Honeywell
301 Plainfield Road
Suite 330
Syracuse, NY 13212
315-552-9700
315-552-9780 Fax

April 7, 2010

To: Gregg Townsend, NYSDEC, Region 7 (1 bound)
Holly Sammon, Onondaga County Public Library (1 bound)
Samuel Sage, Atlantic States Legal Foundation (1 bound)
Gina Fredericks, Liverpool Public Library (1 bound)
Mary Ann Coogan, Camillus Town Hall (1 bound)
Stephen Weiter, Moon Library (1 bound)
Cara Burton, Solvay Public Library (1 bound)
Joseph J. Heath, Esq. (1 bound)

Re: Letter of Transmittal – Onondaga Lake Document Depository

The below document has been received by the New York State Department of Environmental Conservation (NYSDEC) and is enclosed for your document holdings:

- Onondaga Lake Remedial Design: SCA Water Treatment Plant – Design Package #1 – Process Submittal (DRAFT). Comments received on this submittal will be incorporated into the final submittal.

Sincerely,

John P. McAuliffe by CCC

John P. McAuliffe, P.E.
Program Director, Syracuse

Enc.

cc: Richard Mustico, NYSDEC (cvr ltr only)

Honeywell
301 Plainfield Road
Suite 330
Syracuse, NY 13212
315-552-9700
315-552-9780 Fax

March 10, 2010

Mr. Richard Mustico
New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau D
625 Broadway
Albany, NY 12233-7013

Re: **Onondaga Lake Bottom Subsite – Onondaga County, NY**
Consent Decree 89-CV-815
SCA Water Treatment Plant

Dear Mr. Mustico:

Please find enclosed the SCA WTP Design Package #1 (DP#1) for your review and approval. DP#1 includes the following:

- Updated process flow diagram (PFD) and P&IDs
- Updated General Arrangement Plan of equipment
- Site/Civil components to support a Grading Plan and Construction Access for the site
- Effluent line to the Retention Ponds.

In addition, please find responses to the NYSDEC comments on SCA WTP Intermediate Design Submittal dated October 8, 2009.

Comment 1: Section 3.4.1. Conveyance to Metro and Monitoring. Greater detail should be provided in the detailed engineering process design document with regard to the 30-inch and 24-inch forcemain. It is envisioned that this forcemain will convey treated water from the SCA WTP to the Onondaga County sewer system for polishing (mainly for ammonia treatment). Honeywell should document that there is sufficient capacity in the forcemain to prevent backups or overflows.

Response: The 30-inch and the 24-inch forcemain capacities are being addressed under a separate project.

Comment 2: Section 4.1.3. Filtration System (optional). Filtration units prior to the granular activated carbon (GAC) units are described as optional. Based on discussions with Honeywell and bench scale results, the Department recommends utilizing multi-media filtration (MMF) units (or equivalent) prior to the GAC units in the treatment train systems. MMF units would also likely reduce operational problems with the GAC units.

Response: Polish Filtration (MMF's or equal) is included in the design. Refer to the Process Flow Diagram.

Comment 3: Section 5.3.5. Alternate Discharge. Additional detail with regard to Outfall 021 should be provided in the detailed engineering process design document. Testing (e.g., from the post water treatment basin, prior to discharge) and outfall location should be further discussed and depicted. Treated water discharged from Outfall 021 would be required to meet the Department's final SPDES equivalent discharge limits (draft limits are in Appendix F of the Intermediate Design).

Response: Outfall 021 is not addressed in DP#1. If Outfall 021 is added in the future, the discharge will have sampling and testing requirements prior to discharging that demonstrate that the water quality of the discharge meets the final SPDES equivalent discharge limits.

Honeywell is requesting your review of DP#1 to allow DP#2 and DP#3 to progress. After receipt of your comments, Honeywell will resubmit DP#1 to address applicable comments.

Sincerely,

John P. McAuliffe by ccc

John P. McAuliffe, P.E.
Program Director, Syracuse

cc:	Mr. Robert Nunes	USEPA (4 copies)
	Mr. Donald J. Hesler	NYSDEC, Albany
	Mr. Tim Larson	NYSDEC, Albany
	Ms. Sandy Lizlovs	NYSDEC, Syracuse
	Mr. James Burke	NYSDEC, Syracuse
	Ms. Sandra Tuori-Bell	OCDWEP, Syracuse
	Ms. Patricia Pastella	OCDWEP, Syracuse
	Mr. Steve Martin	OCDWEP, Syracuse
	Joseph J. Heath, Esq.	(copy & ec or CD)
	Thane Joyal, Esq.	(ec or ec ltr only)
	Ms. Jeanne Shenandoah	HETF/Onondaga Nation (ec or CD)
	Ms. Heidi Kuhl	Onondaga Nation (ec or ec ltr only)
	Mr. Beynan Ransom	Onondaga Nation (ec or ec ltr only)
	Brian D. Israel, Esq.	Arnold & Porter (ec or CD)
	Mr. Gregg Townsend	NYSDEC, Region 7 (1 copy & CD)
	Argie Cirillo, Esq.	USEPA (ltr only)
	Margaret A. Sheen, Esq.	NYSDEC, Region 7 (ltr only)
	Mr. Geoffrey J. Laccetti	NYSDOH (ltr only)
	Mr. Mark Sergott	NYSDOH (1 copy, 1 CD)
	Mr. William Hague	Honeywell (ec or CD)
	Mr. Steven Miller	Parsons (CD/hc cov ltr)
	Mr. Al Labuz	Honeywell (ltr only)
	Mr. Christopher Calkins	O'Brien & Gere (ec or ec ltr only)
	Mr. Jeffrey Rogers	O'Brien & Gere
	Mr. Brian White	O'Brien & Gere
	Stephen Bray	
	Jeanne Powers	
	Daniel Jean	
	Nick Capozza	
	Sandra Tuori-Bell	
	Mike Lannon	

Dear Interested Citizen:

This fact sheet provides you with information on the draft final Design Package #1 – Process Submittal, Onondaga Lake Remedial Design, SCA Water Treatment Plant, for the Onondaga Lake Bottom Site, a sub site of the Onondaga Lake Superfund Site. If you have any questions or would like more information about this project, please contact:

Mr. Richard Mustico P.E.
Project Manager
NYSDEC, 625 Broadway, 12th Floor
Albany, New York 12233-7016
(518) 402-9676
Email: rxmustic@gw.dec.state.ny.us

With respect to Citizen Participation inquiries, please contact:

Ms. Diane Carlton or
Ms. Stephanie Harrington
Citizen Participation Specialists
NYSDEC, 615 Erie Boulevard West
Syracuse, New York 13204-2400
(315) 426-7403
Email: reg7info@gw.dec.state.ny.us

For project-related health questions, contact the New York State Department of Health (NYSDOH) at the following:

Mr. Mark Sergott
Project Manager
NYSDOH, 547 River Street
Troy, New York 12180-2216
(800) 458-1158, Ext. 27860
E-mail: beei@health.state.ny.us

New York State
Department of Environmental Conservation

FACT SHEET

DRAFT FINAL DESIGN PACKAGE #1 – PROCESS SUBMITTAL, ONONDAGA LAKE REMEDIAL DESIGN, SCA WATER TREATMENT PLANT; SUBMITTAL AVAILABLE FOR REVIEW

Onondaga Lake Bottom Site (#7-34-030)
Onondaga County - March 2010

Introduction

The draft final Design Package #1 – Process Submittal, Onondaga Lake Remedial Design, SCA Water Treatment Plant has been submitted for review. The purpose of this design document is to provide detailed design level information on the process components of the water treatment plant for the Onondaga Lake remedy. The design document is currently under review by the New York State Department of Environmental Conservation (NYSDEC) and the United States Environmental Protection Agency.

Design Package #1 - Process Design - Water Treatment Plant for the Onondaga Lake Bottom Site

This document is one of three draft final design documents for the water treatment plant, which is part of the Onondaga Lake Bottom remedy. Water from the Onondaga Lake dredged sediments will be treated by this water treatment plant, and then discharged to the sanitary sewer system for final ammonia treatment. This document focuses on the drawings and specifications for the processes to be used to treat this water. Process units at the water treatment plant will include clarifiers, multi-media filters and granular activated carbon.

Future Design Submittals and Next Steps

Comments on Design Package #1 are scheduled to be submitted to Honeywell in early-April 2010. If needed, a revised design document incorporating these comments is scheduled to be submitted in late-April 2010. The draft final Design Package #2 is scheduled to be submitted for review in mid-May 2010. Design Package #2 will include the water treatment plant's mechanical (*e.g.*, pumps and pipes) and site (*e.g.*, footprint) details. The draft final Design Package #3 is scheduled to be submitted for review in September 2010. Design Package #3 will include the electrical and automation design of the water treatment plant, as well as the building design to house the water treatment plant. Any public comments on Design Package #1 may be submitted to the NYSDEC project manager listed in this fact sheet.

Project Contact List

The NYSDEC intends to utilize electronic mailing as much as possible for environmental and economic reasons. If you would like to begin receiving information electronically on the Onondaga Lake Bottom site, such as this fact sheet, please sign up for the Onondaga Lake News email list by visiting the NYSDEC website (www.dec.ny.gov/chemical/52545.html). Once signed up, please also notify the NYSDEC at reg7info@gw.dec.state.ny.us to stop receiving printed copies in the mail.

Location of Reports and Information

The draft final Design Package #1 – Process Submittal, Onondaga Lake Remedial Design, SCA Water Treatment Plant and other information on the Onondaga Lake cleanup are available online at www.dec.ny.gov/chemical/37558.html on the NYSDEC website. This design document and other Onondaga Lake cleanup documents are also available for review at the locations listed below.

Atlantic States Legal Foundation
658 West Onondaga Street
Syracuse, NY 13204
Phone: (315) 475-1170
Please call for an appointment.

Liverpool Public Library
310 Tulip Street
Liverpool, NY 13088
Phone: (315) 457-0310

NYSDEC, Region 7
615 Erie Blvd. West
Syracuse, NY 13204-2400
Phone: (315) 426-7400
Please call for an appointment.

Onondaga County Public Library
Syracuse Branch at the Galleries
447 South Salina Street
Syracuse, NY 13202
Phone: (315) 435-1800

Moon Library
SUNY ESF
1 Forestry Drive
Syracuse, NY 13210
Phone: (315) 470-6712

Camillus Town Hall
4600 West Genesee Street, Room 100
Syracuse, NY 13219
Phone: (315) 488-1234

NYSDEC
625 Broadway
Albany, NY 12233-7016
Phone: (518) 402-9676
Please call for an appointment.

Solvay Public Library
615 Woods Road
Solvay, NY 13209
Phone: (315) 468-2441

DESIGN PACKAGE (DP) #1 - PROCESS SUBMITTAL

Draft

Onondaga Lake Remedial Design
SCA Water Treatment Plant

Prepared for:

Honeywell

March 2010

DESIGN PACKAGE (DP) #1 - PROCESS SUBMITTAL

Onondaga Lake Remedial Design
SCA Water Treatment Plant

Prepared for:

Honeywell

301 Plainfield Road
Suite 330
Syracuse, New York 13212

Jeffrey S. Rogers, P.E.
Senior Vice President

March 2010

O'BRIEN & GERE

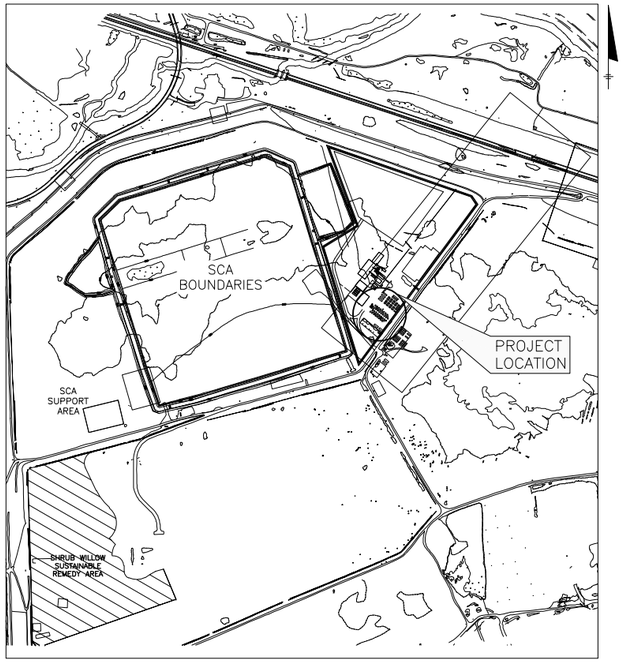
TABLE OF CONTENTS

DRAWINGS

TECHNICAL SPECIFICATIONS

DRAWINGS

Mar 10, 2010 - 11:09am



LOCATION PLAN

NOT TO SCALE

ISSUED FOR NYSDEC AND COUNTY REVIEW

DESIGN PACKAGE DP #1

SCA WATER TREATMENT PLANT (WTP)

TOWN OF CAMILLUS, NEW YORK

HONEYWELL INTERNATIONAL, INC.
MORRISTOWN, NEW JERSEY

MARCH 2010

O'BRIEN & GERE
ENGINEERS INC.

5000 BRITTONFIELD PKWY
EAST SYRACUSE, NY 13057
PHONE: 315-437-6100

INDEX TO DRAWINGS

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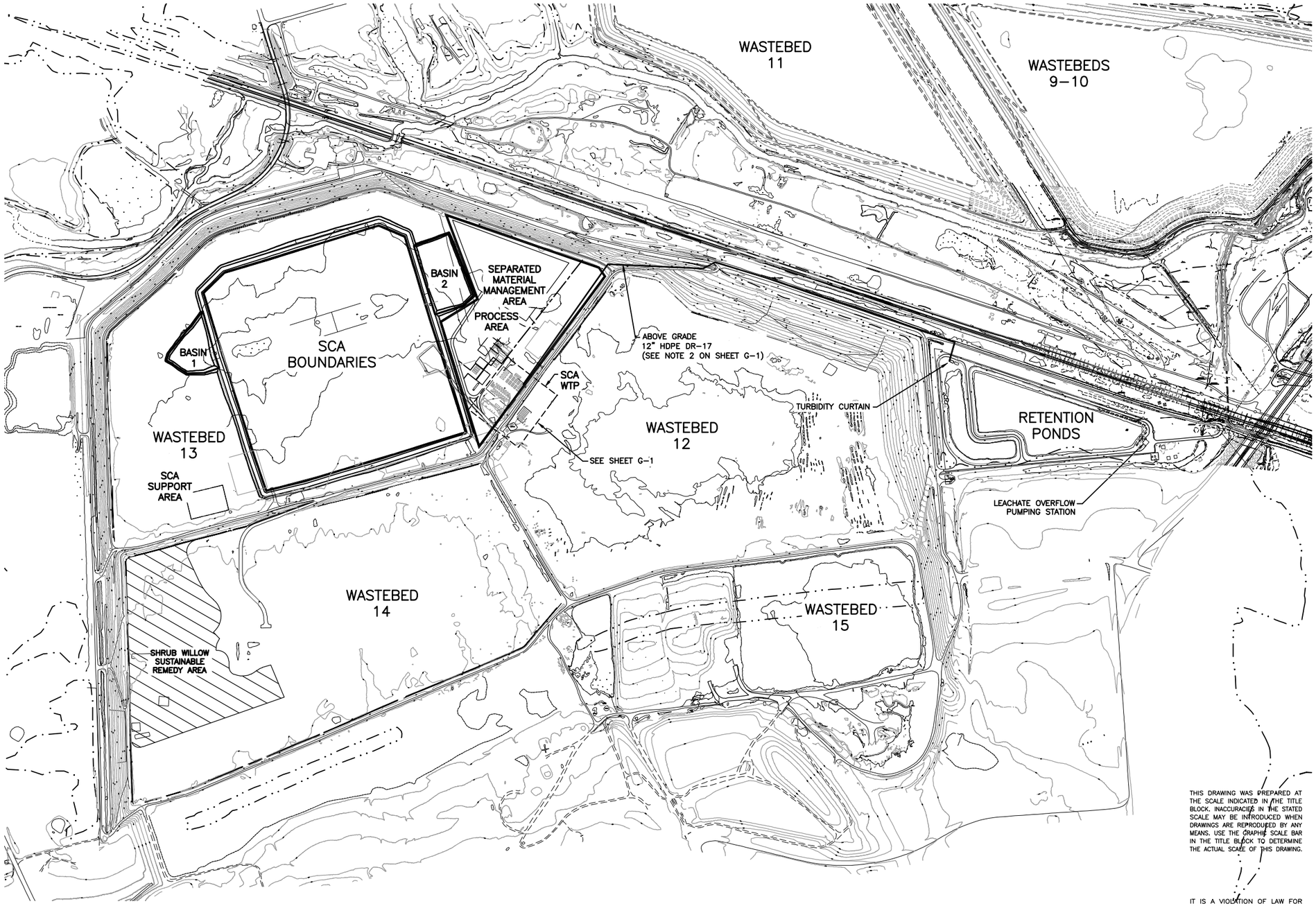
Mar 10, 2010 - 12:32pm



PLAN
SCALE: 1"=400'

NOTES:

1. NEW CONSTRUCTION INCLUDES SCA BOUNDARIES, BASINS 1 & 2, PROCESS AREA, SEPERATED MATERIAL MANAGEMENT AREA, SCA WTP, SCA SUPPORT AREA, AND THE EFFLUENT LINE.

LEGEND

100 YEAR FEMA FLOOD ZONE

NYS FRESHWATER WETLAND

NO.	DATE	REVISION	INIT.
C	3/10/10	DP#1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/5/10	DRAFT FOR PERMIT SUBMISSION	

1"=400' 400 0 400 800

O'BRIEN & GERE ENGINEERS INC.

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 2/12/10

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

OVERALL SITE PLAN

IN CHARGE OF _____
DESIGNED BY ____ CHECKED BY ____
DRAWN BY _____

FILE NO. 1163.45613-SP1
DATE FEBRUARY 2010

SP-1

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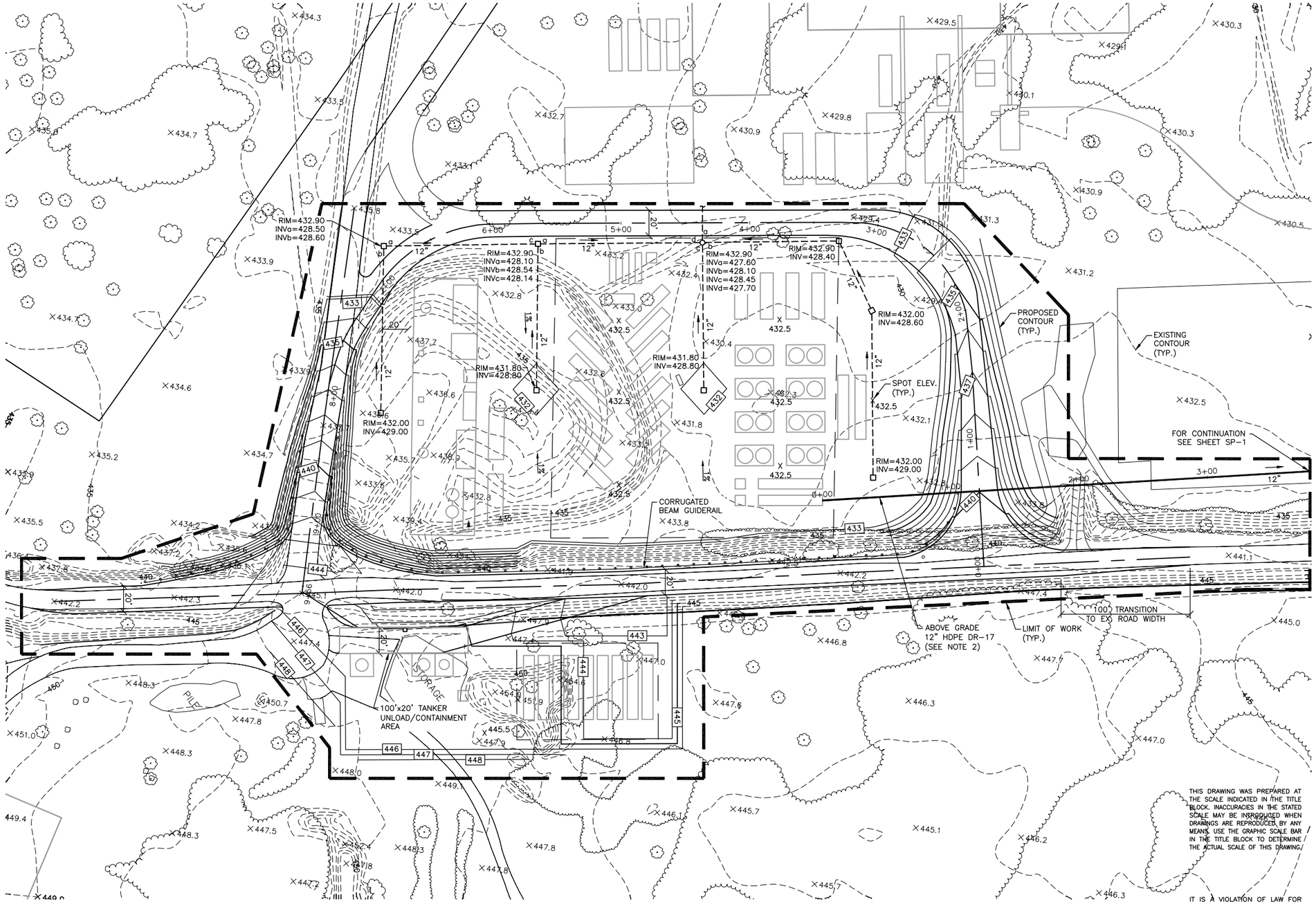

PLAN
SCALE: 1"=40'

1. SEE SHEET GA-1 FOR LABELING OF WATER TREATMENT PLANT EQUIPMENT.
2. 12" HDPE IS A TEMPORARY GRAVITY LINE FOR STORM WATER MANAGEMENT DURING CONSTRUCTION.

446 EXISTING GRADE

437 PROPOSED GRADE

NO.	DATE	REVISION	INIT.
C	3/10/10	DP#1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP#1 DRAFT FOR HONEYWELL REVIEW	
A	2/5/10	DRAFT FOR PERMIT SUBMISSION	

1"=40' 40 0 40 80

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PRELIMINARY
NOT FOR CONSTRUCTION
DATE: 2/12/10

O'BRIEN & GERE ENGINEERS INC.

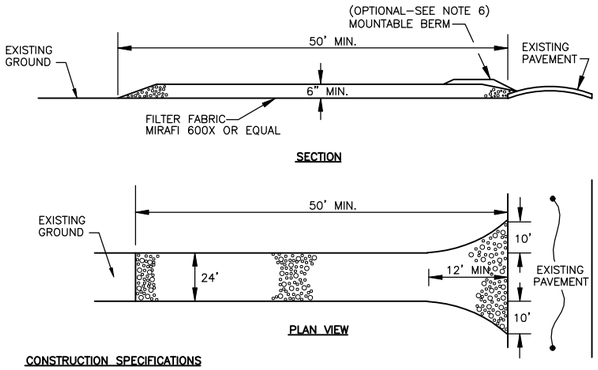
HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

GRADING PLAN

IN CHARGE OF _____
DESIGNED BY _____ CHECKED BY _____
DRAWN BY _____

FILE NO. 1163.45613-G1
DATE FEBRUARY 2010

G-1

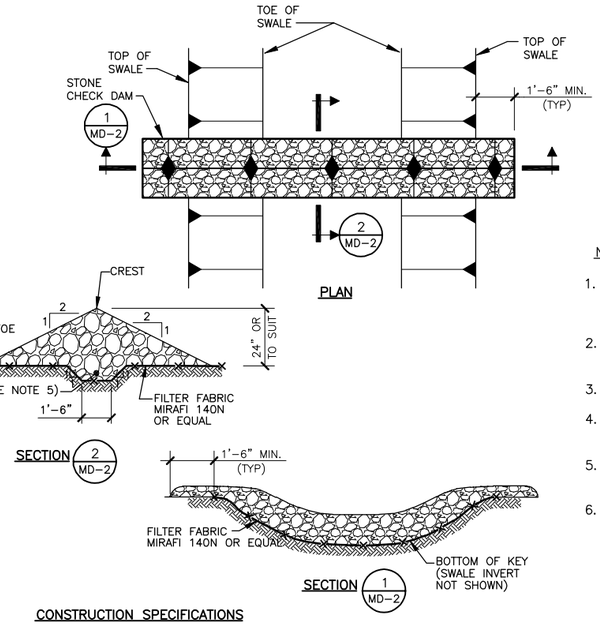


CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – AS REQUIRED, BUT NOT LESS THAN 50 FEET
3. THICKNESS – NOT LESS THAN SIX (6) INCHES
4. WIDTH TWENTY–FOUR (24) FEET MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE EGRESS OCCURS.
5. FILTER FABRIC (MIRAFI 600X OR EQUAL) – SHALL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARDS CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS NOT POSSIBLE, A MOUNTABLE BERM 3' WIDE (MIN.) WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCES SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WASHING – WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS–OF–WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO ADJACENT SEDIMENT BASINS.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PERFORMED IN ACCORDANCE WITH THE PROJECT STORM WATER POLLUTION PREVENTION PLAN.

STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

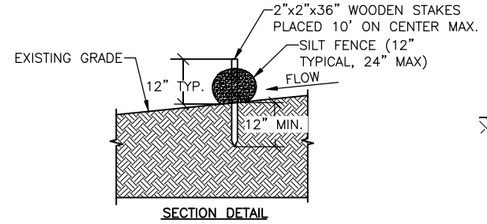


CONSTRUCTION SPECIFICATIONS

1. NYSDOT ITEM 623.12 STONE SHALL BE PLACED ON A FILTER FABRIC FOUNDATION.
2. SET SPACING OF CHECK DAMS SUCH THAT THE ELEVATION OF THE CREST OF THE DOWNSTREAM DAM IS AT THE SAME ELEVATION OF THE TOE OF THE UPSTREAM DAM. MAXIMUM SPACING 300 FEET.
3. EXTEND THE STONE A MINIMUM OF 1.5' BEYOND THE DITCH BANKS TO PREVENT CUTTING AROUND THE DAM.
4. PROTECT THE CHANNEL DOWNSTREAM OF THE LOWEST CHECK DAM FROM SCOUR AND EROSION WITH STONE OR LINER AS APPROPRIATE.
5. KEY SHALL BE 0'–6" DEEP AND LINED WITH FILTER FABRIC FOR FULL LENGTH OF CHECK DAM.

CHECK DAM DETAIL

NOT TO SCALE



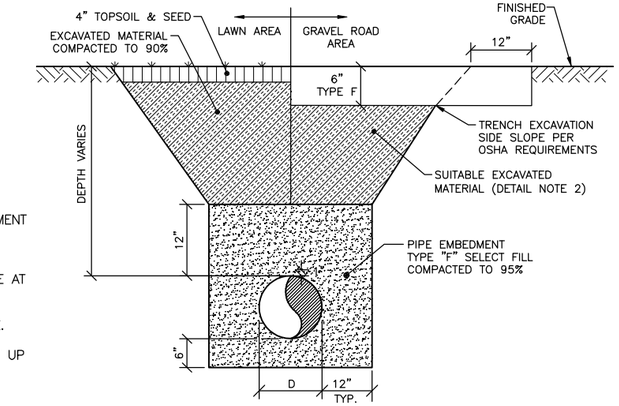
NOTES:

1. USE FILTREXX® SEDIMENT CONTROL SYSTEM BY FILTREXX® LAND IMPROVEMENT SYSTEMS OR APPROVED EQUAL. ONE SUCH APPROVED EQUAL IS MIRAFI ENVIROFENCE.
2. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE SILT FENCE AT 10' INTERVALS MAXIMUM USING HARDWOOD STAKES.
3. SILT FENCE TO BE ALIGNED ALONG CONTOUR AS CLOSELY AS POSSIBLE.
4. BOTH ENDS OF EACH FENCE SECTION MUST EXTEND AT LEAST 10 FEET UP SLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT.
5. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
6. ANY SILT FENCE SECTION WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPAIRED OR REPLACED AT NO ADDITIONAL COST TO THE OWNER.

STANDARD SYMBOL —— SF —— SF

SILT FENCE

NOT TO SCALE

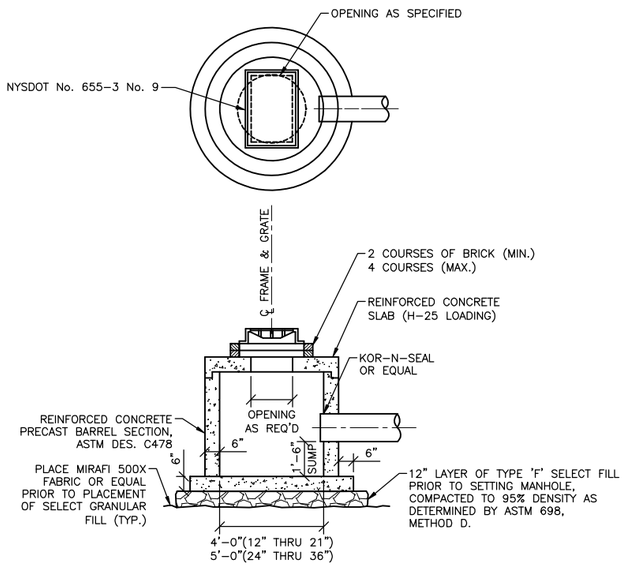


NOTES:

1. CONTRACTOR SHALL RESTORE EXISTING UNIMPROVED SURFACES WITH TOPSOIL AND SEED.
2. EXCAVATED MATERIAL MAY BE USED AS BACKFILL ONLY WHERE APPROVED BY OWNER.

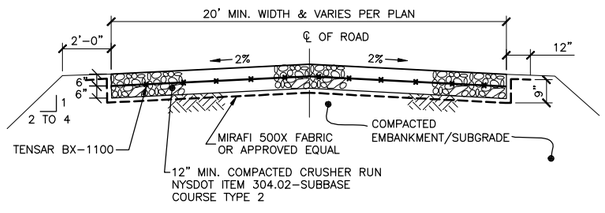
TYPICAL UTILITY TRENCH DETAIL

NOT TO SCALE



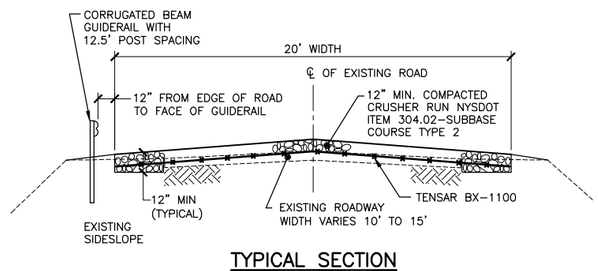
TYPICAL CATCH BASIN DETAIL

NOT TO SCALE



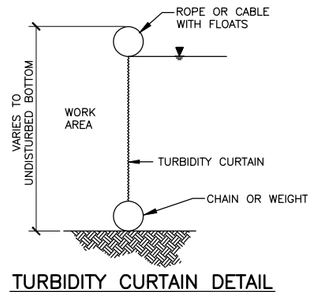
STA. 0+00 TO 3+50
ACCESS ROAD TYPICAL SECTION

NOT TO SCALE



TYPICAL SECTION
SITE ACCESS ROAD WIDENING

NOT TO SCALE



TURBIDITY CURTAIN DETAIL

NOT TO SCALE

DETAIL NOTES:

1. IF A PRE–MANUFACTURED PRODUCT IS USED, THE TURBIDITY CURTAIN SHALL BE INSTALLED PER THE MANUFACTURER'S WRITTEN INSTRUCTIONS, OVERLAPPING AND SECURING SIDE AND ENDS AS REQUIRED.
2. THE HEIGHT OF THE CURTAIN SHALL BE 20% GREATER THAN THE DEPTH OF THE WATER TO ALLOW FOR WATER LEVEL FLUCTUATIONS.
3. IF WATER DEPTH AT THE DESIGN ALIGNMENT IS MINIMAL, THE TOE CAN BE ANCHORED IN PLACE BY STAKING.

