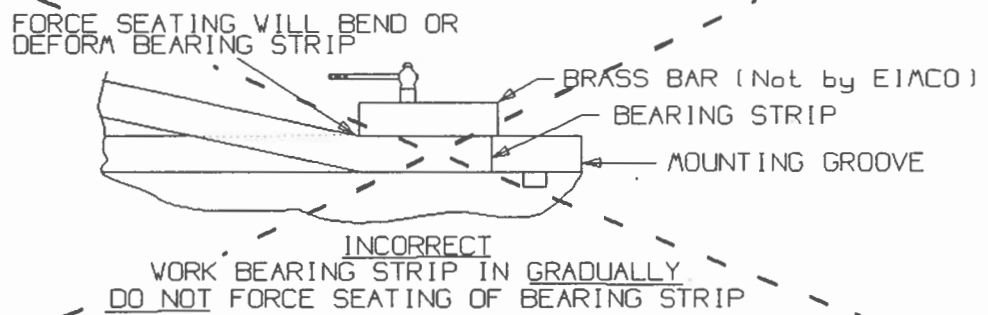


Fig. d

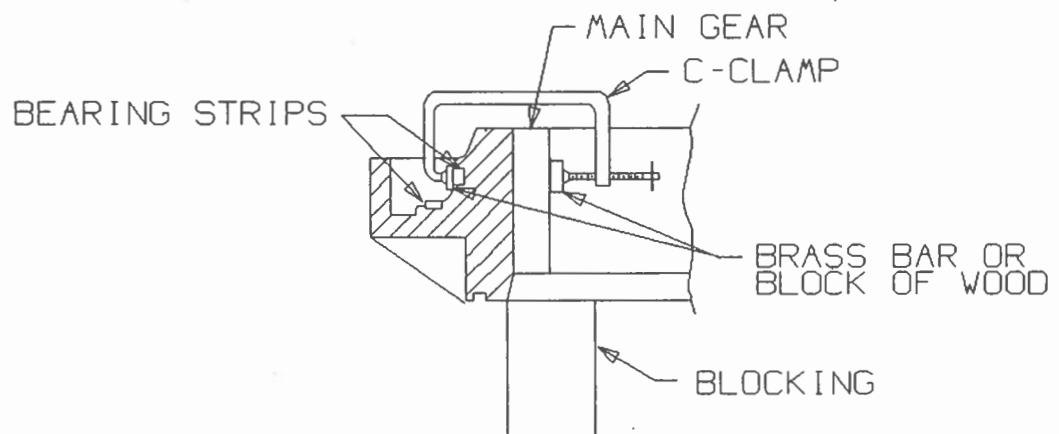
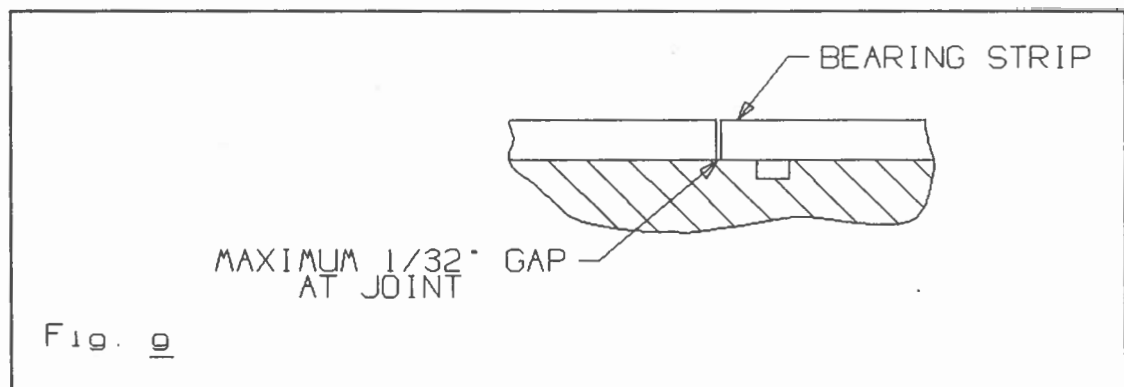
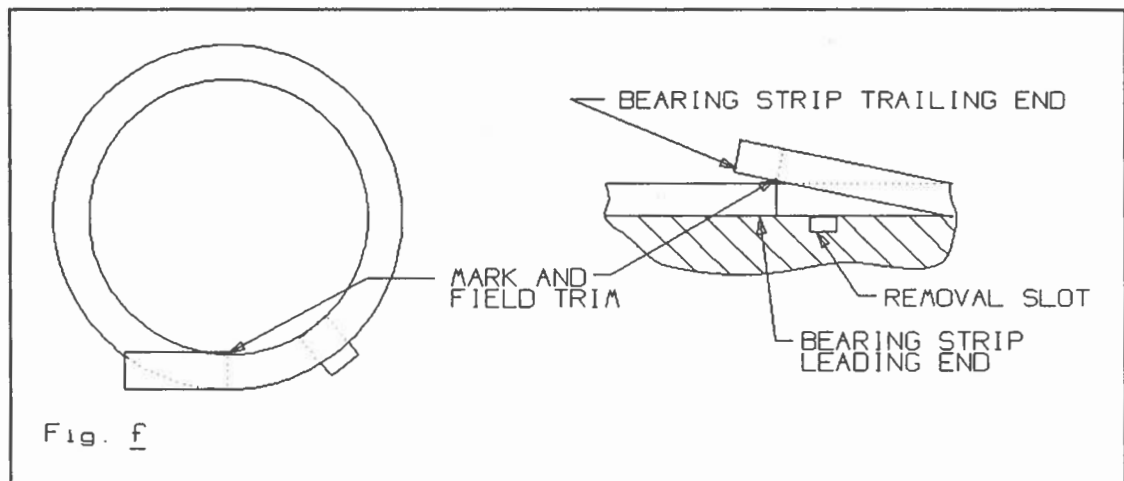


Fig. e

8. Check to be sure the mounting groove is free of all metal particles and debris, then finish seating the bearing strip in the mounting groove. Care must be taken to obtain a clean, tight joint. The ends of the bearing strip must butt together with a maximum 1/32" gap between the ends. See Figure g.



9. Check to be sure the bearing strip is completely seated all around.
10. After the strips are installed, polish the bearing surfaces on the strips to 32 RMS finish. Use a 120 Emery cloth for polishing.

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D. REASSEMBLY OF THE MAIN GEAR

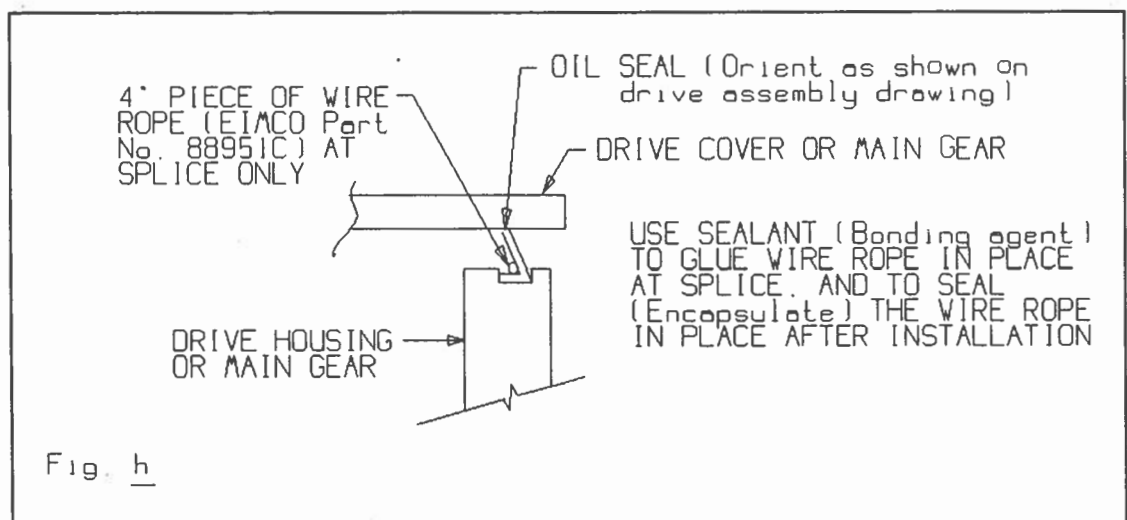
1. Thoroughly clean all parts, including housing, before reassembly. Remove all gasket and packing material.

NOTES:

- a. Take care to prevent dirt or foreign matter from getting into the drive assembly. All parts must be cleaned with a solvent before reassembly and blown dry.
 - b. Seals, packing and gaskets should be replaced whenever the unit is disassembled.
 - c. Inspect all parts for damage or wear and replace as necessary. Refer to the "Inspection".
2. Coat bearing balls with grease, then set the balls in place in the drive base. Refer to the parts list for the specified number of bearing balls required.
 3. If the lip seal between the drive base housing and the main gear is being replaced, refer below to item "E. Replacement of the Lip Seals".
 4. Apply Mobilith AW-1 grease to the areas on the main gear where the lip seals will slide.
 5. Referring to the main gear disassembly instructions for lifting, set the main gear in place, resting on the bearing balls.
 6. If the lip seal between the main gear and the cover is being replaced, refer to the instructions below for the lip seals.
 7. Apply Mobilith AW-1 grease to the areas on the main gear cover where the lip seals will slide.
 8. Install the main gear cover, using Ultra Blue RTV-Silicone at the joints, as specified on the Drive Assembly drawing.
 9. Install the worm gear assembly, referring to the worm gear disassembly and reassembly instructions.
 10. Lubricate the drive referring to the lubrication instructions.
 11. Install the motor, guards, etc.
 12. Connect the electrical wiring and check for proper drive rotation.

E. REPLACEMENT OF THE LIP SEALS

1. Thoroughly clean the seal mounting surfaces. These surfaces must be free of dirt, grease, or any foreign matter.
2. Measure a seal for cutting by laying it in position on the housing or gear mounting surface, where it will be located. The sealing surface must be oriented as shown on the Drive Assembly drawing. Make a square cut on the end of the seal, leaving a slight overlap. Refer to the Assembly drawing and Fig. h.
3. Apply sealant (bonding agent) (Eimco Part No. 88899A) over the mounting surfaces where the seals will be installed.
4. Referring to Figure h, set the lip seal in place, except the last 12 inches of one end of the seal, making sure the seal lip is facing in the direction shown on the Drive Assembly drawing. Since bonding will take place within 45 seconds of contact, take care in setting the seal in place.
5. Bring the uncemented end together with the opposite end. Mark and cut the end of the seal for a square, butt fit against the opposite end.
6. Apply the sealant (bonding agent) to both square ends and set the seal in place. Press the ends together until a firm bond is made.
7. Apply sealant (bonding agent) to the inside angle of the seal at the splice, for about 3" on both sides of the splice. Then, glue a 4" long piece of wire rope (Eimco part no. 88951C) in place, as shown in Figure h, centered on the splice.
8. Allow the bonding agent to harden, then use additional bonding agent to seal (encapsulate) the piece of wire rope in position.



SKIMMING DEVICE MAINTENANCE AND ADJUSTMENT	14-BC3 (3/93)a 97

The skimming device is designed to skim the surface of the tank and push the floating scum towards the periphery where the skimmer blade will collect it and dump it into the scum box. To operate correctly the skimmer blade and scum scraper must be proper submergence, the scum skimmer must pivot and rotate correctly and the wipers must be able to wipe most solids from their contact surfaces.

CHECK POINTS BEFORE START-UP

Observe skimming device rotation for several complete revolutions. The scum skimmer must be level, proper elevation and aligned parallel to the leading "drop" edge of the scum box, as shown in Fig. a. The scum skimmer should be submerged about 3" (76.2 mm) and all wipers, or scrapers, must contact their wiping surfaces on the baffles and scum box. The baffles must provide a smooth and uninterrupted surface for the scraper. Any deviation should be adjusted as specified below.

SKIMMER ADJUSTMENT

1. Adjust the scum skimmer for parallel alignment with the scum box discharge leading "drop" edge, if necessary, referring to Figures b, c and d. Shift the arm clevis and collar for the trailing side of the scum skimmer only. Do not shift the leading side arm clevis or collar.
2. Adjust the scum skimmer for specified skimming depth, as specified on the drawings (normally 3" submergence), using the stop screws (collars and eye bolts). Note that the arm clevis should allow the scum skimmer to rise up and over the scum box ramp for discharge, but the collars should stop the scum skimmer from dropping below the adjusted submergence level (about 3" (76.2 mm) submergence).
3. Adjust the scum skimmer wipers, as required, for contact with their wiping surfaces on the scum box and baffle, using the slotted mounting holes in the wipers.
4. Adjust the hinged skimmer (vertical hinged deflector) radially and longitudinally on the skimmer arm within the 6" (152.4 mm) [nominal] allowed to maintain contact with the inner vertical skirt of the scum box. This is to minimize the loss of scum when the scum skimmer goes up the scum box ramp.
5. Adjust the spring tension on the hinged skimmer, as specified on the assembly drawing, by shifting the hinged skimmer support and collar on the skimmer arm within the 6" (152.4 mm) [nominal] allowed. This tension should force the scum scraper to pivot horizontally so it will contact the inner surface of the scum baffle (normal spring tension is about 8 lbs. [3.6 kg] against the wiper).

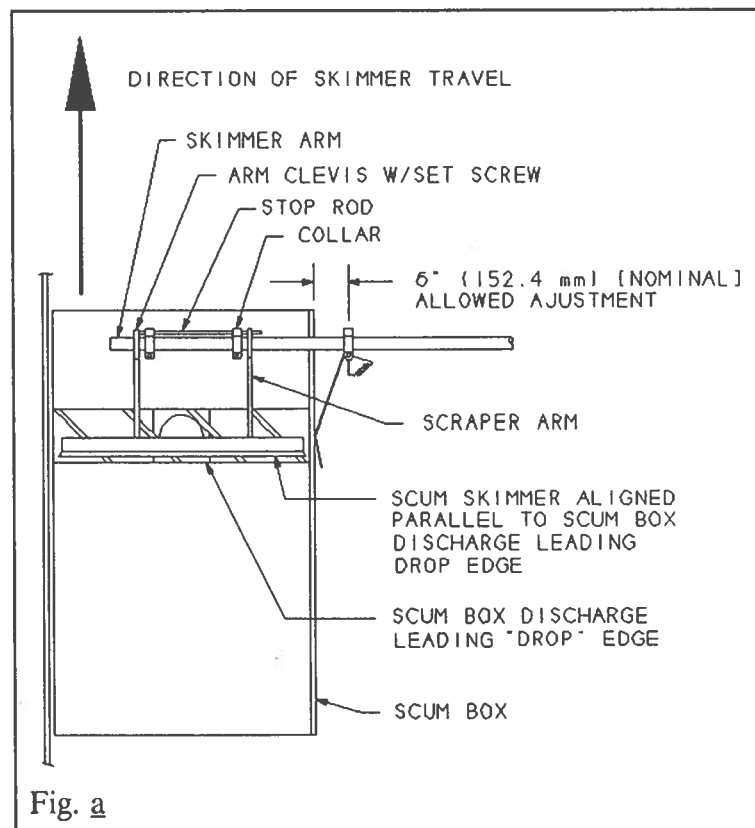
SKIMMING DEVICE MAINTENANCE AND ADJUSTMENT	14-BC3 (3/93)a 98

UPKEEP AND MAINTENANCE

Once a week, check that the scum skimmer assembly is collecting the scum from the baffle and carrying it to and into the scum box. This includes the neoprene wipers and hinged skimmer. It is particularly important when the scum skimmer passes over the scum box that scum does not run back and down the ramp.

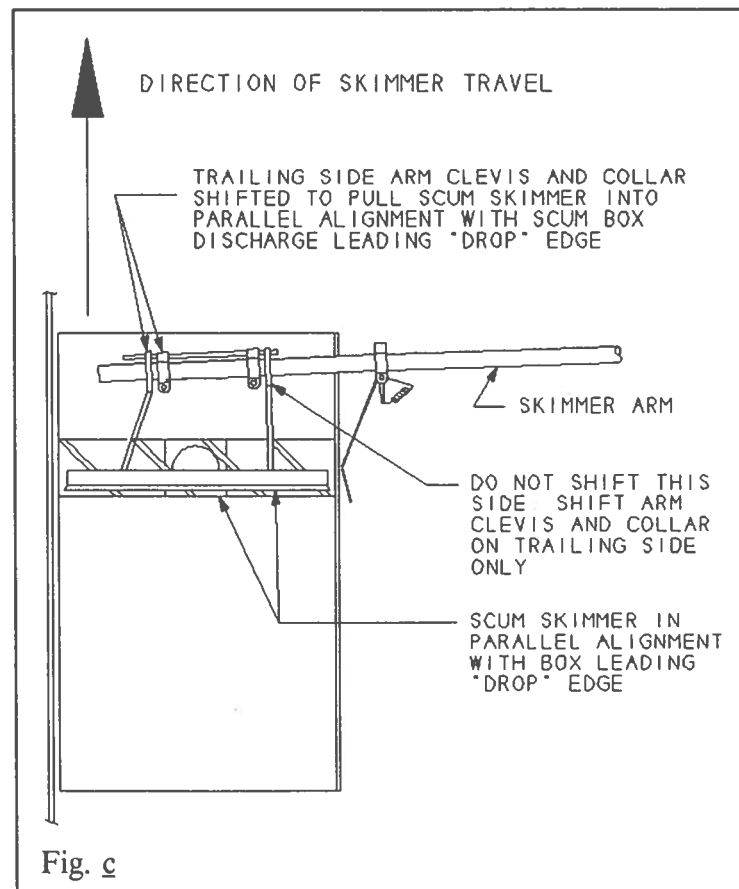
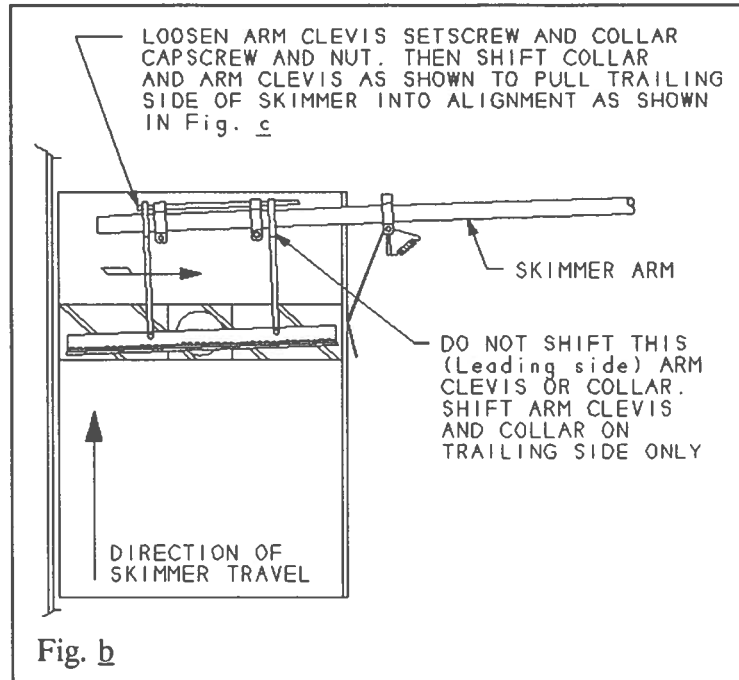
Clean the scum box beach and ramp, as required by operating conditions, to keep them free of heavy scum/float accumulations that could cause skimmer damage.

Icing of the scum box beach and box can also cause skimmer damage. Clean the beach and box, as required by local operating conditions to keep them free from ice. Refer to the Eimco Operating Instructions in this manual.

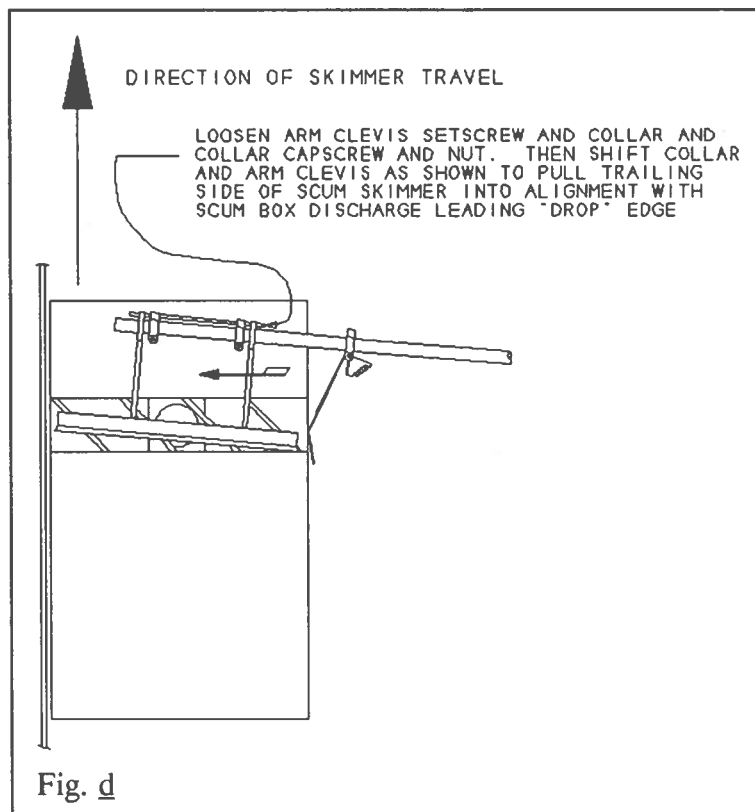


SKIMMING DEVICE MAINTENANCE AND ADJUSTMENT

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SKIMMING DEVICE MAINTENANCE AND ADJUSTMENT	14-BC3 (3/93)a 100



MAINTENANCE AND START-UP SERVICES PARTS AND REPAIR ORDERS	01-AA3e (12/92) 101

MAINTENANCE AND START-UP SERVICES

Experienced Eimco engineers and service personnel are available to assist in the maintenance and start-up of your Eimco equipment. They offer you the benefits of their technical know-how and firsthand knowledge of the equipment, plus the backing of Eimco's entire engineering and research facilities.

They can instruct on proper operating and maintenance procedures, advise on trouble shooting and, if necessary, supervise the entire start-up, depending on your requirements.

If you should want such assistance, arrangements should be made at the earliest possible date, outlining the services required, giving the approximate duration of such services. Charges for the services will be arranged at that time.

Contact your Eimco PEC Representative; referring to the addresses page.

PARTS AND REPAIR ORDERS

To make sure you receive the right replacement parts for your equipment and avoid delay, it is important to give the following information with each order.

1. SIZE AND TYPE OF UNIT: These are found on the cover page of the manual and on the Parts List pages.
2. SERIAL NUMBER: This is found on the unit nameplate and the Parts List. In case the S/N is omitted on the Parts List, use the Order number since it and the S/N are similar
3. PART NUMBER AND DESCRIPTIONS: Listed on Parts List.
4. SPECIAL FIELD MODIFICATIONS: This is important if the original material or design has been changed. Include drawings or other descriptive information.

Please contact your Eimco PEC Representative for parts, repair orders and equipment service.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 102

PURPOSE

The clarifier is a final unit in the activated sludge process. It is designed to continuously remove substantially all the settleable solids from the sewage or waste water after prior treatment, to discharge these solids in a highly active state for either further use in the process or disposal, and to discharge an effluent with minimum settleable solids.

PRINCIPLES OF OPERATION

The clarifier consists of collection arms that are supported and driven by a center drive unit by way of a cage that connects to the drive unit main gear. The drive mounts on top of a center influent column, which also serves as the center influent inlet for the feed and as the sludge discharge outlet, through a center down pipe.

Sludge removal piping mounted along the collection arms connects to the sludge discharge pipe in the column through a sludge collection box (drum) that surrounds the column and rotates with the cage.

The feed enters the tank through the center influent column, connecting with a pipe beneath the tank, and is discharged through submerged ports directly under the sludge collection drum. As the feed discharges from the center column, its entering velocity is dissipated by means of a feedwell and influent well (if used), which both cause the feed to take a downward direction.

As the flow is directed downward, and then outward, the solids settle out on the tank bottom along the flow path from the center column to the outer tank wall. The clarified effluent, following this radial pattern, flows upward and outward into an overflow collection launder around the tank.

Overflow Weirs

To ensure a steady and uniform flow of effluent around the tank, adjustable V-notched overflow weirs are fitted to the launder. These weirs must be level. Irregularity in the level will cause more flow at the low points and the increase in velocity at these points will pull fine suspended solids that would otherwise settle out into the effluent. V-notched weirs also minimize the effect of wind across the tank surface, which would produce unequal weir loading.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 103

Scum Baffles and Skimmer

Primary clarifiers are provided with scum baffles that are located parallel to and about 6" away from the weirs to prevent scum from overflowing the weirs into the effluent channel. Secondary clarifiers may have scum baffles if required; however, they are generally not necessary because scum is not normally present in effluent from trickling filters or activated sludge tanks.

Integral with the scum baffle is a scum box that receives and discharges accumulated scum as it is moved from the center of the tank to the periphery by means of a scum skimmer and scum scraper. This scum box must be level and adjusted in height in accordance with the erection instructions.

The scum skimming device is designed for long service life with a minimum of maintenance. No lubrication is required. Periodically the condition of the wipers on the skimming device should be checked to make certain they are effectively contacting the scum box and baffle surfaces in order to properly contain the scum material for discharge into the scum box. The scum skimming device must also be leveled in accordance with the erection instructions.

Sludge Removal

A feature of the suction clarifier is its ability to rapidly and continuously remove the settled sludge and discharge it in a biologically active state for reintroduction into the process. It is economically necessary to return this activated sludge in as highly a concentrated form as consistent with the freshness or clarity required, the one being inversely proportional to the other. As such, it is generally desirable to operate with a sludge blanket depth over the tank bottom of approximately two feet (at the outer tank wall). This will not retain the sludge in the clarifier much more than two hours, yet it will allow a much higher concentration than would be possible if the bottom were "swept clean".

The sludge is continuously "sucked up" from the tank bottom through suction piping on the collection arms and carried up by piping to the sludge control boxes built into the sludge collection box (drum). Each of the suction pipes transports sludge from an annular area of the tank bottom, allowing a controlled flow from each of these areas by means of the control boxes in the sludge collection box (drum).

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 104

Control of Sludge Removal

Sludge flow is induced by a head differential between the liquid levels in the sludge collection box and the main tank. The amount of this differential, and hence the amount of flow through the sludge suction pipes, depends on the rate of flow through the sludge discharge pipe in the column and/or capacity of the sludge recirculation pumps and/or the rate of feed to the tank.

Each suction pipe is provided with an adjustable gate or valve located at the collection drum or box. The purpose of this adjustable orifice is to control the flow from each suction pipe so that sludge of equal concentration can be withdrawn from all areas. Comparative samples should be taken from the individual control boxes and then the gates or valves should be adjusted so that individual samples are equal density. This may be accomplished by comparing the percent solids produced by 30 minutes settlement in a 1,000 cc graduated cylinder. Each adjustable orifice should be set at the largest opening possible consistent with required density and sludge equalization while minimizing the head loss through the clarifier.

Sludge is withdrawn from the rotating collection box (drum) through an opening in the center column through the sludge discharge pipe located in the center of the influent pipe.

Adjustable squeegees extend downward from the collection arms to scrape the tank bottom and prevent septic action of the sludge settled on the clarifier tank floor. Grit and other foreign material are pushed to the grit pocket at the center by the squeegees for periodic removal via the drain line to the pocket.

On some machines an adjustable variable speed drive motor may be provided to regulate the rotational speed of the collection arms. By changing the speed of rotation of the arms, it is possible to change the percent solids removed in sludge withdrawal. In some instances, it is necessary to change the speed in order to prevent solids being disturbed and passing over the effluent weir with the effluent.

STARTING PROCEDURE

It is assumed that the machine has been lubricated, all parts are in alignment, and proper clearances exist between the squeegees and the tank bottom throughout a complete revolution of the arms.

The arms should be rotated 4 or 5 times before allowing feed into the tank. Refer to General Maintenance Instructions.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 105

After operating the mechanism in the dry tank, start the influent into the tank while the mechanism continues to operate. As the water approaches operating level, all sludge collection piping will fill up and the sludge recirculation system will become operative.

The sludge control gates should be adjusted as described above, after allowing proper build up of a sludge blanket and equilibrium of the process.

NORMAL OPERATION

The clarifier mechanism and the sludge pumps should be operated continuously in order that sludge will not build-up to where it begins to overflow with the effluent.

After the initial settings of the sludge control gates, no further adjustments need be made unless the quantity and/or solids character of the influent changes noticeably. Such changes, if occurring, will probably be of a cyclic nature so that a record of adjustments will be of value in anticipating future changes. Comparative samples of sludge should be taken periodically from the sludge control boxes for determining the solids concentrations in the annular areas of the tank and for checking solids flow through the piping.

OPERATING PROBLEMS AND CORRECTIONS

1. Foreign Objects in Tank

To minimize damage resulting from objects such as tools, rocks, rags and other foreign bodies being dropped into the tank, it is imperative that the mechanism be stopped and these objects removed immediately before continuing operation.

2. Sludge Suction Lines Plugged

If one of the sludge suction pipes appears to have become plugged due to a rag or other foreign material, it will be noticed by a reduced level in its control box.

In some cases, it may not be blockage but a suction pipe that has slipped, preventing the upward flow of sludge. In this case it will be necessary to drain the tank and adjust the piping. In any case, find the reason for the plugging or reduced flow before continuing with normal operation.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 106

3. Plugged Return Lines

It is unlikely that the main sludge return line will become plugged; however, if it does, it will become evident by a lack of recirculation flow causing the level in the sludge control boxes to increase the same as that in the tank. It will be necessary to locate the problem and correct the situation.

4. Higher Than Normal Torque on Drive Control

Sludge may gradually accumulate in the tank over a period of time due to the sludge being discharged at a rate less than the rate of solids entering with the feed. This will be noticed by a higher than normal operating torque. It will be necessary to increase the rate of recirculation in order to bring the sludge down to the appropriate level.

Also, if a very gradual increase in the torque load is noted, it is possible that grit or silt is being introduced with the influent. If this material cannot be removed normally through the tank drain it will gradually overload the mechanism, until the alarm sounds. However, the drive should not be allowed to operate continuously for days at a high torque (over 20%), even though the alarm has not sounded. It will be necessary to remove the silt. Usually, grit and silt are removed from the influent before it can reach a final Clarifier of this type and it is unlikely that this kind of problem will occur.

5. Overload Alarm Sounds or Motors Stops

But if the sludge load becomes so heavy that torque build-up occurs in the machine and the drive control indicates a load sufficient to actuate the alarm, the operator will then know that something is causing an overload on the mechanism, although the operator should not allow the torque to reach this point before taking corrective action.

If the overload continues to increase, the drive control will cut electrical power and stop the mechanism. When this occurs, it will be necessary to drain the tank and remove the sludge from the tank. This can be done by draining the sludge or sluicing out the sludge.

If some foreign object has been dropped into the tank accidentally, the mechanism may suddenly overload, sound the alarm and then stop. In this case, the object must be removed. It might be necessary to bypass the influent if the obstruction cannot be located quickly and it may be necessary to drain the tank.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 107

6. Solids in the Effluent and Overloading

If the solids rise to the surface and overflow with the effluent, any number of problems may be at fault and each should be investigated individually.

The clarifier may be overloaded either by too much water or too much solids material.

Too much water, due to storm water etc., will increase the flow above design capacity of the clarifier causing sludge particles to wash over with the effluent rather than settle out. This also reduces the sludge level in the tank adversely affecting the solids concentration. When there is excessive flow some of the flow should be by-passed if possible.

Too much solids in the overflow may be caused simply by an overload of the treatment plant and too many solids for the clarifier to handle. This and too much water, over a period of time, can be corrected only by additional treatment units.

But too many solids in the effluent may be caused by a low head differential between liquid levels due to a low rate of flow through the sludge discharge pipe, allowing the sludge level in the tank to build up and approach the overflow launder. Check the sludge recirculation pumps for proper operation. If this is not the problem, check for plugging of the sludge pipe. Temporary shutdown will be necessary.

An overload may also be the result of a single unusually large discharge of solids into the plant or system, but this must be corrected at the source. Temporary relief may be obtained by increasing the sludge recirculation, if possible, or by-passing to other units.

7. Poor Settling Sludge

Solids in the effluent may also be the result of a poorly settling sludge or other sludge problems.

In a low solids condition, inadequate flocculation may occur and so the solids will be dispersed and fail to settle. This can be controlled by temporarily reducing the sludge flow with the recirculation pumps or throttling the sludge control boxes although this latter procedure is not recommended once even flow has been obtained. In some cases, flocculants must be added to develop the bulk and weight for the solids to settle.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 108

Growths of certain organisms may also cause the sludge to swell, but they themselves do not flocculate. Since there are various conditions and solutions involving pH, temperature, low oxygen, etc., consult your Eimco Representative.

