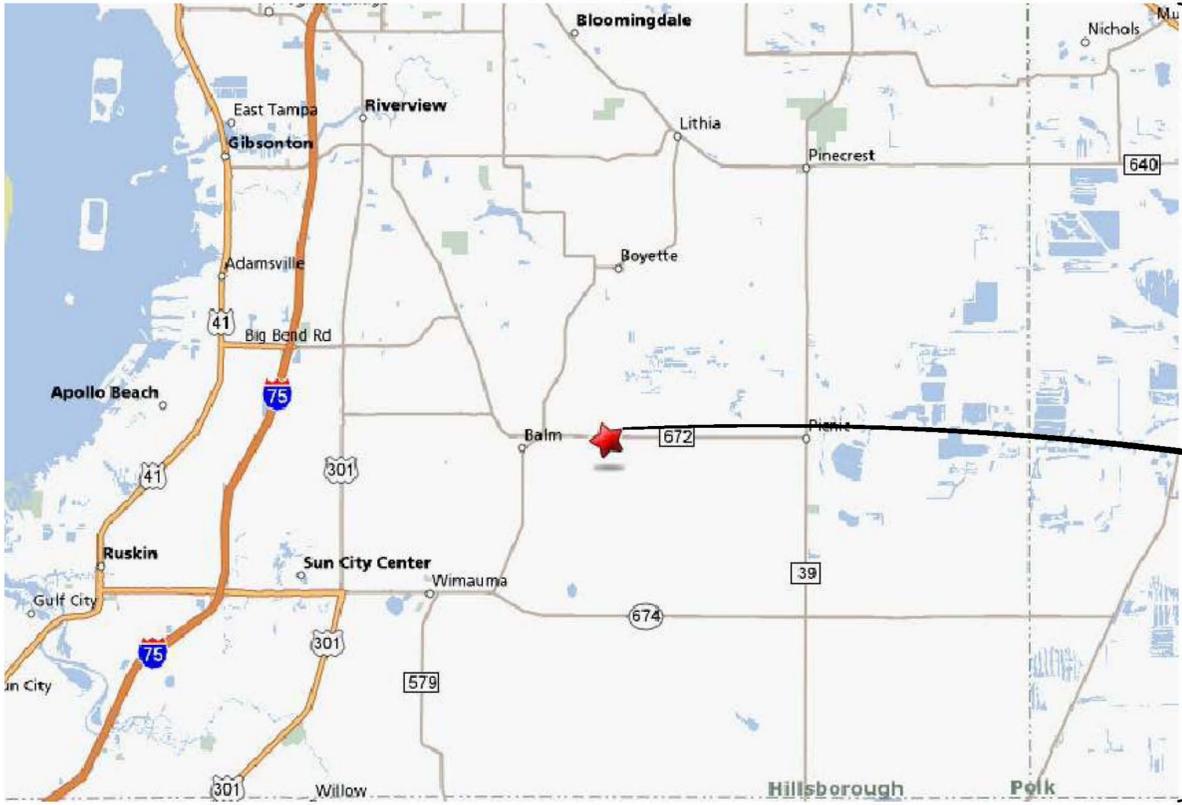


FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY 100% DESIGN DOCUMENTS

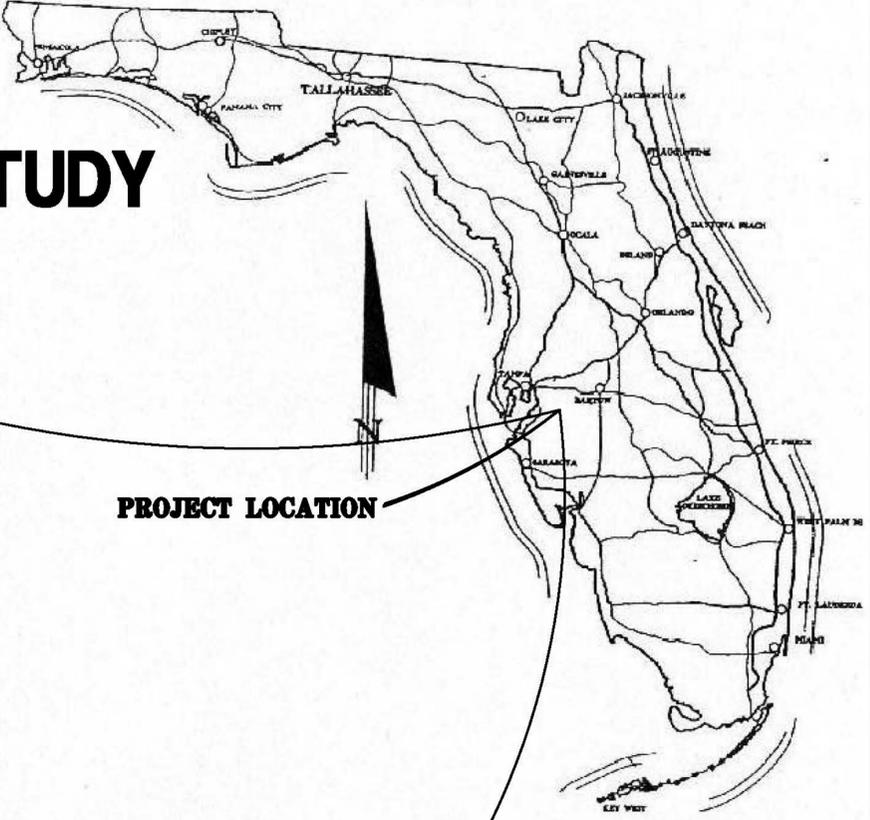
LIST OF DRAWINGS

SHEET COUNT	SHEET NUMBER	SHEET TITLE
GENERAL		
1	G-1	COVER SHEET AND INDEX OF DRAWINGS
2	G-2	LEGENDS AND NOTES
CIVIL		
3	C-1	EXISTING ONSITE WASTEWATER TREATMENT SYSTEM
4	C-2	OVERALL PROPOSED SITE PLAN
5	C-3	PROCESS FLOW DIAGRAM
6	C-4	HYDRAULIC PROFILE PNRS II
7	C-5	PNRS II DETAILS
8	C-6	PNRS II DETAILS
9	C-7	TASK C NITROGEN FATE & TRANSPORT STUDY DETAILS
10	C-8	WASTEWATER SOURCE COMPONENTS DETAILS
11	C-9	MONITORING PLAN
STRUCTURAL		
12	S-1	PNRS II STRUCTURAL SITE PLAN
13	S-2	PNRS II STRUCTURAL SITE PLAN AND DETAILS
14	S-3	PNRS II STRUCTURAL SITE PLAN AND DETAILS
MECHANICAL		
15	M-1	YARD PIPING PLAN
ELECTRICAL		
16	E-1	ELECTRICAL SITE PLAN
17	E-2	ELECTRICAL SITE PLAN AND DETAILS
INSTRUMENTATION		
18	I-1	PANEL POWER
19	I-2	DI MODULE 1
20	I-3	DI MODULE 2
21	I-4	DI MODULE 3
22	I-5	DO MODULE 1
23	I-6	DO MODULE 2
24	I-7	PANEL ELEVATIONS
25	I-8	BILL OF MATERIALS



LOCATION MAP

N.T.S.



PROJECT LOCATION

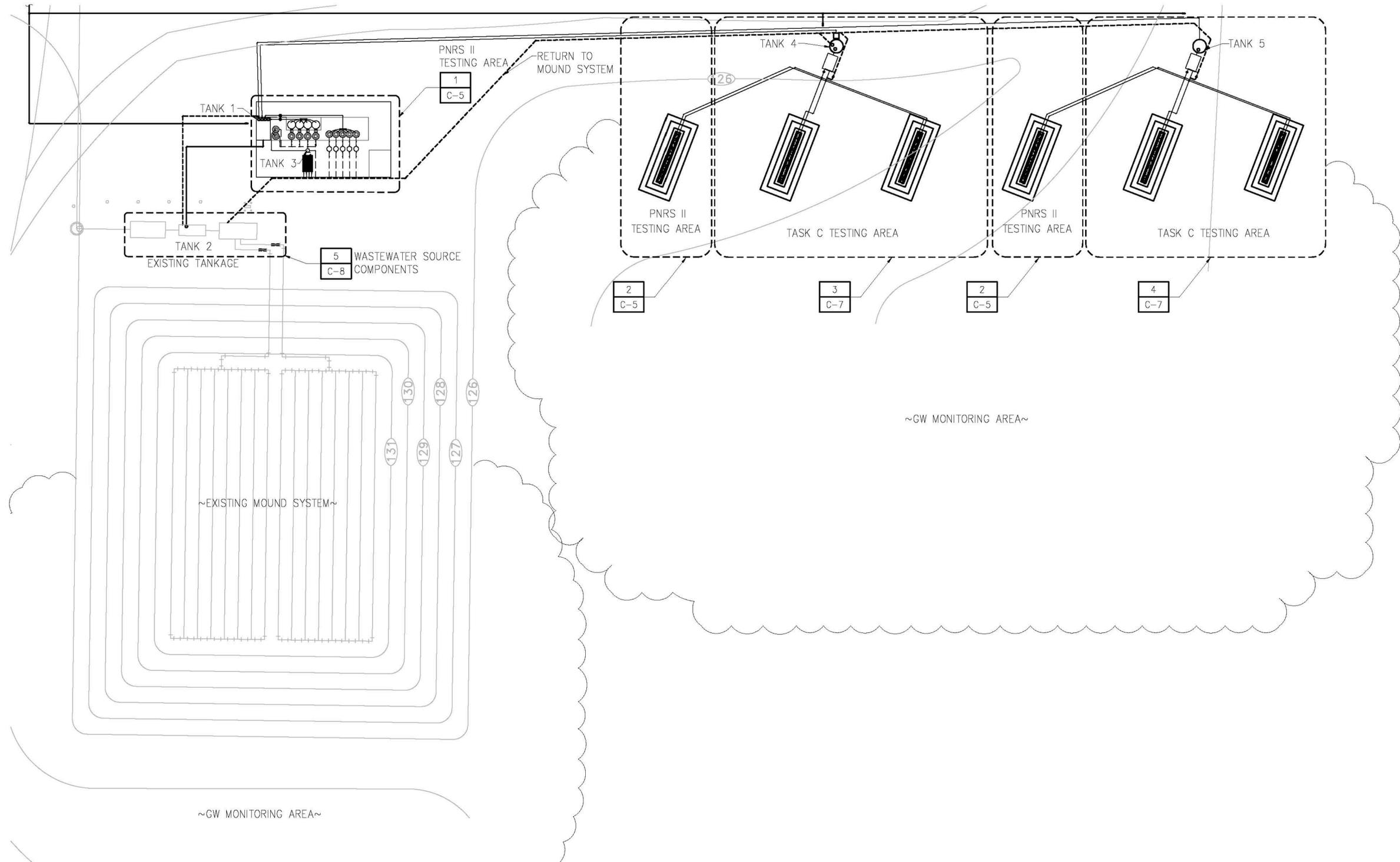
**PROJECT LOCATION
UNIVERSITY OF FLORIDA
GULF COAST RESEARCH AND
EDUCATION CENTER
WIMAUMA, FL.**

HAZEN AND SAWYER
Environmental Engineers & Scientists

10002 Princess Palm Ave., Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771



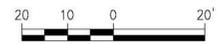
FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FLORIDA 32399-1713
(850)-245-4070



PROPOSED SITE PLAN

1"=20'

1"=20'-0"



PLOT DATE: 12/07/2009 2:58 PM BY: GSCOTT

NO.	ISSUED FOR	DATE	BY	APPROVED
3	100% SUBMITTAL	12/09	--	PROJ. ENGR.
2	75% SUBMITTAL	12/09	--	--
1	50% SUBMITTAL	08/09	--	--

DESIGNED	--
DRAWN	--
CHECKED	--
PROJ. ENGR.	--
APPROVED	--

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____

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 Environmental Engineers & Scientists
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 Registry One Building, Suite 200
 Tampa, Florida 33619
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 4052 BALD CYPRESS WAY, BIN A08
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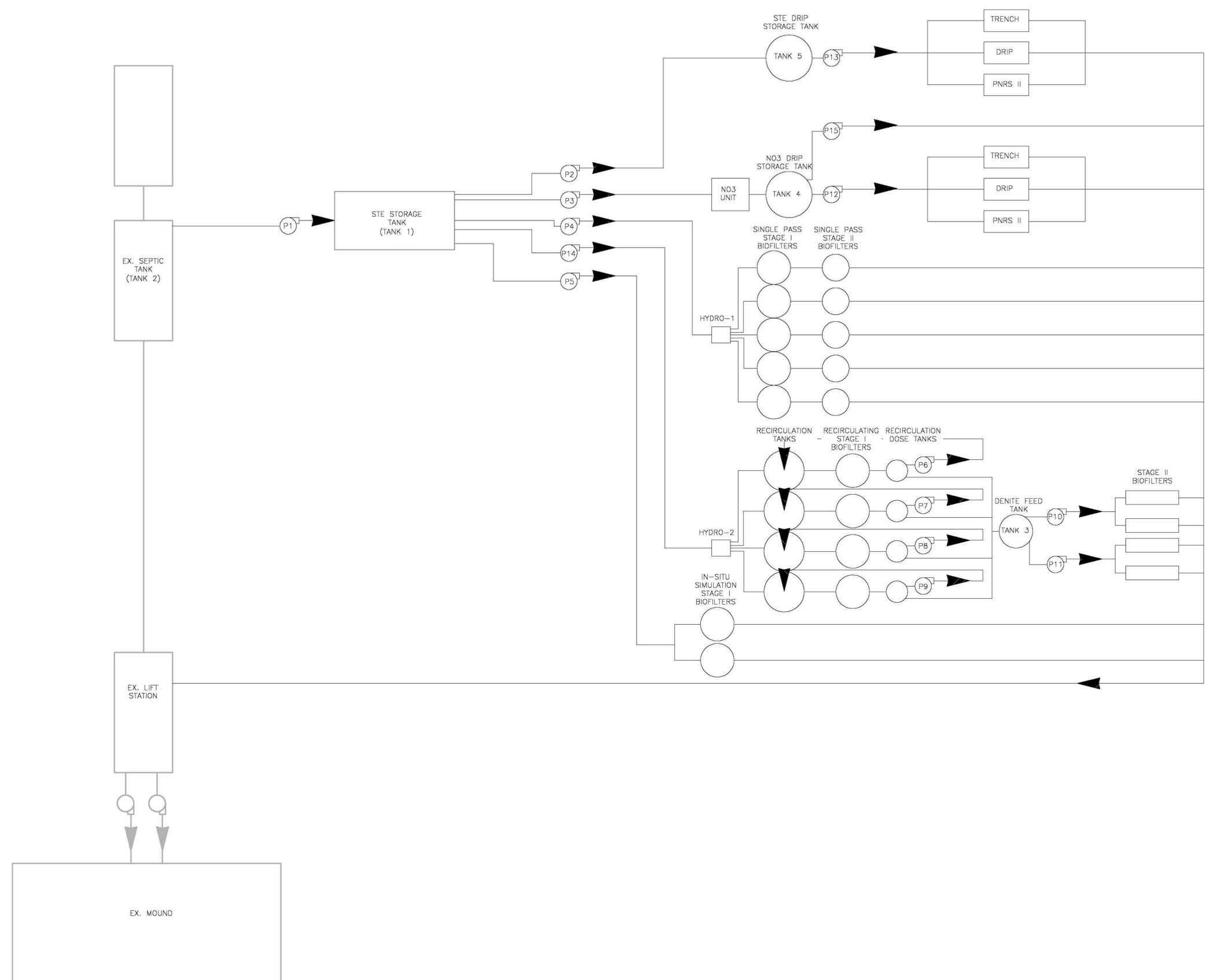
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

OVERALL PROPOSED SITE PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE	DECEMBER 2009
H & S JOB NUMBER	44237-001
CONTRACT NUMBER	
DRAWING NUMBER	C-2

File: G:\44237-001\PA\14337-001\Drawings\0005 Design - C12, G04, C-2, OVERALL SITE PLAN.dwg Saved by: jrmey. Save date: 12/07/2009 2:23 PM