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 2/12/10

NO.	DATE	REVISION	INIT.
B	3/10/10	DP#1 FOR NYSDEC AND COUNTY REVIEW	
A	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

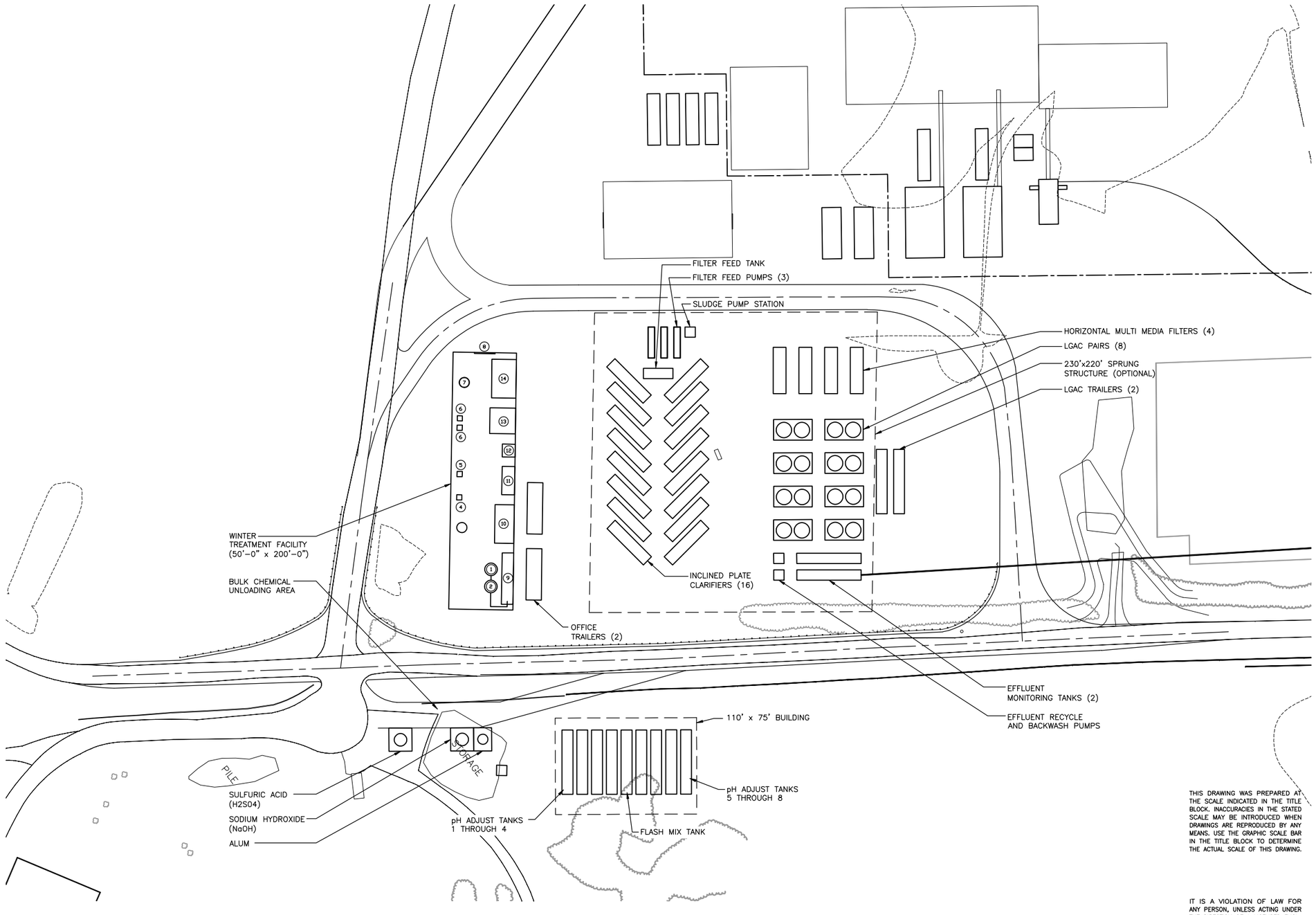
HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

MISCELLANEOUS DETAILS

IN CHARGE OF _____
DESIGNED BY _____ CHECKED BY _____
DRAWN BY _____

FILE NO. 1163.45613–MD1
DATE FEBRUARY 2010

MD–1



SITE PLAN
SCALE: 1"=40'

KEYED NOTES FOR WATER TREATMENT FACILITY:

1. pH ADJUST TANK 1
2. pH ADJUST TANK 2
3. NOT USED
4. ALUM TOTE
5. NaOH TOTE
6. BACKWASH AND EFFLUENT PUMPS
7. TREATED WATER TANK
8. 16'-0" WIDE DOOR
9. FLASH MIX AND FLOCCULATION
10. INCLINED PLATE CLARIFIER
11. FILTER FEED TANK
12. FILTER FEED PUMP
13. MULTI MEDIA FILTER
14. GRANULAR ACTIVATED CARBON

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

1"=40' 40 0 40 80

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PRELIMINARY
NOT FOR CONSTRUCTION
DATE: 3/10/10

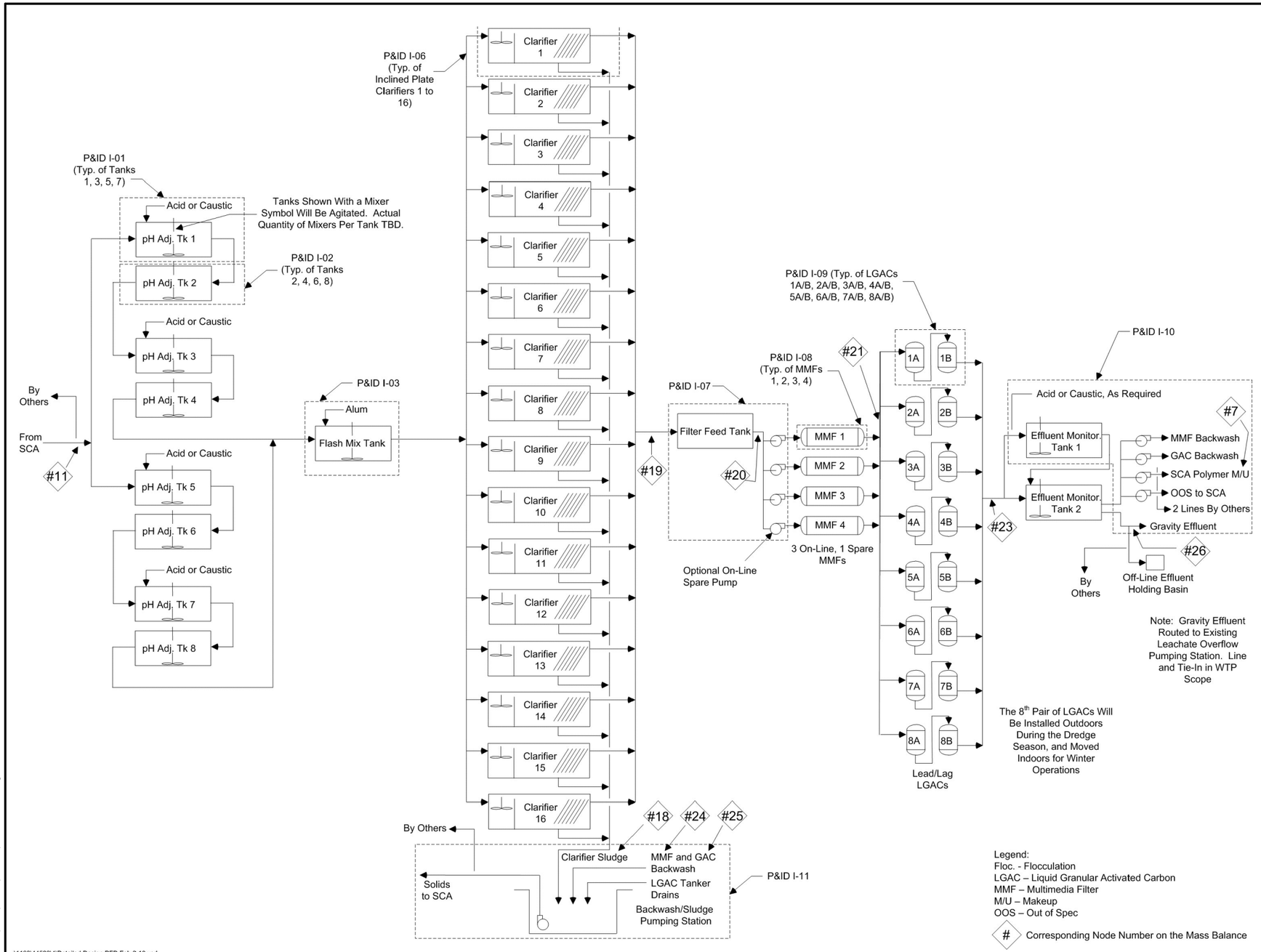
O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

GENERAL
SITE CIVIL
GENERAL ARRANGEMENT

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS
FILE NO. 1163.44523
DATE FEBRUARY 2010
GA-01

Mar 10, 2010 - 11:09am



I:\1163\44523\4\Detailed Design PFD Feb 3 10.vsd

Legend:
Floc. - Flocculation
LGAC – Liquid Granular Activated Carbon
MMF – Multimedia Filter
M/U – Makeup
OOS – Out of Spec

Corresponding Node Number on the Mass Balance

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

NO.	DATE	REVISION	INIT.
B	3/10/10	DP #1 ISSUED FOR NYSDEC AND COUNTY REVIEW	
A	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

MECHANICAL

OUTDOOR TRAINS

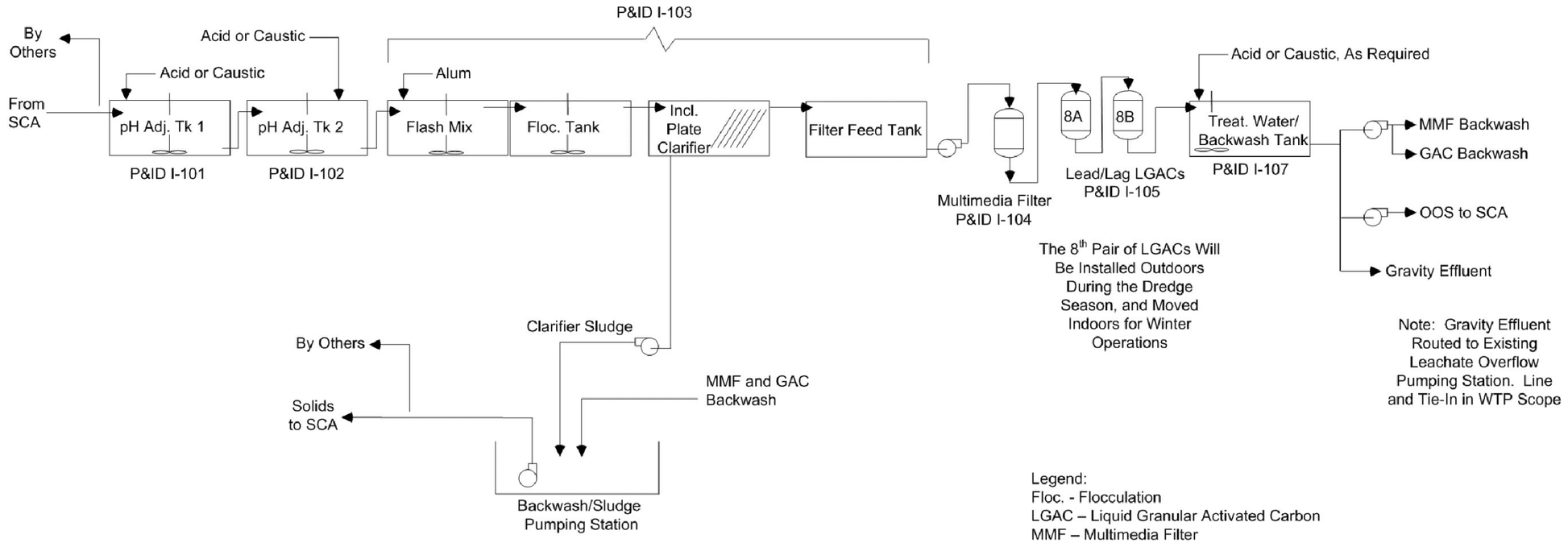
PROCESS FLOW DIAGRAM

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-GA1
DATE FEBRUARY 2010

PFD-1

I:\Honeywell.1163\45613.Sca-Wtp-Detail\Docs\DWG\DP-1\Sheets\44523-PFD1.dwg



P&ID I-11 (Outdoor Trains)

Legend:
Floc. - Flocculation
LGAC – Liquid Granular Activated Carbon
MMF – Multimedia Filter
M/U – Makeup
OOS – Out of Spec

NO.	DATE	REVISION	INIT.
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PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

MECHANICAL

INDOOR TRAIN PROCESS FLOW DIAGRAM

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-GA1
DATE FEBRUARY 2010

PFD-2

Mar 10, 2010 – 12:43pm

Honeywell SCA WTP
Mass Balance Maximum Flow - Based on Phase II Pre-Design Investigation Report - Pre Holding at Peak Flows
Review Rev. 9
3/9/2010

Draft

PARAMETER	Primary Screen Underflow		Combined Recirculation to Geotubes		Recirculation Solids Contribution to Geotubes		Non-Recirc. Liquid Stream to EQ Basin leaving Geotubes		Recirculation Liquid to EQ Basin leaving Geotubes		Total Liquid to EQ Basin		Parson Polymer Makeup		Rain Water to EQ Basin		Internal Reuse from EQ		Accumulation in EQ Basin		pH Adj Tank Influent		H2SO4 Add to pH Adj Tk		NaOH Add to pH Adj Tk		Alum Addn to Floc	
Line Number	1		2		3		4		5		6		7		8		9		10		11		12		13		14	
Column Designation	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr			Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr
GENERAL																												
Flow Rate	---	2,581,564	---	584,663	---	694	---	2,313,795	---	583,969	---	2,897,764	---	87,049	---	70,539	---	51,029	---	75,042	---	2,842,233	---	994.8	---	0.000	---	56.8
Flow Rate (GPM)	---	5,160	---	1,169	---	1.4	---	4,625	---	1,167	---	5,792.3	---	174.0	---	141.0	---	102	---	150	---	5,681	---	1.08	---	0.000	---	0.092
Flow Rate (MGD)	---	7.43	---	1.68	---	0.002	---	6.66	---	1.681	---	8.3	---	0.251	---	0.203	---	0.15	---	0.22	---	8.18	---	0.002	---	0.000	---	0.000
Temp (deg F)	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient
Specific Gravity	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.84	---	1.53	---	1.23
Design pH (S.U.)	11.5 - 12.0	---	9.0 - 10.0	---	6.5 - 7.5	---	11.5 - 12.0	---	9.0 - 10.0	---	10.0 - 11.5	---	---	---	6.5 - 7.5	---	9.0 - 10.0	---	9.0 - 10.0	---	9.0 - 10.0	---	< 1	---	> 13	---	---	---
CATIONS / ANIONS (mg/L)																												
Aluminum	---	---	8.49	4.97	3,605.5	2.50	4.900	11.346	4.220	2.466	4.763	13.81	4.215	0.367	0.0	0.0	4.650	0.24	4.650	0.35	4.773	13.58	0.0	0.0	0.0	0.0	19,930	0.9
Cadmium	---	---	0.005	0.003	0.0	0.000	0.005	0.012	0.005	0.003	0.005	0.015	0.005	0.000	0.0	0.0	0.005	0.000	0.005	0.000	0.005	0.01	0.0	0.0	0.0	0.0	0.0	0.0
Chlorides	---	---	1,193	697.9	0.0	0.000	1,190	2,756	1,194	698	1,191	3,453	1,193	104	0.0	0.0	1,163	59.4	1,163	87.3	1,193	3,394	0.0	0.0	0.0	0.0	0.0	0.0
Chromium	---	---	0.1	0.040	53.9	0.037	0.020	0.046	0.004	0.003	0.017	0.049	0.004	0.000	0.0	0.0	0.016	0.001	0.016	0.001	0.017	0.05	0.0	0.0	0.0	0.0	0.0	0.0
Hex Chromium	---	---	0.005	0.003	0.0	0.000	0.005	0.012	0.005	0.003	0.005	0.015	0.005	0.000	0.0	0.0	0.005	0.000	0.005	0.000	0.005	0.01	0.0	0.0	0.0	0.0	0.0	0.0
Copper	---	---	0.893	0.522	663.6	0.461	0.240	0.556	0.105	0.062	0.213	0.617	0.037	0.003	0.0	0.0	0.208	0.011	0.208	0.016	0.213	0.61	0.0	0.0	0.0	0.0	0.0	0.0
Lead	---	---	0.203	0.119	143.2	0.099	0.070	0.162	0.033	0.019	0.063	0.182	0.026	0.002	0.0	0.0	0.061	0.003	0.061	0.005	0.063	0.18	0.0	0.0	0.0	0.0	0.0	0.0
Mercury	---	---	0.005	0.025	35.1	0.024	0.011	0.025	0.000	0.000	0.009	0.026	0.000	0.000	0.0	0.0	0.009	0.000	0.009	0.001	0.009	0.03	0.0	0.0	0.0	0.0	0.0	0.0
Molybdenum	---	---	3.715	2.174	961.2	0.667	2.700	6.252	2.578	1.506	2.675	7.759	2.412	0.210	0.0	0.0	2.612	0.133	2.612	0.196	2.681	7.63	0.0	0.0	0.0	0.0	0.0	0.0
Nickel	---	---	2.402	1.405	1941.3	1.348	0.670	1.551	0.098	0.057	0.555	1.609	0.078	0.007	0.0	0.0	0.542	0.028	0.542	0.041	0.556	1.58	0.0	0.0	0.0	0.0	0.0	0.0
Silver	---	---	0.005	0.003	0.0	0.000	0.005	0.012	0.005	0.003	0.005	0.015	0.005	0.000	0.0	0.0	0.005	0.000	0.005	0.000	0.005	0.01	0.0	0.0	0.0	0.0	0.0	0.0
Sulfate	---	---	551.0	322.4	0.0	0.00	150.0	347.3	551.6	322.4	230.9	669.7	551.0	48.00	0.0	0.0	225.4	11.51	225.4	16.93	231.4	658.2	1,674,971	906.3	0.0	0.0	70,864	3.3
Zinc	---	---	0.363	0.212	294.6	0.205	0.098	0.227	0.013	0.008	0.081	0.235	0.008	0.001	0.0	0.0	0.079	0.004	0.079	0.01	0.081	0.23	0.0	0.0	0.0	0.0	0.0	0.0
Total Tracked Cations / Anions	---	---	1,760.0	1029.8	7,698.5	5.3	1,348.7	3,123.1	1,752.9	1024.4	1,430.2	4,147.5	1,750.6	152.5	0.0	0.0	1,396.2	71.3	1,396.2	104.9	1,433.1	4,076.2	1,674,971	906.3	0.0	0.0	90,794	4.2
VOC (ug/L)																												
TIO	---	---	15.5	9.1	0.0	0.0	28.0	64.8	15.6	9.1	25.5	73.9	0.026	0.002	0.0	0.0	24.9	1.27	24.89	1.87	25.5	72.7	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL ORGANICS	---	---	15.5	9.1	0.0	0.0	28.0	64.8	15.6	9.1	25.5	73.9	0.026	0.002	0.0	0.0	24.9	1.27	24.89	1.87	25.5	72.7	0.0	0.0	0.0	0.0	0.0	0.0
OTHER																												
TBOD5 (mg/L)	---	---	334.2	195.5	142,147	98.7	170.0	393.7	165.7	96.8	169.1	490.5	131.8	11.5	0.0	0.0	165.1	8.43	165.11	12.40	169.5	482.1	0.0	0.0	0.0	0.0	0.0	0.0
TSS (mg/L)	---	---	991	579.9	666,147	462.6	200.0	463.1	200.0	116.9	200	580.0	2.0	0.2	0.0	0.0	195.2	9.97	195.25	14.66	200.4	570.0	0.0	0.0	0.0	0.0	0.0	0.0
TP (mg/L)	---	---	1.0	0.6	0.0	0.0	0.7	1.7	1.0	0.6	0.8	2.2	0.8	0.1	0.0	0.0	0.8	0.04	0.76	0.06	0.8	2.2	0.0	0.0	0.0	0.0	0.0	0.0
TKN (mg/L)	---	---	61.4	35.9	0.0	0.0	47.0	108.8	61.5	35.9	49.92	144.8	48.9	4.3	0.0	0.0	48.7	2.49	48.74	3.66	50.0	142.3	0.0	0.0	0.0	0.0	0.0	0.0

PARAMETER	Polymer Addn to Floc		Polymer Makeup Water		I.P. Clarifier Influent		I.P. Clarifier Sludge		I.P. Clarifier Effluent		Filter Feed Tank Disch		MMF Effluent		GAC Units		GAC Effluent		Spent MMF B/Wash		Spent GAC B/Wash		Eff. Tanks Discharge		PERMIT LIMIT
Line Number	15		16		17		18		19		20		21		22		23		24		25		26		
Column Designation	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr			Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	Concent.	lb/hr	
GENERAL																									
Flow Rate	---	1.42	---	1,156	---	2,844,441	---	355,555	---	2,488,886	---	2,488,886	---	2,488,886	---	---	---	2,488,886	---	83,172	---	58,887	---	2,258,623	NA
Flow Rate (GPM)	---	0.003	---	2.310	---	5,686	---	710.7	---	4,975	---	4,975	---	4,975	---	---	---	4,975	---	166.3	---	117.7	---	4,515	
Flow Rate (MGD)	---	0.000	---	0.003	---	8.19	---	1.023	---	7.16	---	7.16	---	7.16	---	---	---	7.16	---	0.239	---	0.170	---	6.5	
Temp (deg F)	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	---	Ambient	< 150
Specific Gravity	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	1.00	---	---	---	1.00	---	1.00	---	1.00	---	1.00	
Design pH (S.U.)	6.5 - 7.5	---	9.0 - 10.0	---	8.5-10.5	---	8.5-10.5	---	8.5	---	8.5	---	8.5	---	---	---	9.0 - 10.0	---	8.5	---	9.0 - 10.0	---	9.0 - 10.0	---	5.5-10.5
CATIONS / ANIONS (mg/L)																									
Aluminum	0.0	0.0	4.215	0.005	5.094	14.502	11.251	4.003	4.215	10.498	4.215	10.498	4.215	10.498			4.215	10.498	4.215	0.351	4.2	0.248	4.2	9.5	---
Cadmium	0.0	0.0	0.005	0.000	0.005	0.014	0.005	0.002	0.005	0.012	0.005	0.012	0.005	0.012	---	0.000	0.005	0.012	0.005	0.000	0.005	0.000	0.005	0.011	2.0
Chlorides	0.0	0.0	1,192.8	1.380	1,192.8	3,395.5	1,192.80	424.4	1,192.80	2,971.07	1,192.80	2,971.07	1,192.80	2,971.1	---	0.000	1,192.8	2971.1	1,192.8	99.28	1,193	70.3	1,193	2,696	---
Chromium	0.0	0.0	0.004	0.000	0.017	0.048	0.10	0.025	0.005	0.013	0.005	0.013	0.005	0.013	---	0.000	0.004	0.009	0.004	0.000	0.068	0.004	0.004	0.008	0.3
Hex Chromium	0.0	0.0	0.005	0.000	0.005	0.014	0.005	0.002	0.005	0.012	0.005	0.012	0.005	0.012	---	0.000	0.005	0.012	0.005	0.000	0.005	0.000	0.005	0.011	4.0
Copper	0.0	0.0	0.037	0.000	0.213	0.607	0.661	0.235	0.149	0.372	0.149	0.372	0.149	0.372	---	0.000	0.037	0.093	0.037	0.003	4.8	0.281	0.037	0.084	0.7
Lead	0.0	0.0	0.026	0.000	0.063	0.178	0.238	0.085	0.038	0.094	0.038	0.094	0.038	0.094	---	0.000	0.026	0.066	0.026	0.002	0.503	0.030	0.026	0.060	0.2
Mercury	0.0	0.0	0.000	0.000	0.009	0.025	0.069	0.024	2.651E-04	6.602E-04	2.65E-04	6.60E-04	2.65E-04	6.60E-04	---	0.00040	1.06E-04	2.64E-04	1.06E-04	8.82E-06	1.06E-04	6.25E-06	0.00011	0.00024	0.0002
Molybdenum	0.0	0.0	2.412	0.003	2.680	7.628	2.680	0.953	2.680	6.674	2.680	6.674	2.680	6.674	---	0.000	2.412	6.007	2.412	0.201	13.7	0.810	2.4	5.5	---
Nickel	0.0	0.0	0.078	0.000	0.555	1.581	3.666	1.305	0.111	0.277	0.111	0.277	0.111	0.277	---	0.000	0.078	0.194	0.078	0.006	1.49	0.088	0.08	0.18	0.35
Silver	0.0	0.0	0.005	0.000	0.005	0.014	0.005	0.002	0.005	0.012	0.005	0.012	0.005	0.012	---	0.000	0.005	0.012	0.005	0.000	0.005	0.000	0.005	0.011	1.0
Sulfate	0.0	0.0	551.0	0.637	551.0	1568.4	551.0	196.0	551.0	1372.3	551.0	1372.3	551.0	1372.3	---	0.000	551.0	1372.3	551.0	45.9	551	32.5	551	1245	---
Zinc	0.0	0.0	0.008	0.000	0.081	0.231	0.534	0.190	0.016	0.040	0.016	0.040	0.016	0.040	---	0.000	0.008	0.020	0.008	0.001	0.350	0.021	0.008	0.018	0.4
Total Tracked Cations / Anions	0.0	0.0	1,750.6	2.0	1,752.5	4,988.7	1,763.0	627.3	1,751.0	4,361.4	1,751.0	4,361.4	1,751.0	4,361.4	---	0.000	1,750.6	4,360.3	1,750.6	145.7	1,769	104	1,751	3,957	---
VOC (ug/L)																									
TIO	0.0	0.0	0.026	0.002	25.5	72.7	25.5	9.1	25.5	63.57	25.5	63.6	25.5	63.6	---	63.5	0.026	0.064	0.026	0.002	0.026	0.002	0.026	0.058	0.1
TOTAL ORGANICS	0.0	0.0	0.026	0.002	25.5	72.7	25.5	9.1	25.5	63.57	25.5	63.6	25.5	63.6	---	63.5	0.026	0.064	0.026	0.002	0.026	0.002	0.026	0.058	---
OTHER																									
TBOD5 (mg/L)	0.0	0.0	131.8	11.5	173	493.5	416	148.1	138.7	345.5	138.7	345.5	138.7	345.5	---	0.0	131.8	328.2	131.8	11.0	424.9	25.0	132	298	NA
TSS (mg/L)	0.0	0.0	2.0	0.2	205	584.4	1571	558.9	10.3	25.6	10.3	25.6	5.0	12.5	---	0.0	2.0	5.0	159.6	13.3	128.8	7.6	2.0	4.5	NA
TP (mg/L)	0.0	0.0	0.8	0.07	0.8	2.3	0.8	0.3	0.8	2.0	0.8	2.0	0.8	2.0	---	0.0	0.8	1.9	0.76	0.06	2.4	0.1	0.76	1.7	NA
TKN (mg/L)	0.0	0.0	48.9	4.3	51.5	146.5	51.5	18.3	51.5	128.2	51.5	128.2	51.5	128.2	---	0.0	48.9	121.8	48.9	4.1	157.7	9.3	49	111	NA

Notes:
1. Cadmium, hexavalent chromium and silver were non-detect.
2. Molybdenum data and estimates are provided for informational purposes. A draft permit limit has not been established.
3. The Geotube effluent TSS maximum anticipated value is 200 mg/L.
4. Sludge underflow from the I.P. Clarifier is 12.5% by influent volume.
5. Backwash design frequencies are: 1 time per day for each MMF unit, and 1 time per two-day period for each GAC unit.
6. Nickel removal is anticipated to occur at a pH of 10.5 S.U.
7. Parson's Mass Balance and O'Brien & Gere's Mass Balance correspond as follows: Parson's Node # 4 is equivalent to O'Brien & Gere's Node #16. Parsons Node #9 is equivalent to the sum of O'Brien & Gere Nodes # 18, 24 & 25. Parson's Node # 10 is equival
8. O'Brien & Gere's in scope work for the SCA Water Treatment System begins at Node #11, the pH Adjust Tank Influent. Nodes #1 through #10 are presented for calculation purposes only, and are being addressed by Parsons.

NO.	DATE	REVISION	INIT.
B	3/10/10	DP #1 ISSUED FOR NYSDEC AND COUNTY REVIEW	
A	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	

NOT TO SCALE

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

MECHANICAL

MASS BALANCE

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-GA1
DATE FEBRUARY 2010

PFD-3

I:\Honeywell.1163\45613.Sca--Wtp--Detaile\Docs\DWG\DP--1\Sheets\44523--PFD3.dwg

PIPING SYMBOLS

PIPE LINES

- NEW PIPING
- EXISTING PIPING
- SECONDARY HOSE
- FLUID DESTINATION / CONN. P&ID NO. / (COL., ROW ON CONN. P&ID) — OFF-DRAWING PIPING CONNECTOR
- FL CODE / P&ID — OFF-DRAWING UTILITY CONNECTOR
- TIE-IN POINT
- PIPING AND/OR EQUIPMENT TO BE REMOVED
- M.S. — INDICATES SCOPE BREAK FOR MECHANICAL SUB-CONTRACTOR
- FL CODE / P&ID — OFF-DRAWING DRAIN CONNECTOR

VALVES

- GATE VALVE
- EXTENDED BODY GATE VALVE
- VENT/DRAIN GATE VALVE
- BLANK GATE VALVE
- BUTTERFLY VALVE
- KNIFE GATE VALVE
- SLIDE VALVE
- 3-WAY SLIDE VALVE
- GLOBE VALVE
- ANGLE GLOBE VALVE
- Y GLOBE VALVE
- 3-WAY GLOBE VALVE
- NEEDLE VALVE
- HOSE VALVE
- ANGLE HOSE VALVE
- BALL VALVE
- 3-WAY BALL VALVE
- ANGLE BLOWDOWN VALVE
- Y BLOWDOWN VALVE
- TANK DRAIN VALVE
- PLUG VALVE
- 3-WAY PLUG VALVE
- 4-WAY PLUG VALVE
- DIAPHRAGM VALVE
- PINCH VALVE
- CHECK VALVE
- WAFER CHECK VALVE
- ANGLE CHECK VALVE
- STOP CHECK VALVE
- ANGLE STOP CHECK VALVE
- Y STOP CHECK VALVE
- BACKFLOW PREVENTER
- AUTOMATIC RECIRCULATION VALVE
- MULTIVANE DAMPER OR LOUVER VALVE
- SINGLE DAMPER OR LOUVER VALVE
- ANGLE VALVE
- 3-WAY VALVE
- 4-WAY VALVE
- EXCESS FLOW VALVE
- PULSATION DAMPENERS
- FE — BALANCING VALVE
- LC — FLOAT VALVE
- CSV — CSV CONSERVATION BREATHER VENT
- FLAPPER VALVE
- DIAPHRAGM AIR RELEASE VALVE
- BLAST GATE
- AUTOMATIC AIR RELIEF VALVE

PIPING SEGMENT LABELS

2-XXX-0000-XXX-XX-XX

- HEAT TRACING
- INSULATION PURPOSE
- MATERIAL SPECIFICATION
- LINE NUMBER
- FLUID CODE
- LINE SIZE (IN INCHES)

BOUNDARY LINES

- PACKAGE
- SYSTEM BOUNDARY
- VENDOR

PIPING

MATERIAL	DESIGNATION	PRESSURE RANGE
ALLOY	AL6XN	TBD
COPPER TUBING (TYPE K)	C4	420# AT 250°F
CAST IRON	CI	ATMOS AT AMB
CS	CS1	150# ANSI B16.5
CS	CS2	125# ANSI B16.1
CS	CS3	300# AT 550°F
CS	CS4	AT 350°F
CS	CS5	300# AT 550°F
CS	CS6	SCHED 20
CS	CS7	SCHED 10
SCH80 CPVC	CPVC	100# AT 100°F
DUCTILE IRON	DI	ATMOS AT 75°F
FRP PIPE	FRP	150# AT 100°F
FRP DUCT W/ LINER	FRP2	±" TBD WC
GALVANIZED STEEL	GS	
POLYETHYLENE TUBING	PE	90# AT 73°F
PTFE LINED	PTFE	TBD
SCH80 PVC	PVC	100# AT 100°F
304L S/S TUBING	SS2	1000# AT 150°F
304 S/S	SS1	150# AT 300°F
304 S/S	SS3	150# ANSI B16.5 AT -320°F THRU 120°F
316L S/S TUBING	SS4	125# AT 250°F
316L S/S TUBING	SS5	150# AT 350°F
316L S/S	SS6	150# AT (-)100°F
316 S/S	SS7	150# ANSI B16.5 AT -20°F THRU 100°F
316L S/S CORE W/VAC INSULATION & 304 SS JACKET	SS8	150# AT (-)300°F
316 S/S CS	SS9	SHEETMETAL DUCTING
TEFLON TUBING	TF	75# AT 73°F
SCHED 80 PVC	PVC80	
HDPE DR 32.5	HDPE	