When pieces of sludge float to the tank surface accompanied by objectionable odor, this is caused by septic sludge on the tank bottom due to a lack of oxygen (anaerobic decomposition occurs). This may be due to a clogged suction pipe failing to pick up in an area or squeegees that are not sufficiently close to the tank bottom to scrape up the sludge. Locate and correct the problem before the condition gets worse.

8. Surface Ice Or Heavy Surface Scum Loading

The skimming device assembly is not designed to push ice or other heavy floating items or accumulations. During icing or severe surface float conditions, lock the skimmer in position above the liquid level on top of the skimmer arm. To raise the skimmer assembly, lift the scum skimmer blade vertically (it will rotate on the arm clevises) above the skimmer arm. Then, move the blade horizontally toward the center of the tank, folding the scum skimmer blade and scraper arms down to a position on top of the skimmer arm and vertical hinged skimmer.

CAUTION: Make sure the skimming device rests securely in position. It must not be allowed to slip off to either side of the skimmer arm during operation of the clarifier.

CAUTION: Make sure the skimmer assembly does not contact the walkway superstructure or other stationary objects as it is rotated around the tank in this "out of service" condition.

Note: When the skimming device is placed back into operation, pull the vertical hinged skimmer out of the way before lowering the scum skimmer blade back into operating position. Then, check the skimming device for proper adjustment, referring to the Skimmer Maintenance instructions.

9. Shutting Down the Clarifier

Before a tank is drained or dewatered to correct any operating problem, every effort should be made to correct the problem first. Sludge pipes should be cleared if possible with plumber's rods or by applying air or water. Foreign objects should be fished out, if possible, with hooks. And, causes of operating problems should be determined if possible.

EIMCO SUCTION CLARIFIER OPERATING INSTRUCTIONS	15-LC1 (7/90) 109

Draining the tank to correct problems or reconditioning the mechanism should be done preferably in the winter rather than in the warm weather of summer when biological growth is greatest. It should also be planned so that the down time is at a minimum and when the flow into the plant is at its lowest point.

OPERATING WARNING:

DO NOT ATTEMPT TO KEEP THE CLARIFIER RUNNING WHEN AN OVERLOAD IS INDICATED! FIND THE TROUBLE AND CORRECT IT!
DO NOT TAMPER WITH THE OVERLOAD ALARM SWITCH ADJUSTMENTS!

DO NOT START UP WITH A LOAD OF SLUDGE IN THE TANK!

MAINTENANCE

Refer to the Maintenance Instructions in a previous section.

PROCESS PERFORMANCE	01-AA5 (12/83) 110

The process performance of the equipment referred to in these instructions is dependent upon many factors, including influent or feed quality and quantity, additives required, time, temperature, rates of change, sizing criteria used, operating conditions, etc. Therefore, unless a written Process Performance Warranty has been included, Eimco P.E.C. cannot assume any liability or responsibility for performance results that the user of the equipment is expecting or has predicted.

Should assistance be required in the operation of the equipment, due to unexpected conditions, or should accessory or add on components or changes be required to meet your performance needs, Eimco P.E.C. can, at additional cost, provide the service of experts to assist you in determining what actions must be taken.

TROUBLE SHOOTING

16-LC1
24666-01 E
111

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
1. Overload alarm sound-or, drive operates at high torque for several days	a. Torque build up on drive and mechanism	(1) Stop feed to clarifier and check for operating problem. Refer to Operating Instructions (2) Check for grit in sludge. See Operation (3) Check for foreign object in tank. Stop drive if pointer is jumping (4) Check skimmer for hang up
2. Drive stops	a. Loss of electrical power	(1) Check power source (2) Check control fuse
	b. Drive control cutout	(1) If pointer on control is at maximum cut-out, drain tank to locate problem <u>Do not</u> by pass control (2) If pointer is <u>not</u> at maximum torque, check control. See Maintenance Instructions
	c. Motor drive(s) cutout	(1) Check for overheating refer to manufacturer's instructions (2) Check for broken chain or belts or shear pins
3. Solids in effluent	a. Overloading of clarifier	(1) Check flow rate and feed solids content (2) Refer to Operation Reduce sludge blanket level. See Operation
	b. Inadequate flocculation	(1) Check for finely dispersed solids. See Operating Instructions
	c. Clogged suction lines	(1) Stop drive and use plumber's snake (2) Drain tank and reopen piping. See Maintenance Instructions

TROUBLE SHOOTING

16-LC1
24666-01 E
112

PROBLEM	POSSIBLE CAUSE	CORRECTIVE ACTION
4. Low solids content in sludge	a. Inadequate sludge blanket in tank	(1) Adjust sludge control gates. See Operating Instructions. (2) Check flow rate. See Operating Instructions
	b. Drum seal worn (bubbles around column in sludge collection drum)	(1) Refer to Maintenance Instructions for inspection and Installation Instruction for Replacement
	c. Clogged suction line(s)	(1) Stop drive and use plumber's snake (2) Drain tank and repair piping. See Maintenance Instructions
	d. Inadequate flocculation	(1) Check for finely dispersed solids in effluent. See Operating Instructions
5. Excessive floating scum	a. Skimmer malfunction	(1) Adjust skimmer for smooth operation and replace wipers. Refer to Skimmer Maintenance Instructions (2) Adjust hinged skimmer (deflector) to trap solids. See Skimmer Maintenance Instructions
	b. Scum box flushing system not working	(1) Adjust as necessary
	c. Septic conditions on bottom of tank (pieces of floating sludge and objectionable odor)	(1) Check for clogged discharge line. See Operating Instructions (2) Squeegees need replacement. See Maintenance Instructions
6. Poor flow of sludge through sludge collection box	a. Clogged sludge discharge pipe or suction lines	(1) See Problem 4 & Operation (2) Check sludge control valves or gates. See Operation
	b. Worn drum seal	(1) Refer to Maintenance and Installation Instructions

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DATE: 07/02/93

Service Parts & Filter Media Department

BID #: 45-RM103505/SJH-93

P.O. Box 300 / Salt Lake City, Utah 84110-0300

Telephone 801/526-2000 * Facsimile 801/526-2562

***** RECOMMENDED SPARE PARTS PROPOSAL *****

CUSTOMER INFORMATION

SHIPPING ADDRESS: PLYMOUTH WWTP
625 COUNTY HWY PP
PLYMOUTH,WI 53073

EQUIPMENT DATA

SERIAL NUMBERS: 24666-01
MODEL : C30LT DRIVE
EQUIPMENT : CLARIFIER

SERVICE OFFICE

TO RECEIVE ASSISTANCE PLEASE CONTACT THE FOLLOWING LOCATION:

ENERGENECS INC.
W59 NO.M249 CARDINAL AVE
P.O. BOX 153
CEDARBURG,WI 53012
VOICE: 414/377-6360
FAX : 414/377-1515

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PART		DESCRIPTION	RSPL UNIT ITEM		UNIT PRICE	TOTAL PRICE
QTY	NUMBER		CODE	KILO NO.		

		MOTOR & DRIVE PACKAGE L24666A31 -----				
1	L115759-1	DRIVE CONTROL ASSEMBLY	A	2		
1	48806A	ACTUATING PIN	A	3		
1	21092F	SPRING	A	7		
1	86331A	GEARMOTOR	B	9		
1	87453A	SPROCKET	C	11		
1	86143AF	SPROCKET	C	12		
1	85853S	BUSHING	A	14		
	86603H	ROLLER CHAIN (10' LENGTHS) INCLUDES: (1) 86605H LINK	A	16		
1	86605H	CONNECTING LINK	A	17		
		DRIVE ASSEMBLY (C30LT) L115100-1 -----				
1	20766CS	BEARING STRIP - BOTTOM LOCATED IN BASE	A	1		
1	20766CR	BEARING STRIP - OUTER LOCATED IN BASE	A	1		
1	114379A1A	MAIN GEAR INCLUDES BEARING STRIPS	B	2		
1	20766CS	BEARING STRIP - TOP LOCATED IN MAIN GEAR	A	2		
1	20766CP	BEARING STRIP - INNER LOCATED IN MAIN GEAR	A	2		
1	49031	BEARING STRIP DWG / NO CHARGE				
	L202316	BUSHING HOUSING ASSEMBLY	B	6		

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=====						
QTY	PART NUMBER	DESCRIPTION	RSPL UNIT CODE KILO	ITEM NO.	UNIT PRICE	TOTAL PRICE

1	86196A	SPRING SEAT	C	7		
1	204170A	SLIDING BEARING SEAT	B	10		
1	204158A1A	WORM GEAR	B	12		
1	203604A	WORM & SHAFT	B	16		
1	203791A	MAIN PINION	B	17		
1	86213A	STOP SCREW	C	18		
1	48686A	STOP ROD	B	19		
1	86762F	OIL GAUGE	C	24		
10	88683C	LIP SEAL (PER FOOT)	A	28		
10	88683C	LIP SEAL (PER FOOT)	A	29		
1	88887A	SPRING ADJUSTMENT SCREW	A	34		
87	85321R	BEARING BALL	A	39		
		BEARING SET CONSISTING OF:				
1	46783H	INNER RACE	A	40		
1	46783K	OUTER RACE	A	40		
1	46807F	BEARING	A	41		
1	46789Y	BEARING	A	42		
2	46767BC	RETAINING RING	C	43		
1	46766AZ	RETAINING RING	C	44		
1	88931J	OIL GAUGE	C	47		
1	46758AR	OIL SEAL	A	48		
2	46762AC	OIL SEAL	A	49		

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QTY	PART NUMBER	DESCRIPTION	RSPL CODE	UNIT KILO	ITEM NO.	UNIT PRICE	TOTAL PRICE
1	86055A	DRAIN COCK	C		51		
1	85414A	DRAIN COCK	C		52		
		ALARM UNIT ASSEMBLY L201444					
1	85667A	ALARM HORN	B		5		
2	85389B	RELAY	A		10		
1	86423D	FUSE	A		15		
		GENERAL ERECTION L24666D51					
	114767A	ROTARY VALVE	A		26		
2	88268A	SEAL	A		34		
		RAKE ARM & PIPING ERECTION L24666D52					
14	88336A	SQUEEGEE	A		7		
2	88344A	SQUEEGEE	A		8		
2	88526A	SQUEEGEE	A		9		
		SKIMMING DEVICE L42700-4					
1	84032A	BOTTOM WIPER	A		2		
2	81602A	SIDE WIPER	A		3		
2	81598A	SIDE WIPER CLAMP	C		4		
1	84030A	BOTTOM WIPER CLAMP	C		5		
	48080A1A	SCRAPER ARM	C		8		

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Telephone 801/526-2000 * Facsimile 801/526-2562

PART		DESCRIPTION	RSPL UNIT ITEM		UNIT	TOT
QTY	NUMBER		CODE	KILO NO.	PRICE	PRI
1	85606A	EXTENSION SPRING	A	11		

SYMBOL NOTATION

* PRICE AVAILABLE UPON REQUEST

RSPL CODES

A-WEAR ITEM

B-LONG LEADTIME

C-CONVENIENCE ITEM

REFERENCE THE "BID #" ABOVE
(EIMCO'S PROPOSAL NUMBER)
WHEN ORDERING FROM THIS
PROPOSAL TO ENSURE CORRECT
PRICING AND TO HELP EXPEDITE
YOUR ORDER.

CHECKED BY: DH

EIMCO - P.E.C. / an EnviroTech company

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Service Parts & Filter Media Department

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QTY	PART NUMBER	DESCRIPTION	RSPL CODE	UNIT KILO	ITEM NO.	UNIT PRICE	TOTA PRIC

TERMS AND CONDITIONS

PRICES ARE FIRM FOR 90 DAYS
TERMS OF PAYMENT ARE NET 30 DAYS
PRICES ARE F.O.B. SHIPPING PT
FREIGHT IS PREPAID
MINIMUM ORDER IS \$50.00
NORMAL SHIPMENT IS 08 WEEKS AFTER
RECEIPT OF YOUR PURCHASE ORDER
IN SALT LAKE CITY, UTAH.



WARRANTY

Equipment manufactured by Eimco Process Equipment Company, is backed by the following warranty:

For the benefit of the original user, Eimco warrants all new equipment manufactured by it to be free from defects in material and workmanship; and will replace or repair, F.O.B. its factories or other location designated by it, any part or parts returned to it which examination shall show to have failed under normal use and service by the original user within one year following initial shipment by Eimco. Such repair or replacement shall be free of charge except for those parts such as filter media, filter drainage belts and the like that are consumable and normally replaced during maintenance with respect to which repair or replacement shall be subject to pro-rata charge based upon Eimco's estimate of the percentage of normal service life realized from the part. Eimco's obligation under this warranty is conditioned upon its receiving prompt notice of claimed defects which shall in no event be later than thirty (30) days following expiration of the one year warranty period and is limited to repair or replacement as aforesaid.

THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY EIMCO AND ACCEPTED BY PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED, OR STATUTORY. EIMCO NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITIES WITH RESPECT TO ITS EQUIPMENT. EIMCO SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO INOPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ON ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.

This warranty shall not apply to equipment or parts thereof which have been altered or repaired outside of an Eimco factory, or damaged by improper installation, application, erosion or corrosion of any sort, or subjected to misuse, abuse, neglect or accident.

Eimco makes no warranty with respect to parts, accessories, or components manufactured by others. The warranty applicable to such items is that offered by their respective manufacturers.



EIMCO PROCESS EQUIPMENT COMPANY
Salt Lake City, Utah

THIS WARRANTY REPLACES AND
SUPERSEDES ALL OTHERS DATED PRIOR TO 4/82.



**EIMCO PROCESS EQUIPMENT COMPANY
SALT LAKE CITY, UTAH**

GENERAL TERMS AND CONDITIONS OF SALE

1. **SCOPE:** The General Terms and Conditions of Sale of equipment set forth herein apply to any order accepted by Eimco, as Seller.

2. **PRICE:** Quoted prices are subject to change prior to acceptance of order by Seller.

If Purchaser is in default of payment, Seller may accelerate payments and declare all payments for work completed immediately due. Stop all further work until payments are brought current and interest paid, and/or require advance payment for future shipments. If payments are accelerated by Seller the entire sum shall bear interest at the rate stated in the following paragraph.

Interest shall be paid on overdue payments at the prime rate as published by the Bank of America for the date of this proposal.

3. **ITEMS INCLUDED:** Each sale includes only the equipment described in the order.

Responsibility for proper operation of equipment, if not installed by Seller or in accordance with its instructions, rests entirely with Purchaser.

Seller will supply only the safety devices, if any, described in the order and will comply with provisions of the Occupational Safety and Health Act of 1970, applicable to equipment as manufactured by Eimco. Seller shall not be responsible for compliance with state or local construction codes or safety and health statutes unless it has accepted such responsibility in writing.

4. **SECURITY INTEREST:** Seller retains title and right of repossession to the equipment until the full purchase price has been paid. Purchaser will not encumber nor permit others to encumber said equipment by any liens or security instruments.

5. **SHIPMENTS AND DELIVERY:** Seller shall use reasonable efforts to meet specified delivery dates, but such dates are estimates only and not guaranteed. So long as Seller makes reasonable effort to complete manufacture and shipment, it shall have no liability, direct or indirect, for delay in delivery and may not be declared in breach nor shall the order be subject to cancellation. In any event, delivery is based upon the effective date of the order and subject to prompt receipt by Seller of all necessary information and instructions from Purchaser, including any required approval of drawings.

Seller may make partial shipments and invoices therefor shall be payable in accordance with their terms.

Purchaser shall inspect the equipment and notify Seller of any damage or shortage within seven days of receipt. Failure to so notify Seller shall constitute acceptance, relieving Seller of liability for damage or shortage.

Seller shall not be liable for loss, damage, detention, or delay resulting from causes beyond its reasonable control, or caused by fire, strike, civil or military authority, embargoes, shortages, wrecks or delays in transportation, or inability to obtain necessary labor, materials or manufacturing facilities due to such causes.

6. **SELLER WARRANTS EQUIPMENT OF ITS MANUFACTURE ONLY IN ACCORDANCE WITH ITS CURRENT APPLICABLE EIMCO WARRANTY AGAINST DEFECTS IN WORKMANSHIP AND MATERIALS (FORM E-1112), WHICH WARRANTY IS INCORPORATED BY REFERENCE AND MADE A PART HEREOF.**

7. **PATENTS:** Seller agrees that it will defend and save harmless Purchaser against proceedings, or damages arising therefrom, alleging that Seller's equipment infringes any apparatus claim of a United States Patent existing as of date of order, provided Seller is given prompt notice of such proceeding, is accorded full control of the defense, settlement or compromise thereof and Purchaser furnishes Seller, on request, all needed information, assistance and authority to enable Seller so to defend. Seller will reimburse Purchaser for actual out-of-pocket expenses, exclusive of legal fees, incurred in rendering assistance at Seller's request. The foregoing states the entire liability of Seller with respect to patent infringement.

8. **CANCELLATION, SUSPENSION OR DELAY:** If Purchaser requests or causes a cancellation, suspension or delay of Seller's work, Purchaser shall pay Seller all appropriate charges incurred up to date of such event plus Seller's overhead and reasonable profit. Additionally, all charges related to and risks incidental to storage, disposition and/or resumption of work shall be borne solely by Purchaser.

9. **LIMITATION OF LIABILITY:** Seller shall not be liable for incidental or consequential damages for any reason whatsoever.

10. **CHANGES AND BACKCHARGES:** Seller shall not be obliged to make changes in or additions to the scope of work unless seller agrees thereto and an equitable adjustment is made to price and/or delivery.

Seller will not approve or accept returns of or backcharges for labor, materials or other costs incurred in modification, adjustment, service or repair of equipment unless previously approved in writing by an authorized employee of Seller.

11. **CHANGES IN DESIGN:** Seller reserves the right to modify the design and construction of equipment in order to incorporate improvements or to substitute material equal or superior to that originally specified. No charge shall be made to Purchaser for modifications made at Seller's option.

**THESE TERMS AND CONDITIONS OF SALE REPLACE AND
SUPERSEDE ALL OTHERS DATED PRIOR TO 5/82.**



LINE No.	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
1							
2							
3	2	85979P	85979	ANCHOR BOLT 3/4 X 8 (WALKWAY)		Q79215	
4							
5							
6							
7							
8	4	85979P	85979	ANCHOR BOLT 3/4 X 8 (RCUM BOX)			
9							
10							
11							
12							
13	8	85979KK	85979	ANCHOR BOLT 1 1/4 X 18 (C. COLUMN)			
14							
15							
16							
17							
18							
19	8			NUT HEX 3/4-10NC			
20							
21	16			NUT HEX 1 1/4-7NC			
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
ONE LOT OF (1) MECHANISM ☒				ORDER COMPLETE ☐		NOT COMPLETE ☒	
ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED.				* WEIGHT SHOWN IS TOTAL FOR ORDER. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.			
TITLE: ANCHOR BOLTS (STAINLESS STEEL) 55'-ODIA. C3S CLARIFIER				REVISIONS:		BY	CK'D BY
MASTER PARTS LIST				When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.		SERIAL NUMBER	
				PREPARED BY	DATE	CK'D BY	DATE
				GFT	2-24-93	PW	2-25-93
				PAGE 11 OF		ORDER NUMBER	
						24666-01	



LINE No.	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N NUMBER	REL No.	
1	1	L24666A31		DRIVE UNIT - C30 LT				
2		L201444		ALARM				
3		L24666A32		DOCUMENT PACKET ASSEMBLY				
4		L24666A33		SPARE PARTS				
5				NAMEPLATE SERIAL NUMBER: 24666-01A				
6								
7			46551	TOLERANCE AND RULES				
8								
9			86858	FABRICATION AREA CLEANING GRADE D				
10								
11				SURFACE PREPARATION: SP - 6				
12								
13				PAINT SPECIFICATION:				
14				ONE COAT TNEMEC 161 - BB42, 4 MILS D.F.T. MINIMUM				
15	1	49002A	49002	PATENT NUMBER NAME PLATE				
16								
17				NOTES:				
18				1. ASSEMBLE AND TEST RUN PRIOR TO SHIPMENT.				
19				2. GREASE ALL MACHINED SURFACES.				
20				3. TAPE SHUT ALL GAPS WHERE DUST CAN ENTER.				
21				4. PACKAGE AS REQUIRED FOR SAFE SHIPMENT.				
22								
23								
24				ENGINEERING REFERENCE:				
25				DRIVE MOUNTING / INTERFACE EDM				
26								
27								
28				DRIVE DATA: .05 RPM, 3/4 HP, 15 K TORQUE				
29								
30								
31				(DRIVE COMPLETE)				
32								
ONE LOT OF (1) MECHANISM			ORDER COMPLETE ☐ NOT COMPLETE ☒					
ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED.			* WEIGHT SHOWN IS TOTAL FOR ORDER. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.					
TITLE: C30LT DRIVE UNIT			REVISIONS:			BY	CK'D BY	DATE
MASTER PARTS LIST			When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list			SERIAL NUMBER		
			PREPARED BY DATE CK'D BY DATE			ORDER NUMBER		

LINE No.	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	* REQ'N NUMBER	REL No.
1		L24666D51		GENERAL ERECTION	10384	
2	1	L24666A55		SPARE PARTS (PACKAGED & LABELED FOR STORAGE)		
3	2	L24666C57		SCUM BOX FLUSH FOR (2) EXISTING UNITS		
4			46551	TOLERANCE & RULES		
5			86858	FAB. AREA CLEANING GRADE <u>10</u>		
6			77012A1	FABRICATOR CHECKLIST		
7			77012A2	" "		
8			24666A72	SHOP ASS'Y INSTRUCTIONS		
9				SURFACE PREP. SSPC SP-6 ON:		
10				L24666A54 ITEMS: 3, 4, 8,		
11				SURFACE PREP. SSPC SP-10 ON:		
12				L24666D51 ITEMS: 8, 9, 10, 14, 15, 16, 20, 23, 29, 32,		
13				33, 36, 37 & 67		
14				L24666D52 ITEMS: 4, 6, & 15		
15				L24666D53 ITEMS: 7, 8, 9, 19, 20, 21, 23 & 25		
16				L24666A56 ITEMS: 5 & 7		
17				L24666C57 ITEMS: 5 & 7		
18						
19				PAINT SPECIFICATION: (1) COAT TNE MEC 66-1211		
20				3 MILS MIN. D.F.T. AS PER LINES 10 & 12 THRU 17.		
21						
22						
23				REFERENCE DRAWINGS:		
24			24666D1	GENERAL ARRANGEMENT		
25			24666D2	" " DETAILS		
26			24666C3	DRIVE CONTROL		
27			24666C4	TORQUE TEST		
28			295129	MOTOR WIRING DIAGRAM		
29			115197	DRIVE GENERAL ARRANGEMENT		
30			295519	SCUM BOX FLUSHING		
31			295445	C3S SLUDGE WITHDRAWAL G.A.		
32			87064	ALARM		
ONE LOT OF (1) MECHANISM ☒				ORDER COMPLETE ☒ NOT COMPLETE ☐		
ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED.				* WEIGHT SHOWN IS TOTAL FOR ORDER. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.		
TITLE: CLARIFIER TYPE "C3S" 55'-0 DIA.				REVISIONS:		BY CK'D BY DATE
MASTER PARTS LIST				When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.		SERIAL NUMBER
				PREPARED BY DATE CK'D BY DATE		ORDER NUMBER

PARTS LIST No. L24666A31

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				115342	ASSEMBLY DRAWING			
1	1		L115100-1		C3OLT DRIVE ASSEMBLY			
2	1		L115759-1		DRIVE CONTROL ASSEMBLY R.H.	(B)		
					(SET SWITCHES: #1-85, #2-40, #3-100 & #4 OVER 100			
3	1		48806A	48806	ACTUATING PIN			
6	1		196128A	196128	CHAIN GUARD (GALV STL)			
7	1		21092 F	21092	SPRING	(B)		
8	3		88557A	88557	MOUNTING ANGLE			
9	1		86331A	86331	GEARMOTOR 37 RPM 230/460-3-60	(B)		
					SL-7 (13), SL-16 (3), SL-24			
11	1		87453A	87453	SPROCKET-13T 1" BORE			
12	1		86143AF	86143	SPROCKET-54T			
13	4		88558C	88558	NUT W/SPRING			
14	1		85853S	85853	BUSHING-TAPER-LOCK #2517 2 3/16 BORE			
15	3		88558D	88558	NUT W/SPRING			
16	81		86603H	86603	CHAIN ROLLER ASA 60			
17	1		86605H	86605	CONNECTING LINK ASA 60			
18	4		88441D	88441	SCREW-SELF DRILLING & TAPPING			
19	4				CAPSCREW-HEX HD 3/8-16NC X 1 1/2 (STL)			
22	6				CAPSCREW-HEX HD 1/2-13NC X 1 (STL)			
24	3				NUT - HEX 1/2-13NC (STL)			
25	4		88975C	88975	WASHER - SQUARE			
26					NOT REQ'D			
27					NOT REQ'D			
28	3				WASHER - FLAT 1/2 STD (STL)			
29	12				SCREW-DRIVE RD HD #6 X 1/2 TYPE U (SS)			
30	1		203422A	203422	NAMEPLATE (CAUTION)			
31	1		21066A	21066	NAMEPLATE			
32	1		21066H	21066	LEGEND PLATE (CLARIFIER)			
33	1		48743A	48743	INSTRUCTION PLATE			

ALL CAPSCREWS ARE SAE GRADE 6 UNLESS OTHERWISE SPECIFIED.

WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.

SERIAL FROM: L115342-2

TITLE: DRIVE AND MOTOR PACKAGE: FOR CLARIFIER
C3OLT DRIVE, WITH 3/4 HP
.05 RPM, 15,000 FT LB TORQUE

REVISIONS: D/R 6560, 6656

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY

GFT

DATE

4-14-93

When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.

UNITS REQ'D.
FOR ORDER

1

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY DATE

CK'D BY DATE

ORDER
PAGE NO.

ORDER NUMBER

NOTE: SHOP ASSEMBLE ALL ITEMS

TITLE: DRIVE AND MOTOR PACKAGE: FOR CLARIFIER
C30LT DRIVE, WITH 3/4 HP
.05 RPM, 15,000 FT LB TORQUE

BY	CK'D BY	DATE

PREPARED BY
GFT

DATE
4-14-93

When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list

	UNITS REQ'D. FOR ORDER

ORDER	
PAGE NO.	

ORDER NUMBER



PARTS LIST No. L115100-1

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				115100	ASSEMBLY			
1	1		115623A1A	115623-1	BASE	(B)		
/	1		115623A	115623	BASE (RAW CASTING)			
/	1		20766CS	20766	BEARING STRIP-BOTTOM	(A)		
/	1		20766CR	20766	BEARING STRIP-OUTER	(A)		
					SEE NOTE PAGE 4			
2	1		114379A1A	114379-1	MAIN GEAR	(B)		
/	1		114379A	114379	MAIN GEAR (RAW CASTING)			
/	1		20766CS	20766	BEARING STRIP-TOP	(A)		
/	1		20766CP	20766	BEARING STRIP-INNER	(A)		
					SEE NOTE PAGE 4			
4	1		112837A2A	112837-2	WORM GEAR HOUSING			
/	1		112837A	112837	WORM GEAR HOUSING (RAW CASTING)			
5	1		201415A1A	201415-1	END CAP			
/	1		201415A	201415	END CAP (RAW CASTING)			
6	1		L202316		BUSHING HOUSING ASSEMBLY			
7	1		86196A	86196	SPRING SEAT	(A)		
10	1		204170A	204170	SLIDING BEARING SEAT			
12	1		204158A1A	204158-1	WORM GEAR	(B)		
/	1		204158A	204158	WORM GEAR (RAW CASTING)			
13	1		203790A	203790	MAIN GEAR COVER	(B)		
16	1		203604A	203604	WORM AND SHAFT	(B)		
17	1		203791A	203791	MAIN PINION	(B)		
18	1		86213A	86213	STOP SCREW	(A)		
19	1		48686A	48686	STOP ROD	(A)		
21	1		40442J	40442	KEY	(B)		

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SERIAL FROM:

TITLE:

DRIVE ASSEMBLY
C30LT (BASIC)REVISIONS: D/R 5910, 6066, 6113, 6146,
6209, 6271, 6436.

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY

DATE

W.D.

9-16-82

When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.UNITS REQ'D.
FOR ORDER

1

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY

DATE

CK'D BY

DATE

ORDER
PAGE NO.

ORDER NUMBER



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
22	1		40447A	40447	KEY	(B)		
24	1		86762F	86762	GAUGE-OIL STRAIGHT	(C)		
25					NOT REQUIRED			
26	1		86223A	86223	PLUG			
27	1		85471L	85471	PLUG			
28	10		88683C	88683	SEAL, LIP	(A)		
29	10		88683C	88683	SEAL, LIP	(A)		
31	1		49115K	49115	SHIM PACKAGE			
33	2		87548C	87548	LIFTING BOLTS			
34	1		88887A	88887	SPRING ADJUSTMENT SCREW	(C)		
35	1				PLUG-PIPE 1" COUNTERSUNK SCRD 1" STD (MI)			
37	1		84640A	84640	INSTRUCTION PLATE (ARROW)			
38	1		49045A	49045	SIGN-WARNING-END CAP NAMEPLATE			
39	87		85321R	85321	BEARING BALL 1 1/4 DIA.	(A)		
40					BEARING CONSISTING OF:			
/	1		46783H	46783	INNER RACE	(A)		
/	1		46783K	46783	OUTER RACE	(A)		
41	1		46807F	46807	BEARING	(A)		
42	1		46789Y	46789	BEARING	(A)		
43	2		46767BC	46767	RETAINING RING	(A)		
44	1		46766AZ	46766	RETAINING RING	(A)		
47	1		88931J	88931	GAUGE-OIL 3/8"	(B)		
48	1		46758AR	46758	SEAL-OIL	(A)		
49	2		46762AC	46762	SEAL-OIL	(A)		
50	1		88963A	88963	BUSHING, HEX-PIPE			
51	1		86055A	86055	DRAIN COCK 3/4"	(C)		

ALL CAPSCREWS ARE SAE GRADE 6 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SERIAL FROM:

TITLE: DRIVE ASSEMBLY C30LT (BASIC) (CONTINUED)		REVISIONS: D/R 5940, 5981, 6113, 6209, 6220, 6245, 6271, 6731, 6436, 6465, 6555, 6734, 6742.		BY	CK'D BY	DATE
SUB-PARTS LIST		PREPARED BY W.D.	DATE 9-16-82	When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.		UNITS REQ'D. FOR ORDER 1
PARTS LIST No. L115100-1	CHECKED BY JMM	DATE 9-22-82	PREPARED BY	DATE	CK'D BY	DATE
		ORDER PART NO.	ORDER NUMBER			



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.
52	1		85414A	85414	COCK-DRAIN 1/4	(C)		
60	1				NIPPLE-PIPE 3/4 CLOSE TBE (STL BLK)			
62	1				NIPPLE-PIPE 3/4 X 4 STD TBE (STL BLK)			
65	1				NIPPLE-PIPE 1/4 X 2 STD TBE (STL BLK)			
68	1				TEE-RED-PIPE 3/4 X 3/4 X 3/8 STD (MI)			
70	2				PLUG-SQ HD PIPE 1/2 STD (MI)			
75					NOT REQUIRED			
76					NOT REQUIRED			
80	1				SETSCREW-SOC HD CUP PT 1/2-13NC X 3/4 (STL)			
81	4				CAPSCREW-HEX HD 3/4-10NC X 9 1/2 (STL)			
82	4				CAPSCREW-HEX HD 3/4-10NC X 2 (STL)			
83	8				CAPSCREW-HEX HD 1/2-13NC X 1 1/2 (STL)			
84	4				CAPSCREW-HEX HD 1/2-13NC X 2 1/2 (STL)			
85	2		F12520		CAPSCREW-FLAT SOC HD 3/4-10NC x 1 3/4 (STL ALLOY)			
86	4				CAPSCREW-HEX HD 1/2-13NC X 1" (STL)			
87	4				CAPSCREW-FLAT HD,HEX SOC 5/8-11NC X 1 1/2 (STL)			

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SERIA FROM:

TITLE: DRIVE ASSEMBLY C30LT (BASIC) (CONTINUED)		REVISIONS:		D/R 6131, 6146, 6232, 6271,		BY	CK'D BY	DATE
		6856,						
SUB-PARTS LIST		PREPARED BY W.D.	DATE 9-16-82	When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.		UNITS REQ'D. FOR ORDER 1		
PAGE 3 OF 4	PARTS LIST No. L115100-1	CHECKED BY JKM	DATE 2-22-83	PREPARED BY	DATE	CK'D BY	DATE	ORDER PAGE NO. 66
				ORDER NUMBER				

[illegible]

[illegible]

* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

BUSHING HOUSING ASSEMBLY

BY	CK'D BY	DATE

PREPARED BY
CBR

DATE 1-19-73

UNITS REQ'D. FOR ORDER	

PARTS LIST No.
L202316

CHECKED BY
AG

DATE 1-31-73

PREPARED BY	DATE	CK'D BY	DATE
GET	4-14-93	PA	5-4-93

ORDER
PAGE NO. 4-7

ORDER NUMBER
341226-01



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.
				115759	DRIVE CONTROL			
1	1		L48929-2		COVER-WELDMENT & MACHINING			
2	1		115595A2A	115595-2	DRIVE CONTROL HOUSING (MACHINING)			
/	1		115595A	115595	DRIVE CONTROL HOUSING (RAW CASTING)			
3	1		204163A	204163	INDICATOR HOUSING			
/	2		88749A	88749	INSERT			
5	1		48993A1A	48993-1	MOUNTING PLATE (MACHINING)			
/	1		48993A	48993	MOUNTING PLATE (RAW CASTING)			
7	1		204217A	204217	INDICATOR POINTER			
9	1		L49080-1		SHAFT ASSEMBLY			
10	4		88932A	88932	CAM			
/	4		F14987		SETSCREW-SOC HD CUP PT NO. 8-32UNC X 3/16 (STL ALLOY)			
11	2		88966A	88966	PLATE-SWITCH MOUNTING			
13	5		88825A	88825	SEPARATOR-INSULATING			
14	2		88753A	88753	WASHER-PLATE			
17					NOT REQUIRED			
18					NOT REQUIRED			
19	1		88845A	88845	COLLAR-SET			
21	1		88965A	88965	BUSHING FLANGED			
23	1		46783X	46783	BEARING-ROLLER			
25	5		88964A	88964	WASHER-NYLON			
27	4		88819A	88819	SWITCH			
28					NOT REQUIRED			

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* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.

