

Document 00911

NOTICE OF
ADDENDUM NO. 1

Date of Addendum: 3/27/14

PROJECT NAME: Willowbrook Wastewater Treatment Plant Improvements

PROJECT NO: R-000265-0104-4

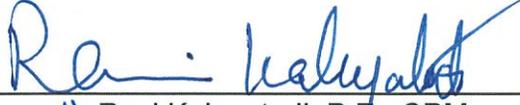
BID DATE: April 2, 2015 (There is no change to the Bid Date.)

FROM: J. Timothy Lincoln, P.E., City Engineer
City of Houston
Department of Public Works and Engineering
611 Walker, 15th Floor
Houston, Texas 77002
Attn: Tanu Hiremath, P.E., Project Manager

TO: Prospective Bidders

The referenced Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable.

Written questions regarding this Addendum may be submitted to the Project Manager following the procedures specified in Document 00200 – Instructions to Bidders. Immediately notify the City Engineer through the named Project Manager upon finding discrepancies or omissions in the Bid Documents.


Ravi Kaleyatodi, P.E., CPM
Senior Assistant Director
Department of Public Works and
Engineering

END OF DOCUMENT

Document 00910

ADDENDUM NO. 1

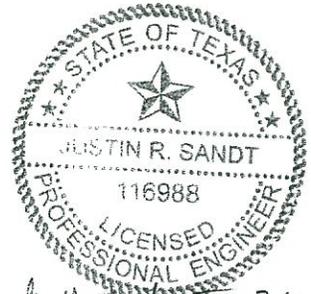
Date of Addendum: 3/27/14

PROJECT NAME: Willowbrook Wastewater Treatment Plant Improvements

PROJECT NO: WBS No. R-000265-0104-4

BID DATE: April 2, 2015 (There is no change to the Bid Date.)

FROM: J. Timothy Lincoln, P.E., City Engineer
City of Houston,
Department of Public Works and Engineering
611 Walker Street
Houston, Texas 77002
Attn: Tanu Hiremath, P.E., Project Manager



TO: Prospective Bidders

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.

CHANGES TO PROJECT MANUAL

CONTRACT DOCUMENTS

1. Document 00410 – Bid Form. Remove Document 00410 in its entirety and replace with revised Document 00410.
2. Document 00800 – Supplementary Conditions. Remove Document 00800 in its entirety and replace with revised Document 00800.

SPECIFICATIONS

3. Document 01110 – Summary of Work. Remove Document 01110 in its entirety and

replace with revised Document 01110.

4. Document 11319 – Scum Pumps, paragraph 2.05A. Delete last sentence and replace with “Level control shall utilize submersible level probe, Multitrode or equal, with integral transmitter”.
5. Document 11319 – Scum Pumps. Change motor horsepower listed under section 2.04 A from 5 hp to 7.5 hp maximum.
6. Document 11365 – Clarifier Mechanism. Remove Document 11365 in its entirety and replace with revised Document 11365.

CHANGES TO DRAWINGS

7. Sheet 27. Remove Sheet 27 and replace with revised Sheet 27.

CLARIFICATIONS

8. Manufacturers other than those listed in the project specifications for equipment or individual components will be considered for approval during submittal review following contract award provided the specifications and design intent are met.
9. The proposed clarifier feedwell diameter duplicates the diameter of the existing clarifier feedwell.
10. Drawing 19 – Notes 7 & 8 and Document 09011 Paragraph 1.07F. The building permit has been conditionally approved with a requirement for the Contractor to submit the FRP building shop drawings to Code Enforcement (differed submittal), since this is a pre-engineered building and not fully detailed on the drawings.
11. Contractor means and methods will be considered in selecting location of construction joints.
12. Drawing 23 – Section F. A hydrophilic waterstop may be used at the scum box wall connection to the radius clarifier wall.
13. Drawing 33. There are two existing weir gates presently set at a higher elevation according to record drawings that shall be lowered (mechanically adjusted within existing gate vertical adjustment limits).
14. Document 11310 – RAS Pumps. The contract drawings are based upon pumps provided with direct drives. For any listed, or “OR EQUAL” pump, work including, but not limited to, any necessary re-design, revised piping/equipment/wiring, etc., at no additional costs to the Owner.
15. Document 11500 – NPW System, paragraph 2.02 (Pumps). Pumps shall be non-clog as specified.

16. Pay item #3 covers sludge removal and disposal from existing structures including the lift station, clarifier, piping, and RAS and MLSS channels as necessary to complete work.
17. Temporary shutdown of flow to the plant is described in Document 01110 Section 1.07C.
18. Record drawings and utility records may be obtained from the City's electronic filing system at the permitting center on 1002 Washington Avenue or GIMS.

END OF ADDENDUM NO. 1

DATED:



Ravi Kaleyatodi, P.E., CPM
Senior Assistant Director
Department of Public Works and
Engineering


RK:EN:BZ:TH:JA:sdd

END OF DOCUMENT

Document 00410A

BID FORM – PART A

To: **The Honorable Mayor and City Council of the City of Houston
City Hall Annex
900 Bagby Street
Houston, Texas 77002**

Project: Willowbrook Wastewater Treatment Plant Improvements

Project No.: WBS No. R-000265-0104-4

Bidder: _____

(Print or type full name of business entity, such as corporation, LLC, etc.)

OFFER

- A. Total Bid Price:** Having examined the Project location and all matters referred to in Bid Documents for the Project, we, the undersigned, offer to enter into a Contract to perform the Work for the Total Bid Price shown on the signature page of this Document
- B. Security Deposit:** Included with the Bid is a Security Deposit in the amount of 10 percent of the Total Bid Price subject to terms described in Document 00200 – Instructions to Bidders.
- C. Period for Bid Acceptance:** This offer is open to acceptance and is irrevocable for 90 days from Bid Date. That period may be extended by mutual written agreement of the City and Bidder.
- D. Addenda:** All Addenda have been received. Modifications to Bid Documents have been considered and all related costs are included in the Total Bid Price.
- E. Bid Supplements:** The following documents are attached:
 - Security Deposit (*as defined in Document 00200 – Instructions to Bidders*)
 - Document 00450 - Bidder's Statement of MWSBE Status
 - Document 00452 - Contractor's Submission List - Fair Campaign Ordinance Form A
 - Document 00453 – Bidder's Statement of Residency (*not required for AIP funded project*)
 - Document 00454 - Affidavit of Non-interest
 - Document 00455 - Affidavit of Ownership or Control
 - Document 00456 - Bidder's Certificate of Compliance with Buy American Program (*required for AIP funded project*)
 - Document 00457 – Conflicts of Interest Questionnaire (CIQ)
 - Document 00458 - Bidder's Certificate Regarding Foreign Trade Restriction (*required for AIP funded project*)
 - Document 00459 - Contractor's Statement Regarding Previous Contracts Subject to EEO (*required for AIP funded project*)

- Document 00460 – (POP 1) Pay or Play Acknowledgement Form
- Document 00470 – Bidder’s MWSBE Participation Plan (*required unless no MWSBE participation goal is provided in Document 00800 (the “Goal”)*).
- Document 00471 – Pre-bid Good Faith Efforts (*required if the goal in Bidder’s Participation Plan–Document 00470 is lower than the Goal*).
- Document 00472 – Bidder’s Goal Deviation Request (*required if the goal in Bidder’s Participation Plan–Document 00470 is lower than the Goal*).
- Others as listed: Valid official letter from OBO with your designation as a City or Local Business (Bidder’s Participation Hire Houston First)

CONTRACT TIME

- A. If offer is accepted, Contractor shall achieve Date of Substantial Completion within 450 days after Date of Commencement of the Work, subject to adjustments of Contract Time as provided in the Contract.

Document 00410B
BID FORM – PART B

1.0 TOTAL BID PRICE HAS BEEN CALCULATED BY BIDDER, USING THE FOLLOWING COMPONENT PRICES AND PROCESS (PRINT OR TYPE NUMERICAL AMOUNTS):

A. STIPULATED PRICE: [\$N/A, if Unit Price Job]
(Total Bid Price; minus Base Unit Prices, Extra Unit Prices, Contractor Incentive/bonus, Cash Allowances and All Alternates, if any)

B. BASE UNIT PRICE TABLE:

Item No.	Control No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in figures
1.	01502	Mobilization – Willowbrook WWTP	LS	1	[\$150,000] ⁽¹⁾	[\$150,000] ⁽¹⁾
2.	Div 1 thru Div 16	Willowbrook WWTP Improvements as shown in the Contract Drawings and Specifications, including but not limited to Lift Station, Odor Control, Secondary Clarification, RAS/WAS Pumps, and NPW System, Detention Pond Improvements, complete in place, SWPPP and BMPs	LS	1		
3	02220	Removal and disposal of sludge and debris (sediment) in existing structures at Willowbrook.	TON	100		
<u>TOTAL BASE UNIT PRICES</u>						\$ _____

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C. EXTRA UNIT PRICE TABLE:

