Document 00910

ADDENDUM NO. 1

Date of Addendum: 1/28/16

PROJECT NAME: Metro Central, Upper Braes, White Oak, and Kingwood West WWTPs Improvements

PROJECT NO: WBS No. R-000265-0102-4

BID DATE: February 4, 2016 (No change in bid date)

FROM: Tim Lincoln, P.E., City Engineer
City of Houston, Department of Public Works and Engineering
611 Walker Street, Houston, Texas 77002
Attn: Bill Zod, 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

INTRODUCTORY INFORMATION

1. Document 00010 – TABLE OF CONTENTS. Remove page 00010-7 and replace with the attached revised page 00010-7.

BIDDING REQUIREMENTS

2. Document 00410B – BID FORM – Part B. Remove this document in its entirety and replace with the attached, revised Document 00410B – BID FORM – Part B.

GENERAL REQUIREMENTS

3. Section 01110 – SUMMARY OF WORK. Replace this section in its entirety with the attached revised Section 01110.

EQUIPMENT

4. Section 11176 – NON-POTABLE WATER SYSTEM. Remove page 11176-16 and replace with the attached revised page 11176-16.

5. Section 11200 – FABRICATED GATES. Add this new document to the Project Manual.

6. Section 11312 – DRY-PIT SUBMERSIBLE PUMPS. Remove pages 11312-8 and 11312-9 and replace with the attached, revised pages 11312-8 and 11312-9, respectively.

7. Section 11333 – MECHANICAL MULTI RAKE BAR SCREEN. Remove pages 11333-5, 11333-6, 11333-7, 11333-14, and 11333-15 and replace with the attached, revised pages 11333-5, 11333-6, 11333-7, 11333-14, and 11333-15, respectively.

8. Section 11342 – SELF-PRIMING CENTRIFUGAL CHOPPER PUMP. Remove pages 11342-6 and replace with the attached, revised page 11342-6.

9. Section 11363 – FLOATING DECANTERS. Remove pages 11363-3 and 11363-4 and replace with the attached, revised pages 11363-3 and 11363-4, respectively.

MECHANICAL

10. Section 15096 – ECCENTRIC PLUG VAVLES. Remove page 15096-5 and replace with the attached, revised page 15096-5.

11. Section 15105 – MOTORIZED VALVE ACTUATORS. Remove this section in its entirety and replace with the attached revised Section 15105.

CHANGES TO DRAWINGS

1. Sheet MC-E-1 (Sheet 28 of 117). Delete this sheet in its entirety and replace with the attached MC-E-1 (Sheet 28 of 117).

2. Sheet MC-I-1 (Sheet 31 of 117). Delete this sheet in its entirety and replace with the attached MC-I-1 (Sheet 31 of 117).

3. Sheets UB-G-1 (Sheet 33 of 117) and UB-G-2 (Sheet 34 of 117). Delete these sheets in their entirety and replace with the attached UB-G-1 (Sheet 33 of 117) and UB-G-2 (Sheet 34 of 117).

4. Sheet UB-S-2 (Sheet 59 of 117). Delete this sheet in its entirety and replace with the attached UB-S-2 (Sheet 59 of 117).

5. Sheet UB-S-3 (Sheet 60 of 117). Delete this sheet in its entirety and replace with the attached UB-S-3 (Sheet 60 of 117).

6. Sheet UB-E-4 (Sheet 64 of 117). Delete this sheet in its entirety and replace with the attached UB-E-4 (Sheet 64 of 117).

7. Sheet UB-E-5 (Sheet 65 of 117). Delete this sheet in its entirety and replace with the attached UB-E-5 (Sheet 65 of 117).

8. Sheet UB-E-6 (Sheet 66 of 117). Delete this sheet in its entirety and replace with the attached UB-E-6 (Sheet 66 of 117).

9. Sheet UB-I-1 (Sheet 74 of 117). Delete this sheet in its entirety and replace with the attached UB-I-1 (Sheet 74 of 117).

10. Sheet WO-S-3 (Sheet 76 of 117). Delete this sheet in its entirety and replace with the attached WO-S-3 (Sheet 76 of 117).

11. Sheet WO-S-5 (Sheet 78 of 117). Delete this sheet in its entirety and replace with the attached WO-S-5 (Sheet 78 of 117).

12. Sheet KW-E-7 (Sheet 107 of 117). Delete this sheet in its entirety and replace

with the attached KW-E-7 (Sheet 107 of 117).

13. Sheet KW-E-8 (Sheet 108 of 117). Delete this sheet in its entirety and replace with the attached KW-E-8 (Sheet 108 of 117).

CLARIFICATIONS

1. All exposed Non-Potable Water (NPW) pipes (including PVC) less than 2-inch in size shall be insulated with a minimum of 1.5" thick mineral wool.

2. The NPW pipes crossing roads and sidewalks shall be augered. Contractor to include the costs incidental to augering of NPW pipes in the base bid of the respective plant.

3. All non-insulated NPW pipes of any size shall be painted in purple and stenciled "Non Potable Water".

4. The elevation of the bridge at White Oak WWTP is per the survey conducted for the project. The new supports for the bridge shall maintain the bridge at the same elevation.

5. The new structural supports for the air bridge at White Oak WWTP can be offset from the current supports but no more than One (1) foot apart.

6. Lift station wet well at Kingwood West WWTP does NOT have to be cleaned in this project.

7. The actuators on the motorized valves at Kingwood West WWTP aerobic digester decanters shall be accessed from the top of the basin.

END OF ADDENDUM NO. 1

STATE OF TEXAS
MEHRAN BAVARIAN
48811
REGISTERED
PROFESSIONAL ENGINEER
1-28-16

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

mb

END OF DOCUMENT

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

(Total Bid Price; minus Base Unit Prices, Extra Unit Prices, Cash Allowances and All Alternates, if any)

B. BASE UNIT PRICE TABLE:

Item No.	Spec Ref.	Base Unit Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total in figures
1	01502	**Mobilization**	LS	1	$150,000(1)	$150,000(1)
2	00260	**Trench Safety System**	LF	1000		
3	Div 1 thru Div 16	**Metro Central WWTP** Improvements as shown in the Contract Drawings and Specifications. Complete in Place, including but not limited to: • Replacement of current non-functional Non-Potable Water (NPW) System and distribution System	LS	1		
4	Div 1 thru Div 16	**Upper Braes WWTP** Improvements as shown in the Contract Drawings and Specifications. Complete in Place, including but not limited to: • Installation of motor operated valves on all clarifier inlet gates • Improvements to the Non-Potable Water (NPW) system	LS	1		
5	Div 1 thru Div 16	**White Oak WWTP** Improvements as shown in the Contract Drawings and Specifications. Complete in Place, including but not limited to:	LS	1		

		• Replacement of the structural supports for the air header/ catwalk over the two aeration basins • Concrete repair of the two aeration basins • Inspection and replacement of gaskets on main air header from the blower building. • Inspection and replacement of gaskets at up to four (4) fittings on the air pipes at the two aeration basins.				
6	02101	**Removal, Loading, Transportation, and Disposal of Accumulated Grit:** from the two aeration basins at White Oak WWTP.	Wet Ton	600		
7	Div 1 thru Div 16	**Kingwood West WWTP** Improvements as shown in the Contract Drawings and Specifications. Complete in Place, including but not limited to: • Improvements to the existing rotary drum screen • Installation of a second bar screen with 1/4-inch spacing in a prefabricated steel channel. • Installation of plastic plate splash guard on both the sides of the conveyor for wind protection. • Installation of electric actuators for the two existing knife gates (42-inch and 30-inch) and one new 30-inch knife for the proposed second mechanical screen. • Installation of one floating tube decanter in each sludge holding basin for decanting. • Installation of a second WAS pump and associated piping and	LS	1		

		valves. • Replacement of stop logs at the clarifier inlet opening with manual slide gates. • Replacement of existing four (4) vertical centrifugal pumps at the lift station with four dry pit submersible pumps each of capacity 1.5 MGD, for a firm capacity of 4.5 MGD for the lift station. • Installation of new VFDs for the four new lift station pumps.				
TOTAL BASE UNIT PRICES						

C. EXTRA UNIT PRICE TABLE:

Item No.	Spec. No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in figures
1	02316 02317	Extra Hand Excavation	CY	100	[$50.00](2)	[$5,000.00](2)
2	02316 02317	Extra Machine Excavation	CY	500	[$10.00](2)	[$5,000.00](2)
3	02318	Extra Placement of Select Backfill Material	CY	100	[$10.00](2)	[$1,000.00](2)
4	02321	Extra Cement Stabilized Sand, complete in place	CY	100	[$50.00](2)	[$5,000.00](2)
5	02751	Reinforced Concrete Pavement 6”	SY	100	[$45.00](2)	[$4,500.00](2)
6	02741	Asphalt Pavement 3” with 8” Cement Treated Base	SY	200	[$40.00](2)	[8,000.00](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 forms	CY	100	[$200.00](2)	[$20,000.00](2)
9	02501	Extra 4” DI Pipe	LF	100	[$42.00](2)	[$4,200.00](2)
10	02501	Extra 8” DI Pipe	LF	100	[$68.00](2)	[$6,800.00](2)
11	02501	Extra 12” DI Pipe	LF	100	[$84.00](2)	[$8,400.00](2)
12	02501	Extra DI Fittings	TON	4	[$4000.00](2)	[$16,000.00](2)
13	05521	Extra Aluminum	LF	50		

		Handrails			[$55.00](2)	[$2,750.00](2)
14	05530	Extra 1" Aluminum Grating	SF	200	[$20.00](2)	[$4,000.00](2)
15	00700	Extra Floor Drain Installed	EA	3	[$660.00](2)	[$1,980.00](2)
16	00700	Extra Concrete Pipe Support	EA	5	[$1200.00](2)	[$6,000.00](2)
17	00700	Extra Pipe Hangers	EA	10	[$500.00](2)	[$5,000.00](2)
18	00700	Extra Concrete Grout in Place	CY	50	[$32.00](2)	[$1,600.00](2)
19	16111	1" PVC coated Rigid Steel Conduit installed above ground	LF	200	[$9.40](2)	[$1,840.00](2)
20	16111	1-1/2" PVC coated Rigid Steel Conduit installed above ground	LF	100	[$12.80](2)	[$1,280.00](2)
21	16111	2" PVC coated Rigid Steel Conduit installed above ground	LF	50	[$14.40](2)	[$720.00](2)
22	16111	2 ½" PVC coated Rigid Steel Conduit installed above ground	LF	50	[$15.60](2)	[$780.00](2)
23	16120	Copper No 14 AWG conductor with XHHW-2 insulation, installed in conduit	LF	3,000	[$0.50](2)	[$1500.00](2)
24	16120	Copper No 12 AWG conductor with XHHW-2 insulation, installed in conduit	LF	2,000	[$0.56](2)	[$1,120.00](2)
25	16120	Copper No 10 AWG conductor with XHHW-2 insulation, installed in conduit	LF	1,000	[$0.72](2)	[$720.00](2)
26	16120	Copper No 6 AWG conductor with XHHW-2 insulation, installed in conduit	LF	500	[$1.30](2)	[$650.00](2)
27	16120	Copper No 4 AWG conductor with XHHW-2 insulation, installed in conduit	LF	500	[$2.20](2)	[$1,100.00](2)
28	16120	Copper No 1 AWG conductor with insulation, installed in conduit	LF	100	[$4.10](2)	[$410.00](2)
29	16120	Copper No 4/0 AWG conductor with XHHW-2 insulation, installed in conduit	LF	300	[$6.90](2)	[$2070.00](2)
30	16126	2/C or 3/C, #16 AWG twisted shielded instrument cable, installed in conduit	LF	2,000	[$2.10](2)	[$4,200.00](2)
31	16402		LF	400		

		1" PVC Schedule 40 Conduit installed in underground duct bank			[$4.20](2)	[$1,680.00]2)
32	16402	2" PVC Schedule 40 Conduit installed in underground duct bank	LF	100	[$7.00](2)	[$700.00](2)
33	16402	Duct bank Trenching, Rebar, concrete encasement and backfill for a duct bank where the top of the conduit is 36" below grade. The cross sectional area of the concrete encasement shall be four square feet.	LF	100	[$27.00](2)	[$2,700.00](2)
34	16402	Electrical pull box complete and in place.	EA	1	[$2,500.00](2)	[$2,500.00](2)
35	16402	Communications pull box complete and in place.	EA	1	[$2,200.00](2)	[$2,200.00](2)
36	02101	Solids (Grit) Removal, Loading and Transportation	Ton	100	[$170.00] (2)	[$17,000] (2)
37	13441	Software Programming	HOURS	40	[$130.00] (2)	[$5,200] (2)
38		Replace gaskets on air pipe fittings	4	EA	[$1,500.00](2)	[$6,000] (2)
TOTAL EXTRA UNIT COSTS						$158,600.00(2)

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D. CASH ALLOWANCE TABLE: NOT APPLICABLE

Item No.	Spec Ref.	Cash Allowance Short Title	Cash Allowance in figures(1)
1		Building Permit – Metro Central WWTP	$7,500(1)
2		Building Permit – Upper Braes WWTP	$7,500(1)
3		Building Permit – White Oak WWTP	$7,500(1)
4		Building Permit – Kingwood WWTP Improvements	$7,500(1)
TOTAL CASH ALLOWANCES			$30,000(1)

Footnotes for Tables B through E:
(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 but not increased by Bidder by crossing out the Maximum and noting revised price on the line above. A Bid that increases the Maximum Bid Price may be found non-conforming and non-responsive.
(4) Fixed Range Bid 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.

REST OF PAGE INTENTIONALLY LEFT BLANK

E. ALTERNATES TABLE: NOT APPLICABLE

Item No.	Spec Ref.	Alternate Short Title	Unit of Measure	Estimated Quantity	Unit Price (this column controls)	Total Price for Alternate in figures
TOTAL ALTERNATES						$_____

F. TOTAL BID PRICE: **$**

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

REST OF PAGE INTENTIONALLY LEFT BLANK

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.

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.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of the Contract is for construction of Metro Central Wastewater Treatment Plant (WWTP) Improvements, Upper Braes WWTP Improvements, White Oak WWTP Improvements and Kingwood West WWTP Improvements – WBS No. R-000265-00102-4. Contractor shall furnish all labor, materials equipment and incidentals required to construct the modification and improvements in their entirety, as shown on the Drawings and specified herein. Including, but not limited to, the following:

1. Metro Central WWTP, located at 12815 Galveston Road, Houston, Texas 77062; Key Map Grid Number 617D.
   a. Replacement of current non-functional Non-Potable Water (NPW) System and distribution system.
   b. All associated electrical and control improvements.

2. Upper Braes WWTP, located at 13525 West Houston Center, Houston, Texas 77082; Key Map Grid Number 529A.
   a. Installation of electric actuators on existing four (4) clarifier inlet slide gates.
   b. Improvements to the Non-Potable Water system:
      i. Installation of three (3) vertical turbine pumps and associated piping and appurtenances.
      ii. Installation of two self-backwashing strainers and appurtenances.
      iii. Installation of a new air compressor and appurtenances.
      iv. Installation of new instruments on existing hydro-pneumatic tank.
   c. Installation of the NPW distribution system piping, hydrants throughout the facility and spray nozzles at the four (4) clarifiers.
   d. All associated electrical and control improvements.

3. White Oak WWTP, located at 7103 Gulf Bank Road, Houston, Texas 77040; Key Map Grid Number 411N.
   a. Replacement of the structural supports for the air header/catwalk over the two aeration basins.
   b. Clean out of grit accumulated in the two aeration basins.
   c. Concrete repair of the two aeration basins.
   d. Inspection and replacement of gaskets on main air header from the blower building to the aeration basins.
   e. Inspection and replacement of gaskets at up to four (4) fittings on the air pipes at the two aeration basins.

4. Kingwood West WWTP, located at 26808 Sorters Road, Houston, Texas, 77365; Key Map Grid Number 295Z.
   a. Improvements to the existing rotary drum screen
   b. Installation of a second bar screen with 1/4-inch spacing in a prefabricated steel channel.
   c. Installation of splash guard on both the sides of the conveyor for wind protection.
   d. Installation of electric actuators for the two existing knife gates (42-inch and 30-inch) and one new 30-inch knife for the proposed second mechanical bar screen.
   e. Installation of two (2) 200 GPM floating tube decanters, one in each existing aerobic digesters for decanting.
   f. Installation of a second WAS pump for redundancy and new suction pipe from the mixed liquor channel and associated isolation valves.
   g. Install slide gates at the two (2) clarifier inlet openings.
   h. Installation of new four (4) dry pit submersible pumps with VFDs and associated piping and valves at the influent lift station, for a firm capacity of 4.5 MGD.
   i. All associated electrical and control improvements.

1.03 CASH ALLOWANCES

A. Include the following specific Cash Allowances in Contract Price under provision of General Conditions Paragraph 3.11:

   1. Building Permit Fee, as listed in Document 00410B – Bid Form, Part B.

1.04 PRE-BID SITE WALK-THROUGH

A. A pre-bid meeting will be held on January 19th 2016 at 10:00 AM in the 15th Floor, Conference Room No. 1546at 611 Walker Street, Houston, Texas 77002.

B. A Pre-bid Site Walk-through, available to all Bidders and their subcontractors, will be conducted on the following dates:

WWTP	**Date**	**Time**
Metro Central	January 20, 2015	9:00 AM – 10:00 AM
Upper Braes	January 20, 2015	11:00 AM – 12:00 PM
White Oak	January 21, 2015	9:00 AM – 10:00 AM
Kingwood West	January 21, 2015	11:00 AM – 12:00 PM

All visitors must have completed the visit and exited the facility by the stipulated time. The Pre-bid site walk-through will be conducted by the Engineer with Plant Operations Staff present.

1.05 CITY-FURNISHED PRODUCTS

A. Items Furnished by the City for Installation and final connection by Contractor: None.

B. Contractor's Responsibilities:

1. Arrange and pay for Product delivery to the site.

2. Receive and unload Products at the site; jointly with the City, inspect for completeness or damage.

3. Handle, store, Install, and finish Products.

4. Repair or replace damaged items.

1.06 WORK SEQUENCE

A. The Contractor may work on up to two plants during the same time period if coordinated with through City's Inspector. The Contractor shall maintain at least one field office at all times. When work is substantially complete at two plants, the Contractor may work on the next two plants simultaneously. However, the Contractor shall not work on Metro Central WWTP and Kingwood West WWTP during the same time period.

B. The Contractor shall provide the Owner and Engineer with a construction sequencing schedule or chart prior to submitting the construction schedule. The construction sequencing schedule shall incorporate all of the Work required by the Contract Documents and shall

incorporate all of the constraints listed in Paragraphs 1.11 and 1.12 of this section.

C. Plant Operational Requirements

1. Interruption of wastewater flows of any kind and plant, facility or process shut downs are not permitted without prior written approval of the City Wastewater Operation. Contractor shall submit a request for approval to the City Wastewater Operation at least (7) calendar days prior to the planned shutdown. The submittal request shall include construction plans which detail schedule, techniques, and method to be used for interruptions of wastewater flow and shutdowns.

2. Flow interruptions and shut downs should be scheduled for low flow periods for as short a duration as practical. Shutdown of wastewater pumping and processing facilities are not allowed during peak flow conditions. Make provisions for accommodating peak flow as necessary.

