

CITY OF HOUSTON

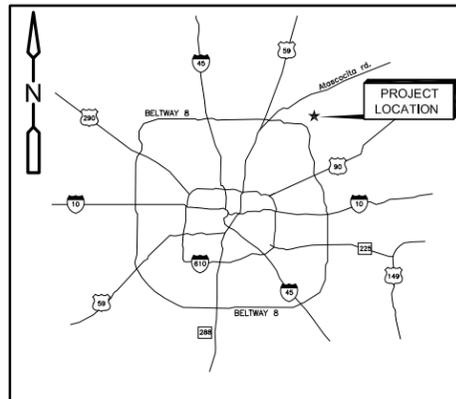
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ENGINEERING AND CONSTRUCTION DIVISION

NORTHEAST WATER PURIFICATION PLANT (NEWPP) IMPROVEMENTS

TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM

WBS No.: S-000066-008-4



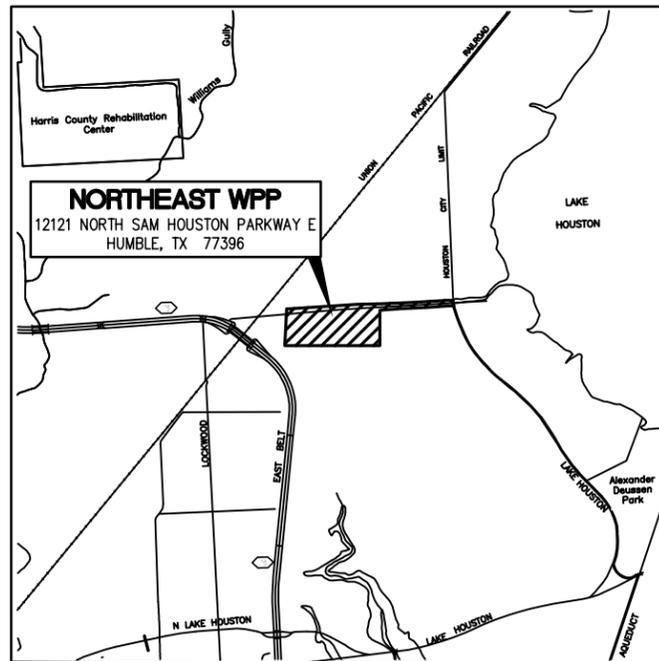
LOCATION MAP
NOT TO SCALE



APRIL 2012

MAYOR
ANNISE D. PARKER

CONTROLLER
RONALD C. GREEN



VICINITY MAP
NOT TO SCALE

HARRIS COUNTY KEY MAP No 376Z, 377W
GIMS MAP No 5765D, 5865C

BRENDA STARDIG
DISTRICT A

WANDA ADAMS
DISTRICT D

OLIVER PENNINGTON
DISTRICT G

**DISTRICT
COUNCIL MEMBERS**

JARVIS JOHNSON
DISTRICT B

MIKE SULLIVAN
DISTRICT E

EDWARD GONZALEZ
DISTRICT H

ANNE CLUTTERBUCK
DISTRICT C

AL HOANG
DISTRICT F

JAMES G. RODRIGUEZ
DISTRICT I

**COUNCIL MEMBERS
AT-LARGE**

STEPHEN C. COSTELLO
POSITION 1

MELISSA NORIEGA
POSITION 3

JOLANDA "JO" JONES
POSITION 5

SUE LOVELL
POSITION 2

C.O. "BRAD" BRADFORD
POSITION 4

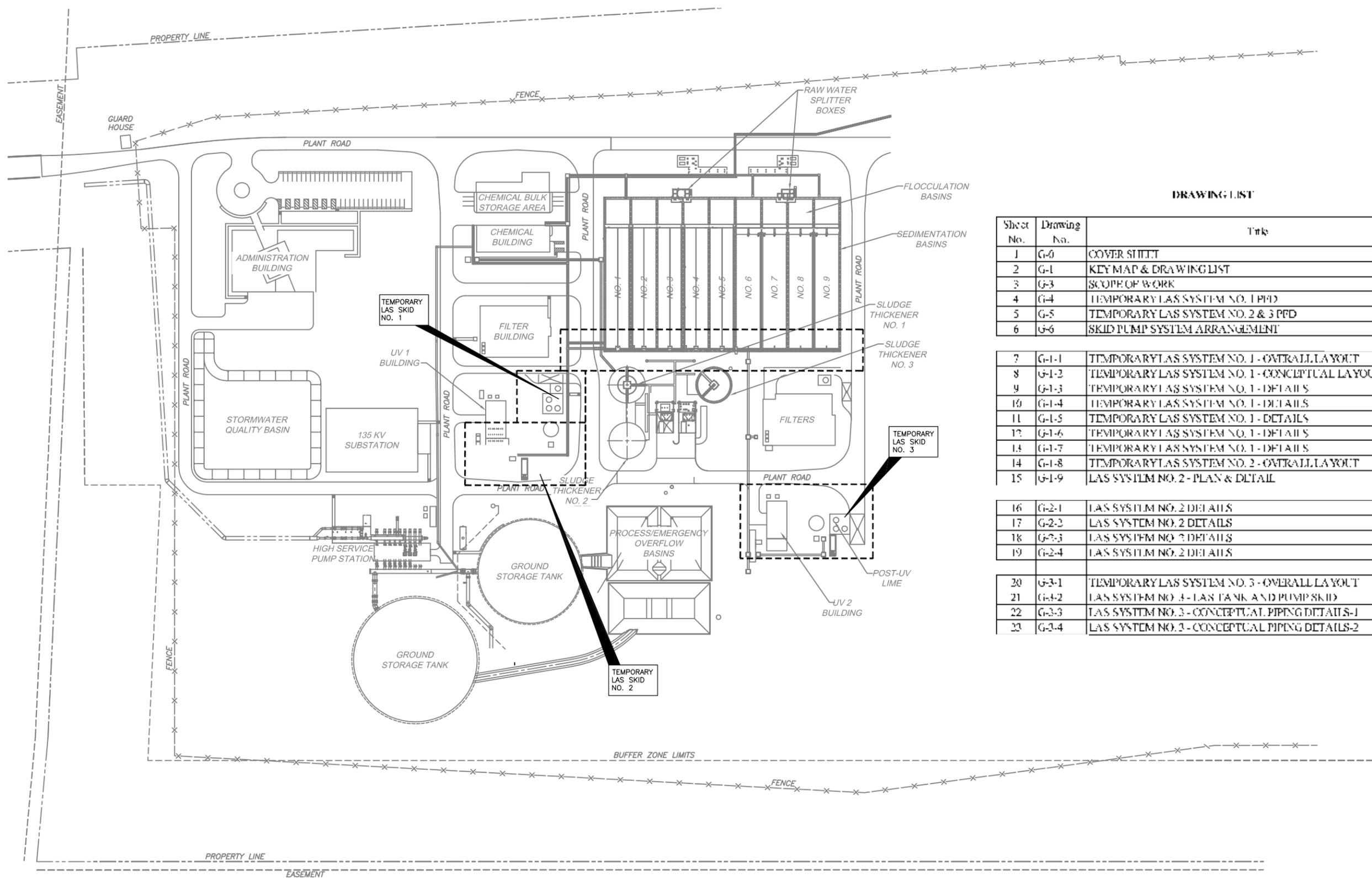
Kalluri Group, Inc. Consulting Engineers & Project Managers TBPE Registration No. F-665 10497 Town & Country Way, Suite 220 Houston, Texas 77024 Phone: (713)-365-9288	
SURVEYED BY: _____ FB NO. ____	

WATER _____ NA _____ WASTEWATER _____ NA _____ STORM WATER _____ NA _____ STREET & BRIDGE _____ CONSTRUCTION _____ NA _____ SECURITY SYSTEM _____ BSD	NA _____ TRAFFIC AND TRANSPORTATION _____ NA _____ SIGNALS _____ ASSISTANT DIRECTOR _____ NA _____ STREET LIGHTING _____ NA _____ PARK-FORESTRY _____ SPONSOR DIV/DEPT _____
--	---

CITY ENGINEER _____ DATE _____	
DIRECTOR OF PUBLIC WORKS AND ENGINEERING _____ DATE _____	

DWG. NO.
G-0

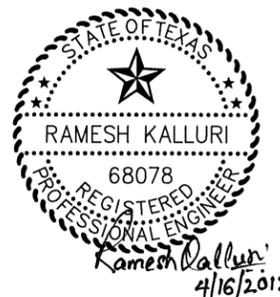
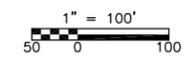
SHEET NO 1 OF 23 SHEETS



DRAWING LIST

Sheet No.	Drawing No.	Title
1	G-0	COVER SHEET
2	G-1	KEY MAP & DRAWING LIST
3	G-3	SCOPE OF WORK
4	G-4	TEMPORARY LAS SYSTEM NO. 1 PFD
5	G-5	TEMPORARY LAS SYSTEM NO. 2 & 3 PFD
6	G-6	SKID PUMP SYSTEM ARRANGEMENT
7	G-1-1	TEMPORARY LAS SYSTEM NO. 1 - OVERALL LAYOUT
8	G-1-2	TEMPORARY LAS SYSTEM NO. 1 - CONCEPTUAL LAYOUT
9	G-1-3	TEMPORARY LAS SYSTEM NO. 1 - DETAILS
10	G-1-4	TEMPORARY LAS SYSTEM NO. 1 - DETAILS
11	G-1-5	TEMPORARY LAS SYSTEM NO. 1 - DETAILS
12	G-1-6	TEMPORARY LAS SYSTEM NO. 1 - DETAILS
13	G-1-7	TEMPORARY LAS SYSTEM NO. 1 - DETAILS
14	G-1-8	TEMPORARY LAS SYSTEM NO. 2 - OVERALL LAYOUT
15	G-1-9	LAS SYSTEM NO. 2 - PLAN & DETAIL
16	G-2-1	LAS SYSTEM NO. 2 DETAILS
17	G-2-2	LAS SYSTEM NO. 2 DETAILS
18	G-2-3	LAS SYSTEM NO. 2 DETAILS
19	G-2-4	LAS SYSTEM NO. 2 DETAILS
20	G-3-1	TEMPORARY LAS SYSTEM NO. 3 - OVERALL LAYOUT
21	G-3-2	LAS SYSTEM NO. 3 - LAS TANK AND PUMP SKID
22	G-3-3	LAS SYSTEM NO. 3 - CONCEPTUAL PIPING DETAILS-1
23	G-3-4	LAS SYSTEM NO. 3 - CONCEPTUAL PIPING DETAILS-2

**KEY MAP
PLAN**
1"=100'



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

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



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
KEY MAP & DRAWING LIST

WARNING
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1
 SHEET NO. 2 OF 23 SHEETS

SCOPE OF WORK

BACKGROUND

THE PROJECT INCLUDES INSTALLATION OF TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEMS WHILE THE EXISTING AQUEOUS AMMONIA (NH4OH) SYSTEM IS BEING UPGRADED. THE TEMPORARY LAS DESIGN WILL HAVE THREE SEPARATE SYSTEMS. SYSTEM NO. 1 WILL BE USED TO FEED TWO INJECTION POINTS. ONE INJECTION POINT IS ON PHASE I SEDIMENTATION BASIN SETTLED WATER PIPE (WEST) AND THE SECOND INJECTION POINT IS ON THE PHASE II SEDIMENTATION BASIN SETTLED WATER PIPE (EAST). THESE TWO POINTS WILL BE THE PRIMARY INJECTION POINTS. SYSTEM NO. 2 WILL BE USED TO FEED LAS TO FINISHED WATER FROM THE PHASE I POST UV 48" HEADER TO GROUND STORAGE TANKS (ALTERNATE INJECTION POINT). SYSTEM NO. 3 WILL BE USED TO FEED LAS TO FINISHED WATER FROM THE PHASE II POST UV 48" HEADER TO GROUND STORAGE TANKS (ALTERNATE INJECTION POINT).