SEPIA FROM:

TITLE: DRIVE CONTROL, R.H. W/O POTENTIOMETER
4 SPDT SWITCH
EXPLOSION PROOF

REVISIONS: D/R 6655, 6683, 6919,

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY
DMCDATE
2-24-89When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.UNITS REQ'D.
FOR ORDER 1

PAGE 1 OF 3

PARTS LIST No.
L115759-1CHECKED BY
S.DEANDATE
3-09-89PREPARED BY DATE CK'D BY DATE
J. F. T. 1-11-82 P. L. 5-1-82

ORDER

ORDER NUMBER



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.
29					NOT REQUIRED			
30					NOT REQUIRED			
31					NOT REQUIRED			
32					NOT REQUIRED			
34	2		88925C	88925	CAP. VINYL			
35	4		88925A	88925	CAP. VINYL			
37	1		88859A	88859	"O" RING			
38	2		89015A	89015	THREADED ROD			
39	2		89015C	89015	THREADED ROD			
41	1		85692A	85692	SPRING			
42	1		88754A	88754	WASHER-SPRING RETAINER			
43					NOT REQUIRED			
44	1		86665S	86665	PLUG			
45	1		82045R	82045	PLUG			
49	1		F14464		CAPSCREW-HEX HD 1/4-20NC x 1/2 (316SS)			
50	1		F14988		SETSCREW-SOC HD CUP PT. 10-24UNC X 3/16 (STL ALLOY)			
52	1		F14596		SCREW, SHOULDER-SOC HD 5/16 SHOULDER DIA X 1-1/4 (STL ALLOY)			
53					NOT REQUIRED			
55	2		F16740		CAPSCREW-HEX HD #10-24NC X 1" (316SS)			
56	4		F11133		CAPSCREW-SOC HD 3/8-16UNC X 1" (STL ALLOY)			
59	2		F14984		CAPSCREW-BUTTON SOC HD 1/2-13NC X 1-1/4 (STL ALLOY)			
63	10		F10894		NUT-HEX MACH. NO. 10-24UNC (316SS)			

ALL CAPSCREWS ARE SAE GRADE 8 UNLESS OTHERWISE SPECIFIED.

* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.

SERIAL FROM:

TITLE: DRIVE CONTROL, R.H. W/O POTENTIOMETER
4 SPDT SWITCH
EXPLOSION PROOF (CONTINUED)

REVISIONS: D/R 6769, 6781, 6786, 6876, 6919.

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY
DMCDATE
2-24-89When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.UNITS REQ'D.
FOR ORDER /

ALL CAPSCREWS ARE SAE GRADE 8 UNLESS OTHERWISE SPECIFIED.	* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.	SEIFA FROM:

BY	CK'D BY	DATE

UNITS REQ'D.
FOR ORDER

ORDER NUMBER

[illegible]

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED	* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.	SEPIA FROM:

TITLE: COVER
DRIVE CONTROL

REVISIONS:

BY	CK'D BY	DATE

SUB-PARTS LIST

PREPARED BY
CWJ

DATE
4-9-84

When ordering parts specify Type of Equipment, Order No
Serial No, Part No, and Description, per this parts list

UNITS REQ'D. FOR ORDER	/

PAGE 1 OF 1

PARTS LIST No.
L48929-2

CHECKED BY
JKM

DATE
4-17-84

PREPARED BY
G.F.T.

DATE
4-14-93

CK'D BY
PW

DATE
5-4-93

ORDER
PAGE
NO. 5-11

ORDER NUMBER
24666-01

[illegible]

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SERIAL FROM:

TITLE:

SHAFT ASSEMBLY

REVISIONS:

BY

CK'D BY

DATE _____

SUB-PARTS LIST

PREPARED BY
DL

DATE 6-26-90

When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.

UNITS REQ'D. FOR ORDER	

PAGE 1 OF 1

PARTS LIST No.
149080-1

CHECKED BY
GEN

DATE 6-27-90

PREPARED BY
LET

DATE
11-14-47

CK'D BY	12.1

DATE
6-1-93

ORDER
PAGE NO. 5-12

ORDER NUMBER
7111-01



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				201444	ASSEMBLY			
				48609	WIRING DIAGRAM			
1	1		47361A	47361	ENCLOSURE AND COVER			
2	1		202026A	202026	BACK PANEL			
7	1		86573D	86573	BACK PANEL			
5	1		85667A	85667	HORN ALARM	(B)		
6	1		85667F	85667	GASKET			
7	1		86638A	86638	SWITCH - PUSH BUTTON			
8	1		86639A	86639	CONTACT - BLOCK			
9	2		86026A	86026	SOCKET - RELAY			
10	2		85389A	85389	RELAY	(A)		
12	1		86027L	86027	TERMINAL BLOCK			
13	1		86040L	86040	MARKER STRIP (MARKED)			
14	1		86424A	86424	FUSE BLOCK			
15	1		86423D	86423	FUSE - 3 AMP 120 V	(A)		
16	1		86598M	86598	WRAPPING - SPIRAL			
18	18		86597A	86597	TERMINALS - FORK TONGUE			
19	1		47181B	47181	WIRING DUCT CHANNEL			
20	1		47181AB	47181	WIRING DUCT COVER			
21	1				GROUND LUG (BURNDY KPA4C)			
22	1		86041F	86041	LEGEND PLATE (RESET)			
23	1		85686A	85686	NAMEPLATE (EIMCO)			
24	1		85687A	85687	NAMEPLATE ELECTRICAL, SEE NOTE			
25	1				SCREW - PAN HD #10-32NF x 3/8 (CD PL STL)			
26	7				SCREW - PAN HD #6-32NC x 1/4 (CD PL STL)			
27	2				SCREW - PAN HD #6-32NC x 1/2 (CD PL STL)			
28	4				SCREW - PAN HD #6-32NC x 1" (CD PL STL)			
29	8				SCREW - PAN HD #4-40NC x 3/16 (CD PL STL)			
				NOTE:	STAMP PART NUMBER "L201444", WIRING DIAGRAM "48609" VOLTS			
					"115", PHASE "1" AND HZ "50/60" IN APPLICABLE SPACE PROVIDED			
					ON ITEM 24.			

ALL CAPSCREWS ARE SAE GRADE 6 UNLESS OTHERWISE SPECIFIED.

* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

TITLE:

ALARM UNIT ASSEMBLY
(BASIC) (115V - 50 OR 60HZ)

REVISIONS:

D/R 2205, 3642, 5393, 5569,
5607, 5623, 5745.

BY

CK'D BY

DATE

SUB-PARTS LIST

PREPARED BY

DATE

GEN

1-21-71

When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list

UNITS REQ'D.
FOR ORDER

/

PAGE 1 OF 1

PARTS LIST No.
L201444CHECKED BY
DRTDATE
2-10-71PREPARED BY
J E TDATE
11-10-82CK'D BY
D.L.DATE
5-1-92ORDER
PAGE NO. 5-12

ORDER NUMBER

211101

[illegible]

* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.

1 88999-1

REVISIONS:

CK'D BY

DATE _____

DOCUMENT PACKET ASSEMBLY SAFETY, INSTALLATION, OPERATING AND MAINTENANCE INSTRUCTIONS

PREPARED BY
KML

DATE 1-22-91

When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.

UNIT NO.	UNIT PRICE	QTY.	UNIT'S REQ'D. FOR ORDER
1	100.00	1	1
2	200.00	1	1
3	300.00	1	1
4	400.00	1	1
5	500.00	1	1
6	600.00	1	1
7	700.00	1	1
8	800.00	1	1
9	900.00	1	1
10	1000.00	1	1
11	1100.00	1	1
12	1200.00	1	1
13	1300.00	1	1
14	1400.00	1	1
15	1500.00	1	1
16	1600.00	1	1
17	1700.00	1	1
18	1800.00	1	1
19	1900.00	1	1
20	2000.00	1	1
21	2100.00	1	1
22	2200.00	1	1
23	2300.00	1	1
24	2400.00	1	1
25	2500.00	1	1
26	2600.00	1	1
27	2700.00	1	1
28	2800.00	1	1
29	2900.00	1	1
30	3000.00	1	1
31	3100.00	1	1
32	3200.00	1	1
33	3300.00	1	1
34	3400.00	1	1
35	3500.00	1	1
36	3600.00	1	1
37	3700.00	1	1
38	3800.00	1	1
39	3900.00	1	1
40	4000.00	1	1
41	4100.00	1	1
42	4200.00	1	1
43	4300.00	1	1
44	4400.00	1	1
45	4500.00	1	1
46	4600.00	1	1
47	4700.00	1	1
48	4800.00	1	1
49	4900.00	1	1
50	5000.00	1	1
51	5100.00	1	1
52	5200.00	1	1
53	5300.00	1	1
54	5400.00	1	1
55	5500.00	1	1
56	5600.00	1	1
57	5700.00	1	1
58	5800.00	1	1
59	5900.00	1	1
60	6000.00	1	1
61	6100.00	1	1
62	6200.00	1	1
63	6300.00	1	1
64	6400.00	1	1
65	6500.00	1	1
66	6600.00	1	1
67	6700.00	1	1
68	6800.00	1	1
69	6900.00	1	1
70	7000.00	1	1
71	7100.00	1	1
72	7200.00	1	1
73	7300.00	1	1
74	7400.00	1	1
75	7500.00	1	1
76	7600.00	1	1
77	7700.00	1	1
78	7800.00	1	1
79	7900.00	1	1
80	8000.00	1	1
81	8100.00	1	1
82	8200.00	1	1
83	8300.00	1	1
84	8400.00	1	1
85	8500.00	1	1
86	8600.00	1	1
87	8700.00	1	1
88	8800.00	1	1
89	8900.00	1	1
90	9000.00	1	1
91	9100.00	1	1
92	9200.00	1	1
93	9300.00	1	1
94	9400.00	1	1
95	9500.00	1	1
96	9600.00	1	1
97	9700.00		

PARTS LIST No.
124666A32

CHECKED BY
S. DEAN

DATE 2-6-91

PREPARED
G.F.T.

DATE
4-14

CK'D
PW

DATE
5-4

ORDER
PAGE NO.

ORDER NUMBER

74666-01

[illegible]

PARTS LIST No. L24666D51

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.
○				24666D51	GENERAL ERECTION	10384		
(3)	1	1	L24666D52		RAKE ARM & PIPING ERECTION	2419		
(4)	1	1	L24666D53		SKIMMING MECHANISM ERECTION	1132		
(5)	1	1	L24666A54		WALKWAY, PLATFORM & HANDRAIL ASSEMBLY	1506		
(8)	1	1	24666D61A	24666D61	UPPER CAGE	STL 229		
(9)	1	1	24666D61B	24666D61	LOWER CAGE	STL 616		
10	4	4	88325A	88325	CAGE BRACE	STL 28		
14	4	4	24666D62A	24666D62	FEEDWELL	STL 1680		
15	4	4	88259A	88259	FEEDWELL SUPPORT BRACKET	STL 32		
16	4	4	48575A	48575	FEEDWELL SUPPORT	STL 300		
(20)	1	1	24666D63A	24666D63	INFLUENT COLUMN	STL 1197		
23	1	1	114400A	114400	SLUDGE COLLECTION BOX	STL 697		
(26)	6	6	114766A	114766	ROTARY VALVE & ADJUSTABLE OUTLET	PVC -		
(27)	12	12	48576A	48576	BAR CLAMP	S. STL -		
(29)	1	1	204127A	204127	HANDLE WITH CHAIN	STL 8		
30	30	30	86999A	86999	CHAIN	-		
(32)	2	2	24200B63A	24200B63	SEAL RING	STL 54		
33	2	2	88266A	88266	SEAL BACK-UP RING	STL 12		
34	2	2	88268A	88268	SEAL	NEOP -		

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM: L114988

TITLE: CLARIFIER: TYPE C3S 55'-0 DIA x 12'-1 SWD		REVISIONS: D/R 10174		BY	CK'D BY	DATE
SUB-PARTS LIST		PREPARED BY G.F.T	DATE 4-14-93	When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.		
PAGE 1 OF 2	PARTS LIST No. L24666D51	CHECKED BY PW	DATE 5-3-93	PREPARED BY	DATE	CK'D BY
				UNITS REQ'D. FOR ORDER (1)	ORDER PAGE NO. 5-16	ORDER NUMBER 24666-01



PARTS LIST No. L24666D51

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.
(36)	1	1	24666D6AA	24666D6A	DISCHARGE PIPE	STL	419	
(37)	1	1	24666D6AB	24666D6A	DISCHARGE PIPE END PLATE	STL	10	
41	17	17			CAPSCREW - HEX HD 5/8-11NC x 1-3/4	(STL)		
(42)	44	44			CAPSCREW - HEX HD 1/2-13NC x 1-3/4	(STL)		
43	40	40			CAPSCREW - HEX HD 5/8-11NC x 1-1/2	(STL)		
44	9	9			CAPSCREW - HEX HD 3/4-10NC x 2"	(STL)		
(45)	7	7			CAPSCREW - Hex HD 3/4-10NC x 2 3/4 (C30-7 IF REQ'D)	(STL)		
(46)	7	2			CAPSCREW - Hex HD 3/4-10NC x 2 (C30-2 IF REQ'D)	(STL)		
50	4	4			CAPSCREW - HEX HD 1/2-13NC x 2	(STL)		
51	26	26			BOLT - HEX HD 3/4-10NC x 1-3/4	(A325)		
52	9	9			BOLT - HEX HD 3/4-10NC x 2-1/2	(A325)		
53	4	4			CAPSCREW-HEX HD 1-8NC x 10	(STL)		
(55)	48	48			NUT - HEX 1/2-13NC	(STL)		
56	57	57			NUT - HEX 5/8-11NC	(STL)		
57	9	9			NUT - HEX 3/4-10NC	(STL)		
58	4	4			NUT - HEX 1-8NC	(STL)		
(59)	9	9			NUT - Hex 3/4-10NC	(STL)		
60	4	4			NUT - JAM 1-8NC	(STL)		
61	4	4			NUT-HEX 1/2-13NC	(STL)		
62	35	35			NUT - HEX 3/4-10NC	(A325)		
64	27	27			WASHER - FLAT 5/8 STD	(STL)		
65	10	10			WASHER - FLAT 3/4 STD	(STL)		
67	1	1	88354A	88354	SHIM PACK	STL	45	

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM: L114988

TITLE: CLARIFIER: TYPE C3S 55'-0 DIA X 12'-1 SWD		REVISIONS: D/R 10174		BY	CK'D BY	DATE
SUB-PARTS LIST		PREPARED BY GFT	DATE 4-14-93	UNITS REQ'D. FOR ORDER (1)		
PARTS LIST No. L24666D51		CHECKED BY PW	DATE 5-3-93	When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.	ORDER PAGE NO. 5-17	ORDER NUMBER 24666-01

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	*	REQ'N. NUMBER	REL. No.	
○				24666D52	RAKE ARM AND PIPING ERECTION	2419			
4	2	2	24666D70A	24666D70	RAKE ARM	STL 2204			
6	2	2	48579A	48579	RAKE ARM DETAILS	-			
7	14	14	88336A	88336	SUMP BLADE	STL 40			
8	2	2	88342A	88342	SQUEEGEE	S.STL -			
9	2	2	88526A	88526	SQUEEGEE	S.STL -			
11	8	8	88330A	88330	PIPE	PVC -			
12	12	12	88331A	88331	ELBOW 90°	PVC -			
15	25	25	88264A	88264	PIPE CLAMP	STL 150			
16	50	50	88263A	88263	CLAMP	H.D.G. STL 25			
17	31	31	32157A72A	32157A72	U-BOLT	H.D.G. STL -			
21	81	81			CAPSCREW-HEX HD 3/8 - 16 NC x 1 1/4	SS			
22	55	55			CAPSCREW-HEX HD 1/2 - 13 NC x 2	(STL)			
23	5	5			BOLT-HEX HD 5/8 - 11NC x 1 1/2	(A325)			
24	9	9			BOLT-HEX HD 3/4 - 10 NC x 2	(A325)			
26	81	81			NUT-HEX 3/8-16 NC	SS			
27	55	55			NUT-HEX 1/2-13 NC	(STL)			
28	5	5			NUT-HEX 5/8-11NC	(A325)			
29	9	9			NUT-HEX 3/4-10 NC	(A325)			
31	81	81			WASHER-FLAT 3/8 STD	SS			
32	110	110			WASHER-FLAT 1/2 STD	(STL)			
33	5	5			WASHER-FLAT 5/8 STD	(A325)			
ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM: L113910									
TITLE: RAKE ARM AND PIPING ERECTION CLARIFIER, 55'-0' DIA.					REVISIONS: D/R 5100, 5301, 5704, 10174		BY	CK'D BY	DATE
SUB-PARTS LIST					When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list	UNITS REQ'D. FOR ORDER (1)			
PAGE 1 OF 1	PARTS LIST No. L24666D52		PREPARED BY GFT CHECKED BY PW	DATE 4-14-93 DATE 5-3-93	PREPARED BY DATE CK'D BY DATE	ORDER PAGE NO. 518	ORDER NUMBER 24666-01		

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				<u>L24666D53</u>	SKIMMING MECHANISM	<u>1132</u>		
<u>3</u>	<u>1</u>	<u>1</u>	<u>L24666A56</u>		SCUM BOX FLUSH	<u>5</u>		
<u>(4)</u>	<u>1</u>	<u>1</u>	<u>L42700-4</u>		SKIMMING DEVICE			
<u>(7)</u>	<u>1</u>	<u>1</u>	<u>24170D63A</u>	<u>24170D63</u>	SCUM BOX	<u>STL</u>	<u>547</u>	
<u>(8)</u>	<u>2</u>	<u>2</u>	<u>24666C65A</u>	<u>24666C65</u>	SCUM BOX SUPPORT	<u>STL</u>	<u>108</u>	
<u>9</u>	<u>4</u>	<u>4</u>	<u>88313A</u>	<u>88313</u>	WASHER-SCUM BOX SUPPORT	<u>STL</u>	<u>4</u>	
<u>(19)</u>	<u>1</u>	<u>1</u>	<u>24666C66A</u>	<u>24666C66</u>	SKIMMER SUPPORT	<u>STL</u>	<u>103</u>	
<u>(20)</u>	<u>1</u>	<u>1</u>	<u>24301B75A</u>	<u>24301B75</u>	SKIMMER ARM	<u>STL</u>	<u>90</u>	
<u>(21)</u>	<u>1</u>	<u>1</u>			SKIMMER BLADE <u>66x8.2x16'-0</u>	<u>STL</u>	<u>131</u>	
<u>22</u>	<u>3</u>	<u>3</u>	<u>88263A</u>	<u>88263</u>	CLAMP	<u>H.D.G. STL</u>	<u>2</u>	
<u>23</u>	<u>1</u>	<u>1</u>	<u>48634A</u>	<u>48634</u>	SKIMMER SUPPORT BRACE	<u>STL</u>	<u>25</u>	
<u>24</u>	<u>2</u>	<u>2</u>	<u>86751A</u>	<u>86751</u>	CHANNEL CLAMP	<u>PLATED STL</u>	<u>-</u>	
<u>(25)</u>	<u>1</u>	<u>1</u>	<u>24666A67A</u>	<u>24666A67</u>	COUNTERBALANCE FORM	<u>STL</u>	<u>117</u>	
<u>(27)</u>	<u>1</u>	<u>1</u>	<u>88616A</u>	<u>88616</u>	SCRAP STEEL <u>133</u> COUNTERBALANCE <u>117 LBS.</u>	<u>GALV. STL</u>	<u>-</u>	
<u>29</u>	<u>8</u>	<u>8</u>			CAPSCREW-HEX HD <u>5/8-11NC</u> : <u>2</u>	<u>(STL)</u>		
<u>30</u>	<u>3</u>	<u>3</u>			CAPSCREW-HEX HD <u>1/2-13NC</u> x <u>1 3/4</u>	<u>(STL)</u>		

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM: L115036

TITLE: SKIMMING MECHANISM

55'-0 DIA. C3SREVISIONS: D/R 10091, 10174

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY

GFT

DATE

4-14-93

When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.

UNITS REQ'D. FOR ORDER

(1)

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY DATE

CK'D BY

DATE

ORDER PAGE

ORDER NUMBER

[illegible]

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED.	* WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES.	SEPIA FROM:	L115036

TITLE: SKIMMING MECHANISM				REVISIONS: D/R 10091				BY	CK'D BY	DATE
55'-0 DIA.										
SUB-PARTS LIST		PREPARED BY GFT	DATE 4-14-93	When ordering parts specify Type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.				UNITS REQ'D. FOR ORDER (1)		
2	2	PARTS LIST No. 11111111	CHECKED BY 111	DATE 5-5-93	PREPARED BY	DATE	CK'D BY	DATE	ORDER PAGE 6-10	ORDER NUMBER 11111111



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				295494	SCUM BOX FLUSH ASSEMBLY	5		
5	1	1	24000B70A	24000B70	PIVOT ARM	STL	3	
7	1	1	24000C71A	24000C71	PIVOT SUPPORT	STL	2	
11	1	1	895738A	895738	FLUSH BALL	PLASTIC		
12	1	1	895738B	895738	CHAIN	304 SS		
13	1	1	24000A72A	24000A72	REDUCER BUSHING	PVC		
14	1	1			1 1/2" STD CLOSE NIPPLE	PVC		
21	1	1	F10937		COTTER KEY 1/8 X 1 1/2	SS		
22	1	1	F10936		COTTER KEY 1/16 X 1 1/4	SS		
25	2	2	F50018		CAPSCREW, FLAT HD 1/4-20NC X 1"	CAD PL STL		
27	1	1			CAPSCREW, DRILLED SCOKET HD 3/8-16NC X 3/4	CAD PL STL		
30	2	2	F12197		NUT-HEX 1/4-20NC	CAD PL STL		
32	2	2	F11198		WASHER, FLAT 1/4 STD	CAD PL STL		
34	2	2			WASHER, LOCK 1/4 STD	CAD PL STL		

ALL CAPSCREWS ARE SAE GRADE 6 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

TITLE:

SCUM BOX FLUSHING
SYSTEM ASSEMBLY

REVISIONS:

BY

CK'D BY

DATE

SUB-PARTS LIST

PREPARED BY

DATE

When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.

UNITS REQ'D.
FOR ORDER

PAGE 1 OF 1

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY

DATE

CK'D BY

DATE

ORDER
PAGE NO.

ORDER NUMBER

L24666A56

PW

4-14-93
5-3-93

GFT

5-21

24666-01



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				42700	ASSEMBLY			
1	1	1	44774A	44774	SCUM SKIMMER			
2	1	1	84032A	84032	BOTTOM WIPER	(A)		
3	2	2	81602A	81602	SIDE WIPER	(A)		
4	2	2	81598A	81598	CLAMP - SIDE WIPER			
5	1	1	84030A	84030	CLAMP - BOTTOM WIPER			
6	1	1	88188A	88188	HINGED SKIMMER			
7	1	1	88187A	88187	HINGED SKIMMER SUPPORT			
8	2	2	48080A1A	48080-1	SCRAPER ARM			
/	2	2	48080A	48080	SCRAPER ARM (RAW CASTING)			
9	2	2	89081A1A	89081-1	ARM CLEVIS			
/	2	2	89081A	89081	ARM CLEVIS (RAW CASTING)			
10	3	3	88011A1A	88011-1	COLLAR			
/	3	3	88011A	88011	COLLAR (RAW CASTING)			
11	1	1	85606A	85606	SPRING - EXTENSION	(A)		
13	4	4	F11034		SCREW - SHLD 1/2 x 3 1/2 (ZNC PL STL)			
14	17	17	F50005		NUT - HEX 3/8-16NC (ZNC PL STL)			
15	1	1	85607F	85607	STOP ROD			
16	2	2	F14867		SETSCREW - SQ HD 3/8-16NC x 3/4 (ZNC PL STL)			
17	13	13	F11005		MACHINE SCREW PAN HD 3/8-16NC x 1 (ZNC PL STL)			
18	2	2	F10427		CAPSCREW - HEX HD 3/4-10NC x 3 (ZNC PL STL)			
19	4	4	F10889		NUT - HEX 3/4-10NC (ZNC PL STL)			
20	2	2	85609A	85609	COLLAR SET			
					NOTE:			
					SHOP ASSEMBLE ITEMS 1,2,3,4,& 5 USING ITEMS 14 & 17 AS REQUIRED			
					SHOP ASSEMBLE ITEMS 8 & 9 USING 2 EACH OF ITEMS 13 & 14			
					SHOP ASSEMBLE 2 EACH OF ITEM 10 USING ITEMS 18 & 19			

ALL CAPSCREWS ARE SAE GRADE 8 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

TITLE:

SKIMMING DEVICE
SIZE 5'-0REVISIONS: D/R 375, 3532, 3629, 3709, 3800,
4235, 4665, 6899, 6920,

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY
THURGOODDATE
2-23-68When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts listUNITS REQ'D.
FOR ORDER (1)

PAGE 1 OF 1

PARTS LIST No.
L42700-4CHECKED BY
DRTDATE
4-21-70PREPARED BY DATE CK'D BY DATE
L. E. T. 4-11-92 J. V. L. 5-3-93ORDER
PAGE NO. 5-27ORDER NUMBER
241616-01

PARTS LIST No. 1-24666A54

ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				295482	WALKWAY, PLATFORM AND HANDRAIL ASSEMBLY	1506		
				88820	GRATING CLIP ASSEMBLY			
3	1	1	203674A	203674	PLATFORM	STL	374	
4	1	1	203674B	203674	COVER	STL	18	
5	1	1	295407A	295407	PLATFORM HANDRAIL	ALUM	-	
6	1	1	295407B	295407	PLATFORM HANDRAIL	ALUM	-	
/	-			295405	HANDRAIL SPECIFICATIONS	-		
8	1	1	114949D	114949	WALKWAY	STL	114	
9	1	1	196132N4	196132	WALKWAY HANDRAIL	ALUM	-	
10	1	1	196132T4	196132	WALKWAY HANDRAIL	ALUM	-	
/	-			295405	HANDRAIL SPECIFICATIONS	-		
12	1	1	24666B68A	24666B68	WALKWAY GRATING	ALUM	-	
15	2	2	88696B	88696	TENSION BAND (GALV STL)	-		
16	1	1	20799A	20799	NAMEPLATE (ZINC)	-		
17	1	1	88697C	88697	GRATING ANCHOR PARTS (S.STL)	-		
19	35	35			CAPSCREW - HEX HD 3/8-16NC x 3" (304 S.STL)			
20	9	9			CAPSCREW - HEX HD 3/4-10NC x 1-3/4 (HDG STL)			
21	2	2			CAPSCREW - HEX HD 5/8-11NC x 1-3/4 (HDG STL)			
22	9	9			CAPSCREW - RD HD 1/2-13NC x 1-3/4 (HDG STL)			
27	35	35			NUT - HEX 3/8-16NC (304 S.STL)			
29	2	2			NUT - HEX 5/8-11NC (HDG STL)			
30	7	7			NUT - HEX 3/4-10NC (HDG STL)			
31	9	9			NUT - HEX 1/2-13NC (HDG STL)			
32	35	35			WASHER - FLAT 3/8 TYPE "B" (WIDE) (304 S.STL)			
33	2	2			WASHER - FLAT 5/8 STD (HDG STL)			

ALL CAPSCREWS ARE SAE GRADE 6 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SERIAL FROM: 1295482-2

TITLE:
WALKWAY, PLATFORM & HANDRAIL ASSEMBLY
CLARIFIER 55'-0" DIAMETER C30 DRIVE
WITH TOE BOARD

REVISIONS:

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY

DATE

When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.

UNITS REQ'D. FOR ORDER

(1)

PAGE 1 OF 1

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY

DATE

CK'D BY

DATE

ORDER PAGE NO.

ORDER NUMBER

1-24666A54

P1A

4-14-93
5-3-93

5-22

24666A-01

[illegible]

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

TITLE:

SPARE PARTS

REVISIONS:

BY	CK'D BY	DATE

SUB-PARTS LIST

PREPARED BY

DATE _____

4.13.94

When ordering parts specify type of Equipment, Order No., Serial No., Part No., and Description, per this parts list.

UNITS REQ'D. FOR ORDER	

(i)

CHECKED BY

DATE _____

5.3.93

PREPARED BY	DATE

CK'D BY	

DATE

ORDER	
PAGE NO.	

ORDER NUMBER

74666-01



ITEM No.	QTY. PER UNIT	TOTAL FOR ORDER	PART NUMBER	DRAWING NUMBER	DESCRIPTION	#	REQ'N. NUMBER	REL. No.
				295494	SCUM BOX FLUSH ASSEMBLY	5		
				24666C57	FLUSH PIPE ERECTION			
5	1	2	24000B70A	24000B70	PIVOT ARM	STL	3	
7	1	2	24000C71A	24000C71	PIVOT SUPPORT	STL	2	
9	1	2	24666A69A	24666A69A	FLUSH PIPING	PVC	-	
10	2	2			1 1/2" HALF COUPLING	STL	-	
11	1	2	895738A	895738	FLUSH BALL	PLASTIC		
12	1	2	895738B	895738	CHAIN	304 SS		
13	1	2	24000A72A	24000A72	REDUCER BUSHING	PVC		
14	1	2			1 1/2" STD CLOSE NIPPLE	PVC		
21	1	2	F10937		COTTER KEY 1/8 X 1 1/2	SS		
22	1	2	F10936		COTTER KEY 1/16 X 1 1/4	SS		
25	2	4	F50018		CAPSCREW, FLAT HD 1/4-20NC X 1"	CAD PL STL		
27	1	2			CAPSCREW, DRILLED SCOKET HD 3/8-16NC X 3/4	CAD PL STL		
30	2	4	F12197		NUT-HEX 1/4-20NC	CAD PL STL		
32	2	4	F11198		WASHER, FLAT 1/4 STD	CAD PL STL		
34	2	4			WASHER, LOCK 1/4 STD	CAD PL STL		

ALL CAPSCREWS ARE SAE GRADE 5 UNLESS OTHERWISE SPECIFIED. * WEIGHT SHOWN IS TOTAL FOR ONE UNIT. LETTERS (A), (B) OR (C) ARE RECOMMENDED SPARE PART CODES. SEPIA FROM:

TITLE:

SCUM BOX FLUSHING
SYSTEM ASSEMBLY

REVISIONS:

BY CK'D BY DATE

SUB-PARTS LIST

PREPARED BY

DATE

When ordering parts specify type of Equipment, Order No.,
Serial No., Part No., and Description, per this parts list.

UNITS REQ'D.
FOR ORDER (2)

PAGE 1 OF 1

PARTS LIST No.

