

**Appendix 4-1**

**Engineering  
Verification  
Reports**



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle**  
**505 King Avenue**  
**Columbus, Ohio 43201**

**R.C. Foster**  
**P.O. Box 77055**  
**Corona, CA 92877**

Date: **February 23, 2005**  
Job Number: 24114

Report No. 01

Attention: Jeff Oxenham

Steve Potter

Subject: **JPL OU1 Backwash Holding Sump Rebar Installation**

It has been observed that # 5 rebar were installed every 15” to 16” on center each way at the bottom of the sump, and # 6 rebar were installed every 16” vertical at the sump wall (horizontal rebar installation will be different phase)



- For Your Information
- For Your Files
- Per Your Request
- To Forward to Proper Party
- For Your Signature
- For Review & Return
- For Execution

Comments: The rebar were installed as shown on the design drawings.

cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle**  
**505 King Avenue**  
**Columbus, Ohio 43201**

**R.C. Foster**  
**P.O. Box 77055**  
**Corona, CA 92877**

Date: **February 23, 2005**  
Job Number: 24114

Report No. 02

Attention: Jeff Oxenham

Steve Potter

Subject: **JPL OU1 Backwash Holding Sump Rebar Installation**

- For Your Information
- For Your Files
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It was observed on this date that # 6 rebar were installed every 14” to 16” horizontal and 14” to 17” vertical at the four sides of the sump wall.



Comments: The rebar were installed as shown on the design drawings. The Contractor will add one additional rebar at any locations that were found 17” wide bar spacing.

cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **February 23, 2005**  
Job Number: 24114

Report No. 04

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 Pad Vertical Rebar**

From the pictures Ben Headington took at the construction site, it can be observed that the vertical rebar installation is satisfied.



- For Your Information
- For Your Files
- Per Your Request
- To Forward to Proper Party
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- For Review & Return
- For Execution

Comments: \_\_\_\_\_

cc: 24114 file \_\_\_\_\_

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle**  
**505 King Avenue**  
**Columbus, Ohio 43201**

**R.C. Foster**  
**P.O. Box 77055**  
**Corona, CA 92877**

Date: **October 18, 2004**  
Job Number: 24114

Report No. 06

Attention: Jeff Oxenham

Steve Potter

Subject: **JPL OU1 Pad Horizontal Rebar (East Portion)**

The rebar installation for the east portion of the OU1 pad and the dowel connecting two portions of the pad was observed acceptable.

- For Your Information
- For Your Files
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- For Your Signature
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- For Execution



Comments: \_\_\_\_\_

cc: 24114 file \_\_\_\_\_

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **October 12, 2004**  
Job Number: 24114

Report No. 05

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 Pad Horizontal Rebar**

It can be observed that the OU1 pad horizontal #6 and #7 rebar were installed according to the design.



- For Your Information
- For Your Files
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- To Forward to Proper Party
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- For Review & Return
- For Execution

Comments: \_\_\_\_\_

cc: 24114 file \_\_\_\_\_

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **February 23, 2005**

Job Number: 24114

Report No. 04

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 Pad Vertical Rebar**

From the pictures Ben Headington took at the construction site, it can be observed that the vertical rebar installation is satisfied.



- For Your Information
- For Your Files
- Per Your Request
- To Forward to Proper Party
- For Your Signature
- For Review & Return
- For Execution

Comments: \_\_\_\_\_

cc: 24114 file \_\_\_\_\_

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
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## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **February 23, 2005**  
Job Number: 24114

Report No. 08

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 CURB, RAISED PAD AND REBAR**

The curb, all raised pad construction have been observed according to the design. Per David Croft with R.C. Foster, all rebar was embedded 9" below the base pad. Some of the bars haven't been installed at the time of this inspection because minor adjustment required.

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- For Execution



Comments: \_\_\_\_\_  
cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE

118 W. LIME AVENUE, MONROVIA, CA 91016 TEL: (626) 357-0588 FAX: (626) 303-7957



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **October 28, 2004**

Job Number: 24114

Report No. 07

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 EPOXY APPLICATION**

R. C. Foster applied Hilti HY-150 two part hybrid, RE500 and HSE 2421 (replaced by RE500 a few months ago, very similar product) wet epoxy in the installation of #6 vertical bars that go through the raised pad and the base footing, 3 1/2" above the bottom of the base footing. The 7/8" holes were cleaned and vacuumed before epoxy products were pumped in. The working procedure followed Hilti instructions. The vertical bars are at maximum of 16" on center, according to the design.

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Comments: \_\_\_\_\_  
cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE

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Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION INSPECTION REPORT

To: **Battelle**  
**505 King Avenue**  
**Columbus, Ohio 43201**

**Sam L. Serpa III**  
**22702 Motnocab Road**  
**Apple Valley, CA 92307**

Date: **February 23, 2005**

Job Number: 24114

Report No. 09

Attention: Jeff Oxenham

Sam L. Serpa III

Subject: **JPL OU1 TRENCHES**

The open trench is approximately 10' away from the pad on south of the OU1 pad. The pipeline layout from trench bottom to top will be sewer, raw water and potable water with a minimum of 6" clear distance between each other, and 1' clear space between vertical center lines. From west to east of the pad, the trench is from 11' to 5' in depth and 3'-6" in width. Hydraulic shoring is used at the places where the trench depth is over 5', and plywood and screw jacks is used at the shallow trench area (<5'). The soil condition is solid at the trenched area.

The original buried sewer manhole will be raised and can be observed after the construction.

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Comments: \_\_\_\_\_  
cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE

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## CONSTRUCTION INSPECTION REPORT

To: **Battelle** **R.C. Foster**  
**505 King Avenue** **P.O. Box 77055**  
**Columbus, Ohio 43201** **Corona, CA 92877**

Date: **February 23, 2005**

Job Number: 24114

Report No. 03

Attention: Jeff Oxenham Steve Potter

Subject: **JPL OU1 Base Material**

I reviewed the aggregate base material analysis by Concrete Engineering Services, Inc. The material is applicable to be used for OU-1 construction.

Sieve Analysis ASTM C136 is the method designated by JPL, however, ASTM C40, C88, C123, C127, C127, C131, C142, and C289 are not identified in JPL standard specifications. These standard methods the base material supplier used are acceptable.

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Comments: \_\_\_\_\_

cc: 24114 file \_\_\_\_\_

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE



General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION EMERGENCY RESPONSE

To: **Battelle** **Sam L. Serpa III**  
**505 King Avenue** **22702 Montnocab Road**  
**Columbus, Ohio 43201** **Apple Valley, CA 92307**

Date: **February 23, 2005**  
Job Number: 24114

Attention: Jeff Oxenham Sam L. Serpa

Report No. 01

Subject: **JPL OU1 SEWER LINE BROKEN**

Ben Headington with Battelle and Sam Serpa (Contractor) reported a sewer line broken on Nov. 17, 2004. The sewer line is approximately 30 ft south of OU1, it is an 8-in clay pipe, 11 ft soil cover. The broken piece is on top, 1.5 to 2 ft long, inside flow was found 15 to 20% full during the day time. The broken area was covered with plywood immediately, and surrounded with sand bags, there have been no overflow observed and no complains heard since yesterday.

The broken piece will be cut by concrete saw and replaced by an 8-in diameter, 3'-6" long new clay segment at 6:00am on Nov. 20, 2004 (Saturday). Fernco fittings will be used to attach the replacement section to the existing pipe with epoxy seal all around.

- For Your Information
- For Your Files
- Per Your Request
- To Forward to Proper Party
- For Your Signature
- For Review & Return
- For Execution

Comments: \_\_\_\_\_  
cc: 24114 file

**CIVILTEC engineering, inc.**

By: \_\_\_\_\_  
Liping Liu, PE

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General Civil, Municipal, Water and Wastewater Engineering  
Monrovia, CA Prescott, AZ Phoenix, AZ

## CONSTRUCTION EMERGENCY RESPONSE

To: **Battelle**  
**505 King Avenue**  
**Columbus, Ohio 43201**

**Sam L. Serpa III**  
**22702 Montnocab Road**  
**Apple Valley, CA 92307**

Date: **February 23, 2005**  
Job Number: 24114

Report No. 02

Attention: Jeff Oxenham

Sam L. Serpa

Subject: **JPL OU1 POTABLE WATER PIPE CONNECTING  
TO FIRE HYDRANT --- THRUST BLOCK REPAIR**

A 4-in in diameter 90° elbow is exposed on northeast OU1 hillside. Here will be the connection of potable water service to OU1. The exposed thrust block is approximately 2 ft x 2 ft. After finishing the connection, this thrust block will be repaired with 3ft along the flow direction by 2.5 ft on vertical direction. The thrust block and connection area will be buried with slurry approximately 4 ft wide 6 ft deep. There will have 2 ft dirt on top of slurry for planting uses.