TEMPORARY LAS SYSTEM NO. 1:

THE SCOPE OF WORK WILL INCLUDE THE FOLLOWING:

1. PROCUREMENT OF TWO (2) 6,250 GALLON REFURBISHED LAS STORAGE TANKS FROM ALTIVIA CORPORATION. (ATTN: PABLO DAVILA, PHONE (713) 658-9000 X333)
 2. PROCUREMENT OF TWO (2) 2-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM FROM ALTIVIA CORPORATION.
 3. PROCUREMENT OF ALL OTHER MATERIAL INCLUDING ELECTRICAL CONDUITS, WIRING, PVC PIPE, 1/2" TUBING, FITTINGS, SUPPORTS AND ALL OTHER APPURTENANCES REQUIRED FOR A COMPLETE SYSTEM.
 4. INSTALLATION OF TWO (2) 6,250 GALLON REFURBISHED LAS STORAGE TANKS PER MANUFACTURER RECOMMENDATIONS. COORDINATE WITH ALTIVIA CORPORATION.
 5. INSTALLATION OF ONE (1) 2-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM ON A MINIMUM 18-INCH ELEVATED PLATFORM. COORDINATE WITH ALTIVIA CORPORATION.
 6. INSTALLATION OF ALL PIPING INCLUDING SUPPORTS BETWEEN STORAGE TANKS TO CHEMICAL FEED SYSTEM AND FROM CHEMICAL FEED SYSTEM TO TWO APPLICATION POINTS ON PHASE I AND PHASE II SETTLED WATER HEADERS FROM SEDIMENTATION BASINS.
 7. PROVIDE ELECTRICAL POWER TO THE TEMPORARY CHEMICAL FEED SYSTEM.
 8. PROVIDE 4-20 MA FLOW PACING SIGNAL FROM UV BUILDING NO. 1 TO THE TEMPORARY CHEMICAL FEED SYSTEM. CONTRACTOR SHALL UTILIZE THE SERVICES OF PONDHOP AUTOMATION & CONTROLS, INC., PHONE: (713) 589-8760 (ATTN: DUNCAN SINCLAIR) FOR PROGRAMMING OF FLOW PACING SIGNALS.
 9. DISINFECTION OF ALL EQUIPMENT AND PIPING THAT COMES IN CONTACT WITH THE CHEMICAL PER AWWA C651 "DISINFECTING WATER MAINS", AWWA C652 "DISINFECTION OF WATER STORAGE FACILITIES" AND AWWA C653 "DISINFECTION OF WATER TREATMENT PLANTS".
 10. START UP THE SYSTEM AND ADJUST FOR PROPER OPERATION.
- NOTE: ASSUMED HOSES FOR UNLOADING CHEMICAL FROM TRUCK TO STORAGE TANKS WILL BE PROVIDED BY ALTIVIA.

TEMPORARY LAS SYSTEM NO. 2:

THE SCOPE OF WORK WILL INCLUDE THE FOLLOWING:

1. PROCUREMENT OF ONE (1) 2,000 GALLON USED LAS STORAGE TANK FROM ALTIVIA CORPORATION. (ATTN: PABLO DAVILA, PHONE (713) 658-9000 X333)
2. PROCUREMENT OF ONE (1) 1-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM FROM ALTIVIA CORPORATION. (ATTN: PABLO DAVILA, PHONE (713) 658-9000 X333)
3. PROCUREMENT OF ALL OTHER MATERIAL INCLUDING ELECTRICAL CONDUITS, WIRING, PVC PIPE, 1/2" TUBING, FITTINGS, SUPPORTS AND ALL OTHER APPURTENANCES REQUIRED FOR A COMPLETE SYSTEM.
4. INSTALLATION OF ONE (1) 2,000 GALLON USED LAS STORAGE TANK PER MANUFACTURER RECOMMENDATIONS. COORDINATE WITH ALTIVIA CORPORATION.
5. INSTALLATION OF ONE (1) 1-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM ON A MINIMUM 18-INCH ELEVATED PLATFORM. COORDINATE WITH ALTIVIA CORPORATION.
6. INSTALLATION OF ALL PIPING INCLUDING SUPPORTS BETWEEN STORAGE TANK TO TEMPORARY CHEMICAL FEED SYSTEM AND FROM CHEMICAL FEED SYSTEM TO THE APPLICATION POINT ON POST UV-1 48-INCH HEADER.
7. PROVIDE ELECTRICAL POWER TO THE CHEMICAL FEED SYSTEM.
8. PROVIDE 4-20 MA FLOW PACING SIGNAL FROM UV BUILDING NO. 1 TO THE TEMPORARY CHEMICAL FEED SYSTEM. CONTRACTOR SHALL UTILIZE THE SERVICES OF PONDHOP AUTOMATION & CONTROLS, INC., PHONE: (713) 589-8760 (ATTN: DUNCAN SINCLAIR) FOR PROGRAMMING OF FLOW PACING SIGNALS.
9. DISINFECTION OF ALL EQUIPMENT AND PIPING THAT COMES IN CONTACT WITH THE CHEMICAL PER AWWA C651 "DISINFECTING WATER MAINS", AWWA C652 "DISINFECTION OF WATER STORAGE FACILITIES AND AWWA C653 "DISINFECTION OF WATER TREATMENT PLANTS".
10. START UP THE SYSTEM AND ADJUST FOR PROPER OPERATION.

TEMPORARY LAS SYSTEM NO. 3:

THE SCOPE OF WORK WILL INCLUDE THE FOLLOWING:

1. PROCUREMENT OF ONE (1) 2,000 GALLON USED LAS STORAGE TANK FROM ALTIVIA CORPORATION. (ATTN: PABLO DAVILA, PHONE (713) 658-9000 X333)
 2. PROCUREMENT OF ONE (1) 1-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM FROM ALTIVIA CORPORATION.
 3. PROCUREMENT OF ALL OTHER MATERIAL INCLUDING ELECTRICAL CONDUITS, WIRING, PVC PIPE, 1/2" TUBING, FITTINGS, SUPPORTS AND ALL OTHER APPURTENANCES REQUIRED FOR A COMPLETE SYSTEM.
 4. INSTALLATION OF ONE (1) 2,000 GALLON USED LAS STORAGE TANK PER MANUFACTURER RECOMMENDATIONS. COORDINATE WITH ALTIVIA CORPORATION.
 5. INSTALLATION OF ONE (1) 1-PUMP CHEMICAL FEED ENGINEERED SKID SYSTEM ON A MINIMUM 18-INCH ELEVATED PLATFORM. COORDINATE WITH ALTIVIA CORPORATION.
 6. INSTALLATION OF ALL PIPING INCLUDING SUPPORTS BETWEEN STORAGE TANK TO TEMPORARY CHEMICAL FEED SYSTEM AND FROM CHEMICAL FEED SYSTEM TO THE APPLICATION POINT ON POST UV-2 48-INCH HEADER.
 7. PROVIDE ELECTRICAL POWER TO THE CHEMICAL FEED SYSTEM.
 8. PROVIDE 4-20 MA FLOW PACING SIGNAL FROM UV BUILDING NO. 2 TO THE TEMPORARY CHEMICAL FEED SYSTEM. CONTRACTOR SHALL UTILIZE THE SERVICES OF PONDHOP AUTOMATION & CONTROLS, INC., PHONE: (713) 589-8760 (ATTN: DUNCAN SINCLAIR) FOR PROGRAMMING OF FLOW PACING SIGNALS.
 9. DISINFECTION OF ALL EQUIPMENT AND PIPING THAT COMES IN CONTACT WITH THE CHEMICAL PER AWWA C651 "DISINFECTING WATER MAINS", AWWA C652 "DISINFECTION OF WATER STORAGE FACILITIES" AND AWWA C653 "DISINFECTION OF WATER TREATMENT PLANTS".
 10. START UP THE SYSTEM AND ADJUST FOR PROPER OPERATION.
- NOTE: ASSUMED HOSE FOR UNLOADING CHEMICAL FROM TRUCK TO STORAGE TANK WILL BE PROVIDED BY ALTIVIA

DEACTIVATION AND REMOVAL OF TEMPORARY LAS SYSTEMS:

WHEN NOTIFIED BY THE CITY, IMPLEMENT THE FOLLOWING:

1. FLUSH CHEMICAL LINES AND TANKS FOR THE THREE TEMPORARY LAS SYSTEMS. DISPOSE OF WASTE TO A LOCATION DIRECTED BY THE CITY.
2. REMOVE ITEMS DESIGNATED BY THE CITY FOR SALVAGE AND DELIVER TO A HOUSTON AREA LOCATION DESIGNATED BY THE CITY.
3. REMOVE AND PROPERLY DISPOSE OF ALL TEMPORARY LAS SYSTEM COMPONENTS NOT DESIGNATED BY THE CITY FOR SALVAGE.
4. RECONNECT POWER AND ANALOG (4-20 MA) CONDUITS AND WIRING TO LIME PUMPS. CONFIRM LIME PUMPS ARE POWERED AND OPERABLE BY MEANS OF ANALOG SIGNALS.

PIPING SPECIFICATIONS:

1. RIGID PIPING: SCHEDULE 80 PVC.
2. RIGID PIPING SUPPORTS: USE 316 STAINLESS STEEL UNISTRUTS. SPACING OF SUPPORTS SHALL BE 4'-0".
3. LAS TUBING: TUBING SHALL BE 1/2-INCH CLEARBRAID STANDARD WALL PVC HOSE PURCHASED IN 300 FT ROLLS MANUFACTURED BY KURIYAMA OF AMERICA, ITEM NO. K3150-08X300. THE HOSE SHALL BE CERTIFIED UNDER NSF/ANSI STANDARD 51. MINIMIZE THE NUMBER OF JOINTS TO THE MAXIMUM EXTENT POSSIBLE.
ROUTE 1/2" TUBING ALONG EXISTING RIGID PIPE. AT 48-INCH INTERVALS, INSERT 1/2" TUBING INTO A 12-INCH LENGTH OF 1-INCH DIAMETER PVC PIPE. STRAP EACH PVC PIPE SEGMENT TO EXISTING RIGID PIPE WITH A MINIMUM OF TWO PIPE STRAPS.
4. TUBING FITTINGS: THE FITTING AND HOSE OR TUBING SHALL BE PROPERLY MATCHED IN SIZE AND TYPE. THE INSERT SHALL BE SLIGHTLY LARGER THAN THE TUBING TO CREATE A SLIGHT EXPANSION OF THE TUBE AND PROVIDE A GOOD CONSISTENT SEAL. FOLLOW MANUFACTURER'S RECOMMENDATION.
5. TUBING CLAMPS: 300 SERIES SS BAND, 400 SERIES SS SCREW. TO PREVENT OVER-CRIMPING OR OVER-TIGHTENING THE CLAMP, INSERT 1/2" TUBING INTO A 12-INCH LENGTH OF 1-INCH DIAMETER PVC PIPE. STRAP EACH PVC PIPE SEGMENT TO EXISTING RIGID PIPE WITH A MINIMUM OF TWO PIPE STRAPS.
6. BALL VALVES: VENTED TYPE BALL, TRUE UNIONS, PVC BODY, PTFE SHAFT BEARINGS AND SEALS, VITON SEALS.
7. CHECK VALVE: PVC BODY, VITON DIAPHRAGM.

NOTES:

1. METERING PUMPS SHALL BE DIAPHRAGM TYPE. EACH METERING PUMP SHALL HAVE A MINIMUM PUMPING CAPACITY OF 20 GPH AT 100 PSIG. ALL COMPONENTS (INCLUDING LUBRICANTS) THAT COME IN CONTACT OR HAS THE POTENTIAL TO COME IN CONTACT WITH PROCESS WATER SHALL BE NSF APPROVED.
2. SEE KBR'S PROPOSAL DATED APRIL 9, 2012 FOR DETAILED SCOPE OF WORK.



DESIGNED BY: R. KALLURI
DRAWN BY: C. MEDINA
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY: R.K.
DATE: APRIL 2012

REV. NO.	DATE	DRWN	CHKD	REMARKS


KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288

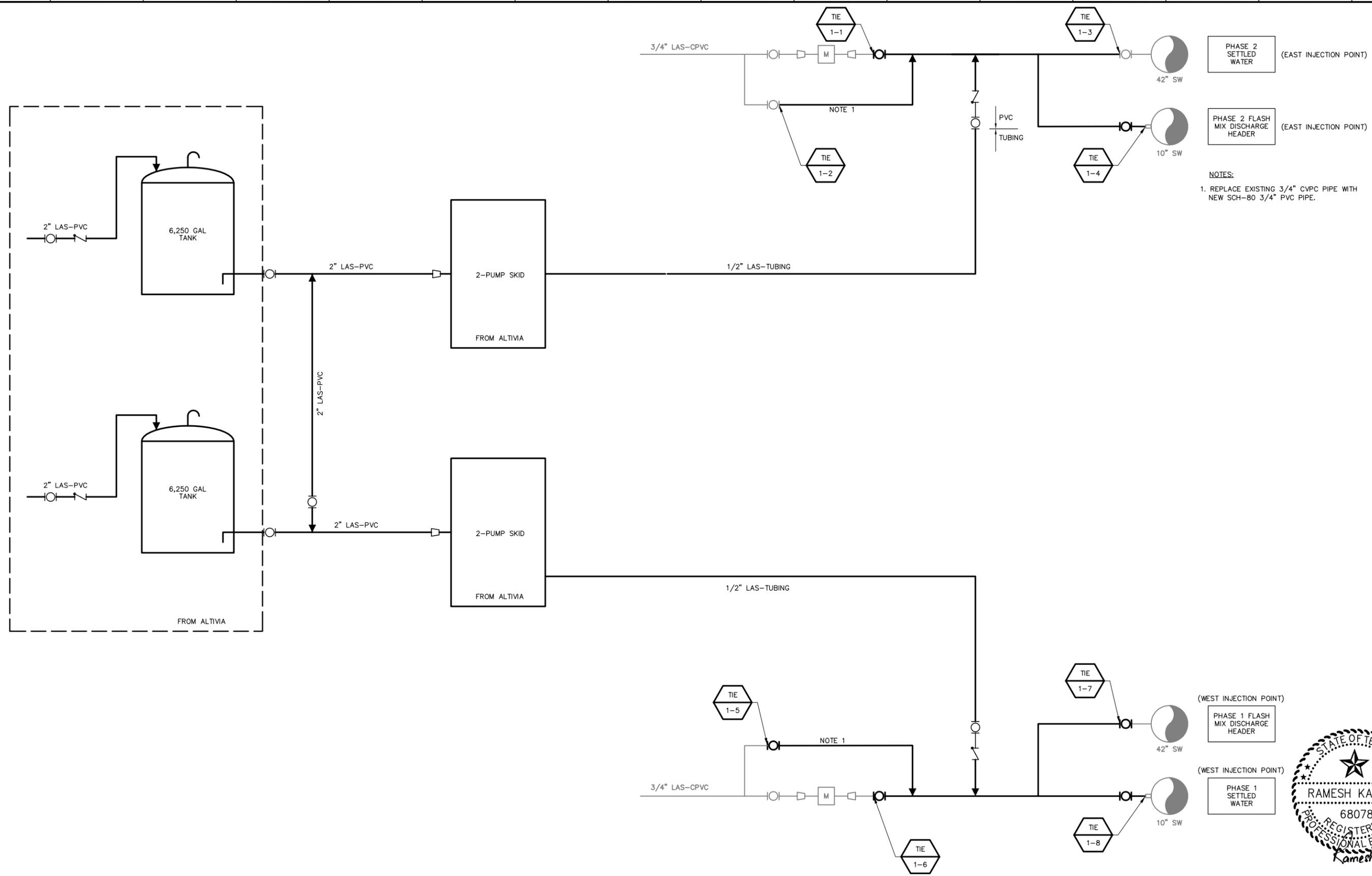


CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
SCOPE OF WORK

WARNING
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-3
 SHEET NO. 3 OF 23 SHEETS