3. Contractor acknowledges that all construction “means and methods” required to accomplish work in the contract documents specifications, and drawings within these constraints is the Contractor’s sole responsibility. No separate payment will be made for “means and methods” used by the Contractor required to accomplish the work. Include price for “means and methods” in Lump Sum as part of the Base Unit Price Table in Section 00410B.

4. Replacing of NPW System at Metro Central and Upper Braes WWTPs:
    a. During the replacement of the NPW system, Contractor shall provide temporary means of non-potable water supply for the following at Upper Braes: clarifier spray nozzles (30 GPM per clarifier at 50 psi), sludge thickener (30 GPM at 50 psi), and belt press booster pump supply (80 GPM at 50 psi).
    b. Replacement of NPW pumps at Upper Braes WWTP parshall flume inlet channel:
        i. Bypassing of flows around in the inlet channel to install the new pump brackets will be allowed during dry weather conditions when flows to the plant is less than 10 MGD.
        ii. Bypassing of flows shall be halted during rain events or when flows exceed 10 MGD and can be resumed when flows subside.
    c. Metro Central WWTP currently uses potable water for NPW

needs at the plant. Potable water supply shall remain in service during the installation of the new NPW system.

5. Replacing of aeration basin catwalk structural supports at White Oak WWTP:
    a. There are two aeration basins at the plant. One of the basin is currently not in service. Work shall be performed on this basin first.
    b. One of the two aeration basins shall be in service at any time. Coordinate with plant staff on shutdown of aeration basins to make the improvements.

6. Replacing of influent lift station pumps at Kingwood West WWTP:
    a. The two existing larger 4 MGD vertical centrifugal pumps shall be replaced first and brought in service before replacing the smaller pumps.
    b. Bypassing shall be allowed when flows to the plant is less than 5 MGD.
    c. Bypassing of flow shall be halted during rain events or when flows exceed 5 MGD and be resumed when flows subside.

7. Improvements to existing rotary drum screen at Kingwood West WWTP:
    a. The new mechanical bar screen shall be installed and in service before the rotary drum screen is take out of service to perform the improvements.

8. Improvements to existing aerobic digesters at Kingwood West WWTP:
    a. There are two aerobic digesters at the plant. At least one basin shall remain in service at all times. Coordinate with plant staff to take basins out of service to install the decanters.

9. Installation of slide gates and clarifier openings at Kingwood West WWTP:
    a. Contractor can bypass flows from the Mixed Liquor (ML) channel to install the slide gates at the clarifier inlet opening.
    b. Bypassing shall be allowed only during normal dry weather when the mixed liquor flow to the clarifiers is less than 2 MGD.

D. Coordination of the Work:

1. Refer to Section 01312 - Coordination and Meetings.
2. The Contractor shall make every effort to group work in similar

areas or work that will affect similar operation together.

1.07 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.

C. Utility Outages and Shutdown: Provide a minimum of 48 hours notice to the City and private utility companies (when applicable), excluding weekends and holidays, in advance of required utility shutdown. Coordinate all work as required.

1.08 STREET CUT ORDINANCE

A. Excavations on or under pavement in the City's right-of-way must have a permit. Comply with City of Houston, Texas Ordinance No. 2000-1115, an ordinance amending Chapter 40 of the Code of Ordinances, Houston, Texas, relating to excavating in the Public right-of-way.

B. Comply with the latest edition of street cut New Pavement Repair and Pavement Replacement details.

C. Quantities are included for street cut pavement repair and replacement in applicable Specification sections for Unit Price contracts.

D. Include payment for street cut pavement repair and replacement in lump sum bid for Stipulated Price contracts.

1.09 WARRANTY

A. Comply with warranty requirements in accordance with Document 0072.00 - General Conditions.

1.10 ADDITIONAL CONDITIONS FOR SUBSTANTIAL COMPLETION

A. One Partial Substantial Completion will be given for each WWTP and Full Substantial Completion will be given when partial substantial completion is given for all the four WWTPs. The City reserves the right to use any of the installed equipment that can be put in service prior to full substantial completion.

B. In addition to requirements outlined in Document 00700 – General Conditions, for Contractor to be substantially complete with the Work

at each WWTP, call for inspection by Project Manager to confirm that the following conditions are met or completed:

1. All new structures and building fully constructed and complete with all utilities connected in service and operation.

2. All equipment installed, tested and functional without any malfunction for seven (7) consecutive days in both Hand and Auto Modes.

3. All site plan, hard piping, electrical and all other site work installed, tested and complete.

4. Fully functional SCADA System and fully functional HMI and operator interface panels.

5. All control narratives and system startup procedures and equipment interaction fully demonstrated.

6. All testing requirements included in Section 13300 shall be completed and accepted by the Project Manager.

7. Three (3) review copies of the O&M manuals including four (4) CDs of the manual in navigable and searchable electronic format shall be delivered to the Project Manager for review prior to the start of training on training on installed equipment and comment in accordance with Section 01782.

C. No additional condition described in Paragraph 1.08 may be included in Contractor's punch list.

1.11 GENERAL CONSTRUCTION NOTES

A. The Contractor is responsible for verifying the location(s) of all underground utility lines shown on the drawings before beginning construction.

B. Information contained on the project drawings for existing facilities was taken from the City's Record Drawings. Existing facilities and structures are shown in a light line weight and are shown for Contractor's information only. All proposed work is shown in a heavy or bold line weight. The accuracy of the existing facilities and structures shown on the drawings is not guaranteed, and the use of such information in no way relieves the Contractor or others

of any responsibility for loss due to inaccuracies. City's Record Drawings referenced in preparation of the project drawings include, but are not limited to, the following sets of Drawings:

1. City Drawing No. 34400 – Southeast and Metro Central WWTP Lift Station Replacements. (March 1998)
2. City Drawing No. 48168 – Metro Central, Keegans Bayou, Park Ten, and Upper Brays Wastewater Treatment Plants Improvements. (April 2011)
3. City Drawing No. 28609 – Upper Brays Regional Wastewater Treatment Plant Total Plant Capacity 18.0 MGD (January 1989)
4. City Drawing No. 30053 – Wastewater Treatment Plant Dechlorination Facilities for Clinton Park, Northborough, Southeast, and Upper Brays (November 1991)
5. City Drawing No. 32518 – Upper Brays WWTP Biofilter Odor and Corrosion Control Program. (March 1996)
6. City Drawing No. 35194 – Miscellaneous Process Improvements. (March 1999)
7. City Drawing No. 35217 – Biosolids Management Plan for the Keegans Bayou, Upper Brays & Metro Central Wastewater Treatment Plants. (April 1999)
8. City Drawing No. 47962 – Upper Brays Wastewater Treatment Plant Electrical Improvements. (January 2011)
9. City Drawing No. 48680 – West District and Upper Brays Wastewater Treatment Plant Improvements. (August 2011)
10. City Drawing No. 27744 – Expansion of White Oak Wastewater Treatment Plant. (June 1984)
11. City Drawing No. 45116 – White Oak Wastewater Treatment Plant Improvements. (June 2008)
12. City Drawing No. 19525 – White Oak Municipal Utility District Expansion of Wastewater Treatment Facilities. (June 1974)
13. City Drawing No. 43086 – Kingwood West Wastewater Treatment Plant Improvements. (February 2007)

C. Contractor shall be responsible for providing required security to protect his own property, equipment and work in progress.

D. Contractor shall be responsible for adequately protecting existing structures, utilities, trees, shrubs and other adjoining facilities and repair or replace due to damage caused by the Contractor.

E. Contractor shall field verify all dimensions and conditions before commencing work. All landscaping features shall be field verified. It shall be the Contractor's responsibility to report any discrepancies to the Engineer in a timely manner.

F. Contractor to keep access road to existing plants open at all times. Contractors staging area used for Contractor's personnel, parking, material, and storage. Stockpile, material fabrication and related construction uses will not be allowed to interfere with normal plant operation. Contractor to provide temporary all-weather access roads as needed to maintain access to all unloading areas, throughout the duration of the project.

G. Obtain all required construction permits prior to commencement of work.

H. The finished grade elevations shown are intended to provide drainage away from plant facilities. Minor changes may be necessary to provided adequate drainage.

I. Maintain drainage of site during all phases of construction. Do not block drainage from adjacent areas or add flow to adjacent areas.

J. Contractor shall comply with all Federal, State, and local laws and regulations of utility companies concerning safety and health practices.

K. Contractor shall provide sodding in all areas disturbed as a result of construction operations that are not covered by structures or pavement.

L. Yard piping locations shown are approximate. Field verify locations of existing pipe. Arrange new piping as necessary to avoid interference and provide clearance noted. All changes in piping shown, to be documented on required "red line drawings."

M. Maintain minimum clearance of 3 feet from edge of structures to closest edge of pipeline adjacent and parallel to edge of structure unless otherwise noted on plans.

N. The Contractor is to provide tape, fittings, plugs, and other devices for use in filling, flushing, testing, etc. as incidental to listed pay items.

1.12 CONFIDENTIALITY OF CONTRACT DOCUMENTS

A. Contractor shall keep the Plans confidential as provided in this Agreement and shall not make copies of the Plans. Contractor understands that the Plans are confidential information under the Texas Homeland Act, Chapter 421 of the Texas Government Code.

B. Contractor shall keep the Plans in a locked secure location. The Company shall admit to this location and share this information with

only its personnel and subcontractors for the purpose of performing the Work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

Table 11176-C: Self-Backwashing Strainers

UPPER BRAES WWTP	
Parameter	Value
Equipment Tags	NP-SBS-1 NP-SBS-2
Number of Units	2
System Flow Rate (gpm)	450
Strainer Flow Rate (gpm/each)	450
Maximum Operating Pressure (psi)	110
Design Pressure (psi)	200
Operating Water Temperature (F)	80
Maximum Screen Spacing (in / micron)	.015 / 385
Maximum Allowable Clean Water Pressure Drop (psi)	1.5
METRO CENTRAL WWTP	
Parameter	Value
Equipment Tags	NP-SBS-1 NP-SBS-2
Number of Units	2
System Flow Rate (gpm)	340
Strainer Flow Rate (gpm/each)	340
Maximum Operating Pressure (psi)	110
Design Pressure (psi)	200
Operating Water Temperature (F)	80
Maximum Screen Spacing (in / micron)	.015 / 385
Maximum Allowable Clean Water Pressure Drop (psi)	1.5

B. Manufacturer

1. Acceptable Manufactures

    a. Amiad, Model SAF
    b. Eaton/Hayward, Model 2596
    c. S.P. Kinney

2. Listing as an acceptable manufacturer will not relieve the manufacturer from conforming to Contract Specifications.

C. Control Panel (NP-CP-1 AND NP-CP-2)

SECTION 11200

FABRICATED GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish labor, materials, equipment and incidentals necessary to install gates as shown in the gate schedule with operators, gate stems, frames, gate guides, and other related appurtenances.

1.02 MEASUREMENT AND PAYMENT

A. Unit Price

1. No separate payment will be made for fabricated gates under this section. Include payment in Lump Sum as part of the Work in appropriate sections.
2. Refer to Section 01270 - Measurement and Payment and Section 01292 - Schedule of Values

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for work in this Section is included in the total Stipulated Price.

1.03 QUALITY ASSURANCE

A. ACCEPTABLE MANUFACTURERS

Whipps.

Fontaine.

Golden Harvest.

HydroGate.

Waterman Industries

Or Approved equal

B. MANUFACTURER'S REPRESENTATIVE FOR STARTUP AND TESTING:

1. The services of the manufacturer's technical representative shall be provided for pre-startup installation checks, startup assistance, training of Owner's operating personnel, troubleshooting and other services as required in Section 01650 “Starting and Adjusting.” Provide training in adequate detail to ensure that the trainees who complete the program will be qualified and capable of operating and

maintaining the equipment, products, and systems provided. Training shall be conducted for a minimum of 4 hours by the manufacturer's representative. The Contractor shall submit the training schedule to the Owner for approval a minimum 2 weeks from the proposed training.

C. The fully assembled gates shall be shop inspected, tested for operation and leakage, and properly adjusted before shipping. Manufacturer shall provide test certificates to show that they meet the leakage rate required in this section. There shall be no assembling or adjusting on the site other than for the lifting mechanism.

D. The gate manufacturer shall be ISO 9001 certified and compliant or have an approved quality assurance policy.

1.04 SUBMITTALS

A. Submittals shall be in accordance with Section 01330 "Submittal Procedures" and shall include:

1. Shop Drawings.
2. Operation and Maintenance Manuals.

1.04 REFERENCE STANDARDS

A. The applicable provisions of the following standard shall apply as if written here in its entirety:

American Water Works Association (AWWA) Standards:

AWWA C513-05	Open Channel Fabricated Metal-Slide Gates and Open Channel Fabricated Metal-Weir Gates
AWWA C561-04	Fabricated Stainless Steel Slide Gates

1.05 EXPERIENCE REQUIREMENTS

A. The equipment Supplier shall have at least 10 years' experience in the design, application and supply of stainless steel fabricated gates in wastewater service. The equipment Supplier shall submit a list of not less than 10 operating installations in the United States with similar size gate as scheduled, as evidence of meeting the experience requirement. Installation list shall be submitted with the Shop Drawings.

1.06 GUARANTEE AND WARRANTY

A. Manufacturer shall warrant that the complete system shall be free from defective material and workmanship for a period of two (2) years from date of Owner acceptance.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials in fabricated gates and appurtenances shall conform to the requirements of the applicable specifications listed below for the alloy, grade, type, or class of material and the condition and finish appropriate to the structural and operational requirements:

1. Carbon Steel Bars: ASTM A108 or ASTM A575.
2. Structural Steel Shapes, Plates, and Bars: ASTM A36.
3. Stainless Steel: ASTM A167, ASTM A276 or ASTM A582, Type 302, 303, 304 or 304L, 316 L.
4. Bronze Bar, Rods, Shapes: ASTM B21 or ASTM B98.
5. Cast Bronze: ASTM B584.
6. Rubber for Gaskets and Seals: ASTM D2000, Grade R-62.
7. UHMW Polyethylene: ASTM D4020.

2.02 FABRICATED GATES

A. General:

1. Gates shall be as specified herein and have the characteristics and dimensions shown on the Contract Documents.
2. Leakage for fabricated gates shall not exceed 0.05 GPM/FT of wetted seal perimeter in seating and unseating head conditions.
3. The gate seal design shall meet the latest applicable AWWA standards.
4. All structural components of the frame and slide shall be constructed of fabricated stainless steel having a minimum thickness of 1/4 inch and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
5. All welding shall be performed by welders with AWS certification and be completed in the manufacturing facility. No welding is allowed in the field during installation.

6. Materials:

Components	Materials
Frame Assembly and Retainers	304 L stainless steel
Slide and Stiffeners	304 L stainless steel
Stem	304 L stainless steel
Fasteners, Nuts and Bolts	304 L stainless steel
Invert Seal (Upward Opening Gates only)	Neoprene
Seat/Seals and Facing	UHMWPE
Lift Nuts	Bronze
Pedestal and Wall Brackets	Stainless steel
Operator Housing	Aluminum

B. Frames

1. Frame shall be formed or extruded construction consisting of guides and invert members and top member where top closure is required. Suitable reinforcements shall be provided to resist all operating loads.
2. Each frame shall be designed for the appropriate mounting style of the individual gate as described in this Specification.
3. The structural portion of the frame that incorporates the seat/seals shall be formed into a one-piece shape for rigidity. Guide members that consist of two or more bolted structural members are not acceptable. Guide member designs where water loads are transferred through the assembly bolts are not acceptable.
4. On self-contained gates, a yoke shall be provided across the top of the frame. The yoke shall be formed by two structural members affixed to the top of the side frame members to provide a one-piece rigid assembly. The yoke shall be designed to allow removal of the slide. The maximum deflection of the yoke shall be 1/360 of the gate's span.
5. A rigid stainless steel invert member shall be provided across the bottom of the opening. The invert member shall be of the flushbottom type on upward opening gates. Flushbottom seal shall incorporate an embedded frame channel gate for new construction or an existing channel gate mount for existing channels.
6. A rigid stainless steel top seal member shall be provided across the top of the opening on gates designed to cover submerged openings.
7. Frames mounted over existing thimbles shall be installed using drilled and epoxy-set anchors through the existing thimbles. These frames shall be installed in such a way as to ensure their performance as new. Shop Drawings shall include a set of instructions from the Manufacturer on installation over existing wall thimbles.

C. Slides and Guides:

1. The slide and reinforcing stiffeners shall be constructed of stainless steel plate. All structural components shall have a minimum thickness of 1/4 inch.
2. The gate slide deflection shall not exceed 1/360th of gate width at maximum design head or 1/16 inch at seal points, whichever is less.
3. Reinforcing stiffeners shall be welded to the slide and mounted horizontally. Vertical stiffeners shall be welded on the outside of the horizontal stiffeners for additional reinforcement.
4. The stem connector shall be constructed of two angles or plates. The stem connector shall be welded to the slide. A minimum of two bolts shall connect the stem to the stem connector.
5. The gate guides shall be designed for maximum rigidity, having a weight of not less than 7 pounds for stainless steel. The guides shall be of sufficient length to contain two-thirds of the height of the slide when the gate is fully open. On self-contained gates, where the guides extend above the operating floor, they shall be strong enough so that no further reinforcing shall be required.
6. Seat facings shall be machined to a smooth finish to ensure proper watertight contact.

D. Gate Stem and Lift:

1. Stems shall be of suitable length with minimum 1.5-inch diameter, and ample strength for the intended service. The operating stem shall be rising. The stem diameter shall be capable of withstanding twice the rated output of the operator at 40 pounds crank or hand wheel pull and shall be capable of moving the gate slide with the specified seating and unseating head against the gate.
2. The stem shall be furnished in sections as necessary to permit reasonable ease in installation. Couplings shall be bolted, pinned or machine-cut ACME threads of sufficient length to completely open the gate. The threads shall be smooth and of uniform lead and cross-section, such that the nut can travel the full length without binding or excessive friction. The stem shall be threaded for connection to the stem block or thrust nut on the gate slide. The entire stem shall be of solid stainless steel and the threaded portion of the stem shall have a rolled or machine cut ACME threads. Stem extension pipes are not acceptable unless approved prior to installation by the Engineer.
3. Stem guides shall be fabricated with UHMWPE bushed collars. Stem guide spacing shall be as recommended by the manufacturer, but in no case shall it exceed slenderness ratio l/r ratio of 200.
4. An adjustable bronze stop collar shall be provided to limit both upward and downward travel of the fabricated gate.
5. Provision shall be made to prevent stem rotation within the thrust nut at the connection with the gate slide.

E. Seals:

1. All gates shall be equipped with UHMW polyethylene side and bottom seat/seals, UHMW polyethylene seats, or J-type seals to restrict leakage and to prevent metal to metal contact between the frame and slide.
2. The seat/seals shall extend to contain two-thirds the height of the slide when the slide is in the fully opened position.
3. All upward opening gates shall be provided with a resilient seal to seal the bottom portion of the gate. The seal shall be attached to the invert member or the bottom of the slide and it shall be held in place with stainless steel attachment hardware.
4. The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or suffering damage.
5. All seals must be bolted or otherwise mechanically fastened to the frame or slide or shall be field replaceable without the need to remove the gate assembly or grout. Arrangement with seals that are force fit or held in place with adhesives are unacceptable.
6. The seals shall be mounted so as not to obstruct the gate opening.
7. The seal system shall be factory tested to confirm negligible wear (less than 0.01 inch) and proper sealing.
8. Neoprene J-type seals are acceptable only when used in combination with UHMW polyethylene seats.