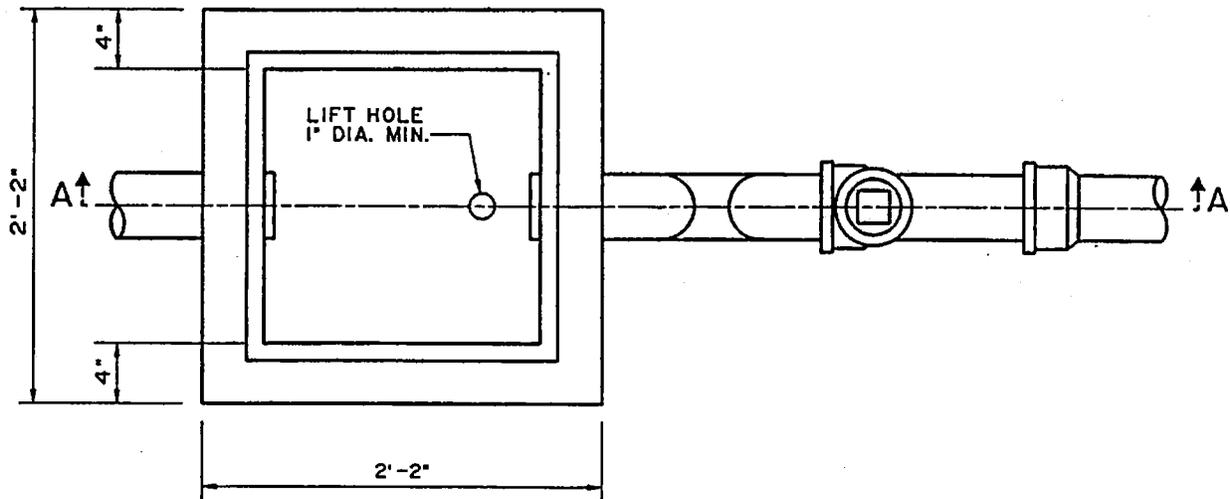
- For Your Information
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- For Execution

Comments: \_\_\_\_\_  
cc: 24114 file

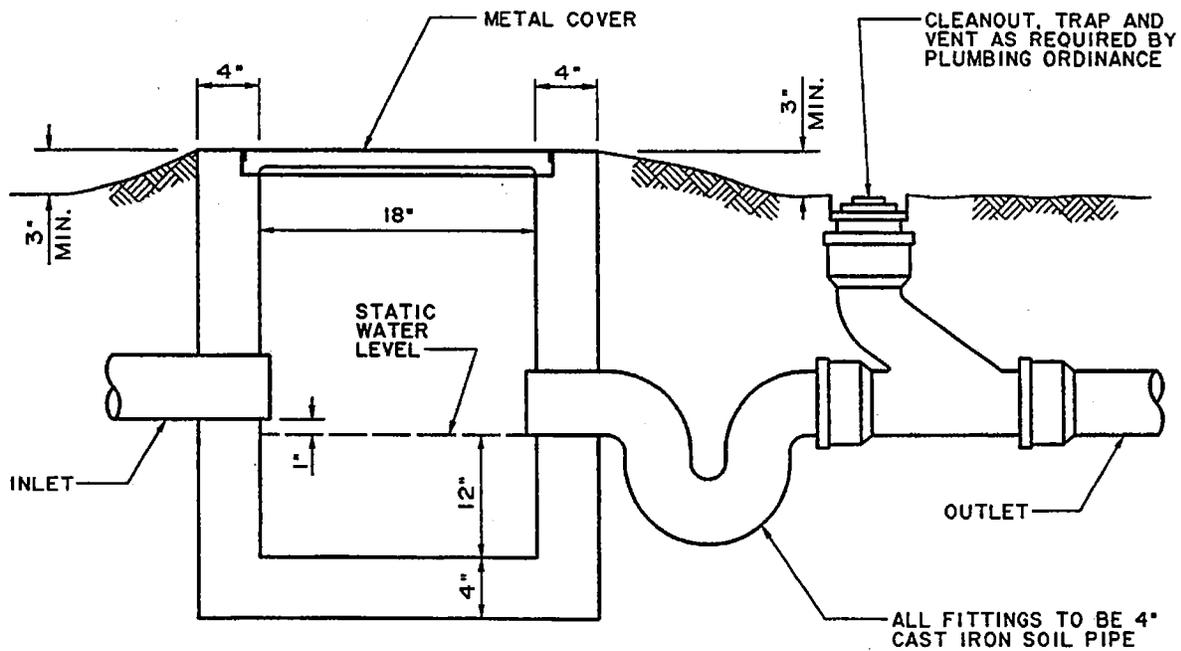
**CIVILTEC *engineering, inc.***

By: \_\_\_\_\_  
Liping Liu, PE

118 W. LIME AVENUE, MONROVIA, CA 91016 TEL: (626) 357-0588 FAX: (626) 303-7957



**PLAN**  
WITH COVER REMOVED



**SECTION A-A**

LOS ANGELES COUNTY DEPARTMENT OF PUBLIC WORKS

SAMPLING BOX

STANDARD PLAN

2044-0

APPROVED

*Thomas A. Fishman*  
DIRECTOR OF PUBLIC WORKS

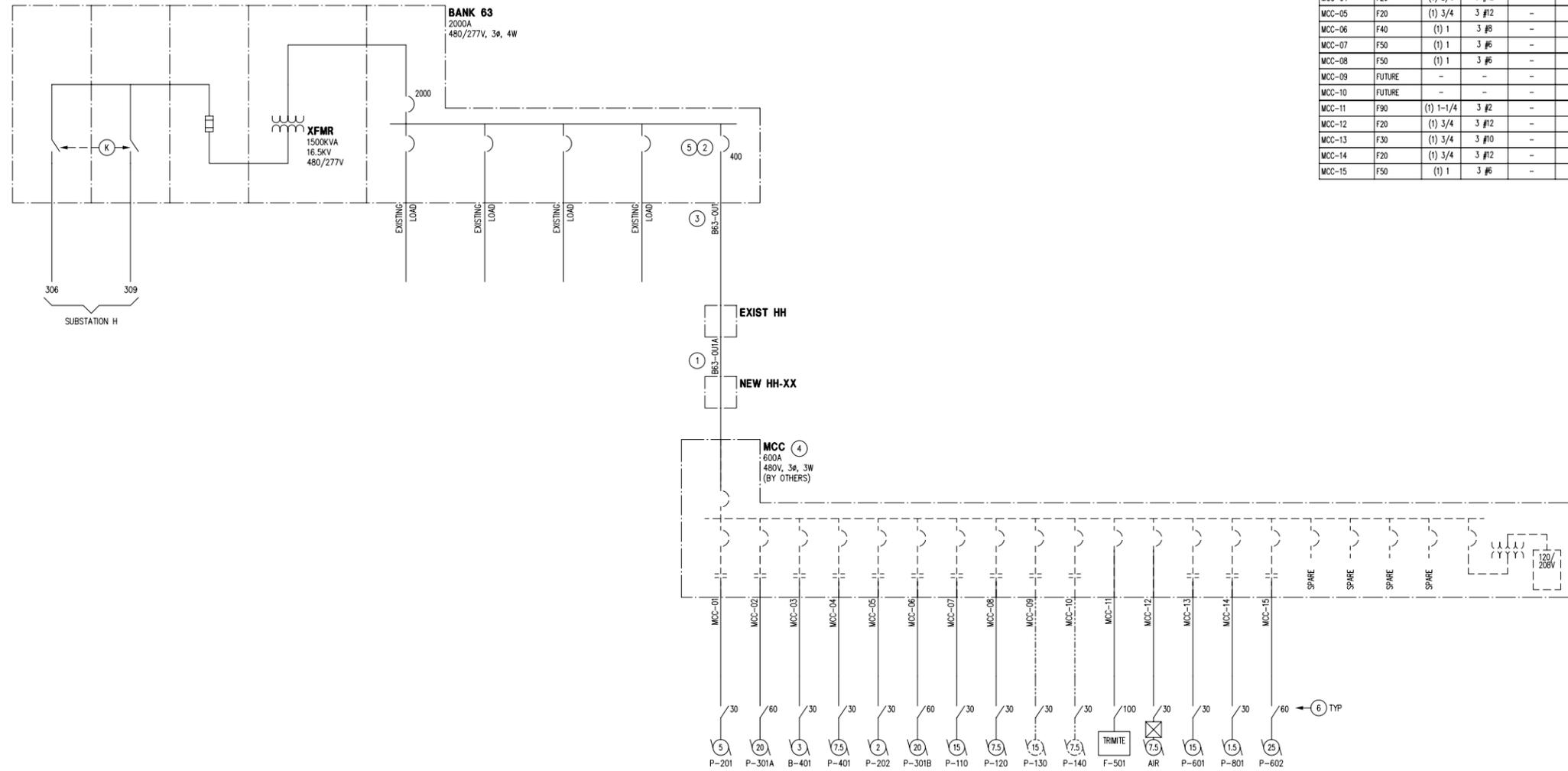
5/31/1992

DATE

SHEET 1 OF 2

SUPERSEDES COUNTY ENGINEER STD. 1-12





FEEDER SCHEDULE											7
CIRCUIT	CODE	RACEWAY INCHES	TOTAL NUMBER OF CONDUCTORS				MOTOR INFORMATION		FLA	LENGTH FEET	
			O	N	G	IG	STARTER	OCF			
BB3-OUT	FP	(1) 4	6 #250	-	1 #1	-	-	-	-	150	
BB3-OUTA	F500	(2) 2-1/2	6 #250	-	2 #1	-	-	-	-	300	
MCC-01	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-02	F40	(1) 1	3 #8	-	1 #10	-	-	-	-	25	
MCC-03	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-04	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-05	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-06	F40	(1) 1	3 #8	-	1 #10	-	-	-	-	25	
MCC-07	F50	(1) 1	3 #6	-	1 #8	-	-	-	-	750	
MCC-08	F50	(1) 1	3 #6	-	1 #8	-	-	-	-	750	
MCC-09	FUTURE	-	-	-	-	-	-	-	-	-	
MCC-10	FUTURE	-	-	-	-	-	-	-	-	-	
MCC-11	F90	(1) 1-1/4	3 #2	-	1 #8	-	-	-	-	25	
MCC-12	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-13	F30	(1) 3/4	3 #10	-	1 #10	-	-	-	-	25	
MCC-14	F20	(1) 3/4	3 #12	-	1 #12	-	-	-	-	25	
MCC-15	F50	(1) 1	3 #6	-	1 #8	-	-	-	-	25	

- SHEET NOTES:**
- 1 NEW CONDUIT FROM EXISTING HANDHOLE TO NEW MCC.
  - 2 UTILIZE EXISTING SPARE BREAKER FOR NEW FEEDER.
  - 3 PULL NEW FEEDER IN EXISTING CONDUIT TO EXISTING HH. CLEAN AND MANDREL EXISTING CONDUIT PRIOR TO PULLING NEW FEEDER.
  - 4 EQUIPMENT PROVIDED BY OTHERS. ELECTRICAL CONTRACTOR TO PROVIDE CONNECTIONS TO MCC AND MECHANICAL EQUIPMENT AS SHOWN. REFER TO SHAW ENVIRONMENTAL DRAWING E-1 FOR ADDITIONAL INFORMATION.
  - 5 REMOVE BREAKER AND PERFORM PRIMARY INJECTION TEST BY THIRD PARTY TESTING AGENCY. SET TRIP UNIT TO MAXIMUM.
  - 6 NON-FUSED DISCONNECTS HP RATED (TYP).
  - 7 LENGTHS SHOWN ARE FOR CALCULATION PURPOSES ONLY. CONTRACTOR TO TAKE OFF HIS OWN FEEDER LENGTHS.