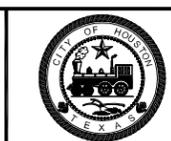
NOTES:
 1. REPLACE EXISTING 3/4\"/>



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288

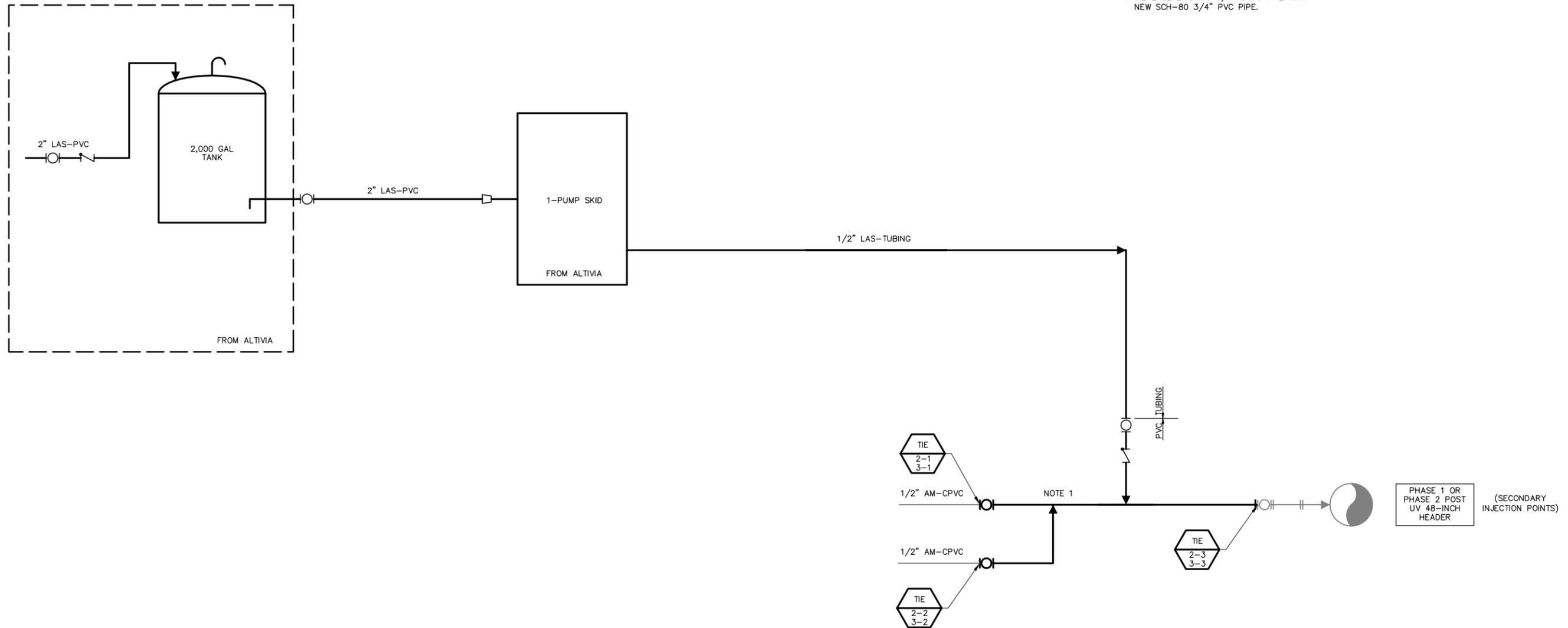


CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

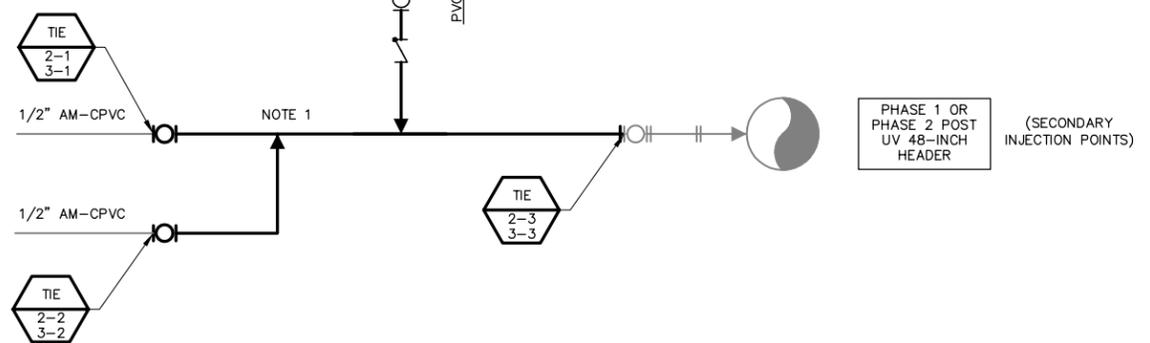
NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM
 NO. 1 PFD



WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-4
 SHEET NO. 4 OF 23 SHEETS



NOTES:
 1. REPLACE EXISTING 3/4\"/>



PHASE 1 OR PHASE 2 POST UV 48-INCH HEADER (SECONDARY INJECTION POINTS)



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
TEMPORARY LAS SYSTEM
 NO. 2 & 3 PFD



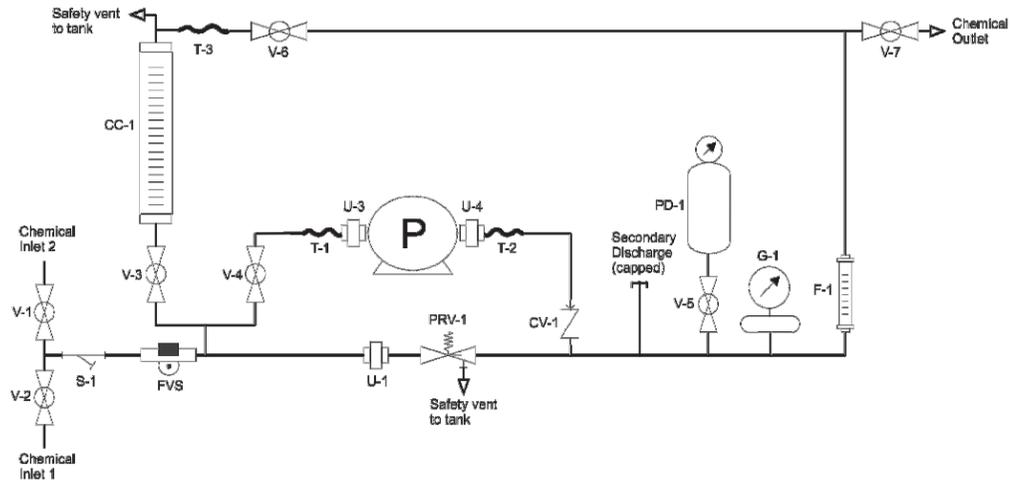
WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-5
 SHEET NO. 5 OF 23 SHEETS

CHEM-FEED® Engineered Skid Systems

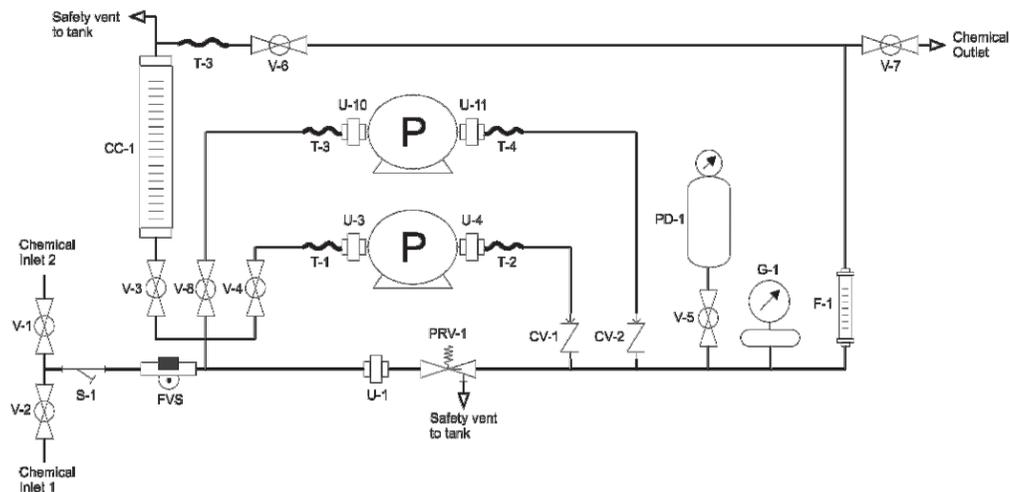
Engineering and Technical Data

Piping and Instrumentation Diagrams:

Single Pump Skids:



Dual Pump Skids:



3 of 6

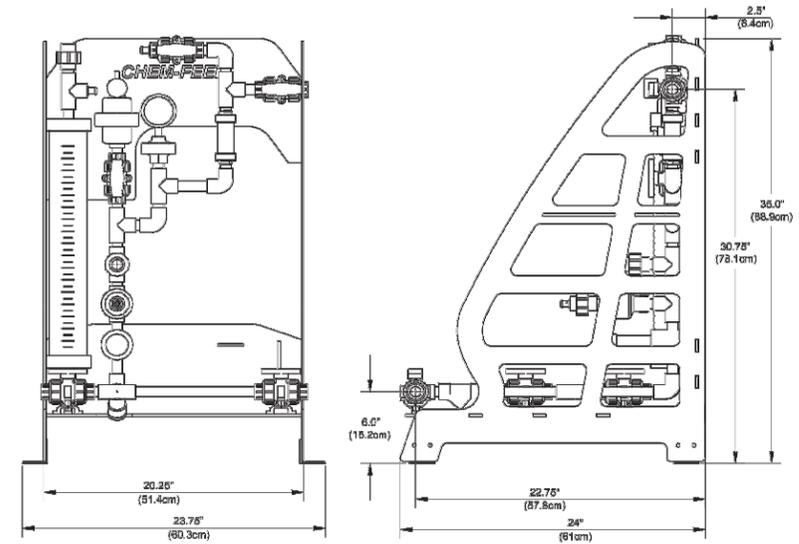
IDS #85000-097 rev. 06192010

CHEM-FEED® Engineered Skid Systems

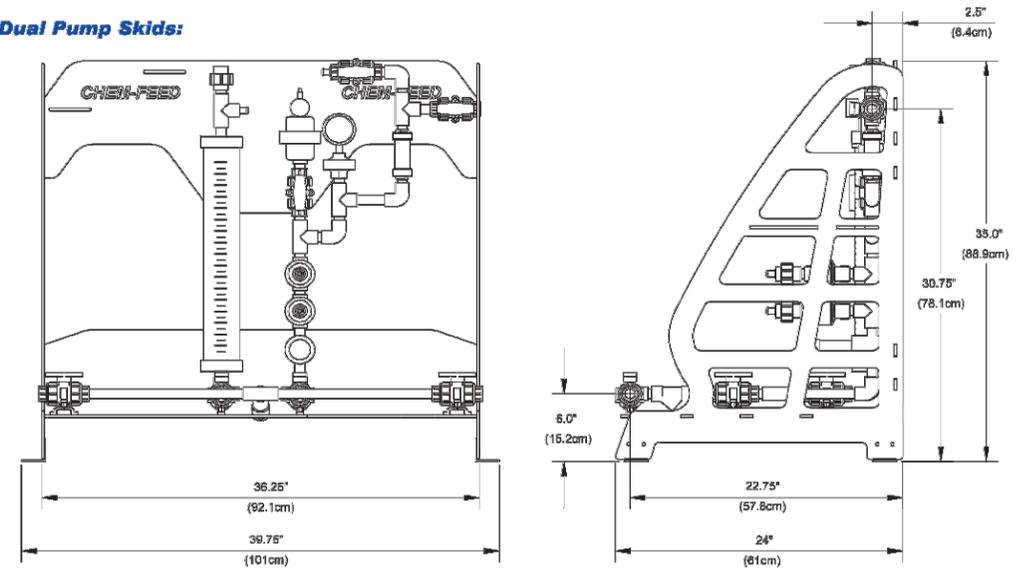
Engineering and Technical Data

Dimensions:

Single Pump Skids:



Dual Pump Skids:



4 of 6

IDS #85000-097 rev. 06192010



Ramesh Kalluri
4/16/2012

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
SKID PUMP SYSTEM
ARRANGEMENT

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-6
 SHEET NO. 6 OF 23 SHEETS

NOTES:

1. ROUTE 1/2" TUBING TO EXISTING CHEMICAL TRENCH. INSTALL TUBING INSIDE A 4"-DUCTILE IRON OR STEEL PIPE BETWEEN THE CONTAINMENT WALL AND CHEMICAL TRENCH.