Item No.	Control No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in figures
1.	01110	Extra T-lock Patch Repair and Mechanical Fittings (Less than 1 sq. ft)	EA	30	[\$250.00] ⁽²⁾	[\$7,500.00] ⁽²⁾
2.	01110	Extra T-lock Panel Repair (greater than or equal to 1 sq. ft)	SF	450	[\$60.00] ⁽²⁾	[\$27,000.00] ⁽²⁾
3.	02316 02317	Extra Hand Excavation	CY	50	[\$50.00] ⁽²⁾	[\$2,500.00] ⁽²⁾
4.	02316 02317	Extra Machine Excavation	CY	300	[\$20.00] ⁽²⁾	[\$6,000.00] ⁽²⁾
5.	02318	Extra Placement of Select Backfill Material	CY	50	[\$10.00] ⁽²⁾	[\$500.00] ⁽²⁾
6.	02321	Extra Cement Stabilized Sand, complete in place	CY	30	[\$50.00] ⁽²⁾	[\$1,500.00] ⁽²⁾
7.	03315	Extra grade 60 reinforcing steel in place	LB	5,000	[\$1.00] ⁽²⁾	[\$5,000.00] ⁽²⁾
8.	03315	Extra class "A" concrete with or without formwork	CY	100	[\$300.00] ⁽²⁾	[\$30,000.00] ⁽²⁾
9.	01110	Critical Location Probing Mechanical Equipment Rig	DAYS	6	[\$1,250.00] ⁽²⁾	[\$7,500.00] ⁽²⁾
10.	16111	¾" PVC Coated Rigid Steel Conduit Installed Above Ground	LF	150	[\$12.00] ⁽²⁾	[\$1,800.00] ⁽²⁾
11.	16111	1" PVC Coated Rigid Steel Conduit Installed Above Grade	LF	150	[\$16.00] ⁽²⁾	[\$2,400.00] ⁽²⁾
12.	16111	2" PVC Coated Rigid Steel Conduit Installed Above Ground	LF	50	[\$28.00] ⁽²⁾	[\$1,400.00] ⁽²⁾
13.	16111	3" PVC Coated Rigid Steel Conduit Installed Above Ground	LF	50	[\$46.00] ⁽²⁾	[\$2,300.00] ⁽²⁾
14.	16402	1" PVC Schedule 40 Conduit Installed in Underground Duct Bank	LF	75	[\$19.00] ⁽²⁾	[\$1,425.00] ⁽²⁾
15.	16402	2" PVC Schedule 40 Conduit Installed in Underground Duct Bank	LF	75	[\$26.00] ⁽²⁾	[\$1,950.00] ⁽²⁾
16.	16402	3" PVC Schedule 40 Conduit Installed in Underground Duct Bank	LF	50	[\$38.00] ⁽²⁾	[\$1,900.00] ⁽²⁾

C. EXTRA UNIT PRICE TABLE: (Continued)

Item No.	Control No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in figures
17.	16402	Duct bank trenching, rebar, concrete encasement and backfill for a duct bank where the top of the concrete encasement is 36" below grade. The cross-sectional area of the concrete encasement shall be four square feet.	LF	100	[\$80.00] ⁽²⁾	[\$8,000.00] ⁽²⁾
18.	16402	Duct bank trenching, rebar, concrete encasement and backfill for a duct bank where the top of the concrete encasement is 48" below grade. The cross-sectional area of the concrete encasement shall be four square feet.	LF	25	[\$110.00] ⁽²⁾	[\$2,750.00] ⁽²⁾
19.	16402	Duct bank trenching, rebar, concrete encasement and backfill for a duct bank where the top of the concrete encasement is 60" below grade. The cross-sectional area of the concrete encasement shall be four square feet.	LF	25	[\$140.00] ⁽²⁾	[\$3,500.00] ⁽²⁾
20.	16120	Copper No. 14 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	300	[\$0.75] ⁽²⁾	[\$225.00] ⁽²⁾
21.	16120	Copper No. 12 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	300	[\$0.90] ⁽²⁾	[\$270.00] ⁽²⁾
22.	16120	Copper No. 10 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	1,000	[\$1.10] ⁽²⁾	[\$1,100.00] ⁽²⁾
23.	16120	Copper No. 6 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	4,500	[\$1.90] ⁽²⁾	[\$8,550.00] ⁽²⁾
24.	16120	Copper No. 2 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	300	[\$4.30] ⁽²⁾	[\$1,290.00] ⁽²⁾
25.	16120	Copper No. 1/0 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	13,500	[\$6.20] ⁽²⁾	[\$83,700.00] ⁽²⁾
26.	16120	Copper No. 4/0 AWG conductor with XHHW-2 insulation, installed in conduit.	LF	150	[\$9.90] ⁽²⁾	[\$1,485.00] ⁽²⁾

C. EXTRA UNIT PRICE TABLE: (Continued)

Item No.	Control No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in figures
27.	16120	350 kcmil copper conductor with XHHW-2 insulation, installed in conduit	LF	100	[\$14.30] ⁽²⁾	[\$1,430.00] ⁽²⁾
28.	16126	2/C or 3/C, #16 AWG twisted shielded instrument cable, installed in conduit	LF	150	[\$3.20] ⁽²⁾	[\$480.00] ⁽²⁾
<u>TOTAL EXTRA UNIT PRICES</u>						\$ _____

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D. CASH ALLOWANCE TABLE:

Cash Allowance No.	Cash Allowance Short Title	Cash Allowance in figures
1.	Permits	\$35,000.00 ⁽¹⁾
<u>TOTAL CASH ALLOWANCES</u>		\$35,000.00 ⁽¹⁾

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E. TOTAL BID PRICE:

(Add Totals for Items A., B., C., and D. above)

\$ _____

2.0 SIGNATURES: By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Bid Price.

Bidder:

(Print or type full name of your proprietorship, partnership, corporation, or joint venture.*)

**By:

Signature Date

Name:

(Print or type name) Title

Address:

(Mailing)

(Street, if different)

Telephone and Fax Number:

(Print or type numbers)

- * If Bid is a joint venture, add additional Bid Form signature sheets for each member of the joint venture.
- ** Bidder certifies that the only person or parties interested in this offer as principals are those named above. Bidder has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding.

Note: This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided in § 37.10 of the Texas Penal Code.

Footnotes for Basic Unit Price Table and Extra Unit Price Table:

- (1) Fixed Unit Price determined prior to Bid. Cannot be adjusted by the Bidder.
- (2) Minimum Bid Price determined prior to Bid. Can be increased by the Bidder by crossing out the Minimum and noting revised price on the line above.
- (3) Maximum Bid Price determined prior to Bid. Can be decreased by Bidder by crossing out the Maximum and noting revised price on the line above.
- (4) Fixed Range Unit Price determined prior to Bid. Unit Price can be adjusted by Bidder to any amount within the range defined by crossing out prices noted and noting revised price on the line above.

END OF DOCUMENT

Document 00800

SUPPLEMENTARY CONDITIONS

The following Paragraphs amend and supplement the January 1, 2015 edition of General Conditions. Unaltered portions of General Conditions remain in effect.

ARTICLE 1 - GENERAL PROVISIONS:

1.1 *DEFINITIONS: Insert the following Paragraph 1.1.23, and reorder the remaining definitions accordingly.*

1.1.23 *Good Faith Efforts.* Steps taken to achieve an MBE, WBE, SBE, or PDBE goal or other requirements which, by their scope, intensity, and usefulness, demonstrate the bidder's responsiveness to fulfill the business opportunity objective, as well as the Contractor's responsibility to put forth measures to meet or exceed the MBE, WBE, SBE, or PDBE goal (Contract Goal). These steps apply from before a contract's award, through its duration, and after its conclusion, in the event the Contractor has been unsuccessful in meeting the Contract Goal. These efforts are required whether a Goal Oriented Contract or a Regulated Contract, as defined in the Office of Business Opportunity's Policy & Procedures Manual, available at <http://www.houstontx.gov/obo>.

ARTICLE 3 - THE CONTRACTOR

3.5 *LABOR: Insert the following Paragraphs, 3.5.3.1.1, 3.5.3.1.2 and 3.5.3.1.3.*

3.5.3.1.1 If the Original Contract Price is greater than One Million Dollars, Contractor shall make Good Faith Efforts to comply with the City ordinances regarding Minority Business Enterprises (MBE), Women Business Enterprises (WBE), Persons with Disabilities Business Enterprises (PDBE) and Small Business Enterprise (SBE) participation goals which are as follows:

- .1 the MBE goal is 11% percent,
- .2 the WBE goal is 7% percent, and
- .3 the PDBE goal is 0% percent.
- .4 The bidder may substitute SBE participation of no more than four percent of the MBE goal, the WBE goal, or portions of the MBE Goal and WBE Goal.

3.5.3.1.2 The MBE, WBE, PDBE, and SBE goals are specific to this Agreement. The Contractor shall make reasonable efforts to achieve these goals.

3.5.3.1.3 Failure by Contractor to comply with the goals for MBE, WBE, SBE, or PDBE is a material breach of the Agreement, which may result in termination of the Agreement, or such other remedy permitted as the City deems appropriate.

ARTICLE 8 - TIME

8.1 *PROGRESS AND COMPLETION: Add the following Paragraph 8.1.6.1.*

8.1.6.1 Contractor shall credit the City by Change Order for inspection services for overtime work or work performed on Sundays or Legal Holidays. The amount Contractor credits the City will be [\$50.00 per hour] per inspector for inspection services.

ARTICLE 9 - PAYMENTS AND COMPLETION

9.12 *LIQUIDATED DAMAGES: Insert the following Paragraph 9.12.1.1.*

9.12.1.1 The amount of liquidated damages payable by Contractor or Surety for each and every day of delay beyond Contract Time, are \$1,200.00 per day.

ARTICLE 11 - INSURANCE AND BONDS

11.2 *INSURANCE TO BE PROVIDED BY CONTRACTOR: Insert the following Paragraph 11.2.1.2.*

11.2.1.2 Contractor shall purchase for the duration of the Contract the insurance set out in Table 2 in addition to the minimum insurance coverage set out in section 11.2.1.

TABLE 2
ADDITIONAL REQUIRED COVERAGE
DEFENSE COSTS EXCLUDED FROM FACE AMOUNT OF POLICY.

<u>(Coverage)</u>	<u>(Limit of Liability)</u>
Property and Casualty Coverage: "All Causes of Loss" Builder's Risk Form for directing physical change to building or plant construction on the Work site and/or all land improvements including all work. (Including but not limited to earthquake, flood, boiler, and machinery including testing, damage to existing or adjoining property, time element coverage, collapse, soft costs (management, architecture, financial costs, pre-opening costs, etc.), transit coverage, off-site storage).	100% of Contract Price, including change orders
Flood Hazard Insurance: Contractor shall apply for flood insurance on all insurable structures built under the Contract. A copy of the completed application must be provided to City Engineer before commencing construction of the Work. Contractor shall obtain flood hazard insurance as soon as possible and submit a copy of the policy to City Engineer.	