CHECKED BY

DATE

PREPARED BY DATE

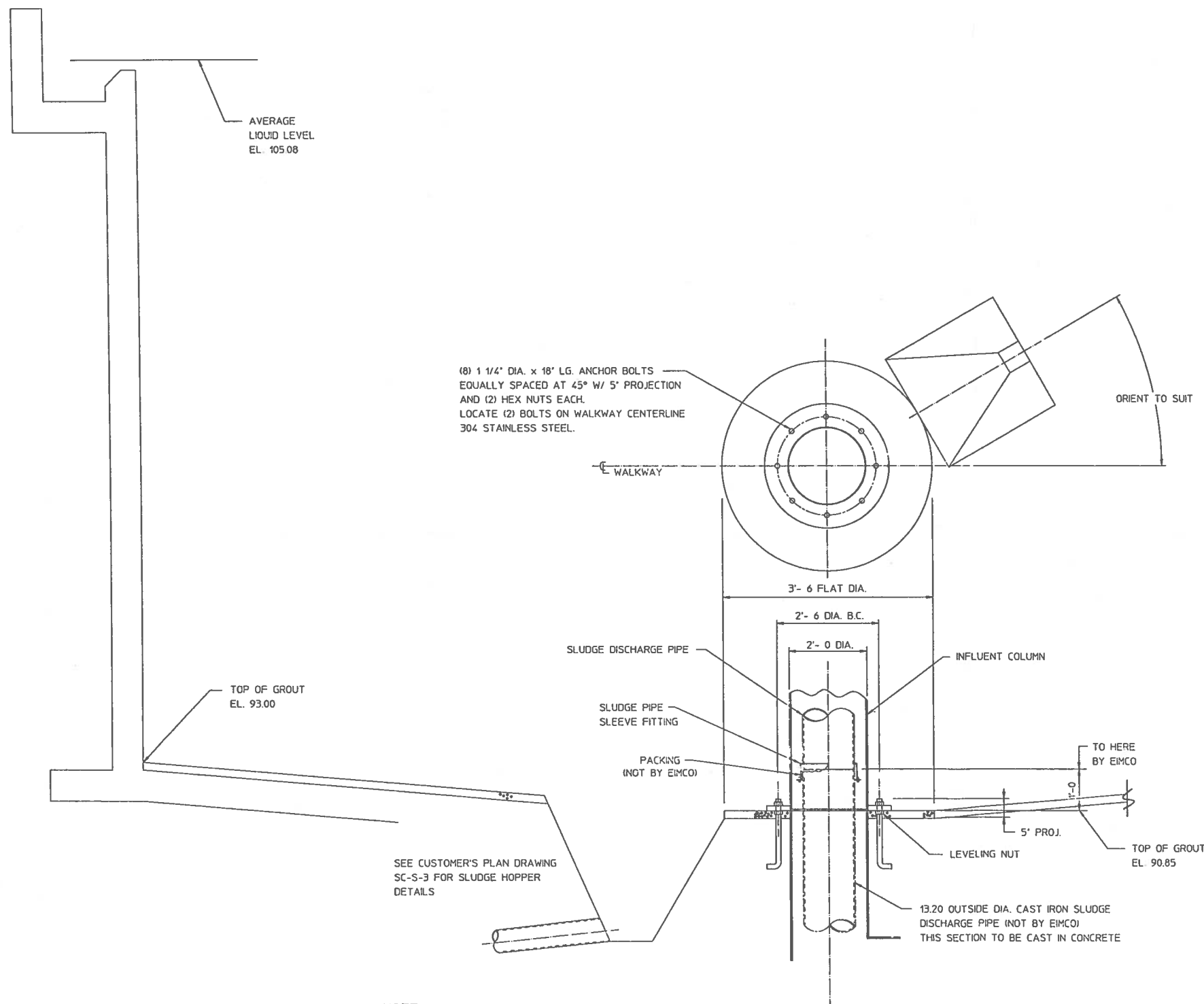
CK'D BY

DATE

ORDER
PAGE NO.

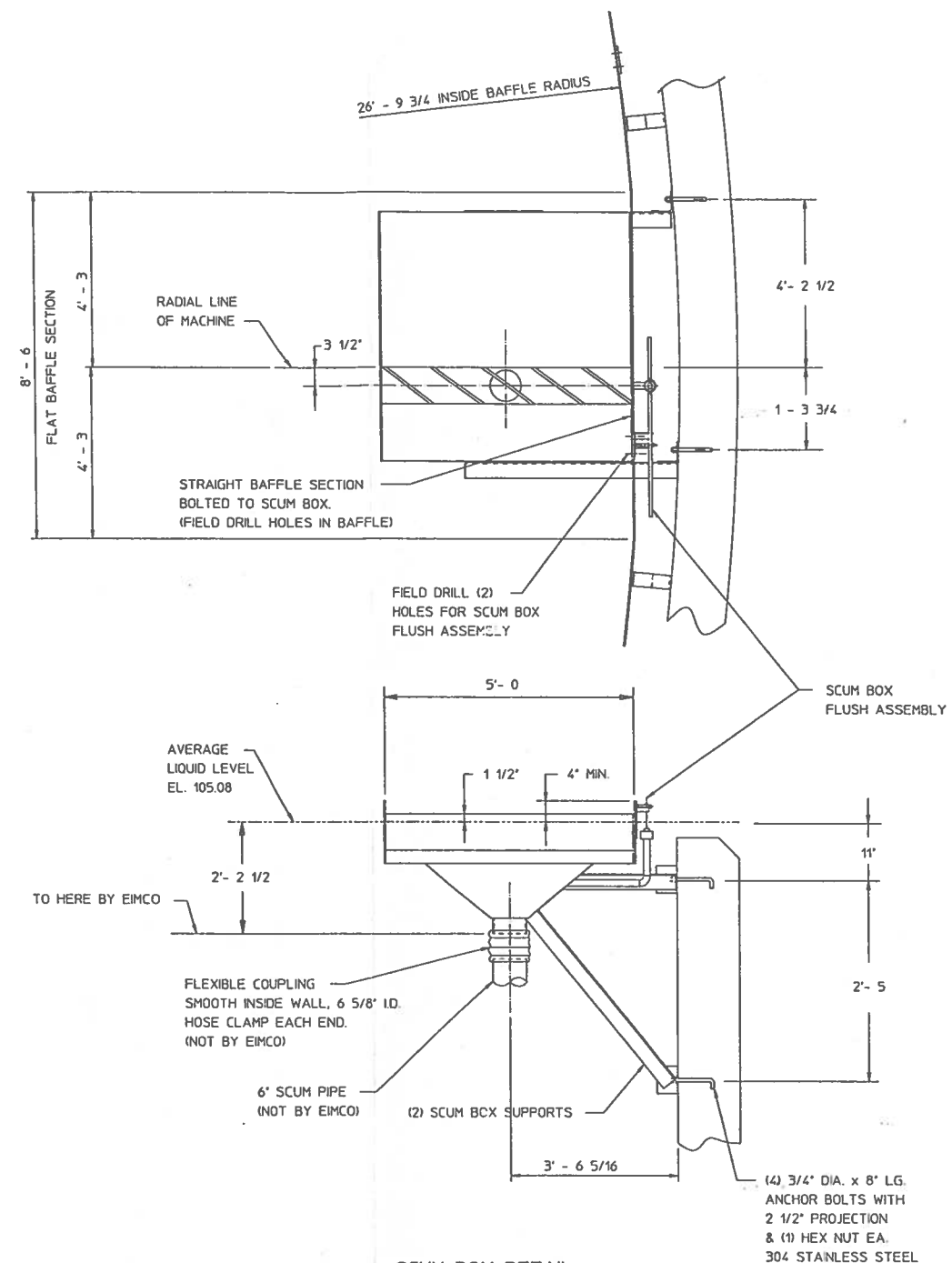
ORDER NUMBER

PIECE MARK	RECD.	MATERIAL	DESCRIPTION / REMARKS	TO WE



NOTE:
CONCRETE SHOULD BE DESIGNED
FOR A MAXIMUM TORQUE LOAD
OF 30,000 FOOT POUNDS.

TANK BOTTOM DETAIL



SCUM BOX DETAIL
(WEIR NOT SHOWN FOR CLARITY)

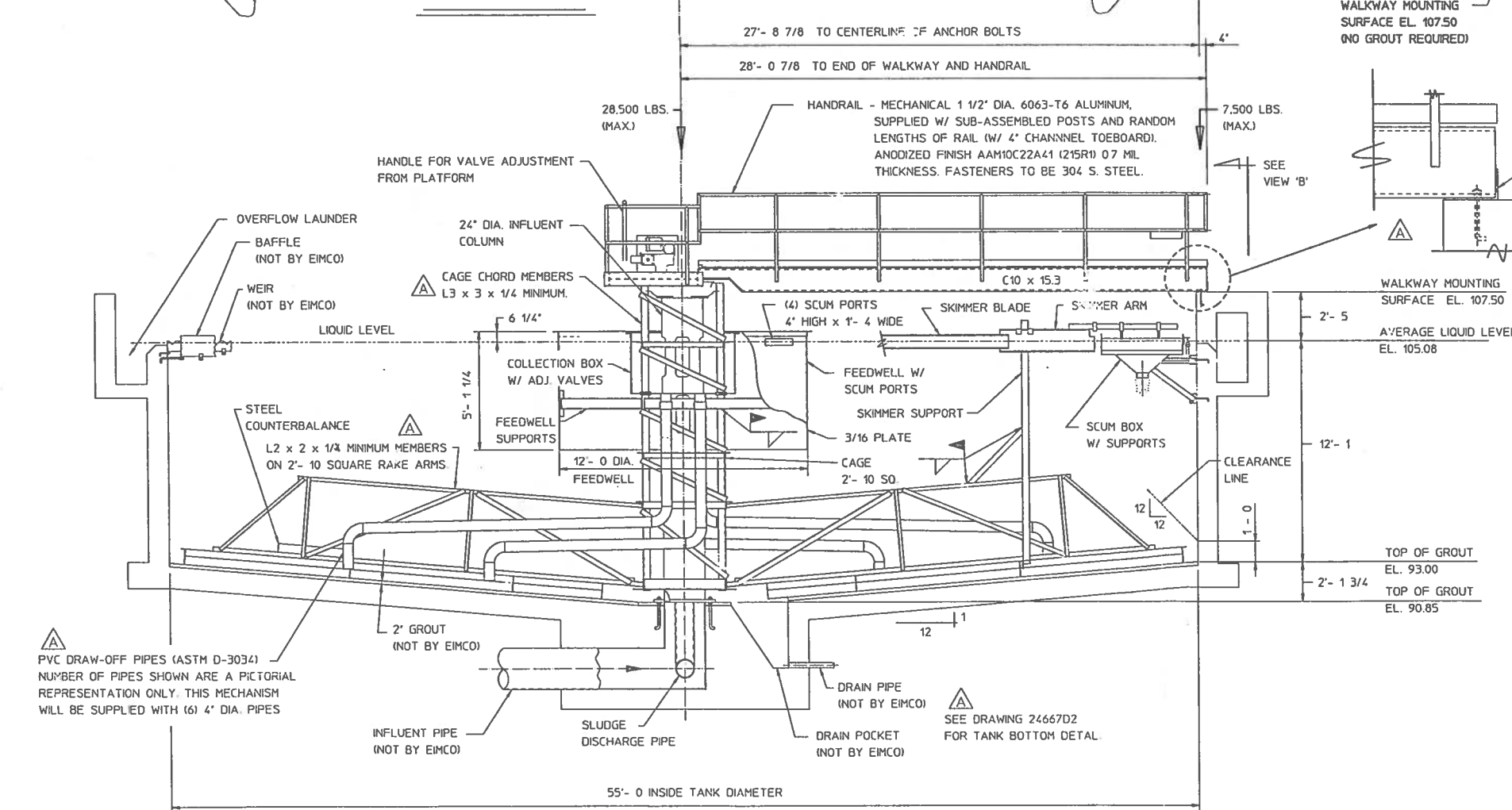
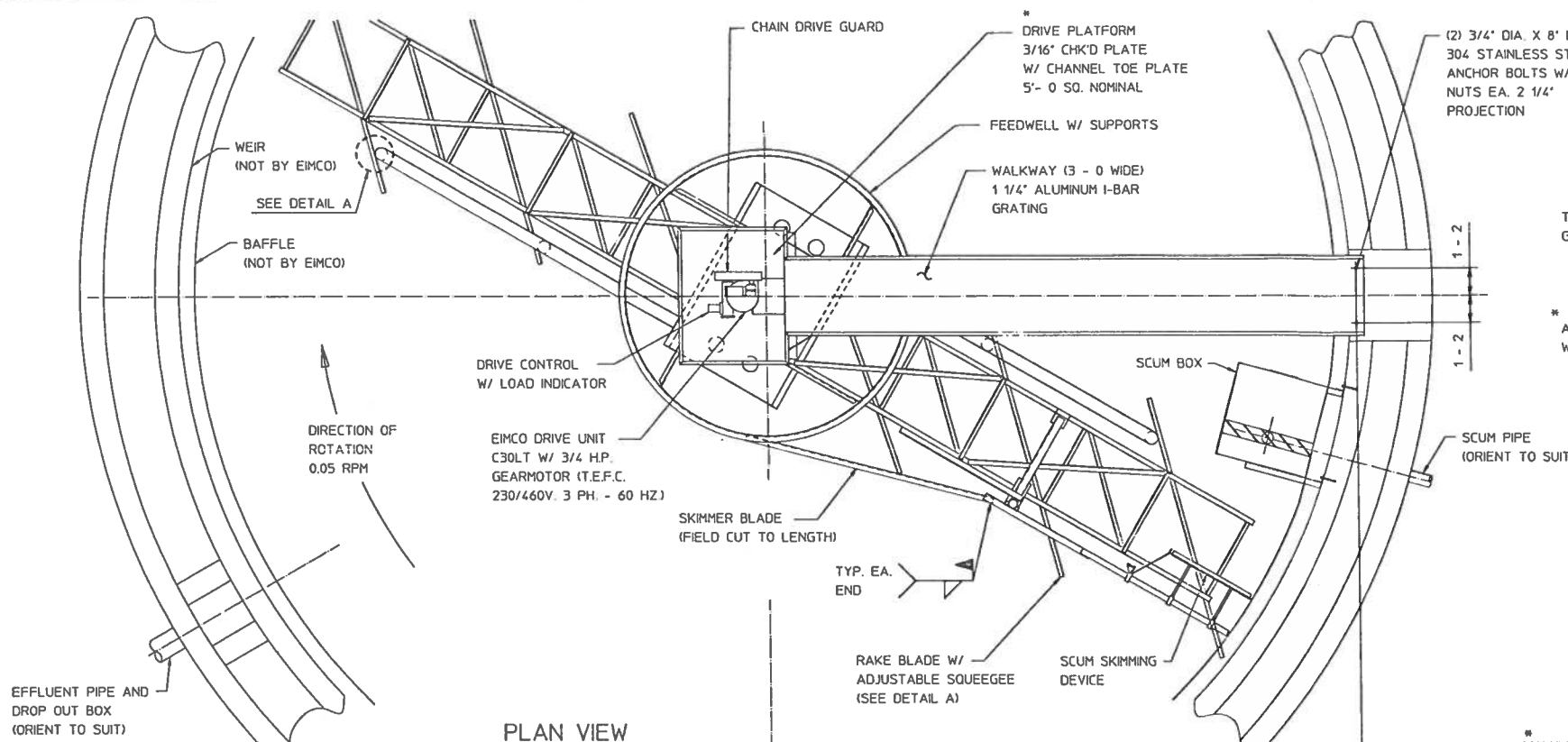
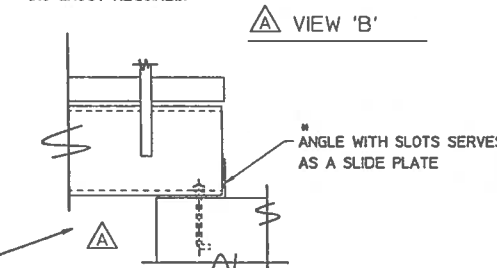
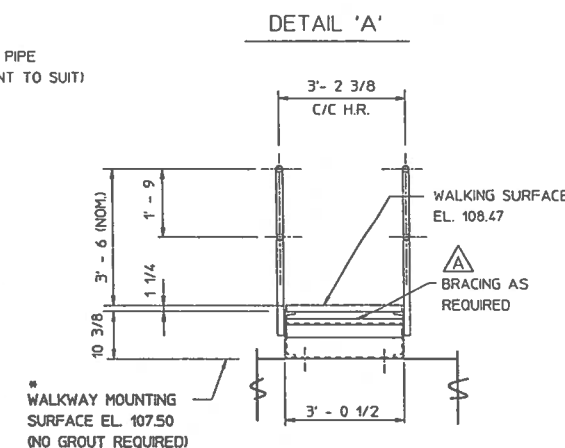
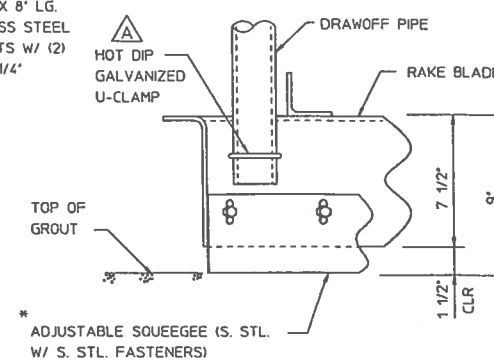
NOTE
1. WORK THIS DRAWING W/ GENERAL ARRANGEMENT
DRAWING 24666D1.

		EIMCO PROCESS EQUIPMENT COMPANY - Salt Lake City, Utah	
This drawing and all information thereon is the property of Eimco PEC and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.		HOLD FRACTION MACHINES DIMENSIONS TO ± 1/32"	
DO NOT SCALE PRINTS		GENERAL ARRANGEMENT DETAILS	
DATE 2-9-93			
DRAWN G.F.T.			
CHECKED ASC		'C3S' TYPE CLARIFIER	
DATE 3-22-93			
BY BLH			
		DWG No	24666D2

MARK	NO.	MATERIAL	DESCRIPTION / REMARKS	TO
WE	REQ'D			WE

NOTES:

1. ASTERISK (*) DENOTES VARIANCE FROM CONTRACT DOCUMENTS AND SHOULD BE PARTICULARLY NOTED.
2. THE FOLLOWING DEFINES THE RESPONSIBILITY OF THE EIMCO PROCESS EQUIPMENT COMPANY (EIMCO), WITH REGARD TO THE INFORMATION AND DIMENSIONS SHOWN ON THIS DRAWING. (A) DIMENSIONS, LOADS, AND OTHER INFORMATION ARE PROVIDED TO ACCOMMODATE THE EQUIPMENT TO THE STRUCTURE AS SHOWN. (B) THE CUSTOMER IS TO PROVIDE REINFORCING STEEL AND ANCHORS FOR CONCRETE STRUCTURES AND IS TO DETERMINE SIZES TO SUIT LOCAL CONDITIONS. (C) THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES UNLESS IT BEARS THE APPROVAL OF THE OWNER, THE ENGINEER OR THEIR AUTHORIZED REPRESENTATIVE. (D) THE MECHANISM SHOWN IS DESIGNED FOR DIRECTION OF ROTATION AS INDICATED. EIMCO DOES NOT ASSUME RESPONSIBILITY FOR DAMAGE IF OPERATED IN THE OPPOSITE DIRECTION. (E) CHARGES FOR MODIFICATIONS, ADDITIONS OR CORRECTIONS TO THE EQUIPMENT WILL NOT BE ACCEPTED BY EIMCO UNLESS PRIOR APPROVAL IS OBTAINED IN WRITING FROM AN AUTHORIZED EIMCO REPRESENTATIVE.
3. EIMCO DOES NOT FURNISH ELECTRICAL WIRING, CONDUIT OR ELECTRICAL EQUIPMENT, PIPING, VALVES OR FITTINGS, LUBRICATING OIL OR GREASE, FIELD PAINTING, FIELD WELDING OR ERECTION, (EXCEPT AS SPECIFICALLY NOTED).
4. SHOP PRIMER PAINT IS INTENDED TO SERVE ONLY AS A PROTECTIVE OR SEALING COAT, AS SUCH IT AFFORDS THE METAL ONLY MINIMAL PROTECTION AGAINST THE ELEMENTS, EIMCO CANNOT BE RESPONSIBLE FOR DETERIORATION OF SHOP-PRIMED EQUIPMENT DURING TRANSIT, JOB STORAGE, OR OTHER EXPOSURE TO THE ELEMENTS PRIOR TO APPLICATION OF FINISH COAT(S).
5. SURFACE PREPARATION TO CONSIST OF:
DRIVE: COMMERCIAL BLAST SSPC SP-6
NON-SUB. STL: COMMERCIAL BLAST SSPC SP-6
SUB. STL: NEAR-WHITE BLAST SSPC SP-10
6. SHOP PAINTING TO CONSIST OF:
DRIVE: (1) ONE SHOP COAT OF TNEDEC 161-BB42, 4 MILS MIN. D.F.T.
NON-SUB. STL: ONE (1) SHOP COAT OF TNEDEC 66-1211, 3 MILS MIN. D.F.T.
SUB. STL: ONE (1) SHOP COAT OF TNEDEC 66-1211, 3 MILS MIN. D.F.T.
7. EIMCO TO SUPPLY (1) MECHANISM AS SHOWN AND NOTED WITH ALL SUBMERGED PLATES AND STRUCTURAL MEMBERS HAVING A MINIMUM STEEL THICKNESS OF 0.25 INCHES UNLESS NOTED.
8. ALL WELDING SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF A.W.S. WELDING PROCEDURES WITH QUALIFICATION RECORDS PER A.W.S. D11.
9. ALL STRUCTURAL SHAPES AND PLATES TO BE PER ASTM A36.
10. FOR MECHANISM ORIENTATION, SEE CONTRACT DRAWING NO. SC-S-2
11. ANCHOR BOLTS: 304 STAINLESS STEEL
ASSEMBLY BOLTS: BLACK STEEL, UNLESS NOTED
12. FOR ADDITIONAL DETAILS, REFER TO DRAWINGS:
24666D2 GENERAL ARRANGEMENT DETAILS
24666C3 DRIVE CONTROL
24666C4 TORQUE TEST
295129 MOTOR WIRING DIAGRAM
115197 DRIVE GENERAL ARRANGEMENT
295519 SCUM BOX FLUSHING
295445 C3S SLUDGE WITHDRAWAL G.A.
87064 ALARM
13. EIMCO TO FURNISH THE FOLLOWING SPARE PARTS:
(1) SET OF DRIVE SIGHT GLASSES
(1) SET OF NEOPRENE SKIMMER WIPERS
(1) SET OF RAKE ARM SQUEEGEES
SPARE PARTS TO BE PACKAGED AND LABELED FOR LONG TERM STORAGE
14. EIMCO TO FURNISH SCUM BOX FLUSH ASSEMBLIES FOR (2) EXISTING SECONDARY CLARIFIERS (SEE DRAWING 295519).



△ PVC DRAW-OFF PIPES (ASTM D-3034)
NUMBER OF PIPES SHOWN ARE A PICTORIAL
REPRESENTATION ONLY. THIS MECHANISM
WILL BE SUPPLIED WITH (6) 4\"/>

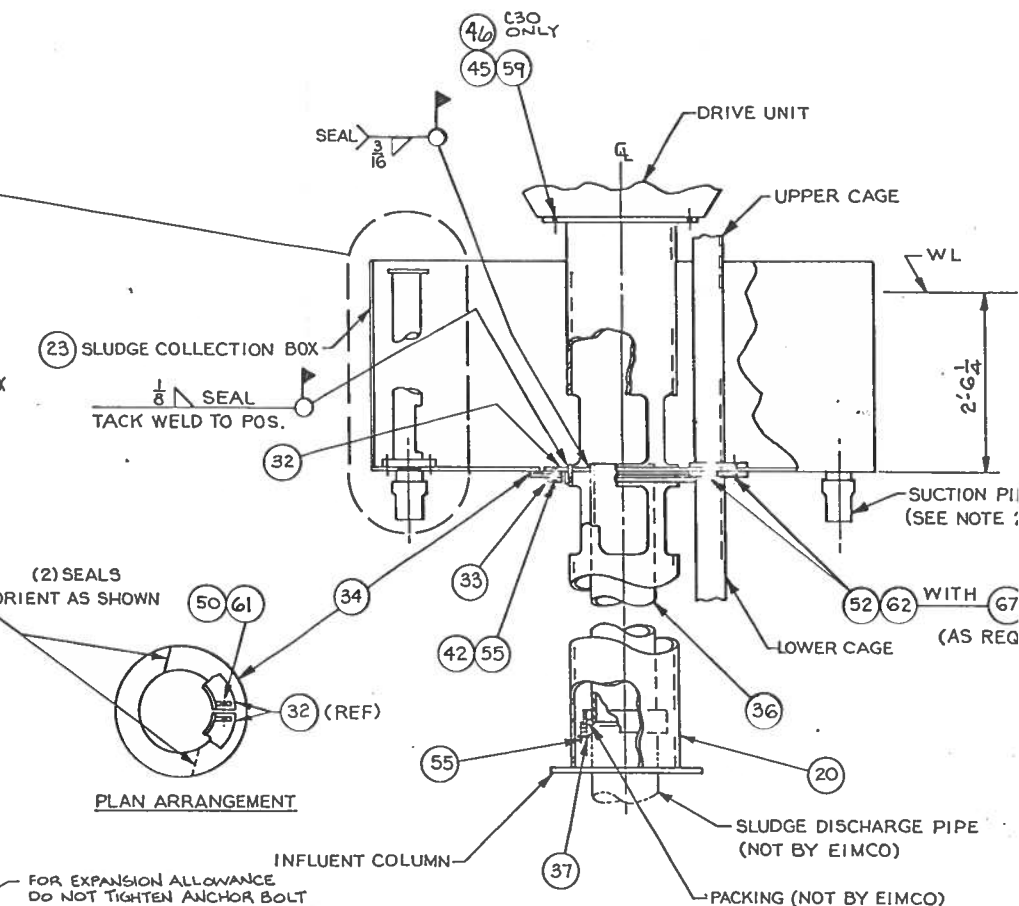
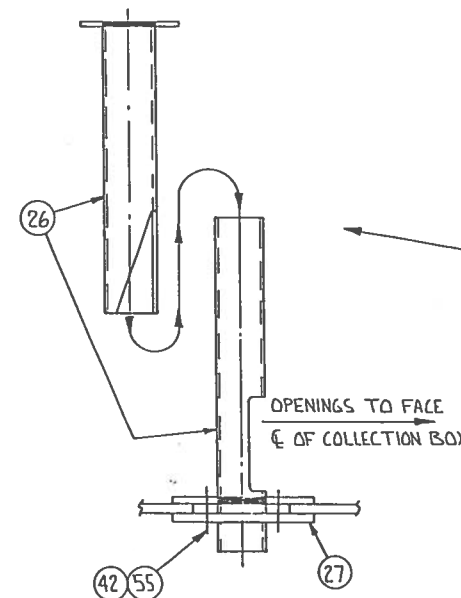
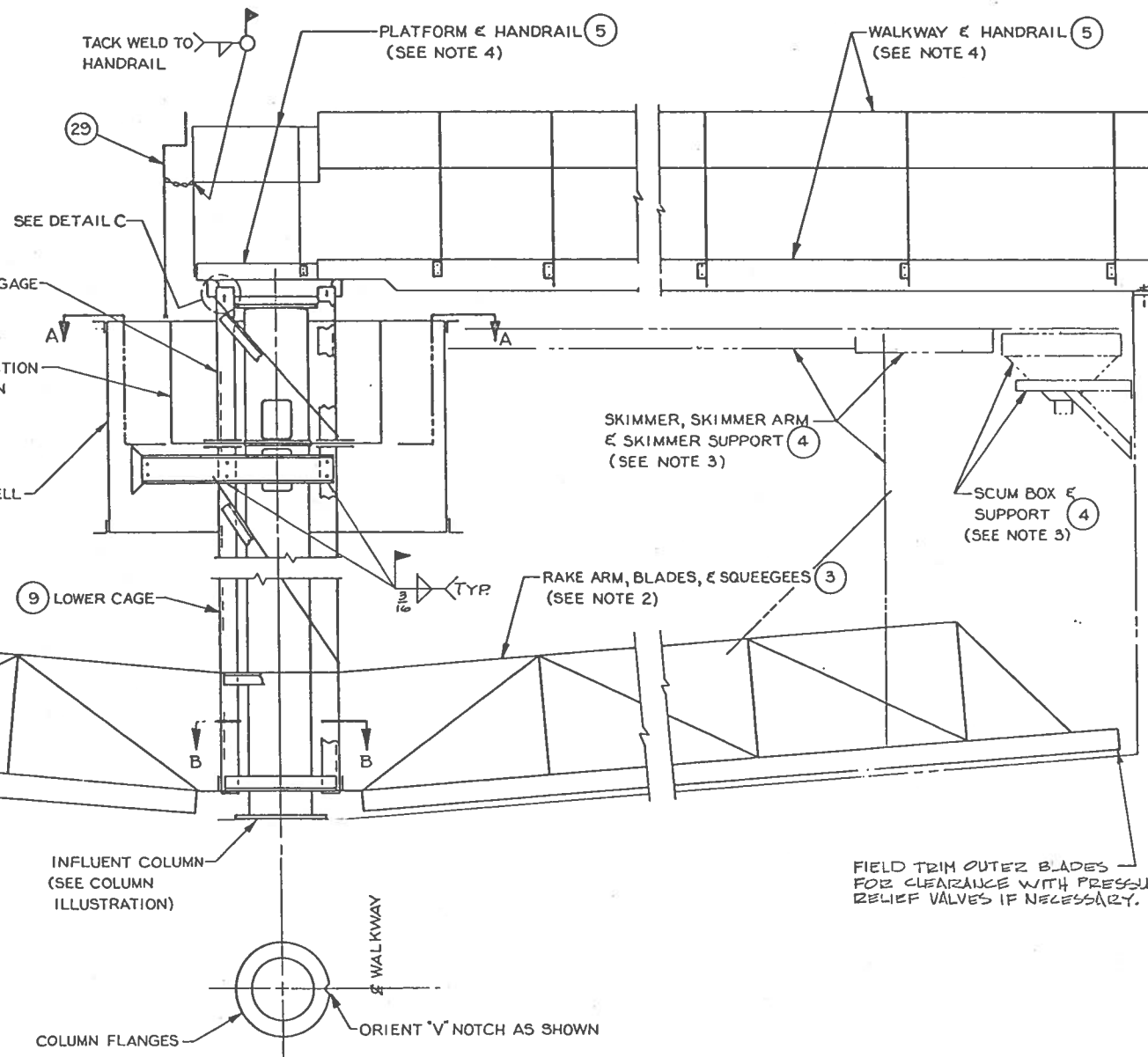
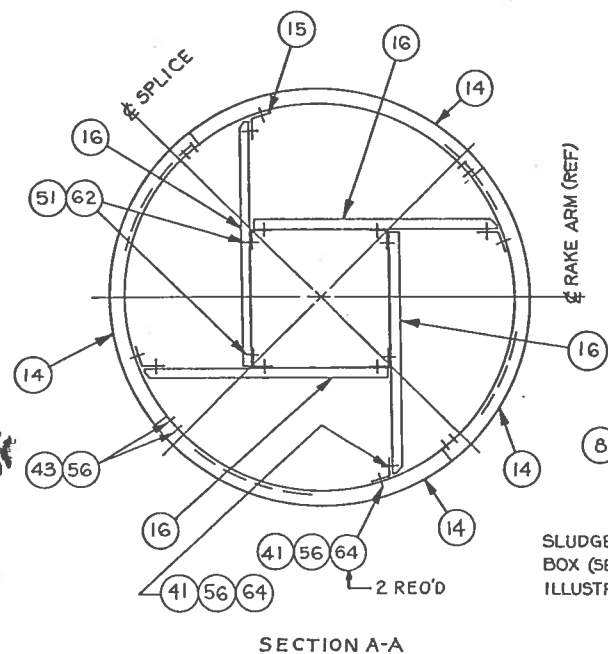
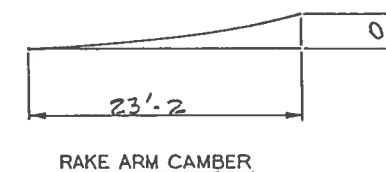
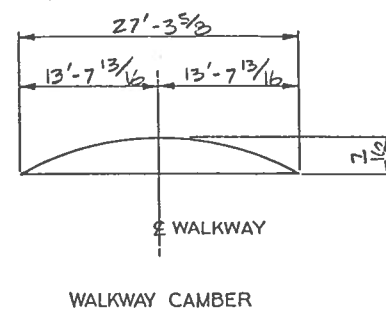
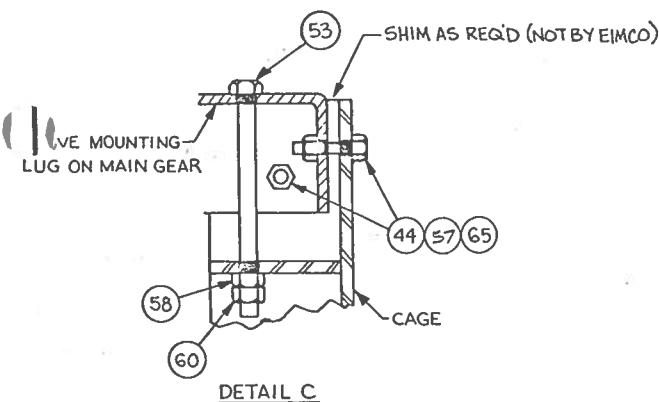
△ SEE DRAWING 24667D2
FOR TANK BOTTOM DETAIL.