F. Manual Operators: The operator shall be mounted on the pedestal.

1. The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40-pound effort when the gate is in the closed position and experiencing the maximum operating head.
2. An arrow with the word "OPEN" shall be permanently attached or cast onto the operator to indicate the direction or rotation to open the gate.
3. Manufacturer shall provide the appropriate operator (handwheel, crank-operated gearbox, off-set crank, or other approved mechanism) at 36 inches above operating floor unless noted otherwise in the schedule or the Drawings.
4. Handwheel operators shall be fully enclosed and shall have a cast aluminum housing.
    a. Handwheel operators shall be provided with a threaded cast bronze lift nut to engage the operating stem.
    b. Handwheel operators shall be equipped with roller bearings above and below the operating nut.

c. Positive mechanical seals shall be provided above and below the operating nut to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.

d. The handwheel shall be removable and shall have a minimum diameter of 14 inches.

5. Crank-operated gearboxes shall be fully enclosed and shall have a cast aluminum housing.

   a. Gearboxes shall have single or double gear reduction, as necessary.

   b. Gearboxes shall be provided with a threaded cast bronze lift nut to engage the operating stem.

   c. Bearings shall be provided above and below the flange on the operating nut to support both opening and closing thrusts.

   d. Gears shall be steel with machined cut teeth designed for smooth operation.

   e. The pinion shaft shall be stainless steel and shall be supported on ball or tapered roller bearings.

   f. Positive mechanical seals shall be provided on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.

   g. The crank shall be cast aluminum or fabricated stainless steel with a revolving nylon or brass grip.

   h. The crank shall be removable. Provide one crank for every gate unless otherwise approved by the Engineer.

6. Pedestals shall be constructed of stainless steel. Aluminum pedestals are not acceptable.

   a. The pedestal height shall be such that the handwheel or pinion shaft on the crank-operated gearbox is located 36 inches above the operating floor.

   b. No anchor bolt shall be located closer than 4.5-inches to the edge of concrete. See structural and mechanical details for requirements.

   c. Wall brackets shall be used to support floor stands where shown on the Drawings and shall be constructed of stainless steel.

   d. Wall brackets shall be reinforced to withstand in compression at least two times the rated output of the operator with a 40-pound effort on the crank or handwheel.

   e. The design and detail of the brackets and anchor bolts shall be provided by the gate manufacturer and shall be approved by the Engineer. The gate manufacturer shall supply pedestal, base plates, anchor bolts and accessories as part of the gate assembly.

7. Operators shall be equipped with fracture resistant clear butyrate or lexan plastic stem covers.

   a. The top of the stem cover shall be closed.

b. The bottom end of the stem cover shall be mounted in a housing or adapter for easy field mounting.

c. Stem covers shall be complete with indicator markings to indicate gate position.

d. Vent holes shall be provided to prevent condensation.

e. Cover shall not become brittle or discolored when subjected to local weather conditions for a minimum of 5 years after installation. Replacement of covers less than 5 years after installation shall be provided under warranty.

PART 3 EXECUTION

3.01 INSTALLATION

A. Fabricated gates shall be installed in accordance with the recommendations of the gate manufacturer. Guide frames for fabricated gates shall be as shown on the schedule. The bottom of the fabricated gate structure shall be embedded flush bottom, unless otherwise indicated.

B. Install the gates in a manner that will prevent leakage around the seats and binding of the gates during operation. Keep surfaces where metal and the concrete placed come in contact free from oil, grease, loose mill scale, loose paint, surface rust, and other debris or objectionable coatings. Secure anchor bolts, thimbles and spigot frames in true position in the forms and hold in alignment during the placement of the concrete. Finish surfaces to provide a smooth and uniform contact surface where concrete and rubber seals come in contact and where flat frames or plates are installed. When a flat frame is installed against concrete, the Contractor shall either install using double-nuts and a grout pad or a minimum 1/2-inch EPDM or 1/2-inch non-shrink grout shall be placed between the gate and the concrete.

C. Carefully align gate stems, stem guides and gate lifts so the stem is parallel to the guide bars or angles on the gate frame after installation.

3.02 FIELD QUALITY CONTROL

A. Prior to final acceptance by the Owner, the gates shall be tested in the presence of the Engineer. A seating head corresponding to the maximum water level shall be placed on the gate and the gate examined for leakage. The maximum allowable leakage for fabricated gates shall be as specified earlier in this Section. Manufacturer shall provide test certificates to show that they meet the leakage rate required in this Section. The gate shall be opened from the fully closed position under maximum seating head, and closed from the fully open position under average flow conditions to verify that the gate lift is operational and in satisfactory working order.

3.03 CLEAN AND ADJUST

A. After installation, clean, lubricate, and otherwise service the gate and lift in accordance with the manufacturer's instructions.

3.04 SCHEDULES

A. Gates shall be supplied in accordance with the following schedule: The required gates and certain pertinent data are given below. This list is given to facilitate description of the various gates and as an aid to plan take-off, and is not guaranteed to be complete.

Gate Size (in) (Width x Height)	**Opening Direction**	**Gate Material**	**Invert El. (ft)**
60 x 24	Upward	304 SS	83.83
60 x 24	Upward	304 SS	83.83

Location	Kingwood West WWTP Clarifiers #1 and #2 Openings
Opening Direction	Upward (Fabricated Gates)
Gate Type	Slide Gate (SLD)
Mount	Existing Structure Existing Channel Mount (EC)
Operator Type	Manual (MAN)

Refer to drawings for gate location, elevations and alignment details.

END OF SECTION

2.04 COOLING SYSTEM

A. Each unit shall be provided with an integral motor cooling system. A motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F (40°C). Operational restrictions at temperatures below 104°F are not acceptable.

1. Thermal sensors shall be embedded in the end coils of stator windings (one in each phase) to monitor stator temperatures. These shall be used in conjunction with external motor over load protection and wired to the control panel.

2. The pump cooling system shall be a self-contained closed loop cooling system. The motor shall be cooled via a high purity mineral oil or water/glycol cooling medium circulated through a jacket surrounding the air-filled motor cavity. The cooling medium shall be circulated by an impeller mounted on the pump/motor shaft. The cooling jacket shall surround the entire motor including the top and down the length of the motor. The cooling medium circulation impeller shall cause the cooling fluid to move through the jacket from which it picks up heat from the motor. This heat is then directed into the internal heat exchanger that transfers the heat to the pumped liquid. The heat exchanger shall be located below the sealing chamber. It shall be provided with a labyrinth design channel system such that sufficient contact time is maintained in the heat exchanger to allow for continuous pump operation without overheating. The cooling system shall have one fill port and one drain port integral to the cooling jacket.

3. Cooling systems requiring separate, clean water source or that circulates the pumped sewage through a cooling jacket, fans, blowers, or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.

2.05 PUMP CONTROL

A. The pumps shall be controlled by adjustable speed drive motors. Refer to section 13440 PLC Control System and 16715 Low Voltage Adjustable Speed Drives.

PART 3 EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with the Manufacturer's instructions. Any modification to the structure as a result of requiring different size access door hatchways is the responsibility of the Contractor.

3.02 FIELD QUALITY CONTROL

A. Upon completion of installation of the equipment, an acceptance test to verify the satisfactory operation of each unit shall be conducted. The Contractor shall provide the services of authorized representative to conduct all field tests. The test shall be conducted in a manner approved by and in the presence of the Engineer. The unit shall be checked for excessive noise, vibration, alignment, general operation, ease of removal, etc. All automatic and manual controls shall be tested to verify that they function in accordance with the requirements. Verify that drive equipment operates without being overloaded. The unit must perform in a manner acceptable to the Engineer before final acceptance will be made by the Owner.

3.03 PAINTING

A. Pumps, motors, baseplates, discharge elbows, and guiderails shall be painted in accordance with Section 09901 "Protective Coatings" of these Specifications.

3.04 SCHEDULES

	Location
Location	Kingwood West WWTP – Influent Lift Station
Equipment No.	LSP-110, LSP-120, LSP-130, LSP-140
Number of Units	4
Rated Capacity (gpm)	1040
Rated Head, TDH (ft.)	66
Min. Cap. Rated Head, TDH (ft.)	75
Minimum Shutoff Head (ft.)	135
Maximum Speed (rpm)	1800
Minimum Pump Speed (rpm)	40-50 percent of max. speed
Rated Motor HP	45
Minimum Pump Efficiency	60
Minimum pump discharge size (in.)	4-in

END OF SECTION

B. Spare parts shall be packed and shipped in containers bearing labels clearly designating contents and pieces of equipment for which it is intended.

1.07 EQUIPMENT WARRANTY

A. Manufacturer shall warrant that the complete system shall be free from defective material and workmanship for a period of two (2) years from the date of substantial completion of the work performed at the site where the equipment operates.

PART 2 P R O D U C T S

2.01 MATERIALS

A. All wetted parts shall be made of type 304 Stainless Steel unless assembly involves welded connections. All welded parts shall be made of type 304L Stainless Steel. Only corrosion resistant materials shall be used in components traveling underwater. These parts shall include, but not be limited to the side frame, bar rack, rake, dead plate, chain links, chain pins, chain rollers, hardware, discharge chute, cover plates, and scraper arm.

B. Materials and components described herein as UHMW-PE (Ultra High Molecular Weight Polyethylene) shall be per ASTM D4020-81 unless specifically noted otherwise.

C. All welders and all welding procedures shall be per AWS D1.6. and/or AWS D1.3.

D. All wetted parts shall have a minimum material thickness of 5/32-inch.

E. All equipment shall be designed, fabricated, and assembled in accordance with recognized and acceptable engineering and shop practice. Individual parts shall be manufactured to standard sizes and thicknesses so that repair parts can be installed in the field. Like parts of duplicate units shall be interchangeable. Equipment shall not have been in service prior to delivery, except as required by factory testing.

2.02 BAR RACK

A. General

1. The bar rack shall consist of equally spaced, 304L stainless steel bars. The bar screen assembly shall be tear drop shaped with minimum dimensions of 0.25” x 2.00”.

2. Bar screen assembly shall adhere to Design Criteria table criteria in

relation to slot opening, angle of installation, tank dimensions, etc.

3. The lower end of the bar rack at the channel invert, shall be fitted with a curved base plate (or channel bottom plate) such that the rake will positively remove screenings from the channel invert. The base plate shall be fabricated from 304L stainless steel and have a minimum thickness of 3-16-inch.

4. The dead plate shall be constructed of 3/16-inch 304L stainless steel plate, suitably reinforced.

5. The dead plates shall be flat to within 1/16".

6. The dead plate shall be connected to the bar screen so that overtopping is prevented.

7. The dead plate shall extend from the top of the bar rack to the screenings discharge point.

2.03 MECHANISMS

A. General

1. The mechanism shall consist of chain guides, discharge chute, link system, scrapers, side frames, rake and chain assembly (with rollers, sprockets, bearings, and drive components).

2. The bar rack shall be cleaned by the rake engaging the bar rack from the front (upstream side) at the channel invert and removing debris on its upward travel.

3. The mechanically cleaned bar screen shall operate intermittently based on differential water level across the screen.

4. On meeting a blockage, the screen shall be able to automatically reverse the direction of travel of the raking mechanism for an adjustable distance and revert to the forward motion to try and clear the blockage. This reversing action can occur a maximum of three times for any one obstruction. The device shall re-set automatically if the blockage causing the initial overload condition is cleared; or, should the blockage remain upon the completion of the fourth attempt, the screen shall be tripped and an alarm generated.

B. Fabricated Tank

1. A channeled tank shall be fabricated from 304 stainless steel and shall incorporate one (1), 30-inch diameter flanged inlet connection

and two (2) 18-inch outlet flanges for screen effluent and tank overflow as shown in the contract drawings. The tank floor upstream of the screen shall be sloped towards the screen to direct any settled solids towards the screen.

2. The tank walls shall have a minimum thickness of 10-gauge with formed stiffeners sufficiently sized to handle all structural loads. Removable tank covers manufactured of 304 stainless steel with handles and latching system shall be provided with neoprene or equal seals between the cover and tank top flange. Tank cover and supports shall be designed for a live load of 60 pounds per squate foot (psf) to be used as a walking surface as shown in the contract drawings.

C. Mechanically Cleaned, Conventional Chain Bar Screen

1. The side frames shall be of 1/4" minimum stainless steel plate construction suitably reinforced to support the required loads and prevent vibration. The frame shall be designed to rest on the channel wall brackets. Channel wall brackets shall be securely fastened to the concrete channel. Each side frame shall include a chain guide to direct the chain and rake assembly and ensure proper engagement of rake teeth. The chain guide shall be bolted to the side frames and not protrude into the flow. The chain guide shall extend the full height of travel and shall have an L-profile made of 304 Stainless Steel. No braces, gussets, or stiffeners shall be located inside the screen frame that will allow for screenings to accumulate.

2. The rake assembly shall include rake bars of 1/2” thick, 304 Stainless Steel, and rake blades with a minimum thickness of 1/2”. Rake blades shall be made of Stainless Steel and have the capacity to lift 100 lbs per linear foot of rake blade. Teeth on Rake Blades shall precisely engage the clear space between each bar in the bar rack. Teeth shall engage to a minimum of 1” past the front of the bar rack.

3. The chain links and rollers shall be fabricated from 304 Stainless Steel. The average ultimate strength of the chain shall be a minimum of 30,000 pounds-force. The chain pins shall be hardened, 304 Stainless Steel.

4. Upper bearings shall be flange bearings, and shall be provided with grease nipples for easy lubrication. The bearings shall be designed for use with biodegradable grease. Their diameter shall be a minimum of 2 inch (50mm). The casing shall be made of paint coated cast iron.

i. Alarm silence push-button

j. VFD

k. Siemens PLC - S7-315-2PN/DP (with Ethernet connection)

2. A differential level controller with ultra-sonic level sensors for each channel shall be provided to automatically control screen operation. The controller senses the head loss, in inches, across the bar rack. When a predetermined head loss is reached, it automatically starts the rake to remove accumulated debris and continues to operate until headloss is appropriately decreased. The controller shall allow the headloss set point to be field adjusted. Include 316L SS mounting hardware to mount level sensor for a complete operation system.

3. Bar screen control panel shall include a run signal to the existing conveyor. When the bar screen is called to run (in either auto or hand mode), a dry contact shall close calling the conveyor to run. The conveyor shall continue running for 0-5minutes after the bar screen stops operation. The timer shall be operator adjustable from inside the cabinet. The conveyor shall send a common alarm to the Bar Screen Control panel. If the conveyor alarm is active the bar screen shall not call the conveyor to operate. Provide all interface services with the existing conveyor control panel for a complete operation. Include all requirement interface relays and related devices.

4. Manufacturer control panel shall provide the following inputs

   a. Wired to a labeled terminal block:
      1) Belt conveyor Auto Enabled (dry contact)
      2) Belt conveyor Run Status (dry contact)
      3) Belt conveyor alarm (dry contact)
      4) Upstream level (4-20mA)
      5) Downstream level (4-20mA)

5. Manufacturer control panel shall provide the following outputs
   a. Wired to a labeled terminal block:
      1) Belt conveyor run (dry contact)
      2) Auto Status (dry contact)
      3) Run Status (dry contact)
      4) Common Alarm (dry contact)
      5) Upstream Level (analog 4-20mA)
      6) Downstream Level (analog 4-20mA)
      7) Conveyor Alarm (dry contact)

b. Available through Ethernet and routed through a Siemens X204-2 switch:
   1) Run Status
   2) Common Alarm
   3) Upstream Level
   4) Downstream Level
   5) Hand/Auto Status

6. One (1) combination Magnetic reversing starter furnishing overload and under-voltage protection with a three-position selector switch located in the cover and marked "Hand-Off-Automatic".

7. Panel event lights indicating on, off, reverse, forward, and screen failure, and an alarm silencer pushbutton.

8. Electrical equipment shall be in compliance with Division 16 of these specifications.

9. Controls shall be mounted in NEMA Type stainless steel enclosures.

B. Mechanically Cleaned, Conventional Chain Bar Screen

1. Bar screen shall be provided with a PLC controller designed for variations in operation over a 24-hour period.

2. Secondary control stations mounted locally, rate NEMA 4X, shall be provided, one for each screen, each including one Hand-Off-Auto selector switch with lockout provision in the Off position and one (1) Forward-Off-Reverse selector switch with spring return on Reverse.

C. Mechanically Cleaned, Catenary Chain Bar Screen

1. Bar screen shall be provided with a time controller designed for variations in operation over a 24-hour period, adjustable to provide from 1 pass to 30 passes per hour.

2. Controls shall include an alarm horn.

3. Enclosure shall have a continuous hinge, exterior, lockable door and shall be located outside of any explosive environment.

4. Main Control Panel shall be designed with a SCCR rating of 25KA minimum and labeled as such.

5. All terminals utilized in the main panel shall be 600V rated terminals and spare terminal space shall be provided for any potential future revisions

3.01 INSTALLATION

A. Installation shall be in accordance with the Manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

A. Upon completion of installation of the equipment, an acceptance test to verify the satisfactory operation of each unit shall be conducted. The Contractor shall provide the services of authorized representative to conduct all field tests. The test shall be conducted in a manner approved by and in the presence of the Engineer. The unit shall be checked for excessive noise, vibration, alignment, general operation, ease of removal, etc. All automatic and manual controls shall be tested to verify that they function in accordance with the requirements. Verify that drive equipment operates without being overloaded. The unit must perform for seven (7) consecutive days without any malfunction before final acceptance will be made by the Owner.

3.03 PAINTING

A. Pumps, motors, baseplates, discharge elbows, and guiderails shall be painted in accordance with Section 09901 "Protective Coatings" of these Specifications.

3.04 SCHEDULES

	Location
Location	Kingwood West WWTP – Waste Activated Sludge Pump
Equipment No.	WASP-810A
Number of Units	1
Rated Capacity (gpm)	200
Rated Head, TDH (ft.)	25
Suction Lift (ft.)	17
Maximum Speed (rpm)	1170
Maximum Motor HP	7.5
Minimum Pump Efficiency	50
Minimum pump discharge size (in.)	6-in

END OF SECTION

Float	ASTM D2996 FRP filled with closed cell foam
Draw tube	ASTM D2996 FRP
Drain tube	ASTM D2996 FRP
Flex connector	Natural Rubber / Neoprene (wire re-enforced)
Knee joint assembly	304 stainless steel
Lower mitered elbow	304 stainless steel
Decanter rests	304 stainless steel

B. The draw tube and float assembly are located in parallel and permanently connected using laminated FRP supports. The drain tube is located in the center of the draw tube and provides a flow path for supernatant to exit the basin through the flex hose and lower mitered elbow. Miter joint connecting the draw tube and drain tube must be re-enforced with FRP hoop wraps to provide added strength. Drain tube, flex connector, and lower mitered elbow shall be connected by flanged connections with hardware and gaskets provided by the manufacturer. A knee brace assembly shall be provided to allow vertical articulation of the decanter as water levels move up and down in the reactor. The knee brace assembly shall support the flex connector and prevent lateral movement of the decanter unit. Flex connector shall be suitable for abrasive materials, and shall be rated at 30 inches mercury vacuum and 15 PSI working pressure. Fixed or retractable decanters will not be accepted.