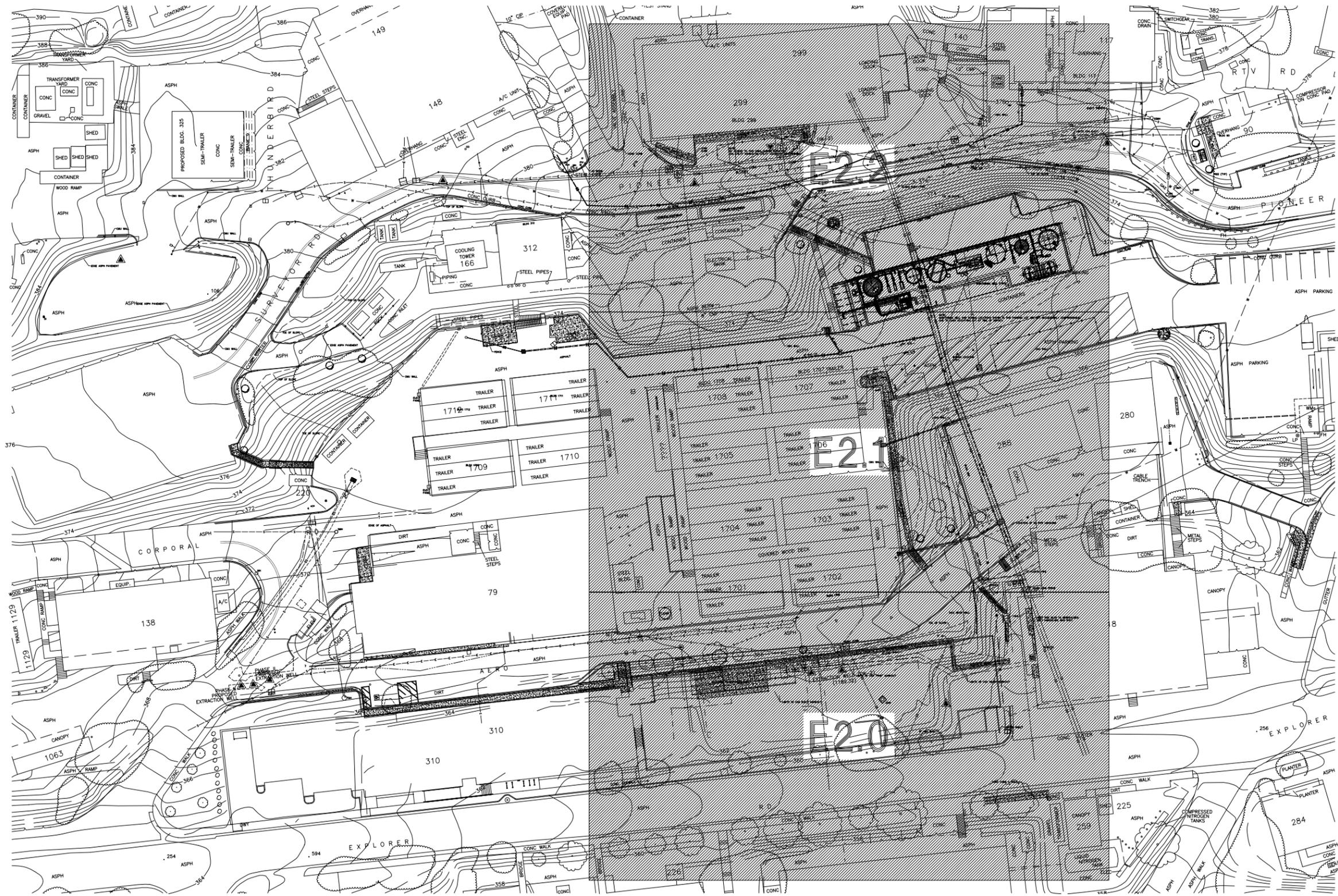
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△	09.03.04	CONSTRUCTION DOCUMENTS			
△	08.05.04	JPL REVIEW			
△	07.23.04	90% SUBMITTAL			
△	06.28.04	30% SUBMITTAL			

DRAWING SCALE		NONE
DESIGNED BY/DATE		DS
DRAWN BY/DATE		CH
CHECKED BY/DATE		MG
SHEET SIZE		D
REVISION		.
SHEET 1 of X		
DRAWING #		<b>E0.1</b>

**MOHAMMAD GOHARIZI**  
ELECTRICAL ENGINEER  
STATE OF CALIFORNIA

**KOCHER SCHIRRA GOHARIZI**  
Consulting Engineers, Inc.  
111 N. JACKSON SUITE 121 GLENDALE CA 91206-4371  
PHONE: 818.240.5630 FAX: 818.240.5144

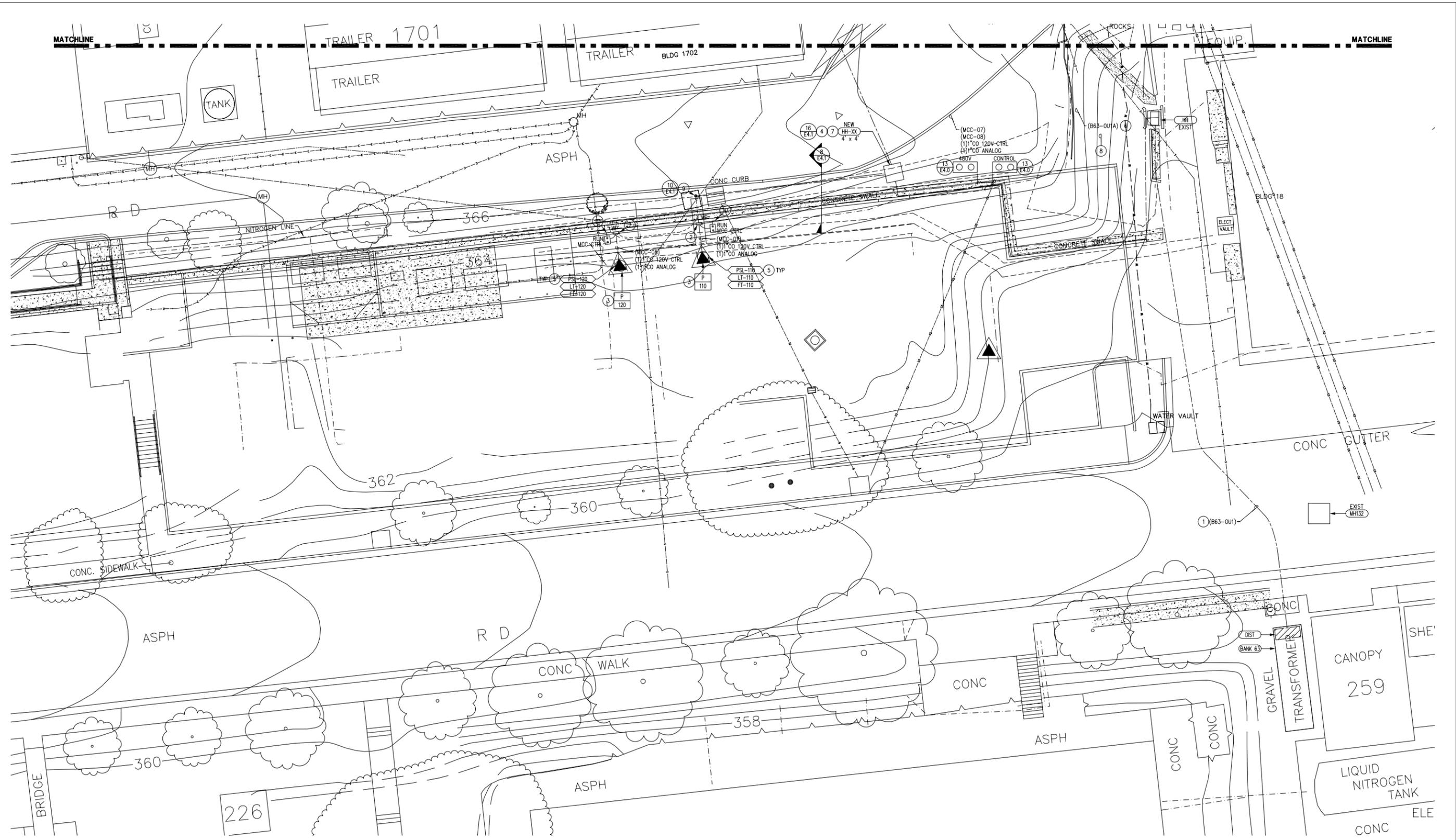
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△	09.03.04	CONSTRUCTION DOCUMENTS			DRAWING SCALE	1"=30'-0"
△	08.05.04	JPL REVIEW			DESIGNED BY/DATE	DS
△	07.23.04	90% SUBMITTAL			DRAWN BY/DATE	CH
△	06.28.04	30% SUBMITTAL			CHECKED BY/DATE	MG
REV	DATE	DESCRIPTION OF REVISION	REVISION	CHECKED	THIS IS A COMPUTER GENERATED DRAWING AND ONLY EDITS CONSISTENT WITH SHAW'S ORIGINAL CAD FORMAT SHALL BE CONSIDERED VALID COPIES.	
					SHEET SIZE	REVISION
					D	.
					GENERAL ARRANGMENT OU-1 TREATMENT SYSTEM OVERALL SITE PLAN	
					SHEET 1 OF X	DRAWING #
						<b>E1.0</b>