TEMPORARY LAS SYSTEM NO. 1 OVERALL LAYOUT

PLAN

N.T.S



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 OVERALL LAYOUT

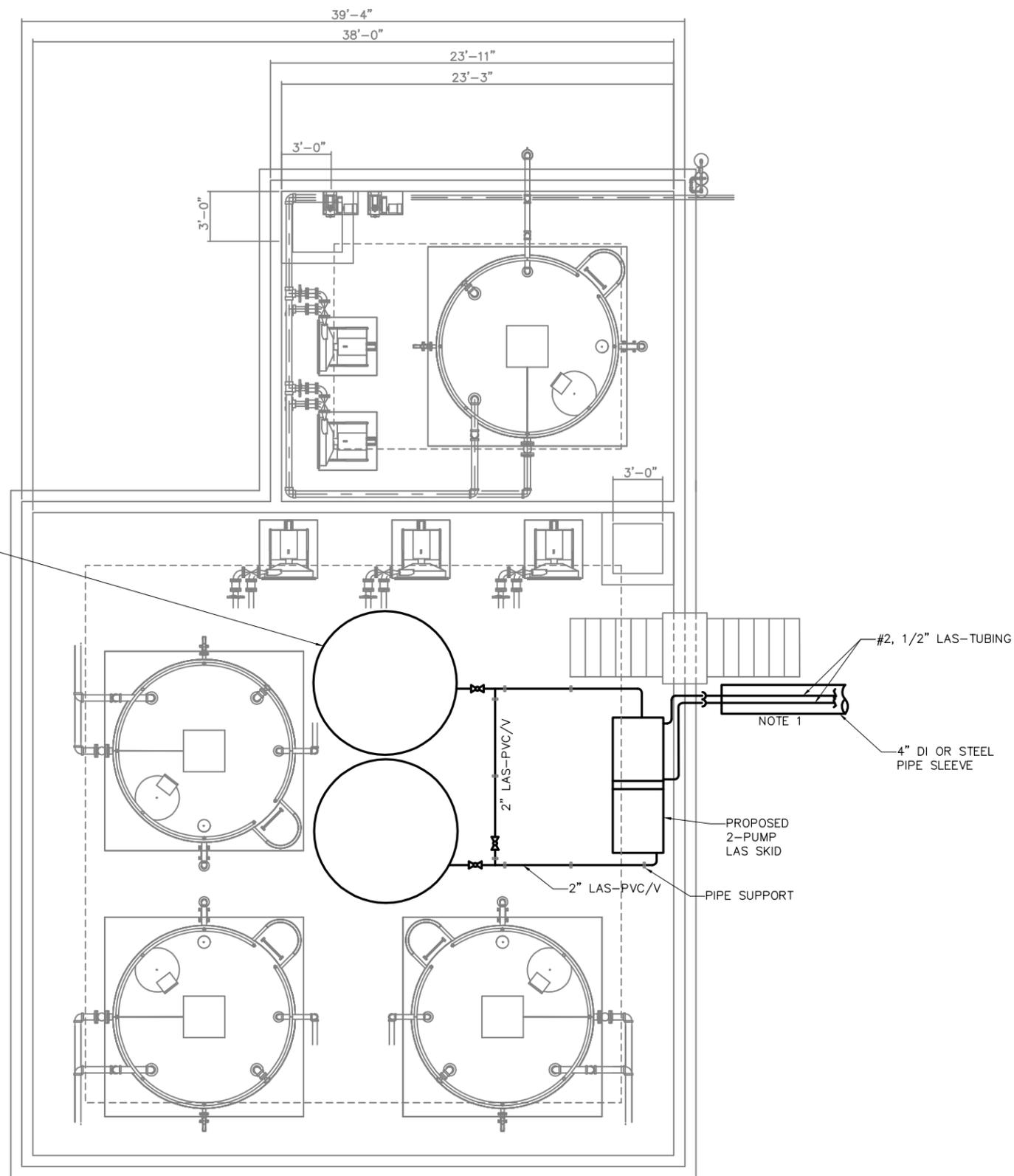
WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-1
 SHEET NO. 7 OF 23 SHEETS

NOTES:

1. ROUTE 1/2" TUBING TO EXISTING CHEMICAL TRENCH. INSTALL TUBING INSIDE A 4"-DUCTILE IRON OR STEEL PIPE BETWEEN THE CONTAINMENT WALL AND CHEMICAL TRENCH.

TWO PROPOSED 8'-6"DIA. X 16'-0"HT LAS TANKS



TEMPORARY LAS SYSTEM NO.1 CONCEPTUAL LAYOUT

PLAN

1/4" = 1'-0"



REV. NO.	DATE	DRWN	CHKD	REMARKS

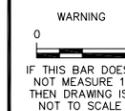
DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

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



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

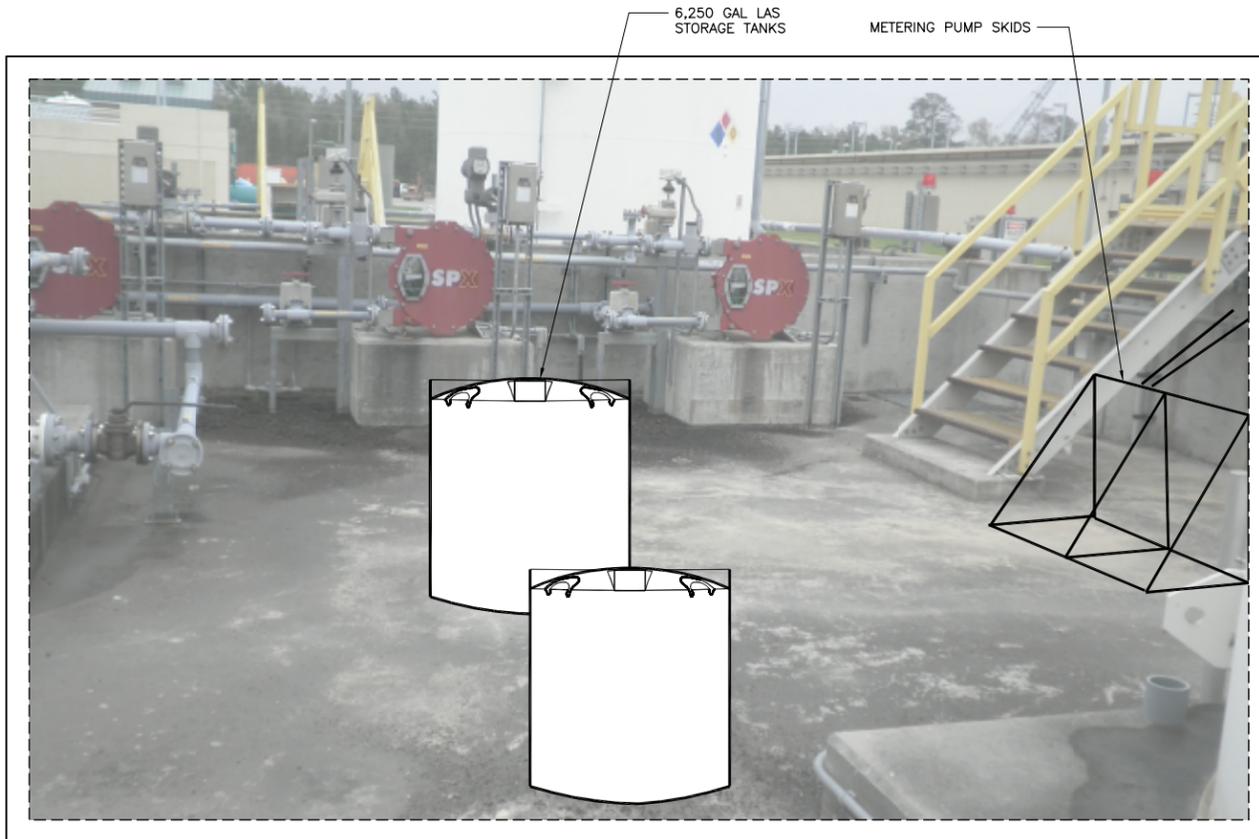
NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 CONCEPTUAL LAYOUT



WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-2
 SHEET NO. 8 OF 23 SHEETS

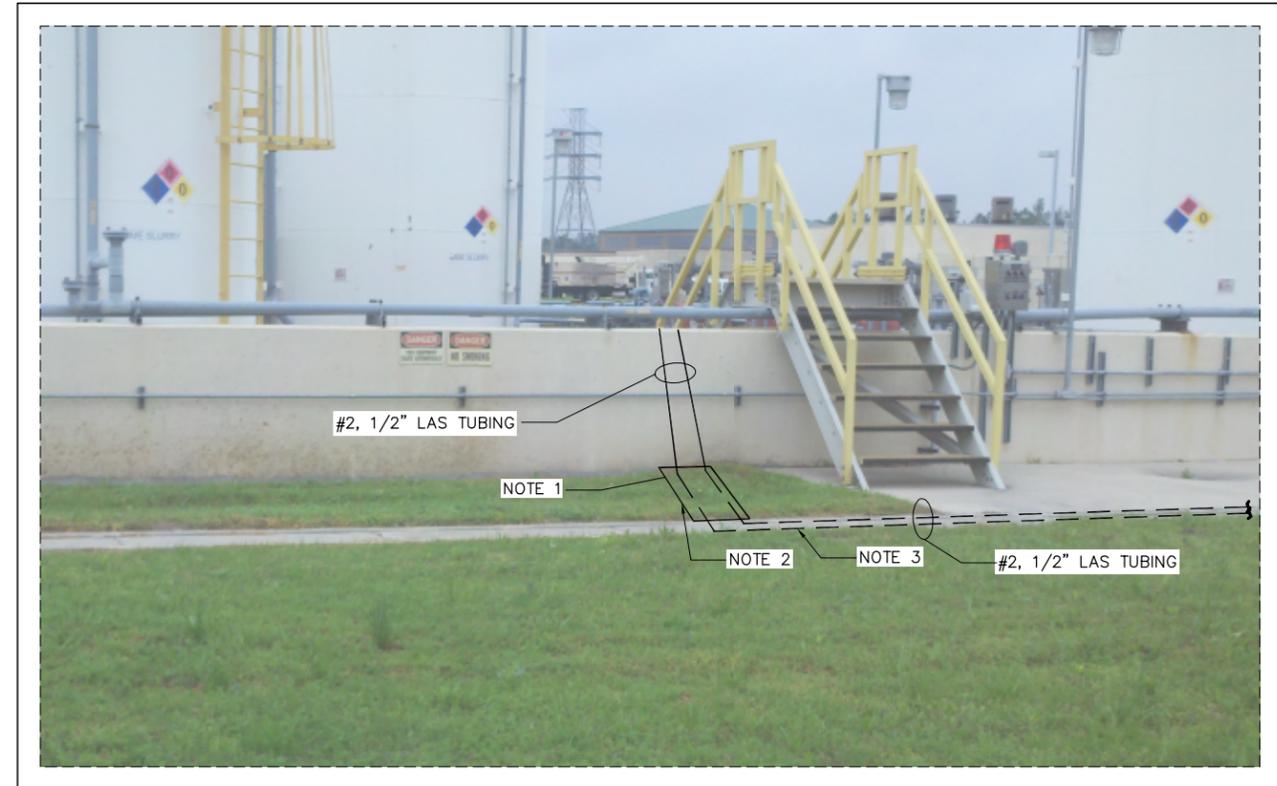
NOTES:

1. ROUTE 1/2" TUBING TO EXISTING CHEMICAL TRENCH. INSTALL TUBING INSIDE A 4"-DUCTILE IRON OR STEEL PIPE BETWEEN THE CONTAMINANT WALL AND CHEMICAL TRENCH.
2. CORE DRILL INTO EXISTING TRENCH.
3. ROUTE 1/2" TUBING ALONG EXISTING RIGID PIPE. AT 48" INTERVALS, INSERT 1/2" TUBING INTO A 12" LENGTH OF PVC PIPE SEGMENT TO EXISTING RIGID PIPE WITH A MINIMUM OF TWO PIPE STRAPS.