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2	75% SUBMITTAL	12/09	--	--
1	50% SUBMITTAL	08/09	--	--

DESIGNED	--
DRAWN	--
CHECKED	--
PROJ. ENGR.	--
APPROVED	--

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____

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 Environmental Engineers & Scientists
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 4052 BALD CYPRESS WAY, BIN A08
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 (850)-245-4070



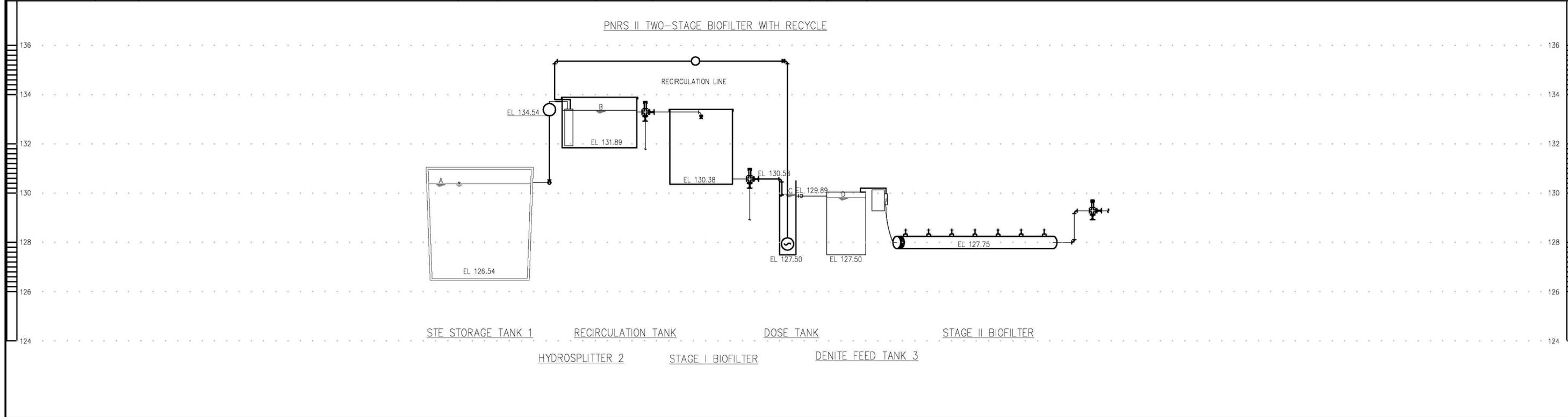
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
PROCESS FLOW DIAGRAM

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

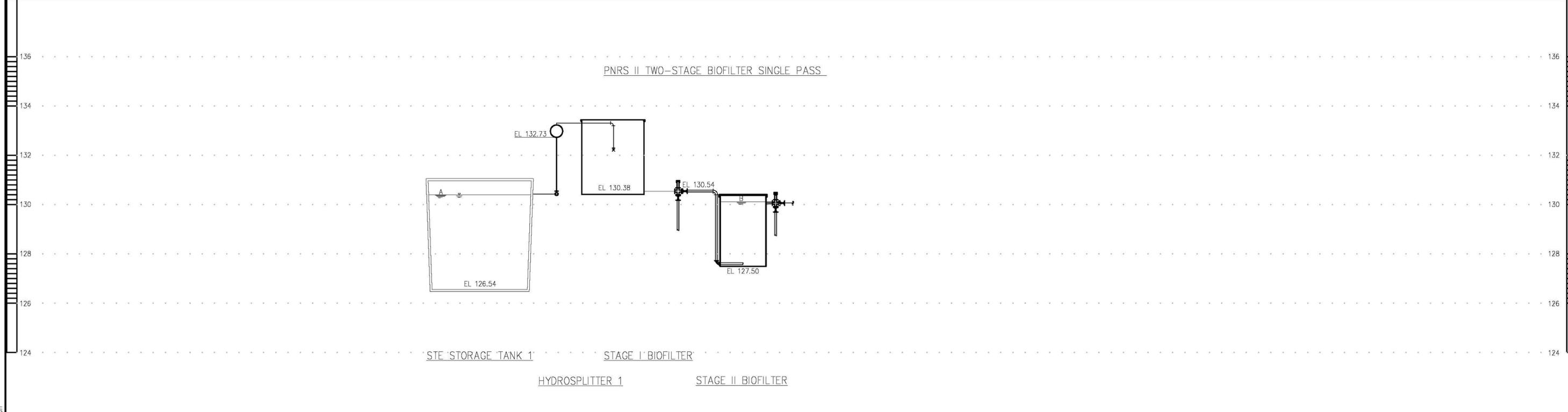
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H & S JOB NUMBER	44237-001
CONTRACT NUMBER	
DRAWING NUMBER	C-3

File: C:\44237-001\PA\14337-001\Drawings\0208 Design - C13\DWG\C-3 PROCESS FLOW DIAGRAM.dwg Saved by account: SCSOTT Date: 12/27/2008 2:54 PM

CONDITION	FLOW	A	B	C	D
AVERAGE FLOW	58.8 GPD	TANK 2 130.37	RECIRCULATION TANK 133.38	DOSE TANK 129.96	STAGE 2 DOSE TANK 129.83



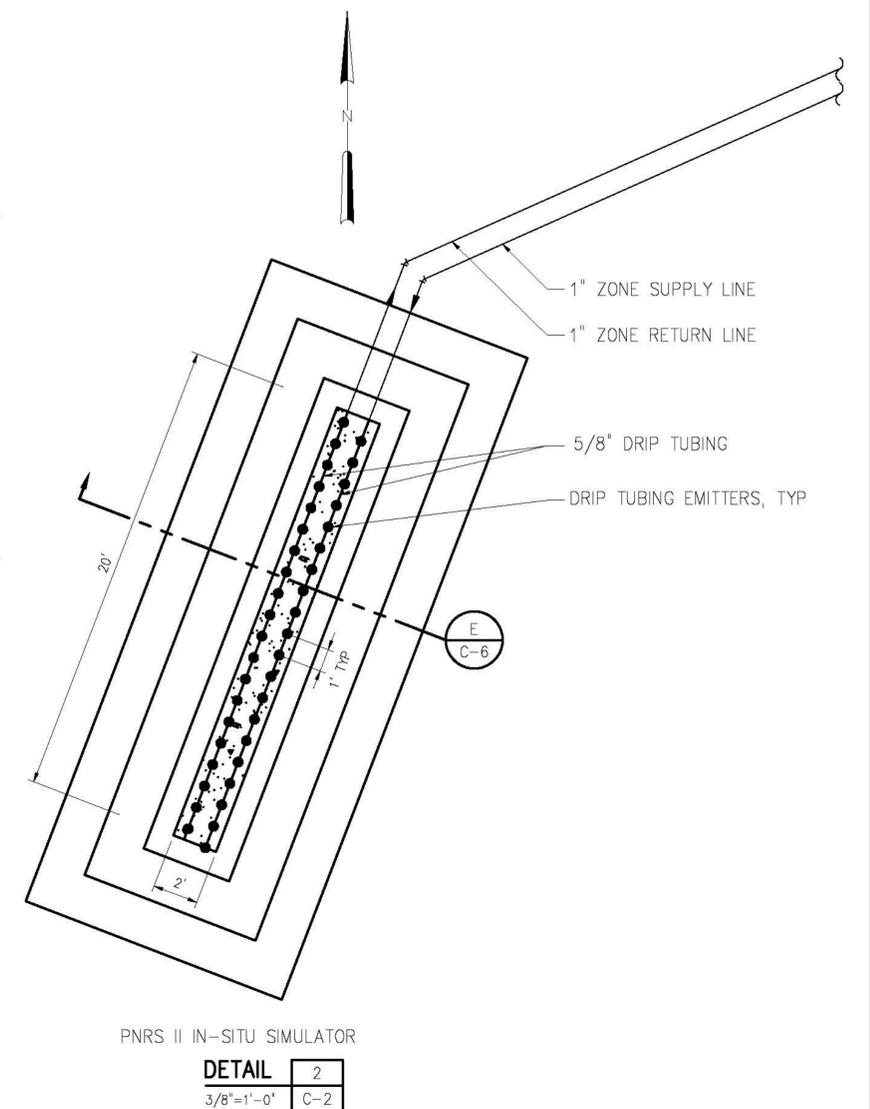
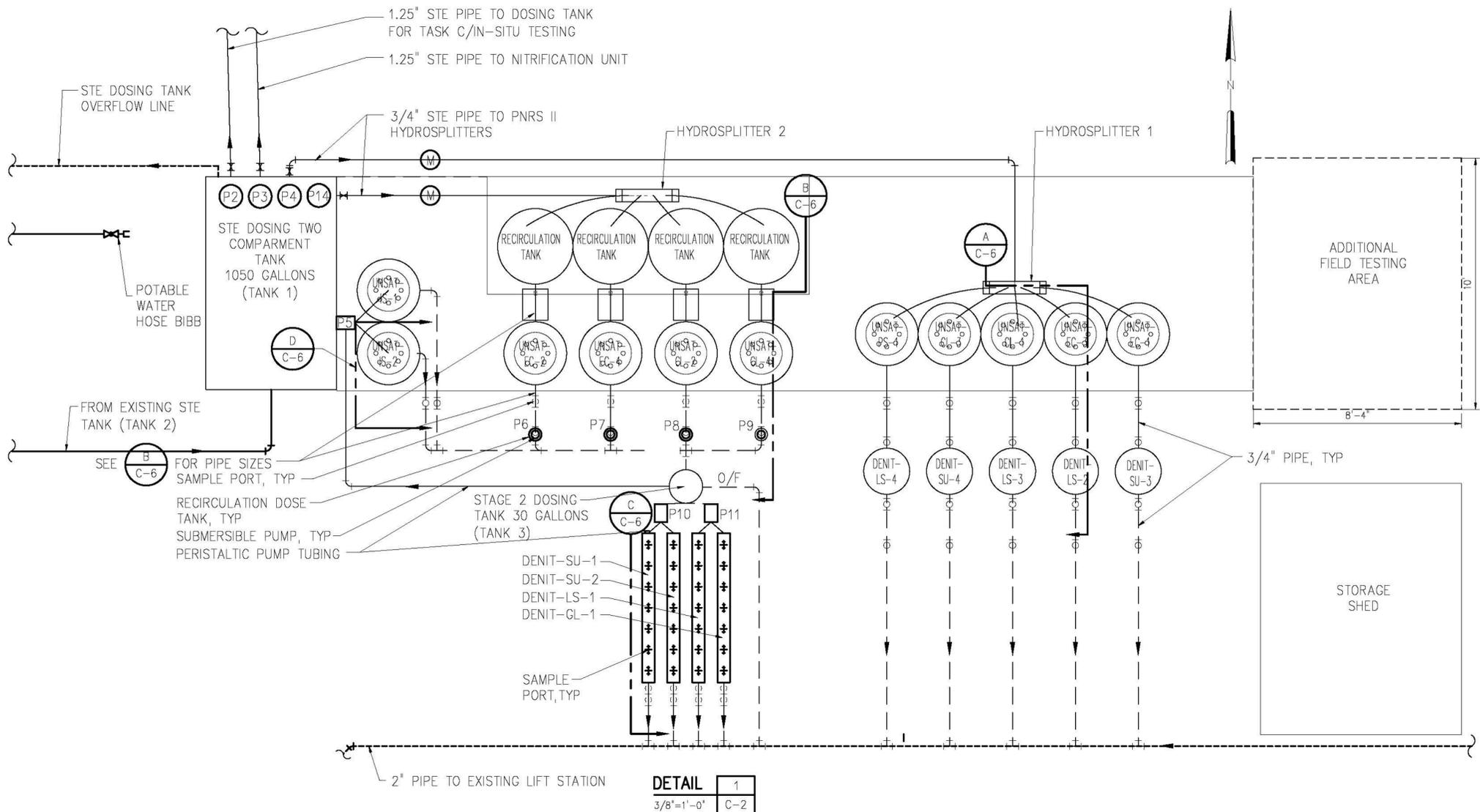
CONDITION	FLOW	A	B
AVERAGE FLOW	73.5 GPD	TANK 2 130.37	STAGE 2 TANK 130.12



DESIGNED — DRAWN — CHECKED — PROJ. ENGR. — APPROVED —	Name: _____ Date: _____ Florida Professional Engineer's Registration Number: _____	HAZEN AND SAWYER Environmental Engineers & Scientists 10002 Princess Palm Avenue Registry One Building, Suite 200 Tampa, Florida 33619 Certificate of Authorization Number: 2771	FLORIDA DEPARTMENT OF HEALTH 4052 BALD CYPRESS WAY, BIN A08 TALLAHASSEE, FL 32399-1713 (850)-245-4070	FLORIDA DEPARTMENT OF HEALTH FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY HYDRAULIC PROFILE PNRS II	THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING. DATE: DECEMBER 2009 H & S JOB NUMBER: 44237-001 CONTRACT NUMBER: _____ DRAWING NUMBER: C-4
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PLOT DATE: 12/07/2009 2:58 PM BY: SCSOTT

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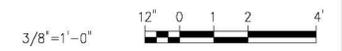


DETAIL 1
3/8\"=1'-0\" C-2

DETAIL 2
3/8\"=1'-0\" C-2

SUMMARY OF PNRS II BIOFILTERS						
	BIOFILTER	TANK SIZE	MEDIA DEPTH	INITIAL SURFACE LOADING RATE	INITIAL DOSE CYCLES	STAGE II BIOFILTER DIRECTLY CONNECTED
STAGE I BIOFILTER	(SINGLE PASS)					
	UNSAT-EC-1	30\"ID X 36\" H	15\" EXPANDED CLAY	3 gal/day-ft ² ; 14.73 gpd	24	DENIT-SU-3
	UNSAT-EC-3	30\"ID X 36\" H	30\" EXPANDED CLAY	3 gal/day-ft ² ; 14.73 gpd	24	DENIT-LS-2
	UNSAT-CL-1	30\"ID X 36\" H	15\" CLINOPTILOLITE	3 gal/day-ft ² ; 14.73 gpd	24	DENIT-LS-3
	UNSAT-CL-3	30\"ID X 36\" H	30\" CLINOPTILOLITE	3 gal/day-ft ² ; 14.73 gpd	24	DENIT-SU-4
	UNSAT-PS-1	30\"ID X 36\" H	30\" POLYSTYRENE	3 gal/day-ft ² ; 14.73 gpd	24	DENIT-LS-4
	(WITH RECYCLE)					
	UNSAT-SAND-2	30\"ID X 36\" H	30\" SAND	3 gal/day-ft ² ; 14.73 gpd	24	
	UNSAT-EC-4	30\"ID X 36\" H	30\" EXPANDED CLAY	3 gal/day-ft ² ; 14.73 gpd	24	
	UNSAT-CL-2	30\"ID X 36\" H	15\" CLINOPTILOLITE	3 gal/day-ft ² ; 14.73 gpd	24	
STAGE II BIOFILTER	(CONNECTED)					
	UNSAT-CL-4	30\"ID X 36\" H	30\" CLINOPTILOLITE	3 gal/day-ft ² ; 14.73 gpd	24	
	UNSAT-IS-1	30\"ID X 36\" H	24\" MIX	0.8 gal/day-ft ² ; 3.92 gpd	6	
	UNSAT-IS-2	30\"ID X 36\" H	24\" MIX	0.8 gal/day-ft ² ; 3.92 gpd	6	
	(COMMON TANK)					
	DENIT-SU-3	22\"ID X 34\" H	80% SU; 20% OS	4.7 gal/day-ft ² ; 12.41 gpd	CONTINUOUS	
	DENIT-SU-4	22\"ID X 34\" H	80% SU; 20% NS	4.7 gal/day-ft ² ; 12.41 gpd	CONTINUOUS	
	DENIT-LS-2	22\"ID X 34\" H	50% LS; 50% EC	4.7 gal/day-ft ² ; 12.41 gpd	CONTINUOUS	
	DENIT-LS-3	22\"ID X 34\" H	50% LS; 50% SAND	4.7 gal/day-ft ² ; 12.41 gpd	CONTINUOUS	
	DENIT-LS-4	22\"ID X 34\" H	30% LS; 70% EC	4.7 gal/day-ft ² ; 12.41 gpd	CONTINUOUS	
DENIT-SU-1	6\"ID X 72\" L	80% SU; 20% OS	10 gal/day-ft ² ; 1.96 gpd	24		
DENIT-SU-2	6\"ID X 72\" L	80% SU; 20% NS	10 gal/day-ft ² ; 1.96 gpd	24		
DENIT-LS-1	6\"ID X 72\" L	50% LS; 50% EC	10 gal/day-ft ² ; 1.96 gpd	24		
DENIT-GL-1	6\"ID X 72\" L	100% EC	10 gal/day-ft ² ; 1.96 gpd	24		