4: JPL\_18031\_JPL\_OU-1 Drawings\Elec\18031e20.dwg SEP 03,2004 4:55 PM JU



**SHEET NOTES**

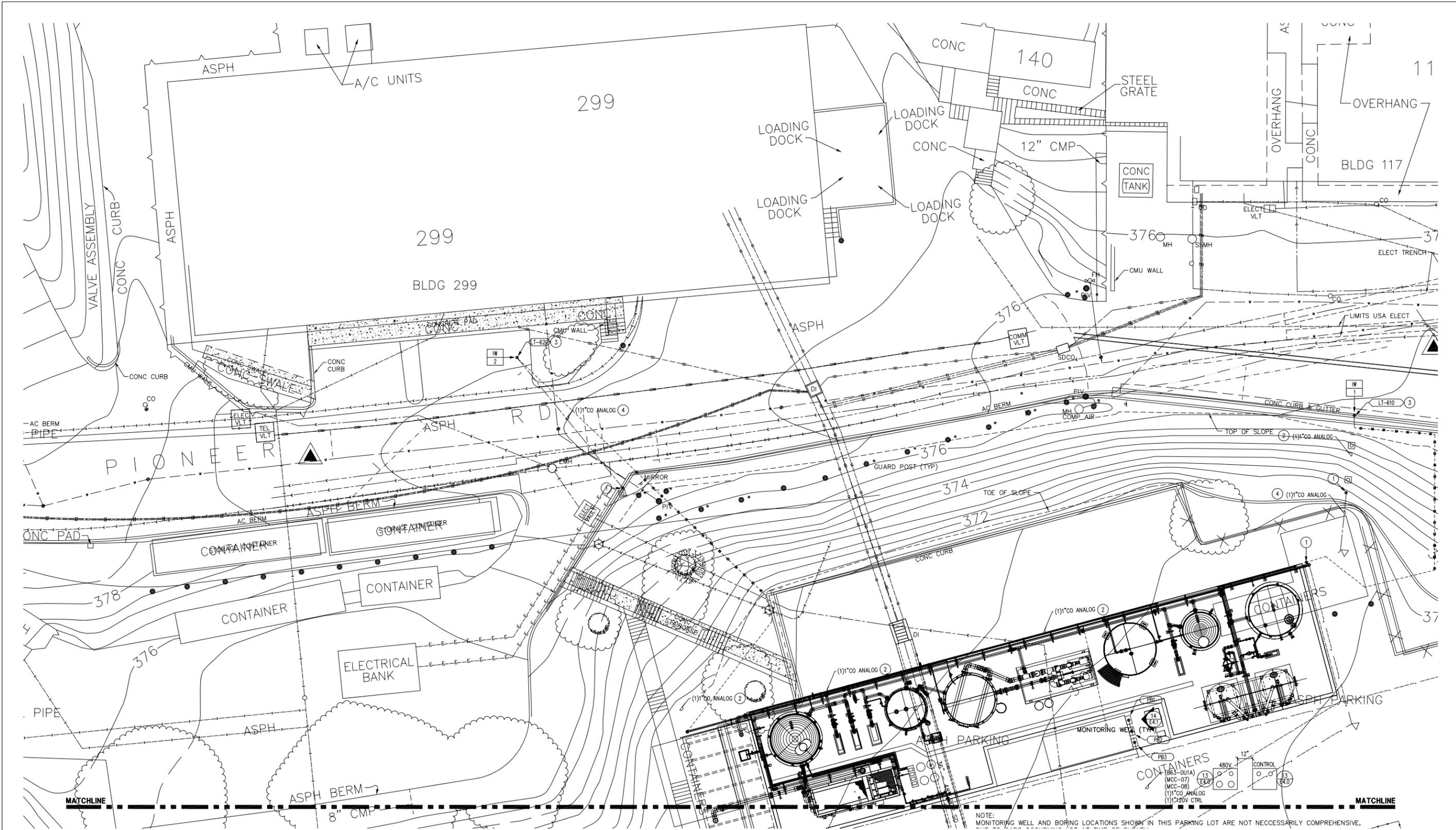
- 1 PULL NEW FEEDER IN EXISTING CONDUIT TO EXISTING HAND HOLE.
- 2 MOUNT DISCONNECT SWITCH ON RETAINING WALL.
- 3 PUMP LOCATED AT BASE OF WELL. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION.
- 4 NEW HANDHOLE. OBTAIN NUMBER FROM JPL AND WELD ON COVER WITH STAINLESS STEEL RODS.
- 5 CONTROL DEVICE. REFER TO CIVIL AND P&ID DRAWINGS FOR ADDITIONAL INFORMATION PRIOR TO ROUGH-IN.
- 6 DIRECT BURY FEEDER IN SLOPE USING PVC COATED RGS CONDUIT AT 36" BELOW GRADE. PROVIDE WARNING TAPE 12" ABOVE CONDUITS ALONG ENTIRE LENGTH.
- 7 ROUTE LV CONTROL CONDUITS CONTINUOUSLY THROUGH HANDHOLE USING RGS CONDUIT. PROVIDE JUNCTION BOX IN HANDHOLE.
- 8 DRAIN, 2" PVC. DAYLIGHT AT BOTTOM OF SLOPE.
- 9 TRANSITION FROM EXPOSED CONDUIT TO BELOW GRADE. USE RGS ABOVE GRADE TO 12" BELOW GRADE. TRANSITION TO PVC-40 UNDERGROUND.
- 10 LOCAL PUMP START WHILE STARTER IS IN HAND POSITION. TWO POSITION MOTOR OPERATOR SWITCH IN METALLIC WEATHER PROOF ENCLOSURE. SQUARE D 9100K SERIES, RUN 2#12 IN 120V CONTROL CONDUIT TO STARTER REMOTE DEVICE TERMINALS IN MCC. SEE SHAW ENVIRONMENTAL 'E-100' DRAWINGS FOR ADDITIONAL INFORMATION.



△	09.03.04	CONSTRUCTION DOCUMENTS			DRAWING SCALE	1"=10'-0"
△	08.05.04	JPL REVIEW			DESIGNED BY/DATE	DS
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△	06.28.04	30% SUBMITTAL			CHECKED BY/DATE	MG
REV	DATE	DESCRIPTION OF REVISION	REVISED	CHECKED	CHECKED BY/DATE	REVISION
THIS IS A COMPUTER GENERATED DRAWING AND ONLY EDITS CONSISTENT WITH SHAW'S ORIGINAL CAD FORMAT SHALL BE CONSIDERED VALID COPIES.						
NASA-JET PROPULSION LABORATORY OU-1 TREATMENT SYSTEM, PASADENA, CA.						
GENERAL ARRANGMENT OU-1 TREATMENT SYSTEM PARTIAL SITE PLAN - SHEET 1 OF 3						
						SHEET 1 OF X
						DRAWING #
						<b>E2.0</b>



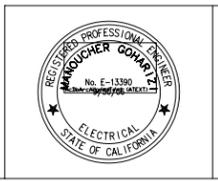
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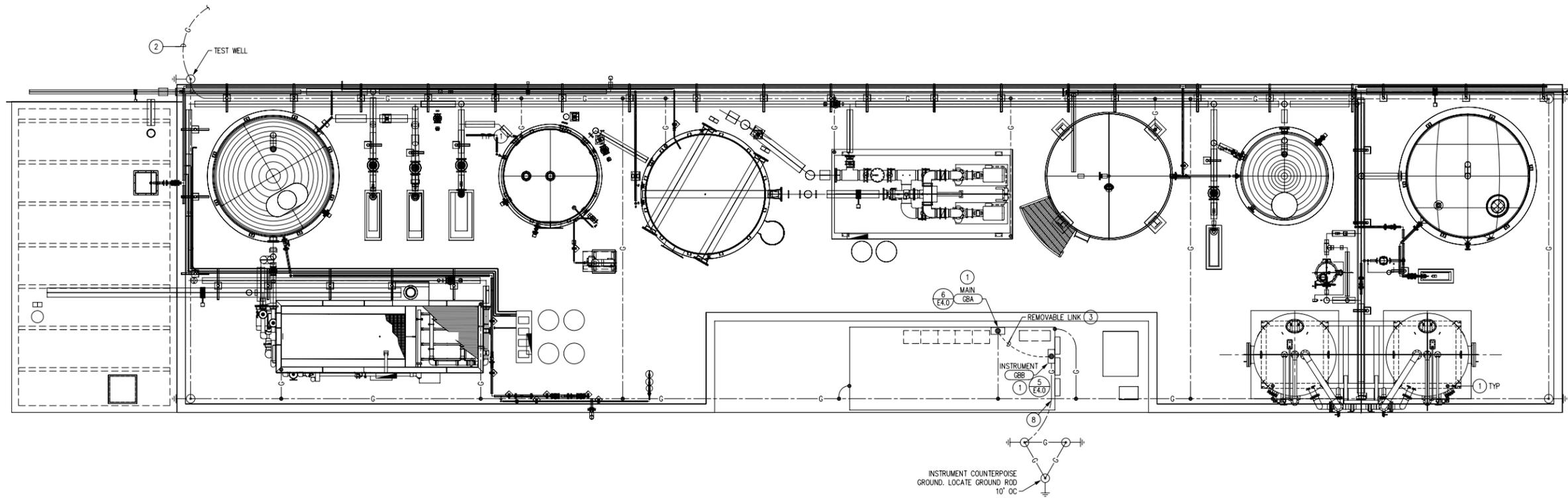
- SHEET NOTES**
- ① TRANSITION FROM EXPOSED CONDUIT TO BELOW GRADE. USE RGS ABOVE GRADE TO 12" BELOW GRADE. TRANSITION TO PVC-40 UNDERGROUND.
  - ② ROUTE CONDUITS ALONG PIPE RACK. ALL EXPOSED CONDUITS TO BE RGS.
  - ③ CONTROL DEVICE. REFER TO CIVIL AND P&ID DRAWINGS FOR ADDITIONAL INFORMATION PRIOR TO ROUGH-IN.
  - ④ DIRECT BURY CONTROL CONDUIT USING PVC CONDUIT AT 24" MIN BELOW GRADE.

NOTE: MONITORING WELL AND BORING LOCATIONS SHOWN IN THIS PARKING LOT ARE NOT NECESSARILY COMPREHENSIVE.