END OF DOCUMENT

SECTION 01110

SUMMARY OF WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Summary of the Work including work by the City, City-furnished Products, work sequence, future work, Contractor use of Premises, special conditions for substantial completion and City occupancy.
- B. Prior to bidding, a pre-bid meeting and a pre-bid site walk will be conducted at Willowbrook Wastewater Treatment Plant (WWTP), as specified in Section 00210.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

Work covered by this contract is for the construction of the Willowbrook WWTP Improvements is generally described in this section. The full and complete project scope is described by the contract documents consisting of technical specifications, drawings and other documents included as part of the bid package. The omission of any work from this summary does not relieve the Contractor from fulfilling his obligations under this Contract to deliver a complete, fully functional project meeting the design intent.

- A. Base Bid Item No. 1 shall consist of the following:
 - 1. Mobilization at Willowbrook WWTP by the Contractor to initiate project start-up. Includes construction of temporary field office and facilities as specified in Section 01520 – Temporary Field Office.
- B. Base Bid Item No. 2 shall consist of the following:
 - 1. Willowbrook WWTP Improvements, including but not limited to:
 - a. Lift Station Improvements, including but not limited to:
 - i. Demolition and replacement of existing pumps and motors, piping, and valves and associated structural, mechanical, and electrical upgrades to meet current City of Houston guidelines.
 - ii. Cleaning and inspection of existing T-lock lining within lift station wetwell.

- iii. Repairs to T-Lock wet well lining as identified by inspection.
 - iv. Diversion pumping, as required, to complete this work. A suggested diversion plan is to provide bypass pumping from each of the two upstream manholes and either bypass to the headworks or tie into the existing forcemain to the headworks.
- b. Odor Control Improvements including, but not limited to:
- i. Demolition of existing headworks grating and associated appurtenances (excluding grit chamber).
 - ii. Installation of biological odor control system, fiberglass piping, solid fiberglass grating, access hatches, equipment pad, duct connections to lift station and headworks (excluding bar screen), and other appurtenances.
 - iii. Associated structural and electrical systems.
- c. Secondary Clarification Improvements including, but not limited to:
- i. Construction of one new 95-ft. diameter (inside dimension) circular, pier-supported, suction-draw clarifier, clarifier mechanism, complete and in-place with all appurtenances.
 - ii. Construction of 24-in diameter mixed liquor influent (MLQ) from aeration basin to proposed clarifier (including concrete encasement under proposed clarifier structure); construction of closure wall at the aeration basin.
 - iii. Construction 30-inch clarifier effluent piping to existing piping stubout.
 - iv. Removal and replacement of existing 95-ft diameter (inside dimension) circular, pier-supported, suction-draw clarifier mechanism, complete and in-place with all appurtenances.
 - v. Demolition of existing air lift return activated sludge

- (RAS) pumps; demolition, repair and re-grouting of existing clarifier floor.
- vi. Inspection, repair, and replacement of existing clarifier scum pump, scum piping, weir brushes, influent piping, pressure relief valves, and concrete.
 - vii. Construction of 10-in diameter RAS pipeline from proposed and existing clarifiers to new RAS pump station (including concrete encasement under clarifier structure).
 - viii. Construction of 8-in diameter drain from proposed clarifier (including concrete encasement under proposed clarifier structure).
 - ix. Construction of 12-in diameter RAS from proposed RAS pump station to existing aeration basin return channel including aeration basin closure wall.
 - x. Construction of pumps, equipment pad, piping, and valves for RAS pump station including one electromagnetic flow meter, and miscellaneous supports.
 - xi. Removal and replacement of existing WAS pumps and motors, piping, and valves and associated structural, mechanical, and electrical upgrades.
 - xii. Construction of sidewalk and installation of electrical, instrumentation, and site lighting for proposed clarifier and RAS station improvements.
- d. Non-Potable Water (NPW) System Improvements including, but not limited to:
- i. Removal of existing NPW system including motors, piping, valves, and associated supports and equipment pads.
 - ii. Installation of new NPW system, including motors, piping, hydropneumatic tank, and valves and associated structural, mechanical, and electrical upgrades.
 - iii. Connections with existing NPW distribution system and additional NPW distribution lines.

- e. Other Improvements including, but not limited to:
 - i. Site grading and construction of storm water detention pond.
 - f. Stormwater Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs) in accordance with Section 01410 and 01570.
- C. Base Bid Item No. 3 shall consist of the following:
 - 1. Removal of existing sludge and debris (sediment) in existing structures as required to complete work, including but not limited to, the lift station wet well, existing clarifier, associated piping, scum box, and aeration basin MLQ and RAS channels (as necessary to complete work). Unit price work to be based on dewatered sediment weight. Any waste characterization or other testing required for disposal shall be performed at no additional cost to the City.

1.03 EXTRA UNIT WORK COVERED BY THIS CONTRACT

Extra Unit Work, as defined in this Section, shall be included in the Total Project Cost. Work items included as "Extra Unit Work" are to be used only if necessary and performed only after receiving approval of the Engineer. No compensation will be received for any work item classified as "Extra Unit Work" unless the work items were actually used on the job after approval from the Engineer. Compensation will be received on a unit price basis relative to the work performed as defined in Section 00410B – Bid Form Part B. Extra Unit Work items include the following:

- A. Extra patch repair (less than one square foot) of existing T-lock lining within lift station wet well in accordance with manufacturer instructions due to small tears pinholes based on inspection, and repair or special fittings for anchor bolt, bracket, pipe or other mechanical appurtenance penetrations required as part of the proposed work included in Base Unit Price work.
- B. Extra panel repair (greater than or equal to one square foot) of existing T-lock lining within lift station wet well in accordance with manufacturer instructions (Arrow-Lock) based on inspection included in Base Unit Price work.
- C. Extra hand excavation that is required to complete work in addition to hand excavation included in Base Unit Price work.
- D. Extra machine excavation that is required to complete work in addition to machine excavation included in Base Unit Price work.

- E. Extra placement of select backfill material that is required to complete work in addition to select backfill material included in Base Unit Price work.
- F. Extra cement stabilized sand in place that is required in addition to cement stabilized sand included in Base Unit Price work to complete work.
- G. Extra grade 60 reinforcing steel in place that is required in addition to reinforcing steel included in Base Unit Price work to complete work.
- H. Extra class "A" concrete with or without formwork in addition to class "A" concrete included in Base Unit Price work to complete work.
- I. Critical location probing mechanical equipment rig required to complete work.
- J. $\frac{3}{4}$ " PVC coated rigid steel conduit installed above ground in addition to $\frac{3}{4}$ " PVC coated rigid steel conduit included in Base Unit Price work to complete work.
- K. 1" PVC coated rigid steel conduit installed above ground in addition to 1" PVC coated rigid steel conduit included in Base Unit Price work to complete work.
- L. 2" PVC coated rigid steel conduit installed above ground in addition to 2" PVC coated rigid steel conduit included in Base Unit Price work to complete work.
- M. 3" PVC coated rigid steel conduit installed above ground in addition to 3" PVC coated rigid steel conduit installed above ground included in Base Unit Price work to complete work.
- N. 1" PVC schedule 40 conduit installed in underground duct bank in addition to 1" PVC schedule 40 conduit installed in underground duct bank included in Base Unit Price work to complete work.
- O. 2" PVC schedule 40 conduit installed in underground duct bank in addition to 2" PVC schedule 40 conduit installed in underground duct bank included in Base Unit Price work to complete work.
- P. 3" PVC schedule 40 conduit installed in underground duct bank in addition to 3" PVC schedule 40 conduit installed in underground duct bank included in Base Unit Price work to complete work.
- Q. Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 36" below grade in addition to the Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 36" below grade that is included in Base Unit Price work to complete work. The cross-sectional area of the concrete encasement shall be four square feet.

- R. Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 48" below grade in addition to the Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 48" below grade that is included in Base Unit Price work to complete work. The cross-sectional area of the concrete encasement shall be four square feet.
- S. Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 60" below grade in addition to the Duct bank trenching, rebar, concrete encasement, and backfill for a duct bank where the top of the concrete encasement is 60" below grade that is included in Base Unit Price work to complete work. The cross-sectional area of the concrete encasement shall be four square feet.
- T. Copper No. 14 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 14 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- U. Copper No. 12 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 12 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- V. Copper No. 10 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 10 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- W. Copper No. 6 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 6 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- X. Copper No. 2 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 2 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- Y. Copper No. 1/0 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 1/0 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- Z. Copper No. 4/0 AWG conductor with XHHW-2 insulation, installed in conduit in addition to Copper No. 4/0 AWG conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.
- AA. 350 kcmil copper conductor with XHHW-2 insulation, installed in conduit in addition to 350 kcmil copper conductor with XHHW-2 insulation, installed in conduit included in Base Unit Price work to complete work.

- BB. 2/C or 3/C, #16 AWG twisted shielded instrument cable, installed in conduit in addition to 2/C or 3/C, #16 AWG twisted shielded instrument cable, installed in conduit included in Base Unit Price work to complete work.

1.04 CASH ALLOWANCES

- A. Include the following specific Cash Allowances in Contract Price under provision of General Conditions Paragraph 3.11:
 - 1. City of Houston Building Permit and any additional fees associated with revisions due to any Addenda or during construction, Harris County Flood Control Permits, Asbestos-Lead Notification (Demolition Permit), and any other federal, state, or local permits required for Willowbrook WWTP Improvements.

1.05 FIXED PRICE

- A. Include the following fixed price items which cannot be adjusted:
 - 1. Mobilization.

1.06 CITY-FURNISHED PRODUCTS

- A. Not applicable.