LS: ELEMENTAL SULFUR, SU: SODIUM SESQUICARBONATE, EC: EXPANDED CLAY, CL: CLINOPTILOLITE, OS: OYSTER SHELL, NS: SODIUM SESQUICARBONATE, EC: EXPANDED CLAY



NO.	ISSUED FOR	DATE	BY	APPROVED
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2	75% SUBMITTAL	12/09	--	
1	50% SUBMITTAL	08/09	--	

DESIGNED	--
DRAWN	--
CHECKED	--
PROJ. ENGR.	--

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____

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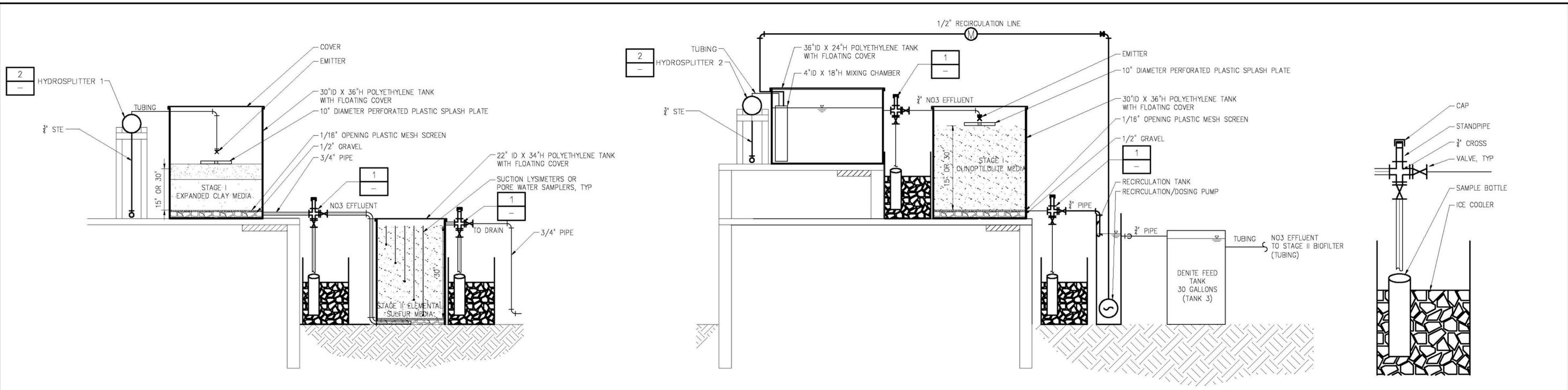
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

PNRS II DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: C-5

PLOT DATE: 12/07/2009 2:58 PM BY: GSCOTT

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PNRS II TWO-STAGE BIOFILTER SINGLE PASS (TYPICAL)

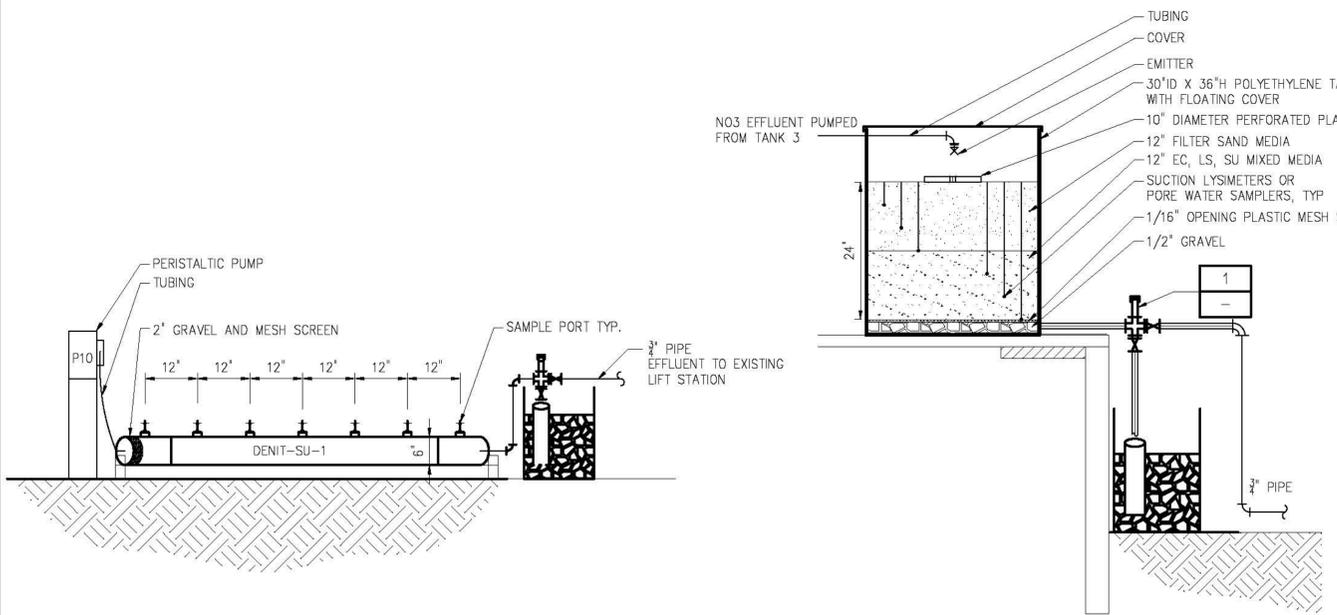
SECTION A
NTS C-5

PNRS II TWO-STAGE BIOFILTER WITH RECYCLE (TYPICAL)

SECTION B
NTS C-5

TYPICAL SAMPLE PORT

DETAIL 1
NTS -

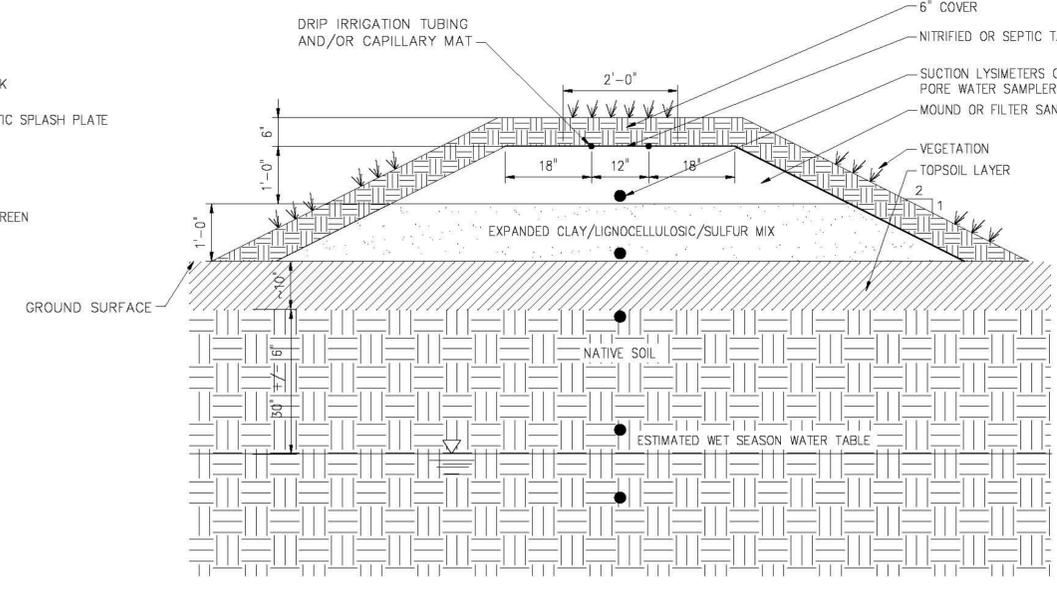


PNRS II STAGE II BIOFILTER FED FROM TANK 3

SECTION C
NTS C-5

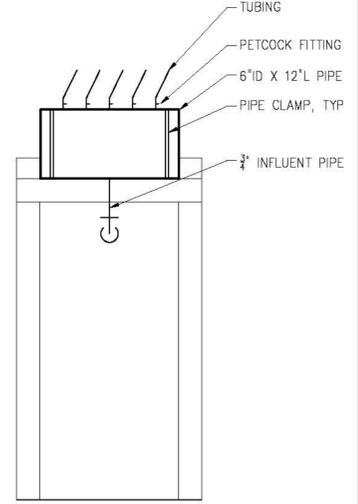
PNRS II STAGE I IN-SITU BIOFILTER SIMULATOR

SECTION D
NTS C-5



PNRS II INSITU SYTEM

SECTION E
NTS C-5



HYDROSPITTER

DETAIL 2
NTS -

PLOT DATE: 12/27/2008 2:57 PM BY: C5001T

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DRAWN	---
CHECKED	---
PROJ. ENGR.	---
NO.	ISSUED FOR
3	100% SUBMITTAL
2	75% SUBMITTAL
1	50% SUBMITTAL
	DATE
	12/09
	12/09
	08/09
	BY

	APPROVED

NAME:	DATE:
Florida Professional Engineer's Registration Number: ---	

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Environmental Engineers & Scientists

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Tampa, Florida 33619
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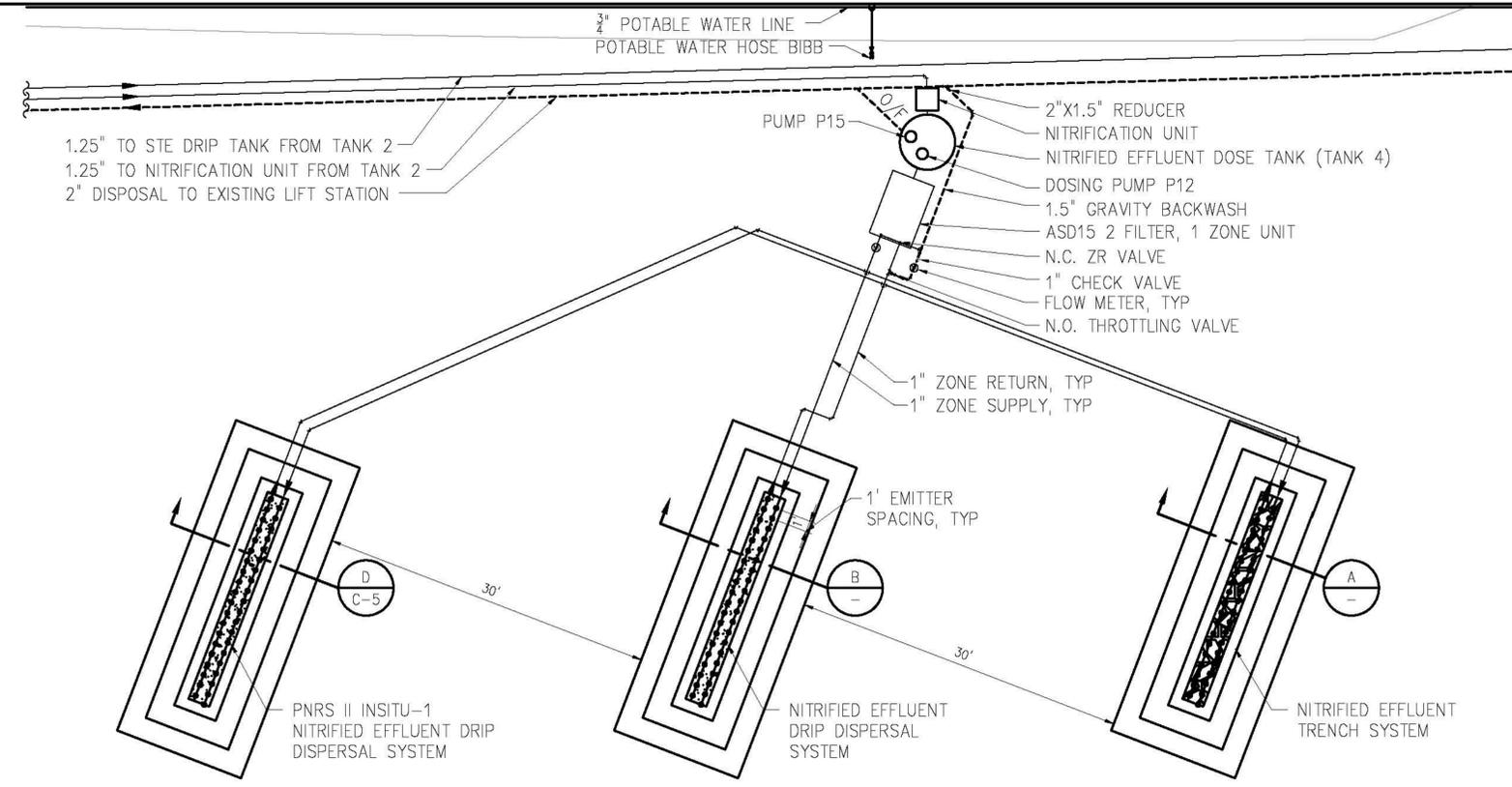
FLORIDA DEPARTMENT OF HEALTH
4052 BALD CYPRESS WAY, BIN A08
TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

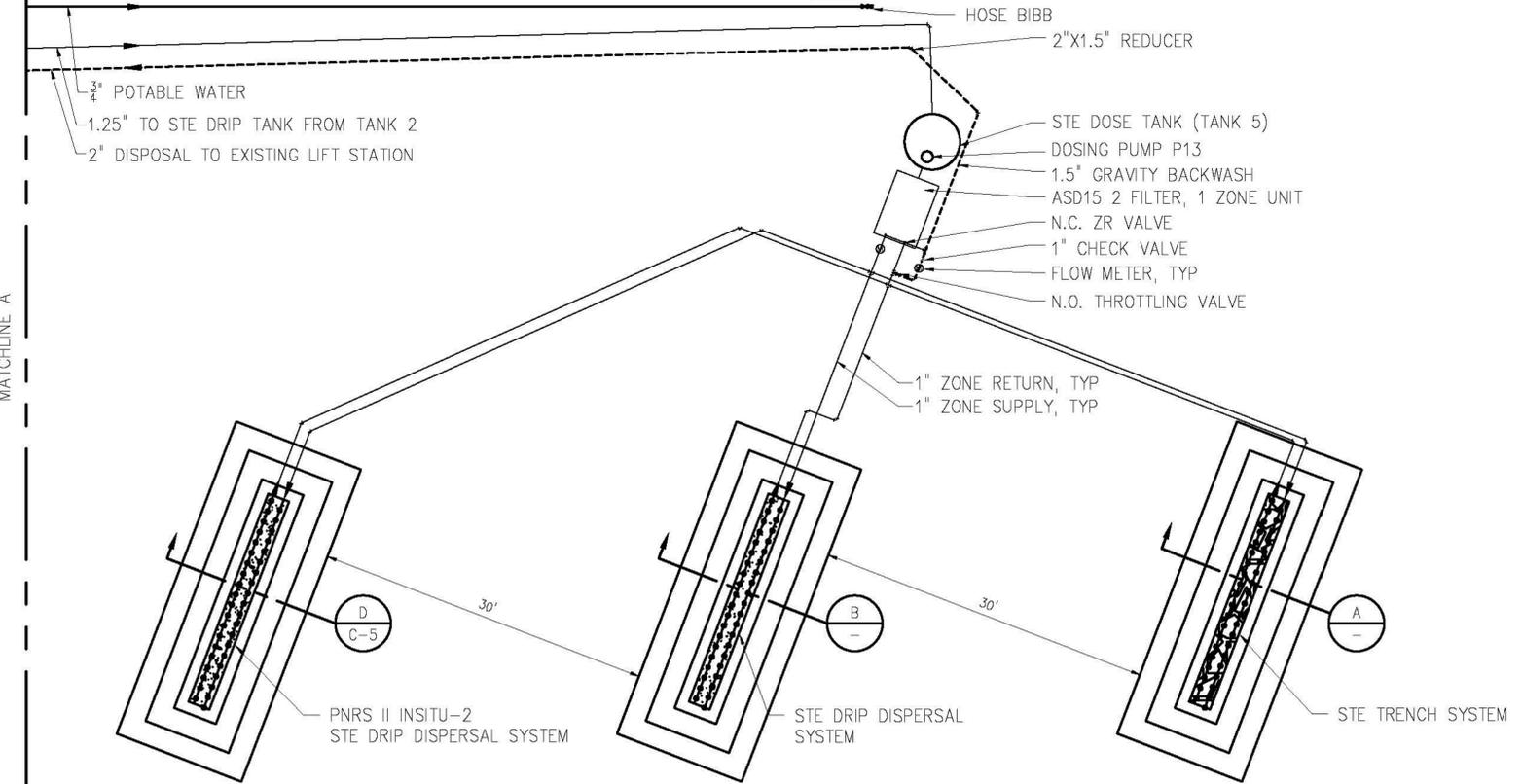
PNRS II DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: C-6