△	09.03.04	CONSTRUCTION DOCUMENTS			DRAWING SCALE	1"=10'-0"
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REV	DATE	DESCRIPTION OF REVISION	REVISED BY	CHECKED	SHEET SIZE	D
THIS IS A COMPUTER GENERATED DRAWING AND ONLY EDITS CONSISTENT WITH SHAW'S ORIGINAL CAD FORMAT SHALL BE CONSIDERED VALID COPIES.					REVISION	
NASA-JET PROPULSION LABORATORY OU-1 TREATMENT SYSTEM, PASADENA, CA.					SHEET 1 OF X	
GENERAL ARRANGMENT OU-1 TREATMENT SYSTEM PARTIAL SITE PLAN - SHEET 3 OF 3					DRAWING #	E2.2

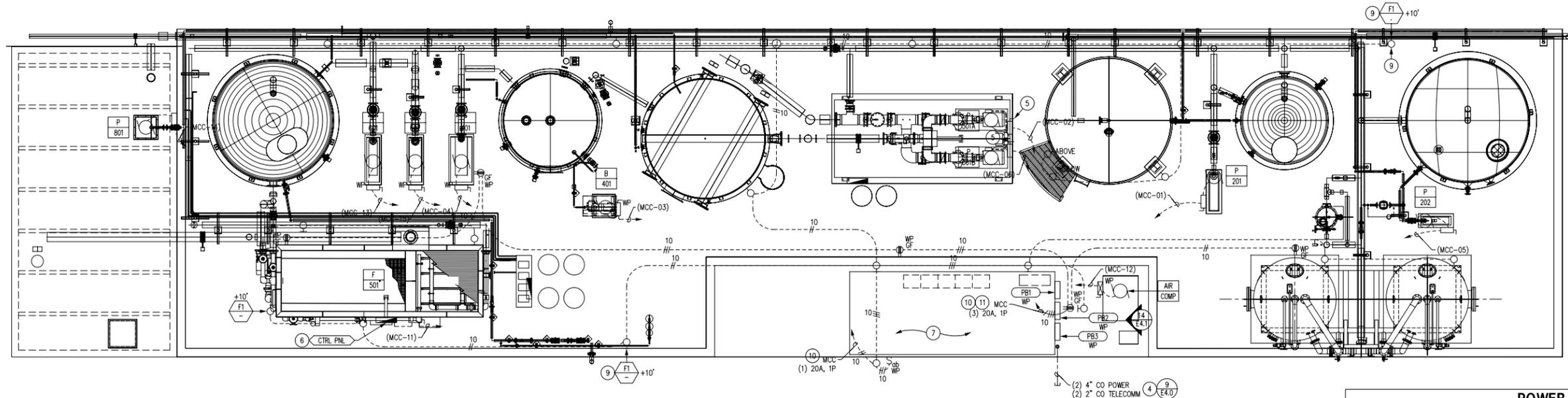


**KOCHER SCHIRRA GOHARIZI**  
Consulting Engineers, Inc.  
111 N JACKSON SUITE 121 GLENDALE CA 91206-4371  
PHONE: 818.240.5630 FAX: 818.240.5144



- GENERAL NOTES**
- A. ALL METALLIC VESSELS TO BE BONDED TO GROUND RING.
  - B. REFER TO CIVIL AND P&ID DRAWINGS FOR ADDITIONAL INFORMATION.
  - C. COORDINATE DEVICE/EQUIPMENT REQUIREMENTS WITH SUPPLIER PRIOR TO ROUGH-IN.
  - D. ALL ELECTRICAL COMPONENTS TO BE UL LISTED FOR WET LOCATION.
  - E. REFER TO JS FILTER DWG 41074-894-12 FOR WIRING INFORMATION.
  - F. ALL EXPOSED CONDUIT TO BE RGS.

**GROUNDING PLAN** 3/16" = 1'-0" **1**



- SHEET NOTES:**
- 1 COORDINATE GROUND POINT OF CONNECTION WITH EQUIPMENT SUPPLIER PRIOR TO ROUGH-IN.
  - 2 STUB PIGTAIL IN CONDUIT FOR FUTURE USE.
  - 3 ELECTRICAL GROUND AND INSTRUMENT GROUND SHOULD BE KEPT SEPARATE THROUGHOUT THE INSTALLATION, BONDED TOGETHER ONLY BY THIS REMOVABLE LINK.
  - 4 STUB CONDUITS 5' FROM EQUIPMENT PAD AT 6" ABOVE FINISHED FLOOR BELOW 'PBI'.
  - 5 DISCONNECT PROVIDED WITH EQUIPMENT SKID.
  - 6 PREWIRED EQUIPMENT CONTROL PANEL PROVIDED WITH SKID.
  - 7 DO NOT PENETRATE CONTROL ROOM ROOF.
  - 8 MAINTAIN 12" VERTICAL SEPARATION.
  - 9 STANCHION MOUNT FIXTURE AND SUPPORT TO PIPE RACK.
  - 10 CONNECT TO PANEL IN MCC. PROVIDE BREAKERS AS NOTED.
  - 11 FIRST DEVICE IN CIRCUIT TO BE GFCI TYPE. CIRCUITS TO BE WIRED "THROUGH" GFCI DEVICE PROVIDING PROTECTION TO STANDARD DOWNSTREAM DEVICES. LABEL STANDARD DEVICES AS "GFCI PROTECTED".

**POWER AND LIGHTING PLAN** 3/16" = 1'-0" **2**

REV	DATE	DESCRIPTION OF REVISION	REVISION BY	CHECKED BY
△	09.03.04	CONSTRUCTION DOCUMENTS		
△	08.05.04	JPL REVIEW		
△	07.23.04	90% SUBMITTAL		
△	06.28.04	30% SUBMITTAL		

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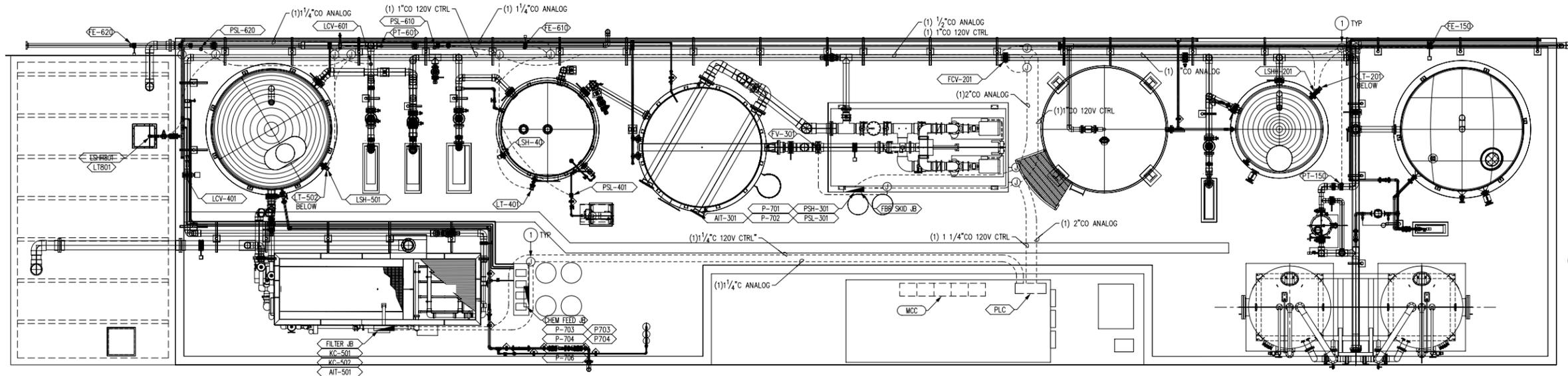
NASA-JET PROPULSION LABORATORY  
OU-1 TREATMENT SYSTEM, PASADENA, CA.

**GENERAL ARRANGMENT  
OU-1 TREATMENT SYSTEM  
ELECTRICAL PLANS**

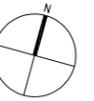
SHEET 1 OF X  
DRAWING # **E3.0**

REGISTERED PROFESSIONAL ENGINEER  
MANOCHER GOHARIZI  
No. E-13380  
ELECTRICAL  
STATE OF CALIFORNIA

**KOCHER  
SCHIRRA  
GOHARIZI**  
Consulting Engineers, Inc.  
111 N. JACKSON SUITE 121 GLENDALE CA 91206-4371  
PHONE: 618.241.5630 FAX: 618.241.5144



- GENERAL NOTES**
- A. ALL CONTROLS CONDUIT TO 3/4" MINIMUM UON.
  - B. REFER TO CIVIL AND P&ID DRAWINGS FOR ADDITIONAL INFORMATION.
  - C. COORDINATE DEVICE/EQUIPMENT REQUIREMENTS WITH SUPPLIER PRIOR TO ROUGH-IN.
  - D. ALL ELECTRICAL COMPONENTS TO BE UL LISTED FOR WET LOCATION.
  - E. REFER TO US FILTER DWG 41074-894-12 FOR WIRING INFORMATION.
  - F. ALL EXPOSED CONDUIT TO BE RGS.
- SHEET NOTES**
- 1 PROVIDE JUNCTION BOX SIZED PER NUMBER OF WIRES AND CONDUITS.