1.07 WORK SEQUENCE

- A. Contractor shall construct work in phases during the construction period. Contractor shall coordinate construction schedule and operations with the City of Houston. Contractor shall submit a detailed Construction Sequencing Plan to the Engineer for review and approval prior to construction, in accordance with Section 01325 – Construction Schedule, which describes the method of construction associated with ensuring uninterrupted/continual plant operations during construction activities. Contractor shall submit Construction Sequencing Plan per Section 01330 – Submittal Procedures. Refer to Section 01312 - Coordination and Meetings.
- B. Construction Sequencing Plan shall be staged so that service/flow through the WWTP is not disrupted during construction in a way that would result in adverse hydraulic or process performance. In general, construction should proceed in the order outlined below to provide continuous, uninterrupted flow.
- C. All work at site which potentially could interfere with normal operations at the plant (and/or off-site facilities) shall be coordinated with the Plant Supervisor. Contractor shall submit a construction sequencing plan that shows no plant

operations (or off-site facility operations) will be adversely affected for more than four (4) hours in any 24 hour period. All requests which impact normal operation of the plant shall be submitted at least five (5) working days in advance of the proposed shutdown date. Approval for shutdown(s) may be dependant upon influent flow conditions (wet-weather vs. dry-weather) and the operating status of near-by facilities to supplement lost influent pumping capacity. The maximum entire plant shutdown period shall be no more than four (4) consecutive hours. Central control/monitoring of the lift station operation and local control of the plant shall be restricted to the same scheduling constraints regarding outages.

1. Where required, any required flow-diversion pumping shall be performed in accordance with Section 01506 – Diversion Pumping and suitable for the two-hour peak flow of Willowbrook WWTP.
 - a. Contractor shall submit diversion pumping plan, including flow and head condition, for approval by the City and Engineer prior to commencing work.
 - b. Contractor shall use diesel engine driven pumps, rather than electric submersible pumps, where possible. If electric pumps are used, Contractor shall furnish its own generators or other power supply.
 - c. No separate payment will be made for costs associated with diversion pumping. Include incidental costs for diversion pumping in pay items for which diversion pumping is a component.

D. Construction Sequence

1. Pre-Construction Activities
 - a. Furnish one temporary field office at Willowbrook WWTP.
 - b. Mobilize and submit key project submittals and shop drawings.
 - c. Take pre-construction photographs of the existing site, including site paving, curbs, landscaping features, etc., prior to commencing any work in accordance with Section 01321 – Construction Photographs.
 - d. Schedule/attend a meeting with the WWTP Plant Supervisor to determine acceptable protocol (i.e., duration, scheduling, notification procedures, etc.) that will be used for any planned shut down of existing WWTP facilities.

2. Willowbrook WWTP Improvements
 - a. Storm Water Improvements:
 - i. Complete site grading, construct storm water detention pond and outfall, and site restoration.
 - b. Lift Station Improvements:
 - i. Remove and dispose of existing sludge and debris (sediment) in the lift station wetwell.
 - ii. Remove and individually replace existing pump units and install appurtenances including mechanical, structural, and electrical upgrades.
 - iii. Remove and replace piping and valves where shown on the Drawings.
 - iv. Provide temporarily flow diversion pumping and piping as necessary to make connections and coordinate plant shutdowns for final tie-ins.
 - v. Clean and inspect T-lock, report inspection findings to the Engineer, and repair as directed by the Engineer.
 - vi. Test and start-up pumps.
 - c. Odor Control Improvements:
 - i. Construct odor control equipment platform and install biological scrubber, fiberglass enclosure, fiberglass piping, and other appurtenances, and remove and replace grating at the headworks.
 - ii. Test and start-up for headworks and lift station odor control system.
 - iii. Complete final site restoration and improvements.
 - d. Secondary Clarification Improvements:
 - i. Construct new clarifier structure including concrete-encased piping below structures. Install clarifier mechanical equipment. Install scum pump, scum

- piping, weir brushes, and piping
- ii. Construct yard-piping improvements from new clarifier including 10-in RAS lines and 8-in process drain.
 - iii. Construct yard-piping improvements from new clarifier including 30-in clarifier effluent piping, 24-in MLQ, and 12-in RAS. Coordinate shutdowns for final tie-ins.
 - iv. Construct RAS pump station and make final piping connections. Coordinate shutdowns and tie-ins.
 - v. Start-up and test new clarifier and RAS pump station.
 - vi. Shutdown existing clarifier and remove existing clarifier equipment, RAS air lift pumps, scum pump, and lines.
 - vii. Demolish existing clarifier grout. Repair and grout clarifier floor for new clarifier mechanism.
 - viii. Inspect and repair pressure relief valves and concrete, and replace clarifier mechanism, scum pump, scum piping, weir brushes, and piping.
 - ix. Test and start-up existing clarifier equipment.
 - x. Remove and replace WAS pumps and appurtenances.
 - xi. Test and start-up WAS pumps.
- e. NPW System Improvements:
- i. Remove existing NPW pumps and piping.
 - ii. Install new NPW pumps, piping, hydropneumatic tank and appurtenances. Install new NPW yard piping and hose bibbs.
 - iii. Test and start-up NPW system equipment. Complete hydrostatic testing of piping.
 - iv. Complete final site restoration and improvements.

1.08 CONTRACTOR USE OF PREMISES

- A. Comply with procedures for access to the site and Contractor's use of rights-of-way as specified in Section 01145 - Use of Premises.
- B. Construction Operations: Limited to the City's rights-of-way provided by the City and areas shown or described in the Contract documents.

1.09 GENERAL CONSTRUCTION NOTES/CONDITIONS

- A. All excess dirt and debris from excavation demolition shall be lawfully disposed of offsite by Contractor at no additional cost to the Owner.
- B. All dimensions shown are approximate and shall be field verified by the Contractor. Necessary horizontal and vertical alignment changes are to be approved by the City.
- C. Contractor shall remove all trash, excess material, debris, etc., from the site upon completion of the project prior to inspection and approval by the approving agencies.
- D. Contractor shall verify horizontal and vertical locations of all existing underground and aboveground utilities prior to commencement of construction activity.
- E. Contractor is responsible for his own horizontal and vertical control. Reference points and construction staking is incidental to the project.
- F. The Contractor will install all equipment and related accessories to operate in the manner intended by the City of Houston and the manufacturer and be in compliance with all application codes and contract specification. The Contractor will coordinate work between the various trades and subcontractors to provide a complete installation so that the equipment is operational at the completion of the project. The completed work will not lack any part that can be reasonably inferred as incidental for proper and useful operation of the facility. This includes all items of equipment, labor, and materials, whether or not shown in the contract documents, where such items are required to fulfill the intent of the contract, and will be in accordance with code requirements, standards, regulatory agencies, manufacturer's recommendations, and acceptable industry practice. This work will be done at no additional cost to the City.

1.10 EXISTING EQUIPMENT DESIGNATED FOR DEMOLITION/REMOVAL

- A. The City shall have the first right of refusal to retain or salvage all items shown to be demolished and/or removed. Prior to initiating demolition, the Contractor and City Engineer shall make a joint inspection of each site to identify all equipment to be retained by the City for salvage or reuse. All other items shown to be demolished and/or removed which are not retained by the City shall become the property of the Contractor. The Contractor shall remove these items from the City property and dispose of these items in accordance with all federal, state, and local regulations.

1.11 DISCONNECTION/RECONNECTION OF EQUIPMENT

- A. The Contractor will be responsible for disconnection/reconnection of electrical and mechanical equipment, as required under this contract, under the direct supervision of the City. The City will not be responsible for the disconnection/reconnection of any electrical and mechanical equipment.
- B. The Contractor shall follow the City's Lockout/Tagout Procedure, Accident Prevention Plan Section 14; Control of Hazardous Energy (Lockout/Tagout) Program for the disconnection/reconnection of all equipment.

1.12 SITE RESTORATION

- A. Contractor shall restore all construction sites covered by this Contract, including but not limited to existing paving, structures, landscaping, etc., to a condition that is equal to or better than that which existed prior to construction operations. Restoration of construction sites shall be performed at no additional cost to the City.

1.13 WARRANTY

- A. Comply with warranty requirements in accordance with Document 00700 - General Conditions.

1.14 ADDITIONAL CONDITIONS FOR SUBSTANTIAL COMPLETION

- A. In addition to requirements outlined in Document 00700 – General Conditions, for Contractor to be substantially complete with the Work and call for inspection by Project Manager to confirm, the following conditions must be met or completed:
 - 1. All testing shall be completed and accepted by Project Manager.
 - 2. Draft O&M manuals shall be delivered to Project Manager.

3. Training shall be conducted, utilizing draft O&M manuals.
 4. All added or modified instrumentation in this project shall be calibrated, functional, and properly communicating with the SCADA System HMI.
 5. All status and alarm points added in this project shall properly communicate with the SCADA System HMI.
 6. A consecutive 7-day operation test, without malfunction, must be completed before being considered for substantial completion.
- B. When requested by the Contractor, Contractor will be given a full substantial completion for the whole project when all the work and associated requirements as set forth in Section 01110 Item 1.14A is completed, at which time the warranty will commence and the retainage reduction will occur for the Contract. No partial substantial completion will be granted. Acceptance as noted under warranty in the individual equipment specifications begins from the date of full substantial completion and not upon the date individual items of equipment are placed in operation.
- C. The City reserves the right to take beneficial use and operate portions of the project when they are completed. However, it will be the Contractor's responsibility to perform the Periodic Preventive and Scheduled Maintenance per Manufacturer's recommendations until substantial completion is granted by the City.
- D. No additional condition described herein may be included in Contractor's punch list.

PART 2 P R O D U C T S - Not Used

PART 3 E X E C U T I O N - Not Used

END OF SECTION

SECTION 11365

CLARIFIER EQUIPMENT

PART 1 GENERAL

1.01 WORK INCLUDES

- A. The Contractor shall furnish all labor, materials, tools and equipment required to install all equipment for two (2) circular pier-supported, scraper cage, suction-draw clarifier, collector mechanisms and appurtenances. The equipment shall include a center drive unit and torque control, half bridge walkway and platform with handrail, stationary center influent column, center feedwell, rotating drive cage, sludge rake arms, scum skimmers, scum collecting troughs, effluent weir (proposed clarifier only), scum baffle (proposed clarifier only), anchor bolts and all other appurtenances required or shown on the Drawings.

1.02 UNIT PRICES

- A. Unless indicated in the Unit Price Schedule as a pay item, no separate payment will be made for work performed under this Section. Include cost of work performed under this Section in pay items for which this work is a component.