INSULATION PURPOSE DESIGNATIONS

- IC — COLD CONSERVATION/ANTISWEAT
- HC — HEAT CONSERVATION
- IP — PERSONAL PROTECTION

PIPELINE TRACING DESIGNATIONS

- ST — STEAM TRACING
- ET — ELECTRIC TRACING
- CT — COLD FLUID TRACING
- JK — JACKETED PIPE

PIPING FLUID CODE DESIGNATIONS

AIR	—	ATMOSPHERIC AIR
AF	—	ANTIFOAM
BA	—	AERATION AIR
BW	—	BACKWASH WASTE
C125	—	CONDENSATE, 125 PSIG
C50	—	CONDENSATE, 50 PSIG
CH4	—	NATURAL GAS
CHS,-R	—	HVAC CHILLED WATER SUPPLY, RETURN, 42°F
CNTC	—	CONTAMINATED CONDENSATE
COAG	—	COAGULANT
CS	—	CLEAN STEAM
DE	—	DIATOMACEOUS EARTH
DIW	—	DEIONIZED WATER
DNAPL	—	DENSE NON-AQUEOUS PHASE LIQUID
DR	—	DRAIN
FA	—	FERMENTATION AIR
FILTR	—	BFP FILTRATE/FLOOR SUMP
FW	—	FIRE WATER
GW	—	GROUND WATER
H202	—	HYDROGEN PEROXIDE
H2SO4	—	SULFURIC ACID
HYD	—	HYDRAULIC FLUID
IA	—	INSTRUMENT AIR
LNAPL	—	LIGHT NON-AQUEOUS PHASE LIQUID
MACT	—	MACT REGULATED WW
MICRO	—	MICRONUTRIENT
N2G,-L	—	NITROGEN GAS, LIQUID
NaOCL	—	SODIUM HYPOCHLORITE
NAOH	—	SODIUM HYDROXIDE SOL'N
P	—	PROCESS
PA	—	PLANT AIR
PC	—	PROCESS CHEMICAL
PHOS	—	PHOSPHORIC ACID
POLY	—	POLYMER
POLY A	—	POLYMER (ANIONIC)
POLY C	—	POLYMER (CATIONIC)
PS	—	PROCESS SEWER
PV	—	PROCESS VACUUM
PW	—	PLANT WATER
RF	—	REFRIGERENT
S125	—	STEAM, 125 PSIG
S40	—	STEAM, 40 PSIG
SA	—	STERILE AIR
SAN	—	SANITARY SEWER
SEQ	—	SEQUESTERING AGENT
SF	—	SEAL FLUID
SL	—	SCRUBBER LIQUOR
SLUDGE	—	SLUDGE
SOL	—	SOLVENT
SW	—	STORM WATER
THIO	—	SODIUM THIOSULFATE
TRWW	—	TREATED WASTEWATER
TWS,-R	—	TOWER WATER SUPPLY,-RETURN
UR	—	UREA
VOC	—	VAPOR ORGANIC COMPOUNDS
VT	—	VENT
WAS	—	WASTE ACTIVATED SLUDGE DOMESTIC WATER
WD,-CW-	—	SUPPLY,-RETURN
WDH	—	HOT DOMESTIC WATER
WFI	—	WATER FOR INJECTION
WFIS	—	PURE STEAM
WP	—	PROCESS WATER
WPH	—	HOT PROCESS WATER
WPUR	—	PURIFIED WATER
WW	—	WASTE WATER

FITTINGS

- FLANGE
- ORIFICE FLANGE
- FIX UNION
- BLIND FLANGE
- OPEN SPECTACLE BLANK
- CLOSE SPECTACLE BLANK
- SPACER
- PADDLE BLANK
- PLUG
- CAP
- CONCENTRIC REDUCER
- ECCENTRIC REDUCER (FLAT ON TOP)
- HOSE CONNECTION
- TRICLAMP STERILE CONNECTION
- INGOLD CONNECTION W/TRICLAMP
- SLIP ON HOSE CONNECTION
- BAYONET CONNECTION FOR TUBING
- FLEX CONNECTOR
- QUICK CONNECTION
- CLEANOUT
- HARNESSED COUPLING

SPECIALITY

- WEATHER CAP
- EXPANSION JOINT
- Y STRAINER
- T — STEAM TRAP
- PULSATION DAMPENER
- CALIBRATION TUBE
- SNUBBER
- FILTER
- FILTER/REGULATOR/GAUGE
- EJECTOR
- CHEMICAL SEAL
- DRAIN
- MUFFLER

PUMP SEAL TYPES

SEAL TYPE 1	SINGLE MECHANICAL SEAL, NO FLUID FLUSH
SEAL TYPE 2	SINGLE SEAL OR PACKING, FLUSH LIQUID FROM PUMP DISCHARGE
SEAL TYPE 3	SINGLE SEAL OR PACKING, EXTERNAL FLUSH LIQUID
SEAL TYPE 4	DOUBLE MECHANICAL SEAL, FLUSH EXTERNAL FLUSH LIQUID
SEAL TYPE 5	DOUBLE MECHANICAL SEAL, FLUSH LIQUID FROM PUMP DISCHARGE
SEAL TYPE 6	SEAL-LESS PUMP
SEAL TYPE 7	DOUBLE SEAL, FLUSH LIQUID FROM LOCAL CONTAINER
SEAL TYPE 8	DOUBLE SEAL FOR AGITATOR WITH PRESSURE CONVECTION COOLER
SEAL TYPE 9	DRY SEAL

EQUIPMENT SYMBOL

- CENTRIFUGAL FAN
- M — CENTRIFUGAL PUMP
- DIAPHRAGM OR TUBULAR METERING PUMP
- M — MIXER OR FLOCCULATOR WITH ELECTRIC MOTOR

EQUIPMENT SYMBOL

- PROCESS VESSEL (NON-PRESSURIZED)
- PROCESS VESSEL (PRESSURIZED)
- AIR OPERATED DIAPHRAM (AOD) PUMP
- ROTARY LOBE PUMP
- ROTARY POSITIVE DISPLACEMENT BLOWER
- EJECTOR/EDUCTOR
- PERISTALTIC PUMP
- SPILL TRAY

SIGNAL LINES

- CONNECTION TO PROCESS LINE
- CAPILLARY TUBE
- ELECTRIC
- PNEUMATIC
- HYDRAULIC
- SOFTWARE OR DATA LINK
- MECHANICAL LINK

CONTROL VALVES AND REGULATORS

- SELF CONTAINED PRESSURE REDUCING REGULATOR
- PRESSURE REDUCING REGULATOR WITH EXTERNAL TAP
- PRESSURE REDUCING REGULATOR WITH INTEGRAL OUTLET PRESSURE RELIEF VALVE
- SELF CONTAINED BACKPRESSURE REGULATOR
- BACKPRESSURE REGULATOR WITH EXTERNAL TAP
- DIFFERENTIAL PRESSURE REDUCING REGULATOR WITH INTERNAL AND EXTERNAL TAPS
- FILLED SYSTEM TEMPERATURE REGULATOR
- LEVEL REGULATOR WITH MECHANICAL LINKAGE
- INSTRUMENT AIR SUPPLY WITH REGULATOR
- ON/OFF FLOW CONTROL VALVE (PNEUMATIC ACT. W/ SPRING RETURN)
- E — ON/OFF FLOW CONTROL VALVE (ELECTRIC ACT. W/ SPRING RETURN)

RELIEF DEVICES

- ANGLE PRESSURE RELIEF VALVE
- STRAIGHT-THRU PRESSURE RELIEF VALVE OR CONSERVATION VENT
- VACUUM RELIEF VALVE OR CONSERVATION VENT
- PRESSURE AND VACUUM RELIEF VALVE
- PRESSURE AND VACUUM RELIEF MANHOLE COVER
- PRESSURE RELIEF RUPTURE DISK
- VACUUM RELIEF RUPTURE DISK
- TEMPERATURE FUSIBLE PLUG OR DISK

PIPING SEGMENT LABELS

- FLAME ARRESTOR
- DETONATION FLAME ARRESTER
- HAMMER ARRESTOR
- EXHAUST HEAD
- BREATHER CAP
- WEATHER CAP
- WEATHER CAP
- MIXING TEE
- SPRAY NOZZLE
- RS — REMOVABLE SPOOL
- SWING ELBOW
- EXPANSION JOINT
- MOTOR
- DRESSER COUPLING
- FLEXIBLE HOSE
- SAMPLE COOLER
- CARTRIDGE FILTER
- TWIN BASKET STRAINER
- T STRAINER
- Y STRAINER
- BASKET STRAINER
- CONE STRAINER
- FLAT PLATE STRAINER
- SUMP STRAINER
- FILTER
- STILLING WELL WITH PROBE INSERT
- VB — VACUUM BREAKER
- T — STEAM TRAP
- IBT — INVERTED BUCKET STEAM TRAP
- TST — THERMOSTATIC STEAM TRAP
- TDT — THERMODYNAMIC STEAM TRAP
- IT — IMPULSE STEAM TRAP
- GENERIC COMPONENT
- T1 — STEAM TRAP ASSEMBLY INCLUDING STRAINER, BLOCK VALVES AND BYPASS WITH VALVE CARBON STEEL
- T2 — STEAM TRAP ASSEMBLY STAINLESS STEEL
- S — SAMPLE PROBE
- SECONDARY CONTAINMENT
- HT — INSULATED, HEAT TRACED
- INSULATED
- STATIC MIXER

LETTER DESIGNATION OF EQUIPMENT

AG	AGITATOR
BL	BLOWER / FAN
CE	CENTRIFUGE
CF	CHEMICAL FEED UNIT
CMP	COMPRESSOR
CV	CHEMICAL VESSEL
D	SCRUBBER
DE	DECANTER
FP	FILTER PRESS
GAC	GRANULAR ACTIVATED CARBON VESSEL
GR	GRINDER
HP	HYDRAULIC PUMP
IE	ION EXCHANGE
IPC	INCLINED PLATE CLARIFIER
LGAC	LIQ. PHASE GRANULAR ACTIVATED CARBON UNITS
MH	MAINTENANCE SHOP HAND HOIST
MIX	MIXER
MMF	MULTIMEDIA FILTER VESSEL
PB	POLYMER BLENDING
PLF	PRESSURE LEAF FILTER
PM	PIPING MANIFOLD
PU	PUMP
R	REACTOR
RTO	REGENERATIVE THERMAL OXIDIZER
SK	SPRAY COOLER
SI	SILENCER
SM	STATIC MIXER
SP	COMPOSITE SAMPLER
ST	AIR STRIPPER
STI	STEAM INJECTOR
T	TANK
TB	TOTE
TD	ELECTRIC HOIST
TK	PROCESS VESSEL
TZ	DIESEL GENERATOR
VGAC	VAPOR PHASE CARBON UNIT
W	ROLLOFF WINCH
X	FUME HOOD
ZZ	LAB INSTRUMENTS

LETTER DESIGNATION OF VALVES

- ARV — AUTOMATIC AIR RELIEF VALVE
- BPV — BACK PRESSURE VALVE
- CKV — CHECK VALVE
- HV — HAND VALVE
- FCV — FLOW CONTROL VALVE
- FV — FLOW VALVE
- LCV — LEVEL CONTROL VALVE
- PRV — PRESSURE REDUCING VALVE
- PSV — PRESSURE RELIEF VALVE
- TCV — TEMPERATURE CONTROL VALVE
- VRV — VACUUM RELIEF VALVE

EQUIPMENT NUMBER IDENTIFICATION

Equipment Tag Numbering:
***-XXYYA, where:

***	Letter designation of equipment, may be fewer or more than 3 letters (e.g., T indicates tank). Refer to the Lead Sheets for list of letter designations for equipment.
XX	Subsystem number, two digits (e.g., 03 indicates Flash Mixing). Refer to the Lead Sheets for list of numerical designations for subsystems.
YY	Sequential numbering for identical equipment items, two digits (e.g., 01 indicates the equipment or tank is the first of one or more identical units).
A, B, C, or D, etc.	Additional categorization, where required, for duplicate items (e.g., MIX-0301C would indicate the mixer is the third identical unit within the first Flash Mixing Tank). This letter will be left blank if there is only one mixer in the tank.

Subsystem Number	Subsystem
01	pH Adjustment (Rough)
02	pH Adjustment (Fine)
03	Flash Mix
04	Flocculation
05	Distribution Box
06	Clarification
07	Filter Feed
08	Multimedia Filtration
09	GAC Adsorption
10	Effluent Monitoring
11	Sludge Holding and Transfer
12	Sodium Hydroxide (Caustic)
13	Sulfuric Acid and Bulk Unloading
14	Aluminum Sulfate (Alum)
15	Plant Water
16	Compressed Air
17	Miscellaneous

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

NOT TO SCALE

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

LEGEND & SYMBOLS

IN CHARGE OF _____
DESIGNED BY _____ CHECKED BY _____
DRAWN BY _____

FILE NO. 1163.44523
DATE FEBRUARY 2010

I-A

Mar 10, 2010 - 11:04am

I:\Honeywell 1163\45613.Sco-Wtp-Details\Docs\DWG\DP-1\Sheets\44523-I-A.dwg Mar 10, 2010 - 11:04am

SYMBOLS

IN-LINE INSTRUMENTS

- ORIFICE PLATE
- ORIFICE PLATE IN QUICK CHANGE FITTING
- FLOW NOZZLE
- VENTURI TUBE
- SINGLE PORT PITOT TUBE
- PITOT-VENTURI TUBE
- AVERAGING PITOT TUBE
- VALVE WITH RESTRICTION ORIFICE

IN-LINE INSTRUMENTS

- ROTAMETER WITHOUT ADJUSTABLE VALVE
- ROTAMETER WITH ADJUSTABLE VALVE
- FLOW GAUGE
- POSITIVE DISPLACEMENT FLOW SENSOR
- TARGET FLOW SENSOR
- TURBINE OR PROPELLER FLOW SENSOR
- VORTEX FLOW SENSOR
- ULTRASONIC FLOW SENSOR
- MASS FLOW SENSOR
- MAGNETIC FLOW TUBE
- FLUME
- WEIR
- SEGMENTAL WEDGE
- FLOW STRAIGHTENING VANE
- ORIFICE PLATE WITH FLANGES
- CALIBRATION CYLINDER
- SIGHT FLOW INDICATOR
- PULSATION DAMPENER
- ORIFICE PLATE W/FLANGES

INSTRUMENT COMPONENT LABELS

- BALLOON WITH TAG NUMBER
- EXISTING
- TOP MOUNTED ACCESSORY
- SIDE MOUNTED ACCESSORY
- DIAPHRAGM ACTUATOR
- PRESSURE-BALANCED DIAPHRAGM ACTUATOR
- 2-WAY SOLENOID VALVE
- ANGLE SOLENOID VALVE
- 3-WAY SOLENOID VALVE
- POSITIONER ACCESSORY
- INTERLOCK WITH IDENTIFICATION NUMBER
- CAPACITANCE SENSOR ACCESSORY
- BALL FLOAT ACCESSORY
- DISPLACEMENT FLOAT ACCESSORY
- DUAL-FLOAT ACCESSORY
- DIAPHRAGM SEAL ACCESSORY
- PADDLE WHEEL ACTUATOR
- SHEET NUMBER
- I-XX / TAG# — SIGNAL CONTINUATION
- CORESPONDING INSTRUMENT
- OPERATOR STATION INDICATOR/CONTROL
- AI — PLC ANALOG INPUT
- DI — PLC DIGITAL INPUT
- AO — PLC ANALOG OUTPUT
- DO — PLC DIGITAL OUTPUT

INSTRUMENT COMPONENT LABELS

- I/P — CONVERTS ELECTRICAL INPUT TO PNEUMATIC
- LEVEL SWITCH (FLOAT TYPE)
- ZS — POSITION SWITCH
- ZSC — POSITION SWITCH CLOSED
- ZSO — POSITION SWITCH OPEN
- ZI — POSITION INDICATOR

ELECTRIC SWITCH DESIGNATION

- HS – HAND SWITCH
- HPS – HAND PNEUMATIC SWITCH
- HOA – HAND OFF AUTOMATIC SWITCH
- PB – PUSH BUTTON
- PBL – PUSH BUTTON W/LIGHT
- PB2 – TWO PUSH BUTTONS
- PB2L – TWO PUSH BUTTONS W/LIGHT
- SS – SELECTOR SWITCH
- OCA – OPEN CLOSED AUTO

OFF-LINE INSTRUMENTS

- FIELD MOUNTED INSTRUMENT
- DISCRETE INSTRUMENT PRIMARY LOCATION ACCESSIBLE TO OPERATOR
- DISCRETE INSTRUMENT AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR
- SINGLE FUNCTION INSTRUMENT LOCATED IN LOCAL CONTROL ROOM OR BACKUP PANEL (NOT NORMALLY ACCESSABLE) REAR OF PANEL
- SHARED DISPLAY/CONTROL FUNCTION, PRIMARY LOCATION ACCESSIBLE TO OPERATOR
- SHARED DISPLAY/CONTROL FUNCTION, AUXILIARY LOCATION ACCESSIBLE TO OPERATOR
- PROGRAMMABLE LOGIC CONTROL FUNCTION, PRIMARY LOCATION ACCESSIBLE TO OPERATOR
- PROGRAMMABLE LOGIC CONTROL FUNCTION, AUXILIARY LOCATION ACCESSIBLE TO OPERATOR
- PROGRAMMABLE LOGIC CONTROL FUNCTION, FIELD MOUNTED
- FIELD INDICATION LIGHT
- PANEL MOUNTED INDICATION LIGHT

INSTRUMENT IDENTIFICATION

PIC – XXX YY A

- A — SUFFIX IF REQUIRED
- YY — SEQUENTIAL No. ON P&ID
- XXX — No. OF P&ID ON WHICH INSTRUMENT APPEARS
- PIC — MEASURED VARIABLE AND INSTRUMENT FUNCTION

PANEL IDENTIFICATION

XXX A B

- B — ALPHA SUFFIX
- A — ASSOCIATED LOCAL CONTROL ROOM
- XXX — PANEL TYPE

PANEL TYPES :

- MBP – MANUAL BACKUP PANEL (HPS & HIC)
- DIP – DIGITAL INDICATOR PANEL (LCD'S)
- CVIB – CONTROL VALVE INTERFACE BOX (EV'S & I/P)
- MP – MARSHALLING PANEL
- TTP – TEMPERATURE TRANSMITTER PANEL

LETTER IDENTIFICATION OF INSTRUMENTS

	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	USER'S CHOICE			CONTROL	
D	USER'S CHOICE	DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	USER'S CHOICE	MOMENTARY			MIDDLE, INTERMEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED	X AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

NO.	DATE	REVISION	INIT.
B	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
A	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	

NOT TO SCALE

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

LEGEND & SYMBOLS

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523
DATE FEBRUARY 2010

I-B

Mar 10, 2010 - 11:05am

Honeywell
SCA WTP
Draft Interlock List
9-Mar-10

Interlock No.	P&ID(s)	Description
		Outdoor Treatment Trains
1	I-01	At a high-high (HH) influent turbidity, as indicated by AE/AIT-00, WTP influent valve FV-02 will automatically close. Coordinate with the SCA project, to determine if a valve position signal can be used to shut down the SCA discharge pumps.
2	I-01, I-14, I-15	At a low (L) liquid level in pH Adjust Tank #1 (T-0101), as indicated by LSL/LAL-0101-00, Mixers MIX-0101A, 0101B, 0101C, and 0101D will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1201 and CF-1301, respectively. Shut FCV-00 on I-01.
3	I-01, I-14, I-15	At a high (H) liquid level in pH Adjust Tank #1 (T-0101), as indicated by LSH/LAH-0101-00, tank influent valve FCV-00 will automatically close. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1201 and CF-1301, respectively. Coordinate with the SCA project, to determine if a valve position signal can be sent to SCA to reduce pumping (i.e., WTP could continue to receive one-half flow to pH Adjust Tank #5)
4	NA (Pertains to pH Adjust Tank #5), I-14, I-15	At a low (L) liquid level in pH Adjust Tank #5 (T-0105), as indicated by LSL/LAL-0105-00, Mixers MIX-0105A, 0105B, 0105C, and 0105D will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1203 and CF-1303, respectively.
5	NA (Pertains to pH Adjust Tank #5), I-01, I-14, I-15	At a high (H) liquid level in pH Adjust Tank #5 (T-0105), as indicated by LSH/LAH-0105-00, tank influent valve FCV-01 will automatically close. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1203 and CF-1303, respectively. Coordinate with the SCA project, to determine if a valve position signal can be sent to SCA to reduce pumping (i.e., WTP could continue to receive one-half flow to pH Adjust Tank #1)
6	I-01, I-02	At a low (L) liquid level in pH Adjust Tank #2 (T-0102), as indicated by LSL/LAL-0102-00, Mixers MIX-0102A, 0102B, 0102C, and 0102D will automatically shut down. Also shut FCV-00 on I-01 to prevent additional leakage.
7	NA (Pertains to pH Adjust Tank #3), I-14, I-15	At a low (L) liquid level in pH Adjust Tank #3 (T-0103), as indicated by LSL/LAL-0103-00, Mixers MIX-0103A, 0103B, 0103C, and 0103D will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1202 and CF-1302, respectively.
8	NA (Pertains to pH Adjust Tank #4)	At a low (L) liquid level in pH Adjust Tank #4 (T-0104), as indicated by LSL/LAL-0104-00, Mixers MIX-0104A, 0104B, 0104C, and 0104D will automatically shut down.
9	NA (Pertains to pH Adjust Tank #6)	At a low (L) liquid level in pH Adjust Tank #6 (T-0106), as indicated by LSL/LAL-0106-00, Mixers MIX-0106A, 0106B, 0106C, and 0106D will automatically shut down.
10	NA (Pertains to pH Adjust Tank #7), I-14, I-15	At a low (L) liquid level in pH Adjust Tank #7 (T-0107), as indicated by LSL/LAL-0107-00, Mixers MIX-0107A, 0107B, 0107C, and 0107D will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1204 and CF-1304, respectively.
11	NA (Pertains to pH Adjust Tank #8)	At a low (L) liquid level in pH Adjust Tank #8 (T-0108), as indicated by LSL/LAL-0108-00, Mixers MIX-0108A, 0108B, 0108C, and 0108D will automatically shut down.
12	I-01, and NA (Pertains to pH Adjust Tank #4)	At a high-high (HH) or low-low (LL) pH in pH Adjust Tank #4 (T-0104), as indicated by AE/AIT/AIC-0104-00, pH Adjust Tank #1 influent valve FCV-00 will close
13	I-01, and NA (Pertains to pH Adjust Tank #8)	At a high-high (HH) or low-low (LL) pH in pH Adjust Tank #8 (T-0108), as indicated by AE/AIT/AIC-0108-00, pH Adjust Tank #5 influent valve FCV-01 will close
14	I-01, I-16	At a low alum flow from CF-1401, as indicated by FSL/FAL-00, pH Adjust Tank #1 influent valve FV-02 will close
15		Deleted
16	I-01, I-06	At a low liquid level in Inclined Plate Clarifier #1, as indicated by LSL/LAL-0601-00, Clarifier Sludge Valve #1 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
17	NA (Pertains to Inclined Plate Clarifier #2)	At a low liquid level in Inclined Plate Clarifier #2, as indicated by LSL/LAL-0602-00, Clarifier Sludge Valve #2 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
18	NA (Pertains to Inclined Plate Clarifier #3)	At a low liquid level in Inclined Plate Clarifier #3, as indicated by LSL/LAL-0603-00, Clarifier Sludge Valve #3 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
19	NA (Pertains to Inclined Plate Clarifier #4)	At a low liquid level in Inclined Plate Clarifier #4, as indicated by LSL/LAL-0604-00, Clarifier Sludge Valve #4 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
20	NA (Pertains to Inclined Plate Clarifier #5)	At a low liquid level in Inclined Plate Clarifier #5, as indicated by LSL/LAL-0605-00, Clarifier Sludge Valve #5 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
21	NA (Pertains to Inclined Plate Clarifier #6)	At a low liquid level in Inclined Plate Clarifier #6, as indicated by LSL/LAL-0606-00, Clarifier Sludge Valve #6 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
22	NA (Pertains to Inclined Plate Clarifier #7)	At a low liquid level in Inclined Plate Clarifier #7, as indicated by LSL/LAL-0607-00, Clarifier Sludge Valve #7 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
23	NA (Pertains to Inclined Plate Clarifier #8)	At a low liquid level in Inclined Plate Clarifier #8, as indicated by LSL/LAL-0608-00, Clarifier Sludge Valve #8 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
24	NA (Pertains to Inclined Plate Clarifier #9)	At a low liquid level in Inclined Plate Clarifier #9, as indicated by LSL/LAL 0609-00, Clarifier Sludge Valve #9 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
25	NA (Pertains to Inclined Plate Clarifier #10)	At a low liquid level in Inclined Plate Clarifier #10, as indicated by LSL/LAL-0610-00, Clarifier Sludge Valve #10 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
26	NA (Pertains to Inclined Plate Clarifier #11)	At a low liquid level in Inclined Plate Clarifier #11, as indicated by LSL/LAL-0611-00, Clarifier Sludge Valve #11 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
27	NA (Pertains to Inclined Plate Clarifier #12)	At a low liquid level in Inclined Plate Clarifier #12, as indicated by LSL/LAL-0612-00, Clarifier Sludge Valve #12 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
28	NA (Pertains to Inclined Plate Clarifier #13)	At a low liquid level in Inclined Plate Clarifier #13, as indicated by LSL/LAL-0613-00, Clarifier Sludge Valve #13 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
29	NA (Pertains to Inclined Plate Clarifier #14)	At a low liquid level in Inclined Plate Clarifier #14, as indicated by LSL/LAL-0614-00, Clarifier Sludge Valve #14 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
30	NA (Pertains to Inclined Plate Clarifier #15)	At a low liquid level in Inclined Plate Clarifier #15, as indicated by LSL/LAL-0615-00, Clarifier Sludge Valve #15 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
31	NA (Pertains to Inclined Plate Clarifier #16)	At a low liquid level in Inclined Plate Clarifier #16, as indicated by LSL/LAL-0616-00, Clarifier Sludge Valve #16 (FV) will close. Close FV-02 on I-01. Shut off Floc Mixer.
32		Deleted
33	I-01, I-06	At a high (H) level in Inclined Plate Clarifier #1, as indicated by LSH/LAH-0601-00, influent valve FV-02 (on I-01) will close. Typical of the other Clarifiers. Provide interlock numbers for each Clarifier.
34	I-07	A low-low (LL) liquid level in the Filter Feed Tank, as indicated by LIT-0701-00, LIT-0701-01, or LSLL-0701-00, will shut down Multimedia Feed Pumps PU-0701, PU-0702, PU-0703, and PU-0704.
35	I-07	A low flow rate, as indicated by FSL/FAL-01, will shut down Multimedia Feed Pump #1 (PU-0701)
36	I-07	A low flow rate, as indicated by FSL/FAL-02, will shut down Multimedia Feed Pump #2 (PU-0702)
37	I-07	A low flow rate, as indicated by FSL/FAL-03, will shut down Multimedia Feed Pump #3 (PU-0703)
38	I-07	A low flow rate, as indicated by FSL/FAL-04, will shut down Multimedia Feed Pump #4 (PU-0704)
39	I-08	A high-high (HH) differential pressure across Multimedia Filter #1 (MMF-0801), as indicated by PDIT-0801-00, will start the idled spare Multimedia Filter and corresponding Multimedia Feed Pump, and shut the valve(s) feeding Multimedia Filter #1.
40	NA (Pertains to Multimedia Filter #2)	A high-high (HH) differential pressure across Multimedia Filter #2 (MMF-0802), as indicated by PDIT-0802-00, will start the idled spare Multimedia Filter and corresponding Multimedia Feed Pump, and shut the valve(s) feeding Multimedia Filter #2.
41	NA (Pertains to Multimedia Filter #3)	A high-high (HH) differential pressure across Multimedia Filter #3 (MMF-0803), as indicated by PDIT-0803-00, will start the idled spare Multimedia Filter and corresponding Multimedia Feed Pump, and shut the valve(s) feeding Multimedia Filter #3.
42	NA (Pertains to Multimedia Filter #4)	A high-high (HH) differential pressure across Multimedia Filter #4 (MMF-0804), as indicated by PDIT-0804-00, will start the idled spare Multimedia Filter and corresponding Multimedia Feed Pump, and shut the valve(s) feeding Multimedia Filter #4.
43	I-01, I-08	A high-high (HH) turbidity at the combined Multimedia Filter outlet, as indicated by AE/AIT-0801-00, will shut the influent feed valve FV-02.
44	I-08, I-09	A high-high differential pressure across LGAC-0901A/B, as indicated by PDIT-0901-00, will shut down the corresponding LGAC feed valve (FCV-0901-00 on P&ID I-08). Provide interlock numbers for each LGAC pair.
45	I-10, I-15	At a low liquid level in Effluent Monitoring Tank #1 or #2 (T-1001 or T-1002), as indicated by LSL/LAL-00 or LIT-00, Mixers MIX-1001A, MIX-1001B, and MIX-1001C (and the corresponding mixers in Tank #2) will shut down. Also shut down pumps PU-1001, PU-1002, PU-1003, and PU-1004. Stop the addition of sulfuric acid by shutting down CF-1305. Shut Effluent Valve FV-1001-00.
46	I-01, I-10	A high-high (HH) or low-low (LL) pH in Effluent Monitoring Tank #1, as indicated by AE/AIC-1001-00 or AE/AIT-1001-01 will close effluent discharge valve FV-1001-00, and shut down pumps PU-1001, PU-1002, PU-1003, and PU-1004. Influent feed valve FV-02 will close.
47	I-10	Coordinate signal(s) back from SCA, including HH level in the destination basin/tank, to shut off the Effluent Recycle Pump(s) (PU-1003).
48	I-10	Coordinate signal(s) back from SCA, including "fault" or similar at the Polymer System, to shut off the Polymer Makedown Pump (PU-1001).
49	I-10	Coordinate signal(s) from the existing Leachate Overflow P.S. to shut the gravity effluent FV-1001-00. And/or would the WTP get a verbal notice from that facility.
50	I-11	A low-low (LL) liquid level in the Backwash/Sludge Pumping Station (T-1101), as indicated by LIT-1101-00 or LSLL/LALL-1101-00, will shut down Sludge Return Pumps PU-1101, PU-1102, and PU-1103.
51	I-11	Coordinate signal(s) from SCA, including HH level in the destination basin/tank, to shut off the Sludge Return Pumps PU-1101, PU-1102, and PU-1103.
52	I-6, I-10, I-11, I-103, I-107	A high-high liquid level in the Backwash/Sludge Pumping Station (T-1101), as indicated by LIT-1101-00 or LSHH/LAHH-1101-00, will shut the Inclined Plate Clarifier Sludge Valves (1 through 16), the MMF Backwash Pump (PU-1004), and the GAC Backwash Pump (PU-1002). Shut down the Indoor Clarifier Sludge Pump PU-0617 and the Indoor Backwash Pump PU-1006.
53		Deleted
54	I-08	Shut GAC-0901A/B feed valve FCV-00 (on I-08) at high-high flow (as indicated by FE/FIQT/FIC-00 on I-08) to prevent inadequate contact time in GACs.
55	I-01, I-10	Shut influent feed valve FV-02 (on I-01) at a high-high liquid level in Effluent Monitoring Tank T-1001, as indicated by LIC-1001-00 or LSHH-1001-00.
56		Deleted
57	I-01, I-03	At low-low (LL) liquid level in Flash Mix Tank, shut down Mixers. Also shut influent valve FV-02 on I-01.
58	I-01, I-14, I-15	At a no (i.e., low-low (LL)) flow to pH Adjustment Train 1 (as indicated by FE/FIC-00 on I-01), shut off sulfuric acid pumps CF-1201 and CF-1202 and caustic feed pumps CF-1301 and CF-1302.
59	I-01, I-14, I-15	At a no (i.e., low-low (LL)) flow to pH Adjustment Train 2 (as indicated by FE/FIC-01 on I-01), shut off sulfuric acid pumps CF-1203 and CF-1204 and caustic feed pumps CF-1303 and CF-1304.
		Indoor Treatment Train
101	I-101, I-108, I-109	At a low-low (LL) liquid level in Indoor pH Adjust Tank #1 (T-0109), as indicated by LIT-0109-00 or LSLL/LALL-0109-00, Mixer MIX-0109 will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1206 and CF-1306, respectively. Close influent valve FV-00 on I-101.
102	I-101, I-106, I-108, I-109	At a high-high (HH) liquid level in Indoor pH Adjust Tank #1 (T-0109), as indicated by LIT-0109-00 or LSHH/LAHH-0109-00, tank influent valve FV-00 will automatically close. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1206 and CF-1306, respectively. Shut down Indoor Floor Sump Pump PU-1701. Coordinate with the SCA project, to determine if a valve position signal can be sent to SCA to stop pumping to the WTP.
103		Deleted
104	I-101, I-102, I-108, I-109	At a low-low (LL) liquid level in Indoor pH Adjust Tank #2 (T-0110), as indicated by LIT-0110-00 or LSLL/LALL-0110-00, Mixer MIX-0110 will automatically shut down. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1307, respectively. Close influent valve FV-00 on I-101.
105	I-101, I-102, I-108, I-109	At a high-high (HH) liquid level in Indoor pH Adjust Tank #2 (T-0110), as indicated by LIT-0110-00 or LSHH/LAHH-0110-00, tank influent valve FV-00 (on P&ID I-101) will automatically close. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1207 and CF-1307, respectively. Coordinate with the SCA project, to determine if a valve position signal can be sent to SCA to stop pumping to the WTP.
106	I-101, I-102	At a high-high (HH) or low-low (LL) pH in Indoor pH Adjust Tank #2 (T-0110), as indicated by AE/AIT/AIC-0110-00, Indoor pH Adjust Tank #1 influent valve FV-00 (on P&ID-101) will close
107	I-103, I-108	At a low (L) liquid level in Flash Mix Tank T-0303 or Flocculation Tank T-0405, as indicated by LSL/LAL-0405-00, Mixers MIX-0303 and MIX-0405 will automatically shut down. Stop the addition of alum by shutting down CF-1403.
108	I-101, I-103	At a high-high (HH) liquid level in Indoor Filter Feed Tank (T-0702), as indicated by LIT-0702-00 or LSHH/LAHH-0702-00, influent valve FV-00 (on P&ID I-101) will automatically close.
109	I-103	A low-low (LL) liquid level in the Indoor Filter Feed Tank, as indicated by LIT-0702-00 or LSLL-0702-00, will shut down Indoor Multimedia Feed Pump PU-0705.
110	I-101, I-108	At a low alum flow from CF-1403, as indicated by FSL/FAL-1403-00, influent valve FV-00 (on P&ID I-101) will close
111		Deleted
112	I-103	A low flow rate, as indicated by FSL/FAL-00, will shut down the Indoor Multimedia Feed Pump (PU-0705)
113	I-103, I-104	A high-high (HH) differential pressure across the Indoor Multimedia Filter (MMF-0805), as indicated by PDIT-0805-00, will shut down the Indoor Multimedia Feed Pump PU-0705, and shut the valve(s) feeding the Indoor Multimedia Filter.
114	I-103, I-104	A high-high turbidity at the Multimedia outlet, as indicated by AE/AIT-0805-00, will shut down the Indoor Multimedia Feed Pump PU-0705.
115	I-103, I-105	A high-high differential pressure across LGAC-0908A/B, as indicated by PDIT-0908-00, will shut Indoor Multimedia Feed Pump PU-0705.
116	I-101, I-106	At a high-high (HH) liquid level in the Indoor Floor Sump, as indicated by LSHH/LAHH-01 on P&ID I-106, shut influent valve FV-00 on P&ID I-101.
117	I-107, I-108, I-109	At a low-low liquid level in Indoor Treated Water Storage/Backwash Tank T-1003, as indicated by LSLL/LALL-1003-00 or LIT-1003-00, Mixer MIX-1003 will shut down. Also shut down pumps PU-1005, and PU-1006. Stop the addition of sodium hydroxide or sulfuric acid by shutting down CF-1208 and CF-1308, respectively.
118	I-103, I-107	At a high-high (HH) liquid level in Indoor Treated Water Storage/Backwash Tank (T-1003), as indicated by LIT-1003-00 or LSHH/LAHH-1003-00, will shut down Indoor Multimedia Feed Pump PU-0705.
119	I-107	A high-high (HH) or low-low (LL) pH in Indoor Treated Water Storage/Backwash Tank (T-1003) or in the treated effluent line, as indicated by AE/AIC-1003-00 or AE/AIC-1003-01, respectively, will close effluent discharge valve LCV-1003-00, and shut down pumps PU-1005, and PU-1006.
120	I-107	Coordinate signal(s) from the existing Leachate Overflow P.S. to shut the gravity effluent LCV. And/or would the WTP get a verbal notice from that facility.
121	I-107	Coordinate signal(s) from the SCA to shut down the Indoor Effluent Recycle Pump PU-1005.
122	I-101, I-108, I-109	At a no (i.e., low-low (LL)) flow to Indoor pH Adjustment Tank #1 (as indicated by FE/FIC-00 on I-101), shut off sulfuric acid pumps CF-1306 and CF-1307 and caustic feed pumps CF-1206 and CF-1207.