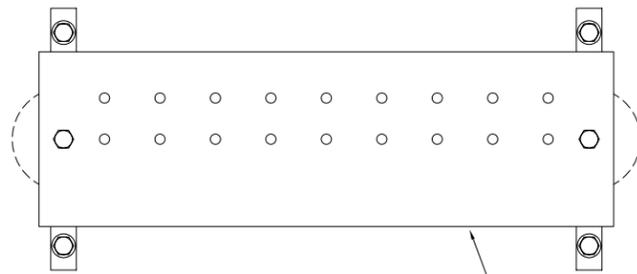
**CONTROL CONDUIT PLAN** 3/16" = 1'-0" **1**

H:\JPL\8031\JPL\_OU-1\Drawings\Elec\8031e31.dwg SEP 03,2004 4:56 PM JU

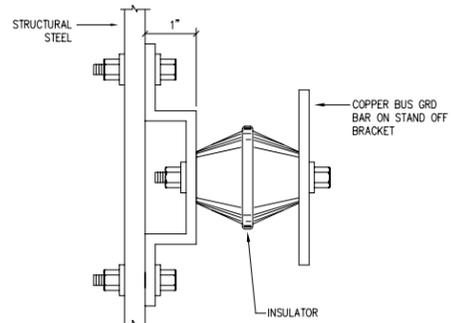
NOT USED				NTS	2
△	09.03.04	CONSTRUCTION DOCUMENTS			DRAWING SCALE AS NOTED
△	08.05.04	JPL REVIEW			DESIGNED BY/DATE DS
△	07.23.04	90% SUBMITTAL			DRAWN BY/DATE CH
△	06.28.04	30% SUBMITTAL			
REV	DATE	DESCRIPTION OF REVISION	REVISOR	CHECKED BY	CHECKED BY/DATE
					MG
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NASA-JET PROPULSION LABORATORY OU-1 TREATMENT SYSTEM, PASADENA, CA.					REVISION .
<b>GENERAL ARRANGMENT OU-1 TREATMENT SYSTEM CONTROL CONDUIT PLAN</b>					SHEET 1 OF X
					DRAWING # <b>E3.1</b>



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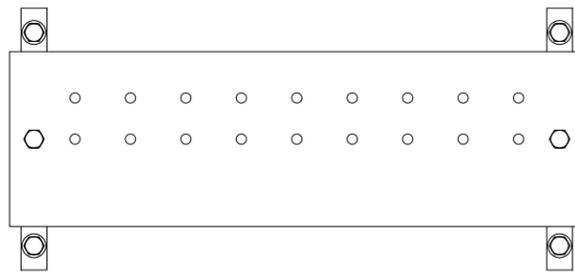
1/4"x4"x20" COPPER BUS GROUND BAR ON STAND OFF BRACKET WITH 7/16" DIAMETER HOLES. CADWELD



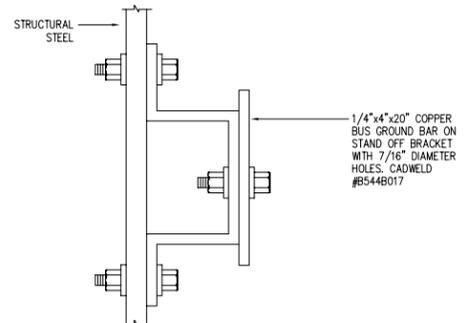
**INSTRUMENT GROUND BUS**

NTS

**5**



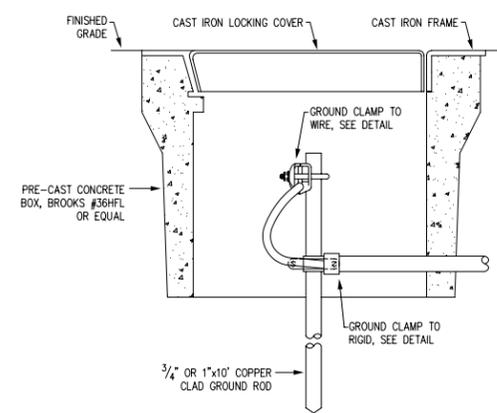
1/4"x4"x20" COPPER BUS GROUND BAR ON STAND OFF BRACKET WITH 7/16" DIAMETER HOLES. CADWELD #B544B017



**EQUIPMENT GROUND BUS**

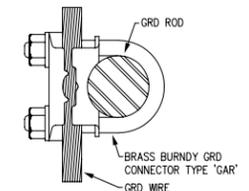
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**6**



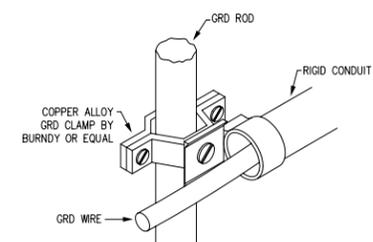
**GROUND ROD / PRECAST CONCRETE BOX**

SCALE: NONE



**CLAMP TO WIRE**

SCALE: NONE



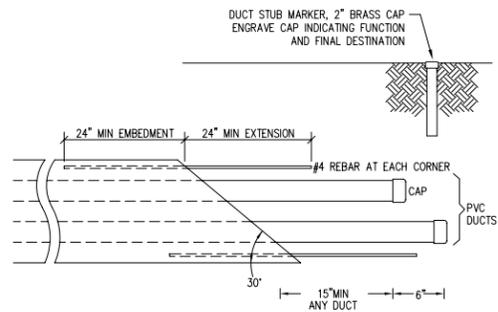
**CLAMP TO RIGID CONDUIT**

SCALE: NONE

**GROUND TEST WELL**

NTS

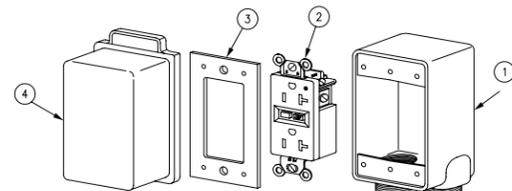
**8**



**DUCTBANK STUB OUT**

NTS

**9**



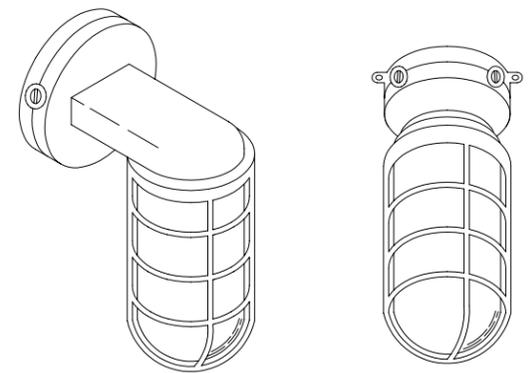
NOTES:

- 1 CAST OUTLET BOX, FERROUS METAL CONSTRUCTION, GALVANIZED WITH HUBS FOR RIGID CONDUIT, (MINIMUM 2 HUBS, REFER TO PLANS FOR NUMBER AND LOCATIONS). PROVIDE PLUGS FOR UNUSED HUBS.
- 2 GROUND FAULT CIRCUIT INTERRUPTING RECEPTACLE.
- 3 NEOPRENE GASKET PRECUT TO FIT RECEPTACLE AND BOX.
- 4 CAST ALUMINUM EXTRA DEEP LIFT COVER RAINTIGHT WHILE IN USE.

**WEATHERPROOF RECEPTACLE**

NTS

**10**



DESCRIPTION: SURFACE OR CEILING MOUNTED, DIE CAST ALUMINUM HOUSING, PORCELAIN SOCKET, HEAT AND SHOCK RESISTANT GLASS GLOBE, STAINLESS STEEL HARDWARE, CAST ALUMINUM GAIRD AND VAPORTIGHT BOX. UL LISTED FOR WET LOCATIONS. PROVIDE STANCHION MOUNTING WHERE INDICATED ON PLANS.

LAMP: 26 WATT PL

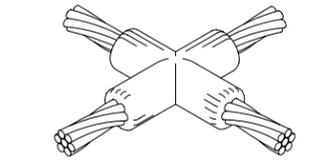
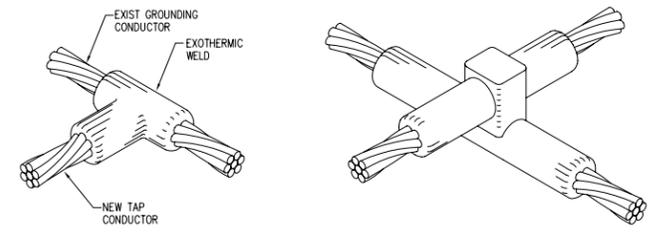
VOLTAGE: 120 VOLT

MANUFACTURER: O-Z GEDNEY 'Y' SERIES STONCO 'VAPORTIGHT' SERIES

**LIGHTING FIXTURE 'F1'**

NTS

**15**

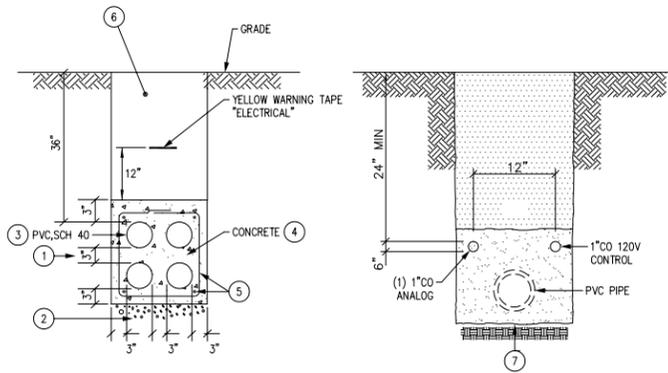


NOTE: ALTERNATIVELY, BURNDY 'HY-GROUND' COMPRESSION FITTINGS MAY BE USED.

**TYPICAL GROUND CONNECTIONS**

NTS

**16**



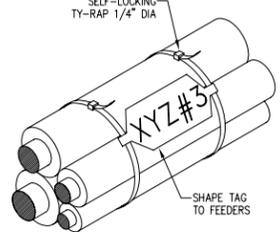
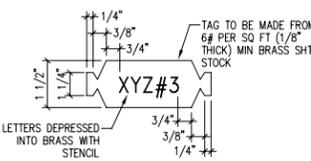
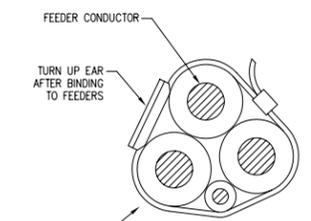
SHEET NOTES:

- 1 CONCRETE ENVELOPE DIMENSIONS ARE MINIMUM REQUIRED. MAINTAIN 3" COVER ON ALL SIDES.
- 2 PROVIDE 6" MINIMUM COMPACTED 3/4" GRAVEL UNDER ALL CONCRETE ENCASED DUCT RUNS.
- 3 A TYPICAL DUCT BANK WITH 4 CONDUITS IS SHOWN. FOR QUANTITY AND SIZE REFER TO THE SITE PLANS. IN CASE OF VARIOUS SIZES, SMALLER CONDUITS SHALL BE LAID ON THE UPPER LAYER. USE PLASTIC SPACERS 5" ON CENTER.
- 4 CONCRETE MIX BATCH WEIGHT FOR ONE CUBIC YARD: A. CEMENT 3.5 SACKS, 329 POUNDS. B. 3/8" AGGREGATE 1618 POUNDS. C. SAND 1637 POUNDS. D. RED OXIDE RATIO, 2 POUNDS TO ONE SACK CEMENT.
- 5 #4 LONGITUDINAL BARS AT 4 CORNERS WITH STIRRUPS AT 24" ON CENTER AND 9" LAP (TYP)
- 6 COMPACTED BACKFILL SOIL IN LANDSCAPE AREAS & ONE SACK SLURRY BACKFILL IN PAVED AREAS. WAIT 48 HOURS BEFORE SOIL BACKFILL AND 12 HOURS BEFORE SLURRY BACKFILL.
- 7 INSTALL CONTROL CONDUITS IN WATER PIPE TRENCH. REFER TO TRENCH DETAIL ON C-102 FOR TRENCH REQUIREMENTS.