LAS SYSTEM NO. 1 CONCEPTUAL LAYOUT

DETAIL AA
NTS



CONCEPTUAL ROUTING OF TWO 1/2" LAS TUBING

DETAIL AB
NTS

SEE DETAIL AC,
DWG. G-1-4



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

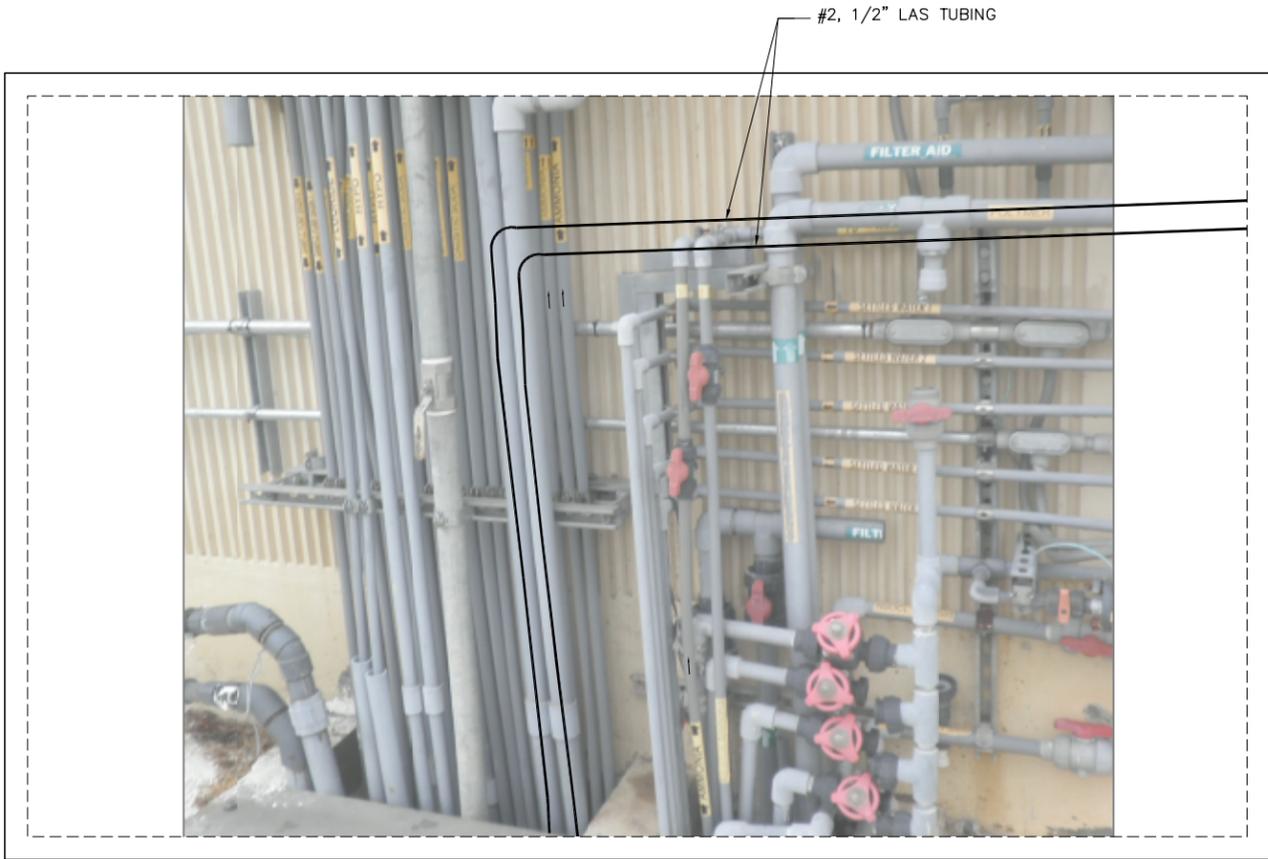
WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-3
 SHEET NO. 9 OF 23 SHEETS



SEE DETAIL AD,
DWG. G-1-4

CONCEPTUAL ROUTING OF TWO 1/2" LAS TUBING

DETAIL AC
NTS



SEE DETAIL AE,
DWG. G-1-5

TIE-IN TO 2-INCH PVC PIPING AT S.W. CORNER OF SEDIMENTATION BASINS

DETAIL AD
NTS



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

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



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

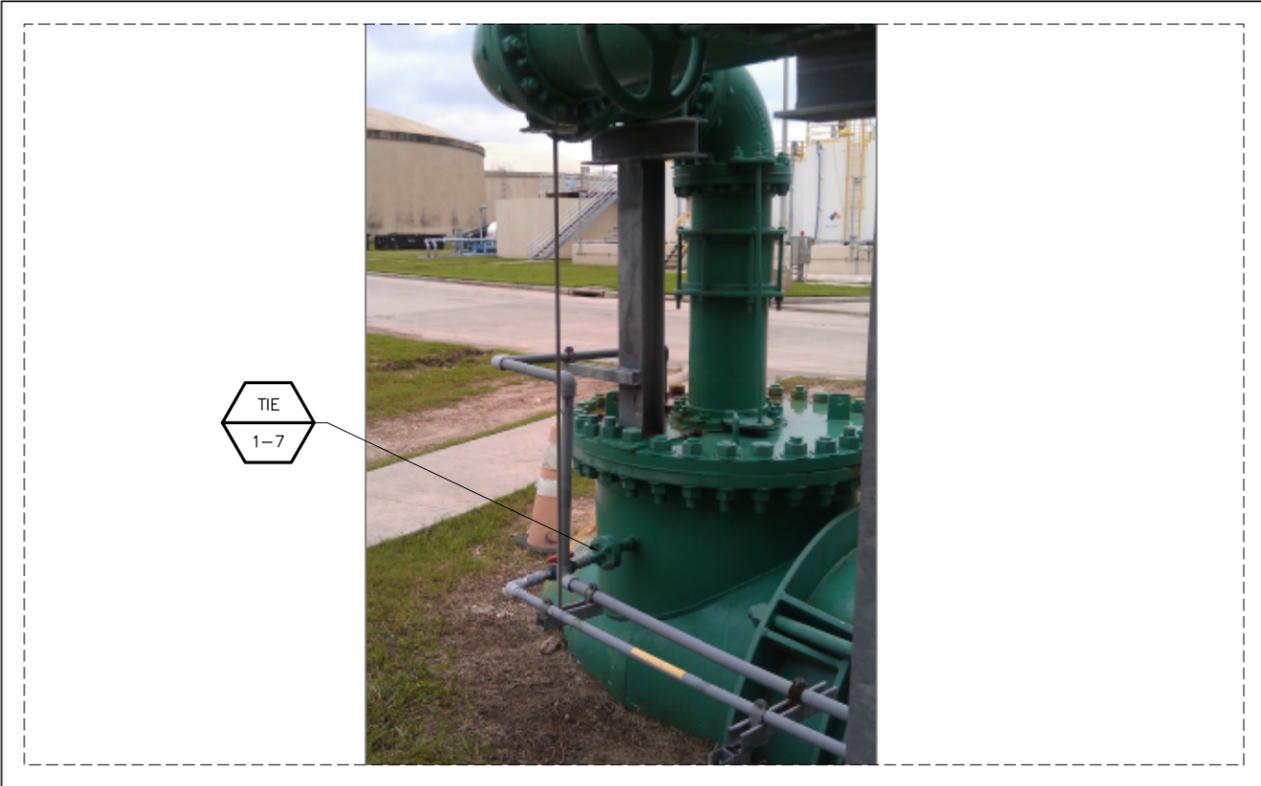
WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-4
 SHEET NO. 10 OF 23 SHEETS

NOTES:
 1. REMOVE AND REPLACE
 EXISTING 3/4" AM-CPVC WITH
 NEW 3/4" AM-PVC.

TIE
 1-6

1/2" LAS TUBING TO SED. BASIN
 EAST INJECTION POINT
 SEE DETAIL AH,
 DWG G-1-6



TIE
 1-7

TIE
 1-5

TIE-IN TO SED. BASIN S.W. INJECTION AQ. AMMONIA

DETAIL
 NTS

AE
 -

EXISTING 3/4" AM-CPVC TO SED
 BASIN WEST INJECTION POINT
 (NOTE 1)

TIE-IN TO SED. BASIN WEST INJECTION POINT 48"-SW HEADER

DETAIL
 NTS

AF
 -



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-5
 SHEET NO. 11 OF 23 SHEETS

TIE
1-8



TIE-IN TO SED. BASIN WEST INJECTION POINT 10"-SW HEADER

DETAIL **AG**
NTS

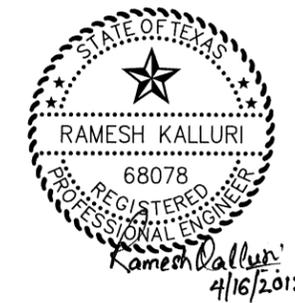
1/2" LAS TUBING TO SED BASIN
EAST INJECTION POINT



CONCEPTUAL ROUTING OF 1/2" LAS TUBING TO SED. BASIN EAST INJECTION POINT

DETAIL **AH**
NTS

FOR CONTINUATION
SEE DETAIL
AI, DWG G-1-7



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-6
 SHEET NO. 12 OF 23 SHEETS



CONCEPTUAL ROUTING OF 1/2" LAS TUBING TO SED. BASIN EAST INJECTION POINT

DETAIL AI
NTS



PHASE II SED. BASIN EAST INJECTION POINT

DETAIL AJ
NTS

SEE DETAIL AK,
DWG G-1-8



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS



WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-7
 SHEET NO. 13 OF 23 SHEETS

SEE DETAIL AJ,
DWG. G-1-7



1/2" LAS TUBING

SEE DETAIL AL,
DWG. G-1-7

CONCEPTUAL ROUTING OF 1/2" LAS TUBING TO SED. BASIN EAST INJECTION POINT

DETAIL **AK**
NTS



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

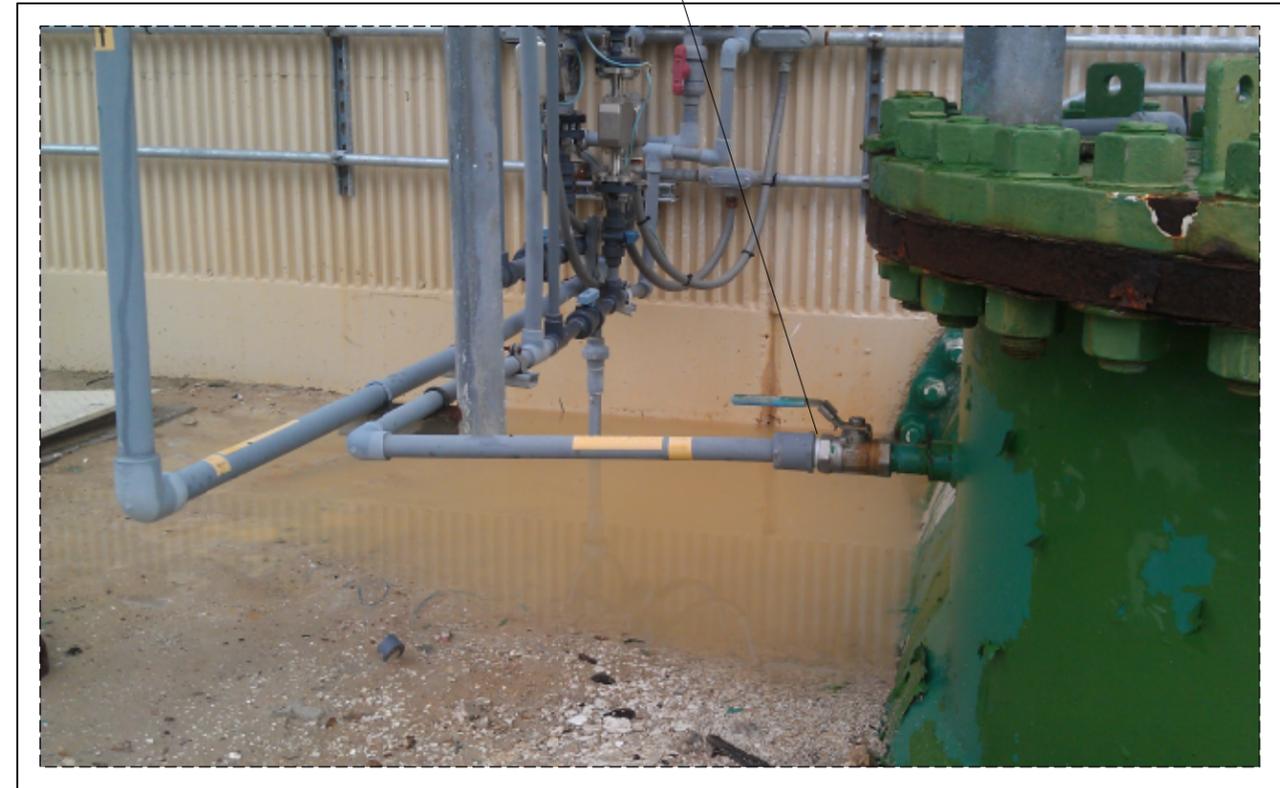
WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-8
 SHEET NO. 14 OF 23 SHEETS



PHASE II SED. BASIN EAST INJECTION POINT TIE-INS

DETAIL **AL**
NTS

TIE
1-2



PHASE II BASIN EAST INJECTION POINT TIE-INS

DETAIL **AM**
NTS

TIE
1-3

TIE
1-1



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 1
 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-1-9
 SHEET NO. 15 OF 23 SHEETS



NOTES:

1. ROUTE 1/2" TUBING ALONG EXISTING RIGID PIPE. AT 48" INTERVALS, INSERT 1/2" TUBING INTO A 12" LENGTH OF PVC PIPE SEGMENT TO EXISTING RIGID PIPE WITH A MINIMUM OF TWO PIPE STRAPS.