1.03 RELATED SECTIONS

- A. All electrical components shall comply with Division 16- Electrical

1.04 REFERENCE STANDARDS

- A. The latest edition of the following standards and codes in effect and amended as of supplier's proposal date, and any applicable subsections there of, shall govern design and selection of equipment and material supplied:
 - 1. ASTM A36-77a: Standard for Structural Steel.
 - 2. ASTM A123-78: Standard for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip.
 - 3. ASTM A 143-74: Recommended Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedures for Detecting Embrittlement.

4. ASTM A153-80: Standard for Zinc coating (Hot-Dip) on Iron and Steel Hardware
5. ASTM A384-76: Recommended Practice for Safeguarding Against Warpage and Distortion During Hot Dip Galvanizing of Steel Assemblies
6. ASTM A385-80: Recommended practice for Providing High Quality Zing Coating (Hot Dip).
7. ASTM A513-00: Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
8. AGMA 2001-D04: Gear bending strength power rating.
9. AWS D1.1: Structural Welding Codes.

1.05 SUBMITTALS

A. Shop Drawings and Product Data

1. Comply with the Section 01340 – Shop Drawings, Product Data, and Samples and the supplemental requirements below.
2. On the shop drawings, include plan, section, and elevation views of all components and assemblies showing configuration, construction and dimensions. Certify for construction.
3. Details shown on the shop drawings should include, but not be limited to, the following:
 - a. Access bridges showing installation and interface with walkways and gear access platform.
 - b. Influent and effluent pipes showing connection to center piers and embedment in concrete foundations.
 - c. Center piers mounting flange outside diameter and anchor bolt locations.
 - d. Sludge rakes showing size and spacing, and adjustment provisions.
 - e. Electrical conduit and NPW water pipe suspension systems.
4. Include the following product data on shop drawings or on accompanying data sheets.

- a. Torque at which collector will stall.
 - b. Torque at which collector alarm is set.
 - c. Torque at which collector is designed to operate continuously.
 - d. Speed of collector rotation.
 - e. Direction of collector rotation.
 - f. Loads for which center pier foundation should be designed.
 - g. Loads for which wall at access bridge should be designed.
 - h. AGMA service factor rating of primary gear reducer.
 - i. Type of materials used to construct all components including reference standards and Brinell hardness where a hardness is specified.
 - j. Type, thickness, and application procedure for coatings.
5. Provide calculations (signed and sealed by a registered professional engineer) to verify gear design based on:
 - a. 20 year, 24 hour/day operation
 - b. AGMA 2001-D04 Gear Bending Strength Power Rating
 6. Provide calculations to verify sludge suction draw and drive cage design.
 7. Submit catalogue bulletins or similar publications illustrating drive assembly and overload protection system and describing its features and operation. Mark out inapplicable information.
 8. Complete data on motors and speed reducers.
 9. Control panel data and wiring diagrams and electrical schematics for all control equipment.
 10. Complete descriptive information and electrical schematic for torque overload device.
 11. Manufacturer's installation instructions.
 12. Factory inspection and testing results for galvanized surfaces.

13. Testing results for coated (painted) surfaces.

- B. Operation and Maintenance Data: Comply with the general requirements of Section 01782 – Operations and Maintenance Data.
- C. Record Drawings: Submit record drawings under provisions of Section 01785 – Project Record Documents.

1.06 QUALITY ASSURANCE

- A. Use new materials of high grade and with properties best suited to the work required. Do not permit any electrical connectivity between dissimilar metals subject to galvanic corrosion.
- B. The equipment manufacturer shall have at least 15 years experience in the design, application, and supply of circular clarifiers in water or wastewater treatment plants, and shall submit a list of not less than 25 operating installations as evidence of meeting the experience requirement.
- C. Coordinate with fiberglass weir supplier to ensure no conflicts occur between the fiberglass components and the other clarifier equipment.
- D. Acceptable Manufacturer
 - 1. Through shop drawing submittals, the following named manufacturers will be considered, provided the submitted equipment meets the specified requirements and system operating conditions:
 - a. Walker Process
 - b. Westech
 - c. Hi-Tech
 - d. Envirodyne
 - e. SPS Engineering
 - f. Approved Equal
 - 2. Listing as an approved manufacturer will not relieve the manufacturer from conforming to Contract Specifications.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Comply with the requirements of Section 01610 – Basic Product Requirements.

1.08 WARRANTY

- A. Provide warranty under provisions of Section 01770 – Closeout Procedures.
- B. Clarifier manufacturer shall furnish to the City a warranty written expressly from the manufacturer to the City of Houston, covering workmanship and material under normal use and service. The warranty shall cover 100 percent of parts and labor for at least one full year. The warranty period shall commence on the day of start-up acceptance by the City. Warranty shall be in printed form and previously published as the manufacturer's standard warranty for similar manufactured units.

PART 2 PRODUCTS

2.01 DESIGN/PERFORMANCE REQUIREMENTS

- A. Number of Clarifiers: 2
- B. Dimensions
 - 1. Inside Diameter of Clarifier: 95'-0"
 - 2. Shape: Circular
 - 3. Side Water Depth: 15'
 - 4. Freeboard: 1'-7 ¼"
 - 5. Floor Slope: 1:12
- C. Flows (Per Clarifier)
 - 1. Maximum Wastewater Influent Flow: 10.81 MGD
 - 2. Maximum Weir Overflow (Effluent): 8.00 MGD
- D. Principal Features:
 - 1. Bottom feed influent flow system: 24" diameter center pier
 - 2. A center drive platform to provide easy access to the drive assembly
 - 3. Influent feedwell (minimum): 10'-8" diameter x 4'-0" depth (nominal)

4. Scum box width: 6'-0"
- E. Drive (Parameters shown are nominal)
1. Ball race diameter: 42" or greater
 2. Motor Horsepower: 1 HP (max)
 3. Drive train capacity: 31,000 ft-lbs. continuous output
 4. Momentary peak torque: 62,000 ft-lbs.
 5. Service Factor: 1.25
 6. Tip Speed: 12 fpm (max)
- F. Sludge characteristics: Sludge collector must be designed for secondary (activated sludge process) type sludges.

2.02 GENERAL DESIGN

A. Description:

1. The clarifier mechanism shall be of the center drive type, supported on a stationary influent column, with the flow entering at the bottom of the influent column and flowing upward into a feedwell through openings near the water level.
2. The clarifier shall be designed to remove settled sludge from the bottom of the tank and floating scum from around the periphery of the tank.

B. Materials:

1. All structural steel shall conform to the requirements of ASTM A36.
2. Steel pipe used for structural members shall conform to ASTM A53. Steel members in contact with liquids, either continuously or intermittently, shall have a minimum thickness of 1/4".
3. All aluminum shall be type 5052, 6061, 6063, or 2014 alloy unless noted.
4. All SS shall be 316, 316L, 304, or 304L.

C. Fabrication

1. Shop fabrication of structural members shall be in accordance with the latest edition of the "Structural Welding Code", AWS D1.1, of the American Welding Society.
2. All welded connections shall develop the full strength of the connected elements and all joined or lapped surfaces shall be completely seal welded with minimum 3/16" fillet weld.
3. Intermittent welding shall not be allowed.
4. All welding shall be done in accordance with the latest edition of the AWS code.

D. Edge Grinding

1. Sharp projections of cut or sheared edges of ferrous metals shall be ground to a radius by multiple passes of a power grinder as required to ensure satisfactory coating adherence.

E. Structural Design

1. The ratio of unbraced length to least radius of gyration (slenderness ratio) shall not exceed the values listed in the AISC manual.
2. For angles, the radius of gyration shall be taken about the Z-Z axis. In addition, all structural members and connections shall be designed so that the unit stresses will not exceed AISC allowable stresses by more than one-third when subject to loading of the stall torque plus 50%.
3. All steel design shall be in accordance with the AISC Manual of Steel Construction, latest edition, and the International Building Code (IBC), latest edition.

2.03 DRIVE UNIT

A. Design Parameters:

1. The drive unit shall be manufactured by the clarifier equipment supplier to ensure unit responsibility.
2. The drive main bearing shall be designed for the total rotating mechanism loads with a minimum L-10 life of 500,000 hours.
3. The drive unit shall be capable of producing and withstanding the momentary peak torque when starting.

4. The clarifier drive assembly shall be designed to operate at a minimum AGMA 2001-D04 torque rating of 31,000 ft-lbs plus a 1.25 service factor based on 20 years continuous service.
5. The main bearing shall be capable of withstanding the overturning moment without the aid of any underwater guides or bearings to ensure correct tooth contact for AGMA rating of the main gear.
6. All gearing shall be designed per AGMA-D04 standard for strength and surface durability, based on a life of 200,000 hours.
7. The design running torque rating of the drive gearing shall be based on the bending strength values determined from the above AGMA standard.
8. No overhung pinions shall be allowed on the speed reducing unit. The lower pinion bearing shall not be located below the turntable base.
9. Any and all welding on the drive unit shall be done using E70XX weld rod.

B. Physical Characteristics:

1. The drive unit shall consist of an electric motor, primary and intermediate speed reducers, pinion, spur gear, 4-point contact precision bearing and turntable, and support base.
2. The drive shall be mounted on the center column and support the entire rotating load of the mechanism.
3. The main internal gear shall be forged of alloy hardened steel or ASTM A536 grade 80-55-06 ductile iron. The pinion shall be through hardened alloy steel to a minimum hardness of 325 Brinell.
4. All speed reducers shall be fully enclosed and running in oil or grease.
5. The housing of the drive shall be welded steel or ASTM A48 class 40 cast iron.
6. Oil and dust shields shall be provided.
7. The drive bearing shall be either a precision bearing assembly or bearing balls with 4140 alloy strip liners. The strip liners shall be heat treated to a minimum hardness of 43-46 Rockwell. The bearing balls shall be chrome steel AFBMA grade 500 or better.

8. The drive shall be designed so the balls, raceways, and gearing can be replaced without removing the access walkway or drive cage.
9. The main gear and pinion shall be oil or grease lubricated. Oil used in the oil bath lubrication shall be a synthetic oil equal to Mobil SHC 630.
10. Lubrication fittings shall be readily accessible. Continuous condensate drains shall be provided in the main gear housing.