C. The draw tube shall contain an adequate number of machined orifices to accommodate the average design flow rate based on site hydraulic conditions. Machined orifices shall be located on the upper side of the draw tube.

D. The Contractor shall provide one (1) motorized control valve per decanter in accordance with Sections 15096 (Eccentric Plug Valves) and 15105 (Motorized Valve Actuators).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the decanter in strict accordance with the Manufacturer's recommendations. The Contractor shall provide the services of a factory-employed service technician who shall adequately inspect the installation and test the equipment furnished under this contract. The services of the technician shall be provided for one (1) trip of two (2) days of service to install, inspect, and certify the installation prior to start-up.

3.02 FIELD QUALITY CONTROL

A. Upon completion of installation and startup of the equipment, an acceptance test to verify the satisfactory operation of each unit shall be conducted. The test shall be up to decant each basin and conducted in a manner approved by the Engineer. The unit shall be checked for excessive noise, vibration, alignment, general operation, etc. The unit must perform in a manner acceptable to the Engineer before final acceptance will be made by the Owner.

END OF SECTION

a. Shaft bearings, upper and lower, shall be sleeve type Type 316 stainless steel bearings, sintered, oil impregnated and permanently lubricated.

b. Thrust bearings shall be PTFE on the upper and lower bearing journals to reduce torque and prevent dirt and grit from entering the bearing and seal area.

c. Bearings are permanently lubricated for ease of operation after long periods of inactivity.

d. Bearings shall be replaceable.

4. SHAFT SEALS

a. Shaft seals shall be multiple V-ring (Chevron) and shall be adjustable.

b. All packing shall be replaceable without removing the actuator and while the valve is in service.

c. Shaft seals shall be made of Buna-N rubber.

d. The seal between the body shall be an O-ring.

5. PLUG

a. Plug shall be cast iron with a cylindrical seating surface that is offset from the center of the plug shafts.

b. The plug shafts shall be integral.

c. Plug shall be of one piece solid construction.

d. The rubber compound shall be approximately 70 (Shore A) durometer hardness.

e. The rubber to metal bond must meet ASTM D 429-73 Method B per AWWA C517-05 Section 4.4.5.1.

f. The CLOSED position travel stop for the plug shall be externally adjustable in the field while the line and valve are under pressure.

6. END CONNECTIONS

a. Flanged valves shall have dimensions, facing and drilling in

SECTION 15105

MOTORIZED VALVE ACTUATORS

PART 1 GENERAL

1.01 SUMMARY

A. This Section covers the furnishing of the three phase electric motor operators for valves. Motorized actuators furnished as part of this Section shall comply with AWWA C540.

B. The operators shall include the motor, reversing starter, power disconnect, 4-20ma positioner, control transformer, relays, power gearing, limit switch gearing, limit switches, phase failure relay, adjustable torque switches, feedback potentiometer for modulating valves, stem nut, auxiliary hand-wheel, local digital display, local control station, switch housings and special brackets to mate with the valve, all as a self-contained unit.

C. The manufacturer of each valve shall work with the actuator manufacturer for the proper sizing of the corresponding motor operator. Complete operator sizing calculations showing required unseating and running torque requirements under actual operating conditions shall be submitted with the shop drawings for review. The operator shall develop 150% of the required unseating torque and 100% of the required running torque under actual operating conditions. Operating conditions shall take into consideration the pressure differential across the valve and shutoff heads. Operators shall be capable of operating over an ambient temperature range of -20F to 150F.

D. Motor operator for 90^{o} rotation valves shall move valve through 90^{o} rotation in not less than one (1) minute nor more than three (3) minutes, unless specified otherwise. Should motor operator be multi-turn, it shall be sized to operate per the valve manufacturer specs. The motor operator shall be a programmable function, each unit provided with an infra red setting tool, field adjustable and without opening the actuator enclosure or by changing gears within the housing.

1.02 SUBMITTALS

A. Submit the following under the provisions of these specifications.

1. Product data, outline drawings with dimensions, capacity, settings, and operating characteristics of selected models.

2. Equipment arrangement drawings

3. Mounting bolt location drawings

4. Electrical schematics and wiring diagrams

5. Current, potential, and power transformer curves

6. Electrical fuse/circuit breaker characteristic

7. Equipment performance curves and data

8. Bill of installation/assembly materials

9. Equipment weights

10. Completed manufacturer's data sheets

11. Catalog data

B. Maintenance data for specialties, for inclusion in Operations and Maintenance Manual specified in Division 1.

1.03 WARRANTY

A. The warranty shall take affect after field installation of the actuators and shall be in force for two (2) years following the final acceptance of the overall project.

B. The warranty shall include on-site, factory authorized, repair or replacement of all parts or the entire system, travel time, and travel expenses for warranty parts and labor.

PART 2 PRODUCTS

2.01 480 VAC MOTORIZED VALVE OPERTORS

A. Valve actuators shall comply with AWWA C540 except as herein modified.

B. Electric multi-turn motor operators or rising-stem shall include a Schedule 40 carbon steel pipe-style stem cover.

C. Electric motor operators shall be designed for operation in corrosive, wet, 95% relative humidity environments having an ambient temperature ranging from -20 to 45˚C.

D. Electric motor operators shall be designed to develop at least 1.5 times the required operating torques of the valves they serve.

E. Electric motor operators shall be either intermittent or continuous duty rated as required by operator type hereinafter defined.

F. Intermittent duty shall be defined as continuous cyclic, forward and /or reverse motion under operations under 100% torque output conditions in any one hour followed by 45 minutes of rest.

G. Continuous duty shall be defined as continuous cyclic, forward and/or reverse motion under 100% torque output conditions, 24 hours a day, 7 days a week. Cyclic shall be defined as a start in either the forward or reverse direction every 5 seconds (i.e., 1200 movements per hour).

H. Electric motor operators shall have control functionality as described herein and shall be factory configured to interface with field control and signal wiring as shown on the drawings.

I. Electric motor valve operators shall include all the required hardware and software for a complete and operational system. Operator items shall include NEMA 4X OR IP68 enclosure, motor, gearing, limit switches, limit switch gearing, mechanical dial position indicator, mechanical drive sleeve, de-clutch lever, auxiliary handwheel, position feedback potentiometer, reversing starter, control power transformer and additional features as herein defined depending on operator type. Conductor entrance and termination area shall be sealed from the actuator mechanical area housing preventing water in conduit from entering the actuator enclosure.

J. Quarter-turn or multi-turn designed electric motor valve operators shall be specifically designed to have high torque, totally enclosed, no-ventilated motors with motor leads brought into the limit switch compartment without having external piping or conduit box. The operator motor shall be of sufficient size to open or close the valve against the specified maximum differential pressure when voltage to the motor terminals is 10% above or below nominal voltage. The operator motor shall be pre-lubricated, and all bearings shall be of the anti-friction type. The operator motor shall be designed to operate from a 480 VAC/3 phase/60Hz electrical service and shall be rated for intermittent or continuous duty (dependent on operator type as defined herein) without overheating. The operator motor shall have Class F winding insulation and embedded motor winding thermal overload sensors. The motor section of the operator shall include an integral anti-condensation heater.

K. Electric motor valve operator gearing shall consist of spline-mounted spur gears of alloy steel construction designed to provide first stage gear reduction and the specified cycles speed of the operator. The second stage gear reduction shall consist of the heat-treated alloy steel worm

with carburized threads hardened and ground for high efficiency and matching worm gear drive sleeve. The worm gear drive sleeve shall be of high tensile cast bronze construction with hobbed teeth. All gearing shall be grease lubricated with ball or roller-type bearings used throughout.

L. Electric operators shall include a permanently mounted handwheel with bearing mounted hand crank to manually actuate the second stage gear reduction train via a clutch spool and lever assembly. The manual handwheel shall require not more than a 40 pound rim-pull force to actuate the second stage gear reduction train when properly engaged. The handwheel shall not rotate during any electric operation. The motor shall not rotate during hand operation. In the manual operation position, the operator shall remain in this position. It shall be impossible to place the unit in manual operation when the motor is running.

M. The electric valve operator shall include limit switches and associated gearing. The limit switch gearing shall be bronze construction and shall be totally enclosed in its own gear case. Limit switches shall be adjustable at any point between the fully opened and fully closed valve positions. Each valve operator shall be provided with a minimum of four rotor type gear limit switches, equipped with four contacts each. Each contact shall be field selectable for normally open or normally closed operation and shall be suitable for switching 5 amp inductive loads (minimum) at 120 VAC/1 phase/60Hz. Limit switches shall be geared to the driving mechanism and engaged at all times whether in motor or manual operation. Switches requiring springs to open or close the contacts shall not be used. The limit switch section of the operator shall include an integral anti-condensation heater.

N. The electric valve motor operators shall be equipped with double torque switch. The torque switch shall be adjustable and shall be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the unit should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear.

O. The modulating electric actuator shall include a local valve position indicator (0-100% open) of the mechanical dial-type clearly. Additionally, each operator shall include a position feedback potentiometer and associated solid state circuitry that produces an internally “wetted”, 4-20mA, output signal proportional to actual valve position. Potentiometer shall be 1000 ohm type and include both zero and span output adjustments. Resolution shall be .15% minimum.

P. Control voltage shall be 120 VAC, unless specified otherwise, and shall include integral motor control circuitry including full voltage reversing

starter, 480 VAC to 120 VAC and 480 VAC to 24 VDC control power transformers, and field wiring terminals on integrated terminal strips to accommodate power, control and signal wring field connections. Field wiring terminals shall be clearly identified in accordance with approved shop drawings. Termination strips shall be clearly labeled and a control schematic shall be included with each type of valve actuator.

Q. In addition the 480 VAC electric motor operators shall have the following additional features and functions depending on operator type:

Multi-Turn Low Thrust pedestal mount with shaft to valve 480 VAC electric motor operator shall be designed for low thrust, multi-turn, intermittent duty, open/close applications. Operator shall be designed for pedestal mounting and include drive sleeve adapter to mate with extended input shaft of a non-close coupled worm gearbox. Operators shall include integral local control station with OPEN/STOP/CLOSE pushbuttons, HAND-OFF-REMOTE SELECTOR SWITCH, RED fully open pilot light and GREEN fully closed pilot light.

2.02 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide motorized valve operators manufactured by Limitorque MX Series, or equal by Rotork, or EIM.

B. All technologies and devices used in the actuator must have a minimum of five years commercial operating experience for that specific manufacturer. This is to include torque and position sensing, lubrication, and electrical compartment design

2.03 CONSTRUCTION

A. Hand-wheel: Operators shall be equipped with an auxiliary hand-wheel to provide for actuation of the valve in the event of power failure. The hand-wheel shall not turn during normal operation of the valve. The hand/auto selection lever should be pad-lockable in both "Hand" and "Auto" positions. It should be possible to select hand operation while the actuator is running or start the actuator motor while the hand/auto selection lever is locked in "Hand" without damage to the drive train. The hand-wheel drive must be mechanically independent of the motor drive, and any gearing should be such as to permit emergency manual operation in a reasonable time.

B. Drive Bushing: The actuator shall be furnished with a drive bushing easily detachable for machining to suit the valve stem or gearbox input shaft. Normally the drive bush shall be positioned in a detachable base of the actuator. Thrust bearings, when housed in a separate thrust base, should be of the sealed-for-life type.

C. Power Gearing:
1. The actuator gearing shall be totally enclosed in an oil-filled gear-case suitable for operation at any angle. All main drive gearing must be of metal construction. Where the actuator operates gate valves or large diameter ball or plug valves, the drive shall incorporate a lost-motion hammer-blow feature. For rising spindle valves, the output shaft shall be hollow to accept a rising stem and incorporate thrust bearings of the ball or roller type at the base of the actuator, and the design should be such as to permit the gear-case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service.
2. For full Modulating applications, “hammer-blow” feature should be removed to increase accuracy and reduce wear.

D. Lost Motion Device: Operators on open-close service shall have a built-in lost motion device to permit motor to attain full speed before load is encountered, thus permitting a hammer-blow to be imparted to start valve in motion in either the closing or opening direction.

E. Torque and Turns Limitations: Torque and turns limitation to be adjustable as follows:
1. Torque rating: 3,115 ft-lbs., minimum.
2. Position setting range: 2.5 to 100,000 turns, with resolution to 15° of actuator output.
3. Torque setting: 40% to 100% rated torque.
4. Torque sensing must be affected purely electrically or electronically. Extrapolating torque from mechanically measured motor speed is not acceptable due to response time; nor shall springs be utilized.
5. “Latching" to be provided for the torque sensing system to inhibit torque off during unseating or during starting in mid-travel against high inertia loads.
6. The electric circuit diagram of the actuator should not vary with valve type remaining identical regardless of whether the valve is to open or close on torque or position limit. An inexpensive setting tool is required for non-intrusive calibration and interrogation of the actuator. This setting tool will provide speedy interrogation capabilities as well as security in a non-intrusive intrinsically safe watertight casing.
7. Separate Control Module: There shall be furnished and mounted on each operator a separate control module, submersible, explosion-proof, containing a lockable power disconnect which shall disconnect all power from the operator for servicing. Supply voltage disconnect that meets the rating of the actuator.
8. Phase Failure Relay: Each operator shall be protected against loss of any one phase, phase unbalance, and phase rotation reversal.

F. Communications:
   1. Configuration and parameterization settings for all actuators are to be made via non-intrusive IrDA communication tool.
   2. Monitoring and Diagnostic:
      a. Monitor (availability) relay, having one change-over contact, the relay being energized from the control transformer only when the Local/Remote selector is in the "Remote" position to indicate that the actuator is available for remote (control room) operation.
      b. Where required, it shall be possible to provide indication of thermostat trip and "Remote" selected as discreet signals.
      c. Actuators shall include a diagnostic module, which will store and enable download of historical actuator data to permit analysis of changes in actuator or valve performance. A software tool shall be provided to allow configuration and diagnostic information to be reviewed and analyzed and reconfigured. Additionally, diagnostic data shall be available over an IrDA™ port, which can be relayed to a remote facility by an IrDA™ compatible device (laptop PC, PDA, cell-phone, etc.). After remote analysis, changes to the actuator configuration can be relayed back to the actuator via the device. The enclosure shall not be opened for data extraction.
      d. Diagnostic status screens must be provided to show multiple functions simultaneously so troubleshooting can be affected rapidly and efficiently. All diagnostic information should be contained on no more than eight (8) screens so multiple functions can be checked simultaneously.
      e. Provision shall be made to graphically display valve torque demand as a percent of rated actuator torque vs. position simultaneously in 1% increments so as to facilitate valve troubleshooting and diagnostics.

G. Provide all necessary brackets and accessories to properly secure the actuator to the valve such that the valve performs in a proper manner (i.e. doesn't leak, properly seats, etc.) as it did with the existing actuators.

2.04 PAINTING

A. The operator mechanism shall be supplied with a factory finish consisting of thoroughly cleaning all surfaces, a prime coat, and the manufacturer's standard paint finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. The electric motor operators shall be carefully handled and installed in accordance with manufacturer's recommendations.

B. All actuators shall be started in the field by the actuator factory representative.

3.02 MANUFACTURERS REPRESENTATIVE

A. The services of a factory representative shall be provided for whatever time period is required to insure proper installation and start-up of the motor operators, and for instruction of the Owner's operating personnel in the proper operation and maintenance of the equipment.

B. All start up and commissioning functions shall be provided by the authorized manufacturer's representative.

C. All actuators shall be warranted for a minimum of three (3) years.

3.03 PERFORMANCE TEST CERTIFICATE

A. Each actuator must be performance tested and individual test certificates shall be supplied free-of-charge. The test certificate should record details of specification, such as gear ratios for both manual and automatic drive, closing direction, and wiring diagram code number.

B. The test should simulate a typical valve load and the following parameters should be recorded: current at maximum torque setting, torque at maximum torque setting, flash test voltage, actuator output speed or operating time.

C. In addition, the test certificate should record details of specification, such as gear ratios for both manual and automatic drive, closing direction, and wiring diagram code number.

3.04 ACCEPTANCE TEST

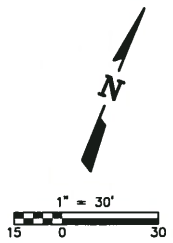
A. Upon completion of the installation of the operators, an acceptance test will be conducted to verify the satisfactory operation of the equipment. The test shall be conducted in a manner approved by, and in the presence of the Engineer. The equipment will be checked for general operation, etc. The equipment must perform in a manner acceptable to the Engineer before final acceptance will be made by the Owner.

3.05 SCHEDULE

A. Motorized valve actuators shall be provided in accordance with the following schedule:

Location	Qty.	Valve Type	Valve Size	Operation
Kingwood West Aerobic Digesters Decant Pipe	2	Plug	6-inch	Open/Close

END OF SECTION



GENERAL NOTES:

1. REFER TO CIVIL MECHANICAL AND PROCESS DRAWINGS FOR LOCATION OF NEW EQUIPMENT.

NOTES:

1. EXISTING NON-POTABLE WATER SYSTEM TO BE REMOVED AND REPLACED.
2. CONCRETE ENCASE DUCT BANK RISER TO 6 INCHES ABOVE GRADE WITH 2 INCHES OF COVERAGE ON ALL SIDES. CORE DRILL WALL 1/2" LARGER THAN CONDUIT OD AND SEAL WITH SILICONE SEALANT. ROUTE CONDUIT ABOVE CEILING TO LIFT STATION PLC CONTROL PANEL. UTILIZE EXISTING SPARE DISCRETE INPUT FOR NPW ALARM CIRCUIT.
3. REPLACE CONDUCTORS. SEE DWG. MC-E-2.
4. PROGRAM LIFT STATION PLC FOR NPW ALARM AND RELATED POINTS. 1

1 — OVERALL METRO CENTRAL SITE PLAN
SCALE: 1"=30'

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN

AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567

Date:
CenterPoint Energy/Electric Facilities
Signature indicates underground electric lines are property shown. No approval for construction is given.

Date:
Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX Incorporated
(Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/27/16	ADDENDUM NO.1	MW

KIT Professionals, Inc.
Engineers • Planners • Construction Managers
2000 W. Sam Houston Pkwy S., Suite 1400
Houston, Texas 77042
Phone: (713) 783-8700, Fax: (713) 783-8747
TBPE Firm Registration No. F-4991
Challenging Challenges...