SEE DWG. G-2-3



CHEMICAL TRENCH

TEMPORARY LAS SYSTEM NO. 2 OVERALL LAYOUT

PLAN

N.T.S



Ramesh Kalluri
4/16/2012

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288

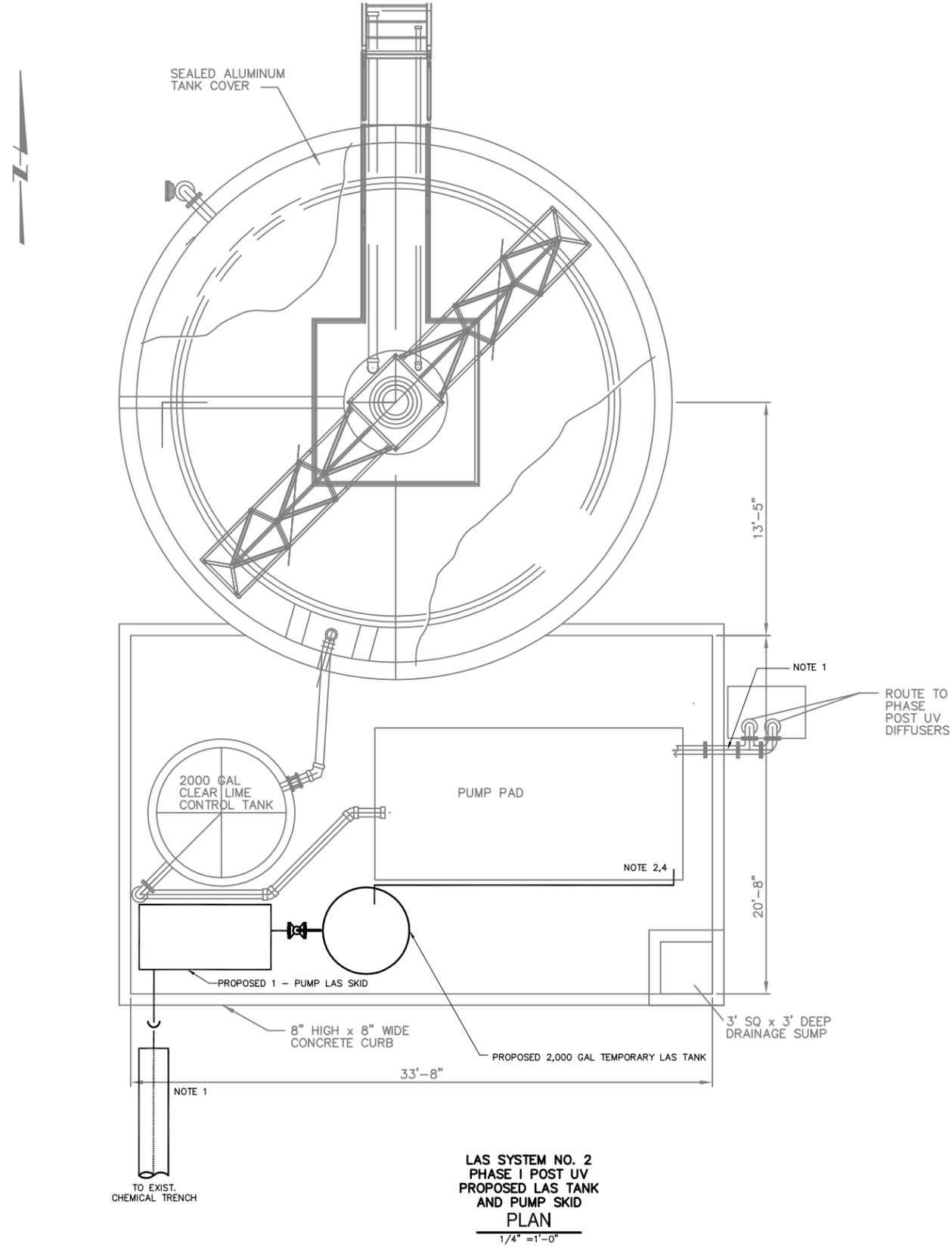


CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 TEMPORARY LAS SYSTEM NO. 2 OVERALL
 LAYOUT

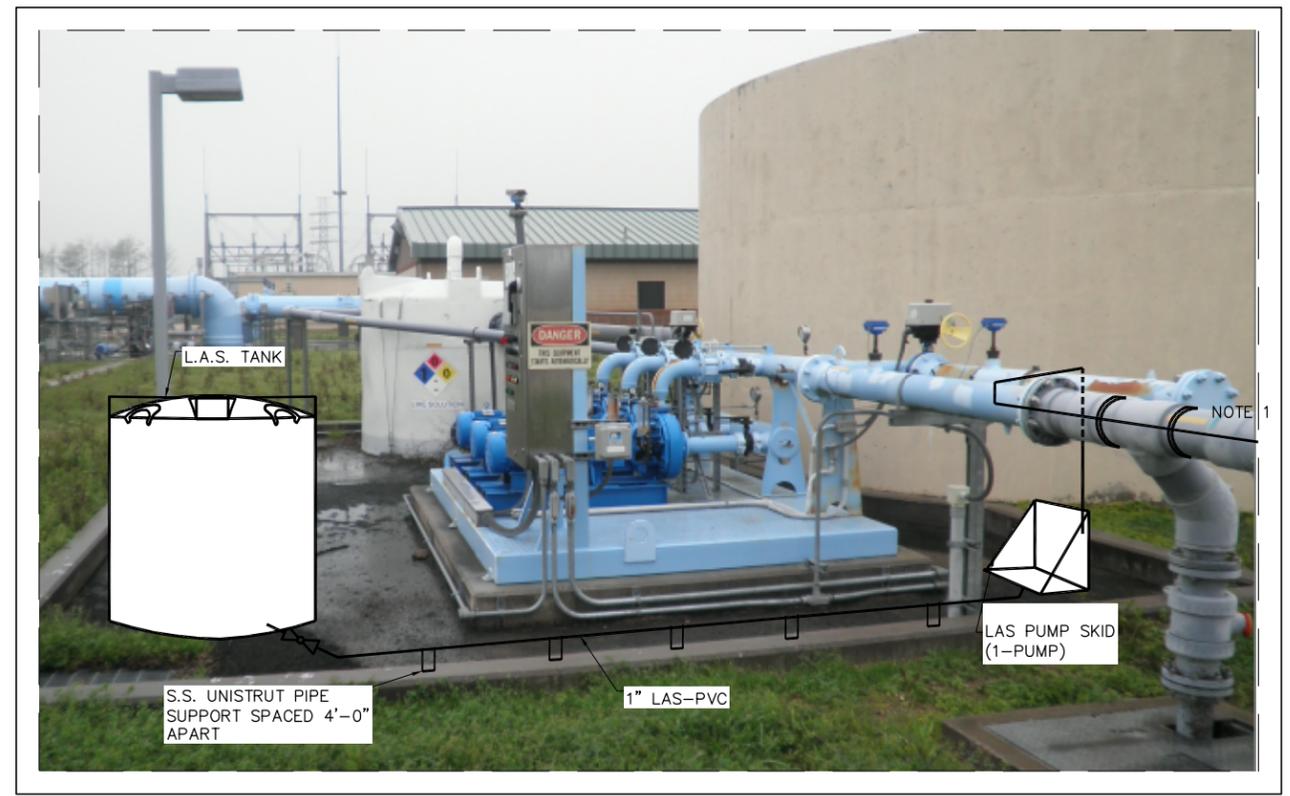
WARNING
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-2-1
 SHEET NO. 16 OF 23 SHEETS



**LAS SYSTEM NO. 2
PHASE I POST UV
PROPOSED LAS TANK
AND PUMP SKID
PLAN**
1/4" = 1'-0"

- NOTES:**
1. ROUTE 1/2" TUBING TO EXISTING CHEMICAL TRENCH. INSTALL TUBING INSIDE A 4"-DUCTILE IRON OR STEEL PIPE BETWEEN THE CONTAINMENT CURB AND CHEMICAL TRENCH. CORE DRILL INTO EXISTING TRENCH WALL TO ROUTE TUBING.
 2. DISCONNECT POWER TO PUMP. DISCONNECT 4-20mA SIGNAL TO PUMP.
 3. ROUTE 2#10, #10 GND, 1" PVC CONDUIT (POWER) AND 1-2/C, #16 TSP, 3/4" PVC CONDUIT (4-20mA ANALOG SIGNAL) AROUND CONTAINMENT WALL TO LAS SKID.
 4. CONNECT NEW CONDUCTORS TO EXISTING CONDUCTOR WITH TERMINAL BLOCKS. LOCATE TERMINAL BLOCK IN A NEMA 3R ENCLOSURE. PROVIDE ONE ENCLOSURE FOR POWER AND ONE ENCLOSURE FOR ANALOG SIGNAL.



**LAS SYSTEM NO. 2 TANK AND PUMP SKID CONCEPTUAL LAYOUT
DETAIL BA**
NTS

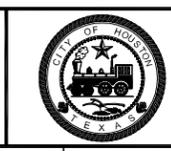
- NOTES:**
1. REVISE KBR'S PROPOSAL DATED APRIL 9, 2012 FOR REVISED ELECTRICAL SCOPE OF WORK.



REV. NO.	DATE	DRWN	CHKD	REMARKS
4/16/12	L.D.V.	R.K.		ADDED NOTES

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY:
 CROSS CHK'D BY:
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
LAS SYSTEM NO. 2
 PLAN & DETAIL

WARNING
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-2-2
 SHEET NO. 17 OF 23 SHEETS

TIE
2-3

SEE DETAILS BC AND BD

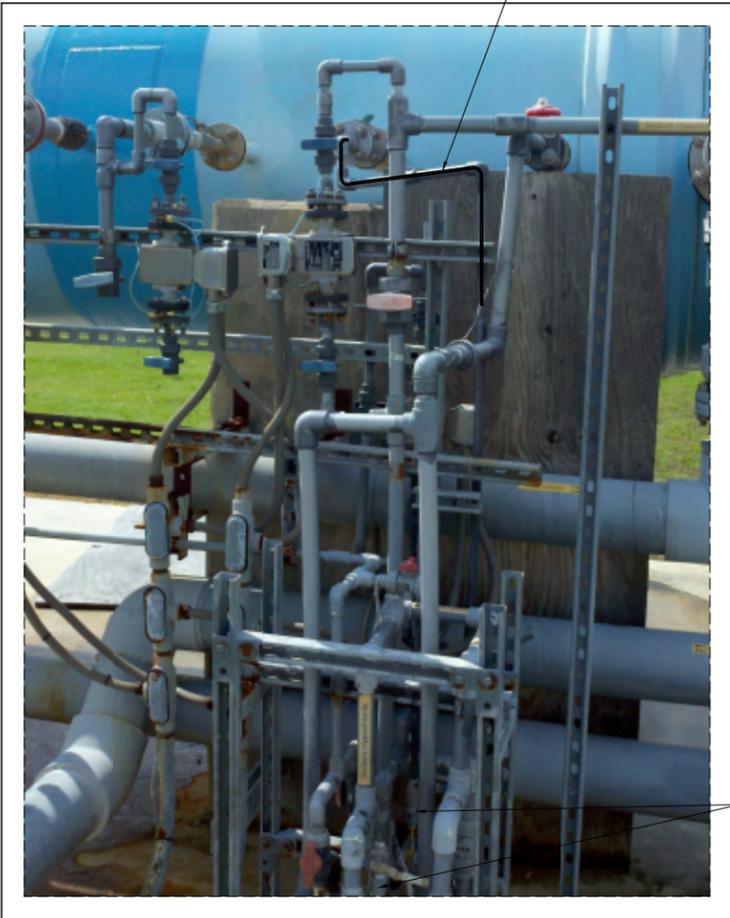


PHOTO OF PHASE I POST UV CHEMICAL INJECTION STATION

DETAIL **BB**
NTS

TIE
2-1
2-2



REPLACE EXISTING 1/2" PVC
PIPE FROM TIE-IN 2-3 TO
TIE-INS 2-2 AND 2-1

TIE-IN TO EXISTING 1/2" AMMONIA AT INJECTION STATION

DETAIL **BC**
NTS

STATE OF TEXAS
RAMESH KALLURI
68078
REGISTERED
PROFESSIONAL ENGINEER
Ramesh Kalluri
4/16/2012

REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
DRAWN BY: C. MEDINA
SHEET CHK'D BY: _____
CROSS CHK'D BY: _____
APPROVED BY: R.K.
DATE: APRIL 2012

KGI Kalluri Group, Inc.
Consulting Engineers & Project Managers
TBPCE Registration No. F-655
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288