NO.	DATE	REVISION	INIT.
A	3/10/10	DP #1 ISSUED FOR NYSDEC AND COUNTY REVIEW	

NOT TO SCALE

THIS DRAWING WAS PREPARED AT THE SCALE INDICATED IN THE TITLE BLOCK. INACCURACIES IN THE STATED SCALE MAY BE INTRODUCED WHEN DRAWINGS ARE REPRODUCED BY ANY MEANS. USE THE GRAPHIC SCALE BAR IN THE TITLE BLOCK TO DETERMINE THE ACTUAL SCALE OF THIS DRAWING.

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED ENGINEER, TO ALTER THIS DOCUMENT.

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

MECHANICAL

INTERLOCKS

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-GA1
DATE FEBRUARY 2010

I-C

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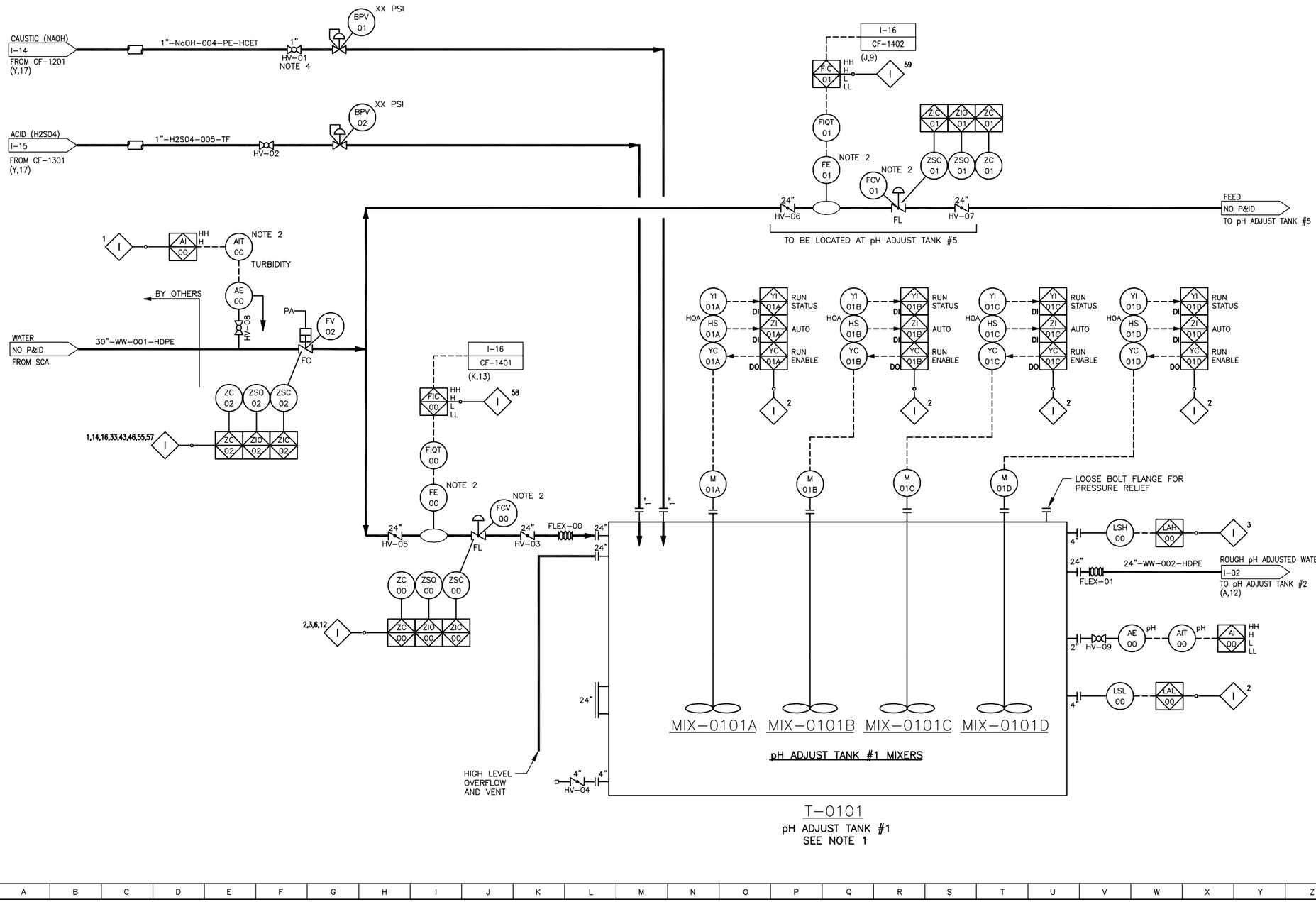


NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR:
   A. pH ADJUSTMENT TANK #1 (FILLED FROM SCA, DISCHARGING TO pH ADJUSTMENT TANK #2),
   B. pH ADJUSTMENT TANK #3 (FILLED FROM pH ADJUSTMENT TANK #2, DISCHARGING TO pH ADJUSTMENT TANK #4),
   C. pH ADJUSTMENT TANK #5 (FILLED FROM SCA, DISCHARGING TO pH ADJUSTMENT TANK #6),
   D. pH ADJUSTMENT TANK #7 (FILLED FROM pH ADJUSTMENT TANK #6, DISCHARGING TO pH ADJUSTMENT TANK #8).
2. FLOW METER AND FLOW CONTROL VALVES TYPICAL FOR pH ADJUST TANKS #1 AND #5 ONLY. TURBIDITY METER ON WTP INFLUENT LINE ONLY.
3. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
4. LOCATE CHEMICAL FEED ISOLATION VALVES AND BPVS AT TOP OF TANK.

INTERLOCKS:

REFER TO SHEET I–C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

pH ADJUSTMENT TANK #1 P&ID

T–0101
pH ADJUSTMENT TANK #1
SIZE: APPROX. 46'L x 8.5'W x 10'H
VOLUME: 18,275 GAL.
MOC:
DESIGN: PRE FABRICATED, TRAILER TANK W/ROOF

MIX–0101A
pH ADJUSTMENT TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX–0101B
pH ADJUSTMENT TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX–0101C
pH ADJUSTMENT TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX–0101D
pH ADJUSTMENT TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

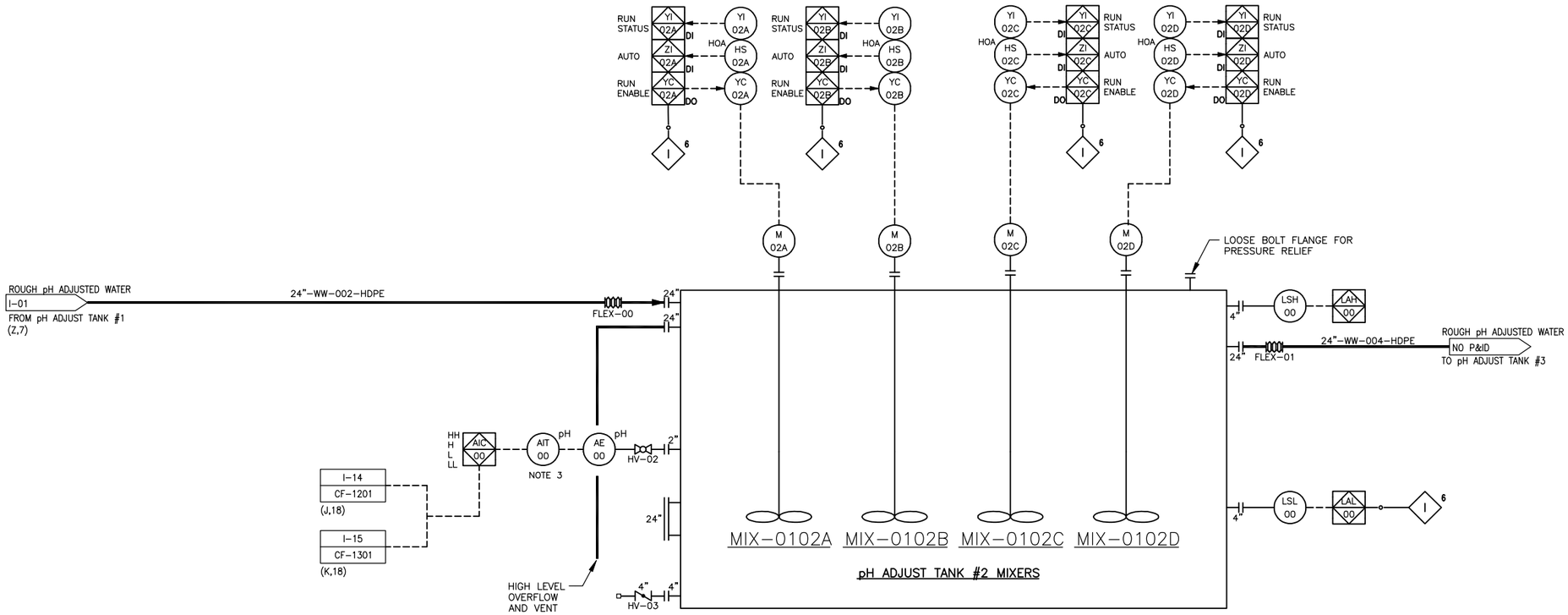
PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523–I01
DATE FEBRUARY 2010

I–01



NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR:
   A. pH ADJUSTMENT TANK #2 (FILLED FROM pH ADJUSTMENT TANK #1, DISCHARGING TO pH ADJUSTMENT TANK #3),
   B. pH ADJUSTMENT TANK #4 (FILLED FROM pH ADJUSTMENT TANK #3, DISCHARGING TO FLASH MIX TANK),
   C. pH ADJUSTMENT TANK #6 (FILLED FROM pH ADJUSTMENT TANK #5, DISCHARGING TO pH ADJUSTMENT TANK #7),
   D. pH ADJUSTMENT TANK #8 (FILLED FROM pH ADJUSTMENT TANK #7, DISCHARGING TO FLASH MIX TANK).
2. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
3. pH ADJUSTMENT TANKS #4 AND #8 TO HAVE REDUNDANT pH PROBES (I.E., 2 PER TANK)

INTERLOCKS:

REFER TO SHEET I-C

T-0102
pH ADJUSTMENT TANK #2
SIZE: APPROX. 46'L x 8.5'W x 10'H
VOLUME: 18,275 GAL
MOC:
DESIGN: PRE FABRICATED, TRAILER TANK W/ROOF

MIX-0102A
pH ADJUSTMENT TANK #2 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0102B
pH ADJUSTMENT TANK #2 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0102C
pH ADJUSTMENT TANK #2 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0102D
pH ADJUSTMENT TANK #2 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10//10

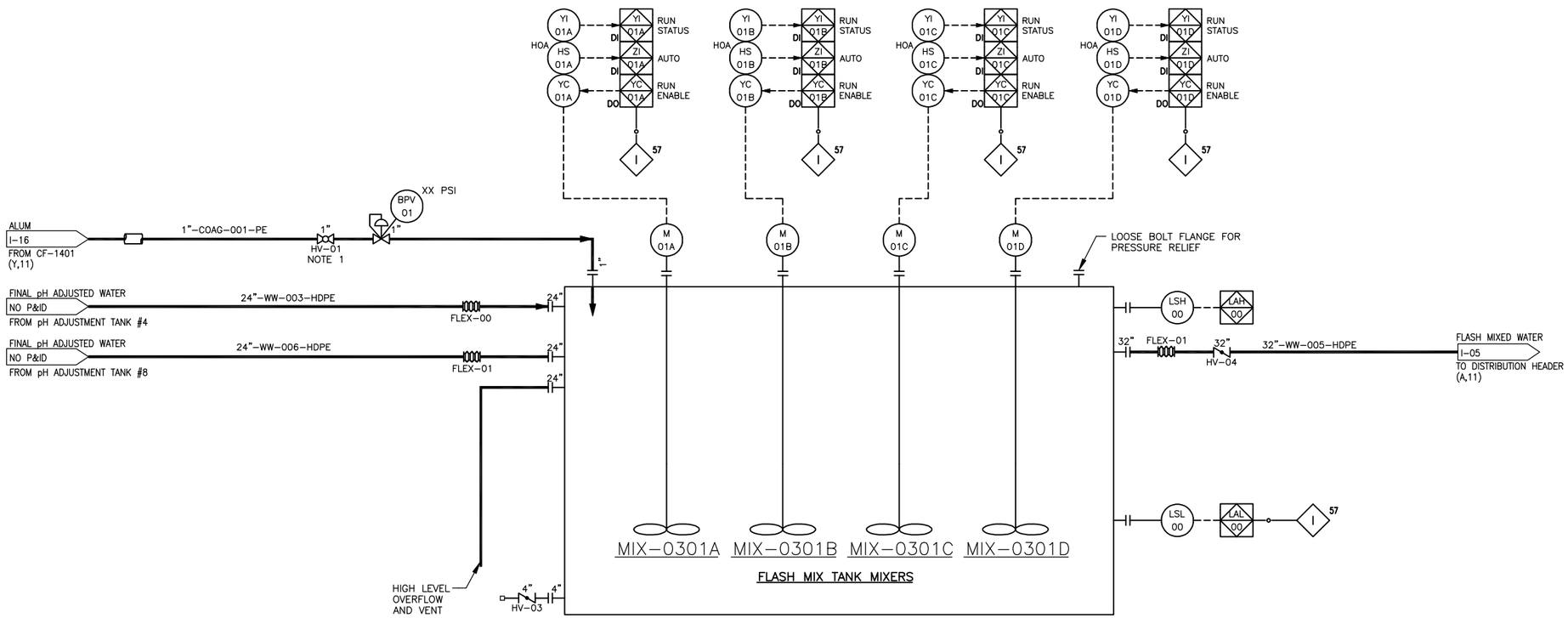
NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
pH ADJUSTMENT TANK #2
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW
FILE NO. 1163.44523-I02
DATE FEBRUARY 2010
I-02



NOTES:

1. LOCATE CHEMICAL FEED ISOLATION VALVE AND BPV AT TOP OF TANK.

INTERLOCKS:

REFER TO SHEET I-C

T-0301
FLASH MIX TANK
SIZE: APPROX. 46'L x 8.5'W x 10'H
VOLUME: 18,275 GAL
MOC: EPOXY COATED STEEL
DESIGN: PRE FABRICATED, TRAILER TANK W/ROOF

MIX-0301A
FLASH MIX TANK MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0301B
FLASH MIX TANK MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0301C
FLASH MIX TANK MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-0301D
FLASH MIX TANK MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: 10HP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
FLASH MIX TANK P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-I03
DATE FEBRUARY 2010

I-03

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INTENTIONALLY

NOTES:

1.

INTERLOCKS:

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

P&ID

PRELIMINARY
NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-I04
DATE FEBRUARY 2010

I-04

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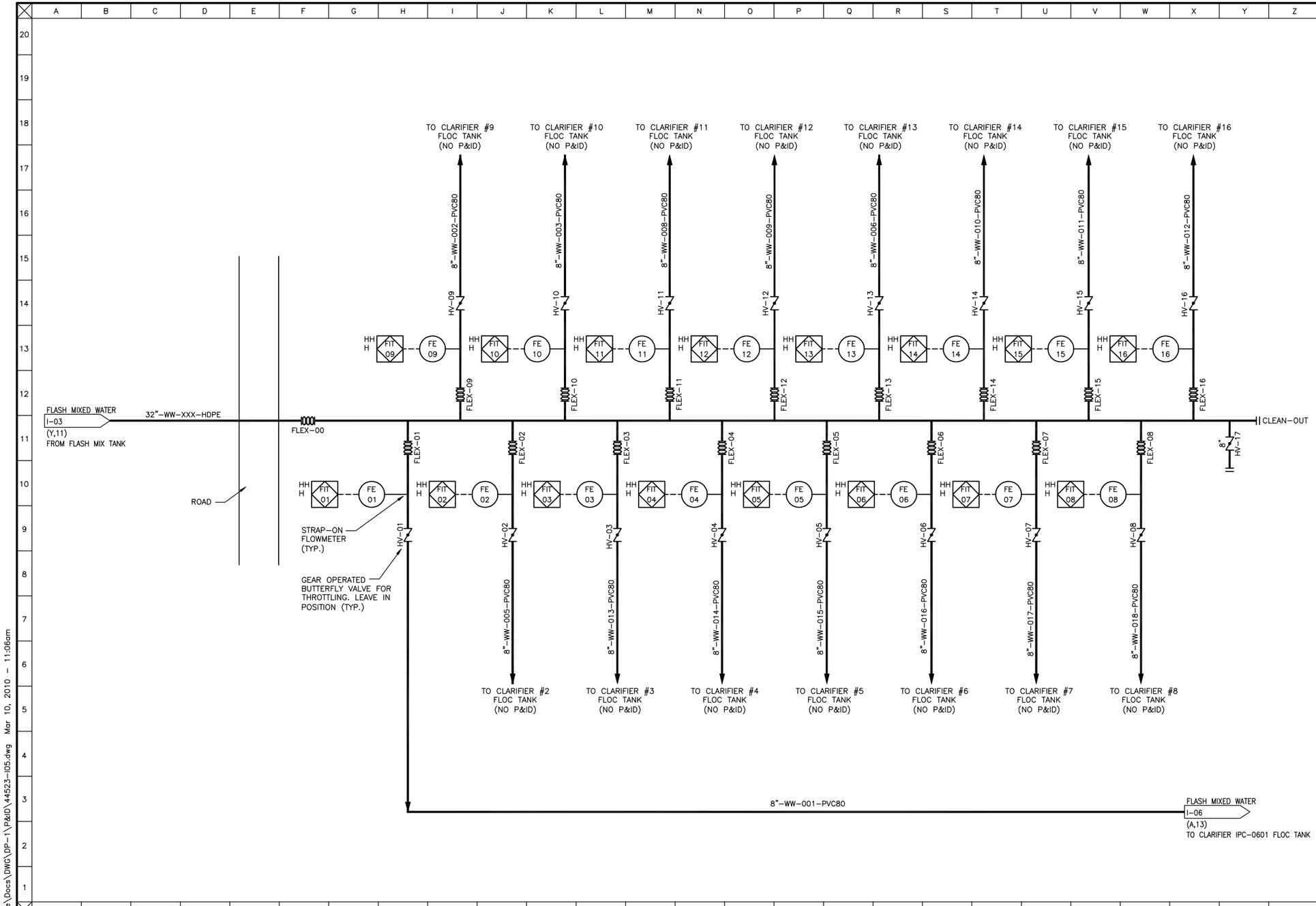

NOTES:

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
DISTRIBUTION HEADER
P&ID

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DATE: 3/10/10

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FILE NO. 1163.44523-I05
DATE FEBRUARY 2010

I-05

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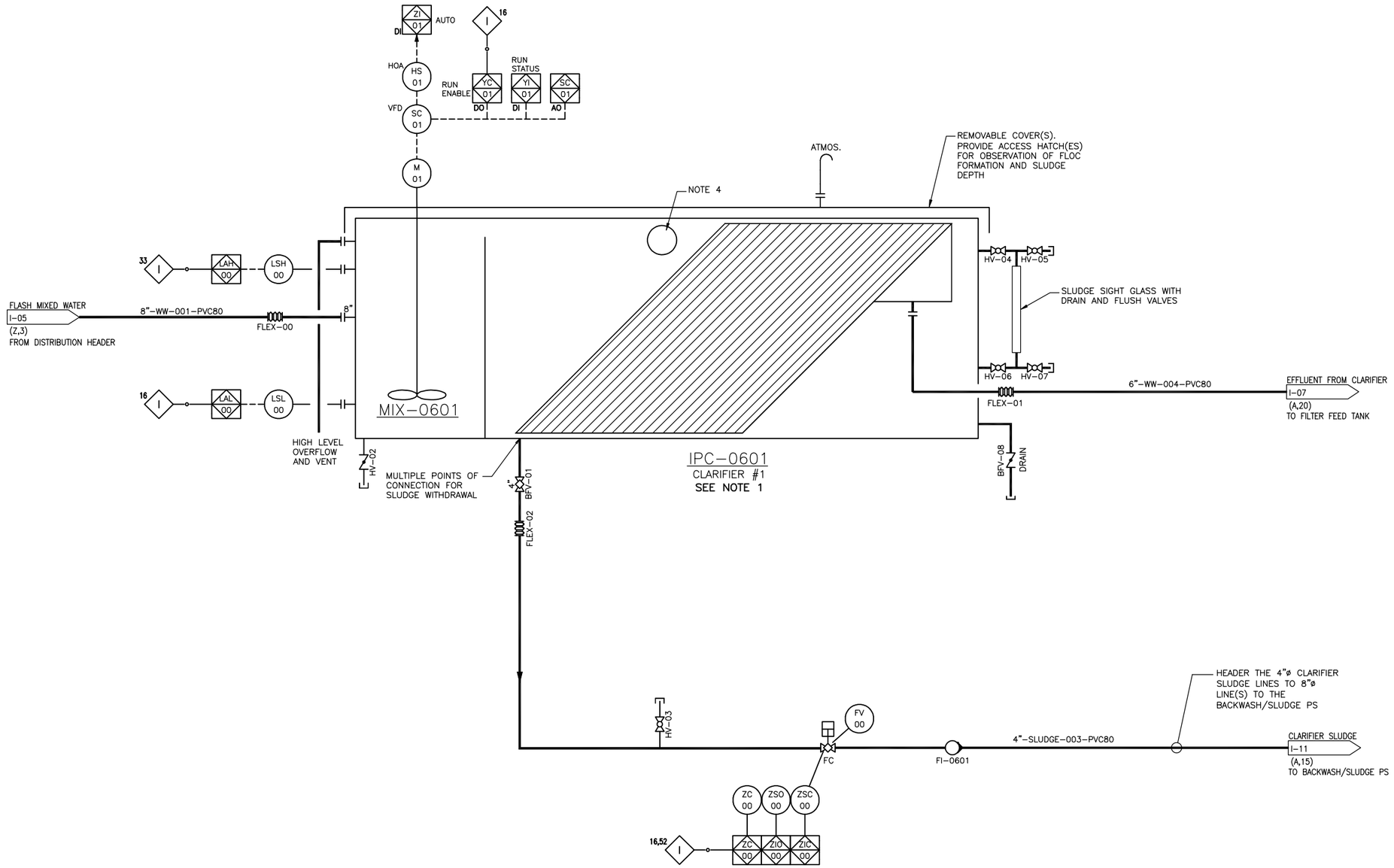

NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR 16 CLARIFIER SYSTEMS.
2. VENDOR SUPPLIED CLARIFIER SYSTEM TO BE INSTALLED PER VENDORS APPROVED SHOP DRAWINGS AND INSTRUCTIONS.
3. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
4. PROVIDE MEANS FOR LNAPL REMOVAL (FLOATING BOOMS OR EQUIVALENT).

INTERLOCKS:

REFER TO SHEET I-C

MIX-0601

CLARIFIER #1 FLOCCULATION MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: TBD / VAR. SPEED
AGITATOR RPM: TBD
IMPELLER: TBD

IPC-0601

CLARIFIER #1
SIZE: 40'L x 8'6"W x 11'2"H TANK
MOC: EPOXY LINED STEEL WITH FRP PLATES
ACCESSORIES: TBD
DESIGN FLOW: 370 GPM AVERAGE

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DATE: 3/10/10

NO.	DATE	REVISION	INIT.
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O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
INCLINED PLATE CLARIFIER
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
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FILE NO. 1163.44523-I06
DATE FEBRUARY 2010

I-06

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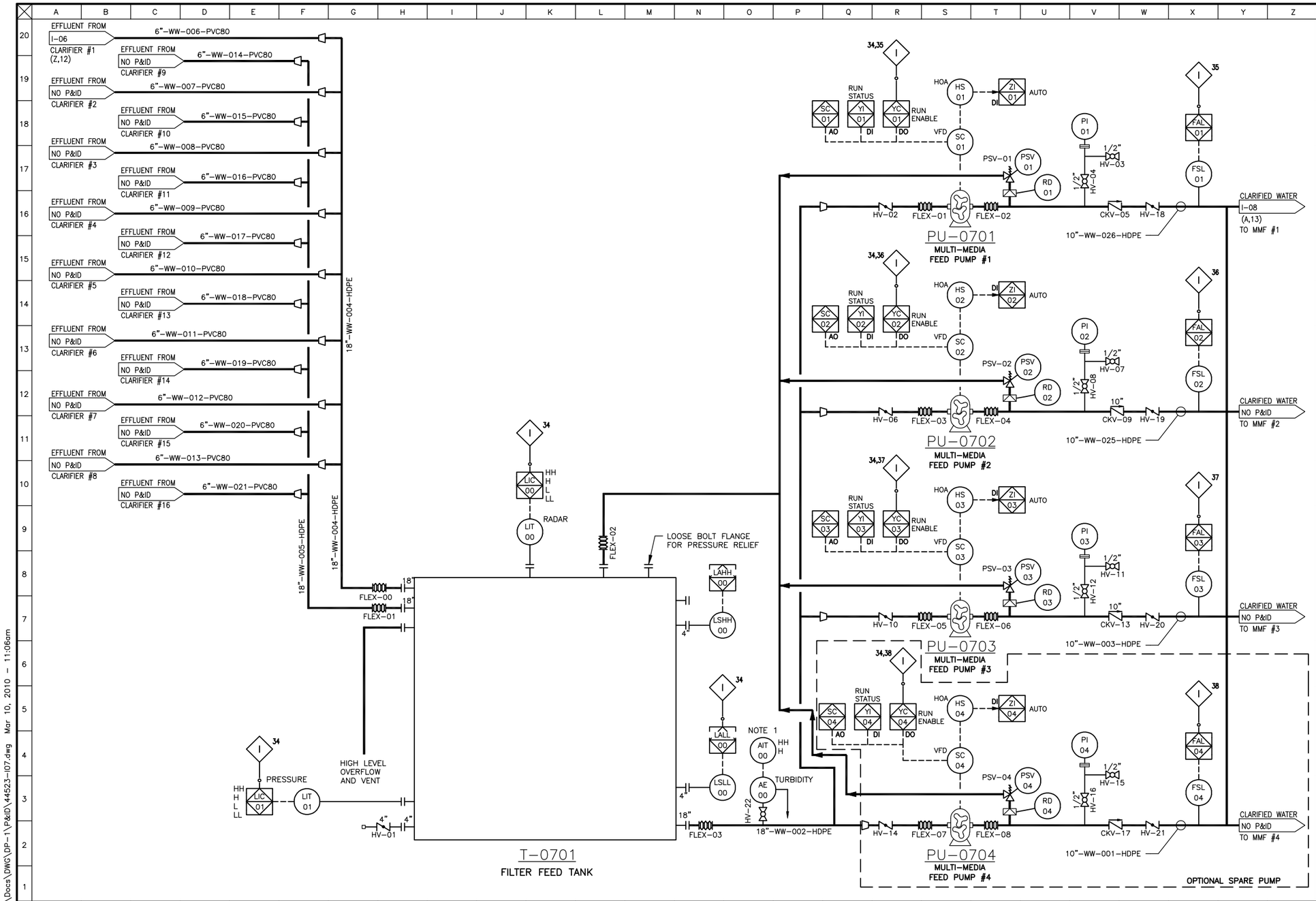

NOTES:

1. PROVIDE SAMPLING TUBING AND MANUAL VALVES TO ASSESS PERFORMANCE OF INDIVIDUAL CLARIFIERS.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
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HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

FILTER FEED TANK
P&ID

T-0701
FILTER FEED TANK
SIZE: 46'lL x 8.5'W x 10'H
VOLUME: 18,275 GAL.
MOC: EPOXY COATED STEEL
DESIGN: PRE FABRICATED, TRAILER TANK W/ROOF

PU-0701
MULTIMEDIA FEED PUMP
TYPE: PROGRESSING CAVITY
CAPACITY: 1715 GPM
HP: APROX. 150
MOC: CI, ALLOY STEEL

PU-0702
MULTIMEDIA FEED PUMP
TYPE: PROGRESSING CAVITY
CAPACITY: 1715 GPM
HP: APROX. 150
MOC: CI, ALLOY STEEL

PU-0703
MULTIMEDIA FEED PUMP
TYPE: PROGRESSING CAVITY
CAPACITY: 1715 GPM
HP: APROX. 150
MOC: CI, ALLOY STEEL

PU-0704
MULTIMEDIA FEED PUMP
TYPE: PROGRESSING CAVITY
CAPACITY: 1715 GPM
HP: APROX. 150
MOC: CI, ALLOY STEEL
OPTIONAL SPARE PUMP

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DATE: 3/10/10

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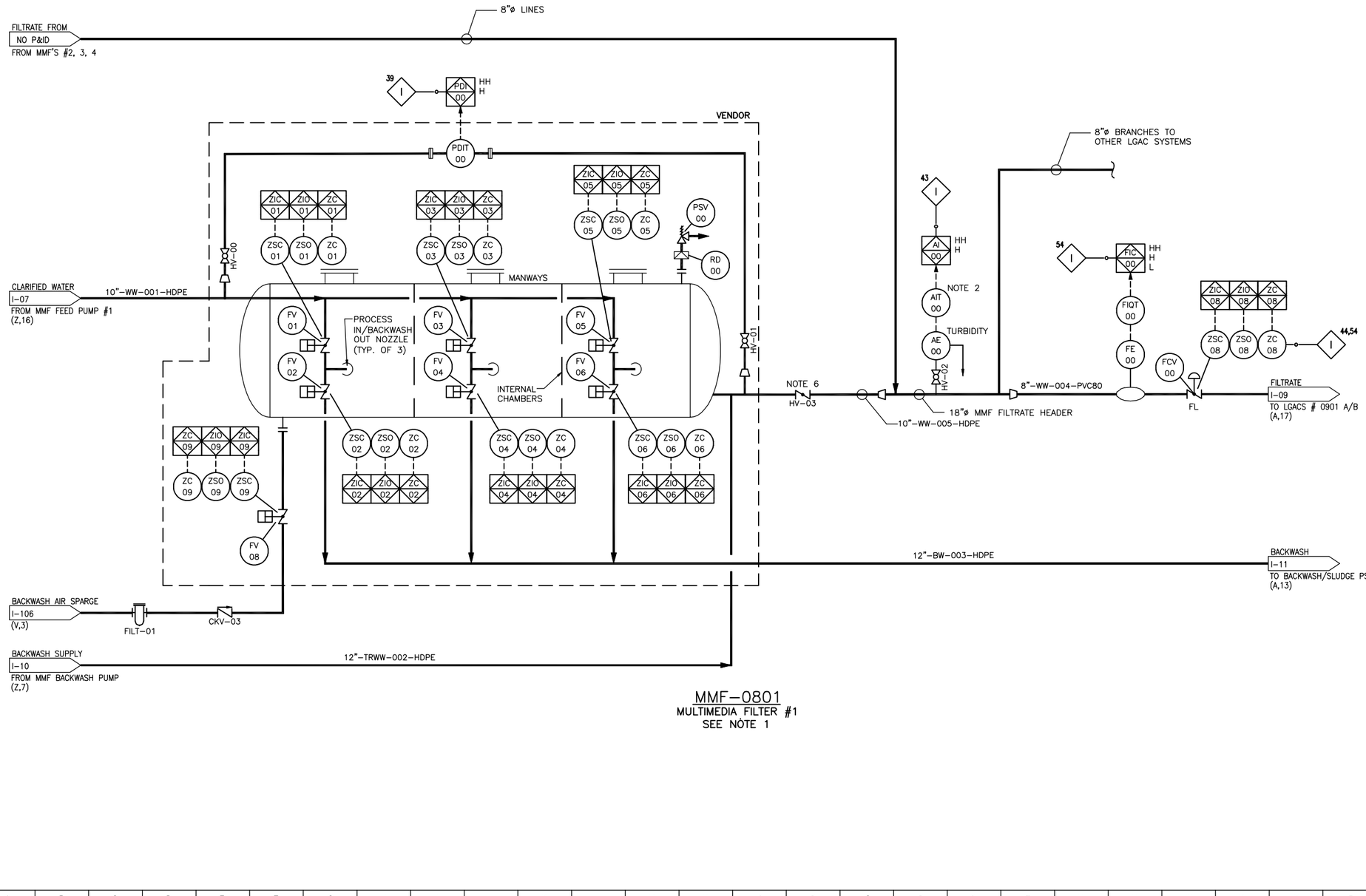
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY LMW

FILE NO. 1163.44523-I07
DATE FEBRUARY 2010

I-07



MMF-0801
MULTIMEDIA FILTER #1
SEE NOTE 1

NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR FOUR MULTIMEDIA FILTER SYSTEMS.
2. ONE TURBIDITY METER ON THE MMF EFFLUENT HEADER TO THE LGAC'S. PROVIDE SAMPLING TUBING AND MANUAL VALVES TO ASSESS PERFORMANCE OF INDIVIDUAL CLARIFIERS.
3. VENDOR SUPPLIED MULTIMEDIA FILTER SYSTEM TO BE INSTALLED PER VENDOR'S APPROVAL SHOP DRAWINGS AND INSTRUCTIONS.
4. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
5. FLEXIBLE CONNECTORS TO BE PROVIDED AT CONNECTIONS TO EQUIPMENT AND AT MANIFOLD PIPING WHERE REQUIRED.
6. INSTALL PORTABLE STRAP-ON FLOW METERS AT DISCHARGE FROM EACH MMF. MODULATE THE INDIVIDUAL MANUAL GEAR OPERATED BUTTERFLY VALVES AND LEAVE AT MAXIMUM ALLOWABLE FLOW WITH CLEAN BEDS.