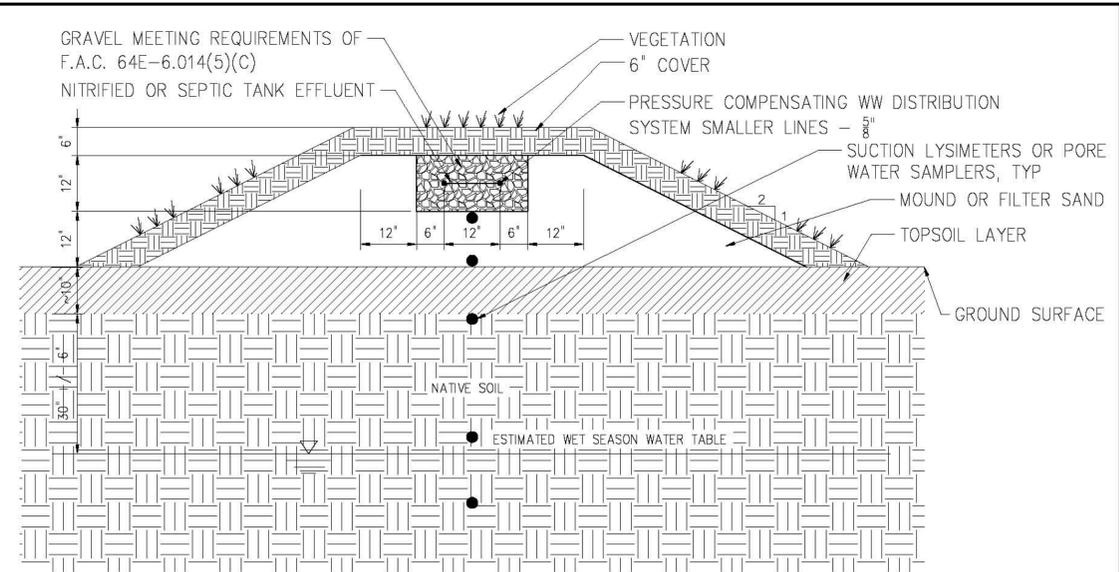
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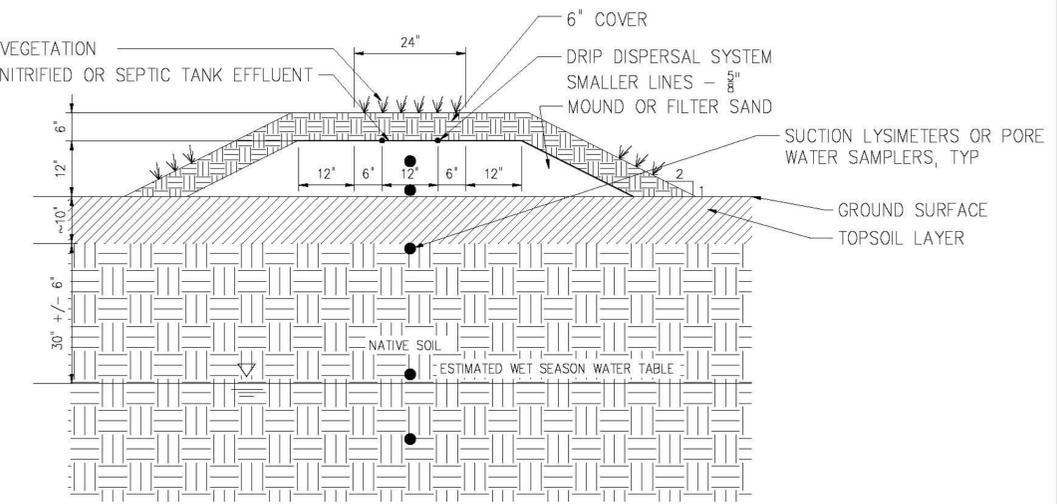
DETAIL 3
NTS
C-2



DETAIL 4
NTS
C-2



SECTION A
NTS



SECTION B
NTS

NOTES

- PROPOSED NITRIFICATION UNIT AT THIS FACILITY REFERS TO A MANUFACTURED WASTEWATER TREATMENT SYSTEM WHICH MAY UTILIZE SPECIAL EQUIPMENT AND MATERIALS SUPPLIED AS A SINGLE PACKAGE WHERE INDICATED. THIS SYSTEM WILL BE PROVIDED BY OTHERS.
- TWO PERC-RITE DRIP DISPERSAL SYSTEMS WITH THREE ZONES EACH SHALL BE PROVIDED AS INDICATED. THE SYSTEMS SHALL INCLUDE A PRESSURE REGULATOR AND FLOW METER ON THE RETURN LINE. THE INSTALLATION OF THIS SYSTEM SHALL BE IN ACCORDANCE WITH SPECIFICATIONS AND PROCEDURES AS SUPPLIED BY THE MANUFACTURER OF THE EQUIPMENT.
- THE DRIP TUBING SHALL BE INSTALLED USING A VIBRATORY PLOW OR TRENCHER. INSTALL ALL TUBING ALONG CONTOUR.
- ALL PVC PIPING AND FITTINGS SHALL BE PVC SCH 40 TYPE 1 RATED FOR PRESSURE APPLICATIONS. ALL GLUED JOINTS SHALL BE CLEANED AND PRIMED WITH PURPLE (DYED) PVC PRIMER PRIOR TO BEING GLUED.
- ALL CUTTING OF PVC PIPE, FLEXIBLE PVC AND DRIPPER TUBING OF SIZE 1.5" OR SMALLER SHALL BE ACCOMPLISHED WITH PIPE CUTTERS APPROVED BY AMERICAN MANUFACTURING COMPANY, INC. NO SAWING OF PVC, FLEXIBLE PVC, OR DRIPPER TUBING OF SIZE 1.5" OR SMALLER IS ALLOWED.
- ALL PVC PIPE, FLEXIBLE PVC AND DRIPPER TUBING IN THE WORK AREA SHALL HAVE THE ENDS COVERED WITH DUCT TAPE TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING THE PIPE. PRIOR TO GLUING, ALL JOINTS SHALL BE INSPECTED FOR AND CLEARED OF ANY CONSTRUCTION DEBRIS.
- ALL AUTOMATIC VALVES (ZONE VALVES & FIELD FLUSH RETURN VALVES) SHALL BE INSTALLED WITH ISOLATION VALVES, BYPASS VALVES, AND DISCONNECTS (I.E. UNIONS, FLANGES) FOR MANUAL FIELD OPERATION DURING FIELD MAINTENANCE EVENTS. ALL VALVES MUST BE PROVIDED WITH AT-GRADE ACCESS.
- NO ACTIVITY ON DRAINFIELD AREA OTHER THAN MINIMUM IS REQUIRED TO INSTALL SYSTEMS. DO NOT PARK EQUIPMENT, DRIVE LARGE EQUIPMENT OVER OR STORE MATERIALS ON DRAINFIELD AREAS.
- NO WET WEATHER INSTALLATION IS PERMITTED.
- ALL FORCE MAINS SHALL BE TESTED FOR LEAKS PRIOR TO DRIP TUBING INSTALLATION AND PRIOR TO SYSTEM STARTUP. UNCOVERED FORCE MAINS SHALL BE VISIBLY INSPECTED FOR LEAKS. IF A LEAK IS SUSPECTED IN COVERED FORCE MAINS THEN THE FORCE MAIN SHALL BE RE-TESTED AT A MINIMUM PRESSURE OF AT LEAST 50 PERCENT ABOVE THE DESIGN OPERATING PRESSURE, FOR AT LEAST 30 MINUTES. THERE SHALL BE NO DISCERNIBLE LEAKAGE.
- THE CONTRACTOR IS ADVISED THAT THE NITRIFICATION UNIT AND DRIP DISPERSAL SYSTEMS AND POSSIBLY OTHER DONATED EQUIPMENT WILL BE DELIVERED AND STORED AT THE PROJECT SITE. EXCEPT WHERE INDICATED IN CONTRACT DOCUMENTS ALL SHIPMENTS WILL BE ARRANGED BY FDOH AND THE ENGINEER. MANUFACTURERS REPRESENTATIVES WILL BE AVAILABLE FOR TECHNICAL GUIDANCE AT THE TIME OF INSTALLATION.

PLOT DATE: 12/07/2009 2:57 PM BY: CS2001

NO.	ISSUED FOR	DATE	BY	APPROVED
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2	75% SUBMITTAL	12/09	-	DRAWN -
1	50% SUBMITTAL	08/09	-	CHECKED -
				PROJ. ENGR. -

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____

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 Environmental Engineers & Scientists
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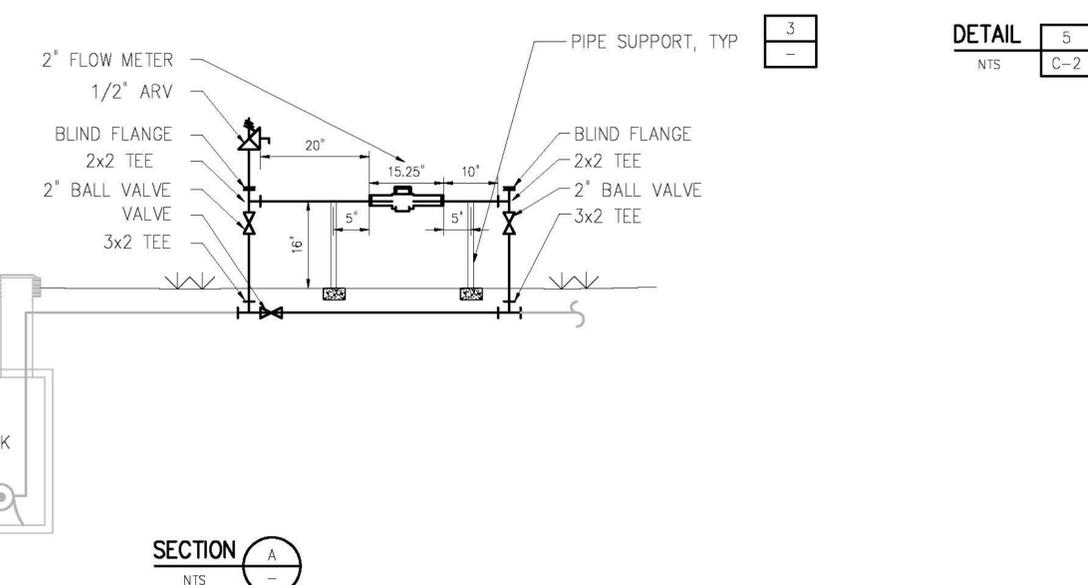
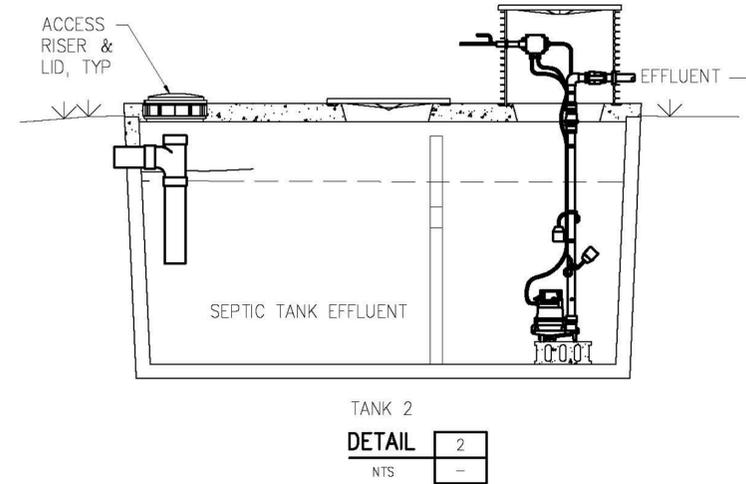
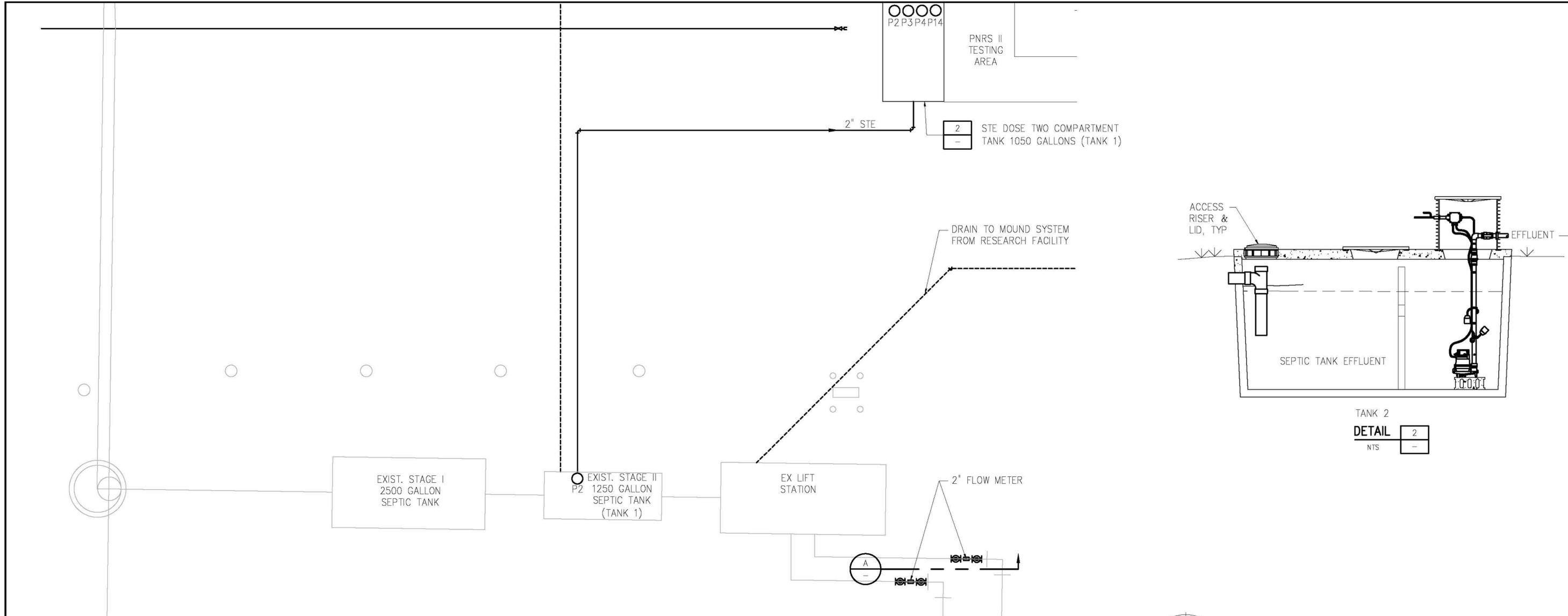
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 4052 BALD CYPRESS WAY, BIN A08
 TALLAHASSEE, FL 32399-1713
 (850)-245-4070

FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
TASK C NITROGEN FATE & TRANSPORT STUDY
 DETAILS

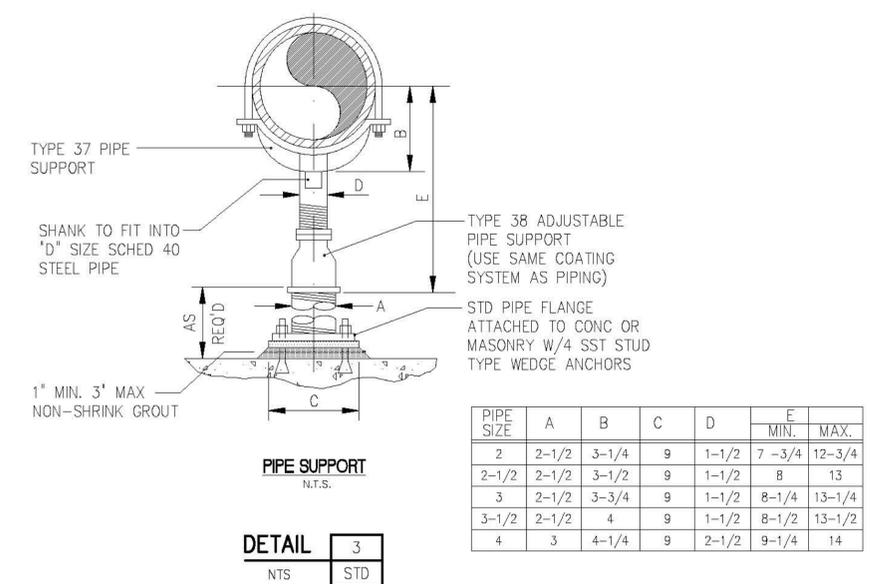
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE: DECEMBER 2009
 H & S JOB NUMBER: 44237-001
 CONTRACT NUMBER:
 DRAWING NUMBER: **C-7**

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- NOTES:
1. PROVIDE HALF ROUND RIGID INSULATION & INSULATION PROTECTION SHIELD, SIMILAR TO ANVIL FIG.167 OR COOPER B-LINE B3151 WHEN PIPING IS INSULATED.
 2. PROVIDE NEOPRENE WAFFLE ISOLATION PAD SIMILAR TO MASON TYPE "W" OR KORFUND KORPAD 40, UNDER SUPPORT FOOT WHEN PIPING IS TO BE ISOLATED OR FIRST SUPPORT ADJACENT TO MECHANICAL EQUIPMENT.
 3. FOR BASE, HEIGHT, & FLANGE DIMENSIONS, SEE TABLE TO RIGHT.
 4. SST=TYPE 316



PIPE SIZE	A	B	C	D	E	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
2	2-1/2	3-1/4	9	1-1/2	7-3/4	12-3/4
2-1/2	2-1/2	3-1/2	9	1-1/2	8	13
3	2-1/2	3-3/4	9	1-1/2	8-1/4	13-1/4
3-1/2	2-1/2	4	9	1-1/2	8-1/2	13-1/2
4	3	4-1/4	9	2-1/2	9-1/4	14

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3	100% SUBMITTAL	12/09	—	—
2	75% SUBMITTAL	12/09	—	—
1	50% SUBMITTAL	08/09	—	—

DESIGNED	DRAWN	CHECKED	PROJ. ENGR.
—	—	—	—

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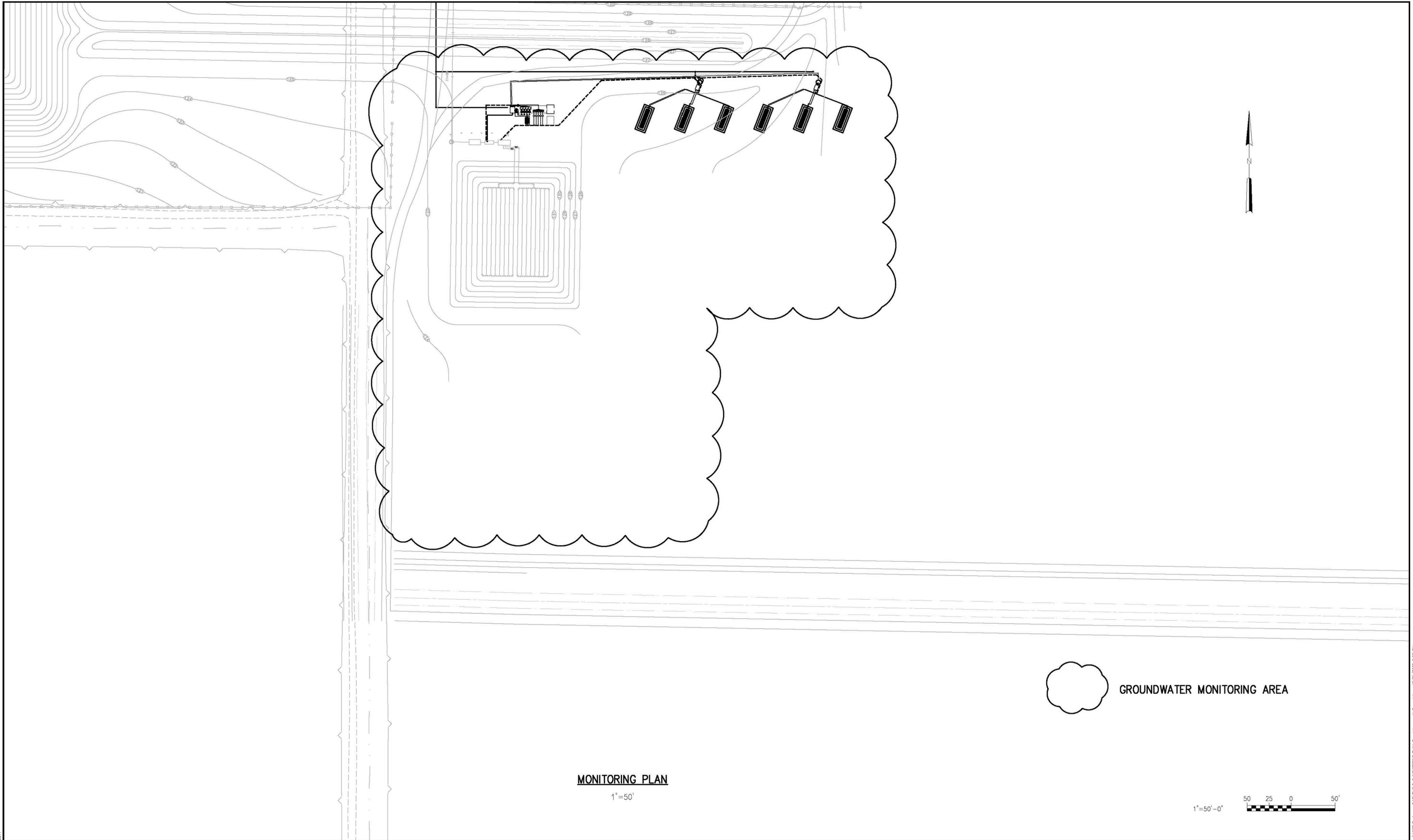
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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY
WASTEWATER SOURCE COMPONENTS DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: C-8

PLOT DATE: 12/07/2009 2:58 PM BY: GSCOTT

File: G:\44237-001\PA\14337-001\Drawings\0005.Dwg - C:\G:\44237-001\Drawings\0005.Dwg - 12/07/2009 2:58 PM



 GROUNDWATER MONITORING AREA

MONITORING PLAN

1"=50'

1"=50'-0" 

PLOT DATE: 12/27/2009 2:58 PM BY: SCOTT

DESIGNED	---
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2	75% SUBMITTAL
1	50% SUBMITTAL
	DATE
	BY
	APPROVED

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____

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 Environmental Engineers & Scientists
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 Registry One Building, Suite 200
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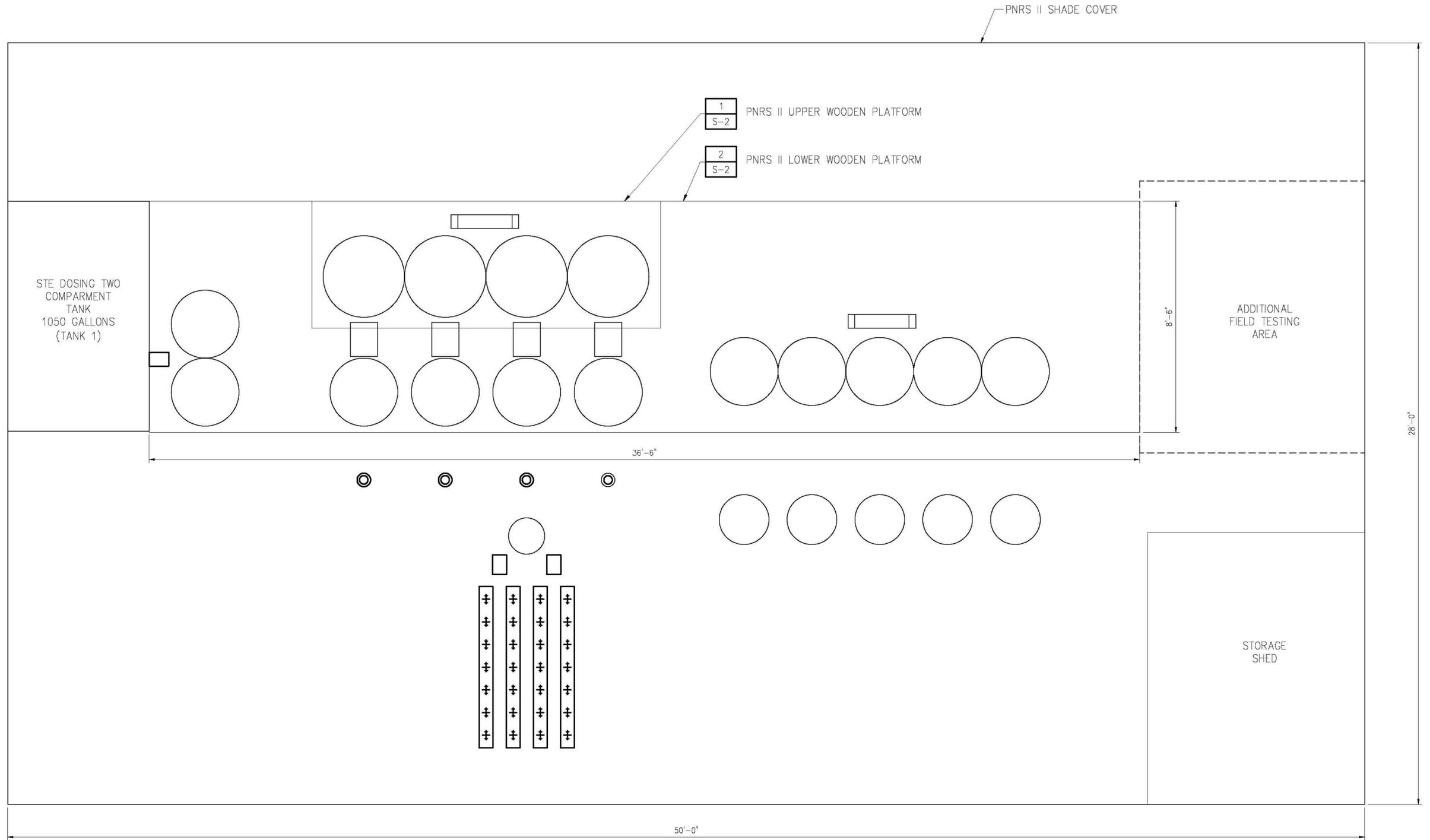
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

MONITORING PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE	DECEMBER 2009
H & S JOB NUMBER	44237-001
CONTRACT NUMBER	
DRAWING NUMBER	C-9

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PROPOSED SITE PLAN
1/2"=1'-0"

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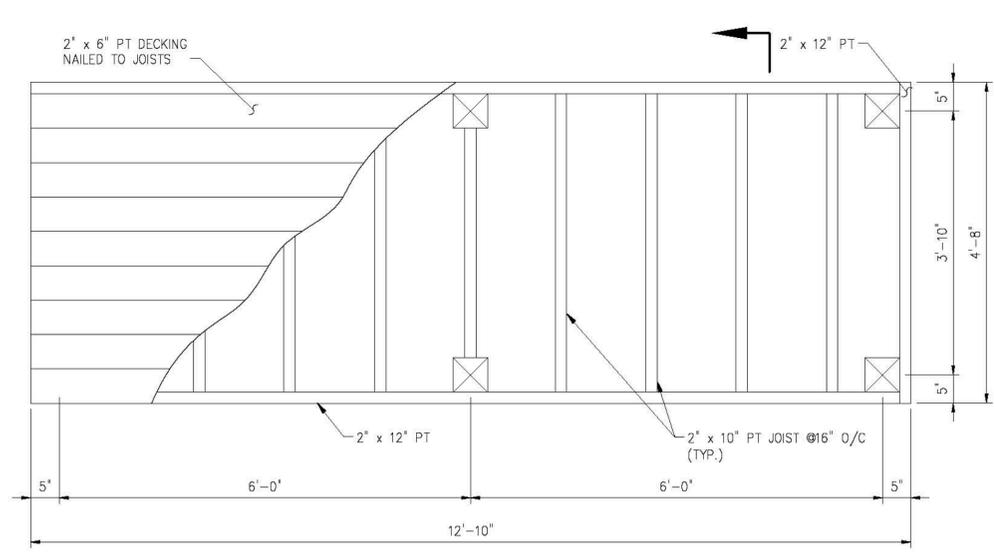


FLORIDA DEPARTMENT OF HEALTH
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PNRS II STRUCTURAL SITE PLAN

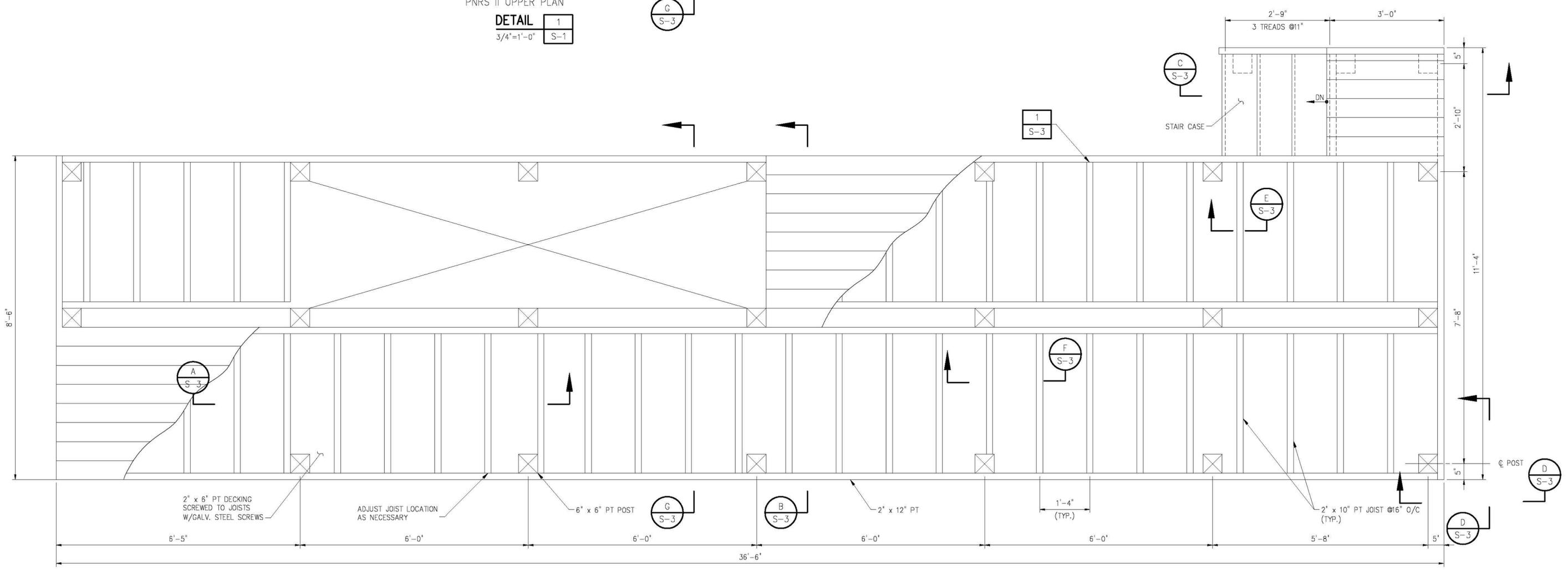
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	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: S-1

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PNRS II UPPER PLAN
DETAIL 1
 3/4"=1'-0"

G
S-3



PNRS II PLAN
DETAIL 2
 3/4"=1'-0"

3/4"=1'-0"

PLOT DATE: 12/21/2009 2:58 PM BY: SCSOIT

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DESIGNED	A.V.F.
DRAWN	G.P.B.
CHECKED	A.F.H.
PROJ. ENGR.	S.J.