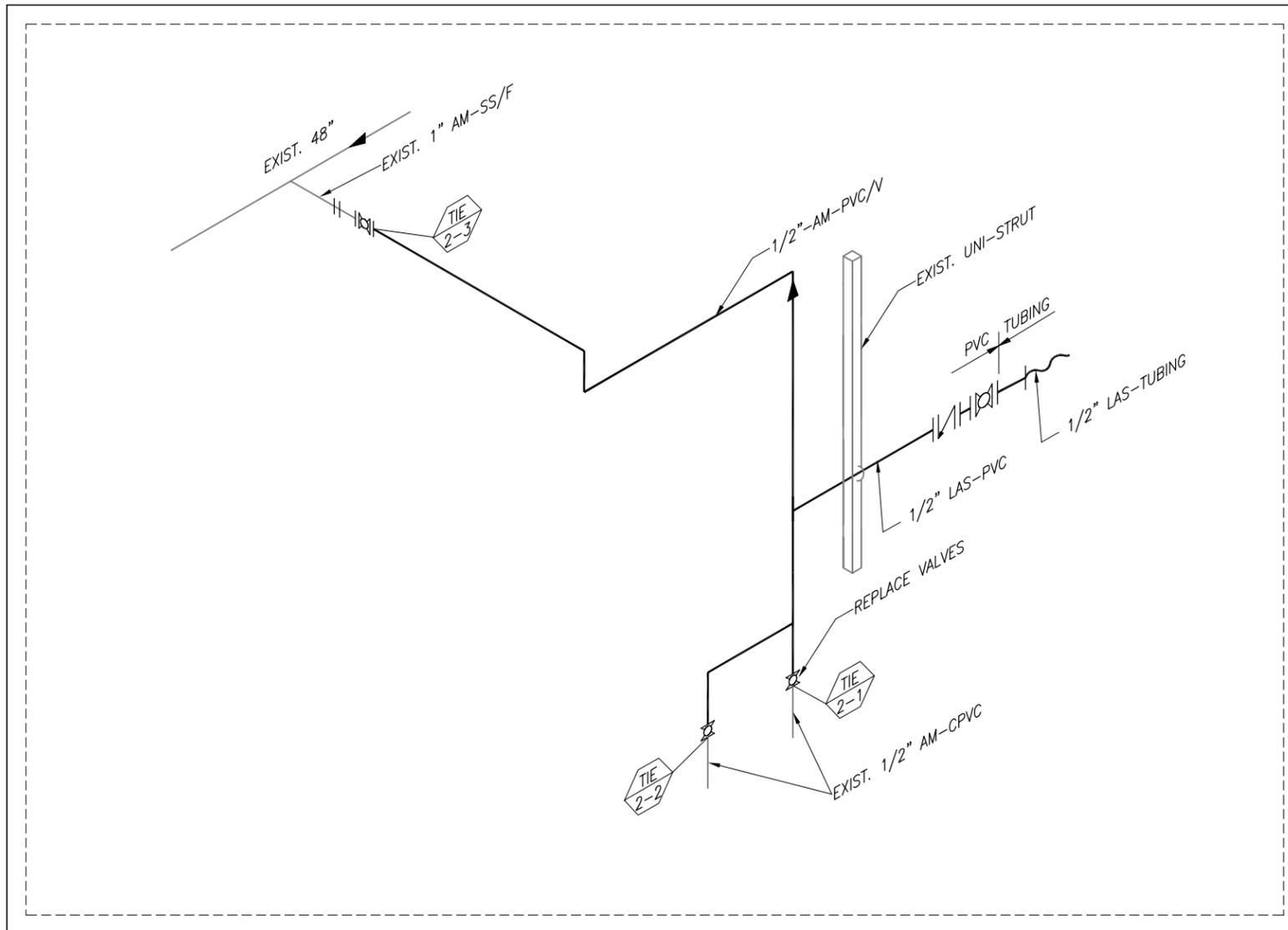


CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
(NEWPP) IMPROVEMENTS
TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
LAS SYSTEM NO. 2 DETAILS

WARNING
0 1
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
FILE NAME:
DRAWING NO.
G-2-3
SHEET NO. 18 OF 23 SHEETS



TIE-IN TO EXISTING 1/2" AMMONIA AT INJECTION STATION

DETAIL BD
NTS



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

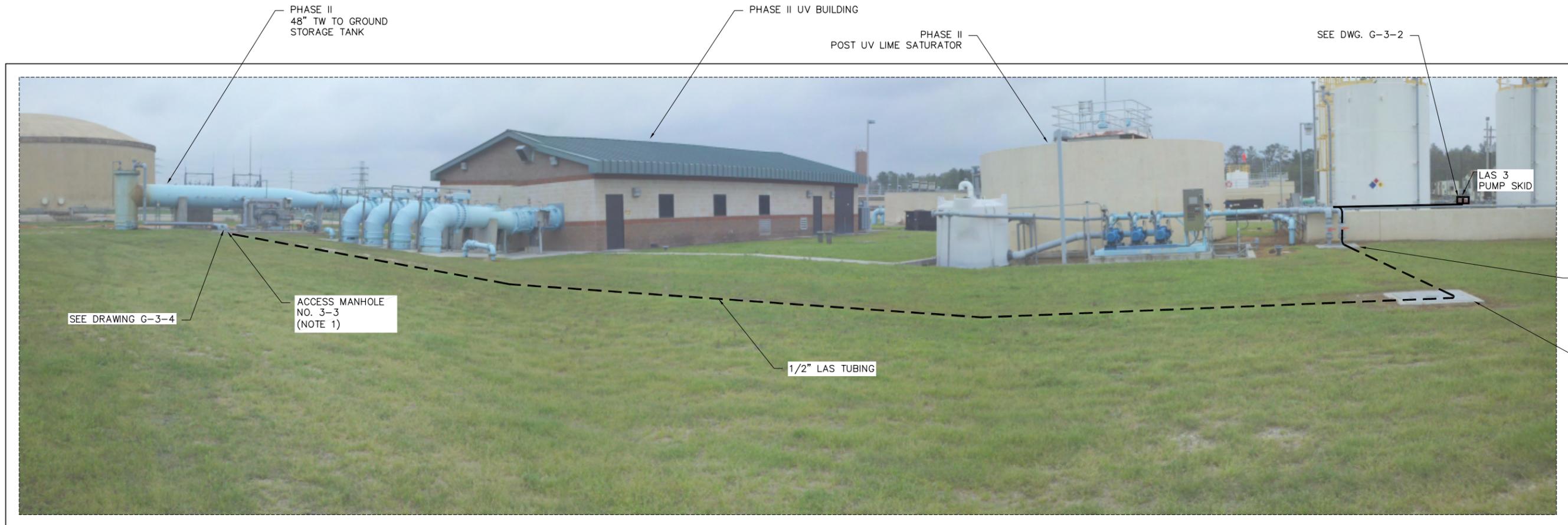
NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
LAS SYSTEM NO. 2 DETAILS

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-2-4
 SHEET NO. 19 OF 23 SHEETS

NOTES

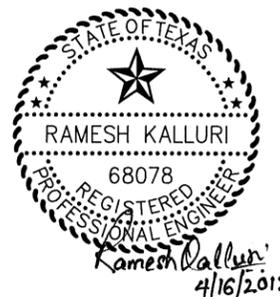
1. REMOVE ELBOWS IN ACCESS MANHOLES IF NECESSARY TO REDUCE PULLING FORCE DUE TO ELBOW FRICTION.



TEMPORARY LAS SYSTEM NO. 3 - OVERALL LAYOUT

PLAN

N.T.S



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPCE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



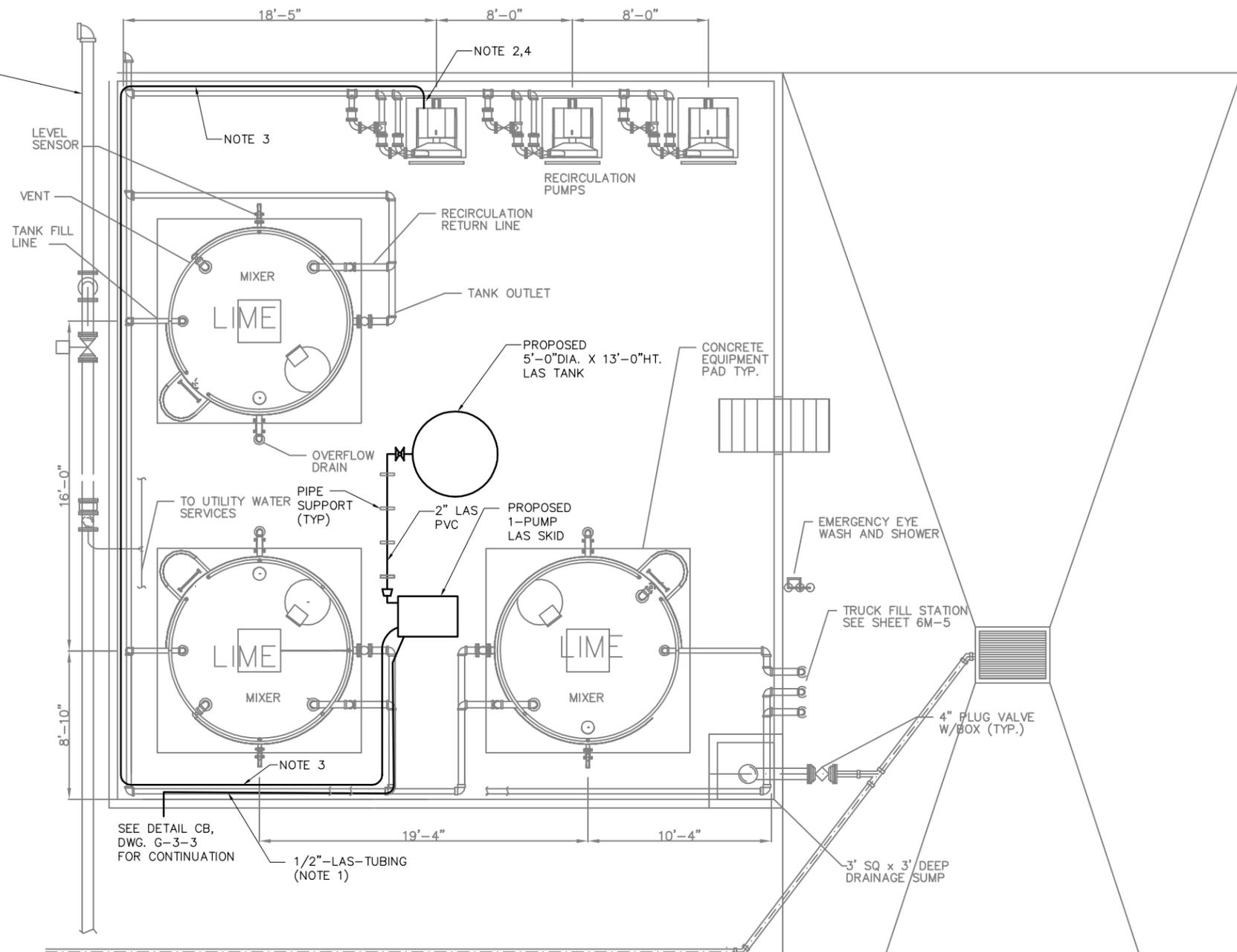
CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
TEMPORARY LAS SYSTEM NO. 3-
OVERALL LAYOUT



WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-3-1
 SHEET NO. 20 OF 23 SHEETS

VIEW FOR
DETAIL CA
DWG. G-3-3



- NOTES:**
- ROUTE 1/2" TUBING ALONG EXISTING RIGID PIPE. AT 48" INTERVALS, INSERT 1/2" TUBING INTO A 12" LENGTH OF PVC PIPE. STRAP EACH PVC PIPE SEGMENT TO EXISTING RIGID PIPE WITH A MINIMUM OF TWO PIPE STRAPS.
 - DISCONNECT POWER TO PUMP. DISCONNECT 4-20mA SIGNAL TO PUMP.
 - ROUTE 2#10, #10 GND, 1" PVC CONDUIT (POWER) AND 1-2/C, #16 TSP, 3/4" PVC CONDUIT (4-20mA ANALOG SIGNAL) AROUND CONTAINMENT WALL TO LAS SKID.
 - CONNECT NEW CONDUCTORS TO EXISTING CONDUCTOR WITH TERMINAL BLOCKS. LOCATE TERMINAL BLOCK IN A NEMA 3R ENCLOSURE. PROVIDE ONE ENCLOSURE FOR POWER AND ONE ENCLOSURE FOR ANALOG SIGNAL.
 - SEE KBR'S PROPOSAL DATED APRIL 9, 2012 FOR REVISED ELECTRICAL SCOPE OF WORK.