INTERLOCKS:

REFER TO SHEET I-C

MMF-0801
MULTIMEDIA FILTER
QTY: 1
SIZE: APPROX. 36'L x 10' DIA. x 11'4"H
MOC: COATED CARBON STEELDESIGN:
TYPE: HORIZONTAL, MULTIPLE CHAMBERS
DESIGN FLOW: 1715 GPM
BACKWASH: 1715 GPM (ONE CHAMBER)

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O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
MULTIMEDIA FILTER
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
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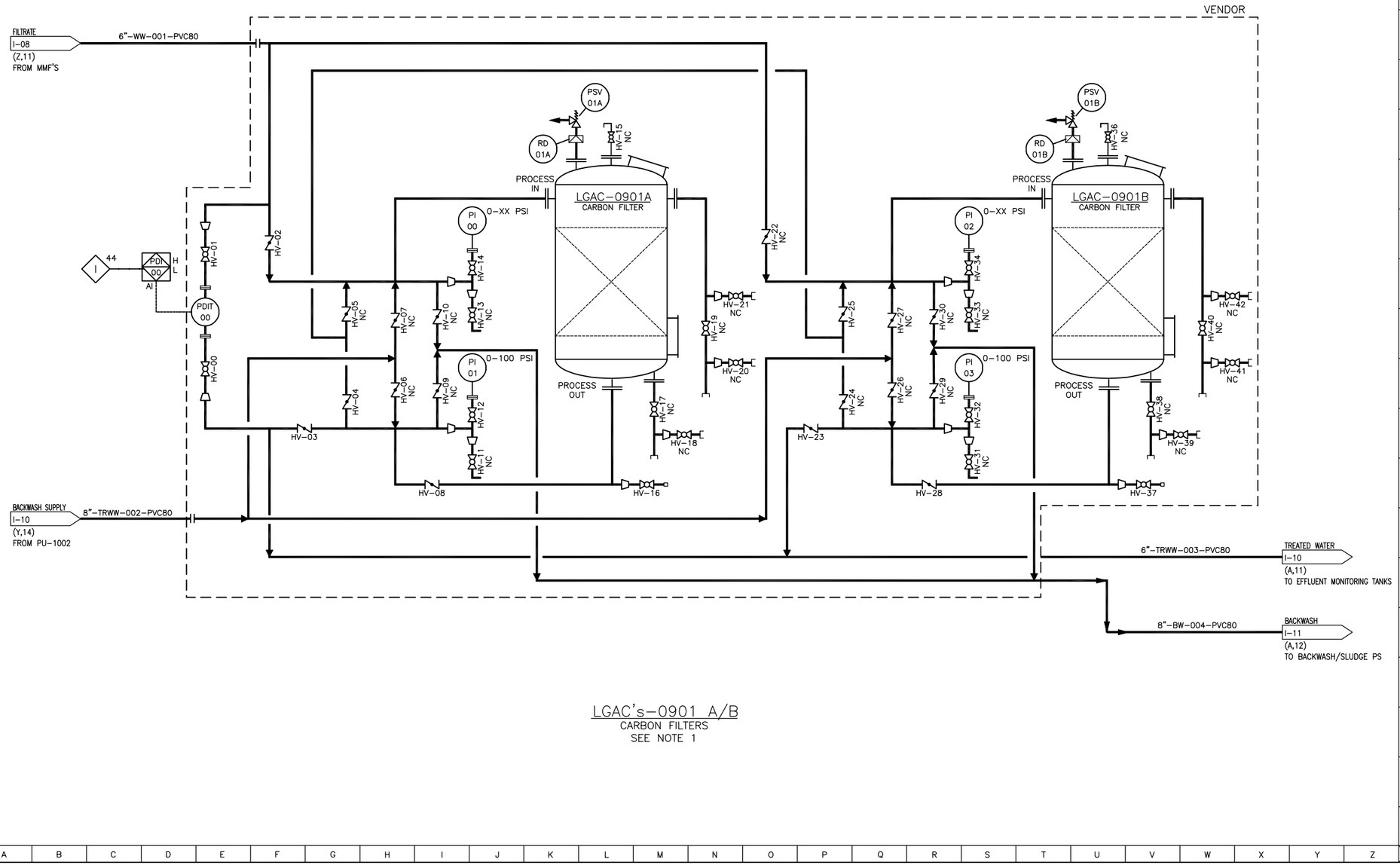
DATE FEBRUARY 2010
I-08



LGAC's–0901 A/B
CARBON FILTERS
SEE NOTE 1

LGAC–0901A, 0901B
CARBON FILTERS
DESIGN FLOW: APPROX. 640 GPM AVERAGE
BACKWASH FLOW: APPROX. 1700 GPM
P/T RATING: 125 PSI @ 150 DEG. F
VESSEL DIMENSIONS: 12' DIA. x 15'4"H
MOC: LINED STEEL
MASS OF CARBON: 20,000 LBS PER VESSEL

NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR EIGHT LGAC PAIRS.
2. NORMAL VALVE POSITIONS ARE SHOWN ASSUMING LGAC–0901A IS THE LEAD VESSEL.
3. VENDOR SUPPLIED GAC SYSTEM TO BE INSTALLED PER VENDOR'S APPROVED SHOP DRAWINGS AND INSTRUCTIONS.
4. THE EIGHTH LGAC PAIR (LGAC–0908 A/B) WILL BE LOCATED OUTDOORS DURING DREDGE OPERATIONS AND MOVED INDOORS FOR WINTER USE.
5. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
6. FLEXIBLE CONNECTORS TO BE PROVIDED AT CONNECTIONS TO EQUIPMENT AND AT MANIFOLD PIPING WHERE REQUIRED.

INTERLOCKS:

REFER TO SHEET I–C

NO.	DATE	REVISION	INIT.
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A	2/4/10	DP #1 INTERNAL REVIEW	

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DATE: 3/10/10

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
CARBON FILTERS
P&ID

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DATE FEBRUARY 2010

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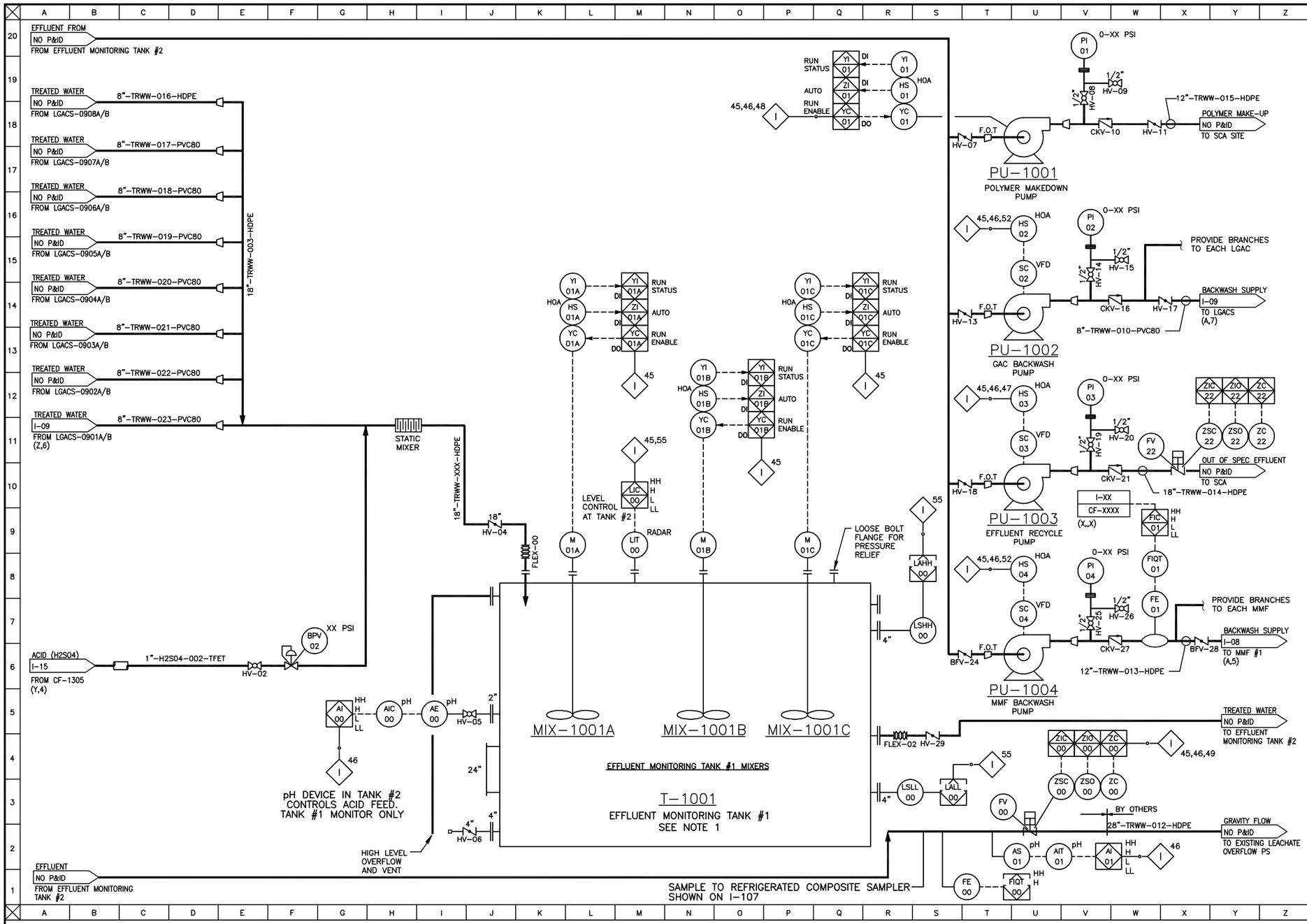

NOTES:

1. REFER TO THE OUTDOOR TREATMENT TRAINS PROCESS FLOW DIAGRAM (PFD). THIS P&ID IS TYPICAL FOR TWO EFFLUENT MONITORING TANKS. HOWEVER, PUMPS PU-1001 THROUGH PU-1004 ARE SHARED BY THE PAIR OF TANKS.
2. REFER TO THE PROJECT EQUIPMENT LIST FOR TANK, PUMP, MIXER, AND EQUIPMENT TAG NUMBERS OF IDENTICAL SYSTEMS.
3. DISCHARGE FROM HIGH ON EFFLUENT MONITORING TANK #2 SIDEWALL.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
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HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
EFFLUENT MONITORING TANK #1
P&ID

T-1001
EFFLUENT MONITORING TANK #1
SIZE: APPROX. 46'L x 8.5'W x 10'H
VOLUME: 18,275 GAL
MOC: EPOXY COATED STEEL
DESIGN: PRE FABRICATED, TRAILER TANK

MIX-1001A
EFFLUENT MONITORING TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR HP: 10 HP
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-1001B
EFFLUENT MONITORING TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR HP: 10 HP
AGITATOR RPM: TBD
IMPELLER: TBD

MIX-1001C
EFFLUENT MONITORING TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR HP: 10 HP
AGITATOR RPM: TBD
IMPELLER: TBD

PU-1001
POLYMER MAKEDOWN PUMP
TYPE: HORZ. CENTRIFUGAL
CAPACITY: 600 GPM
HP: TBD
MOC: 316SS

PU-1002
GAC BACKWASH PUMP
TYPE: HORZ. CENTRIFUGAL
CAPACITY: 1700 GPM
HP: TBD
MOC: 316SS

PU-1003
EFFLUENT RECYCLE PUMP
TYPE: HORZ. CENTRIFUGAL
CAPACITY: 1700 GPM
HP: TBD
MOC: 316SS

PU-1004
MMF BACKWASH PUMP
TYPE: HORZ. CENTRIFUGAL
CAPACITY: 1700 GPM
HP: TBD
MOC: 316SS

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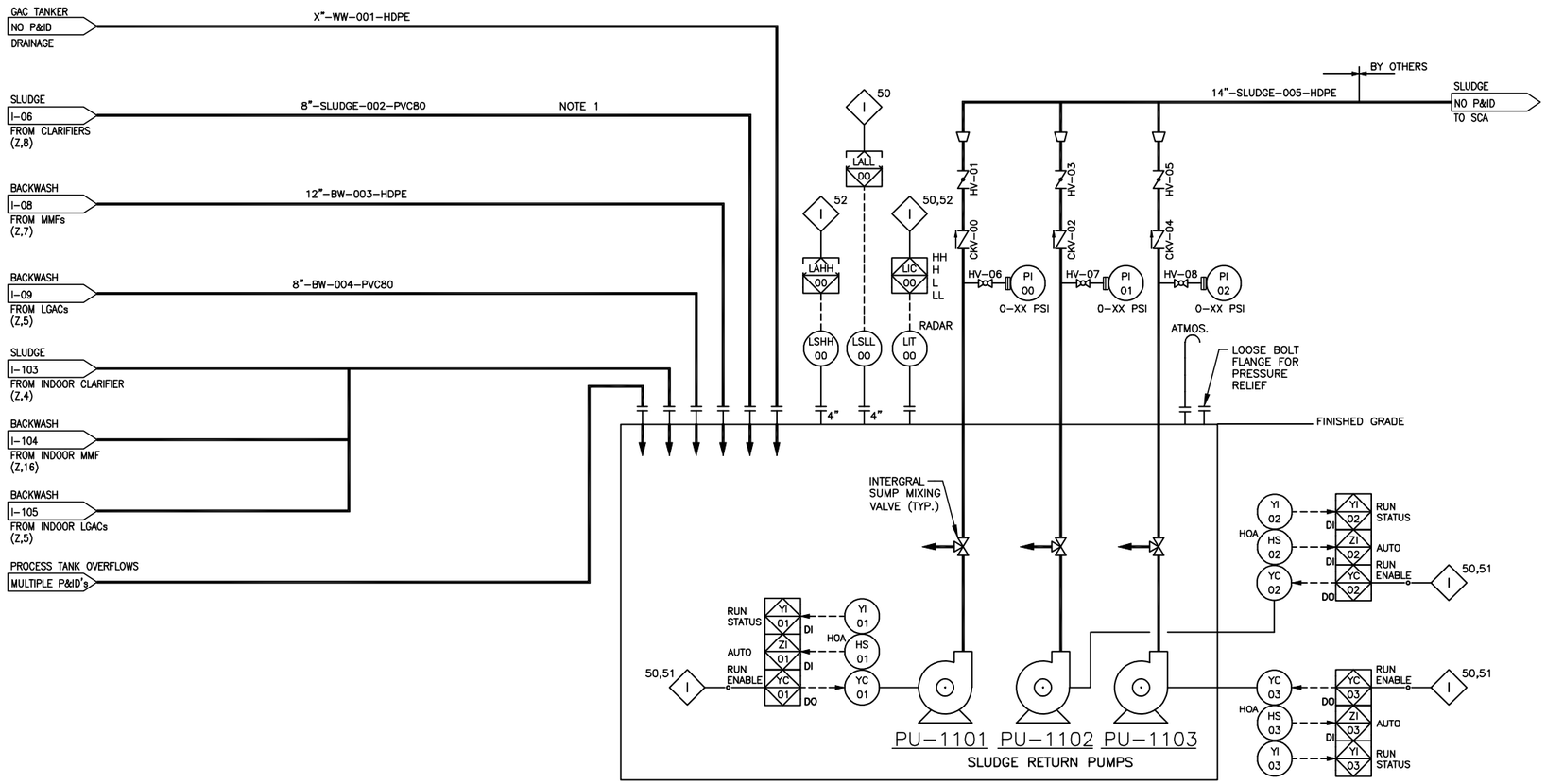
DATE FEBRUARY 2010

I-10



NOTES:

1. HEADER TOGETHER SLUDGE DISCHARGE LINES (4"ø) FROM INCLINED PLATE CLARIFIERS TO A 8"ø LINE TO THE SLUDGE PUMPING STATION.

INTERLOCKS:

RENDING TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
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HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

BACKWASH/SLUDGE PUMPING STATION
P&ID

T-1101
BACKWASH/SLUDGE PUMPING STATION
SIZE: APPROX. 12' x 12' x 12'
VOLUME: TBD GAL.
MOC: CONCRETE
DESIGN: IN-GROUND

PU-1101
SLUDGE RETURN PUMP
TYPE: SUBMERSIBLE
CAPACITY: 1250 GPM
HP: APROX. 15
MOC: CAST IRON, VITON

PU-1102
SLUDGE RETURN PUMP
TYPE: SUBMERSIBLE
CAPACITY: 1250 GPM
HP: APPROX. 15
MOC: CAST IRON, VITON

PU-1103
SLUDGE RETURN PUMP
TYPE: SUBMERSIBLE
CAPACITY: 1250 GPM
HP: APPROX. 15
MOC: CAST IRON, VITON

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
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FILE NO. 1163.44523-I11
DATE FEBRUARY 2010

I-11

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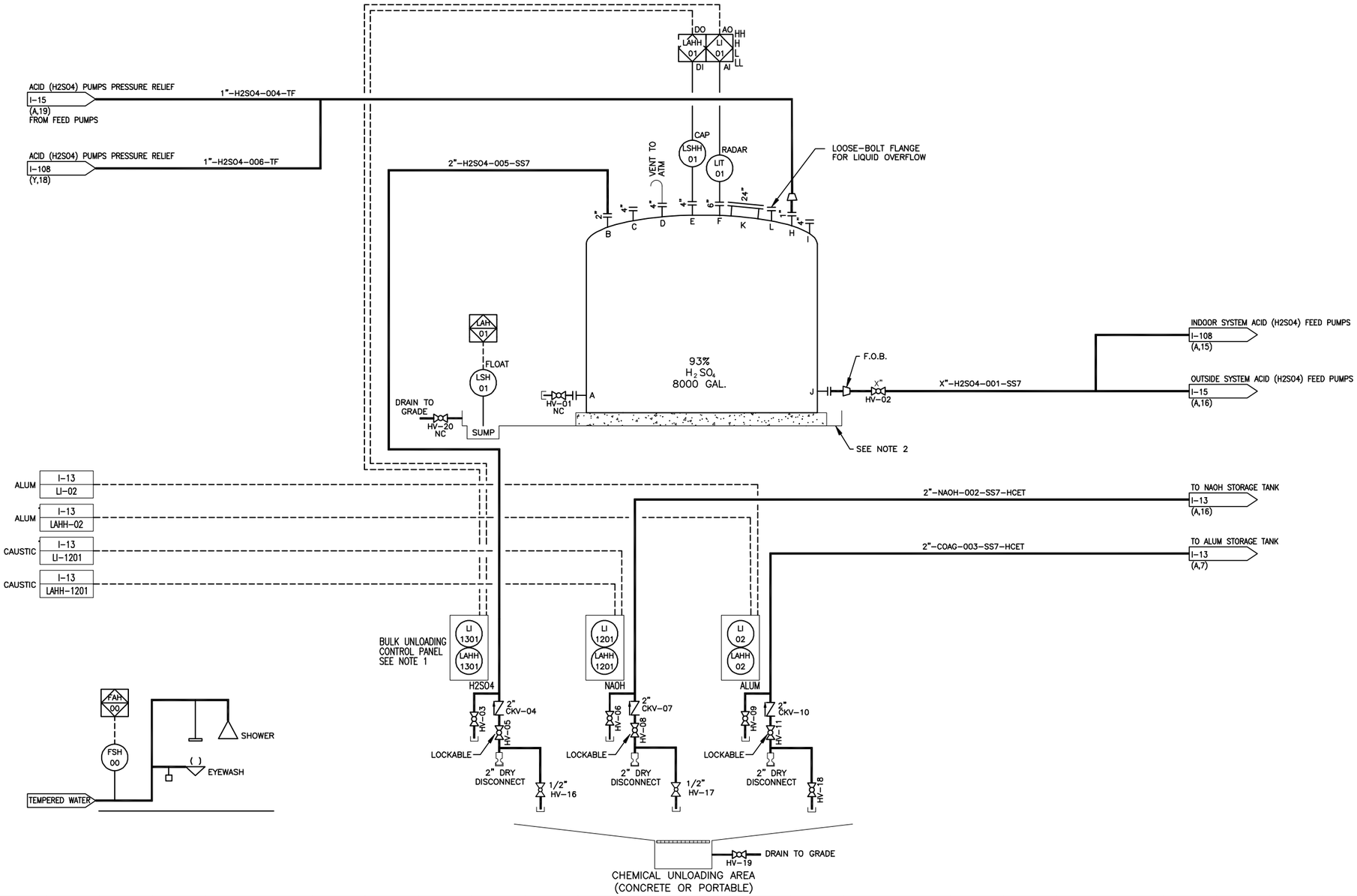

NOTES:

1. AWNING OVER UNLOADING PANEL.
2. SAWCUT/GROOVE CONCRETE PAD TO SHOW LEAKAGE AT TANK BOTTOM.
3. 93% SULFURIC ACID PROPOSED FOR FREEZE PREVENTION. ALTERNATE CONCENTRATIONS MAY REQUIRE HEAT-TRACING AND INSTALLATION.

INTERLOCKS:

REFER TO SHEET I-C

T-1301

H2SO4 STORAGE TANK
SIZE: 10' DIA. x 14'-10" H
VOLUME: 8000 GAL.
MOC: TBD
DESIGN: VERTICAL, CYLINDRICAL

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A	2/4/10	DP #1 INTERNAL REVIEW	

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
CHEMICAL STORAGE - H2SO4/UNLOADING
P&ID

PRELIMINARY NOT FOR CONSTRUCTION
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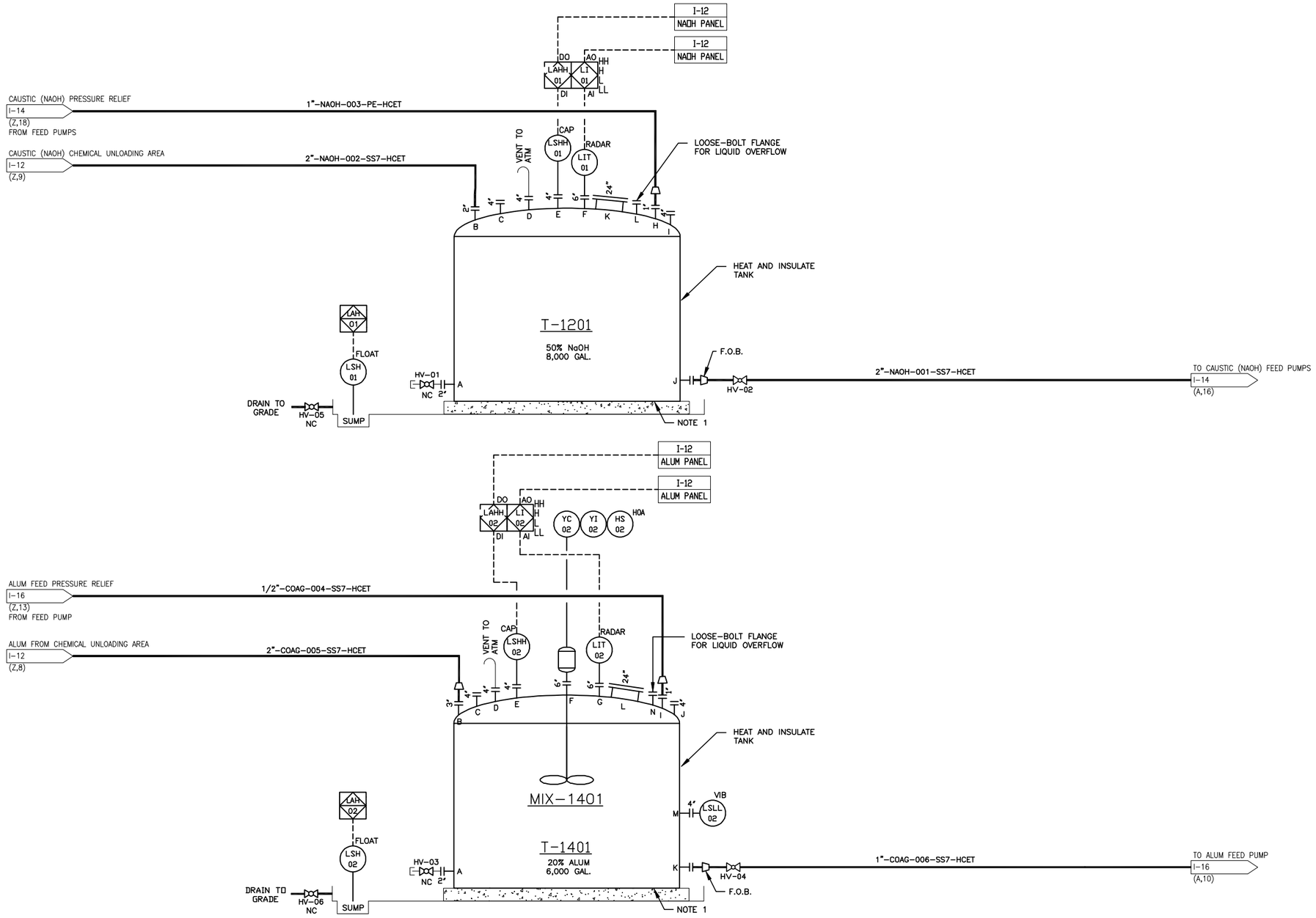
I-12



NOTES:

1. SAWCUT/GROVE CONCRETE PADS TO SHOW LEAKAGE AT TANK BOTTOM.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
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B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

T-1201
NaOH STORAGE TANK
SIZE: APPROX. 10' DIA. x 14'-10" H
VOLUME: 8000 GAL.
MOC: FRP
DESIGN: VERTICAL CYLINDRICAL

T-1401
ALUM STORAGE TANK
SIZE: APPROX. 8' DIA. x 16'-11" H
VOLUME: 6000 GAL.
MOC: FRP
DESIGN: VERTICAL, CYLINDRICAL

MIX-0401
ALUM STORAGE TANK MIXER
MIXER TYPE: TOP ENTRY
MOC: 316SS
MOTOR: TBD
AGITATOR RPM: TBD
IMPELLER: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
CHEMICAL STORAGE – NAOH/ALUM
P&ID

IN CHARGE OF JSR
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FILE NO. 1163.44523-I13
DATE FEBRUARY 2010

I-13

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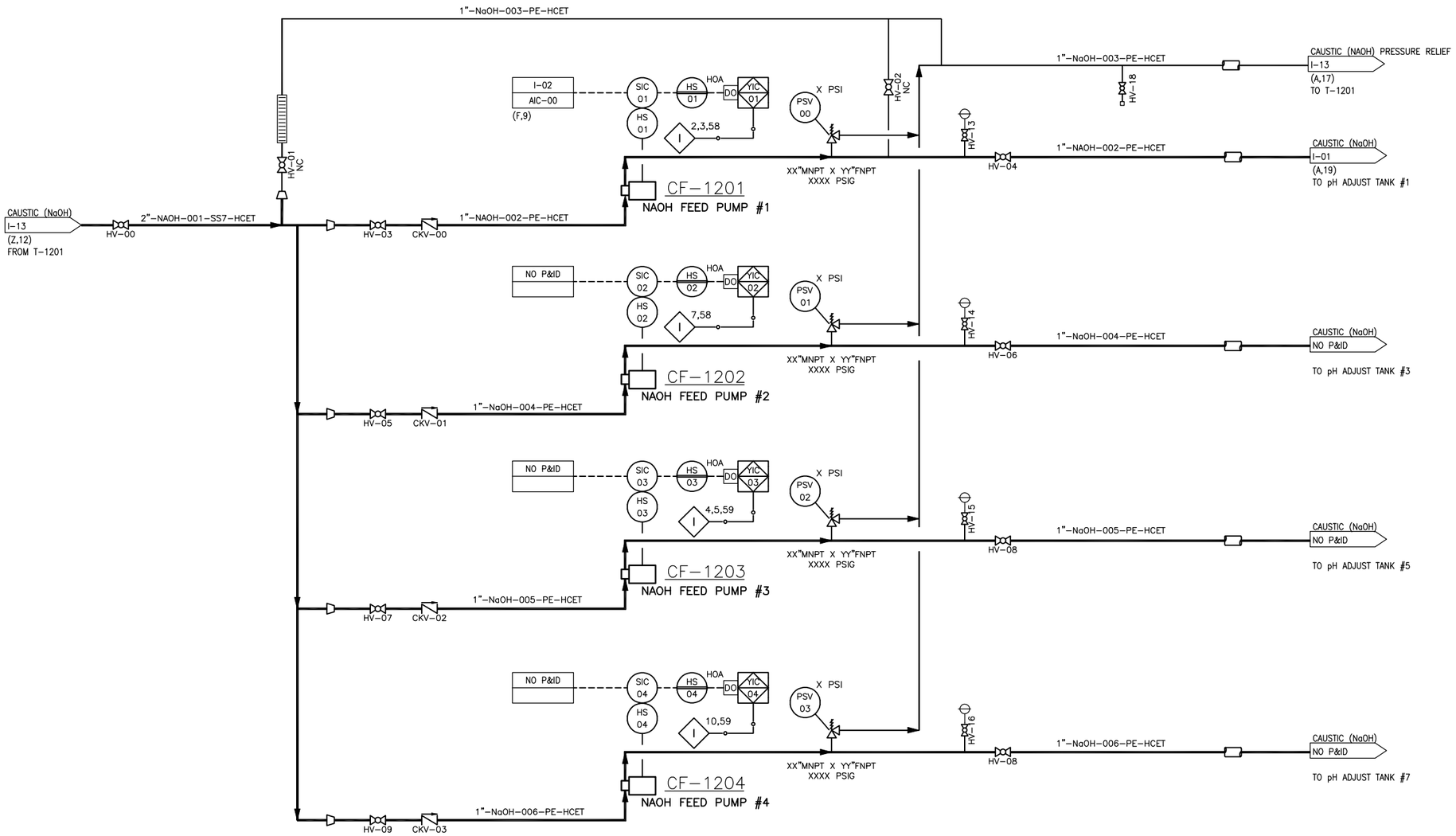