REF. 23438D1



EIMCO PROCESS EQUIPMENT COMPANY -- Salt Lake City, Utah
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and is confidential and must not be made public or copied. This drawing
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or indirectly in any way detrimental to our interests.

DO NOT SCALE PRINTS		GENERAL ARRANGEMENT CLARIFIER (SECONDARY) 55'- 0 DIA. 'C3S' TYPE		
DATE	2-1-93			
DRAWN	G.F.T.			
CHECKD	ASC		DWG. No.	24666D1
APPR	B.H.			



COLUMN ILLUSTRATION (FEEDWELL NOT SHOWN)

HIGH STRENGTH (H.S.) BOLTS (ASTM A325)

MUST BE USED WHERE SHOWN AND SPECIFIED. ASSEMBLY INSTRUCTIONS, TURN-OF-NUT METHOD. ALL JOINT SURFACES SHALL BE FREE OF LOOSE MILL SCALE, BURRS, AND FOREIGN MATERIAL. ENOUGH BOLTS SHALL BE BROUGHT TO A "SNUG TIGHT" CONDITION TO INSURE THAT THE PARTS OF THE JOINT ARE PROPERLY COMPACTED, I.E. BROUGHT INTO FULL CONTACT WITH EACH OTHER. SNUG TIGHT SHALL BE DEFINED AS THE TIGHTNESS ATTAINED BY A FEW IMPACTS OF AN IMPACT WRENCH OR THE FULL EFFORT OF A MAN USING AN ORDINARY SPUD WRENCH. FOLLOWING THE INITIAL TIGHTENING, BOLTS SHALL BE PLACED IN ANY REMAINING HOLES IN THE CONNECTION AND BROUGHT TO SNUG TIGHTNESS. ALL BOLTS IN THE JOINT SHALL BE TIGHTENED ADDITIONALLY BY THE APPLICABLE AMOUNT OF NUT ROTATION SPECIFIED BELOW, WITH TIGHTENING PROGRESSING SYMMETRICALLY FROM THE MOST RIGID PART OF THE JOINT TO ITS FREE EDGES.

Bolt Length (as measured from underside of head to extreme end of point)	Disposition of Outer Faces of Bolted Parts		
	Both faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1:20 (bevel washer not used)	Both faces sloped not more than 1:20 from normal to bolt axis (bevel washers not used)
Up to and including 4 diameters	1/3 turn	1/2 turn	2/3 turn
Over 4 diameters but not exceeding 8 diameters	1/2 turn	2/3 turn	5/8 turn

NUT ROTATION IS ROTATION RELATIVE TO BOLT, REGARDLESS OF THE ELEMENT (NUT OR BOLT) BEING TURNED. TOLERANCE ON ROTATION: 30° OVER OR UNDER. FOR OTHER THAN TURN-OF-NUT METHOD, FOLLOW PROCEDURES OUTLINED IN LATEST EDITION OF THE AISC STEEL CONSTRUCTION MANUAL.

NOTES:

- ALL ITEMS CALLED OUT ON THIS DRAWING ARE IDENTIFIED ON PARTS LIST [24666D51].
- FOR ERECTION OF RAKE ARMS, BLADES, SQUEEGEES, SUCTION PIPING, AND ARM TO CAGE CONNECTION, SEE DRAWING [24666D52].
- FOR SKIMMING MECHANISM ERECTION, SEE DRAWING [24666D53].
- FOR ERECTION OF PLATFORM, WALKWAY, RELATED HANDRAIL AND FLOOR PLATE, SEE DWG [295482].
- THE INSTALLATION, OPERATION, AND MAINTENANCE INSTRUCTIONS MANUAL MUST BE STUDIED PRIOR TO STARTING ERECTION OF THIS EQUIPMENT.
- VALVE ASSEMBLY BASE PLATES, PART OF ITEMS (2) SHOULD BE BUTTED TOGETHER FROM CENTERLINE OF MACHINE OUT. IF THE OPENING IN THE SLUDGE COLLECTION BOX, ITEM (23), IS NOT COVERED, USE FILLER PLATES, ITEM (24), AT EACH SIDE OF OUTER BASE PLATES TO COVER THE GAPS.

SEPIA FROM 114988



EIMCO BSP DIVISION - ENVIROTECH CORPORATION - Salt Lake City, UT

DO NOT SCALE PRINTS

DATE 2-14-93

DRAWN GFT

CHECK'D PW

APPR. BJA

GENERAL ERECTION

55'-0 DIA.

C3S CLARIFIER

DWG. NO. 24666D51

C	10174	9
B	10091	3
A	6013	4
D/R		1

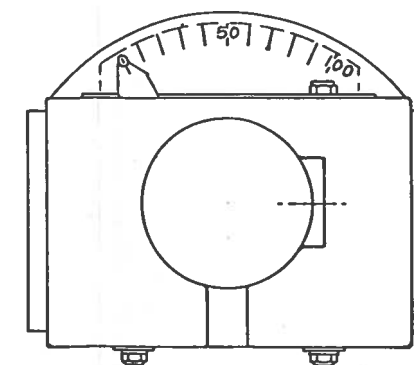
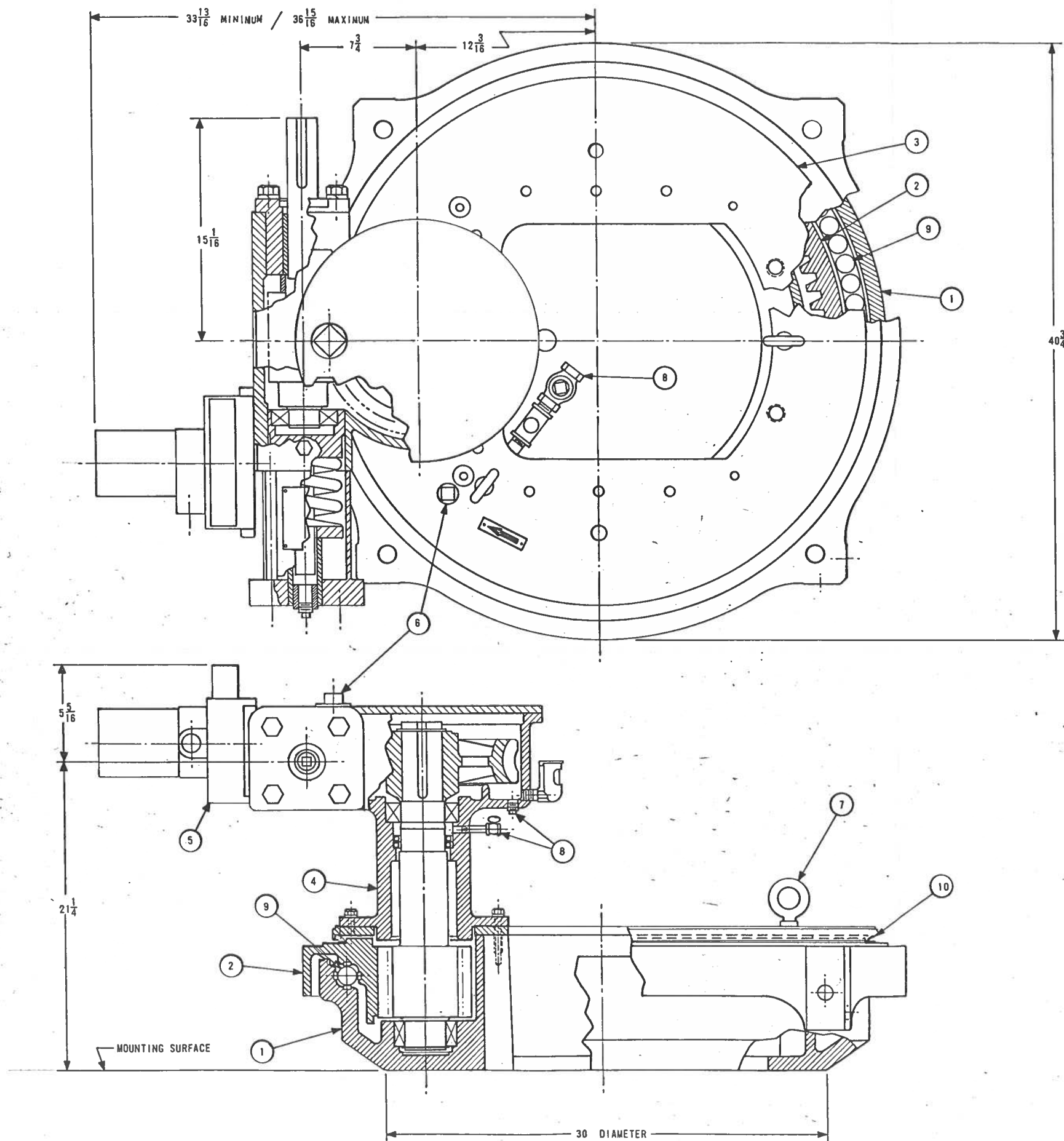
REVISION

HOLD FRACTIC

MACHINED

DIMENSIONS

TO ± 1/64"



DRIVE CONTROL
(FRONT VIEW)

COMPONENTS

- ① DRIVE BASE
- ② MAIN GEAR
- ③ MAIN GEAR COVER
- ④ WORM GEAR HOUSING AND COVER
- ⑤ DRIVE CONTROL (SEE NOTE BELOW)
- ⑥ VENT PLUG (OIL FILLER)
- ⑦ LIFTING EYE BOLTS
- ⑧ OIL DRAIN
- ⑨ BEARING BALLS
- ⑩ SEAL

NOTE:

SEE APPLICABLE DRIVE CONTROL GENERAL ARRANGEMENT DRAWING.

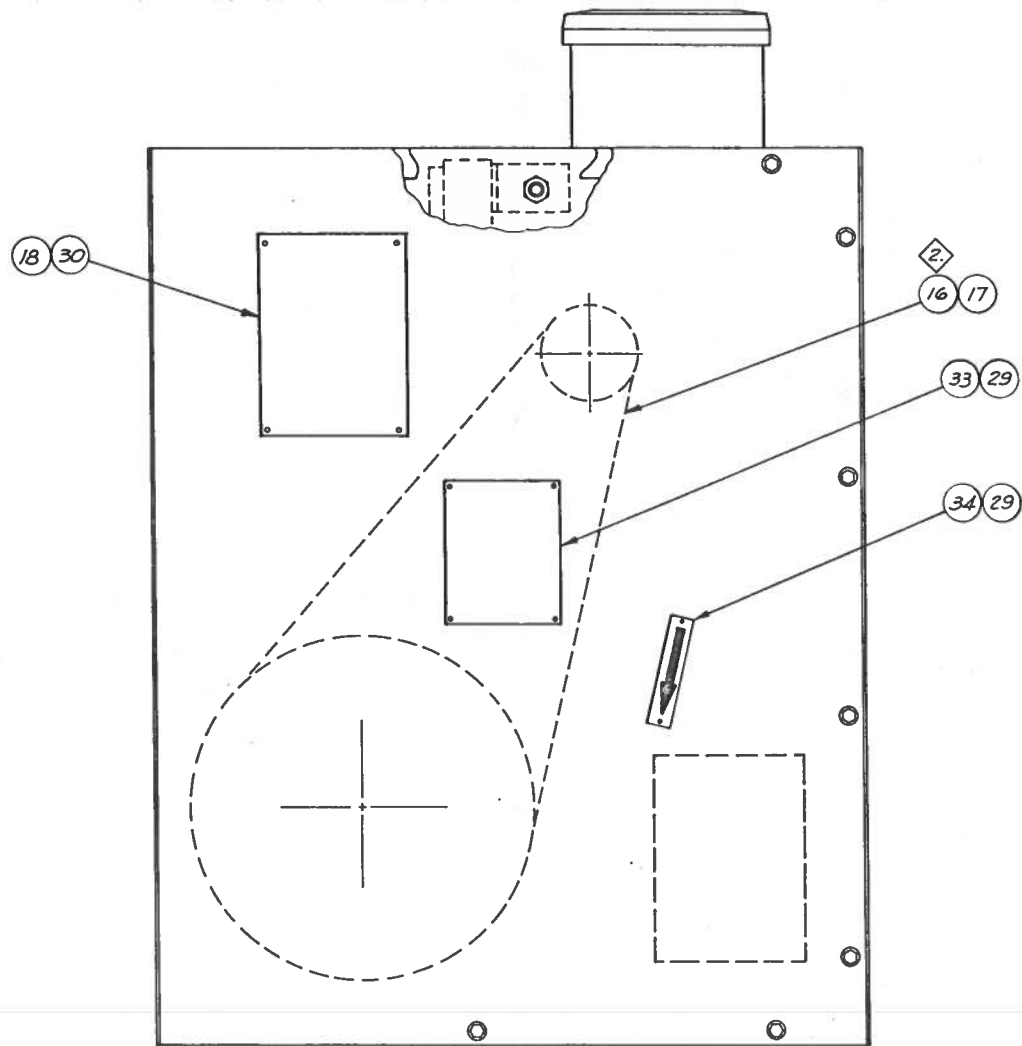
E	6542
D	6376
C	6327
B	6146
A	6068
D/R	

REVISION

ENVIROTECH 		EIMCO PMD — ENVIROTECH CORPORATION — Salt Lake City, Utah	
DO NOT SCALE PRINTS		This drawing and all information thereon is the property of Eimco PMD and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.	
DATE	11-11-82	DRIVE GENERAL ARRANGEMENT C30LT AND C30HT	HOLD FRACT MACHINED DIMENSIONS TO ± 1/64"
DRAWN	DRG		
CHECK'D	JKM		
APPR.	GEN		

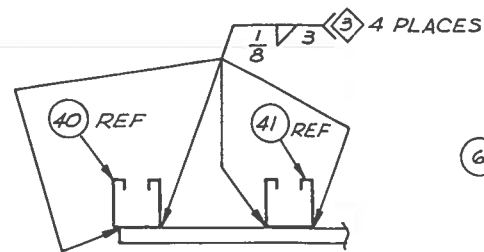
DWG. NO. 115197

PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION/REMARKS

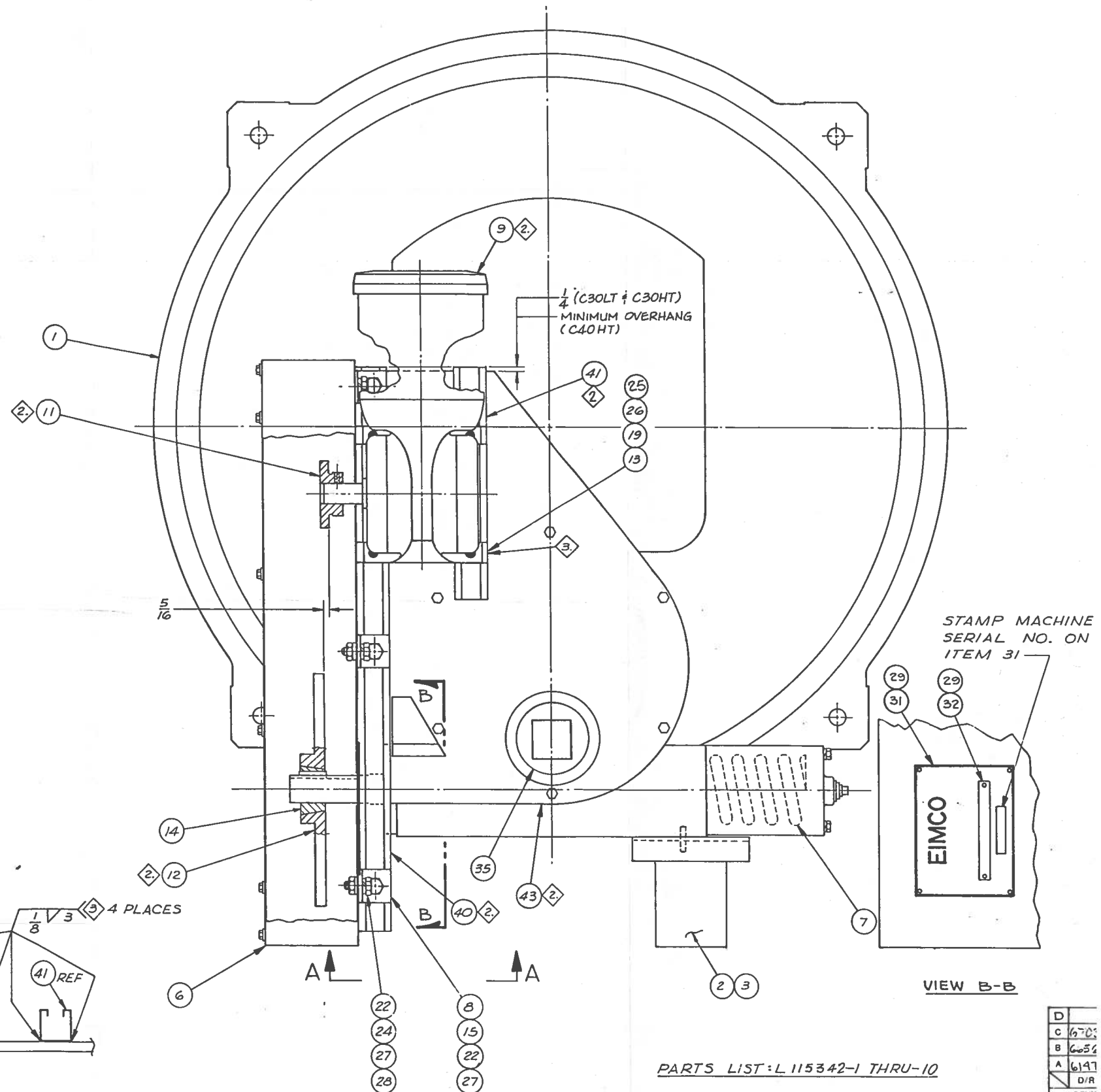


NOTES:

- BASIC DRIVE CONFIGURATION AS SHOWN FOR ILLUSTRATION ONLY.
- BOLT GEAR MOTOR (9) TO MOUNTING CHANNELS (40) AND (41). POSITION ON COVER (43). INSTALL SPROCKETS (11), (12), AND CHAIN (16). ALIGN AS SHOWN AND WELD MOUNTING CHANNELS TO COVER PER VIEW A-A AND PLAN VIEW.
- THREE INCH LONG WELDS, CENTERED AT A POINT WHERE REDUCER FEET BOLT TO MOUNTING CHANNEL.
- SEE DRAWING 203520 FOR CHAIN GUARD ASSEMBLY.



VIEW A-A

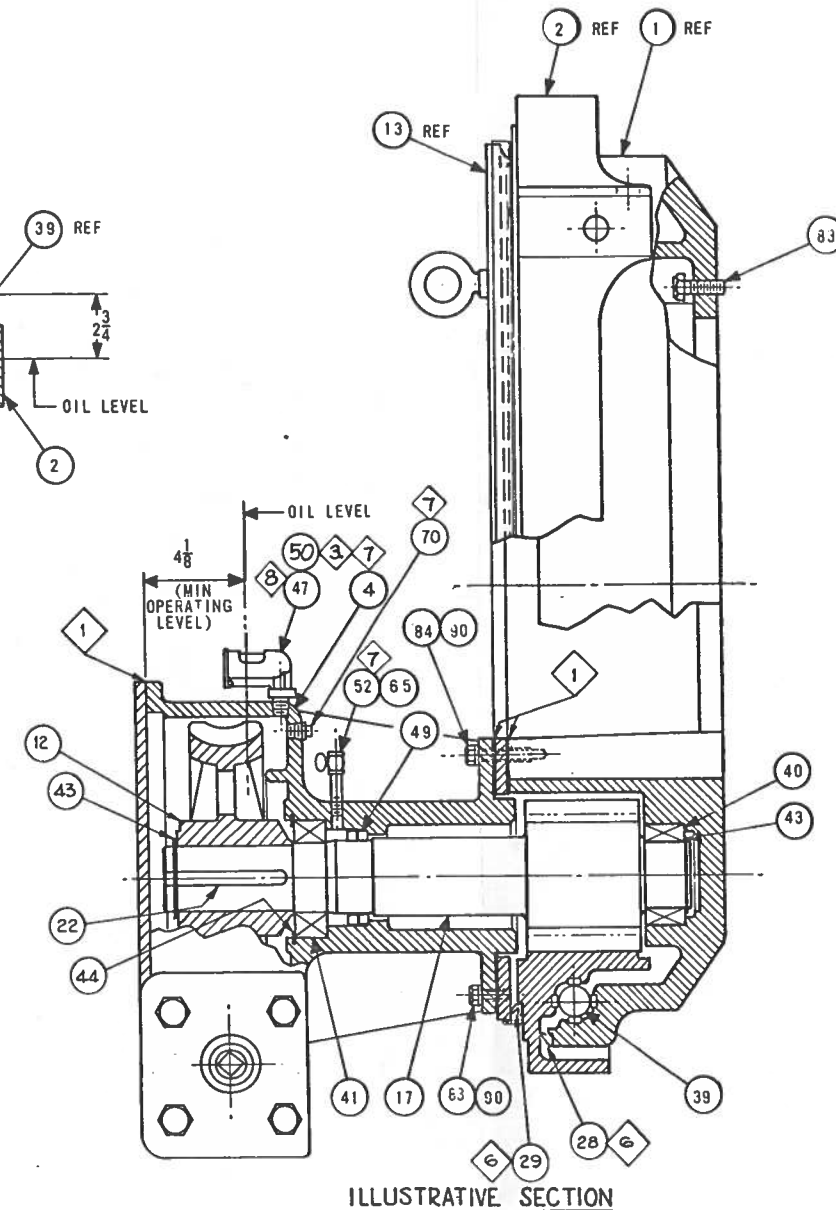
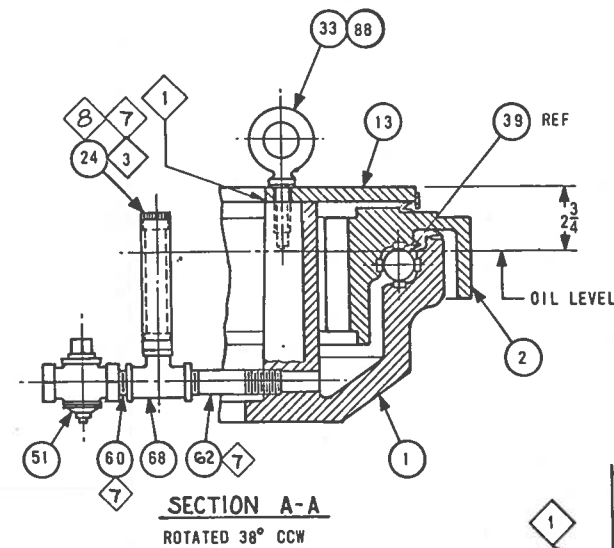
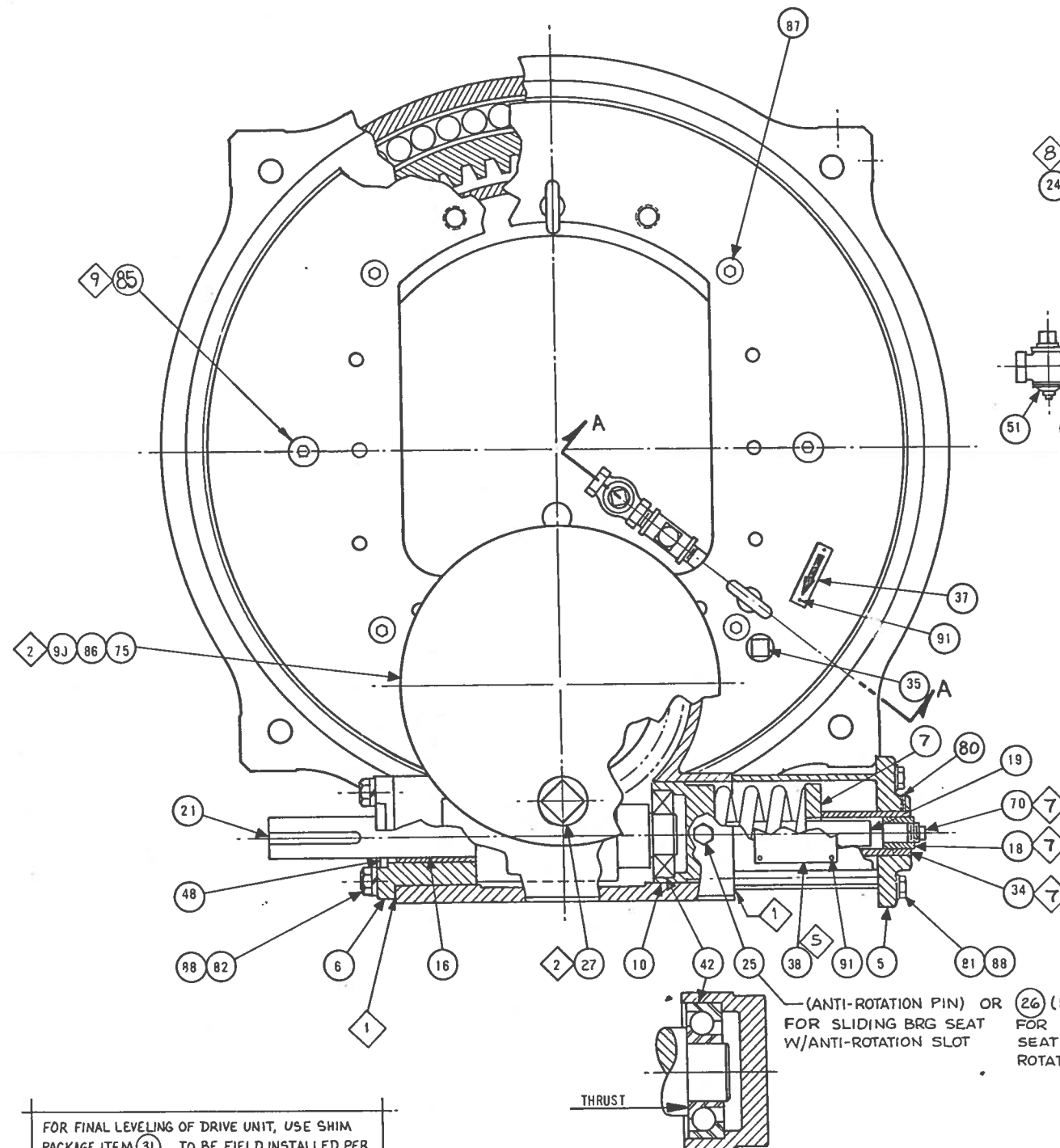


STAMP MACHINE
SERIAL NO. ON
ITEM 31

VIEW B-B

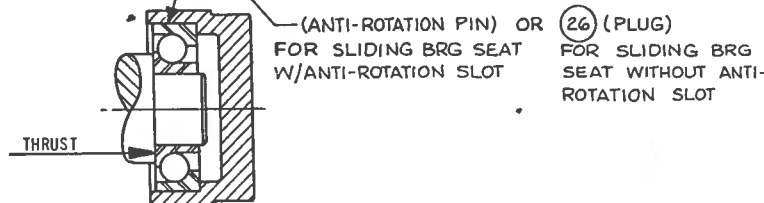
PARTS LIST: L 115342-1 THRU-10

ENVIROTECH		EIMCO PMD - ENVIROTECH CORPORATION - Salt Lake City, Uta	
DO NOT SCALE PRINTS		This drawing and all information thereon is the property of Eimco PMD and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.	
DATE	1-3-84	DRAWN	LEB
CHECK'D	JKM	APPR.	GEN
DRIVE UNIT PACKAGE CLARIFIERS & CLARITHICKENERS W/C30LT, C30HT, C40LT OR C40HT DRIVES		DWG NO.	115342



FOR FINAL LEVELING OF DRIVE UNIT, USE SHIM PACKAGE, ITEM (31). TO BE FIELD INSTALLED PER INSTRUCTIONS TITLED "FINAL LEVEL THE DRIVE" IN THE INSTALLATION, OPERATION & MAINTENANCE MANUAL.

ASSEMBLY SHOP NOTE: BAG & TIE SHIM PACKAGE TO DRIVE UNIT.



----- CAUTION -----
NOTE CAREFULLY HOW BEARING, ITEM (42) IS ASSEMBLED IN HOUSING TO TAKE THRUST TOWARD SPRING
IMPROPER ASSEMBLY WILL CAUSE BEARING FAILURE

- 5 TO ELIMINATE BURRS & CHIPS FROM ENTERING WORM GEAR HOUSING, DRILL (4) #37 (.104 DIA) HOLES IN END CAP, ATTACH ITEM (38) USING ITEM (51) AND CLEAN UP BEFORE INSTALLING END CAP TO WORM GEAR HOUSING.
- 6 INSTALL SEAL ITEM (28) AND ITEM (29) PER INSTALLATION INSTRUCTIONS DRAWING NUMBER 48643.
- 7 APPLY PIPE THREAD SEALANT TO ALL PIPE JOINTS.
- 8 NOTCH LINE ON SIGHT GLASS METAL CASING OF ITEMS (24) & (47) AT OIL LEVEL.
- 9 ITEM (85) MAY BE REMOVED, IF REQUIRED FOR INSTALLATION OF WALKWAY.

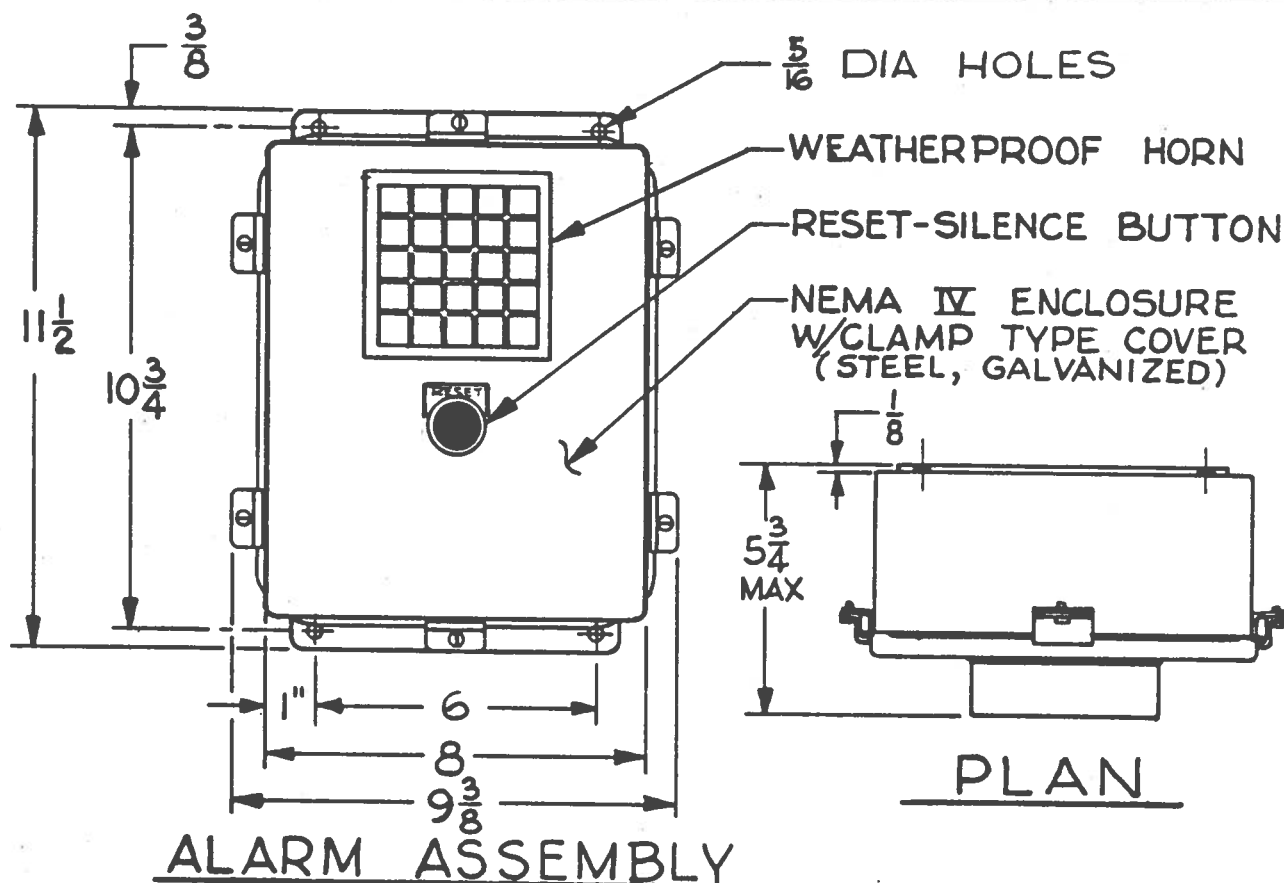
NOTES:

- 1 APPLY ULTRA BLUE RTV-SILICONE TO CONNECTIONS INDICATED TO OBTAIN A LIQUID TIGHT SEAL.
- 2 DESIGN OF WORM GEAR COVER TO BE DETERMINED AS REQUIRED FOR MOTOR DRIVE COMPONENTS. ITEM (27) TO BE BAGGED AND TIED TO DRIVE UNIT. USE A TEMPORARY COVER FOR STOCK UNIT.
- 3 ASSEMBLY SHOP TO NOTCH SIGHT GLASS CASING AT OIL LEVEL.
- 4 SPRING IS CALLED OUT WITH MOTOR DRIVE COMPONENTS. SPRING SHOWN FOR REFERENCE ONLY.