**TYPICAL ELECTRICAL DUCTBANK**

NTS

**13**



**FEEDER IDENTIFICATION**

NTS

**14**



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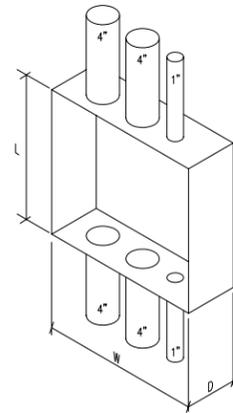
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△	08.05.04	JPL REVIEW			MG
△	07.23.04	90% SUBMITTAL			CH
△	06.28.04	30% SUBMITTAL			CH

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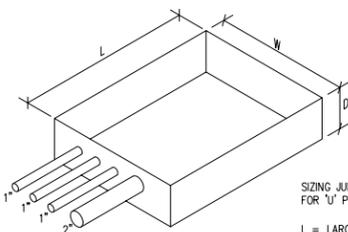
GENERAL ARRANGMENT  
OU-1 TREATMENT SYSTEM  
ELECTRICAL DETAILS-SHT 1 OF 2

SHEET SIZE D  
REVISION .  
SHEET 1 OF X  
DRAWING # **E4.0**



EXAMPLE:  
 $L = 4' \times 8 = 32'$   
 $W = 4' + 4' + 1' + 6 = 15'$   
 $D = 4' \times 1.5 = 6'$

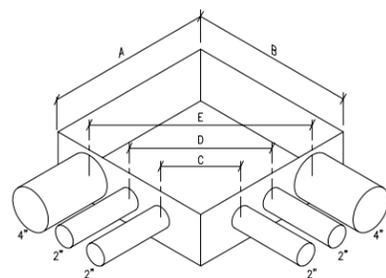
NOTE:  
 SIZES MAY NEED TO BE INCREASED TO MEET REQUIREMENTS OF NEC 370-28, COMPLY WITH STANDARD BOX SIZES OR FOR SHIELDED CABLES.



SIZING JUNCTION BOXES FOR 'U' PULLS  
 $L = \text{LARGEST RACEWAY} \times 6 + \text{DIAMETER OF ALL OTHER RACEWAYS IN ONE ROW}$   
 $W = \text{TOTAL DIAMETER OF ALL RACEWAYS IN ONE ROW} + \text{TOTAL NUMBER OF RACEWAY IN THAT ROW} \times 2$   
 $D = \text{LARGEST RACEWAY IN EACH ROW} \times 1.5$

EXAMPLE:  
 $L = 6 \times 2' = 12' + 1' + 1' = 15'$   
 $W = 2' + 1' + 1' + 1' = 5 \times 2 = 10'$   
 $D = 2' \times 1.5 = 3'$

NOTE:  
 SIZES MAY NEED TO BE INCREASED TO MEET REQUIREMENTS OF NEC 370-28, COMPLY WITH STANDARD BOX SIZES OR FOR SHIELDED CABLES.



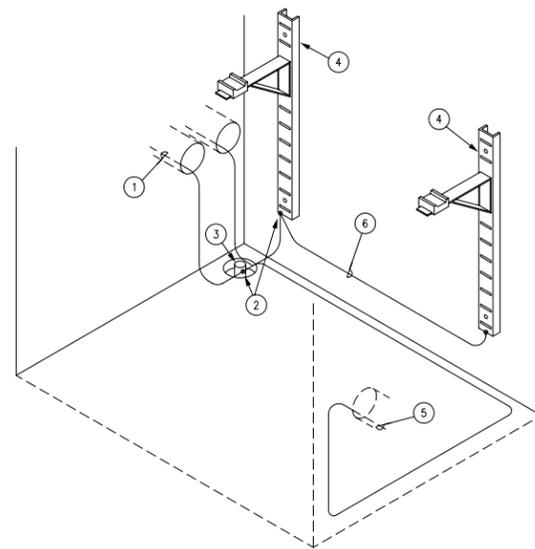
EXAMPLE:  
 $A = (6 \times 4') + 2' + 2' = 28'$   
 $B = (6 \times 4') + 2' + 2' = 28'$   
 $C = (6 \times 2') = 12'$  MINIMUM  
 $D = (6 \times 2') = 12'$  MINIMUM  
 $E = (6 \times 4') = 24'$

NOTE:  
 SIZES MAY NEED TO BE INCREASED TO MEET REQUIREMENTS OF NEC 370-28, COMPLY WITH STANDARD BOX SIZES OR FOR SHIELDED CABLES.

TYPICAL PULL BOX SIZING GUIDE

NTS

13

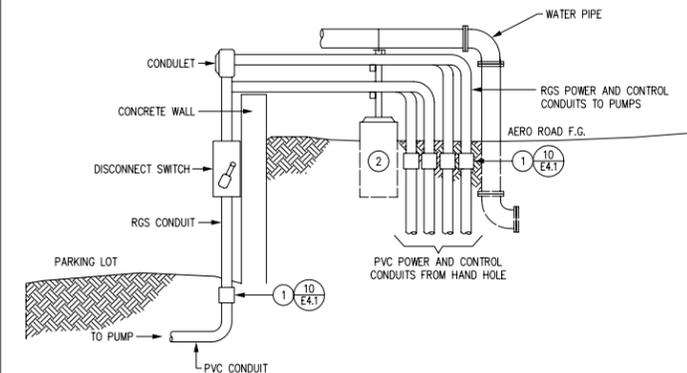


- NOTES:
- GROUND CONDUCTOR ENTERING HANDHOLE VIA ELECTRICAL DUCT.
  - CONNECT GROUND CONDUCTOR TO CABLE RACKS, GROUND RODS AND OTHER EXPOSED METAL COMPONENTS.
  - 3/4" x 10" GROUND ROD
  - CABLE RACK, SEE DETAIL THIS SHEET.
  - GROUND CONDUCTOR EXITING HANDHOLE TO NEXT MANHOLE OR PULLBOX.
  - 2/0 AWG BARE COPPER GROUND CONDUCTOR

HANDHOLE GROUNDING REQUIREMENTS

NTS

7



- SHEET NOTES:
- TRANSITION FROM RGS TO PVC CONDUIT.
  - PIPE SUPPORT REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFO, C-102 AND C-201.

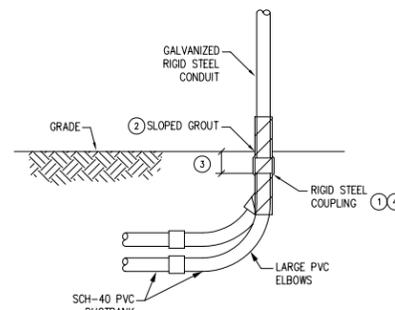
EXTRACTION WELL CONDUITS

NTS

8

NOTES:

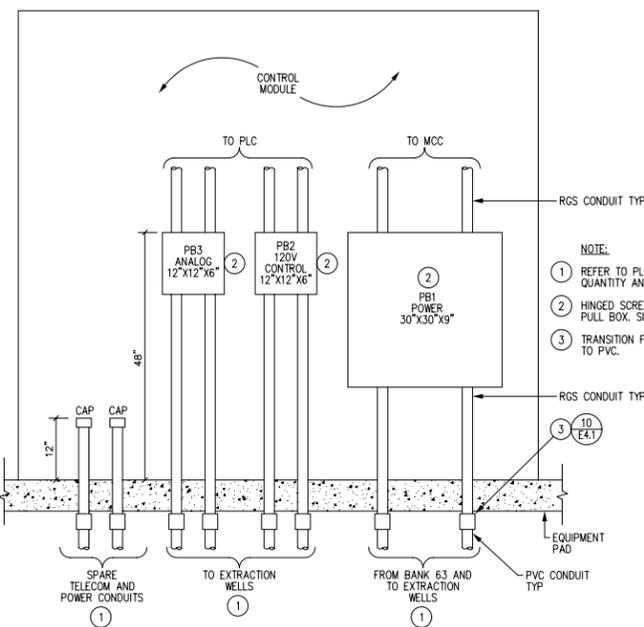
- CLEAN THE CONDUITS AND APPLY THREE LAYERS OF 10 MIL SCOTCHRAP WITH OVERLAP. COVER FROM 6" BELOW THE COUPLING TO 6" ABOVE GRADE.
- GROUT AROUND THE CONDUIT WITH A SLIGHT SLOPE TO ROUTE WATER RUN-OFF AWAY FROM PENETRATION.
- EDGE OF COUPLING MINIMUM 12" BELOW GRADE.
- APPLY PVC GLUE TO THE THREADS BEFORE INSTALLING THE COUPLINGS.



NOT USED

NTS

10

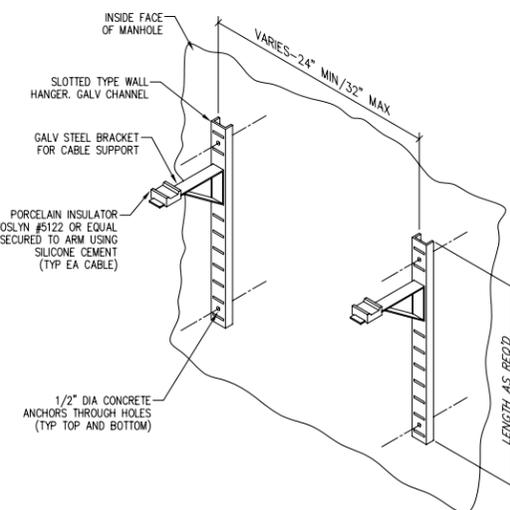


- NOTE:
- REFER TO PLANS FOR QUANTITY AND SIZES
  - HINGED SCREW COVER W/ PULL BOX. SIZE AS NOTED.
  - TRANSITION FROM RGS TO PVC.