NOTES:

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INTERLOCKS:

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O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

CHEMICAL FEED SYSTEMS – NAOH
P&ID

CF–1201
NAOH FEED PUMP #1
TYPE: METERING PUMP
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF–1202
NAOH FEED PUMP #2
TYPE: METERING PUMP
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF–1203
NAOH FEED PUMP #3
TYPE: METERING PUMP
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF–1204
NAOH FEED PUMP #4
TYPE: METERING PUMP
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
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FILE NO. 1163.44523–I14
DATE FEBRUARY 2010

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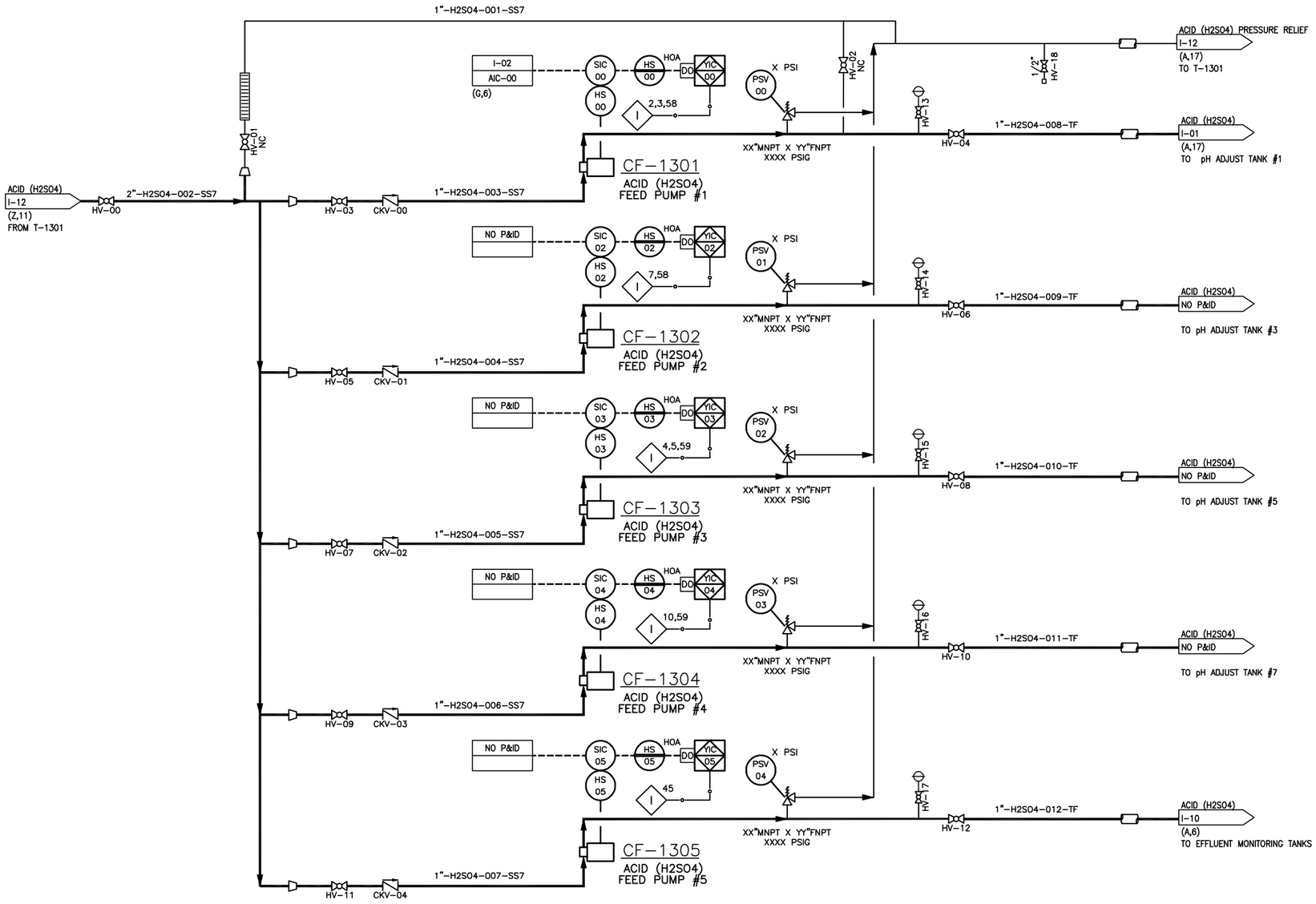

NOTES:

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INTERLOCKS:

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O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

CHEMICAL FEED SYSTEMS – H2SO4

P&ID

CF-1301
ACID FEED PUMP #1
TYPE: 93% SULFURIC ACID
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF-1302
ACID FEED PUMP #2
TYPE: 93% SULFURIC ACID
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF-1303
ACID FEED PUMP #3
TYPE: 93% SULFURIC ACID
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF-1304
ACID FEED PUMP #4
TYPE: 93% SULFURIC ACID
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

CF-1305
ACID FEED PUMP #5
TYPE: 93% SULFURIC ACID
CAPACITY: 5 TO 50 GPH
HP: 0.5 HP
MOC: TBD

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3/10/10

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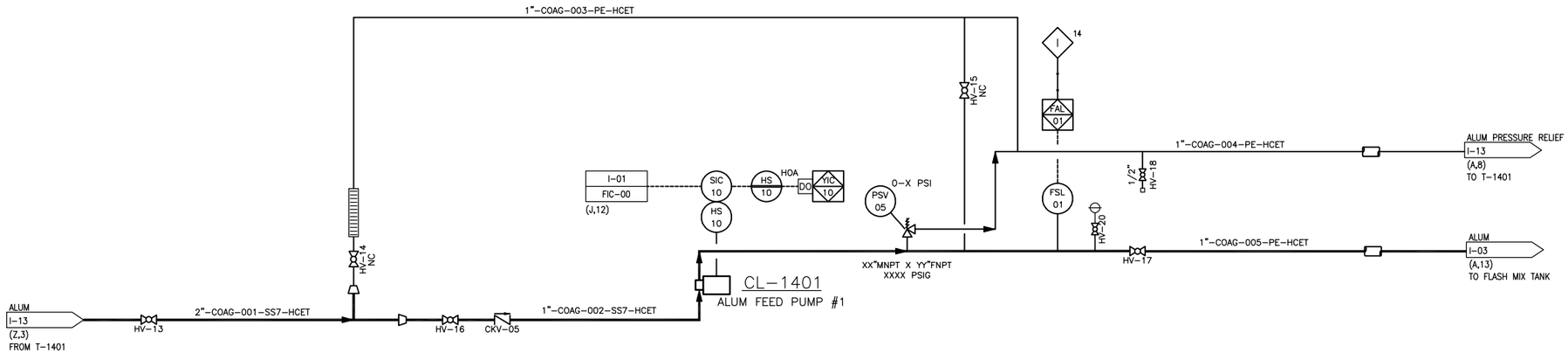
FILE NO. 1163.44523-I15
DATE FEBRUARY 2010

I-15



NOTES:

1. –

INTERLOCKS:

REFER TO SHEET I-C

CL-1401
ALUM FEED PUMP
TYPE: 20% ALUM
CAPACITY: 0-72 GPH
HP: 0.5 HP
MOC: TBD

PRELIMINARY NOT FOR CONSTRUCTION

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O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

CHEMICAL FEED – ALUM
P&ID

IN CHARGE OF JSR
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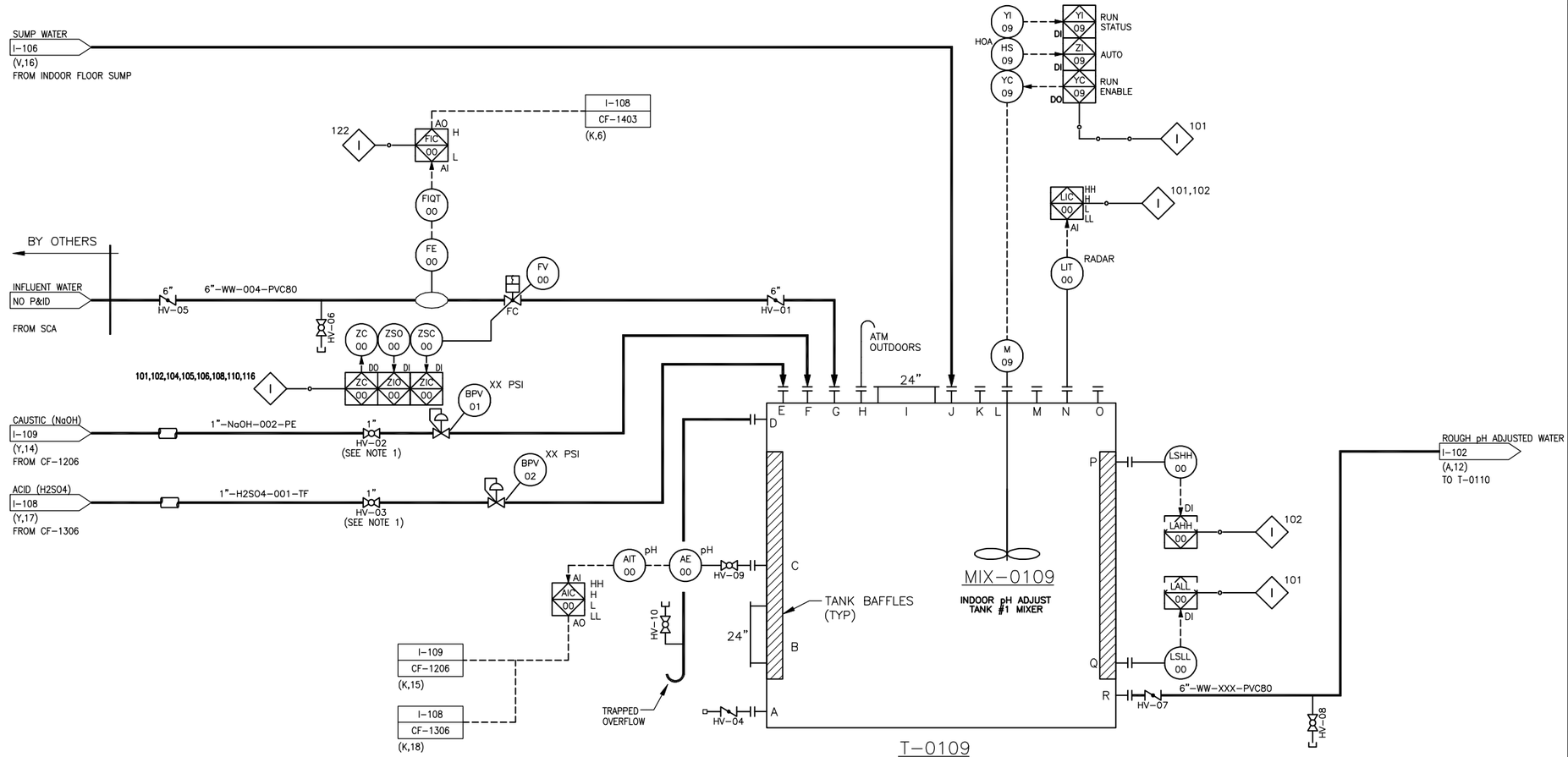
DATE FEBRUARY 2010

I-16



NOTES:

1. LOCATE CHEMICAL FEED ISOLATION VALVES AND BPV's CLOSE TO TOP OF TANK.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

INDOOR pH ADJUSTMENT TANK #1

P&ID

T-0109
INDOOR pH ADJUST TANK #1
SIZE: 10' DIA. x 14'-10" HIGH
VOLUME: APPROXIMATELY 7,500 GALLONS
MOC: FRP
DESIGN: ATMOSPHERIC
TYPE: VERTICAL CYLINDRICAL

MIX-0109
INDOOR pH ADJUST TANK #1 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: xxHP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I101
DATE FEBRUARY 2010

I-101

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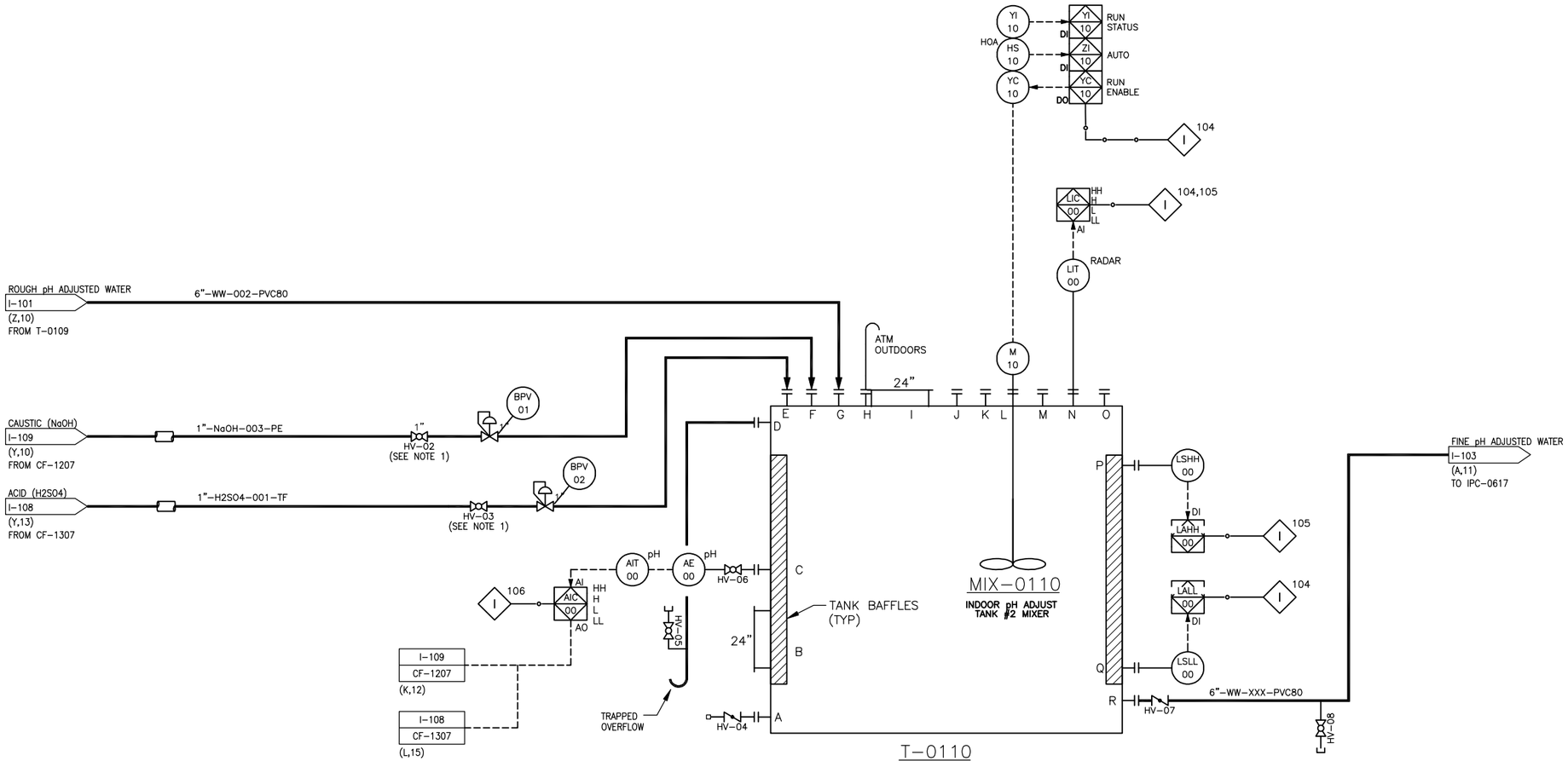


T-0110
INDOOR pH ADJUST TANK #2

NOTES:

1. LOCATE CHEMICAL FEED ISOLATION VALVES AND BPV's CLOSE TO TOP OF TANK.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

INDOOR pH ADJUSTMENT TANK #2

P&ID

T-0110
INDOOR pH ADJUST TANK #2
SIZE: 10' DIA. x 14'-10" HIGH
VOLUME: APPROXIMATELY 7,500 GALLONS
MOC: FRP
DESIGN: ATMOSPHERIC
TYPE: VERTICAL CYLINDRICAL

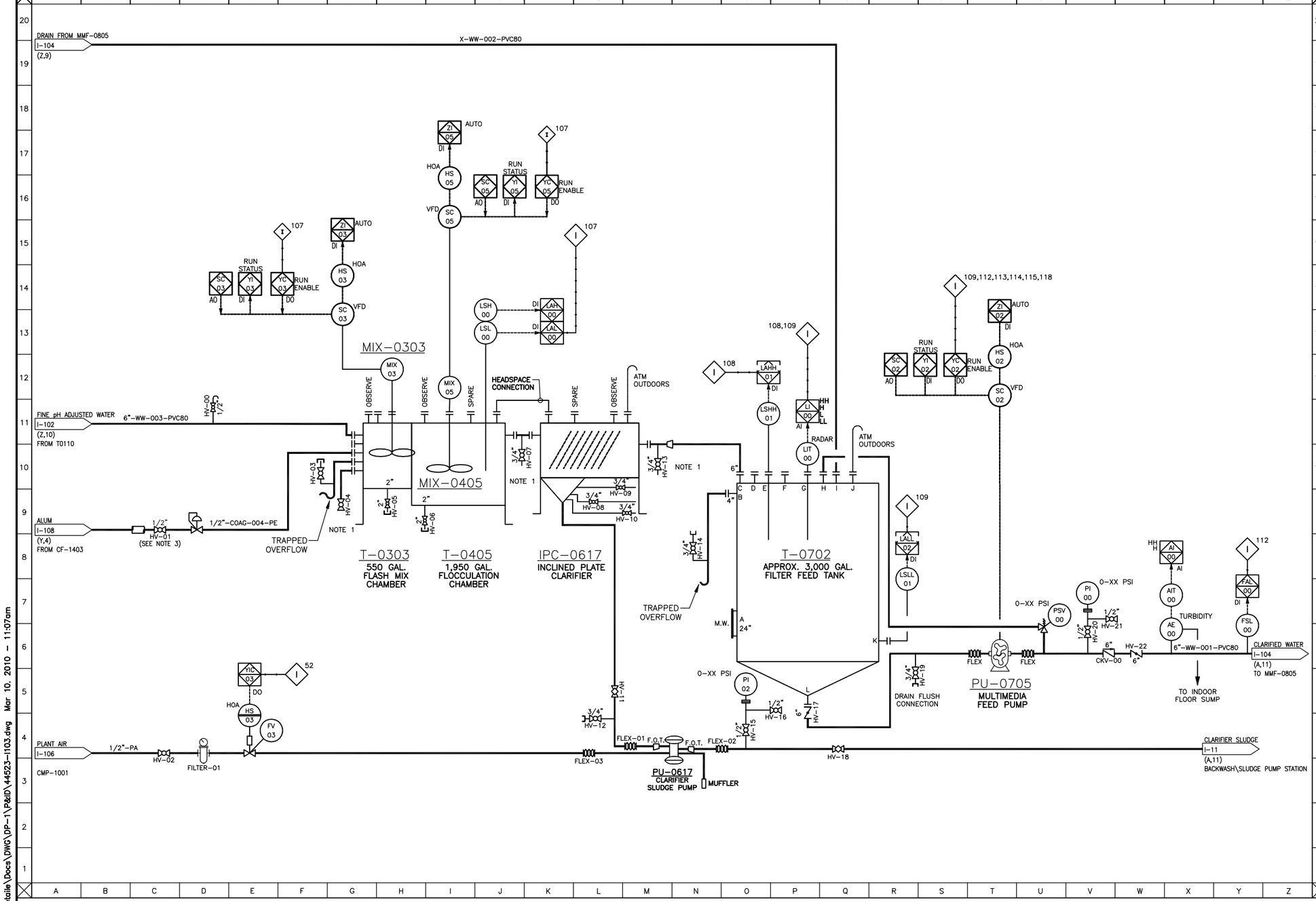
MIX-0110
INDOOR pH ADJUST TANK #2 MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: xxHP / 480V / 3PH
AGITATOR RPM: TBD
IMPELLER: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I102
DATE FEBRUARY 2010

I-102



NOTES:

1. SAMPLE POINTS AT FLASH MIX TANK, FLOC AND IPC DISCHARGES.
2. VENDOR SUPPLIED FLASH MIX/FLOC/IPC SYSTEM TO BE INSTALLED PER VENDOR'S DRAWINGS AND INSTRUCTIONS.
3. LOCATE ISOLATION VALVE AND BPV CLOSE TO TOP OF TANK.

INTERLOCKS:

REFER TO SHEET I-C

T-0303
FLASH MIX CHAMBER
SIZE: TBD
VOLUME: 550 GAL.
MOC: TBD
DESIGN: ATMOSPHERIC
ACCESSORIES: REMOVABLE COVER

MIX-0303
FLASH MIX AGITATOR
TYPE: VARIABLE SPEED
MOC: 316SS
MOTOR: xxHP / xxV / xPH
AGITATOR RPM: TBD
IMPELLER: TBD

T-0405
FLOCCULATION CHAMBER
SIZE: TBD
VOLUME: 1950 GAL.
MOC: TBD
DESIGN:
ACCESSORIES: REMOVABLE COVER

MIX-0405
FLOC MIX AGITATOR
TYPE: VARIABLE SPEED
MOC: 316SS
MOTOR: xxHP / xxV / xPH
AGITATOR RPM: TBD
IMPELLER: TBD

IPC-0617
INCLINED PLATE CLARIFIER
SIZE: 28'-4" Lx10'-11" Wx17'8" H
VOLUME: TBD
MOC: TBD
DESIGN: ATMOSPHERIC
ACCESSORIES: REMOVABLE COVER

PU-0617
CLARIFIER SLUDGE PUMP
PUMP TYPE: TBD
DESIGN FLOW: TBD
SUPPLY PRESS: TBD
MOC: TBD

T-0702
FILTER FEED TANK
SIZE: TBD
VOLUME: APPROXIMATELY 3,000 GAL.
MOC: TBD
DESIGN: VERTICAL CYLINDRICAL, CONE BOTTOM

PU-0705
MULTIMEDIA FEED PUMP
TYPE: PROGRESSING CAVITY
CAPACITY: 500 GPM
HP: TBD
MOC: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

NO.	DATE	REVISION	INIT.
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B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
INDOOR CLARIFICATION AND FILTER FEED
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I103
DATE FEBRUARY 2010

I-103

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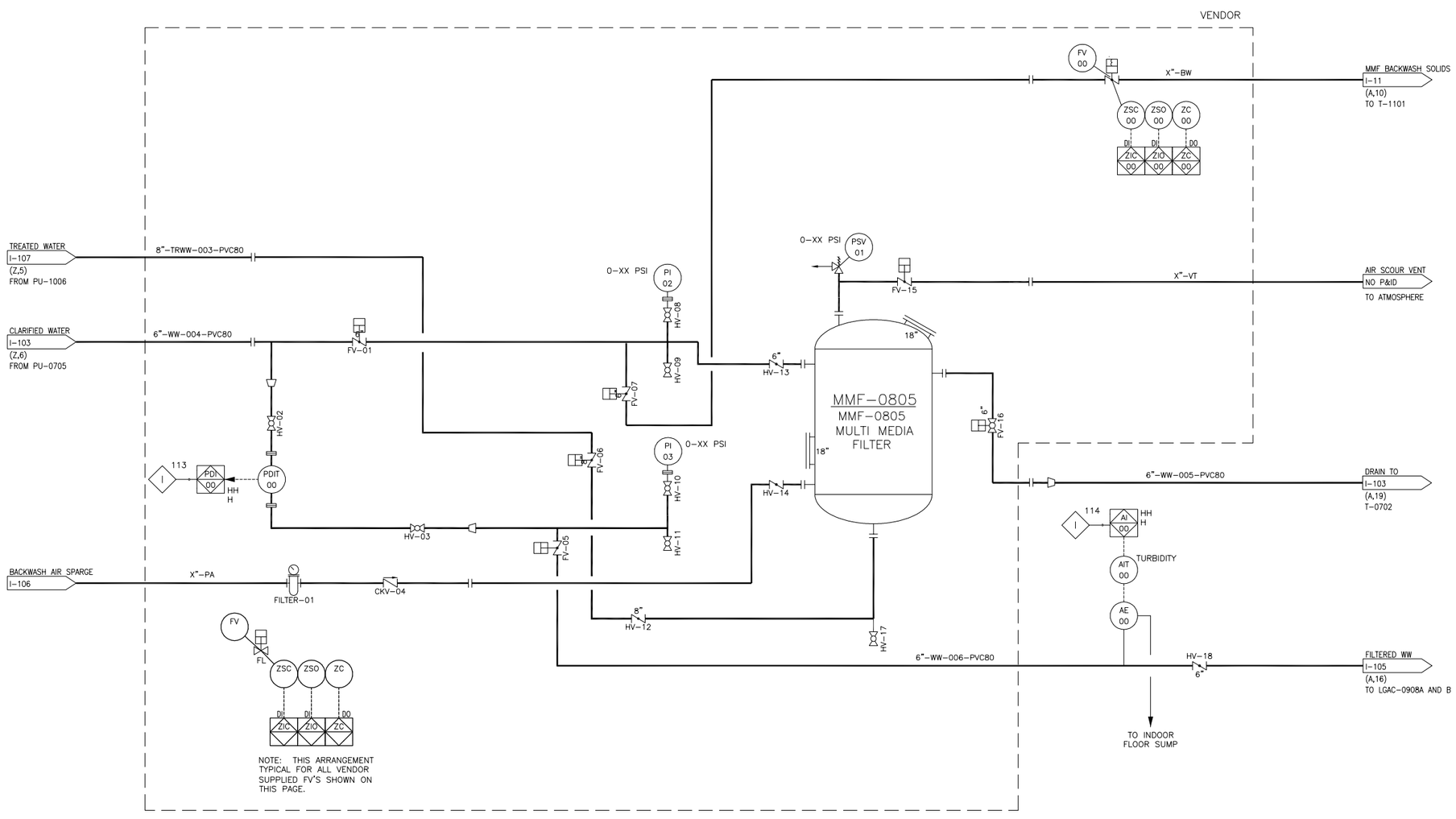


NOTES:

1. FL = FAIL LAST. TYPICAL FOR ALL FV's ON VENDOR PACKARE SHOWN ON THIS SHEET.
2. VENDOR SUPPLIED MULTI-MEDIA FILTER SYSTEM TO BE INSTALLED PER VENDOR'S APPROVED SHOP DRAWINGS AND INSTRUCTIONS.

INTERLOCKS:

REFER TO SHEET I-C

MMF-0805

MULTI MEDIA FILTER

QTY=1
SIZE: APPROX. 12' DIA.
MOC: LINED STEEL
DESIGN: VERTICAL, CYLINDRICAL, DISHED-BOTTOM, DISHED HEAD
DESIGN FLOW: 500 GPM
BACKWASH: TBD GPM

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE: 3/10/10

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE
ENGINEERS INC.

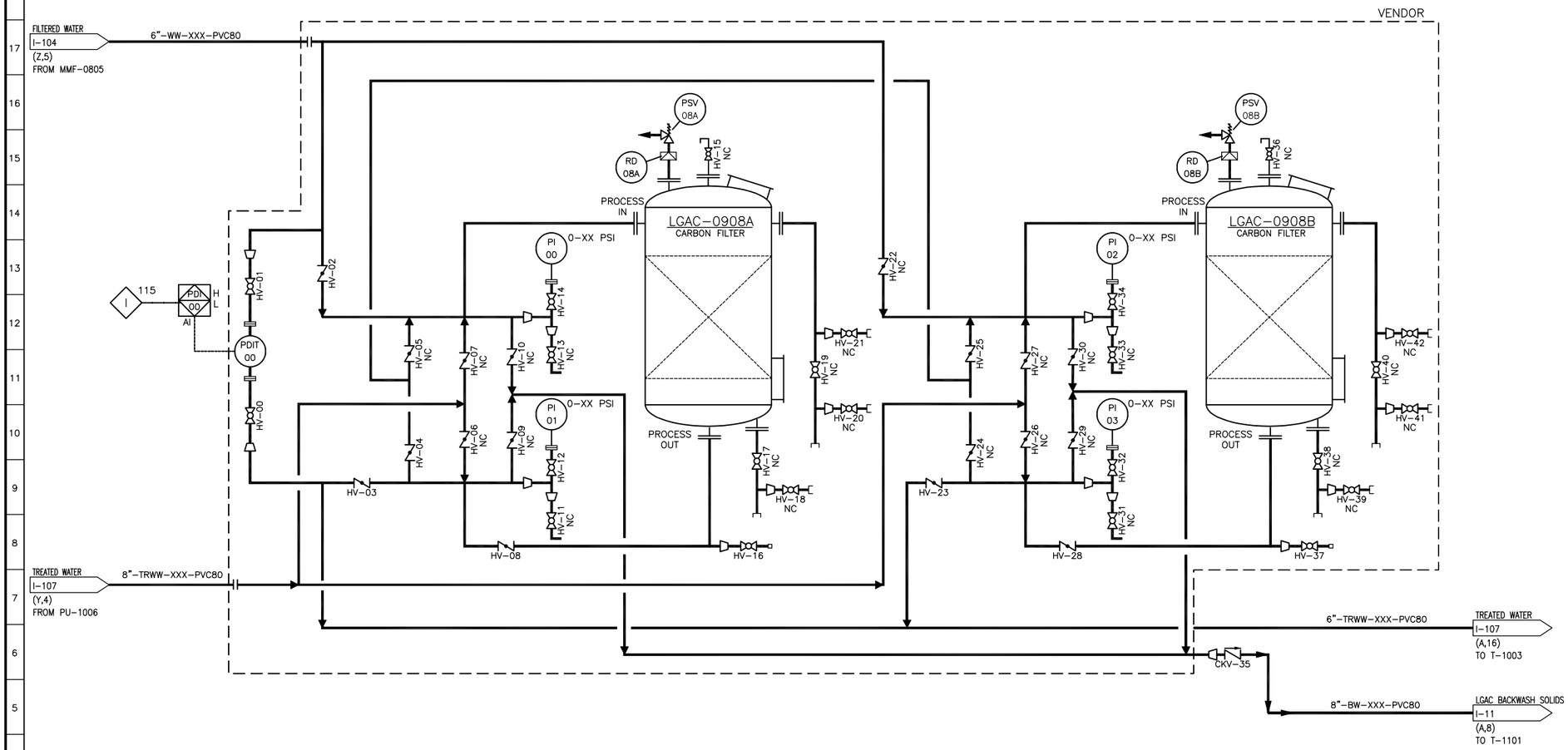
HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
INDOOR MULTIMEDIA FILTER
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I104
DATE FEBRUARY 2010

I-104



NOTES:

1. NORMAL VALVE POSITIONS ARE SHOWN ASSUMING LGAC-0908A IS THE LEAD VESSEL. POSITION VALVES FOR LGAC-0908B LEAD POSITION OPERATION OR BACKWASHING PER EQUIPMENT VENDORS INSTRUCTIONS.
2. VENDOR SUPPLIED GAC SYSTEM TO BE INSTALLED PER VENDOR'S APPROVED SHOP DRAWINGS AND INSTRUCTIONS.