Name: SHAJAN JOYKUTTY, PE Date: _____
 Florida Professional Engineer's Registration Number: 43323

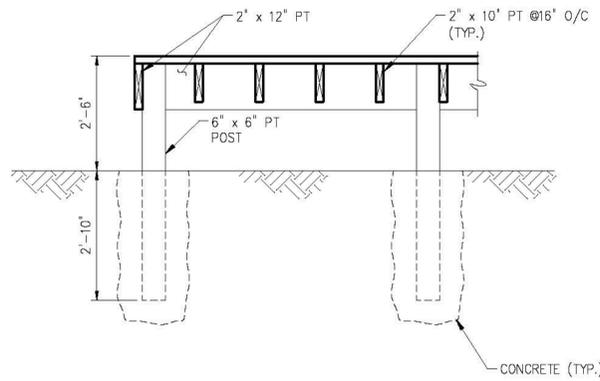
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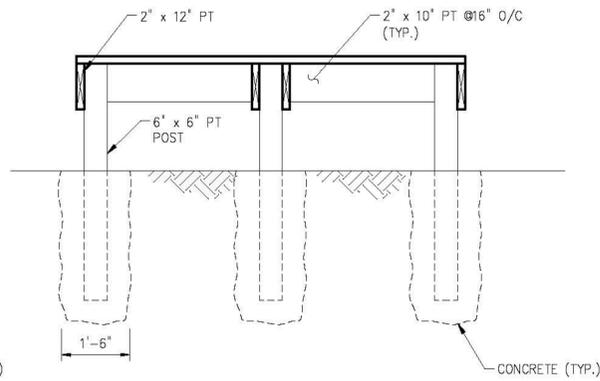
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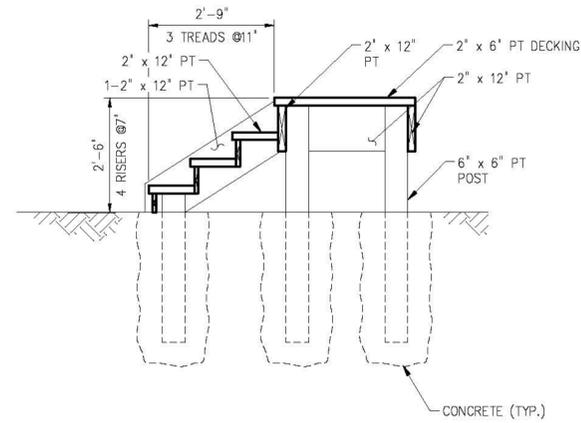
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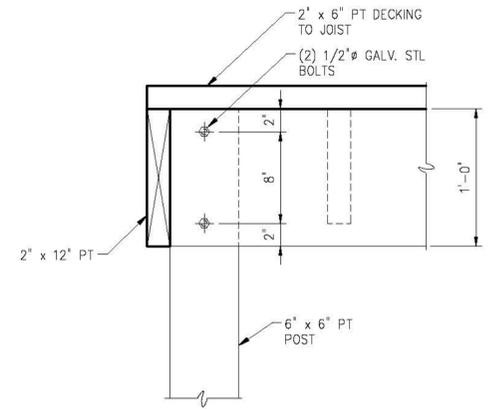
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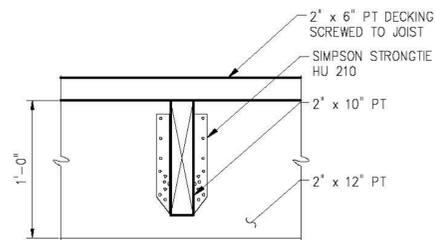
SECTION B
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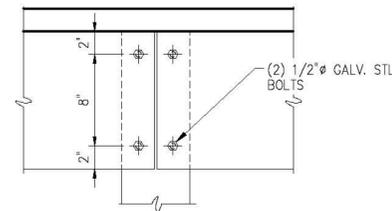
SECTION C
1/2"=1'-0"



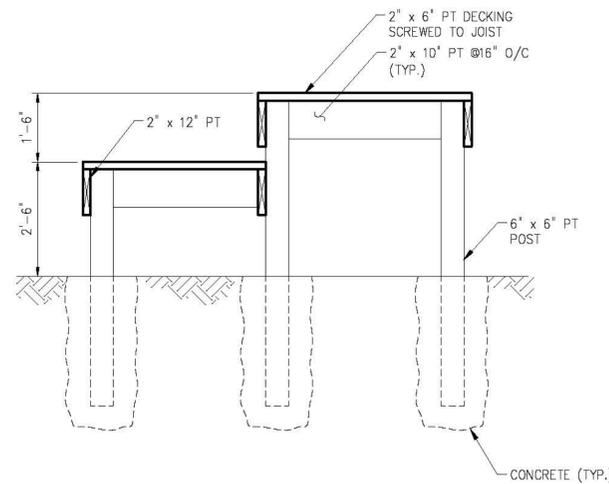
SECTION D
1-1/2"=1'-0"



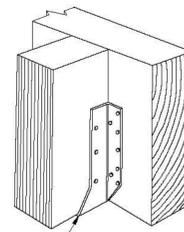
SECTION E
1-1/2"=1'-0"



SECTION F
1-1/2"=1'-0"

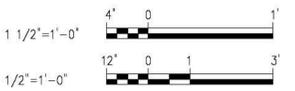


SECTION G
1/2"=1'-0"



HU 210 JOIST HANGER BY SIMPSON STRONG TIE, FASTEN WITH (8) 3/4" x 1 3/4" LONG AND (6) 10d x 1 3/4" LONG NAILS FOR JOIST (N.O.A. #03-0123.05)

DETAIL 1
N.T.S.



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DRAWN	G.P.B.
CHECKED	A.F.H.
PROJ. ENGR.	S.J.

Name: SHAJAN JOYKUTTY, PE Date: _____
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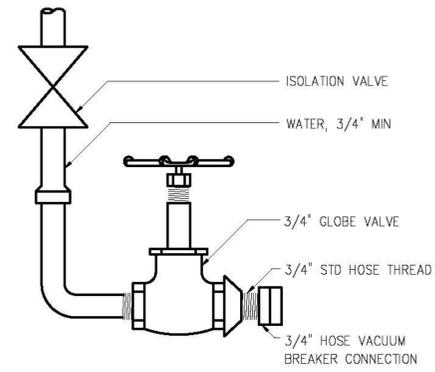
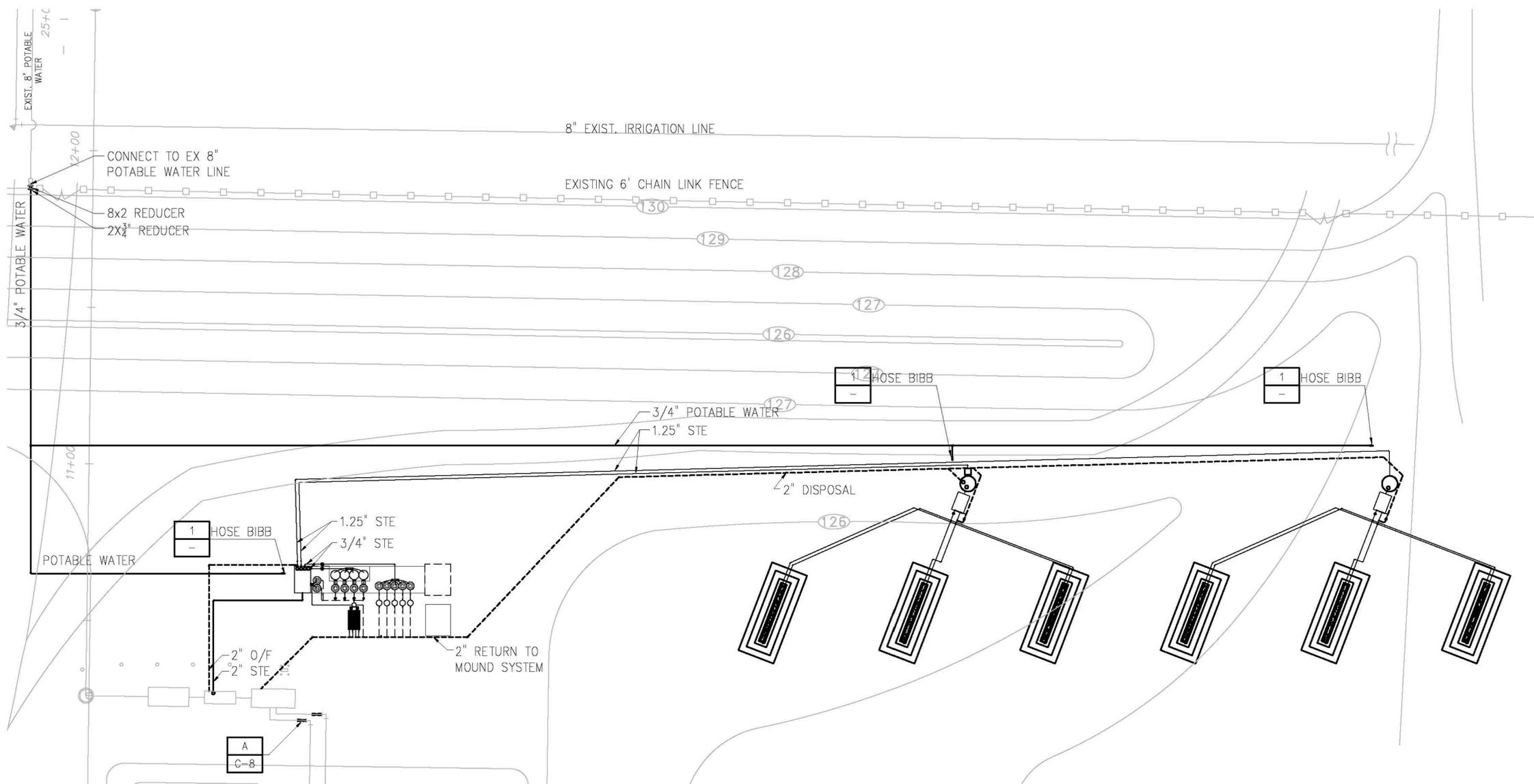


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 PNRS II STRUCTURAL SITE PLAN AND DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
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	DRAWING NUMBER: S-3

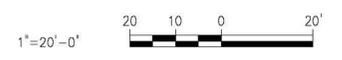
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HOSE BIBB
 DETAIL 1
 NTS -

YARD PIPING PLAN
 1"=20'

- NOTES**
- ALL YARD PIPING, UNLESS OTHERWISE SHOWN SHALL BE SOLVENT WELDED PVC LAID AT EXISTING SITE GRADE AND COVERED WITH FILL MATERIAL.
 PVC PIPING SHALL BE LAID WHERE POSSIBLE IN COMMON TRENCHES AND MARKED WITH PIPE NUMBERS IN PERMANENT MARKINGS AT 10' INTERVALS.
 - MAINTAIN SLOPE AND GRADE OF GRAVITY LINES AS INDICATED ON THE DRAWINGS.



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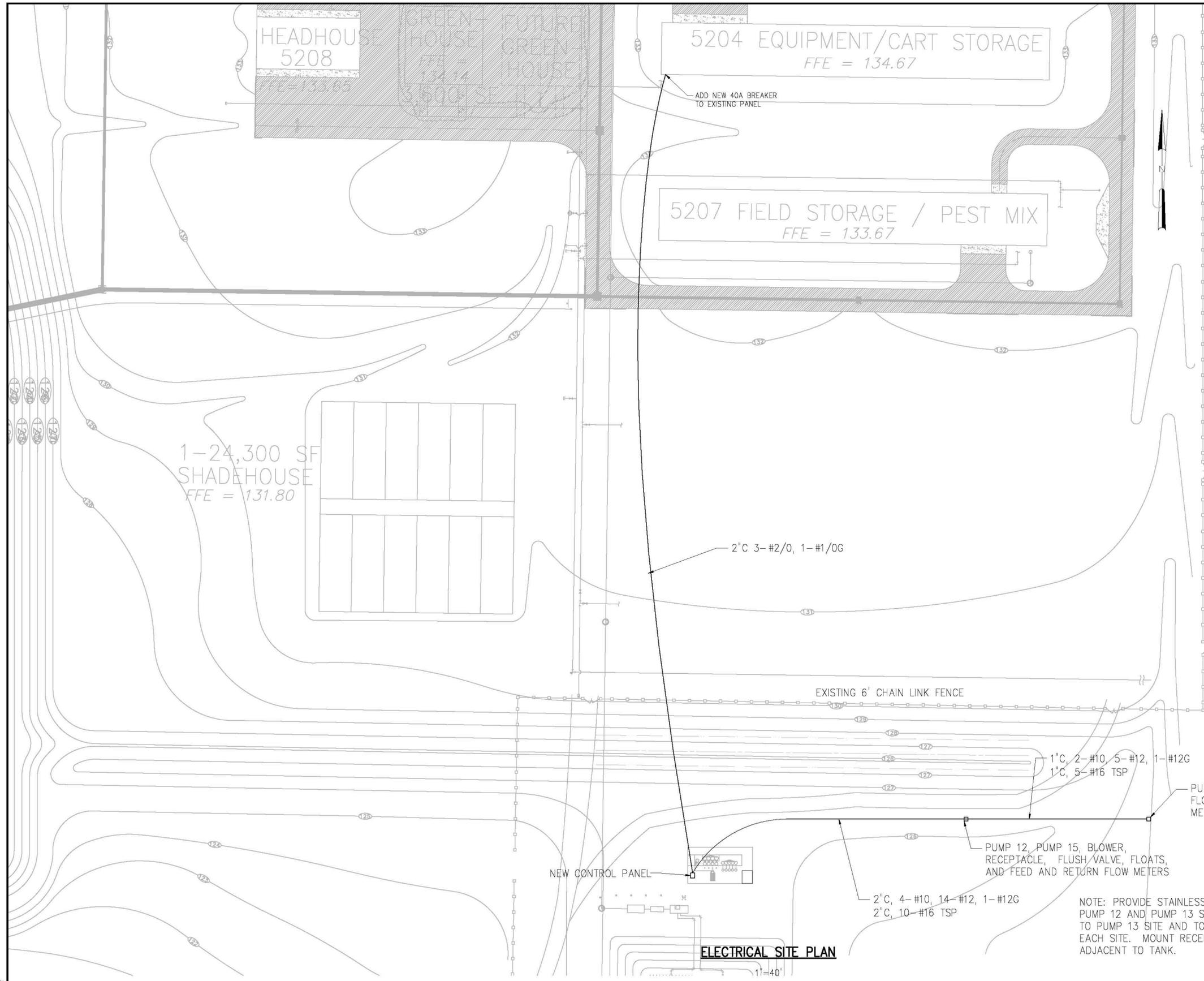
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YARD PIPING PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
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	CONTRACT NUMBER
	DRAWING NUMBER: M-1

File: G:\44237-0001\PA\14337-001\Drawings\0005 Design - C12\Mechanical\Y-1 YARD PIPING PLAN.dwg Saved by: jacobson Date: 12/09/2009 3:08 PM



ELECTRICAL NOTES

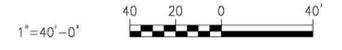
- COORDINATE LOCATIONS OF ELECTRICAL EQUIPMENT, DEVICES, OUTLETS, FIXTURES, ETC. WITH CIVIL, STRUCTURAL, MECHANICAL, AND INSTRUMENTATION DRAWINGS PRIOR TO ROUGH-IN WORK. DO NOT SCALE ELECTRICAL.
- ALL WIRE SHALL BE COPPER.
- PROVIDE INSULATED GROUNDING CONDUCTOR FROM EACH EQUIPMENT CONNECTION AND OUTLET TO GROUNDING BAR IN PANELBOARDS.
- PROVIDE AN INSULATED GROUNDING CONDUCTOR IN ALL FEEDER AND BRANCH CIRCUITS.
- CONTRACTOR SHALL PROVIDE ADDITIONAL JUNCTION BOXES, CONDUCTORS AND OTHER MATERIALS AND LABOR NECESSARY TO CONNECT PARALLEL FEEDER RUNS WHERE SUCH FEEDERS EXCEED CONNECTION CAPACITY OF CIRCUIT BREAKERS, PANELBOARDS AND OTHER CONNECTION POINTS.
- RISER DIAGRAMS SHOW ONLY THE GENERAL CONFIGURATION OF THE SYSTEM. REFER TO THE APPROPRIATE DRAWINGS FOR EXACT DEVICE, QUANTITIES AND LOCATIONS.
- ALL ELECTRICAL EQUIPMENT, DEVICES, ETC. LOCATED OUTDOORS SHALL BE WEATHERPROOF.
- REFER TO STRUCTURAL DRAWINGS FOR CONCRETE WORK.
- EXISTING UTILITIES AND OTHER UNDERGROUND OR CONCEALED ITEMS ARE SHOWN FOR REFERENCE ONLY. ADDITIONAL ITEMS NOT SHOWN MAY BE PRESENT AND LOCATIONS MAY DIFFER FROM THAT SHOWN. CONTRACTOR SHALL EXCAVATE AND CONDUCT DEMOLITION SO AS TO AVOID DAMAGE TO EXISTING ITEMS, SHALL NOTIFY OWNER AND ENGINEER AT ONCE OF ALL DAMAGE AND SHALL REPAIR DAMAGE TO ORIGINAL CONDITION TO THE SATISFACTION OF OWNER AND ENGINEER AT NO CHANGE IN CONTRACT AMOUNT.