C. Overload Protection:

1. An overload device shall be provided in a stainless steel, weatherproof enclosure. Enclosure shall be rated for NEMA 4X.
2. If a secondary worm drive is utilized, the torque overload shall be actuated by the thrust from the worm shaft. A calibrated spring set shall react to the thrust of the worm shaft and activate a torque indicator. Shear pin assemblies shall not be acceptable.
3. If cycloidal or helical speed reducers are used as the secondary drive, the torque overload shall be actuated by torque from the rotation of the secondary speed reducer, which shall operate two independently adjustable cam actuated factory set switches.
4. The alarm switch shall be set at 100 percent of design running torque.
5. Motor cutout switch shall be set at 120 percent of design running torque.
6. These two switches shall be factory adjusted to accurately calibrate the alarm torque value and the overload position.
7. A visual torque indicator shall be provided and oriented so that it may be read from the walkway. It shall be calibrated from 0 to 160 percent of design running torque.
8. Switches shall have auxiliary contacts for remote alarm annunciation.

D. Turntable

1. The turntable base shall have an annular bearing raceway upon which the rotating assembly rests. It shall have a maximum allowable deflection in accordance with the bearing specifications.

2. The allowable modulus of elasticity shall be a minimum of 29×10^6 psi for fabricated steel housings.
 3. The center cage shall be fastened to and supported from the gear casing.
 4. Ball bearings shall be of the highest quality high carbon chrome alloy steel running in fully contoured races, as part of a precision gear/bearing set. The balls shall be grease lubricated and protected by elastomer seals, or shall run fully submerged in oil if lubricated by oil. The drive assembly shall include a stainless steel shield to prevent pressure washdown water from entering the drive assembly.
- E. Speed Reducing Unit:
1. The secondary drive shall consist of either cycloidal and helical speed reducers or a worm gear assembly with a primary reducer.
 2. The main ring gear of cycloidal drives shall be made of high carbon chromium bearing steel.
 3. Speed reducer helical gearing shall be manufactured to AGMA standards. The speed reducer shall have a service factor of 1.25.
 4. The reducers shall be fitted with radial and thrust bearings of proper size for all mechanism loads and run in a totally submerged oil bath or be grease lubricated.
- F. Motor:
1. Motor shall be provided in accordance with Section 16171 – Low Voltage Motors.
 2. Provide totally enclosed, squirrel cage, induction type, fan-cooled, ball bearing heavy duty unit of ample power for starting and operating the mechanism without overload, with a service factor of 1.15.
 3. A motor canopy shall be provided.
 4. Power supply to the equipment shall be 480 volt, 60 hertz, 3 phase.

2.04 WALKWAY AND PLATFORM

A. Walkway

1. Span equal to one half of clarifier diameter, that is, from wall to center pier plus access platform around gear.
 2. Wide flange beam or through-truss design.
 3. Hot-dip galvanized steel construction.
 4. The 36" wide walkway and platform with handrails shall be supported by the influent column at the center and the tank wall at its outer end, and shall be designed to safely withstand a live load of 100 pounds per square foot.
 5. Deflection shall not exceed L/360 when the dead load and live load are applied.
 6. The walkway shall consist of two trusses or beams with ¼" checkered galvanized steel plate between the beams.
 7. The walkway shall be diagonally braced against lateral movement and provided with handrails 42" high, of double-row 1-1/2" diameter horizontal aluminum pipe and ¼" x 4" high kickplates on both sides.
 8. Walkway trusses may serve as handrailings if the top chord is 3'-6" above the walking surface.
 9. Steel bearing plates, UHMW slide plates, and anchor bolts for the wall support, including heavy hex nuts and washers, shall be provided by the manufacturer and installed by the Contractor.
 10. Bearing plate dimensions and anchor bolt diameter, length, quantity, and arrangement shall be supplied by the manufacturer.
 11. The Contractor shall block out or otherwise modify the clarifiers to accommodate walkway and supports, as required.
 12. Walkway shall have lighting, as shown on the Drawings.
- B. Center Drive Platform
1. A center drive platform shall be provided at least 6'-0" long x 6'-0" wide.
 2. The platform shall consist of ¼" checkered galvanized steel plate with necessary stiffeners and supports, resting on the center column, and provided with connections to the walkway.

3. The entire platform shall be surrounded with handrails 42" high of double-row 1-1/2" diameter horizontal aluminum pipe with 1/4" x 4" high kickplates.

2.05 INFLUENT AND SLUDGE REMOVAL

A. Stationary Center Influent Column:

1. A 24" diameter stationary cylindrical galvanized steel influent column of 1/4" minimum wall thickness shall be provided.
 - a. One end shall have a support flange for bolting to the tank floor over the influent line, with a similar flange at the top for supporting the drive unit and walkway.
 - b. The structure and anchor bolts shall provide adequate support for the entire mechanism dead load plus live load and torque with an adequate safety factor to eliminate excessive deflection or vibration.
 - c. Suitable openings shall be provided in the upper portion of the column to allow unrestricted passage of the flow into the influent well.
2. Prior to the center column being grouted in place, the drive unit shall be installed, positioned, and leveled.

B. Feedwell:

1. An energy dissipating feedwell shall be supported outside of the center cage to diffuse the liquid into the tank without disturbance or formation of density currents.
2. Design such that the flow through velocity does not exceed 0.15 fps at maximum flow.
3. The feedwell shall be a minimum 10'-8" diameter with a side depth of 4'-0". It shall be made of not less than 1/4" thick galvanized steel plate with necessary stiffening angles.
4. A minimum of four (4) baffled openings shall be provided near the water surface to allow scum to exit the feedwell.

C. Drive Cage

1. Design to support all rotating equipment including collector arms and influent well from turntable type main gears and to transfer power from gear to collector arms.

2. Design loads to include dead load of rotating components, moments created by cantilevered collector arms and torques equal to at least 50% greater than the stall torque.
3. Galvanized steel, box truss construction with at least one diagonal member per panel and a combination of welded and bolted connections to facilitate shipment and to avoid field welding.
4. It shall be provided with connections for the top sludge rake arms and feedwell supports.
5. The cage top shall be bolted to the main gear which shall rotate the cage with the attached arms and feedwell.
6. Loading to develop the torque shall be considered as uniform loads applied to each arm individually.

D. Scraper Arms

1. Each clarifier mechanism shall include two (2) sludge rakes of galvanized steel rectangular truss construction with Type 304 Stainless Steel scraper blades and adjustable Type 304 Stainless Steel squeegees. Squeegees (20 gauge minimum) shall be fastened to the rake blades with Type 304 Stainless Steel fasteners. Isolate so as to not permit any electrical connectivity between dissimilar metals subject to galvanic corrosion.
2. Rake blades shall be designed to direct the sludge to the hopper near the center of the tank.

2.06 SCUM REMOVAL

A. General

1. The clarifier manufacturer shall furnish two (2) surface skimming devices as part of the mechanism.
2. Each skimming mechanism shall be arranged to sweep the surface of the sedimentation compartment, automatically removing scum and floating material to a scum box located at the periphery of the tank.

B. Skimmer Construction

1. The rotating scum skimmer shall include a horizontal steel plate skimmer blade supported by vertical steel members extending up from the rake arms. The blade shall extend tangentially from the

influent feedwell to the hinged scum skimmer assembly at the tank periphery.

2. A hinged scum skimmer assembly shall be mounted on the outer end of the skimmer blade. The hinged scum skimmer assembly shall be designed to form a pocket for trapping the scum. The hinged arrangement shall ensure continual contact and proper alignment between wiper blade, and ramp as the blade travels up the scum box ramp. The hinged arm shall include a bottom and side wiper blade constructed of (min.) ¼" thick 65 Durometer neoprene.

C. Scum Boxes

1. One (1) 6'-0" wide (radial) scum box shall be provided that is supported from the tank wall and connected to the related scum withdrawal piping. The box shall consist of a scum trough, vertical steel sides, and a sloping ramp.
2. A back plate shall be provided to allow the skimmer arm to smoothly transition from the trough to the water surface.
3. A standard 6" pipe flat face flange connection shall be provided for the scum discharge pipe.
4. Scum box, structural supports, and appurtenances shall be constructed of Type 304 Stainless Steel.
5. Provide an NPW spray header over each scum box and along with walkway consisting of a manually-operated gate valve, pressure reducing valve, and spray nozzles of size indicated on Drawings.
6. Provide eight Type 316 Stainless Steel 1/4" spray nozzles and isolation valves per spray header capable of producing a 60 degree conical spray angle with a flow rate of 1.4 gpm each at 20 psig. Spray nozzles shall be by "Spraying Systems Co." Type G nozzle or equal.

2.07 EFFLUENT WEIR AND BAFFLE

- A. Proposed Clarifier Only. Refer to Specification Section 06615 – Fiberglass Overflow Weirs.

2.08 ALGAE CLEANING SYSTEM

- A. Automated Brush Cleaning System

1. The Automated Brush System shall be custom designed, constructed, for the removal of algae and debris on the circular clarifier.
2. The Automated Brush System for algae and debris control shall be designed for a Brush to make contact with each of the following surfaces:
 - a. Inner Baffle
 - b. Outer Baffle
 - c. Inner Weir
 - d. Outer Weir
 - e. Top Spillway Surface
 - f. Angled Spillway Surface
 - g. Inner Launder Wall
 - h. Launder Bottom
 - i. Outer Launder Wall
3. The Automated Brush System shall be designed to work off the power of the existing clarifier drive motor. The system shall be constructed to avoid any noticeable torque increases. The unit shall be capable of encountering an indefinite stall without incurring damage.
4. The unit shall be designed with an engaged position for cleaning, and a disengaged position allowing the system to ride idle around the tank.
5. Mainframe shall be constructed of Type 304 stainless steel and designed to slip easily into the Attachment Assembly and be tightened in position with the use of set screws. The Mainframe shall be designed so that the Brush Arms can be positioned at any point on the Mainframe.
6. Brush Arms shall be of Type 316 stainless steel and custom designed and installed for individual applications. Brush arms should have flexibility to clean effluent surfaces within a plus or minus 4-inch radial variance (specifically: Clarifier walls, both sides of weirs & baffle).