INTERLOCKS:

REFER TO SHEET I-C

LGAC-0908A, 0908B

CARBON FILTERS

DESIGN FLOW:	500 GPM
BACKWASH FLOW:	TBD
P/T RATING:	125 PSI @ 150 DEGREES F
VESSEL DIMENSIONS:	12' DIA. x 15'-9" H
MOC:	LINED STEEL
MASS OF CARBON:	20,000 LB DRY (EACH VESSEL)

PRELIMINARY NOT FOR CONSTRUCTION

DATE: 3/10/10

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B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

INDOOR CARBON FILTERS

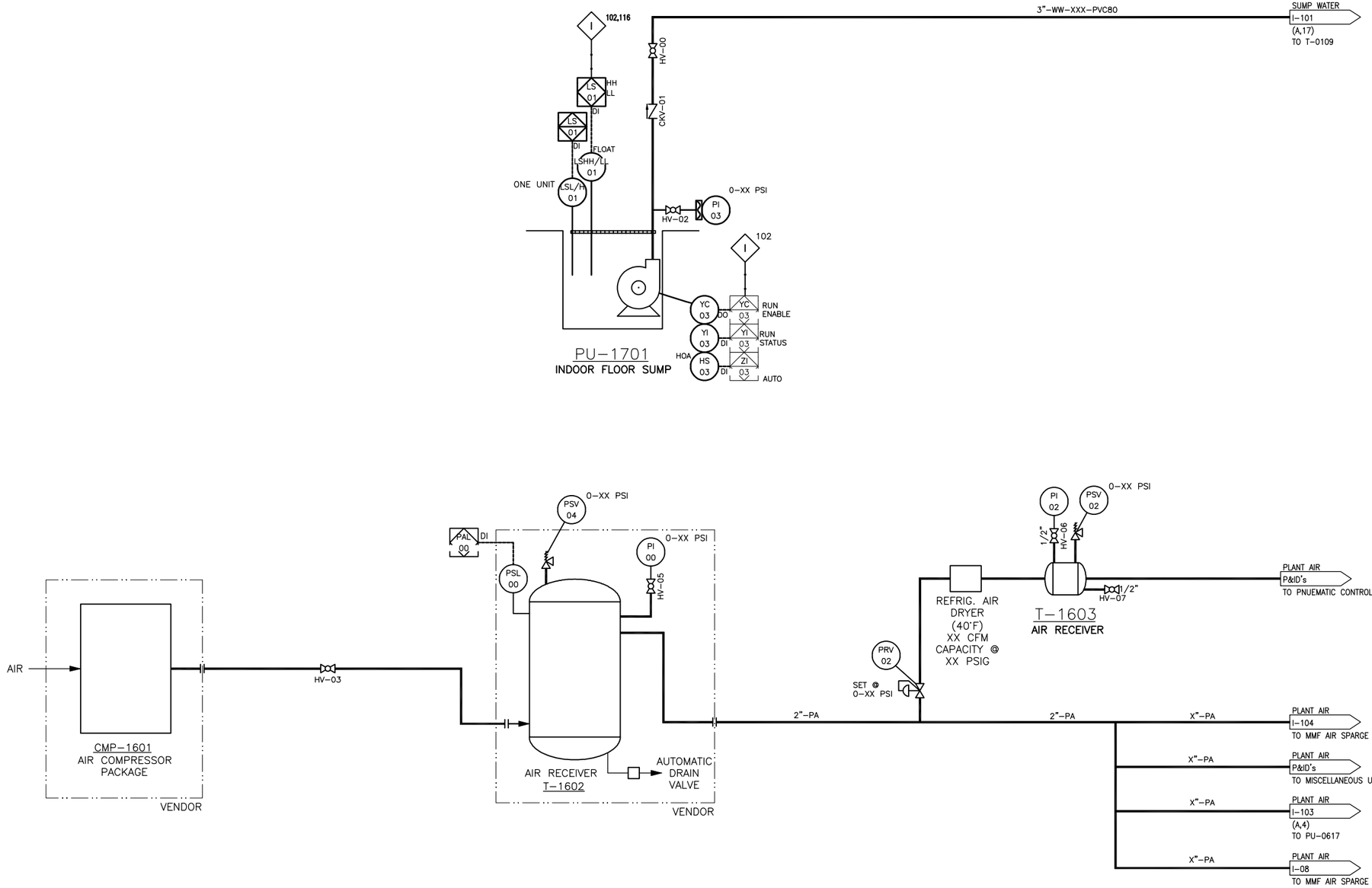
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I105

DATE FEBRUARY 2010

I-105



NOTES:

1. —

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

AIR COMPRESSOR AND INDOOR FLOOR SUMP P&ID

CMP-1601
AIR COMPRESSOR
TYPE: ROTARY SCREW
CAPACITY: 305 CFM
138 PSIG
HP: APPROX. 75
ACCESSORIES: AFTERCOOLER
DIM: APPROX. 40"L x 22"W x 35"H

T-1602
AIR RECEIVER
CAPACITY: 400 GAL.
TYPE: VERTICAL
SIZE: 3' DIA. x 7'-10"H
MOC: CARBON STEEL
ACCESSORIES: SAFETY RELIEF VALVE
PRESSURE GAUGE
ELECTRONIC DRAIN VALVE
PRESSURE RATING: 165 PSIG

PU-1701
INDOOR FLOOR SUMP PUMP
TYPE: SUBMERSIBLE
CAPACITY: 25 GPM
HP: TBD
MOC: CAST IRON

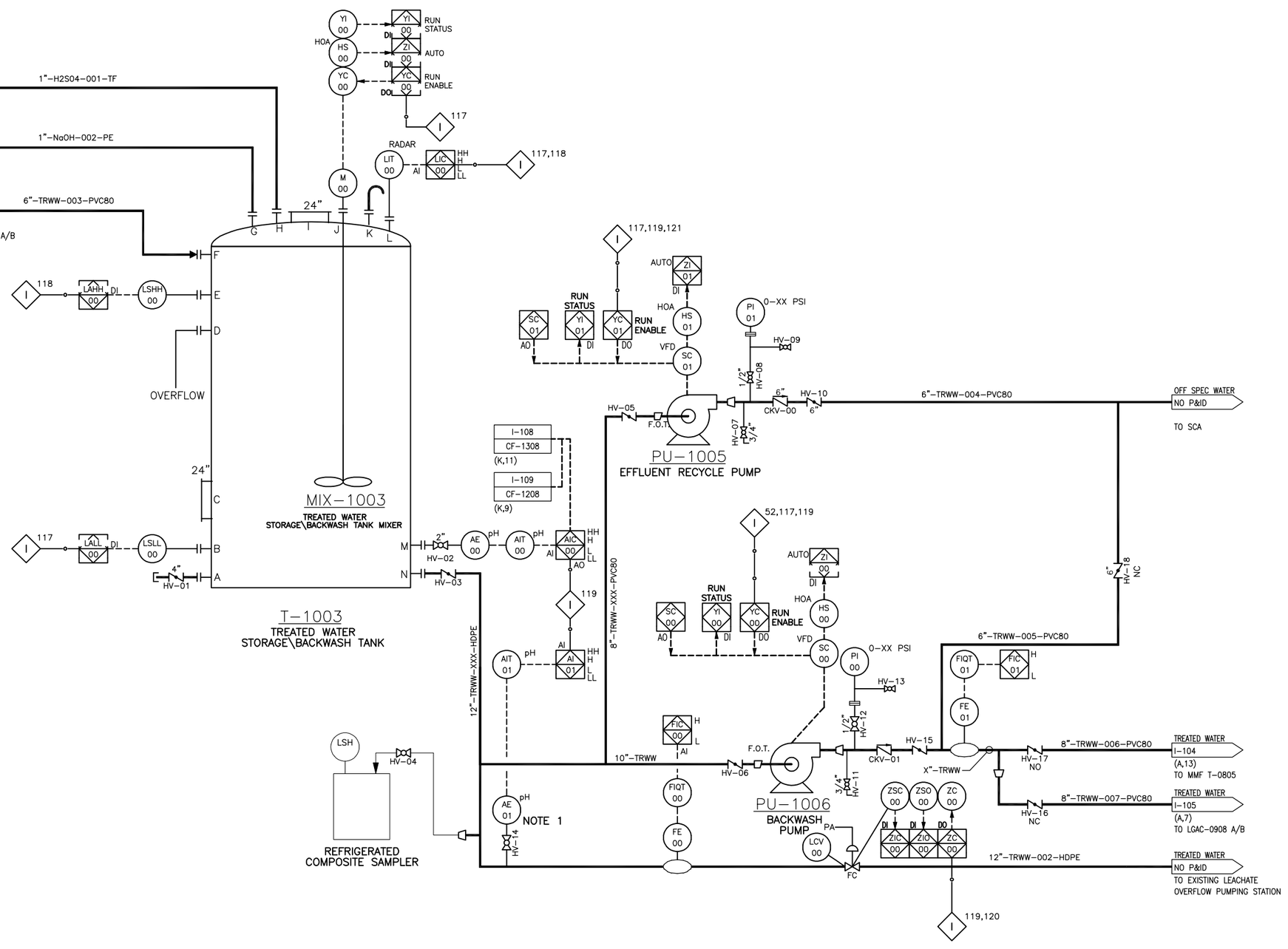
T-1603
AIR RECEIVER
CAPACITY: 52 GAL.
TYPE: HORIZONTAL
SIZE: APPROX. 17"DIA. x 53"L
MOC: CARBON STEEL
ACCESSORIES: SAFETY RELIEF VALVE
ELECTRONIC DRAIN VALVE
PRESSURE RATING: 160 PSIG

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I106
DATE FEBRUARY 2010

I-106



NOTES:

1. INSTALL pH PROBE AND FLOW METERS TO BE CONSTANTLY SUBMERGED AND WITH THE MANUFACTURERS REQUIRED STRAIGHT RUNS.

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TRAETMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
INDOOR TREATED WATER STORAGE / BACKWASH TANK
P&ID

T-1003
TREATED WATER STORAGE\BACKWASH TANK
SIZE: TBD
VOLUME: TBD
MOC: FRP
DESIGN: VERT., CYLINDRICAL

MIX-1003
TREATED WATER STORAGE\BACKWASH TANK MIXER
TYPE: TOP ENTRY
MOC: 316SS
MOTOR: xxHP / xxV / xPH
AGITATOR RPM: TBD
IMPELLER: TBD

PU-1005
EFFLUENT RECYCLE PUMP
TYPE: HORIZ. CENTRIFUGE
CAPACITY: 500 GPM
HP: TBD
MOC: 316SS

PU-1006
BACKWASH PUMP
TYPE: HORIZ. CENTRIFUGAL
CAPACITY: APPROX. 1700 GPM
HP: TBD
MOC: 316SS

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I107
DATE FEBRUARY 2010

I-107

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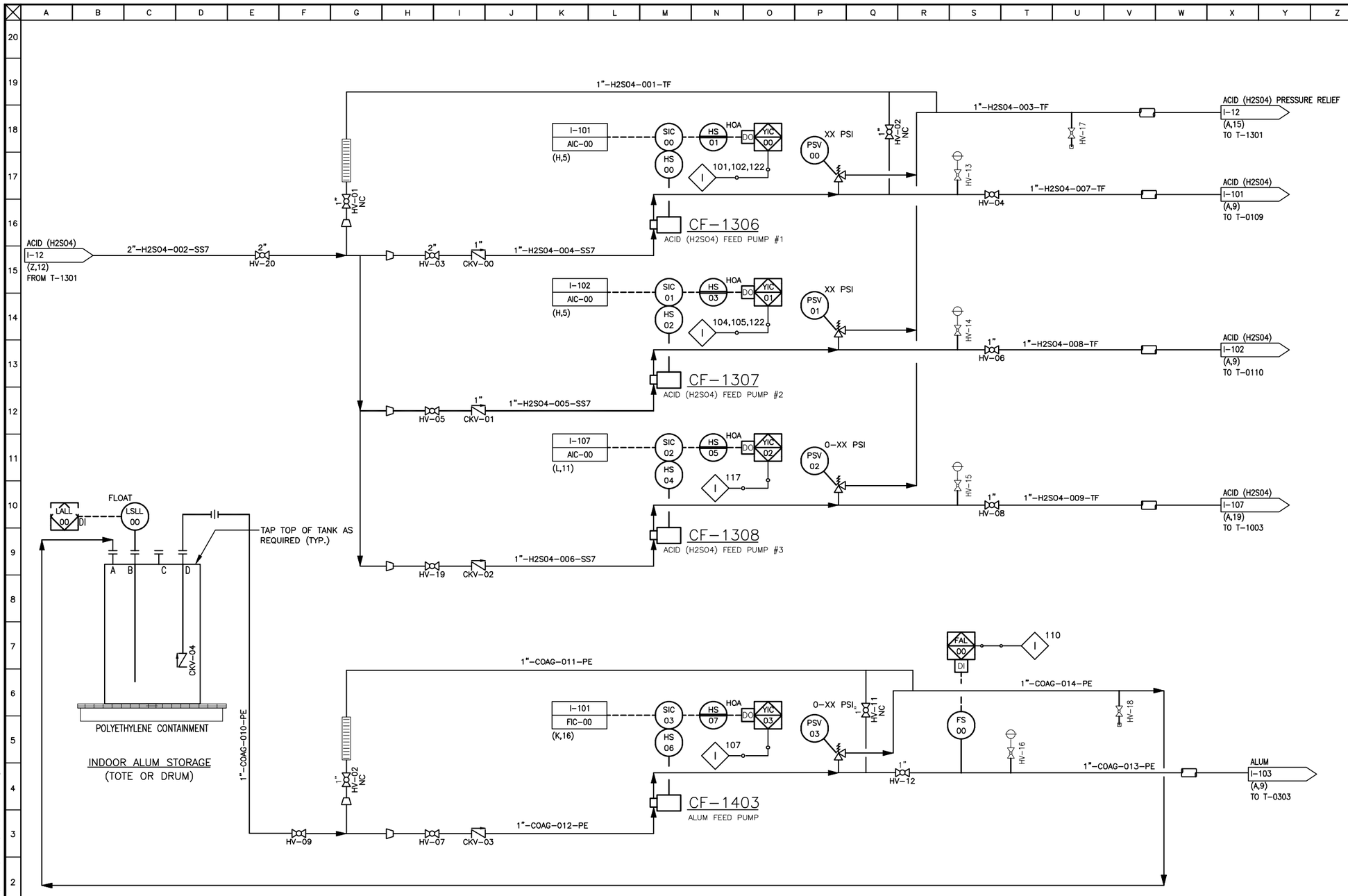

NOTES:

1. –

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

CF-1306
SERVICE: 93% H2SO4
CAPACITY: 0 TO 10 GPM
DISCHARGE: TBD
RPM: TBD
HP: TBD

CF-1307
SERVICE: 93% H2SO4
CAPACITY: 0 TO 10 GPM
DISCHARGE: TBD
RPM: TBD
HP: TBD

CF-1308
SERVICE: 93% H2SO4
CAPACITY: 0 TO 10 GPM
DISCHARGE: TBD
RPM: TBD
HP: TBD

CF-1403
SERVICE: 20% ALUM
CAPACITY: 0 TO 10 GPM
DISCHARGE: TBD
RPM: TBD
HP: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

O'BRIEN & GERE ENGINEERS INC.

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION
INDOOR CHEMICAL FEED SYSTEMS – ACID/ALUM
P&ID

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I108
DATE FEBRUARY 2010

I-108

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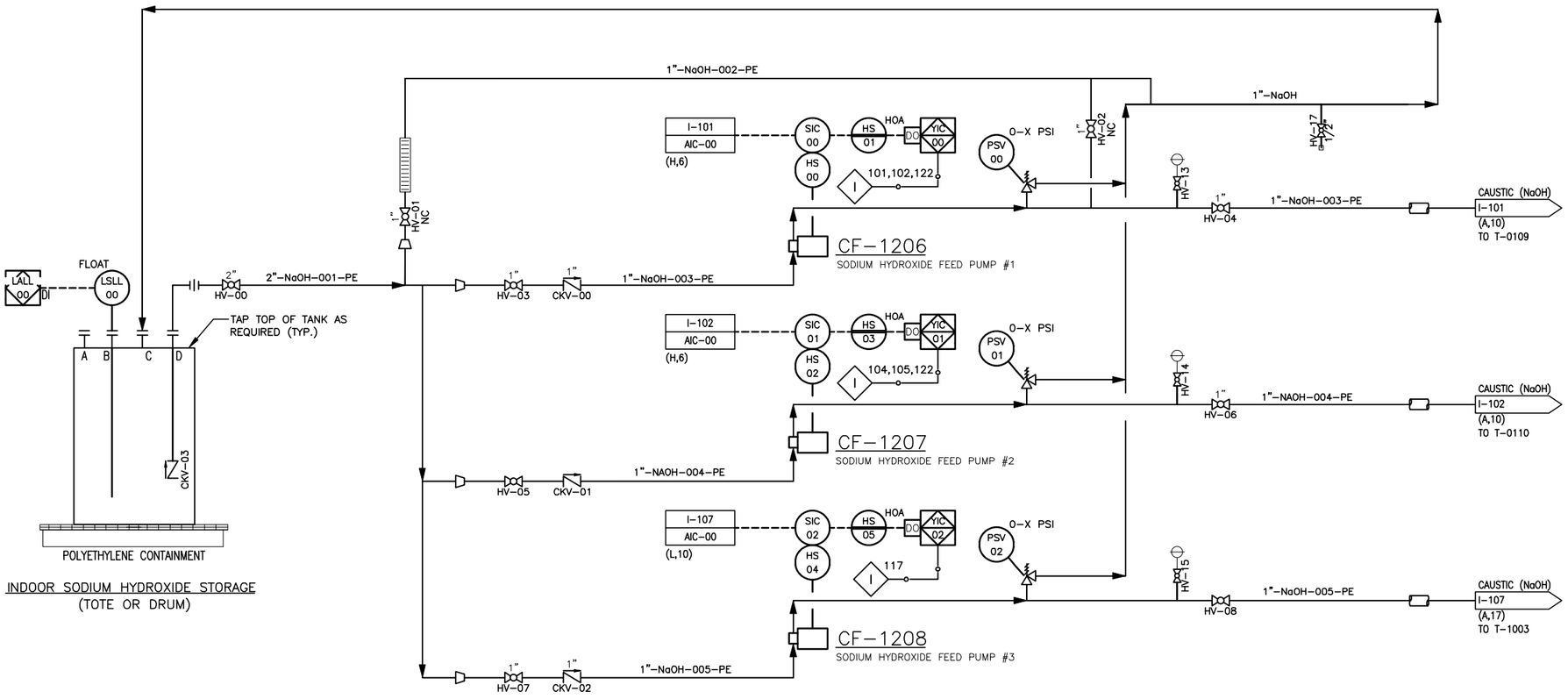

NOTES:

1. —

INTERLOCKS:

REFER TO SHEET I-C

NO.	DATE	REVISION	INIT.
C	3/10/10	DP #1 FOR NYSDEC AND COUNTY REVIEW	
B	2/12/10	DP #1 DRAFT FOR HONEYWELL REVIEW	
A	2/4/10	DP #1 INTERNAL REVIEW	

HONEYWELL INTERNATIONAL, INC.
DP #1
WATER TREATMENT PLANT
TOWN OF CAMILLUS, NEW YORK

PROCESS AND INSTRUMENTATION

INDOOR CHEMICAL FEED SYSTEMS – SODIUM HYDROXIDE P&ID

CF-1206
SERVICE: 50% SODIUM HYDROXIDE
CAPACITY: 0 TO 10 GPH
DISCHARGE: TBD
RPM: TBD
HP: TBD

CF-1207
SERVICE: 50% SODIUM HYDROXIDE
CAPACITY: 0 TO 10 GPH
DISCHARGE: TBD
RPM: TBD
HP: TBD

CF-1208
SERVICE: 50% SODIUM HYDROXIDE
CAPACITY: 0 TO 10 GPH
DISCHARGE: TBD
RPM: TBD
HP: TBD

PRELIMINARY NOT FOR CONSTRUCTION
DATE: 3/10/10

IN CHARGE OF JSR
DESIGNED BY GBE CHECKED BY PDS
DRAWN BY JAS

FILE NO. 1163.44523-I109
DATE FEBRUARY 2010

I-109

TECHNICAL SPECIFICATIONS

SECTION 01160

SPILL AND DISCHARGE CONTROL

PART 1 GENERAL

1.1 WORK INCLUDED

A. Preparation, submission, and implementation of an acceptable Spill and Discharge Control Plan by the Contractor as specified herein and in accordance with all provisions of the Contract Documents.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Honeywell Syracuse Portfolio Health and Safety Programs (HSP2)

1.3 APPLICABLE CODES, STANDARDS, AND SPECIFICATIONS

A. Not Used.

1.4 SUBMITTALS

A. The following items shall be submitted:

1. Spill and Discharge Control Plan

2. Spill Incident Reports

PART 2 PRODUCTS

2.1 GENERAL

A. Spill and Discharge Control (SDC) Plan

1. The Contractor shall develop, implement, maintain, supervise, and be responsible for a Spill and Discharge Control Plan. This SDC Plan shall provide contingency measures for potential spills of oil and hazardous materials and construction-related materials including, but not limited to, fuels, hydraulic fluids, lubricants, and construction water.

2. Procedures outlined in the SDC Plan shall follow applicable local, State, and Federal laws and regulations. The plan shall, at a minimum, contain the following:

a. Procedures for Containing Dry and Liquid Spills.
b. Absorbent Material available on-site.
c. Procedures for collection, storage, and handling/disposal of spilled materials.
d. Decontamination Procedures. Decontamination procedures may be required after cleanup to eliminate traces of the substance spilled or reduce it to an acceptable level. Acceptable levels shall be in accordance with all applicable local, State, and Federal laws and

regulations and shall be approved by the New York State Department of Environmental Conservation (NYSDEC). Complete cleanup may require removal of contaminated soils. All contaminated materials that cannot be decontaminated must be properly containerized, labeled, and properly disposed of within 90 days. Any and all testing and disposal costs related to the cleanup of a spill caused by the Contractor's activities shall be borne by the Contractor.

e. Spill Incident Report Format. A written report detailing the spill or discharge shall include, at a minimum, the cause and resolution of the incident, the substance and quantity spilled, outside agencies involved, date and time the incident occurred and actions taken to prevent incident reoccurrence. The report shall be submitted to the Owner's Representative, the Owner, and NYSDEC, within 24 hours of the incident, and earlier if necessary to comply with local, state, or federal regulations. The Contractor shall document the location of all spills on the Site Drawings and submit the Drawings to the Owner's Representative at project completion.

B. Spill and Discharge Control

1. The Contractor shall provide methods, means, equipment, facilities, and personnel required to prevent contamination of soil, water, air, equipment, or materials by the discharge of bulk wastes from spills due to Contractor's operations.

2. The Contractor shall provide methods, means, equipment, facilities and personnel to perform emergency measures required to contain any spillage and to remove spilled materials and soils or liquids that become contaminated due to spillage. All collected spill material shall be properly disposed of at the Contractor's expense.

C. Decontamination

1. The Contractor shall provide equipment and personnel to perform decontamination measures that may be required to remove spillage from previously uncontaminated structures, equipment, or material. Decontamination residues shall be properly disposed of at the Contractor's expense. Hazardous waste shall be handled in accordance with local, state and Federal regulations.

PART 3 EXECUTION

3.1 GENERAL

A. Contractor shall be responsible for all liabilities related to spills, discharges, leaks, or emissions from equipment, tankage, vessels, drums, or any other devices owned, operated, or controlled by the Contractor, his subcontractors, vendors, personnel, agents, or assigns.

B. In the case of a spill or discharge, the Contractor shall follow procedures outlined in the SDC Plan.

3.2 NOTIFICATION

A. The Contractor shall notify the Owner and Owner's Representative at the time of occurrence and follow-up in writing within 24 hours.

B. The Contractor shall report a spill or discharge to regulatory agencies, as necessary to comply with local, state, and federal regulations.

* * * * *

SECTION 02111

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes clearing and grubbing by removal or destruction of trees, underbrush, logs, stumps, decayed or growing organic matter above the surface of the ground, and snow and ice which interfere with construction or landscaping, specified or directed within or adjacent to the lines of work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Earthwork, Section 02220

B. Restoration of Surfaces, Section 02503

PART 2 PRODUCTS

2.1 Not Used.

PART 3 EXECUTION

3.1 GENERAL

A. Only those portions of the site necessary and essential to be cleared for work shall be cleared.

B. Removal of brush, trees, stumps, and spoil

1. Contractor shall chip brush, tree trunks and tree limbs.

2. Contractor shall likewise chip tree stumps, provided however, that if the tree was located in a potentially contaminated area, all soil adhering to the stump must first be removed prior to chipping. Soil adhering to the stump shall be handled in a manner accepted by the Owner's Representative.

3. All chipped brush, trees, stumps, and spoil material shall be removed from the area and disposed of by the Contractor in a manner accepted by the Owner and Owner's Representative.

* * * * *

SECTION 02220

EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes excavation and backfilling including the loosening, removing, refilling, transporting, storage and disposal of all materials classified as "earth" necessary to be removed for the construction and completion of all work under the Contract, and as shown on the Contract Drawings, specified or directed.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)

a. A328 Specification for Steel Sheet Piling
b. D698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3)
c. D1556 Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
d. D1760 Specification for Pressure Treatment of Timber Products
e. D2922 Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depth)

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Material Handling and Disposal, Section 01170

1.4 DEFINITIONS

A. Excavation (or Trenching)

1. Grubbing, stripping, removing, storing and rehandling of all materials of every name and nature necessary to be removed for all purposes incidental to the construction and completion of all the work under construction.

2. All sheeting, sheetpiling, bracing and shoring, and the placing, driving, cutting off and removing of the same.

3. All diking, ditching, fluming, cofferdamming, pumping, bailing, draining, well pointing, or otherwise disposing of water.

4. The removing and disposing of all surplus materials from the excavations in the manner specified.

5. The maintenance, accommodation and protection of travel.

6. The supporting and protecting of all tracks, rails, buildings, curbs, sidewalks, pavements, overhead wires, poles, trees, vines, shrubbery, pipes, sewers, conduits or other structures or property in the vicinity of the work, whether over- or underground or which appear within or adjacent to the excavations, and the restoration of the same in case of settlement or other injury.

7. All temporary bridging and fencing and the removing of same.

B. Earth

1. All materials such as sand, gravel, clay, loam, ashes, cinders, pavements, muck, roots or pieces of timber, soft or disintegrated rock, not requiring blasting, barring, or wedging from their original beds, and specifically excluding all ledge or bedrock and individual boulders or masonry larger than one-half cubic yard in volume.

C. Backfill

1. The refilling of excavation and trenches to the line of filling indicated on the Contract Drawings or as directed using materials suitable for refilling of excavations and trenches; and the compacting of all materials used in filling or refilling by rolling, ramming, watering, puddling, etc., as may be required.

D. Spoil

1. Surplus excavated materials not required or not suitable for backfills or embankments.

E. Embankments

1. Fills constructed above the original surface of the ground or such other elevation as specified or directed.

F. Limiting Subgrade

1. 6-inches below the underside of the pipe barrel for pipelines
2. 6-inches below the underside of footing lines for structures

G. Excavation Below Subgrade

1. Excavation below the limiting subgrades of structures or pipelines.

2. Where materials encountered at the limiting subgrades are not suitable for proper support of structures or pipelines, the Contractor shall excavate to such new lines and grades as required.

PART 2 PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

A. Wood Sheeting and Bracing

1. Shall be sound and straight; free from cracks, shakes and large or loose knots; and shall have dressed edges where directed.

2. Shall conform to National Design Specifications for Stress Grade Lumber having a minimum fiber stress of 1200 pounds per square inch.

3. Sheeting and bracing to be left-in-place shall be pressure treated in accordance with ASTM D1760 for the type of lumber used and with a preservative approved by the Owner's Representative.

B. Steel Sheeting and Bracing

1. Shall be sound

2. Shall conform to ASTM A328 with a minimum thickness of 3/8 inch.

PART 3 EXECUTION

3.1 UNAUTHORIZED EXCAVATION

A. Whenever excavations are carried beyond or below the lines and grades shown on the Contract Drawings, or as given or directed by the Owner's Representative, all such excavated space shall be refilled with special granular materials, concrete or other materials as the Owner's Representative may direct. All refilling of unauthorized excavations shall be at the Contractor's expense.

B. All material which slides, falls or caves into the established limits of excavations due to any cause whatsoever, shall be removed and disposed of at the Contractor's expense and no extra compensation will be paid the Contractor for any materials ordered for refilling the void areas left by the slide, fall or cave-in.

3.2 REMOVAL OF WATER

A. General

1. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the excavations, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work or the proper placing of pipes, structures, or other work.

2. Unless otherwise specified, all excavations which extend down to or below the static groundwater elevations shall be dewatered by lowering and maintaining the groundwater beneath such excavations at all times when work thereon is in progress, during subgrade preparation and the placing of the structure or pipe thereon.

3. Water shall not be allowed to rise over or come in contact with any masonry, concrete or mortar, until at least 24 hours after placement, and no stream of water shall be allowed to flow over such work until such time as the Owner's Representative may permit.

4. Where the presence of fine grained subsurface materials and a high groundwater table may cause the upward flow of water into the excavation with a resulting quick or unstable condition, the Contractor shall install and operate a well point system to prevent the upward flow of water during construction.

5. Water pumped or drained from excavations, or any sewers, drains or water courses encountered in the work, shall be managed per Section 02141 Construction Water Management and without injury to adjacent property, the work under construction, or to pavements, roads, drives, and water courses. No water shall be discharged to sanitary sewers.

6. Any damage caused by or resulting from dewatering operations shall be the sole responsibility of the Contractor.

B. Work Included

1. The construction and removal of sheeting and bracing, and the furnishing of materials and labor necessary therefor.

2. The excavation and maintenance of ditches.

3. The furnishing and operation of pumps, well points, and appliances needed to maintain thorough drainage of the work in a satisfactory manner.

3.3 STORAGE OF MATERIALS

A. Sod

1. Any sod cut during excavation shall be removed and stored during construction so as to preserve the grass growth. Sod damaged while in storage shall be replaced in like kind at the sole expense of the Contractor.

B. Topsoil

1. Topsoil suitable for final grading shall be removed and stored separately from other excavated material.

C. Excavated Materials

1. All excavated materials shall be stored in locations so as not to endanger the work, and so that easy access may be had at all times to all parts of the excavation. Stored materials shall be kept neatly piled and trimmed, so as to cause as little inconvenience as possible to public travel or to adjoining property holders. Erosion & Sediment control practices shall be installed, inspected, and maintained around stockpiled material.

2. Special precautions must be taken to permit access at all times to fire hydrants, fire alarm boxes, police and fire department driveways, and other points where access may involve the safety and welfare of the general public.

3.4 DISPOSAL OF MATERIALS

A. Spoil Material

1. All spoil materials shall be disposed of on site in a location designated by the Owner's Representative and as required by the local, state or federal regulations pertaining to the area.

2. The surface of all spoil areas shall be graded and dressed and no unsightly mounds or heaps shall be left on completion of the work.

3.5 SHEETING AND BRACING

A. Installation

1. The Contractor shall furnish, place and maintain such sheeting, bracing and shoring as may be required to support the sides and ends of excavations in such manner as to prevent any movement which could, in any way, injure the pipe, structures, or other work; diminish the width necessary for construction; otherwise damage or delay the work of the Contract; endanger existing structures, pipes or pavements; or cause the excavation limits to exceed the right-of-way limits.

2. In no case will bracing be permitted against pipes or structures in trenches or other excavations.

3. Sheeting shall be driven as the excavation progresses, and in such manner as to maintain pressure against the original ground at all times. The sheeting shall be driven vertically with the edges tight together, and all bracing shall be of such design and strength as to maintain the sheeting in its proper position. Seepage which carries fines through the sheeting shall be plugged to retain the fines.

4. Where breast boards are used between soldier pile, the boards shall be back packed with soil to maintain support.

5. The Contractor shall be solely responsible for the adequacy of all sheeting and bracing.

B. Removal

1. In general, all sheeting and bracing, whether of steel, wood or other material, used to support the sides of trenches or other open excavations, shall be withdrawn as the trenches or other open excavations are being refilled. That portion of the sheeting extending below the top of a pipe or structural foundation shall not be withdrawn, unless otherwise directed,

before more than 6 inches of earth is placed above the top of the pipe or structural foundation and before any bracing is removed. The voids left by the sheeting shall be carefully refilled with selected material and rammed tight with tools especially adapted for the purpose or otherwise as may be approved.

2. The Contractor shall not remove sheeting and bracing until the work has attained the necessary strength to permit placing of backfill.

C. Left in Place

1. If, to serve any purpose of his own, the Contractor files a written request for permission to leave sheeting or bracing in the trench or excavation, the Owner's Representative may grant such permission, in writing, on condition that the cost of such sheeting and bracing be assumed and paid by the Contractor.

2. The Contractor shall leave in place all sheeting, shoring and bracing which are shown on the Contract Drawings or specified to be left in place or which the Owner's Representative may order, in writing, to be left in place. All shoring, sheeting and bracing shown or ordered to be left in place will be paid for under the appropriate item of the Contract. No payment allowance will be made for wasted ends or for portions above the proposed cutoff level which are driven down instead of cut-off.

3. In case sheeting is left in place, it shall be cut off or driven down as directed so that no portion of the same shall remain within 24 inches of the street subgrade or finished ground surface.

3.6 BACKFILLING

A. General

1. All excavations shall be backfilled to the original surface of the ground or to such other grades as may be shown, specified or directed.

2. Backfilling shall be done with suitable excavated materials which can be satisfactorily compacted during refilling of the excavation. In the event the excavated materials are not suitable, Special Backfill as specified or ordered by the Owner's Representative shall be used for backfilling.

3. Any settlement occurring in the backfilled excavations shall be refilled and compacted.

B. Unsuitable Materials

1. Stones, pieces of rock or pieces of pavement greater than 1 cubic foot in volume or greater than 1.5 feet in any single dimension shall not be used in any portion of the backfill.