ELECTRICAL SPECIFICATIONS

- THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS AND EQUIPMENT NECESSARY FOR THE INSTALLATION OF A COMPLETE ELECTRICAL SYSTEM AS INDICATED WITHIN THESE DRAWINGS.
 - ALL WORK SHALL BE INSTALLED IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES AND ORDINANCES AND WITH MANUFACTURERS RECOMMENDATIONS. ALL WORK, MATERIALS AND EQUIPMENT SHALL COMPLY WITH THE NATIONAL ELECTRICAL CODE 2002 EDITION.
 - ALL MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN A NEAT, FIRST CLASS, WORKMANLIKE MANNER, TO THE APPROVAL OF THE ENGINEER AND GOVERNING AUTHORITIES.
 - GUARANTEES AND SERVICE:** IN ADDITION TO THE MANUFACTURERS STANDARD GUARANTEES, THE CONTRACTOR SHALL GUARANTEE ALL MATERIALS, EQUIPMENT AND WORKMANSHIP AGAINST DEFECTS FOR ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE, AND SHALL CORRECT ANY DEFECTS AT NO ADDITIONAL COST TO THE OWNER. ALL LAMPS SHALL BE GUARANTEED FOR 30 DAYS.
 - CONDUIT AND WIRING:** THE CONTRACTOR SHALL PROVIDE COPPER CONDUCTORS IN METALLIC RACEWAY. CONDUITS SHALL CONTAIN AN INSULATED GREEN GROUND CONDUCTOR. FOLLOW RULES AND REGULATIONS OF THE NEC FOR PROPER INSTALLATION REGARDING INSTALLATION AND SUPPORT. CONDUIT SHALL BE INSTALLED AS NOTED. IF NOT SPECIFICALLY ADDRESSED THE FOLLOWING SHALL APPLY: (A) PROVIDE RIGID ALUMINUM IN EXPOSED LOCATIONS, (B) PROVIDE PVC (POLY VINYL CHLORIDE) UNDERGROUND, (C) PROVIDE LIQUID-TITE FLEXIBLE METALLIC CONDUIT FOR EQUIPMENT CONNECTIONS WHERE POSSIBILITY OF VIBRATION EXISTS. PROVIDE FITTINGS AS MANUFACTURED FOR CONDUIT USED.
- PROVIDE COPPER CONDUCTORS WITH DUAL RATED THWN-THHN TYPE INSULATION.

ELECTRICAL SITE PLAN

NOTE: PROVIDE STAINLESS STEEL JUNCTION BOXES AT PUMP 12 AND PUMP 13 SITES TO CONTINUE CONDUITS ON TO PUMP 13 SITE AND TO CONNECT TO COMPONENTS AT EACH SITE. MOUNT RECEPTACLE 2 FEET ABOVE GRADE ADJACENT TO TANK.



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CHECKED	—
PROJ. ENGR.	—

Name: _____ Date: _____
 Florida Professional Engineer's Registration Number: _____



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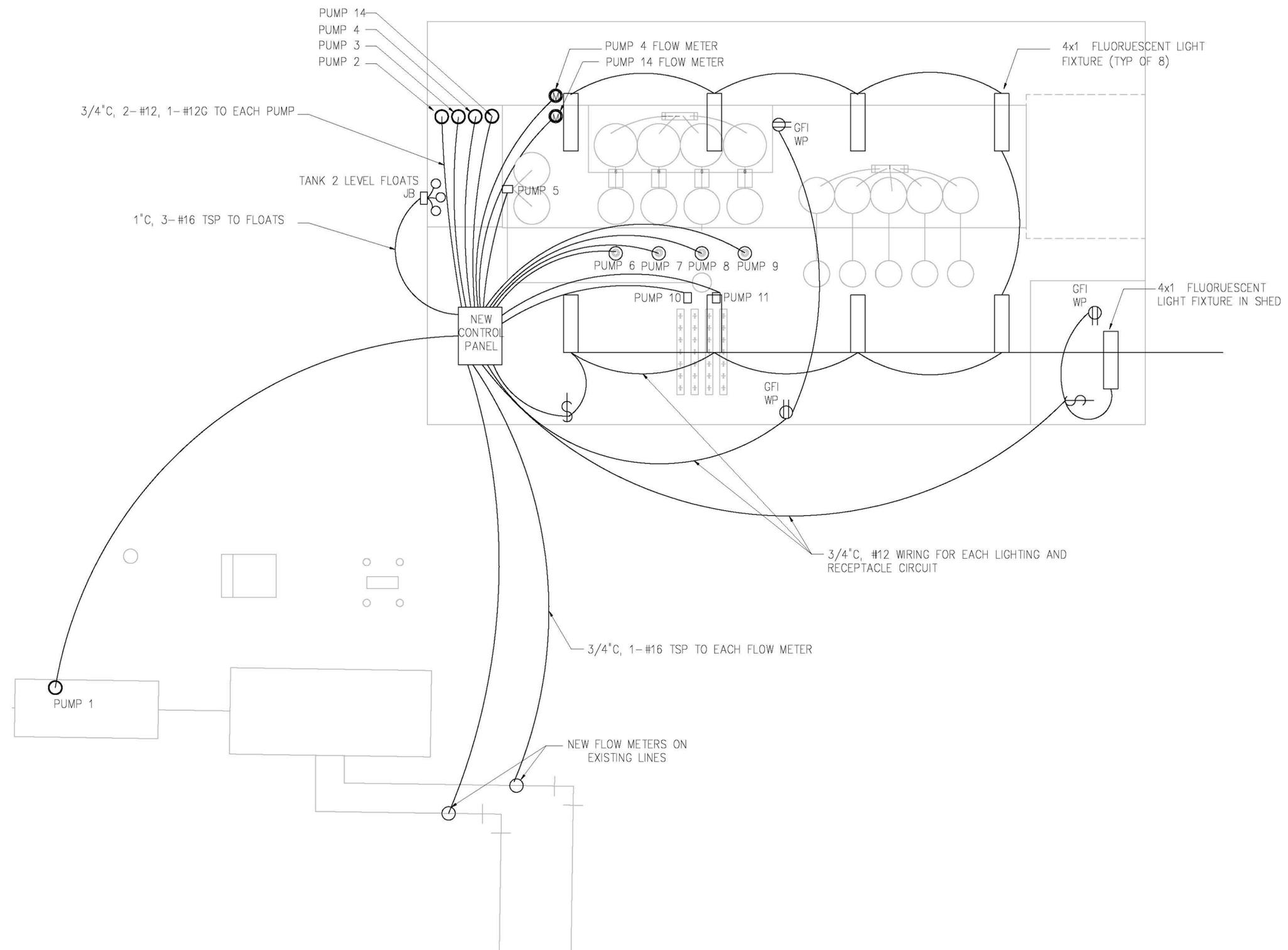
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ELECTRICAL SITE PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
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	CONTRACT NUMBER
	DRAWING NUMBER: E-1

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ELECTRICAL SITE PLAN

1/4"=1'-0"