7. Each Brush Arm requires a minimum of one spring tension assembly made of 316 stainless steel to bias the Brush Arm with the Brush Holder and Brushes into tight engagement with the appropriate effluent surface to be cleaned. The Spring Assemblies shall consist consist of two stainless steel springs & one stainless steel guide.
8. At the end of each Brush Arm, there will be a 316 stainless steel Brush Holder aligned with the surface to be cleaned allowing the insertion of a Cleaning Brush. The holder shall consist of a “bolted clamp design” to allow for the easy insertion and removal of Brushes.
9. Each Brush holder will contain a Shear Safety Component having a frangible point designed to break when subjected to a force exceeding an optimum predetermined stress value. The stress value on each Shear Safety Component will be low enough to release the Brush Holder to forgo any damage to Brush Cleaning unit and/or Skimmer equipment but be high enough to allow standard operation of Brush cleaning system.
10. Each Brush Holder shall contain one (1) Cleaning Brush suitable for prolonged exposure to wastewater. Brushes shall be provided that slip easily into the Brush Holder and provide the cleaning means necessary to remove algae and debris from their respective surfaces. A brush shall be aligned to make contact with both sides of the baffle, both sides of the weir and all the effluent launder surfaces. Brush construction shall be as follows:
 - a. Brush backing shall be of durable plastic able to with stand continuous exposure to sunlight, seasonal temperature changes and the corrosive elements found in wastewater.
 - b. Brush bristles shall be polypropylene with adequate trim length, density, and stiffness for extended continuous use.
 - c. Brushes shall be cut and shaped appropriately so as to clean their respective surfaces without binding.
11. Lock-In/Lock-Out Design
 - a. Each Automated Brush System shall be designed with an engaged or locked in position for cleaning and a disengaged or locked out position for riding idle around the tank.

- b. Each Brush Arm will have permanently mounted to the Brush Arm a Lock Out Hook that corresponds to a Lock Out Ring, which allows disengagement of the individual Brushes. The Lock Out Ring is mounted to a Lock Out Boss that is attached parallel to the Mainframe.
- c. Each Automated Brush System shall be designed so that the entire Brush system can be disengaged or individual Brush Arms can be disengaged allowing for customized cleaning of weir and effluent surfaces.

2.09 CONTROL SYSTEM

A. General

1. Control Panels shall be provided in accordance with Section 16195 – Electrical Identification.
2. Provide a control system for each clarifier as shown on the drawings and as described below. Provide a NEMA 4X, type 316 stainless steel control panel equipped with a door disconnect switch. The control panel shall be suitable for mounting to strut-type supports. Control Panel shall include:
 - a. 3 pole unfused disconnect switch.
 - b. Motor circuit protector (MCP) sized for drive motor.
 - c. NEMA Size “1” drive motor starting contactor with overloads.
 - d. Control power transformer (fused on primary and secondary) sized for motor controls.
 - e. Control power transformer (fused on primary and secondary) sized for clarifier center pier 150W HPS light fixture and duplex receptacle mounted below the control panel.
 - f. High intensity cluster LED indicating lights for: Clarifier Running (red), Clarifier High Torque (amber), Clarifier Torque Shutdown (green).
 - g. Hand/Off/Auto selector switch for starting and stopping clarifier drive motor. In Auto, the clarifier will start/stop via the SCADA.
 - h. Other components indicated on a clarifier control diagram in the Project Electrical Drawings.

- i. Additional components where needed for successful clarifier operation.
 3. Design the control system to be compatible with the existing plant SCADA System. Contractor is responsible for integrating status indication and alarms into existing plant SCADA System.
- B. Functional Requirements of Clarifier Control System
 1. Remote Indication
 - a. Auxiliary motor starter contact outputs signal to status indicator and supervisory indicator to provide remote on/off indication of clarifier drive motor.
 2. Overload Protection
 - a. Torque measurement device outputs signal, upon reaching 100% of rated torque, to high-torque alarm and to supervisory high-torque alarm.
 - b. Torque Measurement device outputs signal, upon reaching 120% of rated torque, to control relay. Control relay contact opens controls for motor starter to provide shut-down of clarifier drive.

2.10 FABRICATION, GALVANIZING, AND PAINTING

- A. Steel Fabrication
 1. Structural Steel
 - a. Use steel meeting the requirements of ASTM A36.
 - b. Use steel at least ¼" thick.
 2. Welding
 - a. Comply with the standards of the American Welding Institute.
 - b. Make all fillet welds at least 3/16".
 - c. Weld all joints continuously all around.
 3. Bolted Connections

- a. Gusset all bolted connections with galvanized steel plate at least 3/8" thick.
 - b. Use a minimum of two 3/4" bolts on structural connections and two 5/8" bolts on secondary connections. Galvanized steel where in contact with water.
4. Field Work
- a. No cutting or welding will be permitted in the field.
 - b. Only bolted connections may be made in the field.
- B. Galvanizing
1. Hot dip-galvanize all steel clarifier equipment after fabrication.
 2. Fabricate components in sections as necessary to permit hot dip galvanizing.
 3. Comply with the requirements of ASTM A123, A143, A384 and A385.
- C. Painting
1. Paint galvanized steel with manufacturer's standard protective coating.
 2. Do not paint stainless steel.
 3. Paint ungalvanized drive assembly components with manufacturer's standard machinery enamel for exterior service. Color shall be selected by City from standard colors available.
 4. Provide protective coatings conforming with Section 09901 – Protective Coatings.

2.11 FASTENERS

- A. All anchor bolts shall be a minimum of 1/2" diameter and made of Type 304 Stainless Steel. The manufacturer shall furnish all anchor bolts, nuts, and washers required for the equipment.
- B. All structural fasteners shall be a minimum of 1/2" diameter and made of Type 304 Stainless Steel. The manufacturer shall furnish all fasteners required for the assembly of the equipment.
- C. Apply waterproof anti-galling lubricant to all threads before make-up.

PART 3 EXECUTION

3.01 SHOP ASSEMBLY

- A. The equipment specified herein shall be completely factory assembled as one unit as far as practical. All mating parts shall be trial fit and match-marked. The manufacturer shall submit certification of shop assembly before shipment.

3.02 INSTALLATION

- A. Install clarifier equipment in accordance with the Drawings, approved shop drawings, the manufacturer's instructions and the supplemental requirements below.
- B. Do not cut or weld galvanized steel component in the field. Violation of this requirement will result in rejection of affected components.
- C. Place concrete fill over bottom of basin as shown on Drawings. After concrete has been placed and rough floated, use collector mechanism for final finishing so that all plows will be in contact with the finished surface at all collector positions. Minimum acceptable concrete fill thickness is 2 inches.
- D. Align, adjust, and lubricate equipment in accordance with the manufacturer's instructions, and leave in proper working conditions.
- E. Prepare prime, finish coat, and touch up all minor scratches and scrapes in galvanized finishes in accordance with Specification Section 09901 – Protective Coatings.
- F. Touch up scratches and scrapes in galvanized and painted surfaces using touch up kit supplied by manufacturer.

3.03 FIELD QUALITY CONTROL

- A. Retain a qualified representative of the manufacturer to perform the following services.
 - 1. Oversee installation of the clarifier equipment specified herein.
 - 2. Inspect the completed installation and note deficiencies.

3. Be present during start-up, adjusting, and site testing of completed installation.
4. Provide visual inspection and field testing by laboratory of galvanization on all equipment to ensure there are no defects. Provide a report indicating results and any corrective measures taken.
5. Provide factory and field testing of galvanization on all equipment to ensure there are no defects.
6. Furnish test forms and procedures for field testing.
7. Instruct City personnel in the operations and maintenance of the equipment.
8. Prepare manufacturer's installation reports and submit within 30 days after completion of field testing. Include the following information:
 - a. Field testing results.
 - b. Descriptions of installation deficiencies not resolved to the manufacturer's satisfaction.
 - c. Description of problems, or potential problems.
 - d. Names of City personnel who attended operations and maintenance training sessions.
 - e. Record copy of materials used for training session including outlined summary of course.