CONTROL MODULE ELEVATION

NTS

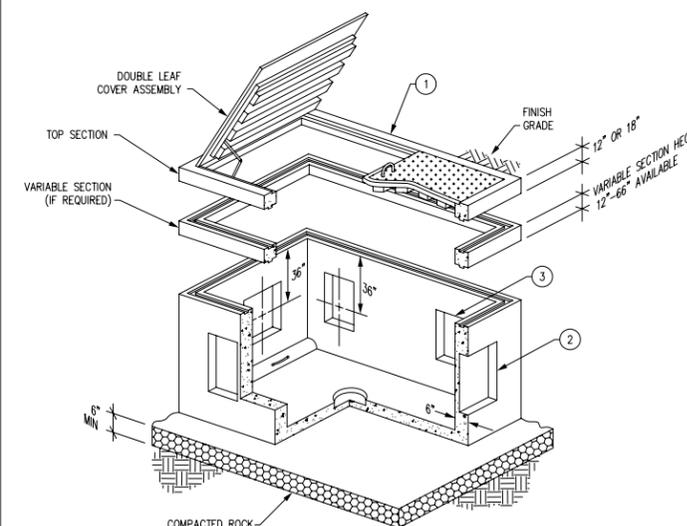
14



CABLE RACK IN HANDHOLES

NTS

15



- DETAIL NOTES:
- 4'-0" X 4'-0" QUICKSET MODEL NUMBER 2026T OR EQUIVALENT WITH ADEQUATE NUMBER OF 12" OR 18" VARIABLE SECTION HEIGHTS TO OBTAIN MINIMUM 3" COVER OVER DUCT ENCASUREMENT AND TWO PIECE TORSION HINGED COVER.
  - 26"x26" KNOCKOUT ON EACH END WALL.
  - 20"x20" KNOCKOUT ON EACH SIDE WALL.

ELECTRICAL HANDHOLE

NTS

16

REV	DATE	DESCRIPTION OF REVISION	REVISION BY	CHECKED BY
△	09.03.04	CONSTRUCTION DOCUMENTS		
△	08.05.04	JPL REVIEW		
△	07.23.04	90% SUBMITTAL		
△	06.28.04	30% SUBMITTAL		

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 OU-1 TREATMENT SYSTEM, PASADENA, CA.

GENERAL ARRANGMENT  
 ELECTRICAL DETAILS-SHT 2 OF 2

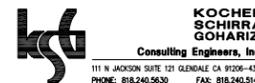
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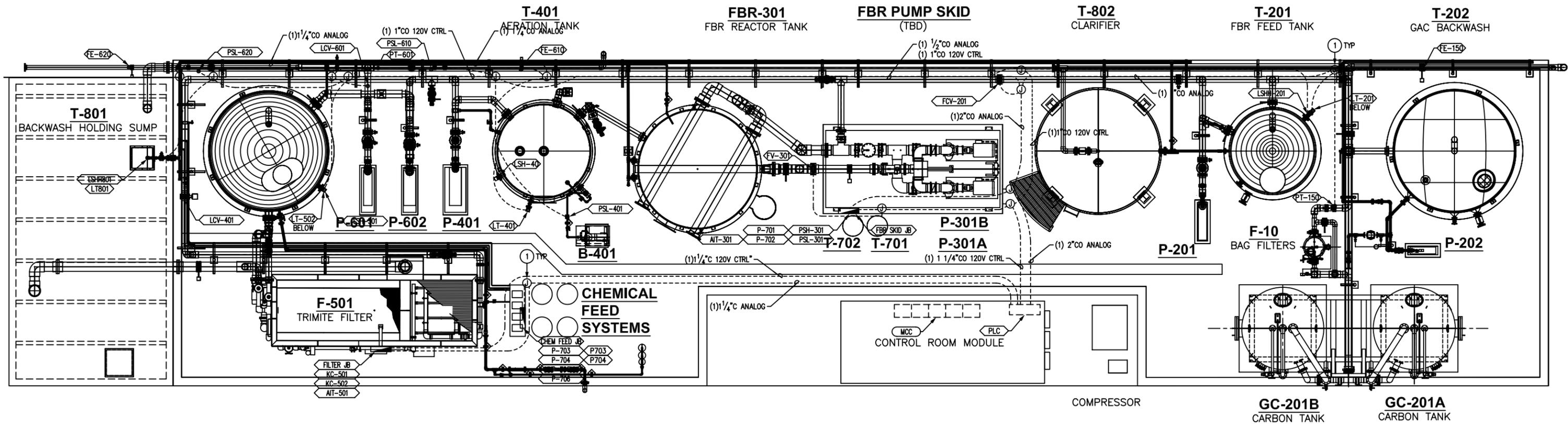
SHEET SIZE: D

REVISION: .

SHEET 1 OF X

DRAWING # E4.1





② TEST WELL

T-401  
AERATION TANK

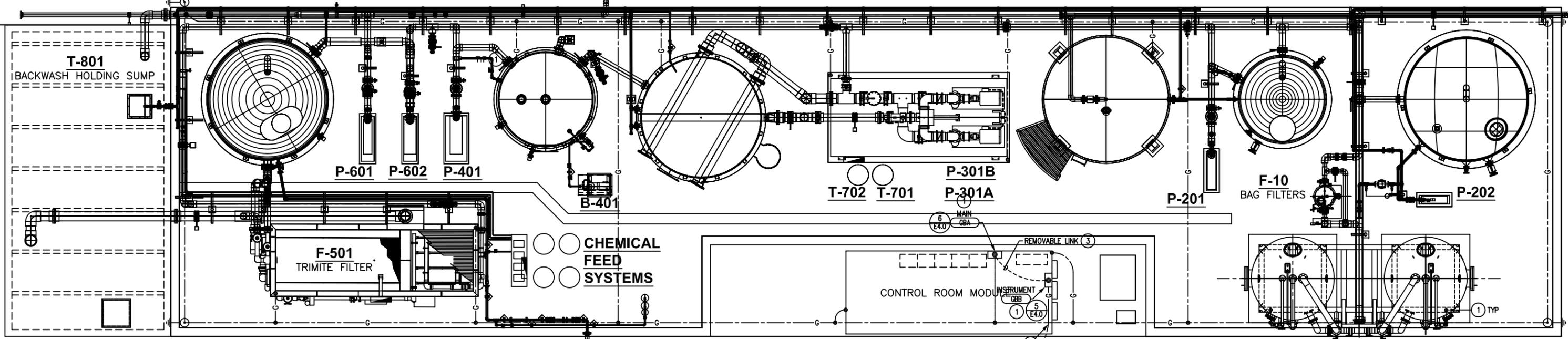
FBR-301  
FBR REACTOR TANK

FBR PUMP SKID  
(TBD)

T-802  
CLARIFIER

T-201  
FBR FEED TANK

T-202  
GAC BACKWASH



T-801  
BACKWASH HOLDING SUMP

P-601 P-602 P-401

CHEMICAL  
FEED  
SYSTEMS

F-501  
TRIMITE FILTER

T-702 T-701 P-301B P-301A

CONTROL ROOM MODU

REMOVABLE LINK (3)

P-201

F-10  
BAG FILTERS

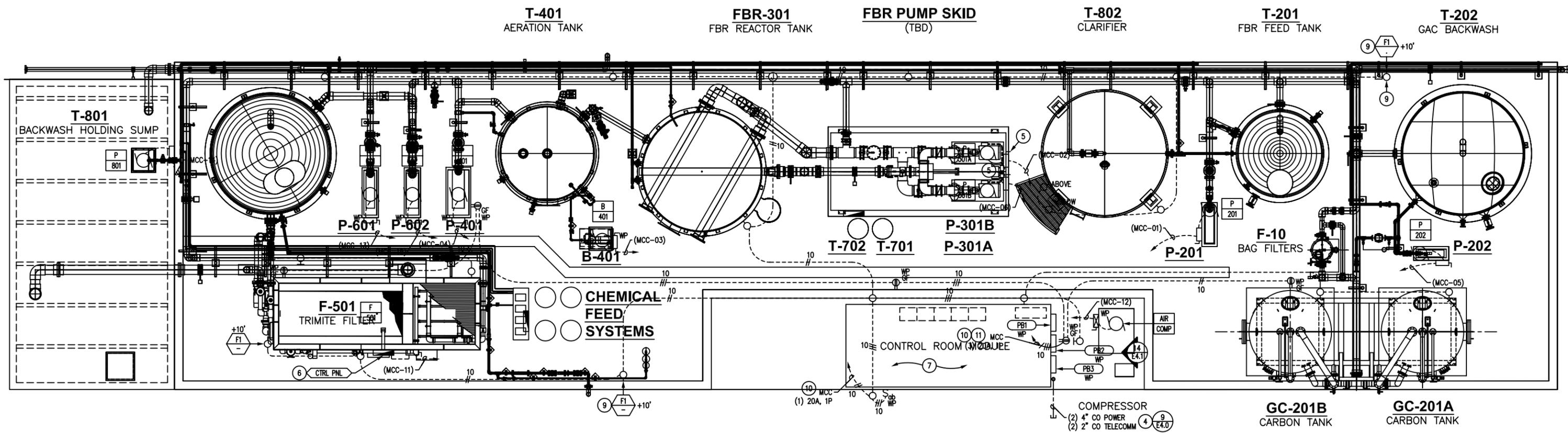
P-202

COMPRESSOR

GC-201B  
CARBON TANK

GC-201A  
CARBON TANK

INSTRUMENT COUNTERPOISE  
GROUND. LOCATE GROUND ROD  
10' OC



**Appendix 4-3**  
**Concrete Reports**