**LAS SYSTEM NO. 3
PHASE II POST UV TEMPORARY LAS TANK AND PUMP SKID
PLAN**
1/4" = 1'-0"



REV. NO.	DATE	DRWN	CHKD	REMARKS
4/16/12	L.D.V.	R.K.		ADDED NOTES

DESIGNED BY: R. KALLURI
DRAWN BY: C. MEDINA
SHEET CHK'D BY:
CROSS CHK'D BY:
APPROVED BY: R.K.
DATE: APRIL 2012

KGI Kalluri Group, Inc.
Consulting Engineers & Project Managers
TPE Registration No. F-655
10497 Town & Country Way, Suite 220
Houston, Texas 77024
Phone: (713)-365-9288



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
(NEWPP) IMPROVEMENTS
TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
**LAS SYSTEM NO. 3 - LAS TANK AND
PUMP SKID**

WARNING
IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
FILE NAME:
DRAWING NO.
G-3-2
SHEET NO. 21 OF 23 SHEETS

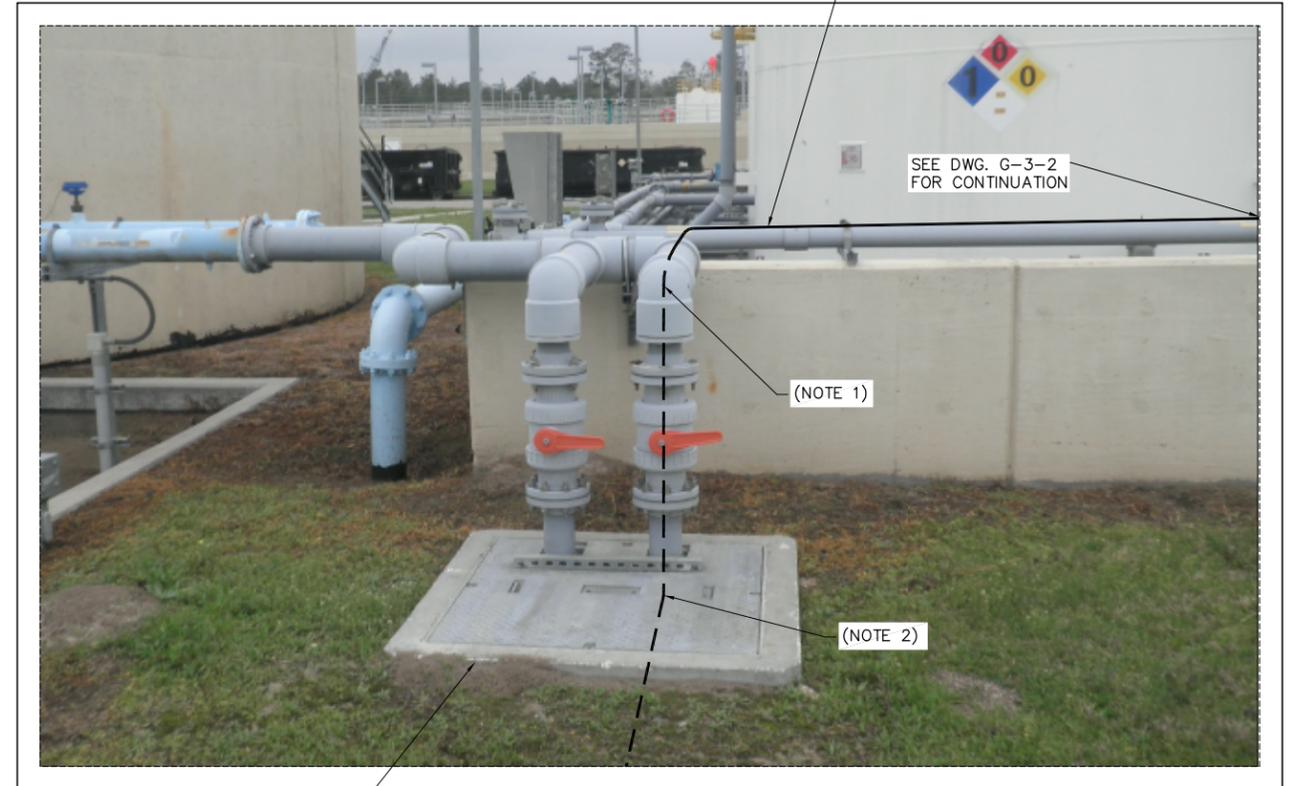
NOTES:

1. REMOVE 6-INCH ELBOW TO FEED 1/2" TUBING. PULL 1/2" TUBING TO ACCESS MANHOLE NO. 3-3. TEMPORARILY PLUG OPENING. BENDING RADIUS OF 1/2" TUBING IS 3-INCHES.
2. REMOVE 6-INCH ELBOW IN ACCESS MANHOLE IF NECESSARY TO REDUCE PULLING FORCE DUE TO ELBOW FRICTION.



LAS 3 - TEMPORARY 2,000 GAL LAS TANK LOCATION

DETAIL **CA**
NTS



CONCEPTUAL ROUTING OF 1/2" -LAS- TUBING

DETAIL **CB**
NTS

ACCESS MANHOLE NO. 3-1



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

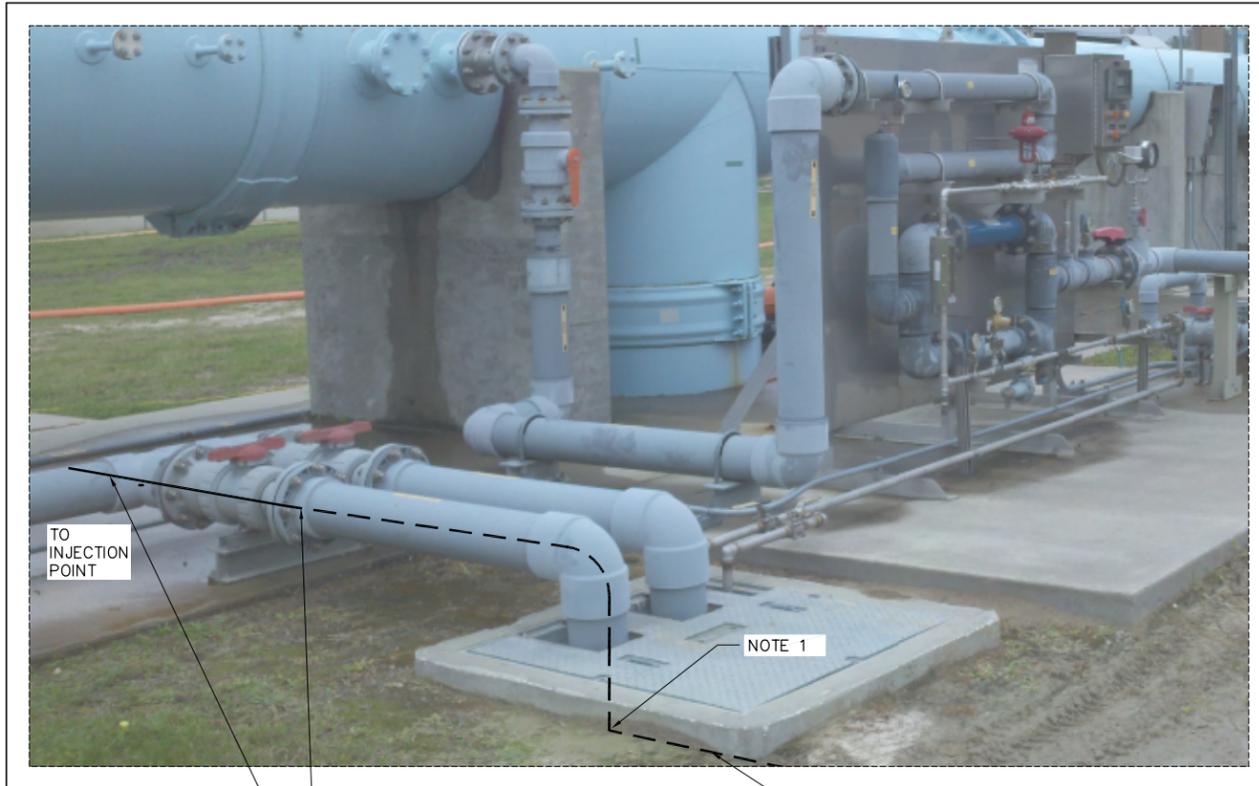
NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 LAS SYSTEM NO. 3 CONCEPTUAL PIPING
 DETAILS - 1

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-3-3
 SHEET NO. 22 OF 23 SHEETS

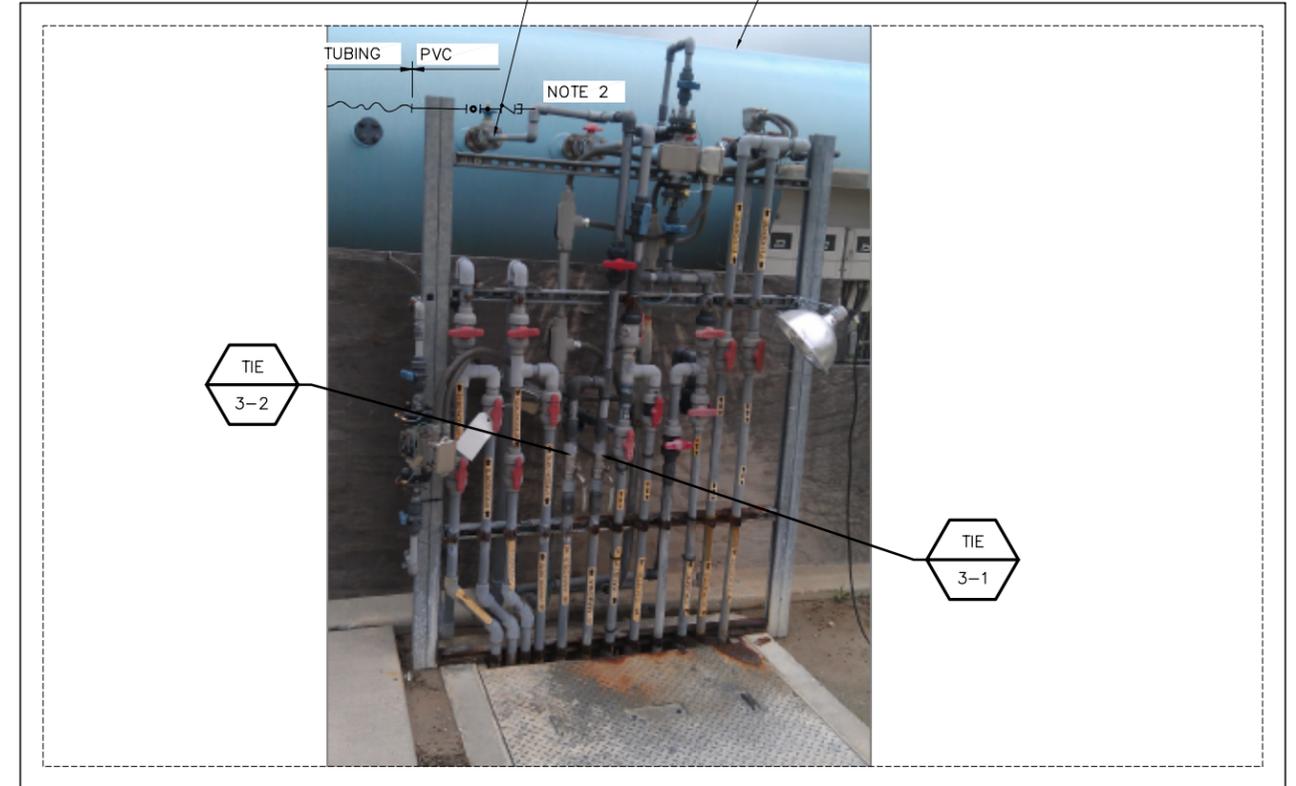
NOTES

1. REMOVE ELBOWS IN ACCESS MANHOLES NECESSARY TO REDUCE PULLING FORCE TO ELBOW FRICTION BENDING RADIUS OF 1/2" TUBING IS 3-INCHES.
2. REPLACE EXISTING 1/2" CPVC BETWEEN TIE-INS 2-1, 2-2 AND 2-3 WITH NEW 1/2" PVC PIPE.

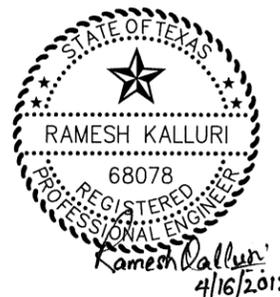


ACCESS MANHOLE NO. 3-3
DETAIL CC
 NTS

REMOVE VALVE AND PULL 1/2" AM TUBING. PLUG OPENINGS.



PHASE II POST UV TIE-IN
DETAIL CD
 NTS



REV. NO.	DATE	DRWN	CHKD	REMARKS

DESIGNED BY: R. KALLURI
 DRAWN BY: C. MEDINA
 SHEET CHK'D BY: _____
 CROSS CHK'D BY: _____
 APPROVED BY: R.K.
 DATE: APRIL 2012

KGI Kalluri Group, Inc.
 Consulting Engineers & Project Managers
 TBPPE Registration No. F-655
 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-365-9288



CITY OF HOUSTON
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

NORTHEAST WATER PURIFICATION PLANT
 (NEWPP) IMPROVEMENTS
 TEMPORARY LIQUID AMMONIUM SULFATE (LAS) SYSTEM
 LAS SYSTEM NO. 3 - CONCEPTUAL PIPING
 DETAILS-2

WARNING
 0 1
 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

WBS#: S-000066-0013-4
 FILE NAME:
 DRAWING NO.
G-3-4
 SHEET NO. 23 OF 23 SHEETS