3.04 FIELD TESTING

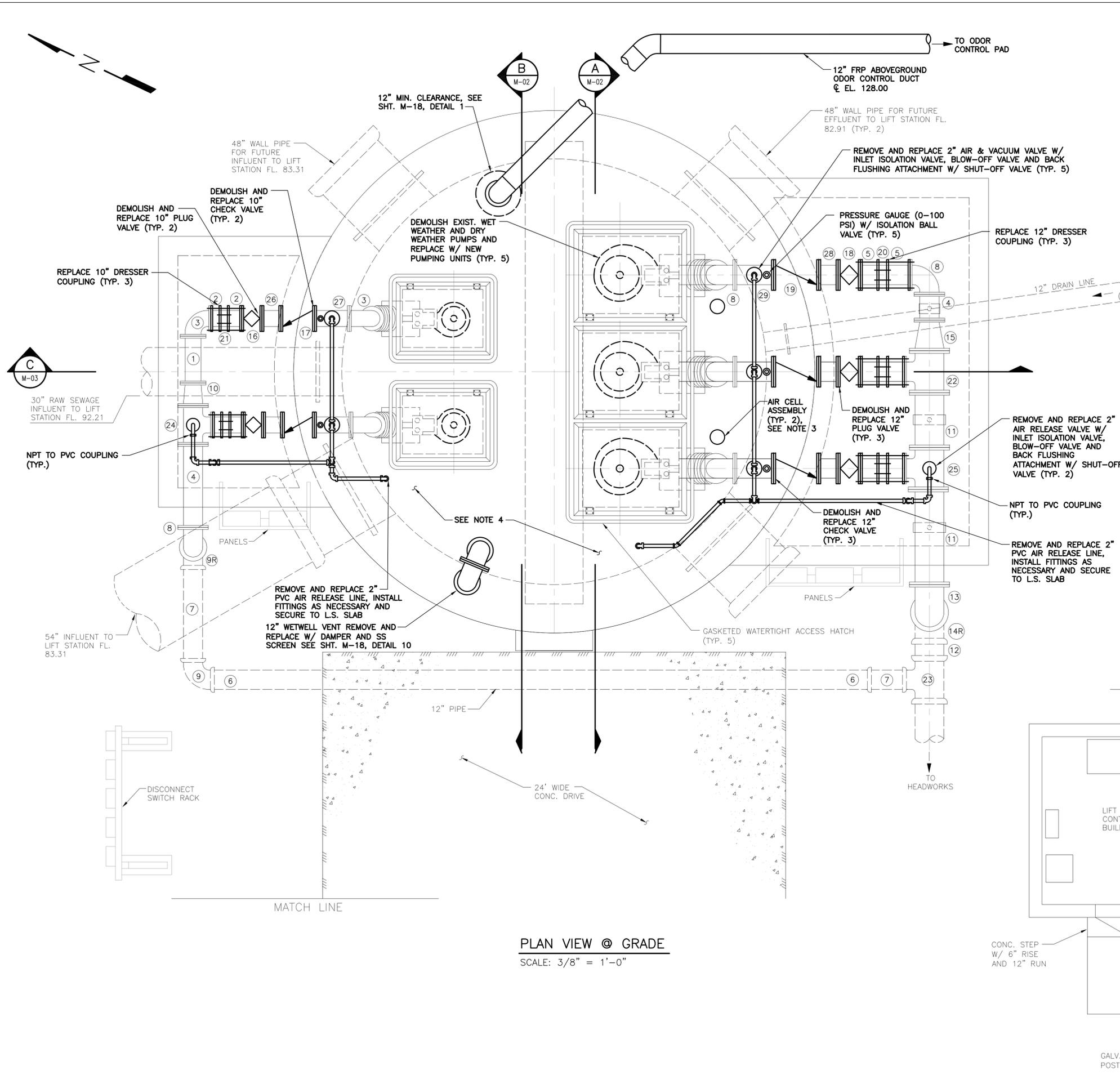
- A. The foregoing requirements shall be accomplished strictly in accordance with procedures designed by the manufacturer and will involve the use of hydraulic cylinders anchored to clarifier floors to apply loads to collector arms.
- B. Furnish all test gear at no additional cost to the City.
- C. Obtain City Engineer's approval of test procedures prior to testing.
- D. Torque Tests:

1. The entire sludge collector mechanism shall be statically load tested by individually loading each rake arm with 120 percent of the specified design running torque.
 2. The test shall verify the torque overload control device settings for alarm and motor cutout.
 3. Each arm shall be individually anchored and the load measured to demonstrate the rake arms', cage's, and drive unit's ability to withstand the specified torque.
 4. Sketches and calculations shall be submitted illustrating how the torque will be applied prior to the test taking place.
 5. Each sludge collector must meet the following criteria:
 - a. Activate overload alarm at 100% of specified continuous operating torque.
 - b. Shut down automatically when it reaches stall torque which shall equal at least 120% of continuous operating torque.
- B. Operation Tests:
1. The mechanism shall be operated in a dry tank for a minimum of 6 continuous hours before flow is allowed to enter the system.
 2. There shall be no binding, jerky, or unusual motion exhibited during this run in period.
 3. Motor amperage shall be checked at least hourly for any unusual or higher than normal figures.
 4. After the unit has successfully passed this initial test, flow shall be introduced into the tank and the same 6 hour observation test run.
 5. If the unit should fail under any of these conditions, the test shall be halted and the problem corrected. The test shall then be re-started at the beginning of the 6-hour test run.
 6. If, after several attempts, the unit does not successfully pass the field test, the faulty portion of the equipment shall be replaced and the test re-run.
- C. Start-Up. Beneficial use will not occur until after the start-up activities have been performed and accepted by the City Engineer. Start-up activities include the following:

1. Receipt and acceptance by the City Engineer of draft Operation and Maintenance manuals, including the wiring and ladder diagrams.
 2. Installation inspection by City operating, electrical and instrumentation staff followed by any corrective measures required by the Contractor.
 3. Satisfactory operation of clarifiers for 7 consecutive days under the City's control. If malfunctions or other operational problems halt the 7-day test period, the Contractor shall make appropriate corrections and restart the 7-day test period.
 4. Provide the services of a factory-trained technician for a period of 8 hours to train the City's operating and maintenance personnel. Training session shall be scheduled and coordinated by the Contractor.
- D. Acceptance. After the start-up operation has been successfully completed, the City will accept the Clarifiers when final Operation and Maintenance manuals have been received, reviewed, and accepted by the City. Include ladder logic diagrams and wiring and termination diagrams for both power and instrumentation systems.

END OF SECTION

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NOTES:

- DIMENSIONS NOTED ARE RELATIVE TO THE PUMP SIZE AND MANUFACTURER SELECTED. CONTRACTOR SHALL CONFIRM. INSTALL PUMPING SYSTEM IN ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS.
- EXISTING PUMPS ARE FLYGT, MODEL 3201 AND 3300. DRAWINGS BASED ON REPLACEMENT WITH FLYGT MODEL NP3202 MT 3~642.
- CONTRACTOR SHALL MODIFY EXISTING AIR CELL SUPPORT PROVISIONS IN WET WELL FOR PROPOSED CITY OF HOUSTON STANDARD TRANSDUCER INSTALLATION, SEE DETAIL SHEET M-19.
- CLEAN WET WELL WALL, AND CONNECTED PIPING TO PUMPS AND REMOVE SLUDGE/SETTLED DEBRIS IN ACCORDANCE WITH SPECIFICATION 02220 - FACILITIES DEMOLITION. INSPECT EXISTING T-LOCK LINER, REPORT FINDINGS TO THE ENGINEER, AND REPAIR PER ENGINEER'S DIRECTIONS. REMOVE AND REPLACE ACCESS HATCH SAFETY NETTING.
- CONTRACTOR SHALL TAKE CARE WHEN WORKING AROUND EXISTING EQUIPMENT, PIPING, AND SYSTEMS TO REMAIN. ANY DAMAGE TO SYSTEMS TO REMAIN SHALL BE REPAIRED BY CONTRACTOR AT NO COST TO OWNER.
- ORIENTATION AND LOCATION OF EXISTING FACILITIES IS BASED ON CONSTRUCTION PLANS OR PREVIOUS PROJECTS. VERIFY ALL FACILITIES IN THE VICINITY OR PROPOSED WORK. NOTIFY CONSTRUCTION MANAGER PRIOR TO COMMENCING WORK.
- PROVIDE BYPASS PUMPING/FLOW DIVERSION DURING CONSTRUCTION ACTIVITIES TO MAINTAIN PLANT OPERATION. AVERAGE DAILY FLOW IS 721 GPM AND MAX OBSERVED 2-HR PEAK IS 3,500 GPM. MINIMUM HEAD REQUIRED IS 43 FT. SEE SPECIFICATION SECTION 01110 - SUMMARY OF WORK.

PIPING LIST

1	10" SPOOL PIECE, FJ X FJ	16	10" PLUG VALVE, FJ X FJ
2	10" SPOOL PIECE, FJ X FJ	17	10" CHECK VALVE, FJ X FJ
3	10" 90° BEND, FJ X FJ	18	12" PLUG VALVE, FJ X FJ
4	12" SPOOL PIECE, FJ X FJ	19	12" CHECK VALVE, FJ X FJ
5	12" SPOOL PIECE, FJ X PE	20	12" DRESSER COUPLING, RESTRAINED JOINT
6	12" SPOOL PIECE, PE X PO	21	10" DRESSER COUPLING, RESTRAINED JOINT
7	12" SPOOL PIECE, PE X PE	22	18" X 12" TEE, FJ X FJ
8	12" 90° BEND, FJ X FJ	23	18" X 12" TEE, PO X PO
9	12" 90° BEND, PO X PO	24	12" X 10" TEE W/ 2" TAP, FJ X FJ
10	12" TO 10" REDUCER, FJ X FJ	25	18" X 12" TEE W/ 2" TAP, FJ X FJ
11	18" SPOOL PIECE, FJ X FJ	26	10" X 1'-0" SPOOL PIECE, FJ X FJ
12	18" SPOOL PIECE, PE X PE	27	10" X 2'-0" SPOOL PIECE W/ 2" TAP, FJ X FJ
13	18" 90° BEND, FJ X FJ	28	12" X 1'-0" SPOOL PIECE, FJ X FJ
14	18" 90° BEND, PO X PO	29	12" X 2'-0" SPOOL PIECE W/ 2" TAP, FJ X FJ
15	18" TO 12" REDUCER, FJ X FJ		

PIPING NOTES:

- AN "R" AFTER THE NUMBER DENOTES THE USE OF A RESTRAINED JOINT, PUSH-ON CONNECTION.

PRIVATE UTILITY LINES SHOWN

N/A
RELIANT ENERGY ENTEX, INC.

N/A
S.B.C. VALID FOR ONE YEAR
APPROVED FOR UNDERGROUND CONDUIT FACILITIES
UNLESS NOTED

N/A
RELIANT ENERGY
HOUSTON LIGHTING & POWER CO.
APPROVED ONLY FOR CROSSING UNDERGROUND DUCTLINES
UNLESS NOTED. VALID AT TIME OF REVIEW ONLY.

N/A
CABLE COMPANY

WESTON SOLUTIONS
5599 SAN FELIPE, SUITE 700
HOUSTON, TEXAS 77056
713-985-8600
TBPB REGISTRATION NO. F-3123

SURVEYED BY: LANDTECH
FB NO. P-5869

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

WILLOWBROOK WWTP IMPROVEMENTS

LIFT STATION IMPROVEMENT PLAN

WBS NUMBER	R-000265-0104-4
DRAWING SCALE	AS SHOWN
CITY OF HOUSTON PM	TANU HIREMATH, P.E.
DWG. NO.:	M-01
SHEET NO.	27 OF 98

PLAN VIEW @ GRADE
SCALE: 3/8" = 1'-0"

NO.	Date	Revisions
1		ADDENDUM NO. 1