R	
Q	
P	
O	
N	
M	6856
L	6742
K	6696
J	6593
I	
H	
G	
F	
E	
D	
C	
B	
A	

PARTS LISTS: L115100-1 AND L115100-2

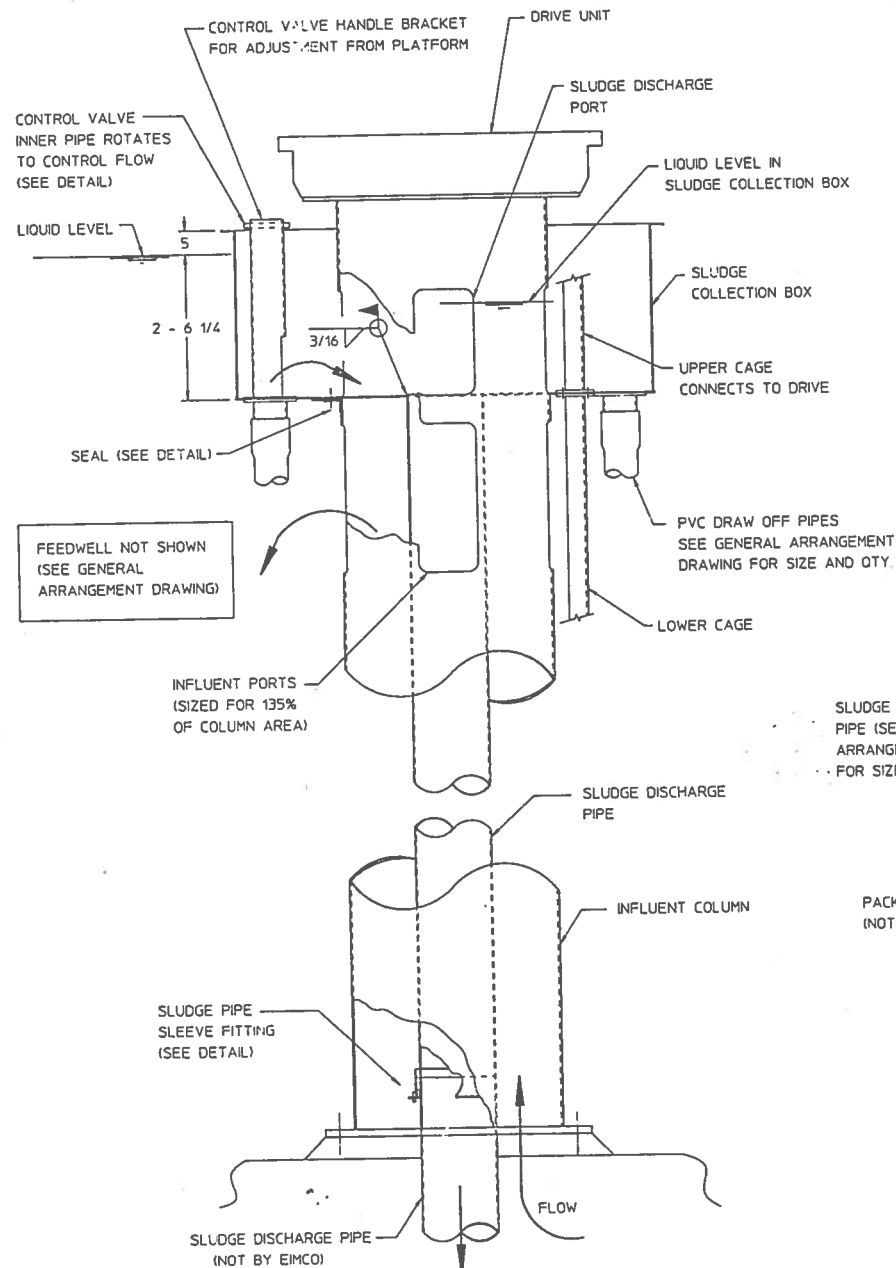
		EIMCO PMD - ENVIROTECH CORPORATION - Salt Lake City, Utah	
This drawing and all information thereon is the property of Eimco PMD and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.			
DO NOT SCALE PRINTS		DATE 8-3-82	
DRAWN Drysdale		CHECKED JHS	
APPR. GEN		HOLD FRAC T MACHINED DIMENSIONS TO ± 1/64"	
DRIVE ASSEMBLY C30LT & C30HT (BASIC)		DWG. NO. 115100	



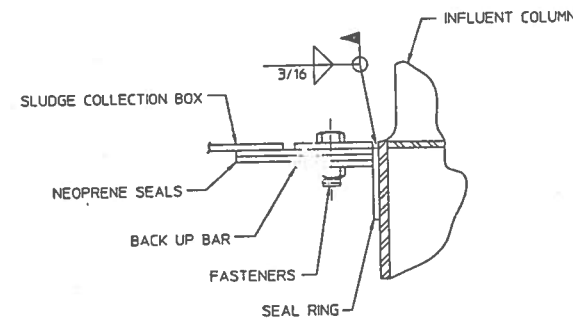
1. WHEN EXTERNAL CONTACT IN THE CONTROL DEVICE CLOSSES THE HORN SOUNDS.
2. HORN SOUNDS UNTIL "ACKNOWLEDGED" BY PUSHING RESET BUTTON.
3. CONNECTIONS ARE PROVIDED INTERNALLY FOR EXTERNAL AND/OR REMOTE SIGNAL LIGHT. (LIGHT NOT BY EIMCO). LIGHT WILL COME ON SIMULTANEOUSLY WITH HORN ALARM AND WILL TURN OFF ONLY AFTER MALFUNCTION HAS BEEN CORRECTED. RESET PUSH-BUTTON DOES NOT TURN LIGHT OFF AS IN (2).

C		
B		
A	2567	9-24-71
	D/R	DATE
REVISION		

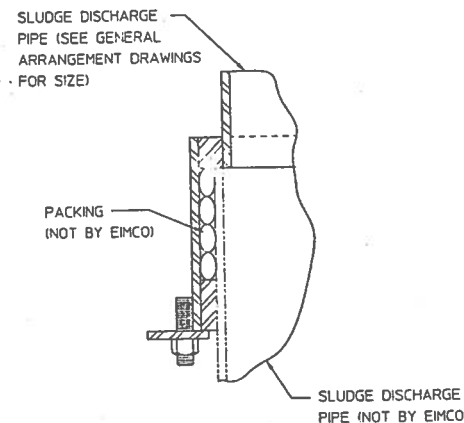
ENVIROTECH 		EIMCO BSP DIVISION - ENVIROTECH CORPORATION - Salt Lake City, Utah	
DO NOT SCALE PRINTS		This drawing and all information thereon is the property of Eimco BSP and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.	
DATE 1-29-71 DRAWN A.G. CHECK'D JLB APPR. VDC.		ALARM UNIT MOUNTING DIM. & DESCRIPTION OF OPERATION	
		DWG. NO. 87064	
		REV. A	



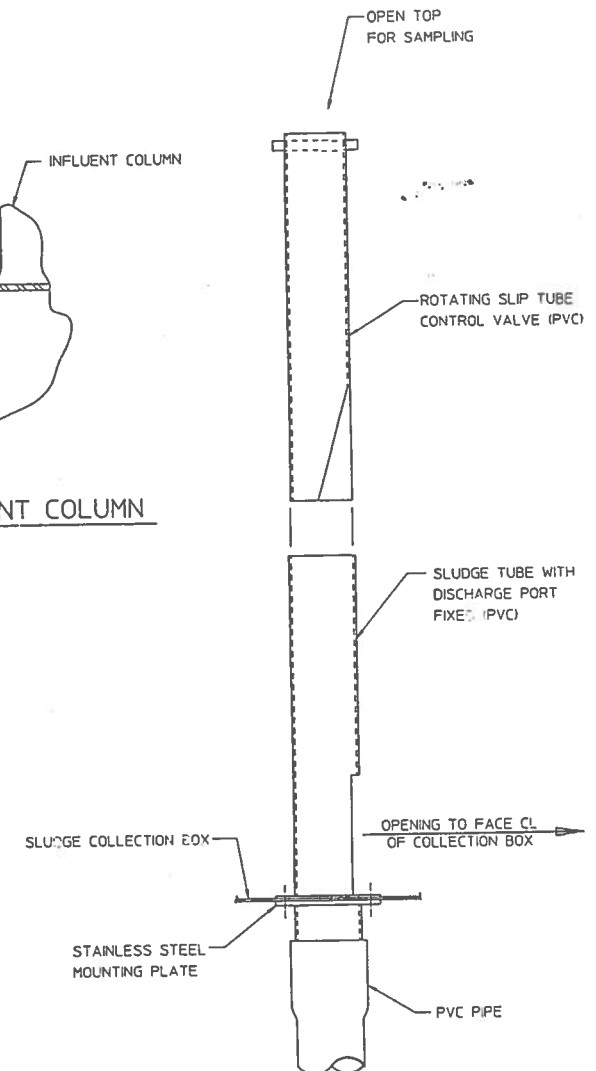
COLUMN ILLUSTRATION



SEAL AT INFLUENT COLUMN



SLUDGE PIPE SLEEVE FITTING

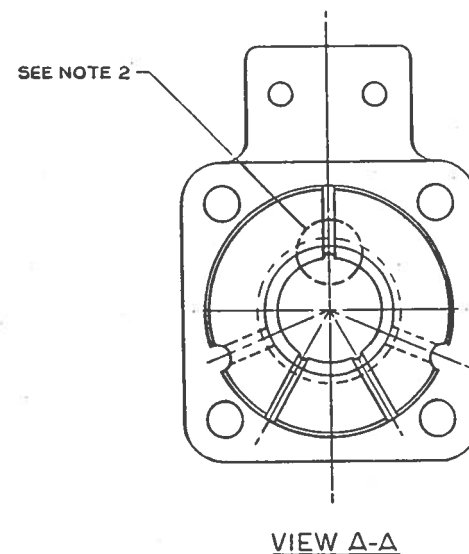
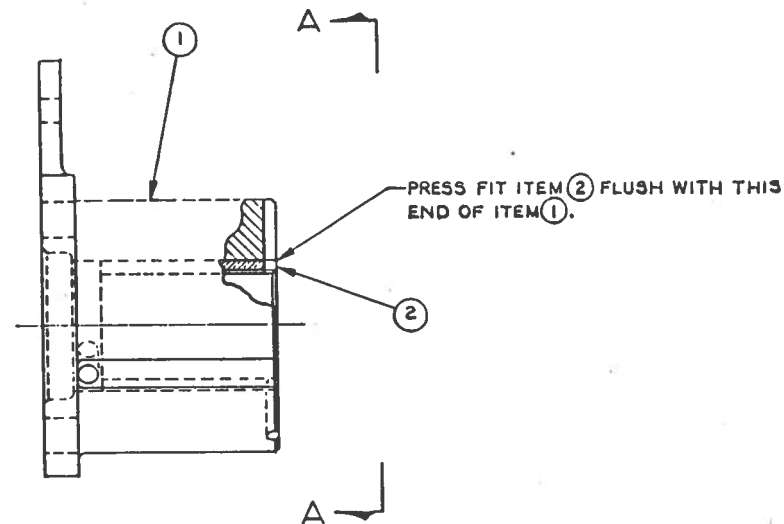
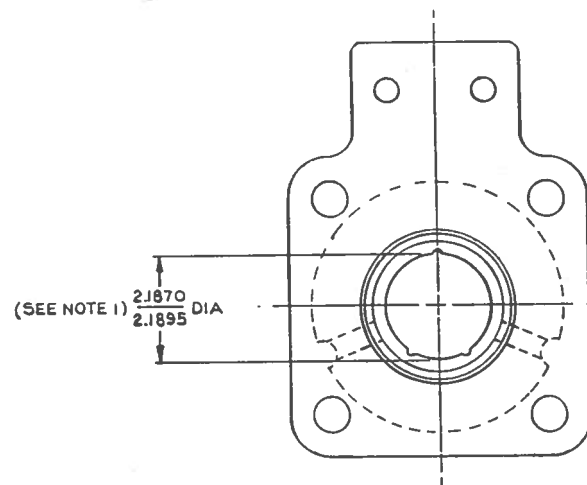


SLUDGE CONTROL GATE DETAIL

		EIMCO PROCESS EQUIPMENT COMPANY - S.		lake City, Utah	
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COLUMN AND SLUDGE COLLECTION BOX GENERAL ARRANGEMENT		295445		REV.	

DO NOT SCALE PRINTS	DATE 6-11-90
DRAWN BS	CHECKD B.H.
APPR D.H.	

PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION//	TOTAL WEIGHT



NOTES:

1. INSIDE DIA OF BUSHING MUST BE HELD AT DIMENSION SHOWN AFTER ASSEMBLY.
2. RADIAL & AXIAL SLOTS IN BUSHING MUST LINE UP WITH RADIAL END SLOTS IN BUSHING HOUSING AS SHOWN.

PARTS LIST NO L202316

C		
B		
A		
	D/R	DATE

REVISION



ELMCO Process Equipment Company - Salt Lake City, Utah

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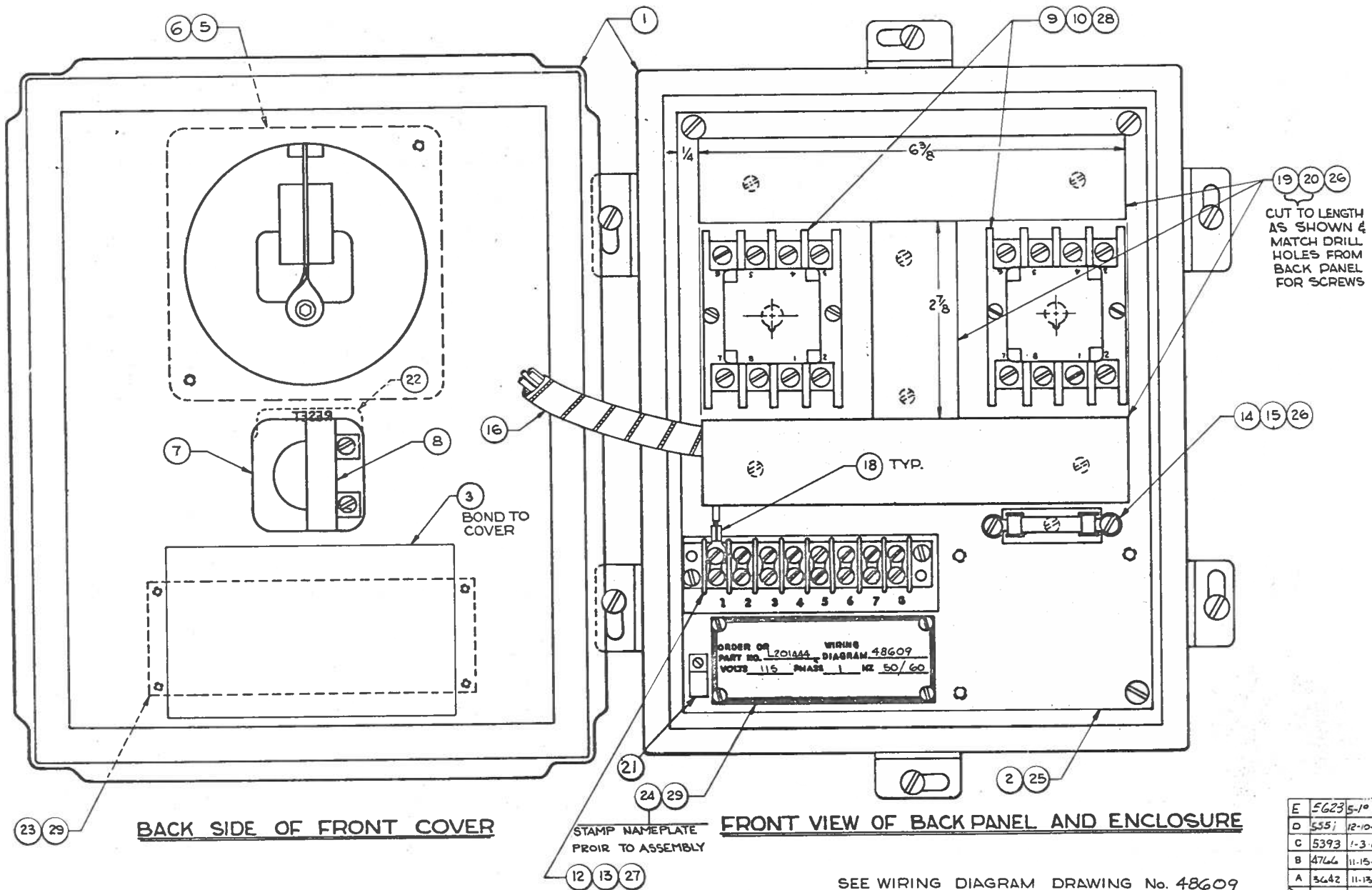
HOLD FRACTIONAL MACHINED DIMENSIONS TO $\pm 1/64"$

DO NOT SCALE PRINTS
DATE 1-18-73
DRAWN <i>AG</i>
CHECK'D <i>A.G.</i>

BUSHING HOUSING
ASSEMBLY

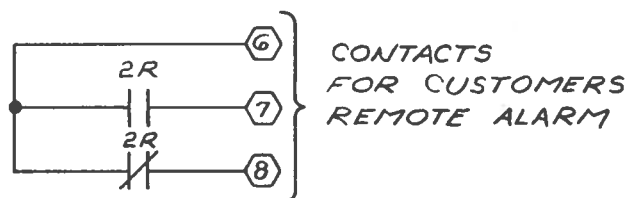
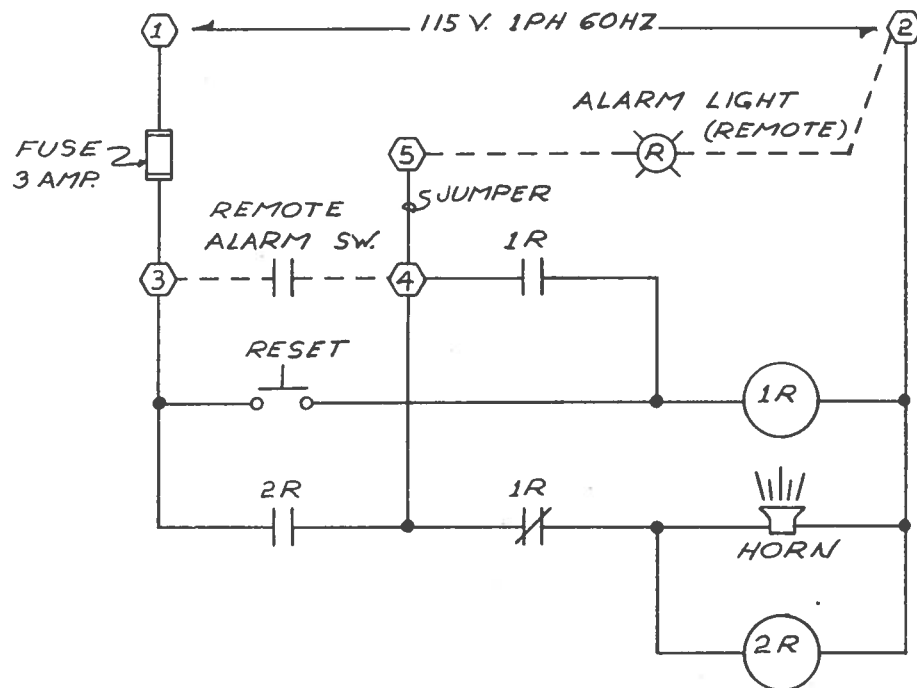
DWG. NO.	202316	REV

PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION/RE	TOTAL WEIGHT



E	5623	5-10-81
D	555	12-10-80
C	5393	1-3-80
B	4766	11-15-76
A	5642	11-13-73
	D/R	DATE
	REVISION	

ENVIROTECH	ENMCO BSP DIVISION - ENVIROTECH CORPORATION - Salt Lake City, Utah
DO NOT SCALE PRINTS	This drawing and all information thereon is the property of Enmco BSP and is confidential and must not be made public or copied. This drawing is loaned subject to return upon demand and is not to be used directly or indirectly in any way detrimental to our interests.
DATE JAN 21, 71	HOLD FRACTIONAL MACHINED DIMENSIONS TO ± 1/64"
DRAWN GEAJ	
CHECKED T&R	
	ALARM UNIT ASSEMBLY (BASIC)
	REV



PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION/REMARKS	TOTAL WEIGHT

NOTES

- WORK WITH: PARTS LIST NO. L 201444
DRAWING(S) 201444
- POWER WIRING TO BE SIZED FOR LOAD.
- WIRING SHALL BE COLOR CODED IN ACCORDANCE WITH JIC ELECTRICAL STANDARDS.
 - (A) BLACK - LOAD AND CONTROL CIRCUIT AT LINE VOLTAGE, AC OR DC.
 - (B) RED - AC CONTROL CIRCUITS.
 - (C) BLUE - DC CONTROL CIRCUITS.
 - (D) YELLOW - INTERLOCK CONTROL CIRCUITS WIRED FROM AN EXTERNAL POWER SOURCE.
 - (E) GREEN - EQUIPMENT GROUNDING CONDUCTOR(S).
 - (F) WHITE - NEUTRAL
- USE 14 GAUGE (MINIMUM) STRANDED MACHINE TOOL WIRE FOR CONTROL WIRING.
- WIRING SHOWN BROKEN - - - - - IS EXTERNAL TO PANEL AND "NOT BY EIMCO."
- ALL WIRES MUST BE TAGGED AT BOTH ENDS. TERMINAL NUMBERS AND WIRE NUMBERS TO BE THE SAME, I.E., TERMINAL 7, WIRE NO. 7.
- CONTROL CIRCUIT VOLTAGE IS 115 VAC.

ENVIROTECH



EIMCO PMD - ENVIROTECH CORPORATION - Salt Lake City, Utah

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HOLD FRACTIONAL
MACHINED
DIMENSIONS
TO $\pm 1/64"$

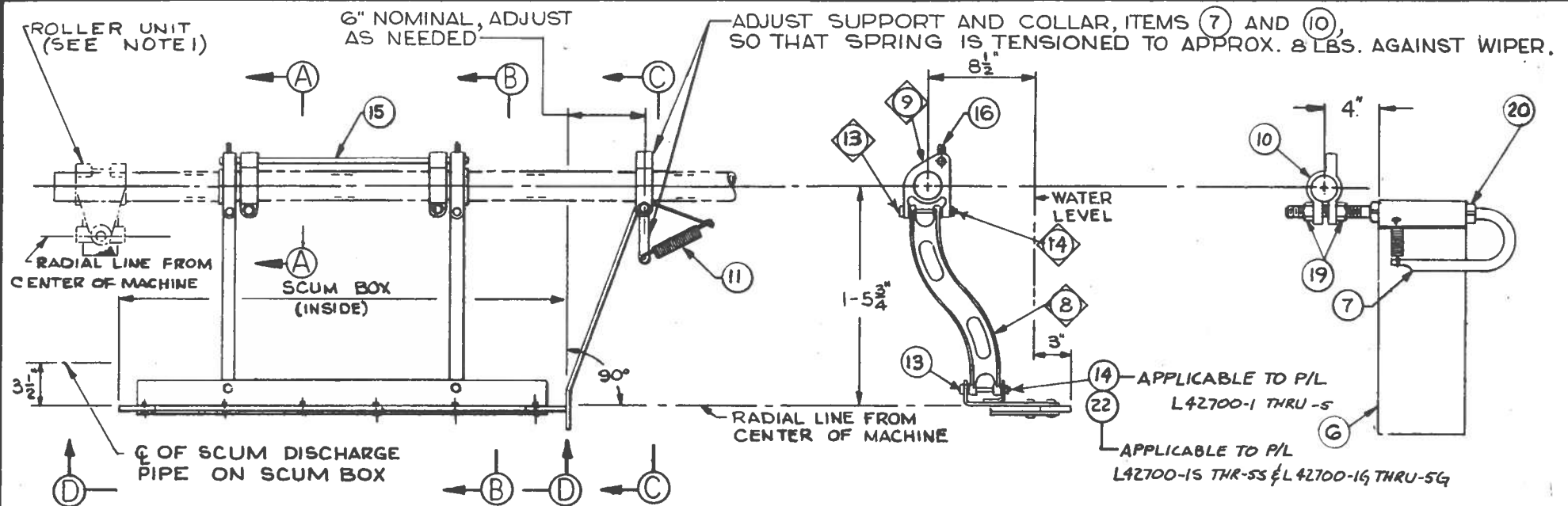
DO NOT SCALE PRINTS
DATE 1-3-80
DRAWN DRW
CHECK'D JED
APPR GEN

WIRING DIAGRAM
ALARM UNIT (BASIC)

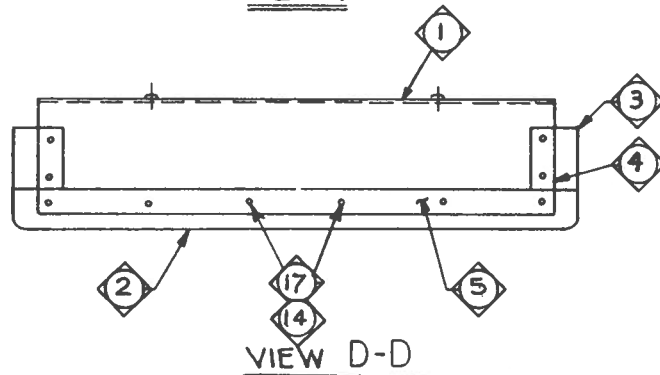
DWG. NO. 48609 REV.

REVISION

BY CHECKED DATE

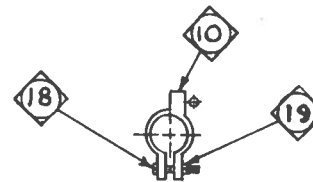


PLAN



VIEW D-D

SECTION B-B



SECTION A-A

SECTION C-C

PART LISTS	
L 42 700-1	(20 LG UNIT)
L 42 700-2	(3' 0" LG. UNIT)
L 42 700-3	(4' 0" LG. UNIT)
L 42 700-4	(5' 0" LG. UNIT)
L 42 700-5	(6' 0" LG. UNIT)

H	6899	9-10-92
G	4665	7-20-76
F	3629	11-5-73
E	2755	2-2-72
D	2626	10-26-71
C	1053	11-17-69
B	446	5-15-68
A	7	1-11-67
D/R		DATE
REVISION		

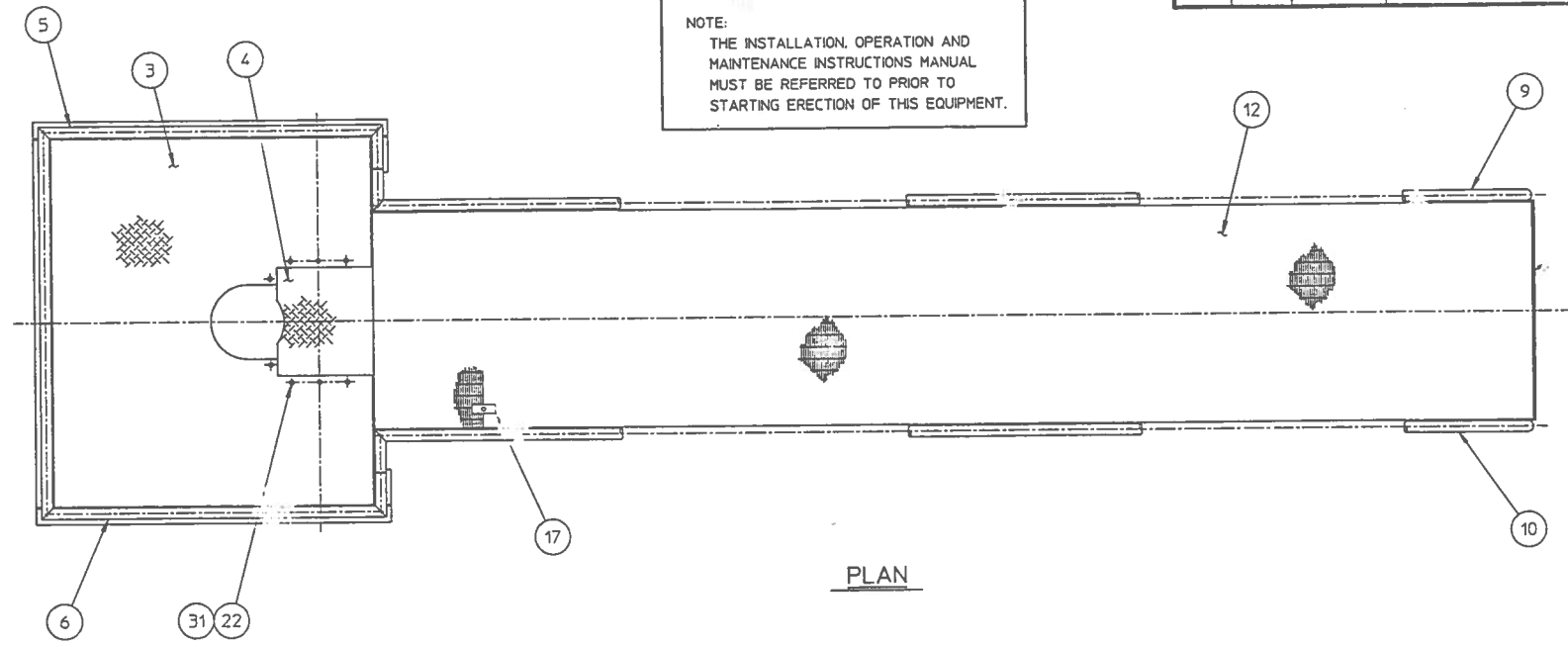
NOTE:

1. ROLLER UNIT PART NO L46378 IS USED ONLY WHEN REQUIRED REFER TO JOB G.A. DRAWING
2. DENOTES SHOP ASSEMBLED

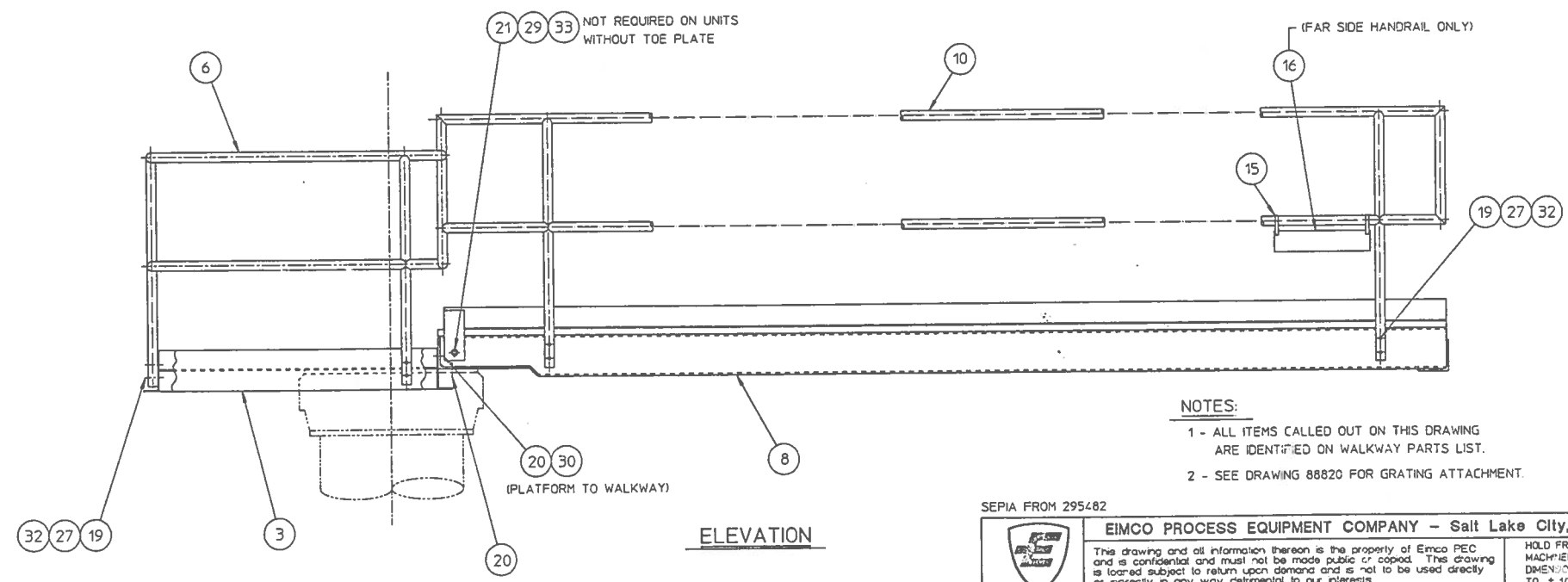
THE EIMCO CORPORATION Salt Lake City, Utah	
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DO NOT SCALE PRINTS	HOLD FRACTIONAL MACHINED DIMENSIONS TO $\pm 1/64"$
DATE 10-15-68	ORDER No.
DR'WN T.T.M.	DATE ISSUED
CHK'D YAC	42700 H
APPR YAC	
SKIMMING DEVICE ASSEMBLY FOR SQUARE SCUM BOXES	
DRAWING No.	

PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION	MARKS	TOTAL WEIGHT

NOTE:
THE INSTALLATION, OPERATION AND
MAINTENANCE INSTRUCTIONS MANUAL
MUST BE REFERRED TO PRIOR TO
STARTING ERECTION OF THIS EQUIPMENT.



PLAN



ELEVATION

NOTES:

- 1 - ALL ITEMS CALLED OUT ON THIS DRAWING ARE IDENTIFIED ON WALKWAY PARTS LIST.
- 2 - SEE DRAWING 88820 FOR GRATING ATTACHMENT.

SEPIA FROM 295482



EIMCO PROCESS EQUIPMENT COMPANY - Salt Lake City, Utah

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HOLD FRACTIONAL
MACHINED
DIMENSIONS
TO ± 1/32"

DO NOT SCALE PRINTS
DATE 9-27-90
DRAWN L.B.N.
CHECK'D BS

**WALKWAY, PLATFORM AND
HANDRAIL ASSEMBLY**

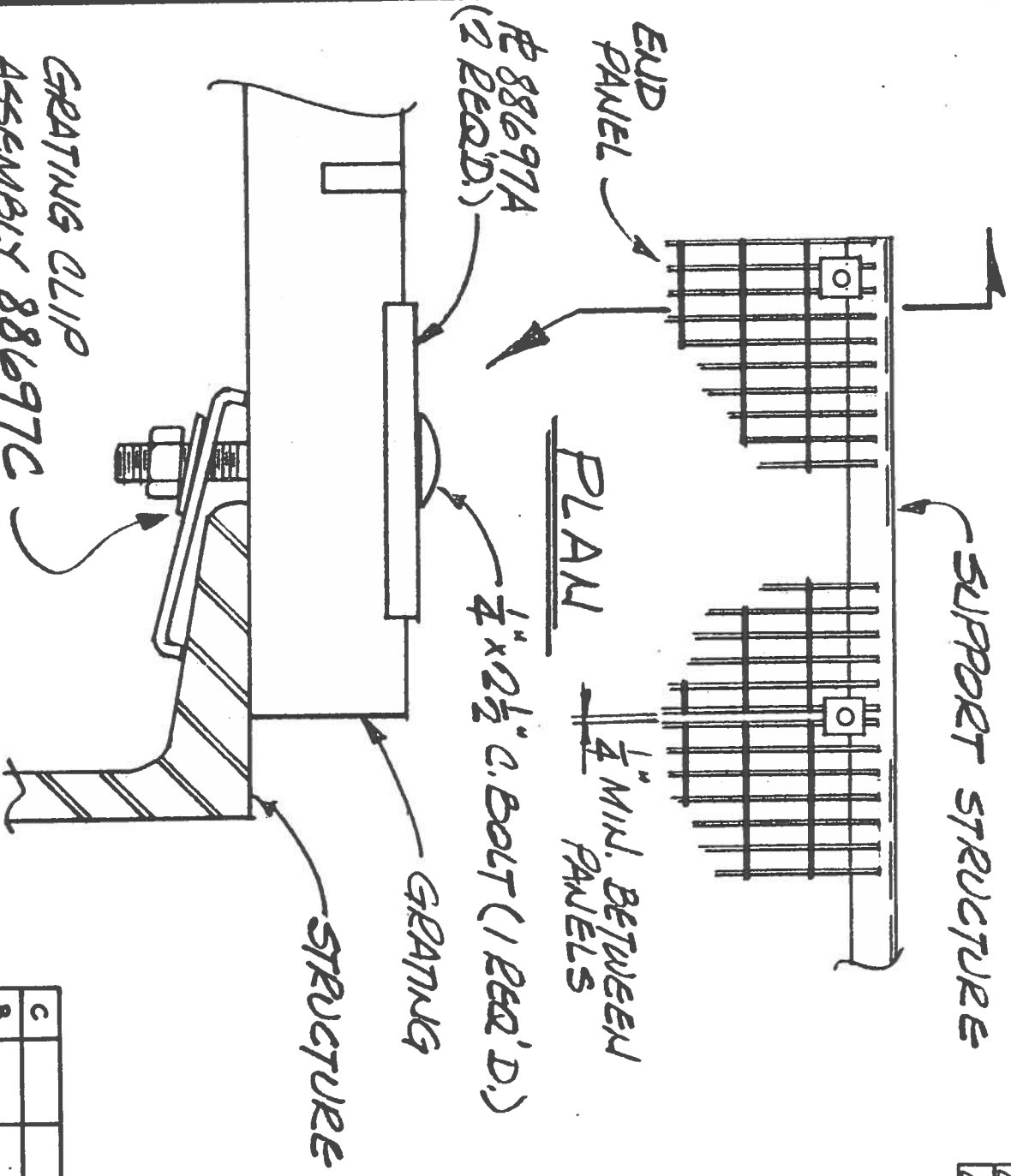
DWG. No.	295482	REV

REVISION

BY

CHECKED

DATE



GRATING CLIP
ASSEMBLY 88697C
(SEE PARTS LIST FOR NUMBER REQ'D.)

C		
B		
A		
D/R	DATE	

REVISION

ENVIROTECH

EIMCO PMD — ENVIROTECH CORPORATION — Salt Lake City, Utah



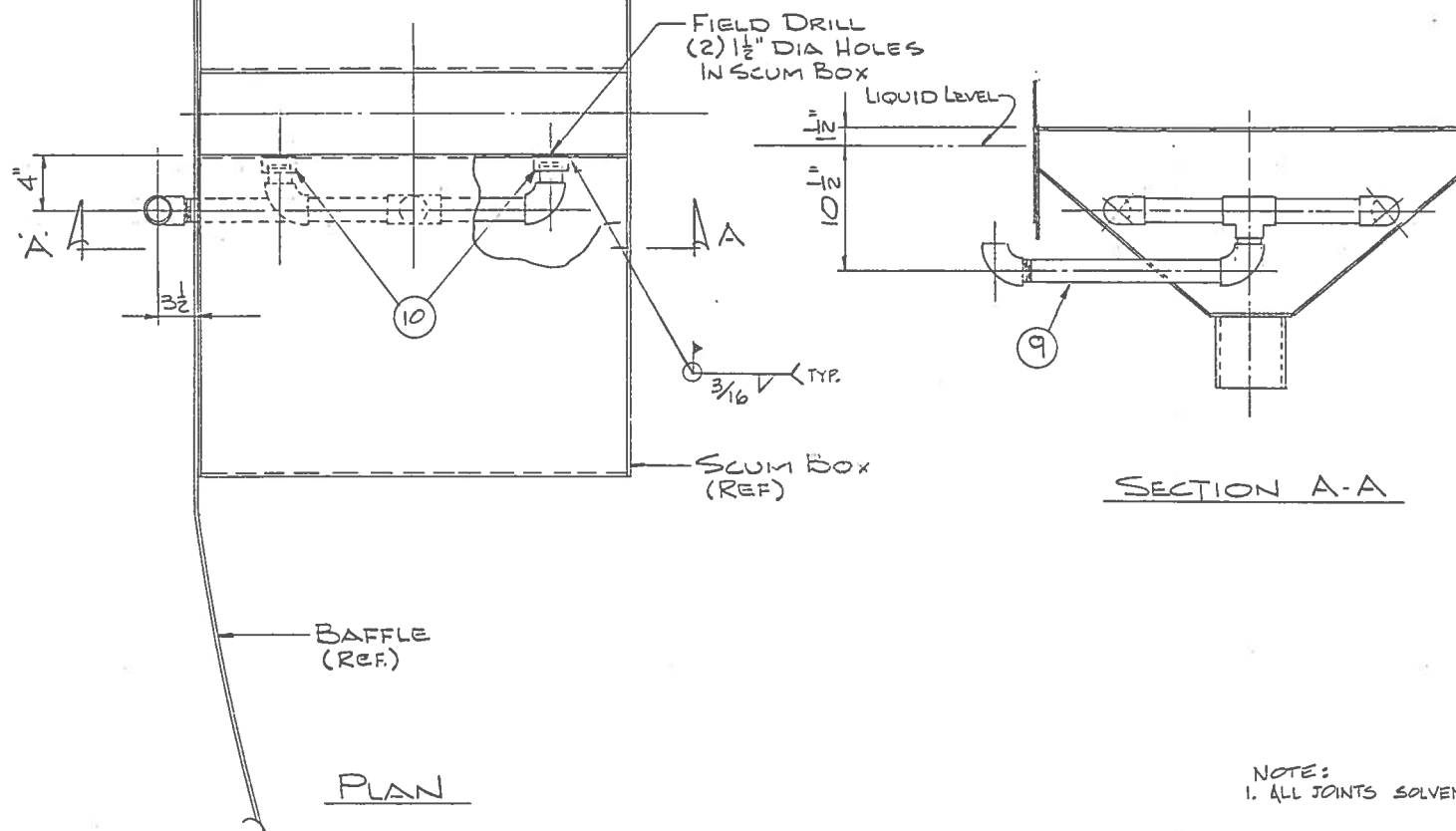
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HOLD FRACTIONAL
MACHINED
DIMENSIONS
TO ± 1/64"

DO NOT SCALE PRINTS	
DATE	4-3-84
DRAWN	RLA
CHECK'D	KW
APPR.	GEN

GRATING CLIP ASSEMBLY
ERECTION

DWG. NO.	88820	REV.	



NOTE:
1. ALL JOINTS SOLVENT WELDED.

SEP1A FROM 23578C60

EIMCO PROCESS EQUIPMENT COMPANY — Salt Lake City, Utah

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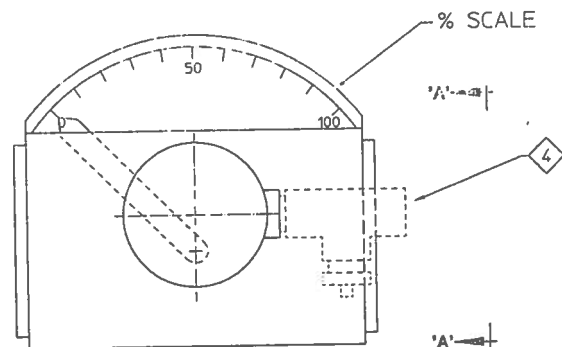
HOLD FRACTIONAL
MACHINED
DIMENSIONS
TO ± 1/32"

DO NOT SCALE PRINTS
DATE 4.30.93
DRAWN G.F.T.
CHECK'D P.W.

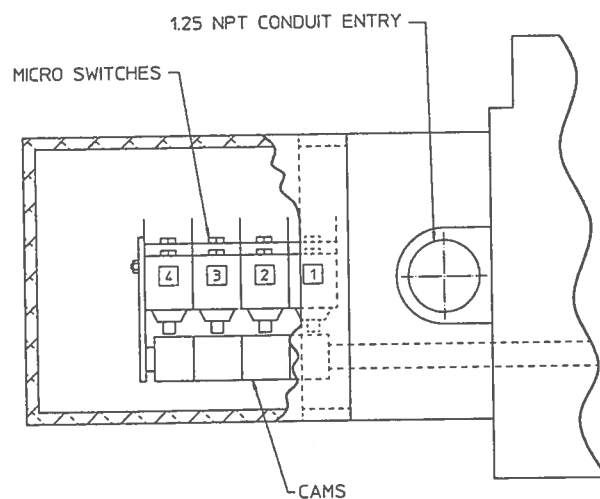
FLUSH PIPE ERECTION

DWG. NO. 74666C57 REV.

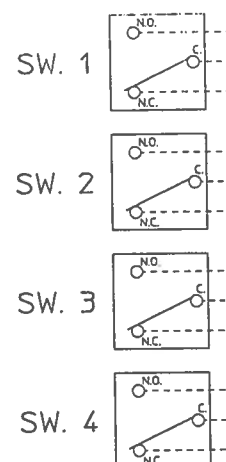
PIECE WORK	Nº. REQ'D.	MATERIAL	DESCRIPTION	MARKS	TOTAL WEIGHT



RIGHT HAND DRIVE CONTROL
CONFIGURATION
(LEFT HAND OPPOSITE)



VIEW 'A' - 'A'
(ENLARGED)



MOTOR CUT OUT @ 85% (12,750 FT-LB TORQUE)

ALARM ACTUATION @ 40% (6,000 FT-LB TORQUE)

FAIL-SAFE MOTOR CUT OUT @ 100% (15,000 FT-LB TORQUE)

SPARE (NOT USED)

NOTES:

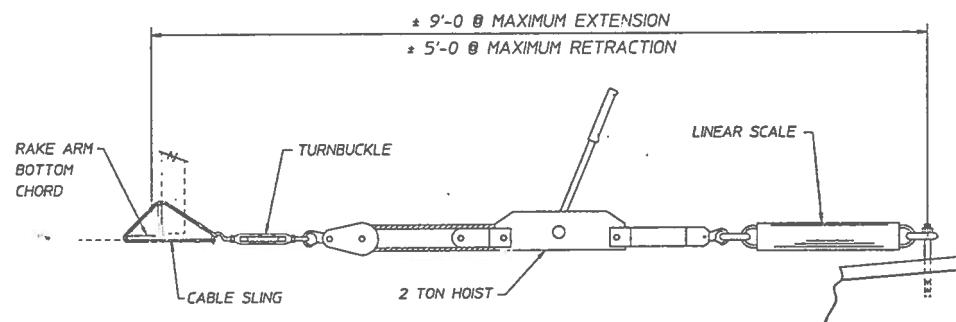
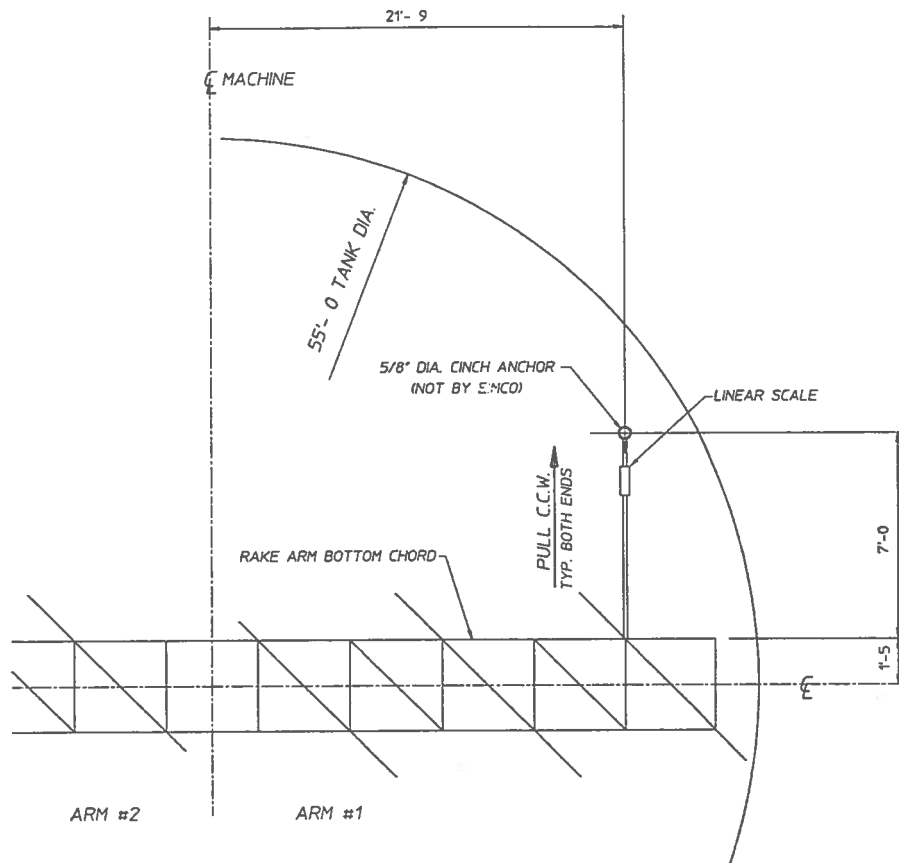
1. CUT-OUT SWITCH (LIMIT SWITCH #1) ACTUATES ON INCREASING LOAD DE-ENERGIZING RAKE DRIVE UNIT MOTOR STARTER. THIS SWITCH MUST BE UTILIZED TO PROTECT DRIVE MECHANISM. IT IS FACTORY SET AND SHOULD NOT BE CHANGED WITHOUT PRIOR AUTHORIZATION BY EIMCO.
2. ALARM SWITCH (SWITCH #2) ACTUATES ON INCREASING LOAD, INDICATING IMPENDING OVERLOAD.
3. ENCLOSURE IS RATED NEMA 7 EXPLOSION-PROOF AND NEMA 4 WEATHERPROOF
4. APPROPRIATE FITTING AND DRAIN MUST BE USED, PER N.E.C. TO ELIMINATE WATER CONDENSATION. (NOT BY EIMCO)

NOTE:

100% TORQUE IS BASED ON
15,000 FT-LBS

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DO NOT SCALE PRINTS DATE 2-9-93 DRAWN G.F.T. CHECK'D ASC APPR P.W.		HOLD FRACTIONAL MACHINED DIMENSIONS TO $\pm 1/32"$	
DRIVE CONTROL BASIC (4) SWITCH UNIT		SN/	REV
DWG. No. 24666C3		REV	

PIECE MARK	NO. REQ'D.	MATERIAL	DESCRIPTION /	ARKS	TOTAL WEIGHT



NOTE:

POSITION SLING AS CLOSE
TO RAKE ARM PANEL POINT
AS POSSIBLE.
(SINGLE RUN ASSEMBLY)

SUGGESTED TORQUE TEST KIT ARRANGEMENT

WARNING 1

TO PREVENT DAMAGE TO LINEAR SCALE, DO NOT
EXCEED AN INDICATED LOAD OF 480 LBS.

NOTE:

THIS KIT IS DESIGNED FOR STATIC TORQUE TESTS TO CONFIRM
THE STRUCTURAL STRENGTH OF THE MECHANISM STEEL IN RELATION
TO THE DRIVE TORQUE. THE CALCULATED LOAD AS INDICATED ON
THE SCALES WILL NOT CORRESPOND TO THE LOAD INDICATED ON THE
DRIVE CONTROL. HOWEVER, DURING THE TEST THE DRIVE CONTROL
MUST BE MONITORED, AND, IF AT ANY TIME THE DRIVE CONTROL
EXCEEDS 100%, DISCONTINUE TESTING AND CONTACT
EIMCO ENGINEERING AT (801) 555-2000.

TEST PROCEDURE:

- CHECK THAT FINAL LEVELING OF MECHANISM IS COMPLETE, THAT
ALL BOLTS ARE TIGHT AND FIELD WELDING HAS BEEN ACCOMPLISHED
PER ERECTION DRAWINGS.
- CHECK OIL LEVELS AND RUN MECHANISM (2) TWO COMPLETE REVOLUTIONS
TO MINIMIZE SLACK IN GEARING.
- ADJUST BOTH SCALES TO ZERO SETTING & ASSEMBLE EQUIPMENT AS SHOWN.
TIGHTEN ASSEMBLIES TO TAKE UP SLACK (APPROX. 25 LBS. ON BOTH SCALES).
- TIGHTEN HOISTS ON BOTH RAKE ARMS SIMULTANEOUSLY TO CALCULATED LOAD ON
SCALES AS SHOWN BELOW, AND RECORD ACTUAL READINGS. USE TURNBUCKLES FOR
MINUTE ADJUSTMENTS.
- WHEN TESTS ARE COMPLETE TO CUSTOMERS SATISFACTION, RELEASE HOIST
SIMULTANEOUSLY TO ZERO AND REMOVE.
- REMOVE ANCHOR BOLTS FROM TANK BOTTOM.
- UPON APPROVAL OF EIMCO REPRESENTATIVE, ROTATE AND OBSERVE MECHANISM FOR AT
LEAST (1) ONE COMPLETE REVOLUTION.

CALCULATED READINGS:

			ARM #1	ARM #2
1ST TEST:	40% TORQUE	CALCULATED LOAD	138	138
	6,000 FT-LB	ACTUAL READING		
2ND TEST	85% TORQUE	CALCULATED LOAD	293	293
	12,750 FT-LB	ACTUAL READING		
3RD TEST	100% TORQUE	CALCULATED LOAD	345	345
	15,000 FT-LB	ACTUAL READING		



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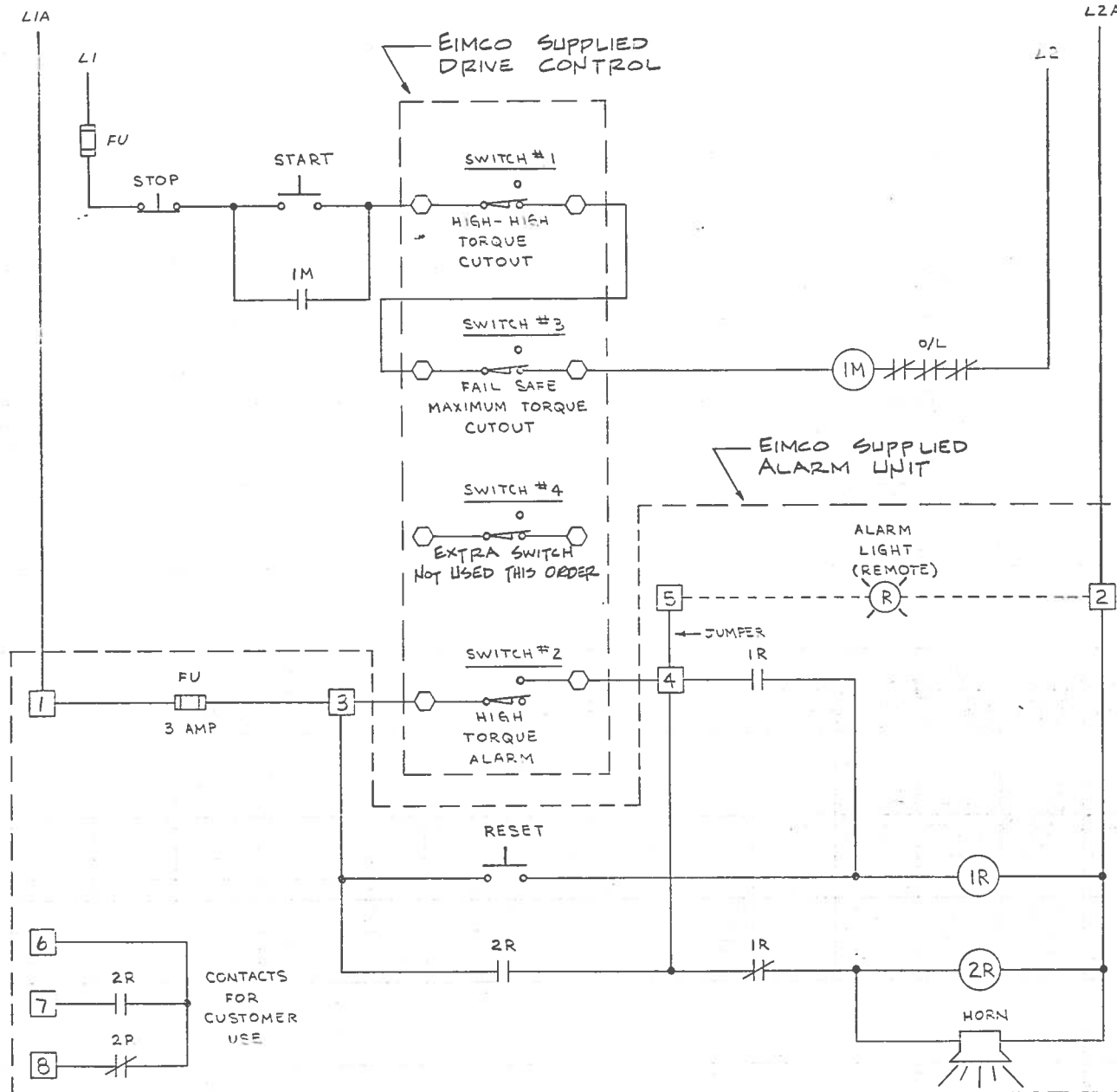
HOLD FRACTIONAL
MACHINED
DIMENSIONS
TO ± 1/32"

DO NOT SCALE PRINTS
DATE 2-9-93
DRAWN C.T.
CHECKED A.E.C.

TORQUE TEST
INSTRUCTIONS
(SINGLE RUN)

SW	
DWG. No.	24666C4
REV	

PIECE MARK	NO. REQ'D	MATERIAL	DESCRIPTION/R	AS	TOTAL WEIGHT



NOTES

1. POWER REQUIREMENTS:

DRIVE UNIT 230/460 VAC 60 HZ 3 PH
CONTROL CIRCUIT 115 VAC 60 HZ 1 PH
ALARM UNIT 115 VAC 60 HZ 1 PH

2. POWER FOR ALARM UNIT MAY OR MAY NOT BE FROM THE SAME SOURCE AS MOTOR CONTROL. LOAD POWER REQUIREMENTS SHOULD BE CHECKED.

3. TERMINALS 2 & 5 PROVIDE A POWERED 115 VAC OUTPUT FOR AN ALARM LIGHT (IF USED). MAXIMUM LOAD IS DEPENDENT UPON INPUT AVAILABLE AT L1.

4. TERMINALS 6, 7 & 8 PROVIDE DRY ALARM CONTACTS FOR CUSTOMER USE.

5. THIS IS A SUGGESTED WIRING SCHEMATIC ONLY. THE CUSTOMER MAY USE HIS OWN WIRING CONFIGURATION - PROVIDED - THE DRIVE CONTROL SWITCHES ARE FUNCTIONAL AS DESIGNED. ALSO, PROVISIONS FOR AUTOMATIC RESTART OR USE OF DELAY TIMERS ARE NOT TO BE UTILIZED.

TYPICAL DRIVE CONTROL SWITCH

○ NORMALLY OPEN
COMMON / NORMALLY CLOSED



EIMCO PROCESS EQUIPMENT COMPANY - Salt Lake City, Utah

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HOLD FRACTIONAL MACHINED DIMENSIONS TO ± 1/32"

DO NOT SCALE PRINTS
DATE 5-13-80
DRAWN GGG
CHECK'D DZ

TYPICAL WIRING DIAGRAM
FOR SINGLE MOTOR DRIVE
WITH ALARM PANEL
AND FAIL-SAFE

DWG. NO. 295129	REV.



U.S. ELECTRICAL MOTORS

DIVISION OF EMERSON ELECTRIC CO.
ORDER DOCUMENTATION SERVICES • 8100 WEST FLORISSANT AVE.
P.O. BOX 3946 BLDG. L • ST. LOUIS, MO 63136
PHONE (314) 553-1071 • FAX (314) 553-1077



1

U.S. ELECTRICAL MOTORS - MOTOR PERFORMANCE 3 PHASE

USEM ORDER.: W0360380 TYPE.: UTP FRAME: 143 HP... .75
MODEL.....: E183 POLES: 4 HZ....: 60 S.F.: 1.25
CUSTOMER NO: B90266 VOLTS: 230 460
NAME: EIMCO PMD DIVISION CLASS OF INSULATION: F

% RATED LOAD	PCT. EFF.	PCT. P. F.	AMPERES @ STATED VOLTS	
			230 V	460 V
125	77.4	74.0	3.1	1.5
100	76.9	66.7	2.7	1.4
75	74.8	56.7	2.5	1.2
50	68.9	44.0	2.3	1.2
25	54.2	29.1	2.2	1.1
NO LOAD		11.7	2.3	1.1
LOCKED ROTOR		76.1	18.6	9.3

TEMP. RISE CLASS: B

NEMA NOMINAL EFF....: 77.0
GUAR. FULL LOAD EFF: 75.9

TORQUES:
BREAKDOWN....: 424% OF RATED LOAD TORQUE
LOCKED ROTOR: 310% OF RATED LOAD TORQUE
RATED LOAD...: 2.3 LB - FT.

NEMA DESIGN LETTER: B

RATED LOAD RPM.: 1750.

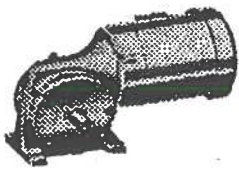
NEMA CODE LETTER...: L

SAFE STALL TIME: 25 SEC. (HOT)

MAX KVAR.....: .5

SOUND PRESSURE LEVEL: 55.2 DB(A)
@ 3 FT., NO LOAD, FREE FIELD

THE ABOVE DATA IS TYPICAL, UNLESS NOTED OTHERWISE.



RIGHT ANGLE SYNCROGEARS*

GEARMOTORS

MOUNTING POSITIONS & OIL CAPACITIES

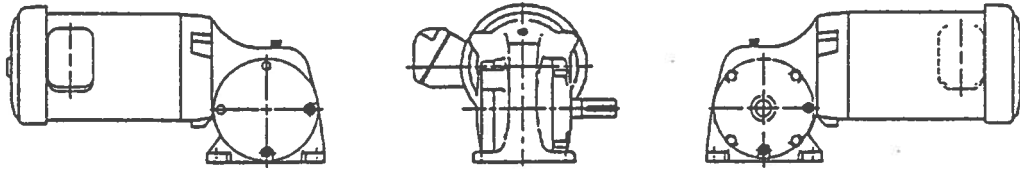
FRAME 6 - TYPE GWP

SECTION: 444
 PAGE: 05
 EFFECTIVE: 03-01-92
 SUPERSEDES: 12-01-90

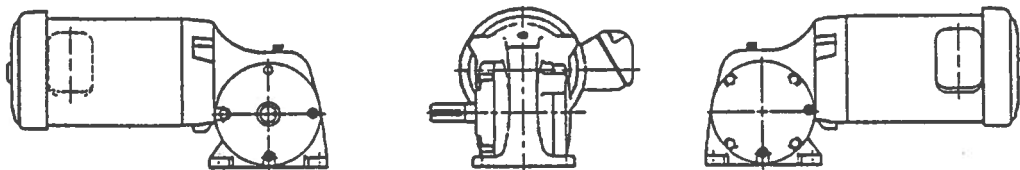
2

PLUG LOCATIONS FOR FILL, VENT, LEVEL, AND DRAIN

UNIVERSAL NO. 1



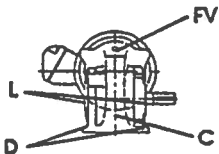
UNIVERSAL NO. 2



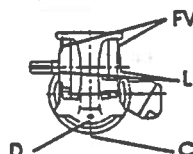
UNIVERSAL NO. 1

UNIVERSAL NO. 2

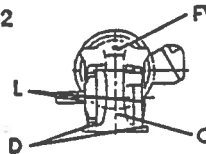
F-1



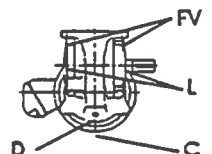
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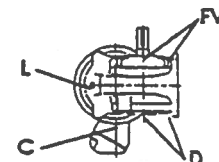
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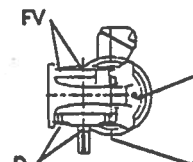
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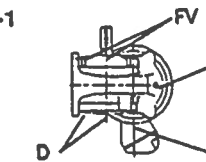
U-3



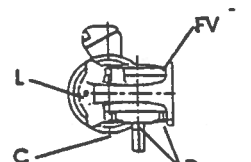
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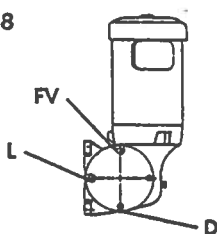
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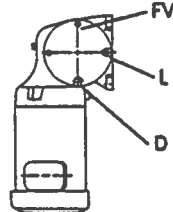
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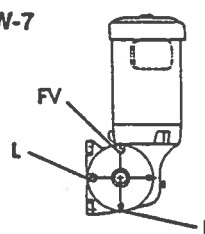
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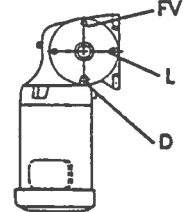
W-1



W-7



W-2



L = Level

D = Drain

F = Fill

V = Vent

C = Condensation Drain

Oil capacity is 26 oz. for all assembly positions.

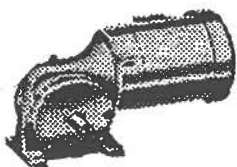
When more than one location is shown for fill, vent, level, or drain, use only one of the locations.