KGI Kalluri Group, Inc.
Consulting Engineers & Project Managers
TBPE Registration No. F-565
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288

FREESE AND NICHOLS
10497 Town and Country Way,
Suite 600
Houston, Texas 77024
Phone - (713) 600-8500
Fax - (713) 600-8501
Freese and Nichols, Inc.
T-2146

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO.: 5691

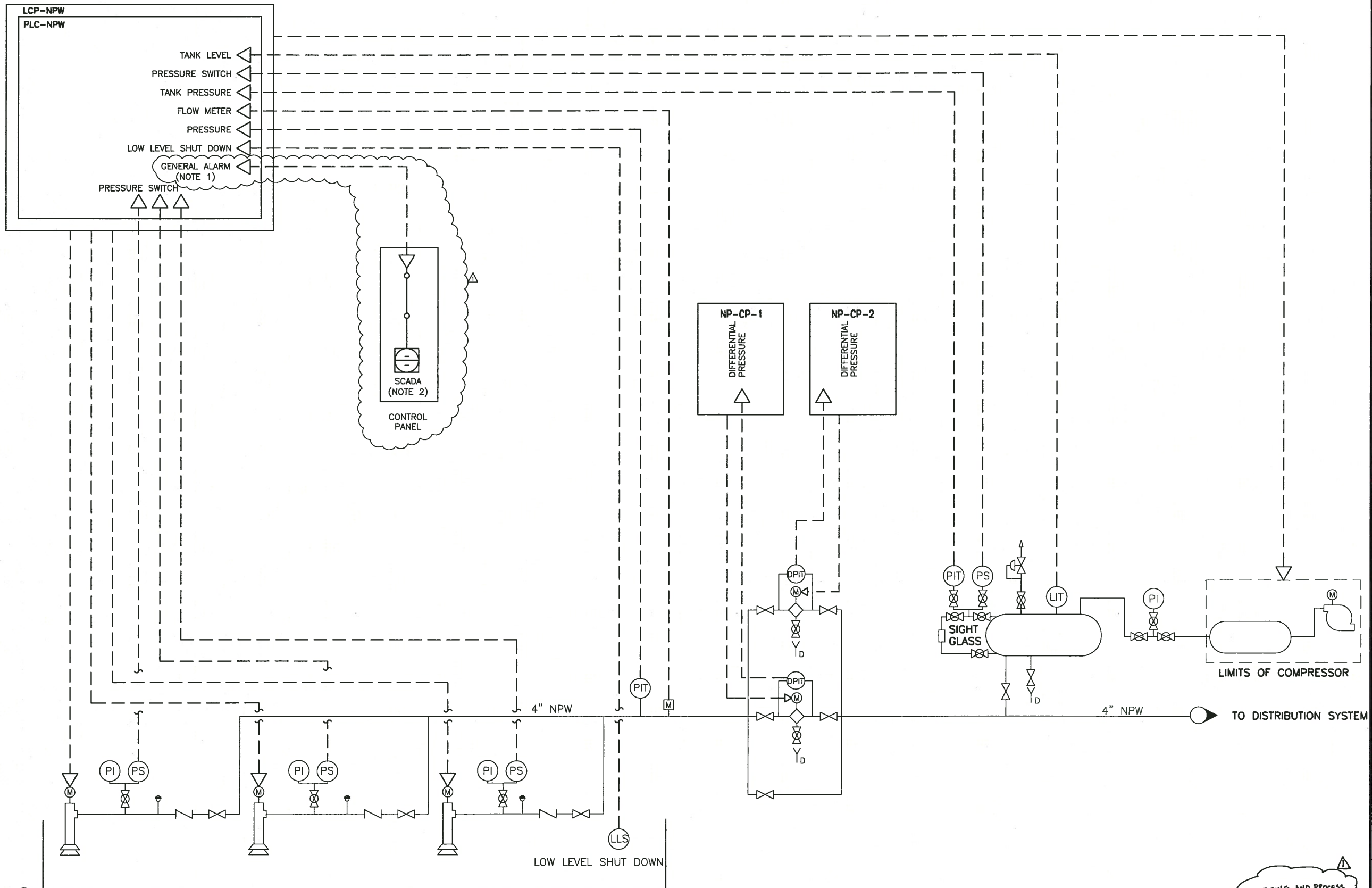
STATE OF TEXAS
MICHAEL H. WOOLEY
40433
PROFESSIONAL ENGINEER
1-27-16

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

METRO CENTRAL WWTP
ELECTRICAL
OVERALL
SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. MC-E-1	
SHEET NO. 28 OF 117	



NOTES:

1. NPW GENERAL ALARM CONDITIONS:
   - 1.A. PUMP FAIL
   - 1.B. AIR COMPRESSOR EXCESSIVE RUN
   - 1.C. LOW LEVEL IN HYDRO TANK
   - 1.D. BACKWASH STRAINER FAIL
2. PROGRAM SCADA UNIT (PLC) AND HMI FOR NPW ALARM.

PIPING AND PROCESS ONLY

STATE OF TEXAS
SHELDON MICHAEL BUCK
93693
LICENSED PROFESSIONAL ENGINEER
1/27/16

STATE OF TEXAS
MICHAEL H. WOOLEY
40433
REGISTERED PROFESSIONAL ENGINEER
1-27-16

SCADA ONLY

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN

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Date:

Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:

CenterPoint Energy/Gas Facilities/ENTEX Incorporated
(Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/19/16	ADDENDUM NO.1	MW

KGI Kalluri Group, Inc.
Consulting Engineers & Project Managers
TBPE Registration No. F-665
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288

KIT Professionals, Inc.
Engineers • Planners • Construction Managers
Challenging Challenges...
2000 W. Sam Houston Pkwy S., Suite 1400
Houston, Texas 77042
Phone: (713) 783-8700; Fax: (713) 783-8747
TBPE Firm Registration No. F-4991

FREESE AND NICHOLS
10497 Town and Country Way,
Suite 600
Houston, Texas 77024
Phone – (713) 600-6800
Fax – (713) 600-6801
Freese and Nichols, Inc.
F-2144

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO.: 5891

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

METRO CENTRAL WWTP
ELECTRICAL

NON-POTABLE WATER P&ID

WBS NUMBER	R-00265-0102-4
DRAWING SCALE	AS NOTED
CITY OF HOUSTON PM	BILL ZOD, P.E.
DRAWING NO.	MC-I-1
SHEET NO.	31 OF 117

FOR CITY OF HOUSTON ONLY

EXISTING CONDITIONS

- TOTAL AREA OF SITE = 21.50 ACRES
- IMPERVIOUS AREA = 9.91 ACRES

PROPOSED CONDITIONS

- IMPERVIOUS AREA
  1. EXISTING IMPERVIOUS AREA = 431,680 SQ. FT.
  2. CONCRETE (REDEVELOPED) = 53 SQ. FT.
  3. CONCRETE (NEW) = 73 SQ. FT.

CHANGE IN IMPERVIOUS = 73 SQ. FT.

DETENTION REQUIRED

V_{REQ} = [43,560 x (0.50 x A_R)] + (1,815 x A_D)
V_{REQ} = [43,560 x (0.50 x 0.0017)] + (1,815 x 0.0012)
V_{REQ} = 39 CY. FT. (PER COH REQ.)

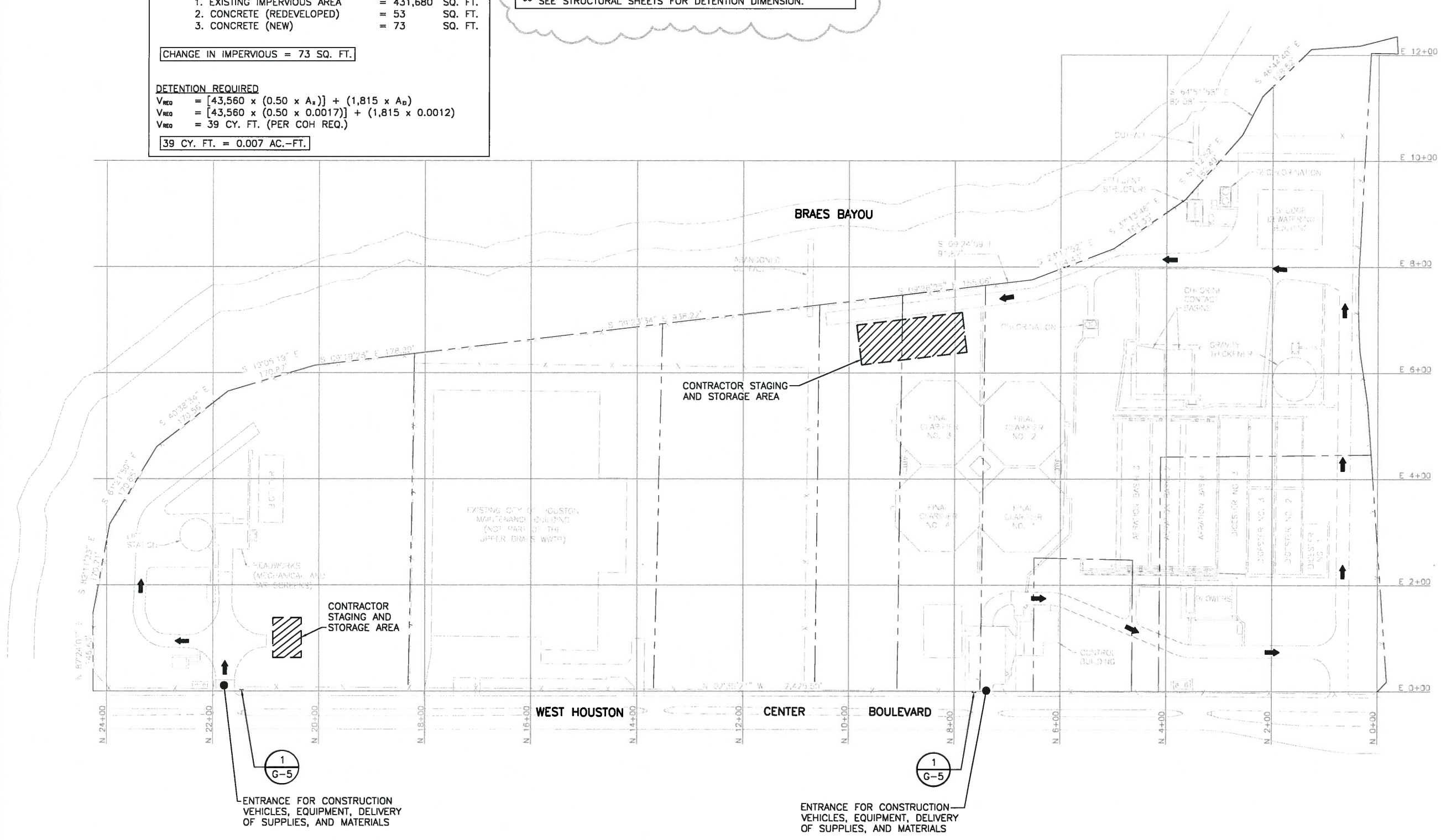
39 CY. FT. = 0.007 AC.-FT.

DETENTION PROVIDED

CONCRETE CONTAINMENT AREA
VOLUME
$V_{PROVIDED}$ = (103 SQ. FT.) X 0.5 FT (DEPTH)
$V_{PROVIDED}$ = 51 CU. FT. => 0.0011 AC. FT.

** SEE STRUCTURAL SHEETS FOR DETENTION DIMENSION.

1



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PRIVATE UTILITY LINES SHOWN

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CenterPoint Energy/Electric Facilities
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Date:
Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX Incorporated
(Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/27/16	ADDENDUM NO. 1	M.E.

FREESE AND NICHOLS
10497 Town and Country Way.
Suite 600
Houston, Texas 77024
Phone - (713) 600-5800
Fax - (713) 600-5801
Freese and Nichols, Inc.
F-2144

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO.: 5891

STATE OF TEXAS
MURALI ERAT
105980
LICENSED
PROFESSIONAL ENGINEER
01/28/16

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

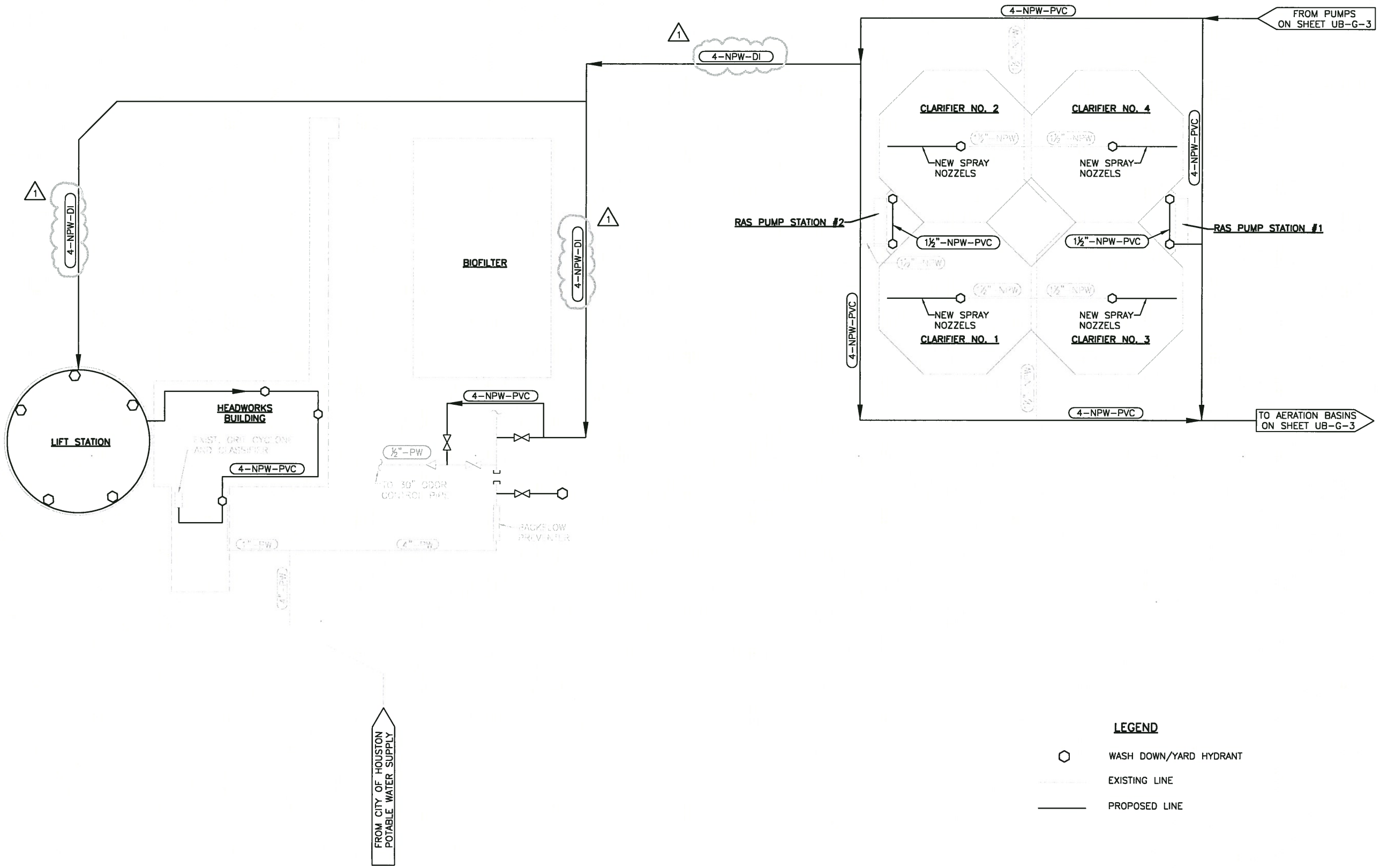
UPPER BRAES WWTP
GENERAL

SITE PLAN

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
1" = 100'	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-G-1	
SHEET NO. 33 OF 117	

ORIGINAL SCALE IN INCHES

FILE NAME:



LEGEND

- WASH DOWN/YARD HYDRANT
- EXISTING LINE
- PROPOSED LINE

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN

AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567

Date:
CenterPoint Energy/Electric Facilities
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Date:
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Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX Incorporated
(Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/27/16	ADDENDUM NO. 1	M.E.

FREESE AND NICHOLS
10497 Town and Country Way,
Suite 600
Houston, Texas 77024
Phone - (713) 600-6800
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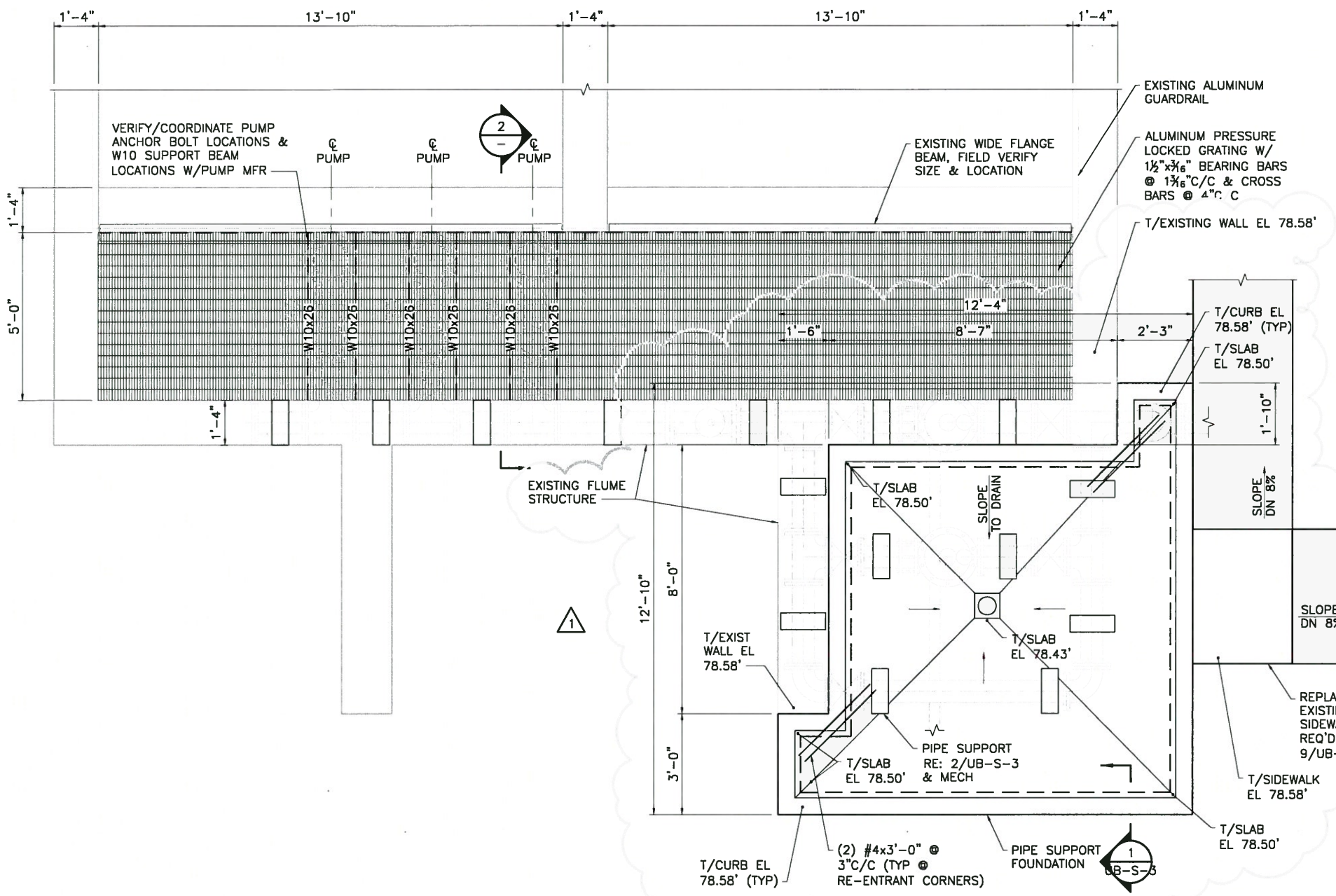
UPPER BRAES WWTP
GENERAL
NPW PROCESS FLOW SCHEMATIC
1 OF 2