2. All stones, pieces of rock or pavement shall be distributed through the backfill and alternated with earth backfill in such a manner that all interstices between them shall be filled with earth.

3. Frozen earth shall not be used for backfilling.

C. Compaction and Density Control

1. The compaction shall be as specified for the type of earthwork, i.e., structural, trenching or embankment.

   a. The compaction specified shall be the percent of maximum dry density.
   b. The compaction equipment shall be suitable for the material encountered.

2. Where required, to assure adequate compaction, in-place density test shall at the expense of the Contractor be made by an approved testing laboratory.

   a. The moisture-density relationship of the backfill material shall be determined by ASTM D698, Method D.
      1) Compaction curves for the full range of materials used shall be developed.
   b. In-place density shall be determined by the methods of ASTM D1556 or ASTM D2922 and shall be expressed as a percentage of maximum dry density.

3. Where required, to obtain the optimum moisture content, the Contractor shall add, at his expense, sufficient water during compaction to assure the specified maximum density of the backfill. If, due to rain or other causes, the material exceeds the optimum moisture content, it shall be allowed to dry, assisted if necessary, before resuming compaction or filling efforts.

4. The Contractor shall be responsible for all damage or injury done to pipes, structures, property or persons due to improper placing or compacting of backfill.

3.7 OTHER REQUIREMENTS

A. Drainage

1. All material deposited in roadway ditches or other water courses shall be removed immediately after backfilling is completed and the section, grades and contours of such ditches or water courses restored to their original condition, in order that surface drainage will be obstructed no longer than necessary.

B. Unfinished Work

1. When, for any reason, the work is to be left unfinished, all trenches and excavations shall be filled and all roadways, sidewalks and watercourses left

unobstructed with their surfaces in a safe and satisfactory condition. The surface of all roadways and sidewalks shall have a temporary pavement.

C. Hauling Material on Streets

1. When it is necessary to haul material over the streets or pavements, the Contractor shall provide suitable tight vehicles so as to prevent deposits on the streets or pavements. In all cases where any materials are dropped from the vehicles, the Contractor shall clean up the same as often as required to keep the crosswalks, streets and pavements clean and free from dirt, mud, stone and other hauled material.

D. Dust Control

1. It shall be the sole responsibility of the Contractor to control the dust created by any and all of his operations to such a degree that it will not endanger the safety and welfare of the general public.

2. Calcium chloride, chemicals, and petroleum products shall not to be used for dust control.

E. Test Pits

1. For the purpose of obtaining detail locations of underground obstructions, the Contractor shall make excavations in advance of the work or as ordered by Owner's Representative. Test pits shall include sheeting, bracing, pumping, excavation and backfilling.

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SECTION 02226

TRENCHING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes excavation and backfill as required for pipe installation or other construction in the trench, and removal and disposal of water, in accordance with the applicable provisions of the Section entitled "Earthwork" unless modified herein.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EXCAVATION

A. The trench excavation shall be located as shown on the Contract Drawings or as specified. Under ordinary conditions, excavation shall be by open cut from the ground surface. Where the depth of trench and soil conditions permit, tunneling may be required beneath cross walks, curbs, gutters, pavements, trees, driveways, railroad tracks and other surface structures. No additional compensation will be allowed for such tunneling over the price bid for open cut excavation of equivalent depths below the ground surface unless such tunnel excavation is specifically provided for in the Contract Documents.

B. Trenches shall be excavated to maintain the depths as shown on the Contract Drawings or as specified for the type of pipe to be installed.

C. The alignment and depth shall be determined and maintained by the use of a string line installed on batter boards above the trench, a double string line installed along side of the trench or a laser beam system.

D. The minimum width of trench excavation shall be 6 inches on each side of the pipe hub for 21-inch diameter pipe and smaller and 12 inches on each side of the pipe hub for 24-inch diameter pipe and larger.

E. Trenches shall not be opened for more than 300 feet in advance of pipe installation nor left unfilled for more than 100 feet in the rear of the installed pipe when work is in progress without the consent of the Engineer. Open trenches shall be protected and barricaded as required.

F. Bridging across open trenches shall be constructed and maintained where required.

3.2 SUBGRADE PREPARATION FOR PIPE

A. Where pipe is to be laid on undisturbed bottom of excavated trench, mechanical excavation shall not extend lower than the finished subgrade elevation at any point.

B. Where pipe is to be laid on special granular material the excavation below subgrade shall be to the depth specified or directed. The excavation below subgrade shall be refilled with special granular material as specified or directed, shall be deposited in layers not to exceed 6 inches and shall be thoroughly compacted prior to the preparation of pipe subgrade.

C. The subgrade shall be prepared by shaping with hand tools to the contour of the pipe barrel to allow for uniform and continuous bearing and support on solid undisturbed ground or embedment for the entire length of the pipe.

D. Pipe subgrade preparation shall be performed immediately prior to installing the pipe in the trench. Where bell holes are required they shall be made after the subgrade preparation is complete and shall be only of sufficient length to prevent any part of the bell from becoming in contact with the trench bottom and allowing space for joint assembly.

3.3 STORAGE OF MATERIALS

A. Traffic shall be maintained at all times in accordance with the applicable Highway Permits. Where no Highway Permit is required at least one-half of the street must be kept open for traffic.

B. Where conditions do not permit storage of materials adjacent to the trench, the material excavated from a length as may be required, shall be removed by the Contractor, at his cost and expense, as soon as excavated. The material subsequently excavated shall be used to refill the trench where the pipe had been built, provided it be of suitable character. The excess material shall be removed to locations selected and obtained by the Contractor.

1. The Contractor shall, at his cost and expense, bring back adequate amounts of satisfactory excavated materials as may be required to properly refill the trenches.

C. If directed by the Engineer, the Contractor shall refill trenches with select fill or other suitable materials and excess excavated materials shall be disposed of as spoil.

3.4 REMOVAL OF WATER AND DRAINAGE

A. The Contractor shall at all times provide and maintain proper and satisfactory means and devices for the removal of all water entering the trench, and shall remove all such water as fast as it may collect, in such manner as shall not interfere with the prosecution of the work.

B. The removal of water shall be in accordance with the Section entitled "Earthwork".

3.5 PIPE EMBEDMENT

A. All pipe shall be protected from lateral displacement and possible damage resulting from superimposed backfill loads, impact or unbalanced loading during backfilling operations by being adequately embedded in suitable pipe embedment material. To ensure adequate lateral and vertical stability of the installed pipe during pipe jointing and embedment operations, a sufficient amount of the pipe embedment material to hold the pipe in rigid alignment shall be uniformly deposited and thoroughly compacted on each side, and back of the bell, of each pipe as laid.

B. Concrete cradle and encasement of the class specified shall be installed where and as shown on the Contract Drawings or ordered by the Engineer. Before any concrete is placed, the pipe shall be securely blocked and braced to prevent movement or flotation. The concrete cradle or encasement shall extend the full width of the trench as excavated unless otherwise authorized by the Engineer. Where concrete is to be placed in a sheeted trench it shall be poured directly against sheeting to be left in place or against a bond-breaker if the sheeting is to be removed.

C. Embedment materials placed above the centerline of the pipe or above the concrete cradle to a depth of 12 inches above the top of the pipe barrel shall be deposited in such manner as to not damage the pipe. Compaction shall be as required for the type of embedment being installed.

3.6 BACKFILL ABOVE EMBEDMENT

A. The remaining portion of the pipe trench above the embedment shall be refilled with suitable materials compacted as specified.

1. Where trenches are within the Site area or road or within a driveway, shall be under a structure, the trench shall be refilled in horizontal layers not more than 8 inches in thickness, and compacted to obtain 95% maximum density, and determined as set forth in the Section entitled "Earthwork".

2. Where trenches are in open fields or unimproved areas, the trench shall be refilled in horizontal layers not more than 8 inches in thickness, and compacted to obtain 90% maximum density.

3. Hand tamping shall be required around buried utility lines or other subsurface features that could be damaged by mechanical compaction equipment.

B. Backfilling of trenches beneath, across or adjacent to drainage ditches and water courses shall be done in such a manner that water will not accumulate in unfilled or partially filled trenches and the backfill shall be protected from surface erosion by adequate means.

1. Where trenches cross waterways, the backfill surface exposed on the bottom and slopes thereof shall be protected by means of stone or concrete rip-rap or pavement.

C. All settlement of the backfill shall be refilled and compacted as it occurs.

D. Temporary pavement shall be placed as specified in the Section entitled "Restoration of Surfaces".

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SECTION 02230

SELECT FILL

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes select fill materials used in either embedment or special backfill, as specified or as directed by the Owner.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)

a. D422 - Method for Particle-Size Analysis of Soil

1.3 SUBMITTALS

A. The following items shall be submitted:

1. The name and location of the source of the material.

2. Samples and test reports of the material.

1.4 DEFINITIONS

A. Embedment or Lining

1. Any type granular material specified or directed placed below an imaginary line drawn one foot above the inside diameter of the pipe and within the trench limits.

B. Special Backfill

1. Pipelines

a. Any select fill material specified or directed placed above an imaginary line drawn one foot above the inside diameter of the pipe and within the trench limits.

2. Structures

a. Any select fill material specified or directed placed within the excavation limits, either in, under or adjacent to the structure.

C. Special Granular Material

1. Special granular material shall mean any of the granular materials listed below or other materials ordered by the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

A. Type A

1. Crushed Gravel

a. Thoroughly washed crushed, durable, sharp angled fragments of gravel free from coatings. Crushed particles shall be a minimum of 85% by weight of the particles with at least two fractured faces. The total area of each fractional face shall exceed 25% of the maximum cross-sectional area of the particle.

b. Crushed gravel shall have the following gradation by weight:

% Passing	Sieve
100%	1½-inch
0-25%	¾-inch
0-5%	½-inch

B. Type B

1. Crushed Stone

a. Thoroughly washed clean, sound, tough, hard crushed limestone or approved equal free from coatings. Gradation for crushed stone shall be the same as specified for Type A material.

C Type E

1. Run-of-Bank Gravel

a. Run-of-bank gravel or other acceptable granular material free from organic matter with a gradation by weight of 100% passing a 1½-inch square opening, 30 to 65% passing a 1/4-inch square opening and not more than 10% passing a No. 200 mesh sieve as determined by washing through the sieve in accordance with ASTM D422.

D Type F

1. Run-of-crusher Stone

a. Run-of-crusher hard durable limestone or approved equal having the following gradation by weight:

% Passing	Sieve
100	1½- inch
95 – 100	1
65 – 80	½
40 – 60	¼
0 – 10	#200 Sieve

PART 3 EXECUTION

3.1 INSTALLATION

A. Special granular material as specified or directed for pipeline embedment shall be placed in accordance with the Section entitled "Trenching, Backfilling and Compacting".

B. Special backfill where specified or directed shall be placed in accordance with the backfilling provisions of the Section entitled "Trenching, Backfilling, and Compacting", and the Section entitled "Earthwork".

3.2 DISPOSAL OF DISPLACED MATERIALS

A. Materials displaced through the use of SELECT fill shall be wasted or disposed of by the Contractor and the cost of such disposal shall be included in the unit price bid for each of the materials.

3.3 SETTLEMENTS

A. Any settlements in the finished work shall be made good by the Contractor.

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SECTION 02270

EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes diversion swales, silt fences, stabilized construction entrance, and other permanent and temporary erosion and sediment control measures intended to minimize erosion of soils and sedimentation of drainage channels and lands adjacent to or affected by the work.

B. Provide temporary vegetation for all areas disturbed by construction.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:

1. New York State Standards and Specifications for Erosion and Sediment Control

1.3 SUBMITTALS

A. The following items shall also be submitted.

1. Shop drawings of erosion and sediment control materials.

PART 2 PRODUCTS

2.1 MATERIALS

A. The Contractor shall provide all necessary supervision, labor, equipment and materials as needed to perform the specified work.

B. Materials shall include silt fence, stone, or other manufactured products to reduce erosion and control siltation as specified on the Contract Drawings.

2.2 SILT FENCE

A. Provide and install as indicated on the Contract Drawings or as directed by the Engineer.

2.3 TURBIDITY CURTAIN

A. Provide and install as indicated on the Contract Drawings or as directed by the Engineer.

2.3 STABILIZED CONSTRUCTION ENTRANCE

A. Provide and install as indicated on the Contract Drawings or as directed by the Engineer.

2.4 TEMPORARY VEGETATION

A. Temporary vegetation shall consist of a mixture of quick germinating, fast growing perennial rye grass mixed with sweet or white clover with an application rate of 50 pounds per acre.

B. Fertilizer shall be applied at the rate of 400 pounds per acre using 15-15-15 or equivalent. Soils which are highly acidic should be lined.

C. Mulch shall be a moist straw or hay and applied at the rate of 2 tons per acre.

D. The seed furnished by the Contractor shall not be more than two years old. Germination tests of the seed proposed to be used shall be made not more than six months prior to seeding operations and a certificate of such tests shall be furnished to the Engineer. When directed by the Engineer, the above mixture may be varied to suit any special condition of soil peculiar to the areas to be seeded. Seed which has become wet, moldy, or otherwise damaged in transit or storage shall not be acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install erosion and sediment control facilities as shown on the Contract Drawings or directed by the Engineer.

B. Temporary Vegetation

1. Spread fertilizer and work into soil by discing or other approved methods.

2. Spread seed by hand or approved sowing equipment at a rate of 50 pounds per acre.

3. After sowing has been completed, apply mulch evenly over the entire seeded area at a rate of 2 tons per acre. Wet mulch immediately after placing. Compact area by two passes of a smooth drum roller, one 90° to the other to the extent possible.

3.2 MAINTENANCE

A. Maintain silt fences as needed, and remove sediment when bulges develop in silt fence.

B. Inspect and install stone dressing on the stabilized construction entrance as necessary or as directed.

C. Install additional erosion control devices in areas as necessary during construction. Place erosion control devices as directed by the Engineer.

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SECTION 02503

RESTORATION OF SURFACES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes restoration and maintenance of all types of surfaces, culverts and other features disturbed, damaged or destroyed during the performance of the work under or as a result of the operations of the Contractor.

B. The quality of materials and the performance of work used in the restoration shall produce a surface or feature equal to the condition of each before the work began.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)

a. D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3)

1.3 SUBMITTALS

A. The following items shall be submitted:

1. A schedule of restoration operations. After an accepted schedule has been agreed upon it shall be adhered to unless otherwise revised with the approval of the Engineer.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 GENERAL

A. The replacement of surfaces at any time, as scheduled or as directed, shall not relieve the Contractor of responsibility to repair damages by settlement or other failures.

3.7 STONE OR GRAVEL PAVEMENT

A. All pavement and other areas surfaced with stone or gravel shall be replaced with material to match the existing surface unless otherwise specified.

1. The depth of the stone or gravel shall be at least equal to the existing.

2. After compaction the surface shall conform to the slope and grade of the area being replaced.

3.9 LAWNS AND IMPROVED AREAS

A. The area to receive topsoil shall be graded to a depth of not less than 4 inches or as specified, below the proposed finished surface.

1. If the depth of existing topsoil prior to construction was greater than 4 inches, topsoil shall be replaced to that depth.

B. The furnishing and placing of topsoil, seed and mulch.

C. When required to obtain germination, the seeded areas shall be watered in such a manner as to prevent washing out of the seed.

D. Any washout or damage which occurs shall be regraded and reseeded until a good sod is established.

E. The Contractor shall maintain the newly seeded areas, including regrading, reseeding, watering and mowing, in good condition.

3.10 OTHER TYPES OF RESTORATION

A. Water courses shall be reshaped to the original grade and cross-section and all debris removed. Where required to prevent erosion, the bottom and sides of the water course shall be protected.

B. Culverts destroyed or removed as a result of the construction operations shall be replaced in like size and material and shall be replaced at the original location and grade. When there is minor damage to a culvert and with the consent of the Engineer, a repair may be undertaken, if satisfactory results can be obtained.

3.11 MAINTENANCE

A. The finished products of restoration shall be maintained in an acceptable condition for and during a period of one year following the date of Substantial Completion or other such date as set forth elsewhere in the Contract Documents.

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SECTION 02600

PIPELINE INSTALLATION

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes all metallic and non-metallic pipelines as shown on the Contract Drawings, complete with fittings and specials.

B. Certain features of pipes shall be as scheduled.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:

1. American Society of Testing and Materials (ASTM)

2. American Water Works Association (AWWA)

1.3 SUBMITTALS

A. The following items shall be submitted:

1. Manufacturer's certification that all materials furnished are in compliance with the applicable requirements of the referenced standards and this specification.

2. Layout drawings are required for pipelines to be installed within structures, showing the location including the support system, sleeves and appurtenances.

PART 2 PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

A. Pipe

1. Materials for the piping, joints and fittings shall be as specified in the Section for the type of pipe to be installed, shown in the pipe schedule or on the Contract Drawings.

a. Pipe and appurtenances shall comply with the applicable standards for its type of material.

B. Joints

1. Type of joints shall be as scheduled in the pipe schedule or as shown or noted on the Contract Drawings.

C. Inspection

1. Pipe and appurtenances shall be inspected by the Contractor in the presence of the Engineer on delivery and prior to installation for conformance with the standards and specifications.

a. Materials not conforming to the standards and specifications shall not be stored on site but removed at once and replaced with material conforming to the specifications.

PART 3 EXECUTION

3.1 INSTALLATION - UNDERGROUND

A. General

1. Install pipelines, fittings, specials, and accessories in accordance with the configuration shown on the Contract Drawings.

2. Excavation and backfilling shall be in accordance with the applicable provisions of the Section entitled "Trenching, Backfilling and Compacting".

3. Blocking will not be permitted under pipe, except where the pipe is to be laid with concrete cradle or encasement.

4. No pipe shall be laid upon a foundation in which frost exists; nor at any time when there is danger of the formation of ice or the penetration of frost at the bottom of the excavation.

5. Temporary bulkheads shall be placed in all open ends of pipe whenever pipe laying is not actively in process. The bulkheads shall be designed to prevent the entrance of dirt, debris or water.

6. Precautions shall be taken to prevent the flotation of the pipe in the event of water entering the trench.

B. Location and Grade

1. Pipelines and appurtenances shall be located as shown on the Contract Drawings or as directed and as established from the control survey in accordance with the Special Provisions.

2. The alignment and grades shall be determined and maintained by a method acceptable to the Engineer.

C. Subgrade

The subgrade for pipelines shall be earth or special embedment as specified or directed and shall be prepared in accordance with the Section entitled "Trenching, Backfilling and Compacting".

D. Joints

1. Joints shall be assembled using gaskets, lubricants and solvents as furnished by the pipe manufacturer and in accordance with the manufacturer's recommendations.

E. Embedment

1. Embedment shall be deposited and compacted in accordance with the Section entitled "Trenching, Backfilling and Compacting", and the Section for the type of pipe being installed and shall be one of the embedments shown below unless otherwise specified or directed.

2. Non-pressure pipe of: High Density Polyethylene Pipe
Smooth Interior Corrugated Polyethylene Pipe

a. The embedment shall consist of compacted Type F granular materials placed from a depth of 6 inches below the pipe to a depth of 12 inches over the pipe.

1) Embedment material shall be deposited and hand-compacted in 6-inch maximum layers.

3.1 INSTALLATION – UNDERGROUND

A. General

1. Install pipelines, fittings, specials, and accessories in accordance with the configuration shown on the Contract Drawings.

2. Above ground Pipe (pipe installed on grade) shall be blocked using 200 pound gravel bags at 50-foot intervals or as directed by the owner’s Representative.

3.4 FIELD TESTING

A. Perform leakage tests in accordance with the applicable provisions of the Section entitled “Leakage Tests”, at the test pressure specified or scheduled.

3.5 CUTTING

A. Field cuts of pipes shall be in accordance with the manufacturer's instructions.

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SECTION 02602

LEAKAGE TESTS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes leakage tests of piping for leakage as specified.

1. The Contractor shall furnish all labor, equipment, test connections, vents, water and materials necessary for carrying out the pressure and leakage tests.

B. All testing shall be witnessed by the Engineer.

1.2 SUBMITTALS

A. The following items shall be submitted:

1. Reports of test results.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 TESTS ON NON PRESSURE PIPING

A. General

1. Pipelines designed to transport effluent and storm water shall be tested hydrostatically and for leakage prior to being placed in service.

2. The length of piping and sections included in the tests shall meet the approval of the Engineer.

3. Equipment in or attached to the pipes being tested shall be protected. Any damage to such equipment during the test shall be repaired by the Contractor at his expense.

4. When piping is to be insulated or concealed in a structure, tests shall be made before the pipe is covered.

5. All fittings and appurtenances must be properly braced and harnessed before the pressure is applied. Thrust restraining devices which will become a part of the system must also be tested at the test pressure.

6. When testing absorbent pipe materials such as asbestos cement or concrete, the pipeline shall be filled with water at least 24 hours before the test is made.

7. If the line fails the test, the Contractor shall explore for the cause of the excessive leakage and after repairs have been made the line shall be retested. This procedure shall be repeated until the pipe complies.

B. Pressure Test

1. Test pressure shall be as scheduled.

2. Test pressure shall be held on the piping for a period of at least 2 hours, unless a longer period is requested by the Engineer.

C. Leakage Test

1. The leakage test shall be conducted concurrently with the pressure test.

2. The rate of leakage shall be determined at 15-minute intervals by means of volumetric measurement of the makeup water added to maintain the test pressure. Leakage test make up water shall maintain pressure within 5 psi of the specified test pressure. The test shall proceed until the rate of leakage has stabilized or is decreasing below an allowable value, for three consecutive 15-minute intervals. After this, the test pressure shall be maintained for at least another 15 minutes.

   a. At the completion of the test the pressure shall be released at the furthermost point from the point of application.

3. All exposed piping shall be examined during the test and all leaks, defective material or joints shall be repaired or replaced before repeating the tests.

4. The allowable leakage for pressure pipelines shall not exceed the following in gallons per 24 hours per inch of diameter per mile of pipe:

Type of Pipe	Leakage
High Density Polyethylene pipe	0
SICPPs	10

5. Regardless of the above allowables, any visible leaks shall be permanently stopped.

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SECTION 02623

HIGH DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE

PART 1 GENERAL

1.1 SCOPE OF WORK

A. Polyethylene pipe of the classification, size, and use as specified and as shown on the Contract Drawings.

1.2 QUALITY ASSURANCE

A. Prior to initiating joining of the pipe the Contractor or his subcontractor shall present evidence to the Engineer of having successfully installed HDPE piping using this method on a minimum of three previous projects.

B. The Contractor shall test and certify each weld.

C. All testing including field services needed during installation of the pipe shall be provided by the Contractor.

1.3 APPLICABLE CODES, STANDARDS AND SPECIFICATIONS

Stormwater

A. American National Standards Institute (ANSI)

B. American Society for Testing and Materials (ASTM)

C. Plastics Pipe Institute (PPI)

D. DOT Regulations

1.4 SUBMITTALS

A. Drawings and manufacturer's data of the pipe, joints and fittings showing compliance with this Specification.

B. Copies of Leakage test results

C. Submit five (5) copies of manufacturer's affidavit that all delivered materials comply with the following criteria:

Parameter	Standard	Criteria
Density	ASTM D1505	0.941 - 0.955 gm/cc
Melt Flow Index	ASTM D1238 Condition E	Less Than 4 gm/10 min
Percent Carbon Black	ASTM D1603	2.5%
Hydrostatic Design Basis	ASTM D2837	Minimum of 1600 psi
Environmental Stress Crack Resistance	ASTM D1693 Condition C	Greater Than 5000 hours
Flexural Modulas	ASTM D790	110,000 - 160,000 psi
Tensile Strength	ASTM D638	3,000 - 3,500 psi

PART 2 PRODUCT

2.1 MATERIALS

A. GENERAL

1. High density polyethylene pipe shall be constructed from PE 3408 high molecular weight polyethylene piping having a cell classification of PE 345434C and conforming to ASTM D3350.

2. Acceptable manufacturers are Performance Pipe or equal.

3. Pipe shall be HDPE, Iron Pipe Size, 6-inch outside diameter, DR 11 with butt fused joints.

B. Fittings and Couplings

1. High density polyethylene piping fittings and couplings shall conform to the requirements of HDPE pipe for classification and size.

2. The high density polyethylene pipe fittings and couplings shall be capable of withstanding the pressure required for the leakage test specified.

3. Fittings larger than 8-inch shall be fabricated. All fabricated fittings shall be one (1) class (SDR/DR) stronger than the mainline pipe.

4. Where mechanical couplings are called for, a steel sleeve in accordance with the manufacturer's recommendations shall be used. Electrofusion couplings, up to 28-inches in diameter, shall be used where typical fusion welding is impractical.

C. Joints

Unless otherwise specified, joints for pipe and fittings shall be fusion welded in accordance with the manufacturer's recommendations.

1. All fusion welders shall be qualified per the DOT code of Federal Regulations Title 49 Part 192.285.

2. Flanged joints shall be used for connecting to valves and other appurtenances unless indicated otherwise.

   a. Gaskets shall be 1/8" thick soft natural or synthetic rubber with a durometer of 73, plus or minus 4."
   b. Steel bolts and nuts shall be cadmium plated.
   c. Backup (follower) rings shall be Ductile Iron.

PART 3 EXECUTION

3.1 INSTALLATION

A. High density polyethylene pipe shall be handled and stored in accordance with the manufacturer's recommendations.

B. The interior fusion bead shall be removed from all pipe joints and disposed of by the Contractor

3.2 TESTING

A. Pipe shall be hydrostatically tested in accordance with Section entitled, "Leakage Tests" at a pressure of 25 psi.

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SECTION 02625

SMOOTH INTERIOR CORRUGATED POLYETHYLENE PIPE

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the requirements for procurement, transportation, storage, handling, and installation of smooth interior corrugated polyethylene pipe (SICPP) as a storm drainage conduit.

B. The SICPP shall be installed to the prescribed lines and grades at the locations indicated on the Contract Drawings or as directed by the Owner.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards, and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)

   a. D-1248 - Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.
   b. D-2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity Flow Applications.
   c. D-3350 - Standard Specification for Polyethylene Plastics Pipe and Fitting Materials.
   d. F-405 - Standard Specification for Corrugated Polyethylene Tubing and Fittings.
   e. F-667 - Standard Specification for Large Diameter Corrugated Polyethylene Tubing and Fittings.

2. American Association of State Highway and Transportation Officials (AASHTO)

   a. M-252 - Specification for Corrugated Polyethylene Drainage Tubing.
   b. M-294 - Specification for Corrugated Polyethylene Pipe.

1.3 SUBMITTALS

A. Contractor’s certification that all products, materials, construction, and installation complies with the applicable requirements of the referenced standards, this specification and the Contract Drawings.

B. A list of minimum property values for the pipe and fittings.

C. Manufacturer's product literature including, but not limited to, parts lists, materials of construction, operations & maintenance requirements, specifications, drawings, and installation guidelines, which demonstrate compliance with this specification.

1.4 QUALITY ASSURANCE

A. Pipe shall be marked with the manufacturer's name, product identification, lot number, pipe size, and pipe length.

1.5 STORAGE AND PROTECTION

A. Transportation is the responsibility of the Contractor who shall be liable for all damages prior to and during transportation to the site.

B. Handling, storage, and care on-site is the responsibility of the Contractor prior to, during, and after installation.

1.6 PLACEMENT AND HANDLING

A. Handle all materials in such a manner as to ensure it is not damaged in any way.

B. Materials shall not be dragged.

C. During placement, care shall be taken not to entrap stones, excessive dust, or moisture that could hamper subsequent performance. If pipe is not free of debris and soil prior to installation, the Contractor shall clean material prior to installation.

D. The Owner will examine the drainage piping over the entire surface to ensure that no potentially harmful foreign objects are present. Any foreign objects so encountered shall be removed by the Contractor or the pipe shall be replaced.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The following manufacturers are named to establish a standard of quality necessary for the Project:

1. Hancor, Inc. – Blue Seal

2. Or equal.

2.2 PIPE

A. The drainage pipe and fittings shall be smooth interior, corrugated, high density polyethylene (HDPE) with dimensions as shown on the Contract Drawings.

B. Piping shall meet all requirements of AASHTO M-294.

C. Pipe joints and fittings shall conform to AASHTO M-252 or AASHTO M-294, or be approved by the Owner.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the specification.

B. Pipe shall be joined with internal or external couplers, or coupling banks and fittings supplied by the pipe manufacturer covering at least two full corrugations on each of the pipe ends.

C. The Contractor shall protect the ends of the drain pipes from being damaged or from allowing foreign objects (*e.g.*, debris, sand, filter fabric) from entering the pipes.

D. Each pipe shall be inspected by the Contractor prior to making connections to ensure pipe is free of foreign objects. Any foreign objects shall be removed by the Contractor.

E. The Contractor shall exercise care to thoroughly compact the bedding material under the haunches of the pipe and to ensure that the material is in intimate contact with the pipe. The selected backfill shall be brought up evenly in layers on both sides of the pipe until the trench is filled to the required elevation.

F. The Contractor shall replace or repair any damaged pipe as directed by the Engineer at no additional cost to the Owner.

G. The Contractor is responsible for all excavation and backfill required for complete installation of the drain pipe.

3.2 CONFORMANCE TESTING

A. Samples of materials delivered to the site may be collected for testing to confirm conformance with the properties in Part 2 of this Specification at the Owner's discretion.

B. Samples, if required, will be obtained by the Owner. All testing performed will be paid for by the Contractor.

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SECTION 02720

VAULTS AND INLETS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes valve and meter vaults, catch basins, curb inlets, surface water inlets, and similar structures, complete with frames and covers, manhole steps and appurtenances as shown on the Contract Drawings.

1.2 REFERENCES

A. Materials and installation shall be in accordance with the latest revisions of the following codes, standards and specifications, except where more stringent requirements have been specified herein:

1. American Society for Testing and Materials (ASTM)

2. American Association of State Highway Transportation Officials (ASHTO)

PART 2 PRODUCTS

2.1 MATERIALS AND CONSTRUCTION

A. Concrete

1. Cast-in-place concrete for vaults and inlets shall be as specified under the Section entitled "Concrete".

2. Precast concrete sections shall be in accordance with ASTM C478 for manhole sections and ASTM C913 for other structures with a minimum wall thickness of 5 inches. Top sections shall withstand H-25 wheel loads and shall be of the type shown.

a. Bell and spigot joints of precast sections shall have an appropriate "O" or square Buna-N rubber section ring as supplied by the manufacturer.

B. Masonry Units

1. Brick shall meet the requirements of ASTM C62, Grade SW, and shall be of a hard-burned manufacture.

C. Mortar

1. Masonry cement for mortar shall meet the requirements of ASTM C 91, Type II and shall be mixed with a graded quality sand conforming to ASTM C144.

2. Mix shall be one part masonry cement to three parts sand using the minimum amount of clean water required for workability.

D. Castings

1. Frames and covers, grates, inlets, and other castings shall be as shown on the Contract Drawings and be in accordance with ASTM A48, Class 30. All castings shall be manufactured to withstand H-25 wheel loads. Frames and covers shall have machined bearing surfaces.

2. Steps shall be manhole steps manufactured of cast iron in accordance with ASTM A48, Class 30 or others acceptable to the Engineer.

a. Steps shall have a minimum tread width of 16 inches.

E. Coatings

1. The exterior and interior surfaces of the precast concrete manholes shall be waterproofed with two (2) coats of Koopers 300M or equal 8 mils each for a total DFT of 16 mils.

PART 3 EXECUTION

3.1 INSTALLATION

A. Precast Sections

1. Precast sections shall be installed level on a flat stable subgrade. Where an unstable condition exists, the Contractor shall excavate the unstable material and replace with compacted granular material.

2. All joints shall be filled inside and out with mortar to provide a smooth and continuous surface.

B. Benchwalls and Inverts

1. Mortar surfaces of benchwalls and concrete floors shall be given a broom finish. Where inverts are required they shall be lined with a half section of pipe of the same type used for the sewer or shall be constructed of Class "C" concrete, shaped and troweled to produce a smooth circular cross-section.

C. Frames and Castings

1. Frames and castings shall be set in a full bed of mortar a maximum of 1/2" thick. Where required to adjust the frames and castings to grade there shall be installed to a maximum of four brick courses.

D. Steps

1. Steps shall be installed in vertical alignment spaced 12 inches on center.

2. In concrete sections the steps shall be cast into the section or secured with cadmium plated bolts to threaded inserts which are precast into the concrete.

3. In masonry construction the steps shall be built into the masonry walls.

E. Plastering

1. Plaster shall be with mortar not less than □inch thick and troweled smooth.

2. Outside of masonry structures.

3. Inside and outside of brick courses under frames and castings.

F. Sumps

1. Sumps of the size specified shall be built into the floors of vaults and similar structures. Floors shall be sloped to the sump.

3.2 FIELD TESTING

A. Perform leakage tests in accordance with the applicable provisions of the Section entitled “Leakage Tests”.

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