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 THIS ISSUE



U. S. ELECTRICAL MOTORS
 DIVISION OF EMERSON ELECTRIC CO.





RIGHT ANGLE SYNCROGEARS ★

GEARMOTORS

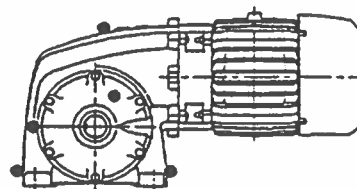
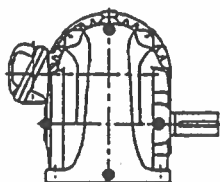
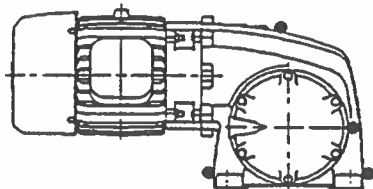
MOUNTING POSITIONS & OIL CAPACITIES

FRAME 20 - TYPE GWP

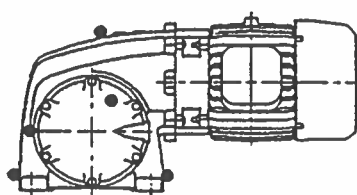
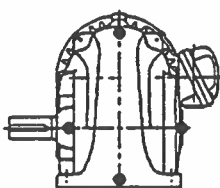
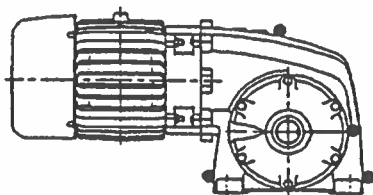
SECTION: 444
 PAGE: 06
 EFFECTIVE: 03-01-92
 SUPERSEDES: 12-01-90
3

PLUG LOCATIONS FOR FILL, VENT, LEVEL, AND DRAIN

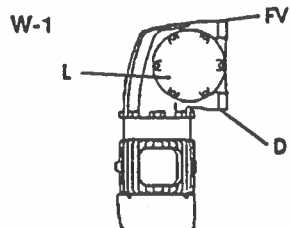
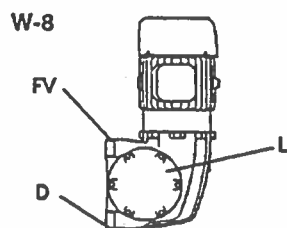
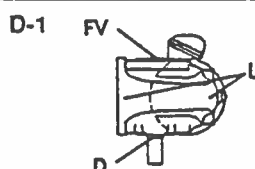
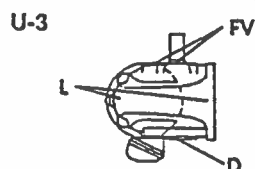
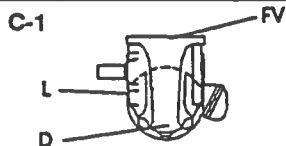
UNIVERSAL NO. 1



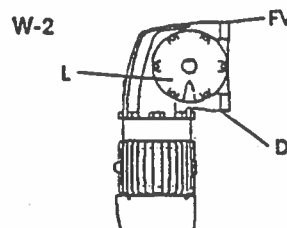
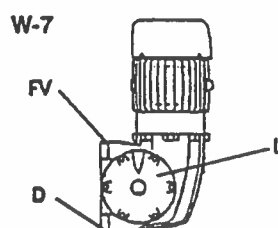
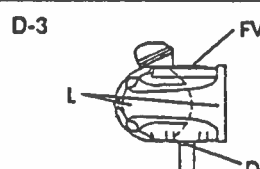
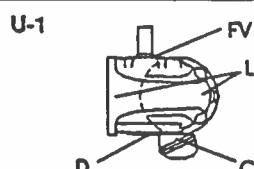
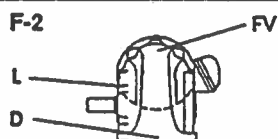
UNIVERSAL NO. 2



UNIVERSAL NO. 1



UNIVERSAL NO. 2



L = Level

D = Drain

F = Fill

V = Vent

C = Condensation Drain

OIL CAPACITIES (In ounces)

ASSEMBLY POSITION					
F-1	C-1	D-1	U-1	W-1	W-7
F-2	C-4	D-3	U-3	W-2	W-8
188	98	128	132	100	144

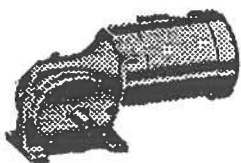
When more than one location is shown for fill, vent, level, or drain, use only one of the locations.

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THIS ISSUE



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DIVISION OF EMERSON ELECTRIC CO.





RIGHT ANGLE SYNCROGEARS ★

GEARMOTORS

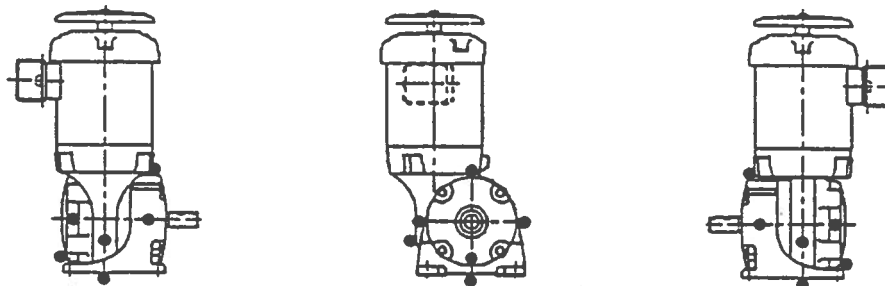
MOUNTING POSITIONS & OIL CAPACITIES

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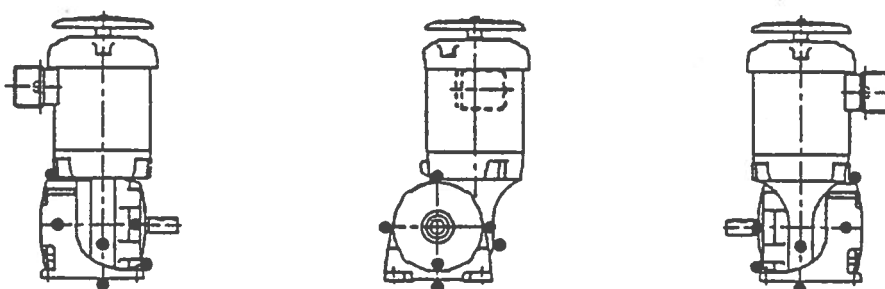
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 PAGE: 07
 EFFECTIVE: 03-01-92
 SUPERSEDES: 12-01-90

4

FOR ASSEMBLIES C-3, D-2, F-4, U-4, W-3, & W-6



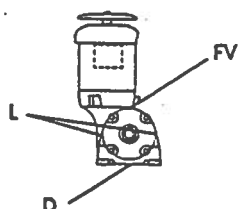
FOR ASSEMBLIES C-2, D-4, F-3, U-2, W-4, & W-5



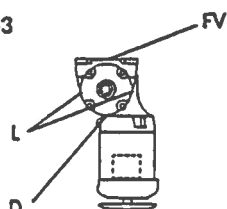
FOR ASSEMBLIES C-3, D-2, F-4, U-4, W-3, & W-6

FOR ASSEMBLIES C-2, D-4, F-3, U-2, W-4, & W-5

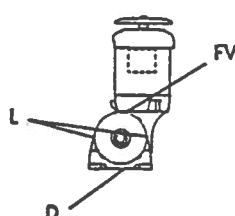
F-4



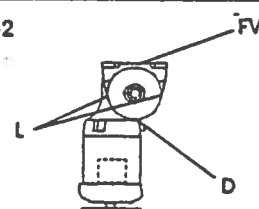
C-3



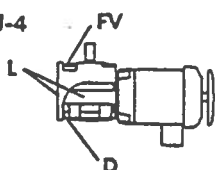
F-3



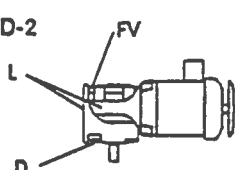
C-2



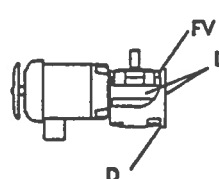
U-4



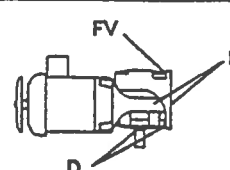
D-2



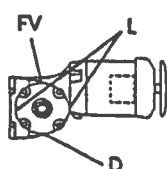
U-2



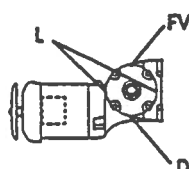
D-4



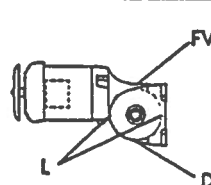
W-3



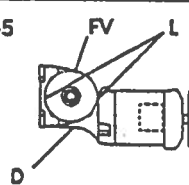
W-6



W-4



W-5



L = Level

D = Drain

F = Fill

V = Vent

C = Condensation Drain

Oil capacity is 26 oz. for all assembly positions.

When more than one location is shown for fill, vent, level, or drain, use only one of the locations.



U. S. ELECTRICAL MOTORS
 DIVISION OF EMERSON ELECTRIC CO.



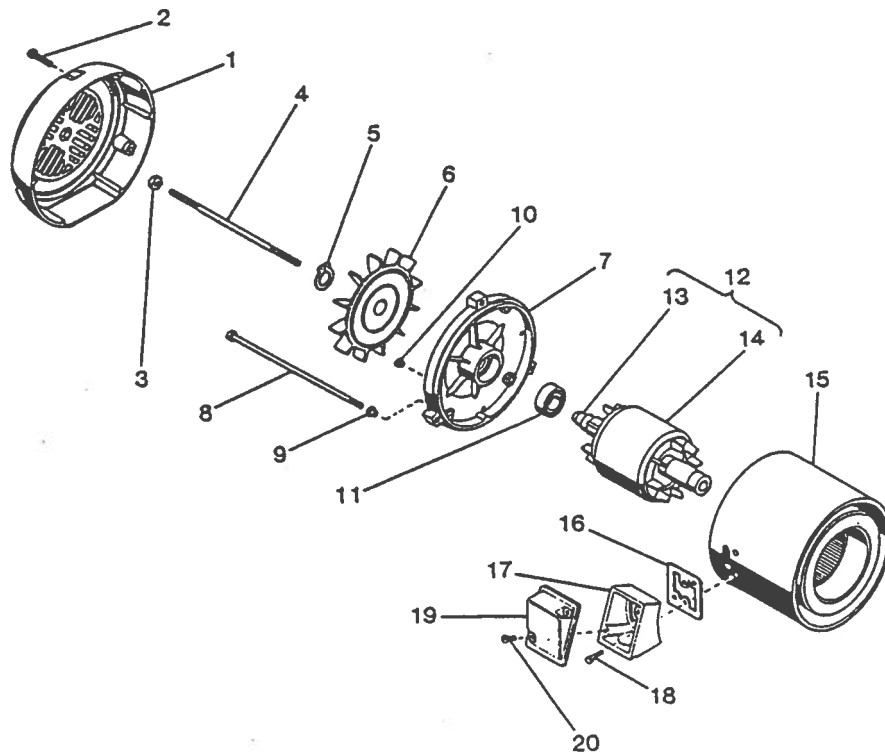
DO NOT USE FOR CONSTRUCTION
 PURPOSES UNLESS CERTIFIED

RENEWAL PARTS



PARTS LIST

FRAMES 56, 143T, 145T - TYPE UTP (TEFC), TCP (CORRODUTY)



ITEM NO.	QTY.	NAME OF PART
1	1	Fan Cover
2	3	Self Tapping Screw
3	1	Hex Nut
4	1	Stud
5	1	Retaining Snap Ring
6	1	Fan
7	1	Bracket
8	4	Screw
9	4	Bushing
10	4	Plastic Plug

ITEM NO.	QTY.	NAME OF PART
11	1	Ball Bearing
12	1	Rotor Assembly (Includes items 13 & 14)
13	1	Shaft
14	1	Rotor Core
15	1	Wound Stator Assembly
16	1	Gasket
17	1	Outlet Box Base
18	2	Self Tapping Screw
19	1	Outlet Box Cover
20	2	Self Tapping Screw

PRICES:

Parts stocking distributors: refer to your USEM renewal parts numerical index.
All others: refer to your nearest USEM parts stocking distributor.



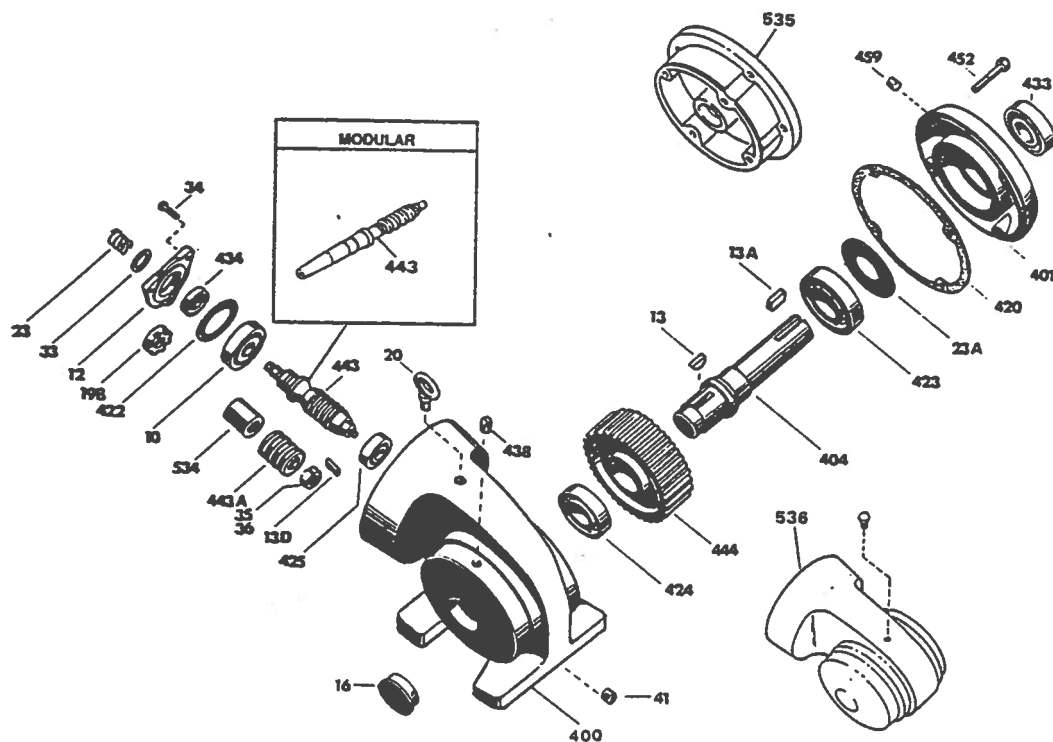
RENEWAL PARTS



PARTS LIST

6

FRAMES 1, 6, 11, & 20 — TYPES GW, GWP, GWV, GWVP — RIGHT ANGLE SYNCROGEAR HEAD ASSEMBLY



ITEM NO.	QTY.	NAME OF PART
10	1	Bearing (Position No. 7)(Refer to Section 775)
12	1	Bearing Cap (on 11 GW & 20 GW) or bearing cap assembly (On 1 & 6 GW) which includes 422 & 434
13	1	Key
13A	1	Key (Take-off shaft)
13D	1	Key (Worm) (Only on 11 GW)
16	1	Bracket plug
19B	1	Cast oil slinger (Only on 11 GW)
20	1	Eyebolt (Used on 11 & 20 GW)
23	1	Spring (Only on 1 & 6 GW with single phase motors)
23A	As req.	Shims (Bearing position No. 1)
33	1	Snap ring (Only on 1 & 6 GW)
34	3	Screw (with lockwasher on some units)(Bearing cap.)(Qty. 4 on 11 & 20 GW)
35/36	1	Locknut & lockwasher (Only on 6 & 11 GW)
37	1	Geared motor shaft or geared variable shaft (Geared variable worm shaft on 1 & 6 GW) (Not illustrated)

PRICES:

Parts stocking distributors: refer to your USEM renewal parts numerical index.
All others: refer to your nearest USEM parts stocking distributor.



RENEWAL PARTS



PARTS LIST 7

FRAMES 1, 6, 11, & 20 — TYPES GW, GWP, GWV, GWVP — RIGHT ANGLE SYNROGEAR HEAD ASSEMBLY

ITEM NO.	QTY.	NAME OF PART
41	3	Pipe plug (Gear case) (Qty. 4 on 1 GW)
400	1	Gear case
401	1	Pulley end bracket
404	1	Take-off shaft
420	1	Gasket (Pulley end bracket)
422	1	Gasket
423	1	Bearing (Position No. 1) (Refer to Section 775)
424	1	Bearing (Position No. 2) (Refer to Section 775)
425	1	Bearing (Position No. 3) (Refer to Section 775)
433	2	Oil seal (Pulley end bracket) (Qty. 1 on 11 GW)
434	2	Oil seal (Position No. 7)
438	1	Vent plug (Location illustrated for 6 & 11 GW)
443	1	Worm shaft (Not on 11 GW)

ITEM NO.	QTY.	NAME OF PART
443A	1	Worm (Only on 11 GW)
444	1	Worm wheel
452	4	Screw (Pulley end bracket) (With lockwasher on 11 GW)
459	1	Pipe plug (Pulley end bracket) (Qty. 2 on 6 GW) (Not used on 20 GW)
534	1	Worm spacer (All 11 GW units — some 6 GW units)
535	1	Flange GWV, GWVP only
536	1	Gear case GWV, GWVP only

WARNING:

Any disassembly or repair work on explosionproof motors will void the Underwriters' Laboratories, Inc. label unless done by the manufacturer, or a facility approved by the Underwriters' Laboratories, Inc.. Refer to your nearest U.S. Electrical Motors office for assistance.

PRICES:

Parts stocking distributors: refer to your USEM renewal parts numerical index.
All others: refer to your nearest USEM parts stocking distributor.



USPRODUCTFACTS

8

AGMA LUBRICANTS

AGMA GRADE NUMBER RECOMMENDATIONS FOR USEM GEAR PRODUCTS

TYPE OF UNIT

AMBIENT TEMPERATURE

-10°C to +10°C 10°C to 50°C
(15°F to 50°F) (50°F to 125°F)

Parallel Shaft Gearmotors and Reducers

2-3

4-5

Right Angle Gearmotors and Reducers

7EP

8EP

For ambients below -10°C (15°F) synthetic lubricants have been recommended. An acceptable low temperature gear oil should have a pour point at least 5°C (9°F) lower than expected minimum ambient start-up temperature.

APPROVED SYNTHETICS (FOR PARALLEL SHAFT GEARMOTORS ONLY)

POUR POINT

MIN. AMBIENT

Union Carbide UCON LB-170-X

-45°C (-50°F)

-40°C (-43°F)

Mobil SHC 629

-40°C (-40°F)

-35°C (-31°F)

Approved Synthetics for USEM Worm Gear Units:

Union Carbide UCON LB-1800-XH-1

-23°C (-10°F)

-18°C (-1°F)

Union Carbide UCON Foodgrade
Lubricant 400

-21°C (-5°F)

-16°C (-4°F)

Mobil SHC 634

-29°C (-20°F)

-24°C (-11°F)

AGMA LUBRICANTS

9**CONVERSION CHART FOR AGMA GRADE NUMBER**

<u>AGMA GRADE NUMBER</u>	<u>ISO VISCOSITY GRADE</u>	<u>SAE GEAR LUBE NO.</u>	<u>VISCOSITY RANGE SSU @ 100° F</u>	<u>KINEMATIC VISCOSITY*</u>	<u>SAE VISCOSITY (Approx.)</u>
1	46	-	193- 235	46	10
2	68	80W	284- 347	68	20
3	100	-	417- 510	100	30
4	150	85W	626- 765	150	40
5	220	90	918-1122	220	50
6	320	-	1335-1632	320	60
7	460	140	1919-2346	460	70
8	680	-	2837-3467	680	-

* Centistokes at 40°C (104°F)



GENERAL INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

10

SAFETY FIRST

High voltage and rotating parts can cause serious or fatal injury. Safe installation, operation, and maintenance must be performed by qualified personnel. Familiarization with and adherence to NEMA MG2, the National Electrical Code, and local codes is recommended. It is important to observe safety precautions to protect personnel from possible injury. Personnel should be instructed to:

1. Avoid contact with energized circuits or rotating parts.
2. Disconnect and lock out all power sources before initiating any maintenance or repair.
3. Act with care in accordance with prescribed procedures in handling and lifting this equipment.
4. Be sure unit is electrically grounded in accordance with code requirements.
5. Be sure equipment is properly enclosed to prevent access by children or other unauthorized personnel in order to prevent possible accidents.
6. Be sure shaft key is fully captive before unit is energized.
7. Avoid contact with capacitors until safe discharge procedures have been completed.
8. Most units are shipped without oil. Always be sure oil lubricated units are filled with correct oil to proper level before operating.
9. Provide proper safeguards for personnel against rotating parts and applications involving high inertia loads which can cause overspeed.
10. Avoid extended exposure to equipment with high noise levels.
11. Be familiar with the equipment and read all instructions thoroughly before installing on equipment.

INSPECTION AND HANDLING

Inspect unit to make sure no damage has occurred during shipment. Check Nameplate for correct speed, horsepower, voltage, Hertz, and phase for conformance with power supply and equipment. **WARNING:** Units should be lifted using all eyebolts or lugs if provided. These eyebolts or lugs are provided for lifting this unit only and must not be used to lift any additional weight. Lifting angle must not exceed 15° with shank of eyebolt. If not provided, eyebolts to be used must be per ASTM A489 or equivalent. All eyebolts must be securely tightened. Be careful not to touch overhead power lines with lifting equipment. Failure to observe this warning may result in serious personal injury or property damage.

STORAGE

Units should be stored indoors, in a clean, dry location. Winding should be protected from excessive moisture absorption. **NOTE:** If motors are to be stored for over one year, refer to U.S. Electrical Motors. If gear and belt transmission units are to be stored for over six months, refer to U.S. Electrical Motors.

LOCATION

Units should be located in a clean, well-ventilated area for maximum life. **WARNING:** Units should be located in a suitable enclosure to prevent access by children or other unauthorized personnel to prevent possible accidents.

MOUNTING

Mount units on a firm, flat surface sufficiently rigid to prevent vibration.

Drive belts and chains should be within recommended limits of tightness. Couplings should be properly aligned and balanced. For drive recommendations, refer to drive or equipment manufacturers or U.S. Electrical Motors. For application of drive equipment, refer to NEMA MG1.

Motors have been dynamically balanced using a half key the same length as the full key shipped with the motor. If pulley length is less than this key length, rework long key by removing one-half of excess length between pulley and end of key to maintain balance.

Do not restrict motor ventilation. Unless otherwise specified on Nameplate, motor is designed for operation in 40°C (104°F) maximum ambient temperature. **NOTE:** Motors operating under rated load and ambient conditions may feel hot when touched; this is normal and should not be cause for concern. When in doubt, measure frame temperature and confer with nearest office. Standard grease lubricated units can be operated in minimum ambient of -30°F. Special lubricants are required for temperatures outside this range.

If unit has been stored in a damp location, dry out thoroughly before operating.

WARNING: Guards should be provided for all exposed rotating parts to prevent possible personal injury. Keep fingers and foreign objects away from ventilation and other openings. Applications involving HIGH INERTIAL LOADS may damage equipment due to motor overspeed during coast down. Such applications should be referred to U.S. Electrical Motors.

CAUTION: Do not force drive coupling or other equipment onto shaft, as bearing damage may result.

POWER SUPPLY AND CONNECTIONS

The power supply must agree with values on Nameplate. Terminal voltage should not vary more than ±10% of Nameplate voltage at rated frequency. Unbalanced line voltage, even a small amount, will cause overheating. Do not exceed the continuous rated operating current on the Nameplate. Starting controls and overload protection should be properly sized in accordance with the National Electrical Code and the control manufacturer's recommendations.

Motor connections should be made by following instructions on connection diagram. Determine direction of rotation before connecting driven equipment. Note direction of rotation label if supplied. Rotation may be reversed on three phase motors by interchanging any two line connections. On two phase motors, interchange A-1 and A-2; and on single phase motors interchange leads per connection diagram on motor. Wiring of units, controls, and grounding shall be in accordance with local and National Electrical Code requirements. **WARNING:** Failure to properly ground unit may cause serious injury to personnel. Where unexpected starting could be hazardous to personnel, do not use automatic reset starting devices.

OIL LUBRICATION

Most oil lubricated units are shipped without oil. Add oil of the correct viscosity for the ambient temperature, per Nameplate on unit, to proper level.

Make certain an oil with mild EP additives is used on wormgear units.

Refer to Nameplate or Lubrication Instruction Plate for oil viscosity and oil change interval. **WARNING:** For applications in the food and drug industry (including animal food), consult the petroleum supplier for lubricants that are acceptable to the Food and Drug Administration and other governing bodies.

MAINTENANCE

Inspect units at regular intervals. Keep units clean and ventilation openings clear of dust, dirt or other debris. Lubricate units per this operating instruction folder and instruction plate on unit. Excessive lubrication may damage the unit. Do not over grease! **WARNING:** Disconnect all power sources to the unit and discharge all parts which may retain an electrical charge before attempting any maintenance or repair. Screens and covers must be maintained in place when unit is in operation. Motors for use in hazardous locations - Class I & II Installation: Repairs of these motors must be made by the manufacturer or authorized service station approved by the manufacturer and U.L. to maintain the U.L. Listing. The U.L. Listing applies to the electrical motor only and not to the belt or gear transmissions or other devices that may be connected to the motor.

VARIDRIVE® UNITS

Do not turn control wheel while unit is not operating as this may cause damage to the unit. Handwheel position is a relative speed indication only. Direct speed sensing accessory for precise speed indication. Units equipped with electric remote speed indicator accessory are not calibrated at the factory and must be calibrated at site. Refer to calibration instructions with meter.

VARIDRIVES equipped with splined shafts require monthly lubrication for 8 hour/day service, and semi-monthly for 24 hour/day service. (For complete instructions for entire drive, refer to the lubrication instruction plate on unit.) Operate VARIDRIVE through its entire speed range weekly. **WARNING:** Do not force control wheel beyond speed limits shown on Nameplate. The mechanism and belt are designed for the rated speed and horsepower shown on the Nameplate. Operation beyond these limits may result in damage to the belt and mechanism and possible injury to personnel. The covers on the frame case must not be removed or left off while unit is in operation. Do not attempt to disassemble or repair the driven pulley discs as high spring force may be released, causing injury to personnel. Refer to authorized Service Center. Refer to VARIDRIVE Installation and Maintenance Manual for complete belt changing instructions.

For additional detailed information, request specific product installation and maintenance manual from U.S. Electrical Motors, St. Louis, MO 63136

RENEWAL PARTS AND WARRANTY SERVICE

When inquiring for renewal parts, call the U.S. Electrical Motor Service Department (Memphis, Tennessee) or Parts Stocking Distributors. For warranty service call the nearest U.S. Electrical Motors Service Station. Give them complete nameplate data including ID number, etc.

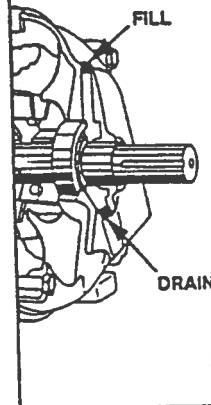
LUBRICATION INSTRUCTIONS

Some small motors have sealed-for-life bearings which require no relubrication. Regreaseable bearings are shipped with a high quality, wide temperature range grease in the bearings.

Motors can be regreased by stopping the motor, removing drain plug and pumping new grease into fill hole. Run motor with drain plug removed until excess grease has been discharged (min. 10 mins.). Stop motor and replace drain plug.

Units that operate at speeds greater than 1800 RPM should be lubricated on a more frequent maintenance schedule depending on duty cycle. Use a low pressure grease gun and avoid overgreasing.

	SUGGESTED REGREASING INTERVALS		
	MOTOR HORSEPOWER		
	UNDER 50	50-100	100 UP
A	3-5 Yrs.	2-4 Yrs.	2 Yrs.
B	2-4 Yrs.	1-1/2 Yrs.	1-1/2 Yrs.
C	1-2 Yrs.	1 Mo.	6 Mos.
D	4 Mos.	4 Mos.	3 Mos.
SERVICE SYMBOL	TYPE OF SERVICE		
A	Infrequent operation or light duty in clean atmosphere.		
B	8-16 Hrs/Day in clean, relatively dry atmosphere.		
C	12-24 Hrs/Day, heavy duty, or if moisture is present.		
D	Heavy duty in dirty, dusty locations; high ambients; moisture laden atmosphere; vibration.		



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8100 West Florissant Avenue, P.O. Box 3946, St. Louis, MO 63136	(314) 553-2000

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ST. LOUIS, MO 63136



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U.S. RIGHT ANGLE SYNCROGEAR INSTALLATION & MAINTENANCE

12

U.S. Right Angle Syncrogear is available in single reduction (Worm Gears) and double reduction (Worm primary & Helical secondary). Typical combinations are illustrated in Fig. 1 & 2. Table on the right lists available combinations.

TYPICAL COMBINATIONS

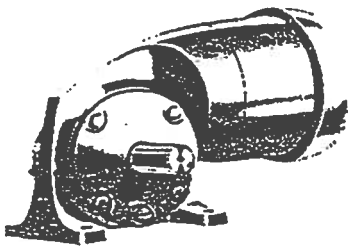


Fig. 1 JF-GW

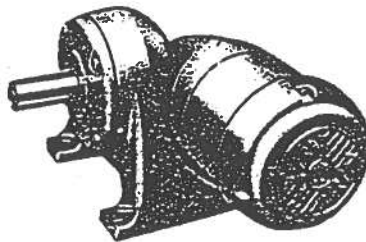


Fig. 2 JF-GWB

TYPICAL FRAME & TYPE DATA			
MOTOR FRAME SIZE	MOTOR SUFFIX ¹	GEAR FRAME SIZE	
56	-4	-6	
MOTOR FRAME TYPE		GEAR FRAME TYPE	
JF		GW	
MF, HV, RF, RV JF, JV, TF, TV JFN, JVN, TFN, TVN EF, EV, LF, LV EFN, EVN, LFN, LVN	OPEN DRIP PROOF T.E.F.C. ENCLOSED NON-VENT. EXPLOSION PROOF FAN COOLED EXPLOSION PROOF NON-VENTILATION CORRO-DUTY	GW GWV GWB GWO	SINGLE REDUCTION WORM GEAR DOUBLE REDUCTION WORM & HELICAL GEARS SINGLE REDUCTION WORM GEAR REDUCERS

¹ Suffix denotes certain Electro-Mechanical specifications relative to the motor winding.

OIL CAPACITY AND TYPES OF REDUCTION — FOR U.S. RIGHT ANGLE SYNCROGEARS			
FRAME SIZE	GEAR FRAME TYPES	NUMBER OF REDUCTIONS	APPROXIMATE OIL CAPACITY IN U.S. QUARTS
1	GW, GWO, GWV	1	3/4
6	GW, GWO, GWV	1	1
6	GWB	2	1-1/4
10	GWB	2	2
11	GW, GWV	1	2
20	GW, GWO, GWV	1	3.5

PROPER LUBRICATION ASSURES LONGEST LIFE

Nameplate on your unit specifies correct lubricant type for ambient (surrounding) temperature.

YOUR UNIT IS SHIPPED WITHOUT OIL

Fill to proper level before operation. Units furnished as universal mounting may be mounted in any position — use plug on 30° above horizontal centerline of gear case for oil level. Locate breather plug per Fig. 3.

Units furnished for specific mounting position (Not designated universal) see tag on gear box for oil level & breather location. Check oil level and refill often enough to assure always maintaining proper level.

BEARING LUBRICATION

In most units, motor end bearings are prelubricated for life and require no relubrication. Bearings located inside the gear case are lubricated by oil bath.

BREATHER PLUG

Install breather plug before operating. Instruction tag on your unit or Figure 3 show location. The breather relieves pressure build-up in the oil chamber due to normal heating during operation. (Oil bath temperature may approach 200°F. and be within safe limit). Keep breather unclogged.

BREATHER PLUG LOCATION

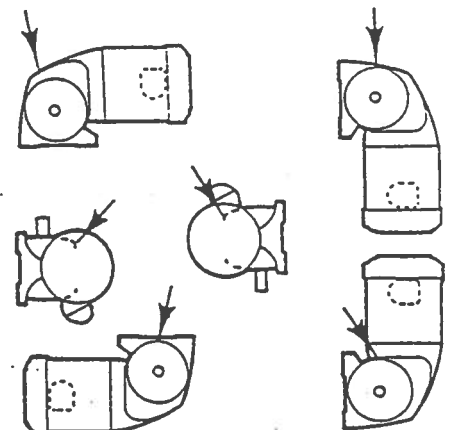


Fig. 3

CONDENSATE DRAINS

Units furnished for universal mounting have condensate drain holes spaced around the gear frame housing nearest the motor, and sometimes around the rear motor bracket. After the unit is mounted, remove the small plastic plug in the drain hole in the lowest position on the gear frame. The plastic plug in the rear motor bracket is accessible by removing the fan cover guard. (Replace the fan cover guard carefully before operating.)

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*Municipal Service is available from these offices, or Municipal Agents.

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