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
NOT TO SCALE	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-G-2	
SHEET NO. 34 OF 117	



1 / – PIPE SUPPORT FOUNDATION PLAN
1/2"=1'-0"

2 / – SECTION
1/2"=1'-0"

N

0 1' 2' 4'
1/2"=1'-0"

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STATE OF TEXAS
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01.27.16

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CITY OF HOUSTON
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METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

UPPER BRAES WWTP
STRUCTURAL
NON POTABLE WATER
PLAN AND SECTION

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-S-2	
SHEET NO. 59 OF 117	

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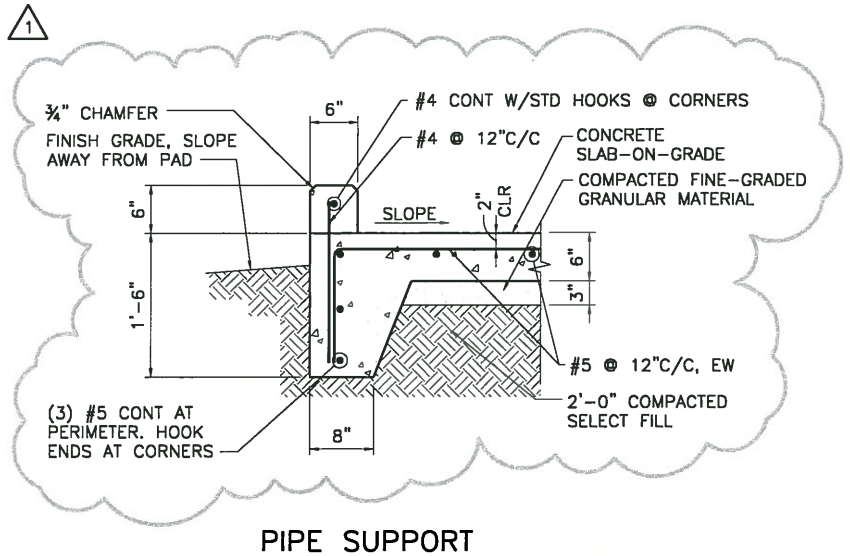
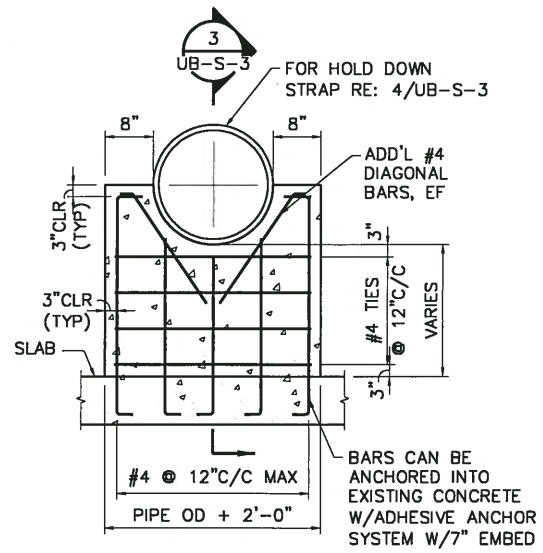
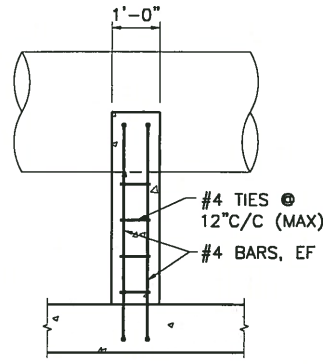


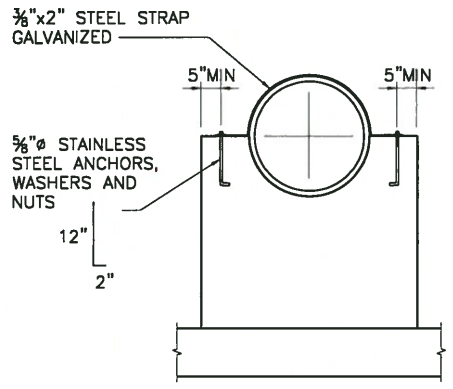
1 UB-S-2 **PIPE SUPPORT FOUNDATION SECTION**
NOT TO SCALE



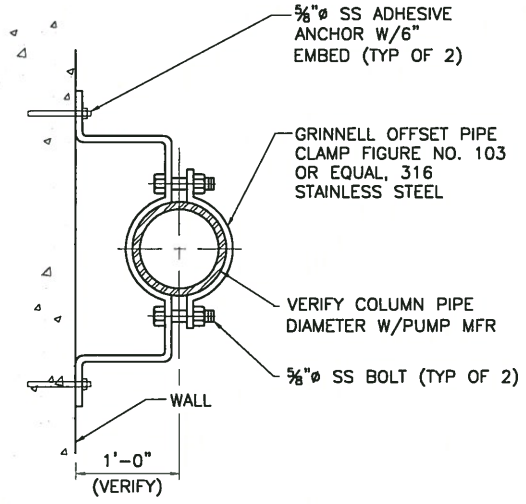
2 UB-S-2 **PIPE SUPPORT PAD**
NOT TO SCALE



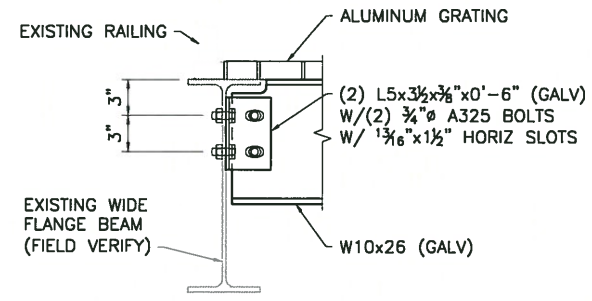
3 – **TYPICAL SECTION AT PIPE SUPPORT PAD**
NOT TO SCALE



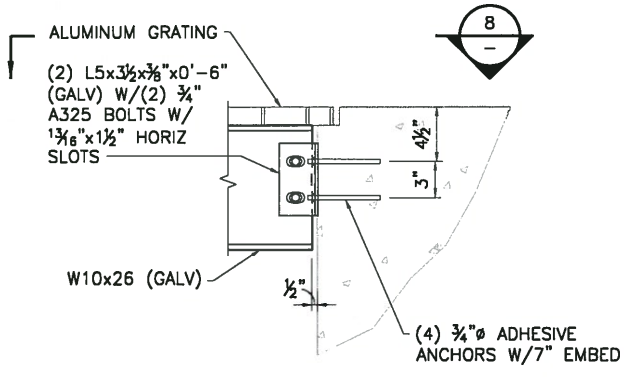
4 – **PIPE HOLD DOWN STRAP**
NOT TO SCALE



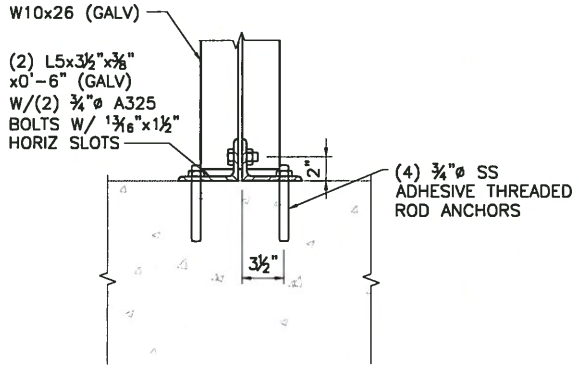
5 UB-S-2 **COLUMN PIPE BRACE DETAIL**
NOT TO SCALE



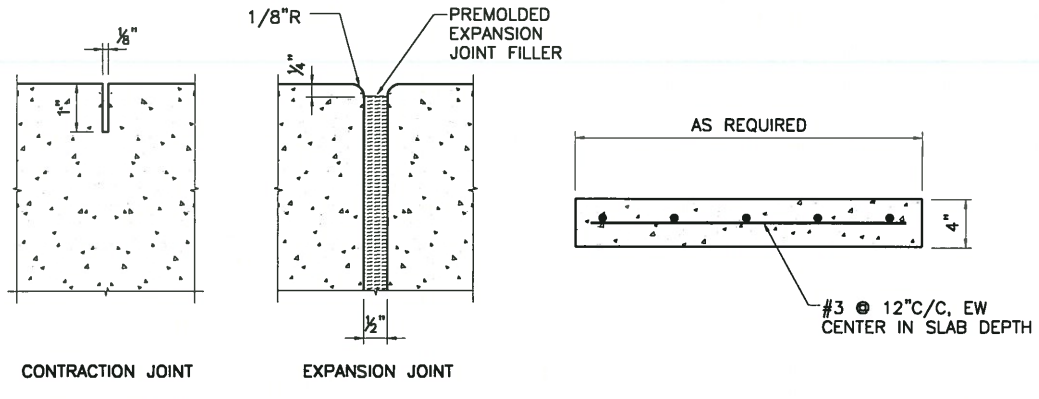
6 UB-S-2 **DETAIL**
1 1/2"=1'-0"



7 UB-S-2 **DETAIL**
1 1/2"=1'-0"



8 – **PLAN DETAIL**
1 1/2"=1'-0"



DETAIL NOTES:
1. PROVIDE TRANSVERSE CONTRACTION JOINTS AT INTERVALS NOT EXCEEDING 5'-0" ON CENTER. PROVIDE CENTERLINE CONTRACTION JOINTS IN SIDEWALKS WIDER THAT 8'-0". SPACING OF CENTERLINE CONTRACTION JOINTS SHALL NOT EXCEED 6'-0".
2. PROVIDE EXPANSION JOINTS AT INTERVALS NOT EXCEEDING 40'-0" ON CENTER WHERE WALK DOES NOT ABUT CURB.

9 – **SIDEWALK DETAILS**
NOT TO SCALE

0 4" 8" 1'
1-1/2"=1'-0"

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01.27.16

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METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

UPPER BRAES WWTP
STRUCTURAL
NON POTABLE WATER SECTIONS AND DETAILS

WBS NUMBER	R-00265-0102-4
DRAWING SCALE	AS NOTED
CITY OF HOUSTON PM	BILL ZOD, P.E.
DRAWING NO.	UB-S-3
SHEET NO.	60 OF 117

FOR CITY OF HOUSTON ONLY

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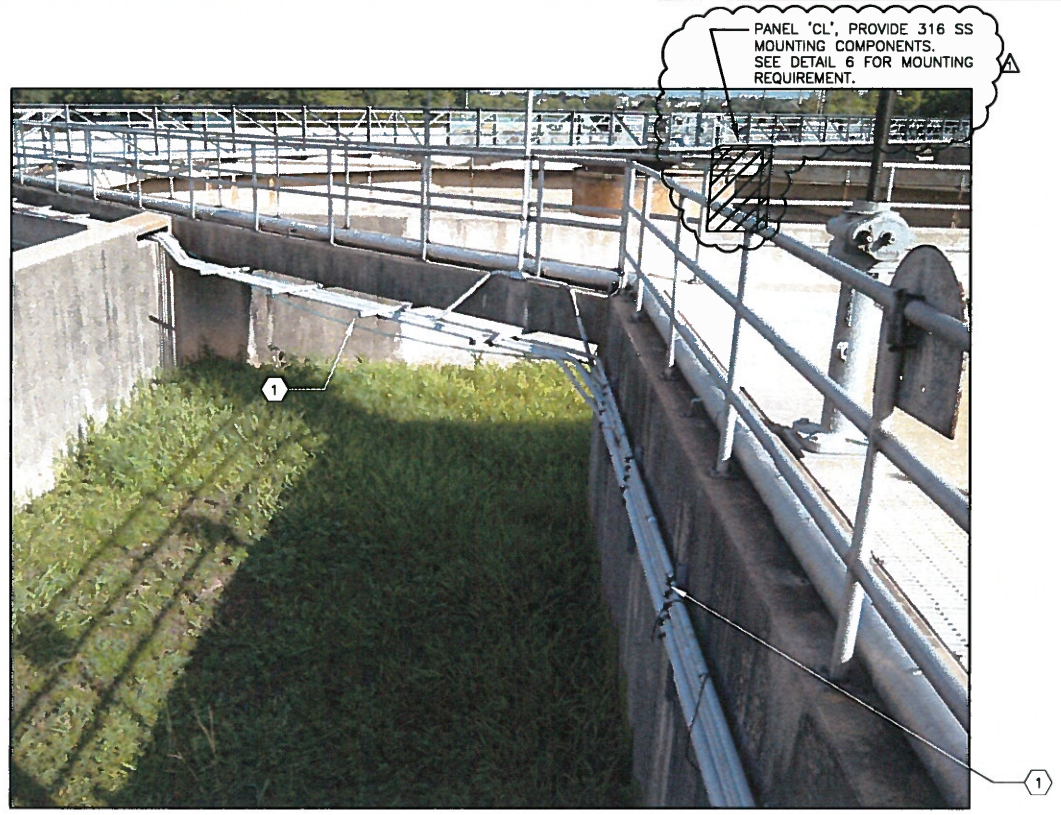
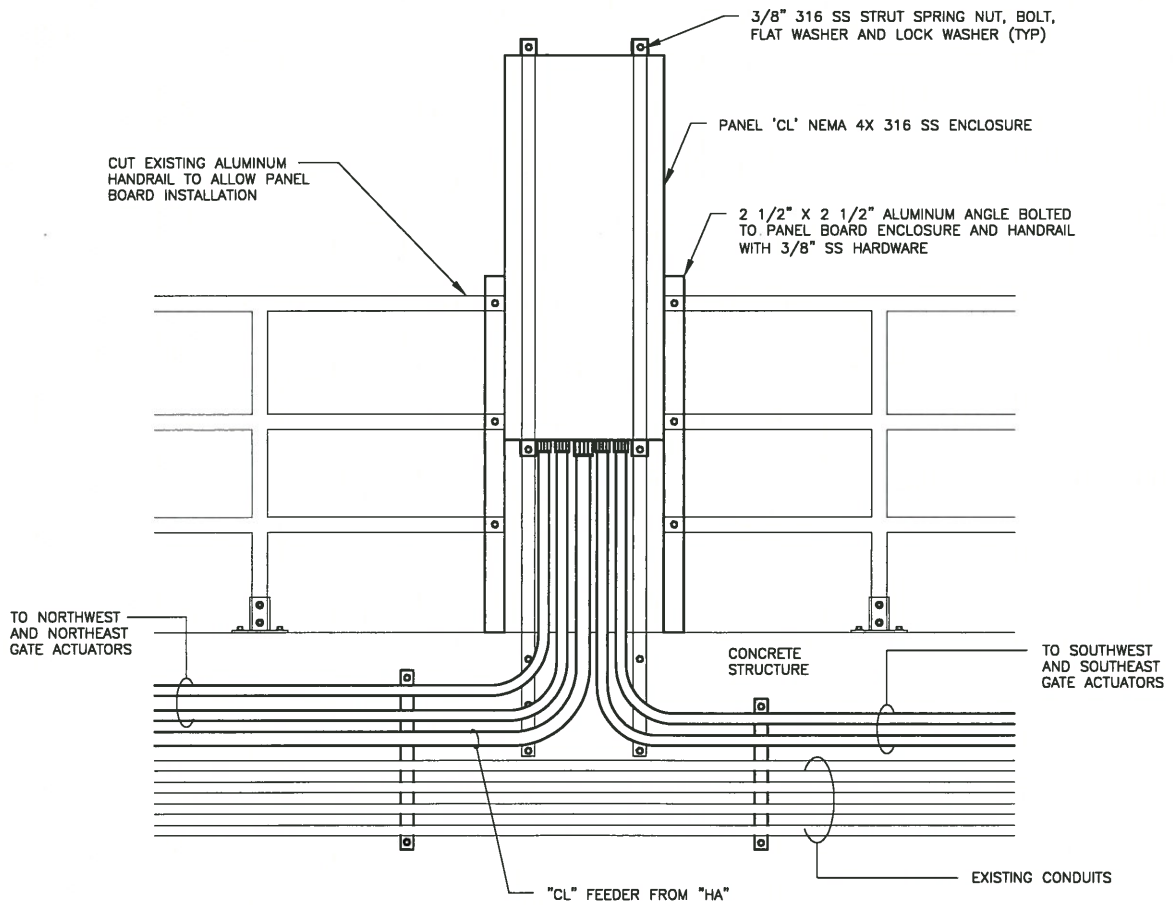
ORIGINAL SCALE IN INCHES

FILE NAME:

4 UB-E-2 PHOTOGRAPH
NTS



5 UB-E-2 PHOTOGRAPH
NTS



6 — PANEL 'CL' MOUNTING DETAIL
NTS

NOTES:

1. REPLACE ALL STRUT SUPPORTS AND CONDUIT CLAMPS WITH 316 STAINLESS STEEL ITEMS (TYPICAL ALL LOCATIONS). REFER TO DETAIL 4, UB-E-3.
2. REPLACE EXISTING STRUT WITH DOUBLE STRUT (TYPICAL ALL PLACES).
3. MOUNT CONDUIT ON TOP OF STRUT.
4. REPLACE ALL CONDUIT STRAPS WITH 316SS STRAPS AT ALL LOCATIONS.

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CABLE COMPANY

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1	1/27/16	ADDENDUM NO.1	MW

KGL Kalluri Group, Inc.
Consulting Engineers & Project Managers
TBPE Registration No. F-665
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288

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STATE OF TEXAS
MICHAEL H. WOOLEY
40433
LICENSED PROFESSIONAL ENGINEER
1-27-16

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METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

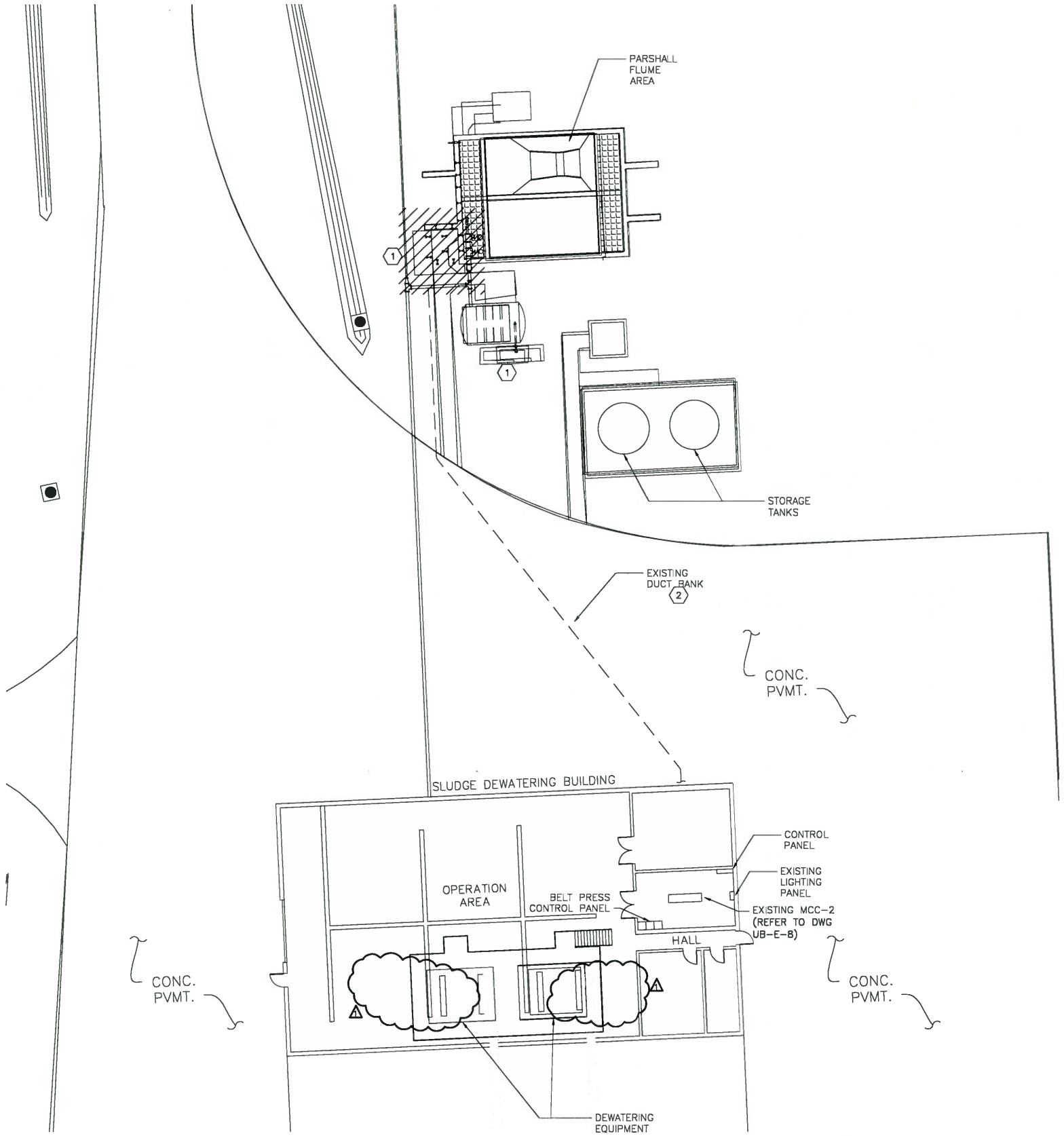
UPPER BRAES WWTP

CLARIFIER AREA PHOTOS
2 OF 2

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-E-4	
SHEET NO. 64 OF 117	

N

1/16" = 1'- 0"
8 4 0 8 16



NOTES:

1. REMOVE ALL ELECTRICAL RELATED TO EXISTING NPW SYSTEM.
2. REMOVE ALL CONDUCTORS RELATED TO EXISTING NPW SYSTEM FROM THE EXISTING DUCT BANK.

1 ENLARGED NPW AREA DEMOLITION PLAN
SCALE: 1/16"=1'-0"

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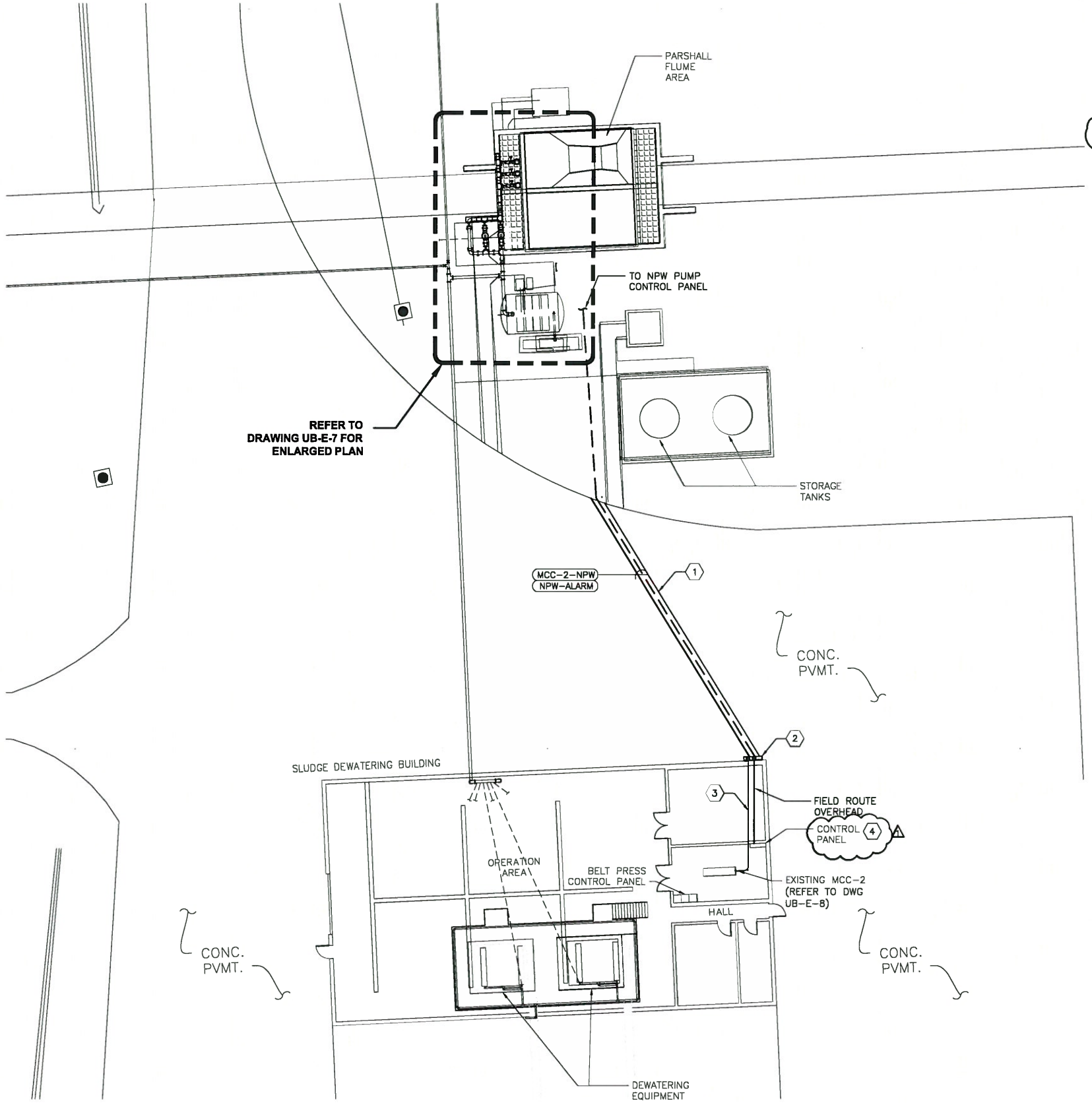
UPPER BRAES WWTP

ENLARGED NPW AREA DEMOLITION PLAN

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-E-5	
SHEET NO. 65 OF 117	

N

1/16" = 1'- 0"
8 4 0 8 16



NOTES:

1. SAW-CUT PAVEMENT FOR DUCT BANK INSTALLATION. REPLACE PAVEMENT TO ORIGINAL CONDITIONS. PROVIDE BASE AND SUB-BASE TO MATCH EXISTING AFTER DUCT BANK INSTALLATION.
2. ENCASE DUCT BANK RISERS TO 12" ABOVE GRADE. CORE DRILL WALL 1/2" LARGER THAN CONDUIT OUTSIDE DIAMETER AND SEAL WITH SILICONE SEALANT.
3. ROUTE CONDUITS ABOVE CEILING ON TRAPEZE HANGERS WITH ALL 316 SS COMPONENTS.
4. PROGRAM LIFT STATION PLC FOR NPW ALARM AND RELATED POINTS.

1 / — ENLARGED NPW AREA PROPOSED PLAN
SCALE: 1/16"=1'-0"

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UPPER BRAES WWTP

ENLARGED NPW AREA PROPOSED PLAN

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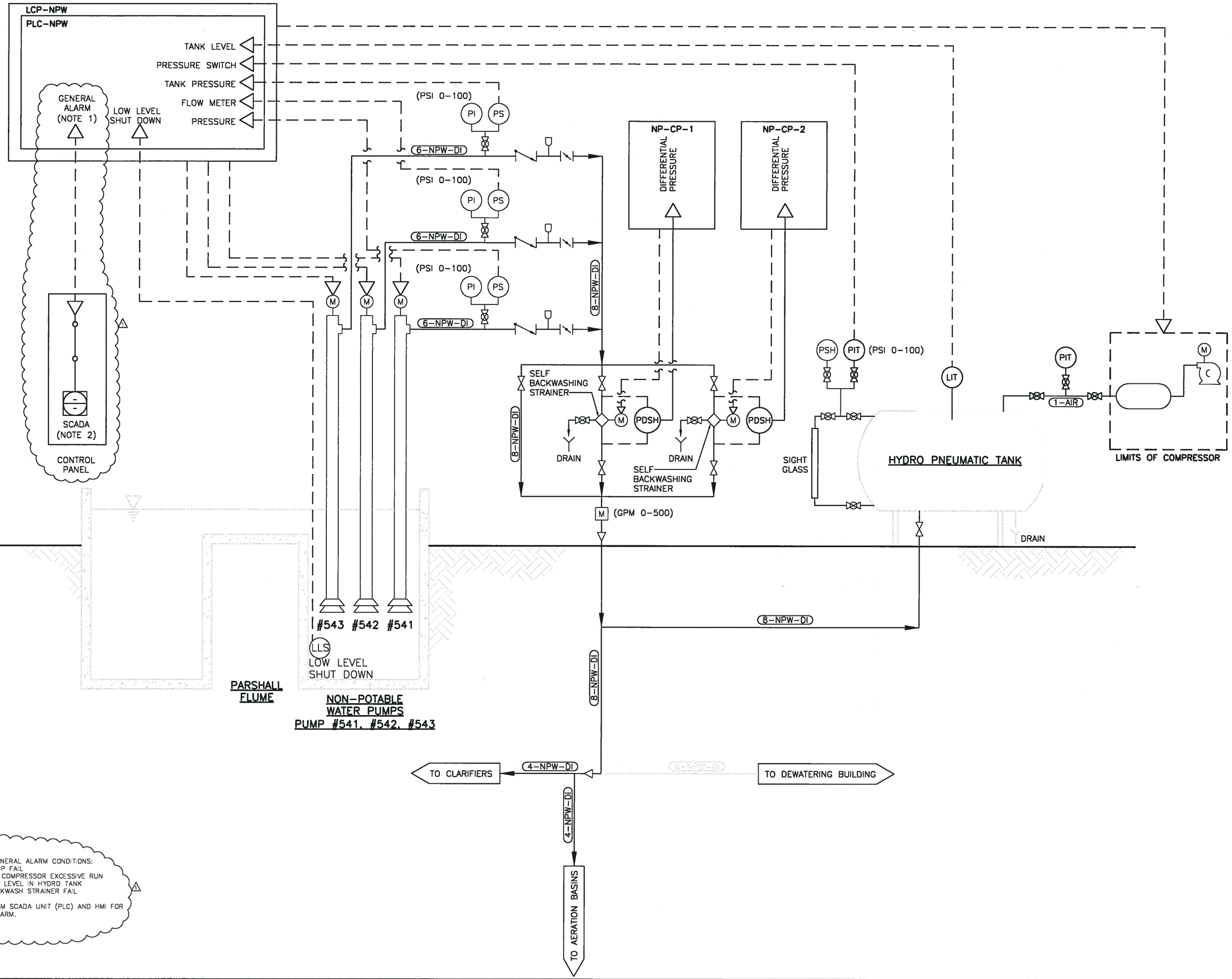
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. UB-E-6	
SHEET NO. 66 OF 117	



NOTES:

1. NPW GENERAL ALARM CONDITIONS:
   1.A. PUMP FAIL
   1.B. AIR COMPRESSOR EXCESSIVE RUN
   1.C. LOW LEVEL IN HYDRO TANK
   1.D. BACKWASH STRAINER FAIL
2. PROGRAM SCADA UNIT (PLC) AND HMI FOR NPW ALARM.

STATE OF TEXAS
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SCADA ONLY

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UPPER BRAES WWTP
GENERAL
NON POTABLE WATER
P&ID

WBS NUMBER	R-00265-0102-4
DRAWING SCALE	NOT TO SCALE
CITY OF HOUSTON PM	BILL ZOD, P.E.
DRAWING NO.	UB-I-1
SHEET NO.	74 OF 117

FOR CITY OF HOUSTON ONLY

CONTRACTOR TO INSPECT AND REPLACE GASKETS OF THE AIR PIPE FITTINGS AT THE AERATION BASINS AS NEEDED.

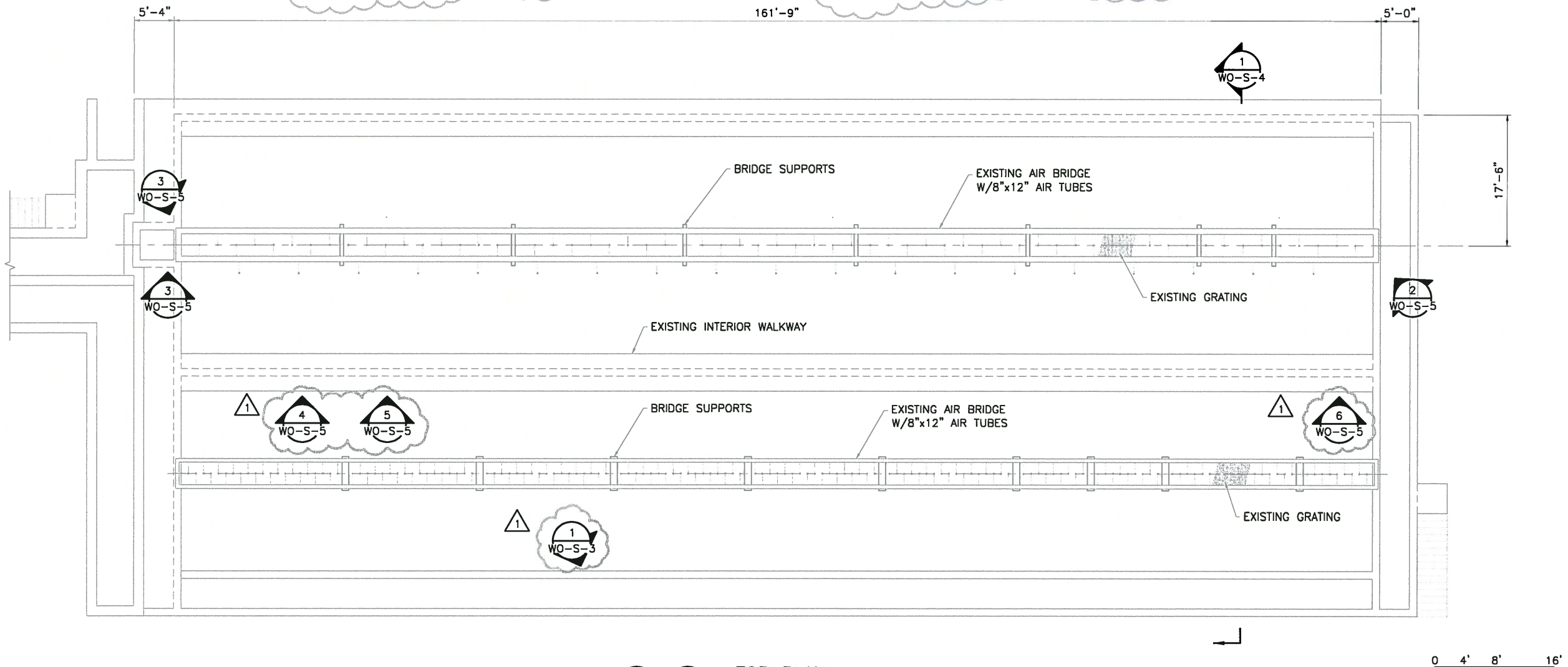
1 — PHOTO 1 – LEAKING GASKET AT AIR PIPE IN AERATION BASIN

NO TO SCALE

CONTRACTOR TO EXCAVATE AND INSPECT BURIED PORTION OF THE MAIN AIR HEADER (APPR. 30') FROM THE BLOWER BUILDING TO THE AERATION BASINS FOR LEAKS AND REPLACE GASKETS AT FITTINGS AS NEEDED.

2 — PHOTO 2 – LEAKING GASKET AT AIR PIPE IN AERATION BASIN

NO TO SCALE



NORTH

1 — TOP PLAN

1/8"=1'-0"

0 4' 8' 16'

1/8"=1'-0"

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FB NO.: 5891

CITY OF HOUSTON

DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

WHITE OAK WWTP

STRUCTURAL

WHITE OAK WWTP REAERATION TOP PLAN

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
1/8"=1'-0"	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. WO-S-3	
SHEET NO. 76 OF 117	

ORIGINAL SCALE IN INCHES

FILE NAME: N:\ST\ST-HOU-PL-AERA02.DWG

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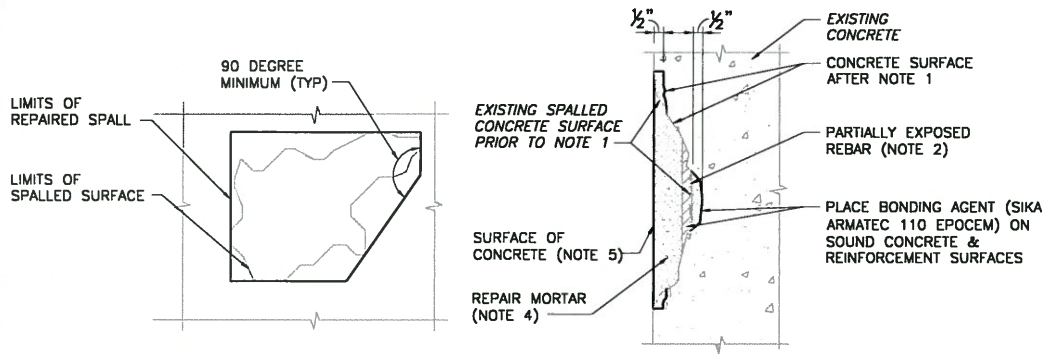


DETAIL NOTE:

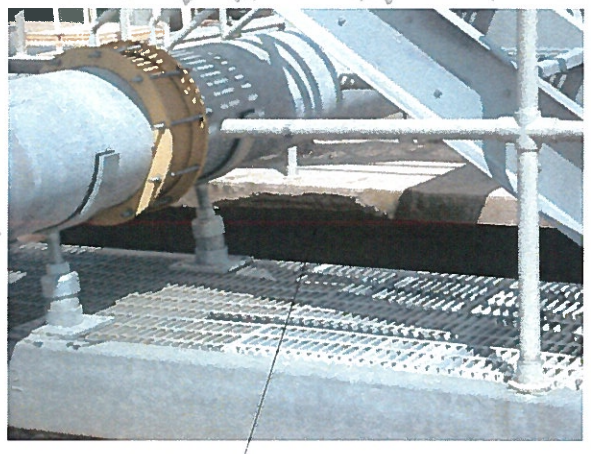
1. SAW CUT PERIMETER OF SPALLED AREA. REMOVE CONCRETE WITHIN CUT PERIMETER AS REQUIRED TO PROVIDE A ½" MINIMUM REPAIR DEPTH. REMOVE ALL UNSOUND CONCRETE. CLEAN REBAR OF CORROSION AND CONTAMINATES USING MECHANICAL MEANS.
2. IF ANY REBAR HAS MORE THAN HALF ITS CROSS-SECTION EXPOSED, THEN REMOVE CONCRETE FROM AROUND THE BAR TO A MINIMUM DEPTH OF ½".
3. CRACKS IN SOUND CONCRETE, THAT EXTEND OUT FROM THE SPALLED AREA TO BE REPAIRED, SHALL BE PRESSURE INJECTED WITH HIGH STRENGTH, LOW VISCOSITY EPOXY. USE SIKADUR 35, HI-MOD LV, BY SIKA CORPORATION. PROVIDE SUPPORT PRODUCTS AND CRACK PREPARATION AS RECOMMENDED BY SIKA.
4. REPAIR MORTAR SHALL BE SIKATOP 122 PLUS OR SIKATOP 123 PLUS, BY SIKA CORPORATION. PREPARE, INSTALL, INSTALL IN MULTIPLE LIFTS, FINISH, AND CURE AS RECOMMENDED BY SIKA.
5. FINISHED SURFACE TEXTURE SHALL MATCH EXISTING FINISH TEXTURE.
6. THIS PROJECT ONLY INCLUDES CONCRETE SPALL AND CRACK REPAIR AT EAST AND WEST ENDS OF EXISTING AIR BRIDGES AND THE CONCRETE WALKWAY BETWEEN THE AERATION BASINS. THE ESTIMATED QUANTITY OF CONCRETE SPALL REPAIR IS 20 CUBIC FEET. THE ESTIMATED QUANTITY OF CRACK REPAIR IS 20 LINEAR FEET. THE ESTIMATED QUANTITIES ARE FOR BIDDING PURPOSES ONLY. CONTRACTOR SHALL FIELD VERIFY ACTUAL QUANTITIES FOR CONCRETE SPALL AND CRACK REPAIR.

1 / – TYPICAL CONCRETE SPALL & CRACK REPAIR
NOT TO SCALE

3 / – PHOTO 3 – WEST END OF EXISTING NORTH AIR BRIDGE
NOT TO SCALE

2 / – PHOTO 1 – EAST END OF EXISTING NORTH AIR BRIDGE
NOT TO SCALE

3 / – PHOTO 2 – WEST END OF EXISTING NORTH AIR BRIDGE
NOT TO SCALE



4 / – PHOTO 4 – SOUTH SIDE OF WEST END OF EXISTING WALKWAY
NOT TO SCALE

5 / – PHOTO 5 – SOUTH SIDE OF WEST END OF EXISTING WALKWAY
NOT TO SCALE

6 / – PHOTO 6 – SOUTH SIDE OF EAST END OF EXISTING WALKWAY
NOT TO SCALE

TO ARRANGE FOR LINES TO BE TURNED OFF OR MOVED, CALL CENTERPOINT AT 713-207-2222

PRIVATE UTILITY LINES SHOWN

AT LEAST 48 HOURS BEFORE EXCAVATING IN STREET R.O.W. OR EASEMENTS CALL THE LONE STAR NOTIFICATION 713-223-4567

Date:
CenterPoint Energy/Electric Facilities
Signature indicates underground electric lines are property shown. No approval for construction is given.

Date:
Approved for SBC underground conduit facilities only.
Signature valid for one year.

Date:
CenterPoint Energy/Gas Facilities/ENTEX Incorporated
(Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/27/16	ADDENDUM NO. 1	M.R.

FREESE AND NICHOLS
10497 Town and Country Way,
Suite 600
Houston, Texas 77024
Phone – (713) 600-6800
Fax – (713) 600-6801
Freese and Nichols, Inc.
F-2144

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO.: 5891

STATE OF TEXAS
MICHAEL RAY ROBERTSON
59701
LICENSED PROFESSIONAL ENGINEER
01/27/16

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

WHITE OAK WWTP

STRUCTURAL

WHITE OAK WWTP REAERATION DETAILS

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R-00265-0102-4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. WO-S-5	
SHEET NO. 78 OF 117	

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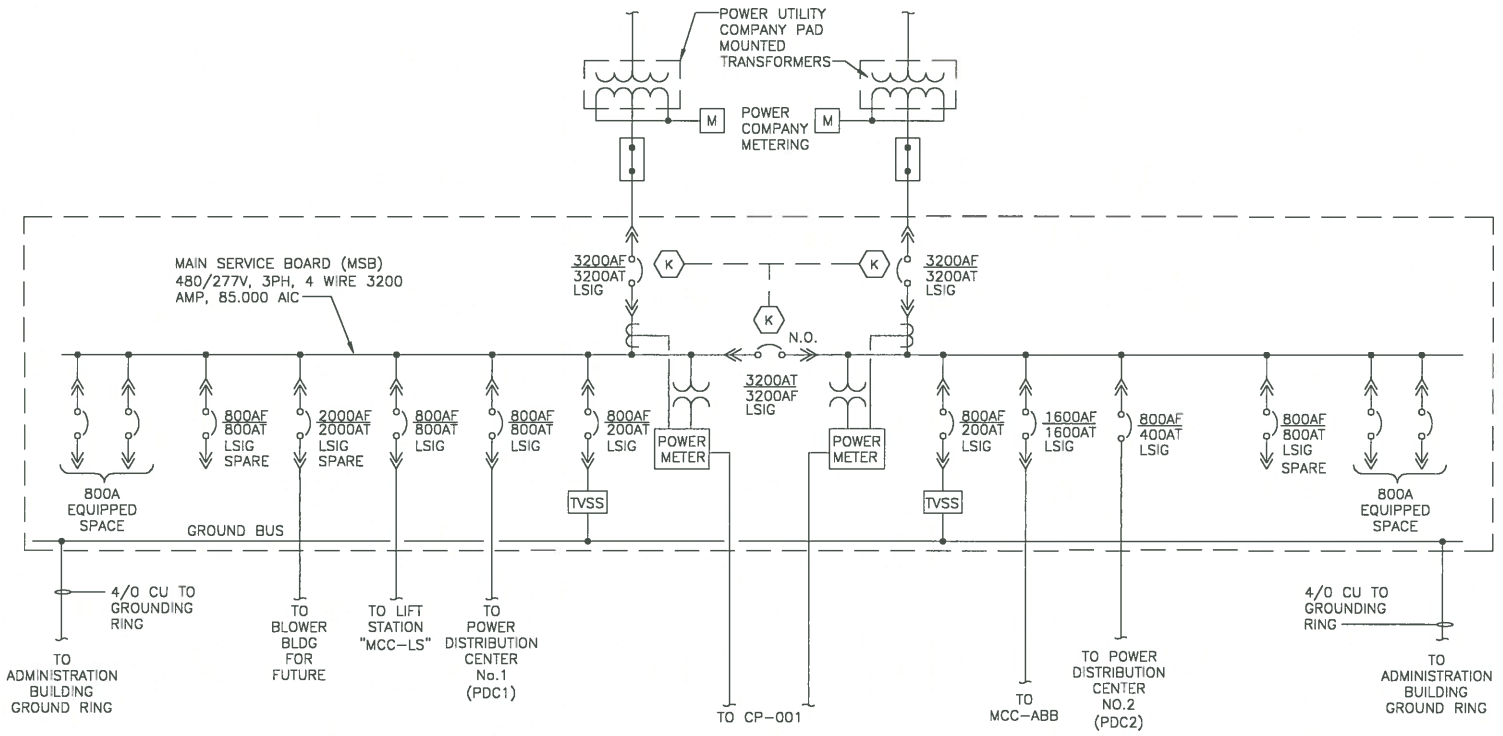
ORIGINAL SCALE IN INCHES
FILE NAME



1 — EXISTING MAIN SWITCHBOARD "MSB" ONE LINE DIAGRAM

NTS

NOTES:

1. 34 HP LIFT STATION PUMP MOTORS REPLACE 60 HP LIFT STATION PUMP MOTORS.

POWER SYSTEM ANALYSIS

DESCRIPTION	AMPS AT 480V A	B	C
MOTOR CONTROL CENTER "MCC-ABB"			
AREATION BLOWER BL-310 200HP	240.0	240.0	240.0
AREATION BLOWER BL-320 200HP	240.0	240.0	240.0
AREATION BLOWER BL-330 200HP	240.0	240.0	240.0
25KVA TRANSFORMER 1ø	52.0	52.0	
15KVA TRANSFORMER 1ø		31.2	31.2
7.5KVA TRANSFORMER 1ø		15.6	15.6
MISC. LOAD	16.0	16.0	16.0
MCC-"ABB" TOTAL LOAD	788.0	834.8	782.8
MOTOR CONTROL CENTER "MCC-LS"			
GATE OPERATOR (NORTH) 1/2 HP	1.1	1.1	1.1
GATE OPERATOR (SOUTH) 1/2 HP	1.1	1.1	1.1
EXHAUST FAN 1HP	2.1	2.1	2.1
25 KVA 1ø TRANSFORMER (PANEL LLP)	52.0		52.0
LIFT PUMP No.1 45 HP (LSP-110) (1) (ADDED)	52.0	52.0	52.0
LIFT PUMP No.2 45 HP (LSP-120) (ADDED)	52.0	52.0	52.0
LIFT PUMP No.3 45 HP (LSP-130) (ADDED)	52.0	52.0	52.0
LIFT PUMP No.4 45 HP (LSP-140) (1) (ADDED)	52.0	52.0	52.0
MCC-"LS" TOTAL LOAD	264.3	212.3	264.3
POWER DISTRIBUTION CENTER NO. 1 "PDC-1"			
SECONDARY CLARIFIER No.1 3/4 HP (CL-410)	1.6	1.6	1.6
SECONDARY CLARIFIER No.2 3/4 HP (CL-420)	1.6	1.6	1.6
INFLUENT ROTARY SCREEN 5 HP (RS-210)	7.6	7.6	7.6
SCREENING CONVEYOR 5HP (BC-250)	7.6	7.6	7.6
COMPACTING SCREW CONVEYOR 5 HP (SC-260)	11.0	11.0	11.0
SCUM PUMP 5HP (SCP-413)	7.6	7.6	7.6
WASTE ACTIVATED SLUDGE PUMP (1600W) (WASP-810)	2.0	2.0	2.0
THICKENER CONTROL PANEL (3) CONTROL VALVES	6.3	6.3	6.3
(4) MIXERS, 3 (MOV) 15KW	18.0	18.0	18.0
(4) MIXERS, 3 (MOV) 15KW	18.0	18.0	18.0
(4) MIXERS, 3 (MOV) 15KW	18.0	18.0	18.0
50 KVA 1ø TRANSFORMER (PANEL LPDC1)	104.0	104.0	
INFLUENT BAR SCREEN 20HP (ADDED)	27.0	27.0	27.0
MOTOR OPERATED GATES 3-5HP (ADDED)	37.0	37.0	37.0
WAS PUMP 1-7 1/2 HP (ADDED)	11	11	11
DIGESTER DECANT 2-5HP (ADDED)	15.0	15.0	15.0
"PDC-1" TOTAL LOAD	293.3	293.3	189.3
POWER DISTRIBUTION CENTER NO. 2 "PDC-2"			
EFFLUENT FILTER CONTROL PANEL	42.2	42.2	42.2
STRAINER CONTROL PANEL	12.1	12.1	12.1
NPW CONTROL PANEL	50.5	50.5	50.5
25KVA 1ø TRANSFORMER (PANEL "CLA")	52.0	52.0	
50KVA 1ø TRANSFORMER (PANEL "LPDC2")		104.0	104.0
MOTORIZED GATES	4.9	4.9	4.9
"PDC-2" TOTAL LOAD	161.7	265.7	213.7
MCC-"ABB" TOTAL LOAD	788.0	834.8	782.8
MCC-"LS" TOTAL LOAD	264.3	212.3	264.3
"PDC-1" TOTAL LOAD	293.3	293.3	189.3
"PDC-2" TOTAL LOAD	161.7	265.7	213.7
25% LARGEST MOTOR (200 HP)	60.0	60.0	60.0
TOTAL PLANT CONNECTED LOAD	1567.5	1666.1	1567.5
SERVICE CONDUCTOR AMPACITY (9 X 380)	3420.0	3420.0	3420.0
SPARE CAPACITY	1852.5	1753.9	1852.5

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PRIVATE UTILITY LINES SHOWN

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Date:

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Signature indicates underground electric lines are property shown. No approval for construction is given.

Date:

Approved for SBC underground conduit facilities only. Signature valid for one year.

Date:

CenterPoint Energy/Gas Facilities/ENTEX Incorporated (Gas service lines are not shown)

CABLE COMPANY

No.	Date	Revision	App.
1	1/27/16	ADDENDUM NO.1	MW

KGI Kalluri Group, Inc.
Consulting Engineers & Project Managers
TBPE Registration No. F-665
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288

FREESE and NICHOLS
10497 Town and Country Way,
Suite 600
Houston, Texas 77024
Phone - (713) 600-8500
Fax - (713) 600-8501
Freese and Nichols, Inc.
F-2144

SURVEYED BY: AMANI ENGINEERING, INC.
FB NO.: 5891

STATE OF TEXAS — MICHAEL H. WOOLEY — 40433 — REGISTERED PROFESSIONAL ENGINEER — 1-27-16

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

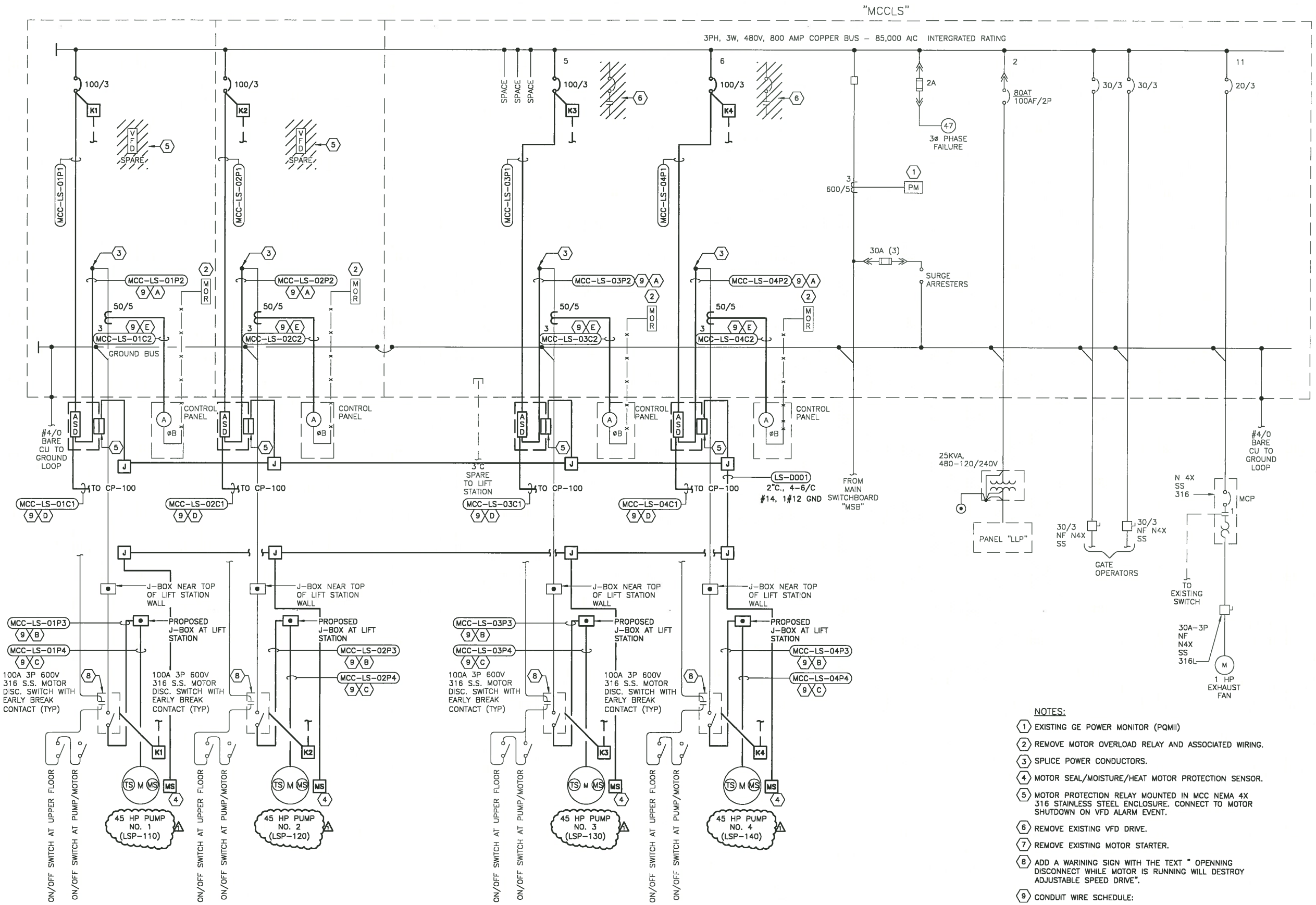
METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

KINGWOOD WEST WWTP

KINGWOOD WEST
OVERALL ONE LINE DIAGRAM

WBS NUMBER
R-00265-0102-4
DRAWING SCALE
AS NOTED
CITY OF HOUSTON PM
BILL ZOD, P.E.
DRAWING NO. KW-E-7
SHEET NO. 107 **OF** 117

FOR CITY OF HOUSTON ONLY



1 — "MCC–LS" LIFT STATION PROPOSED ONE LINE DIAGRAM

NTS

NOTES:

1. EXISTING GE POWER MONITOR (PQMII)
2. REMOVE MOTOR OVERLOAD RELAY AND ASSOCIATED WIRING.
3. SPLICE POWER CONDUCTORS.
4. MOTOR SEAL/MOISTURE/HEAT MOTOR PROTECTION SENSOR.
5. MOTOR PROTECTION RELAY MOUNTED IN MCC NEMA 4X 316 STAINLESS STEEL ENCLOSURE. CONNECT TO MOTOR SHUTDOWN ON VFD ALARM EVENT.
6. REMOVE EXISTING VFD DRIVE.
7. REMOVE EXISTING MOTOR STARTER.
8. ADD A WARINING SIGN WITH THE TEXT " OPENNING DISCONNECT WHILE MOTOR IS RUNNING WILL DESTROY ADJUSTABLE SPEED DRIVE".
9. CONDUIT WIRE SCHEDULE:
   - (A) 1¼"C, 3#3, 1#8 GND.
   - (B) 1¼"C, 3#3, 1#8 GND.
   - (C) PUMP MOTOR CABLE.
   - (D) 2"C, 2PR #18 TSP, 14#14, 1#12 GND.
   - (E) 1"C, 6#10, 1#10 GND.

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SURVEYED BY: AMANI ENGINEERING, INC.
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STATE OF TEXAS — MICHAEL H. WOOLEY — 40433 — REGISTERED PROFESSIONAL ENGINEER — 7-27-16

CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

METRO CENTRAL, UPPER BRAES, WHITE OAK, AND KINGWOOD WEST WWTPS IMPROVEMENTS

KINGWOOD WEST WWTP

LIFT STATION ONE LINE DIAGRAM

WBS NUMBER	FOR CITY OF HOUSTON ONLY
R–00265–0102–4	
DRAWING SCALE	
AS NOTED	
CITY OF HOUSTON PM	
BILL ZOD, P.E.	
DRAWING NO. KW–E–8	
SHEET NO. 108 OF 117	