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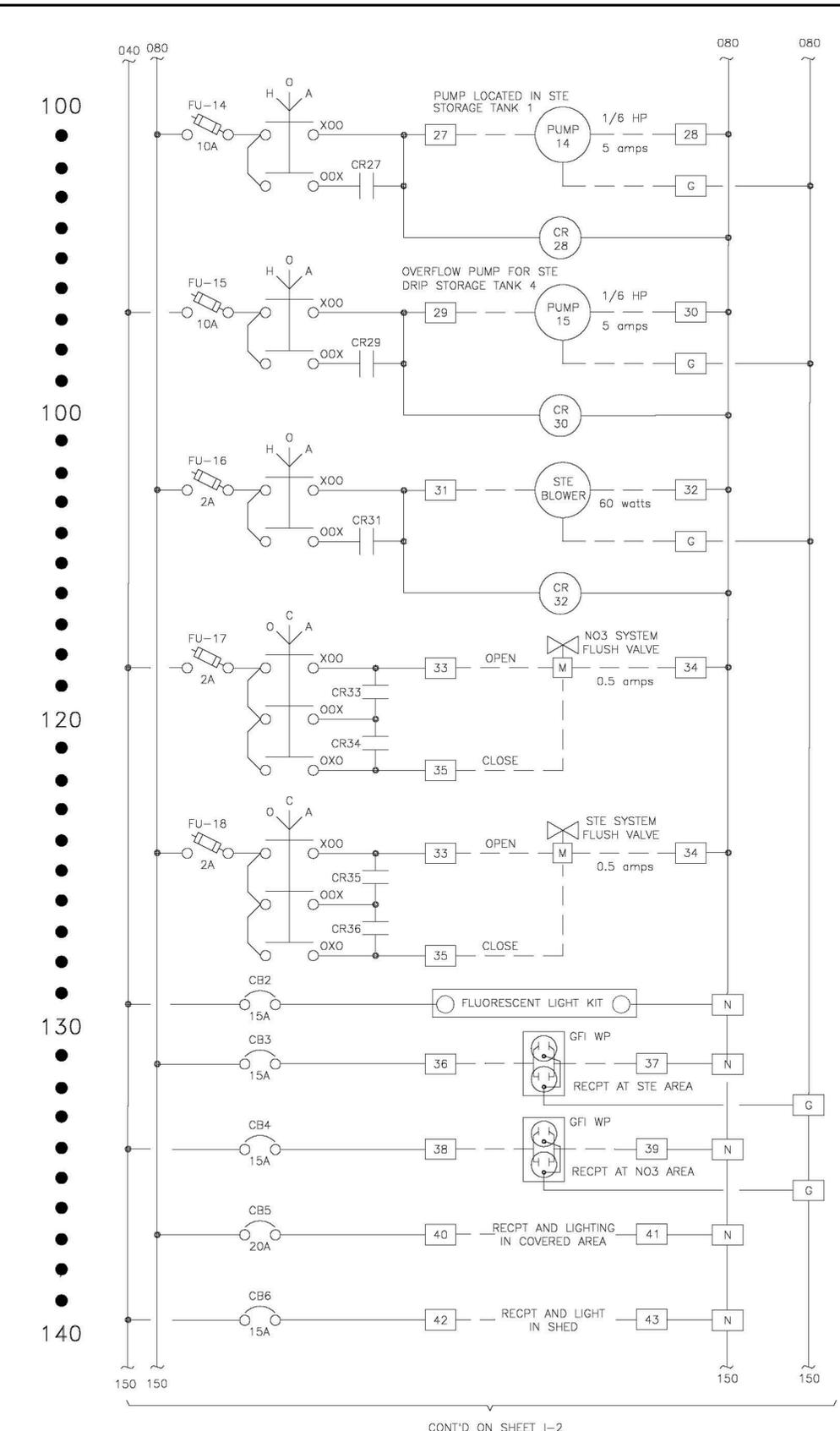
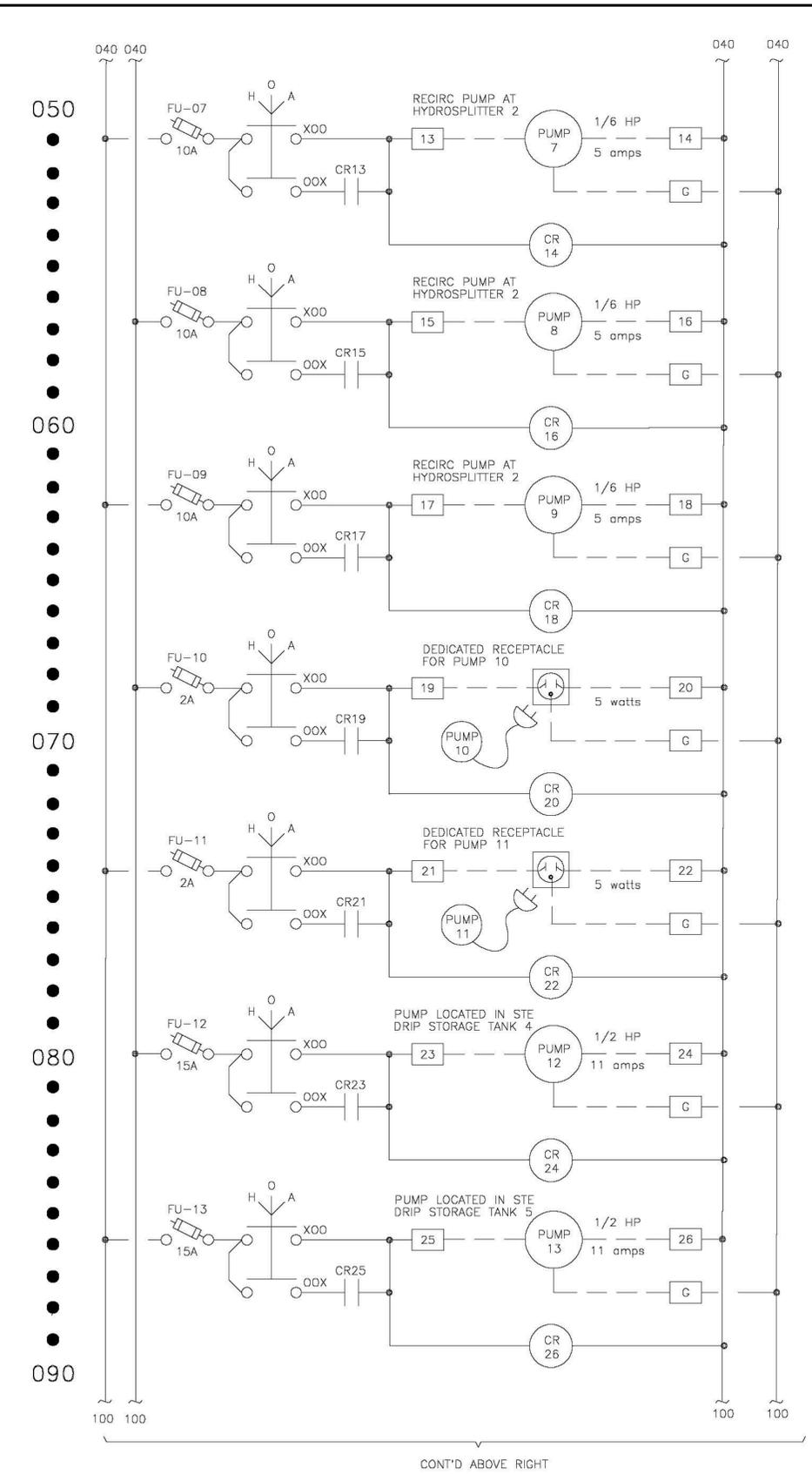
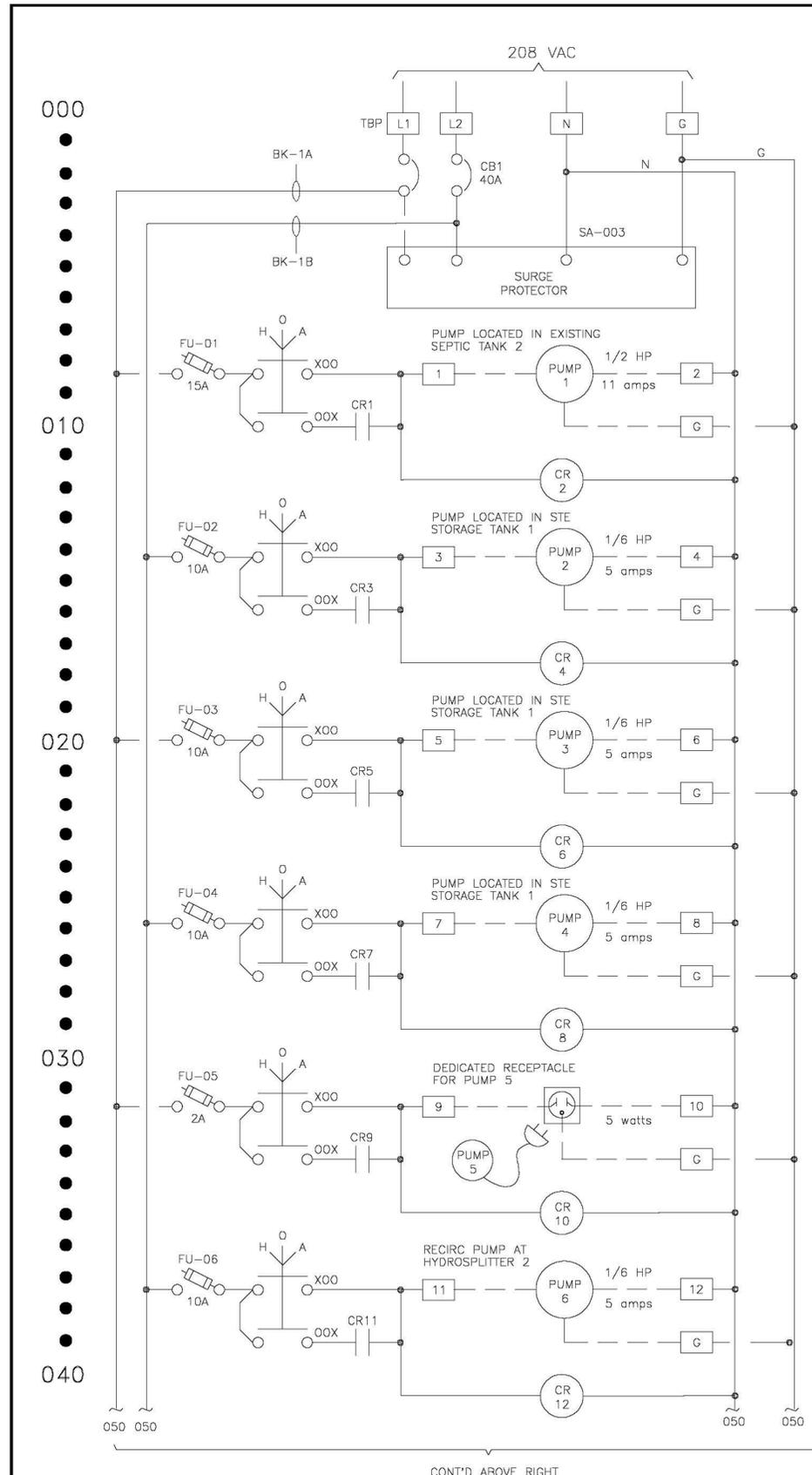
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ELECTRICAL SITE PLAN AND DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE	DECEMBER 2009
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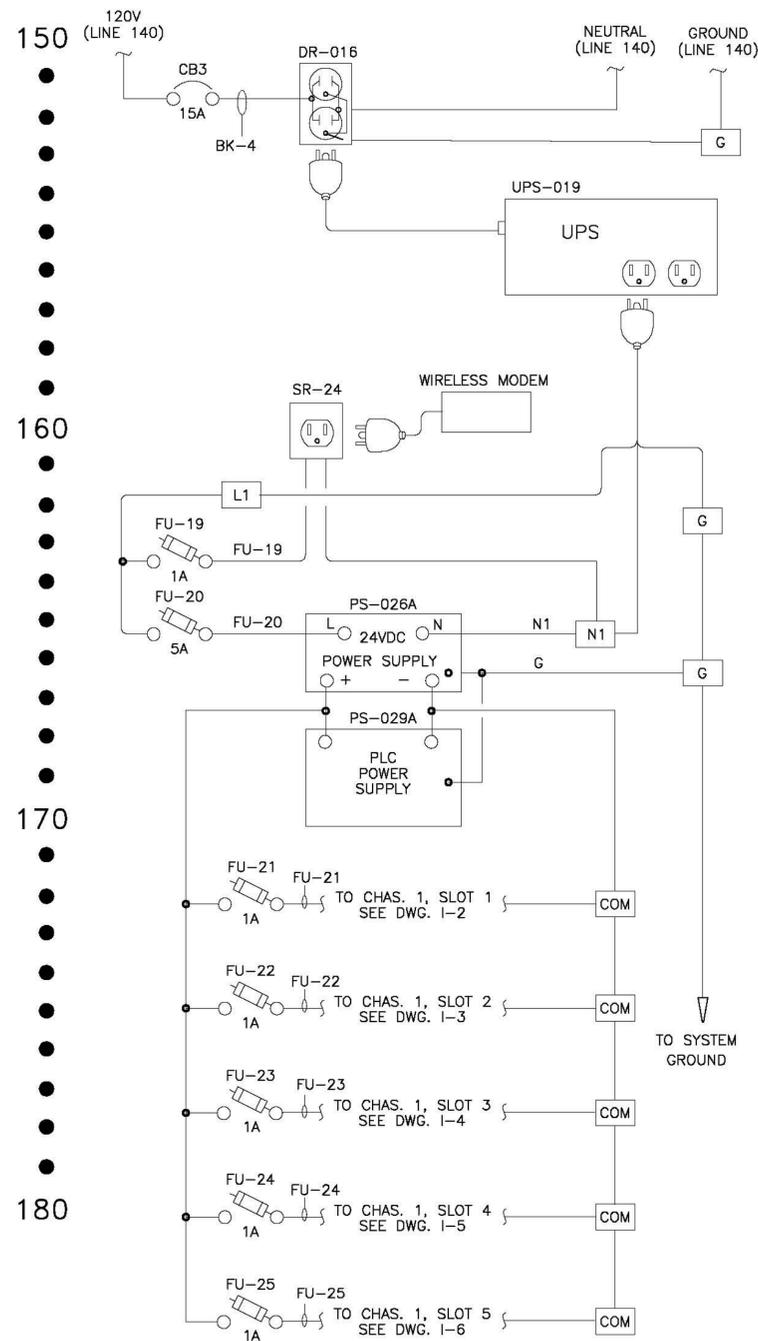
PANEL POWER

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE: DECEMBER 2009
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CONTRACT NUMBER:
DRAWING NUMBER: I-1

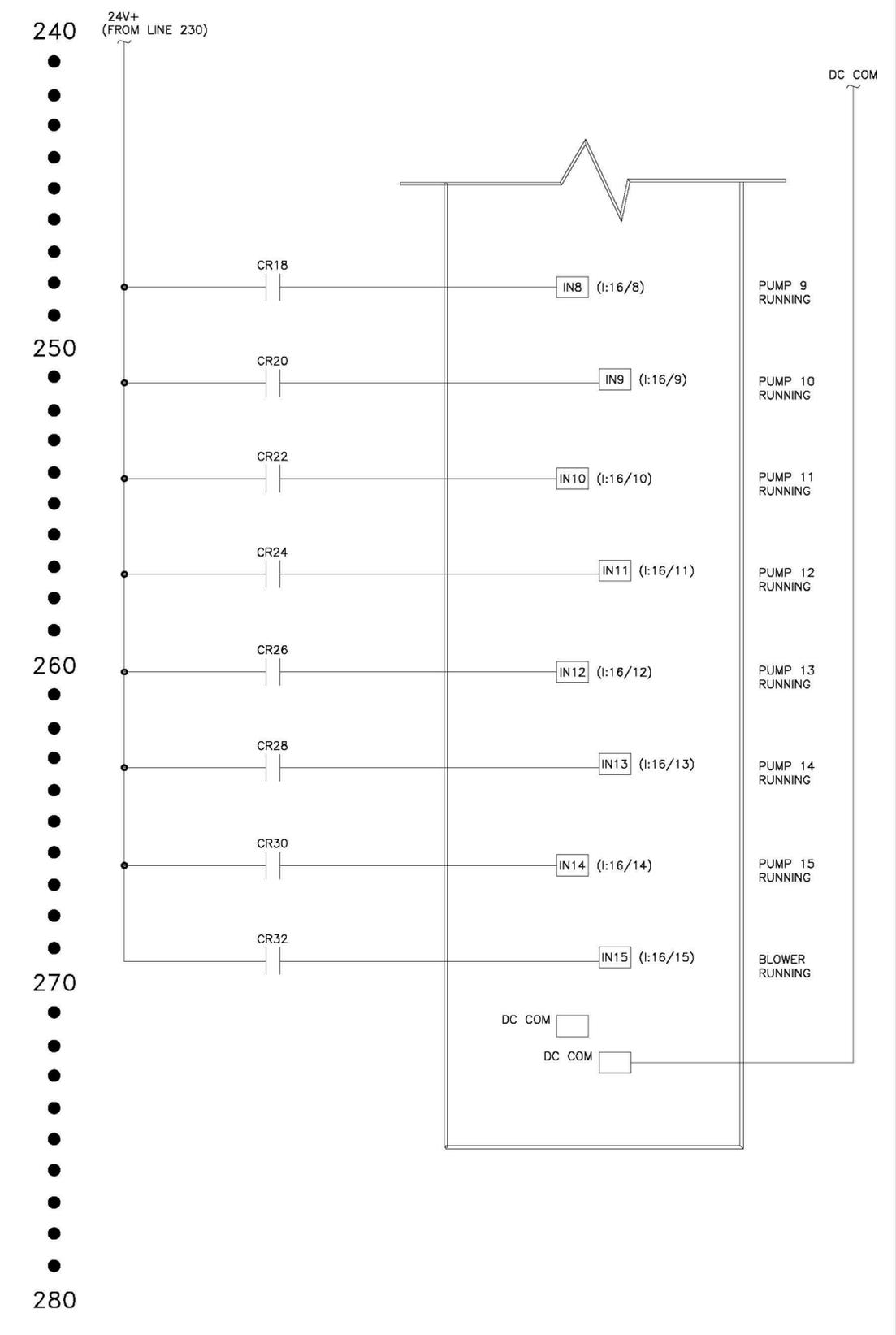
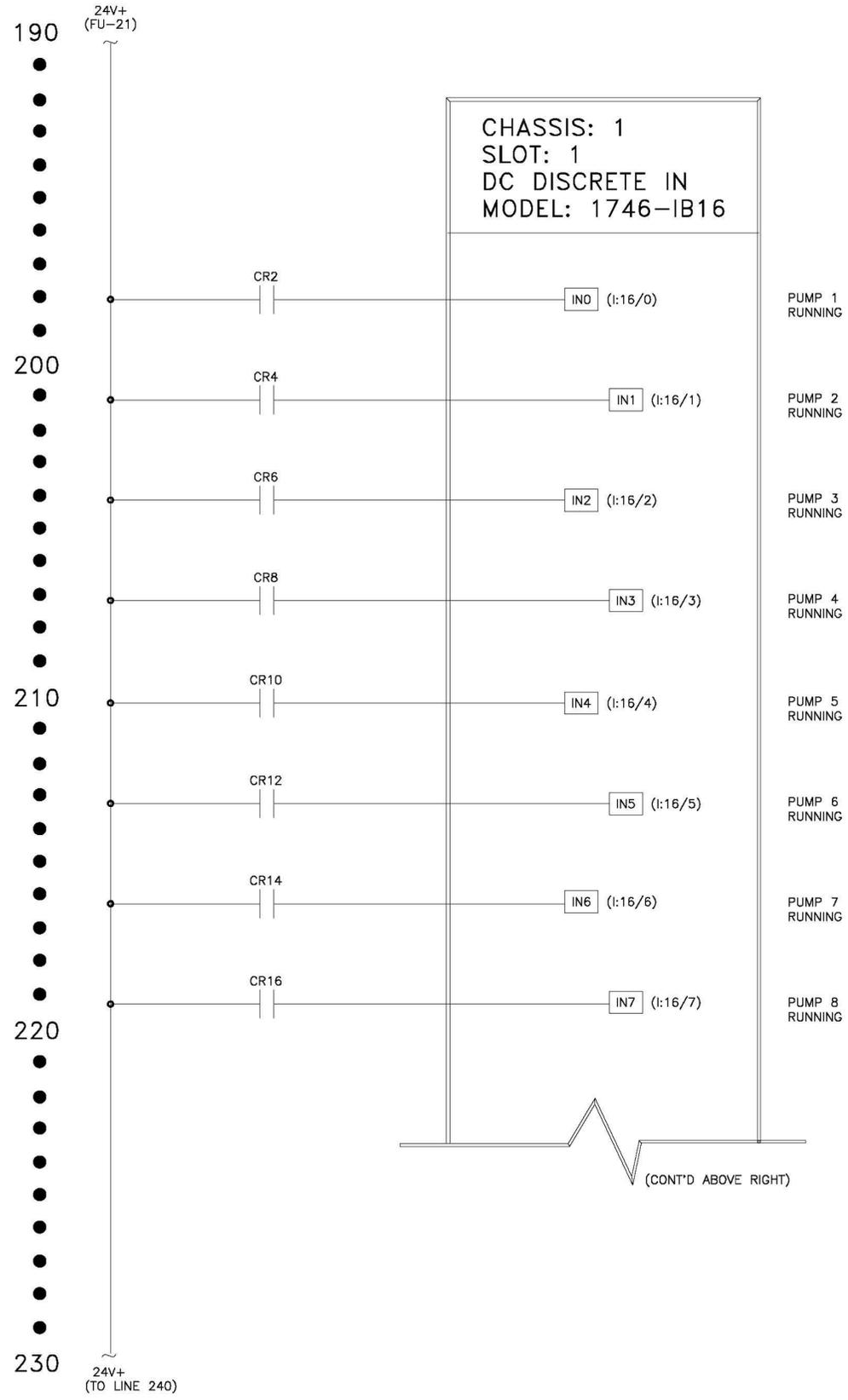
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WIRING SPECIFICATIONS:

- AC WIRING**
- POWER**
 HOT-12AWG THHN BLACK
 NEUTRAL-12AWG THHN WHITE
 GROUND-12AWG THHN GREEN
- CONTROL**
 IN PANEL-16AWG MTW RED
 FIELD-16AWG THHN RED
- FIELD**
 FIELD POWERED CONTROL
 (CONTROL WIRING THAT IS HOT WHEN MAIN DISCONNECT IS OPENED) - 14AWG MTW- YELLOW
- SIGNAL**
 IN PANEL-16AWG. TWISTED PAIR (BLUE/GRAY)
 FIELD-16AWG. TWISTED SHIELDED PAIR (BLACK/CLEAR)
- DC WIRING**
- POWER**
 24V(+)-16AWG MTW PURPLE
 24V(-)-16AWG MTW ORANGE
- CONTROL**
 16AWG MTW BLUE



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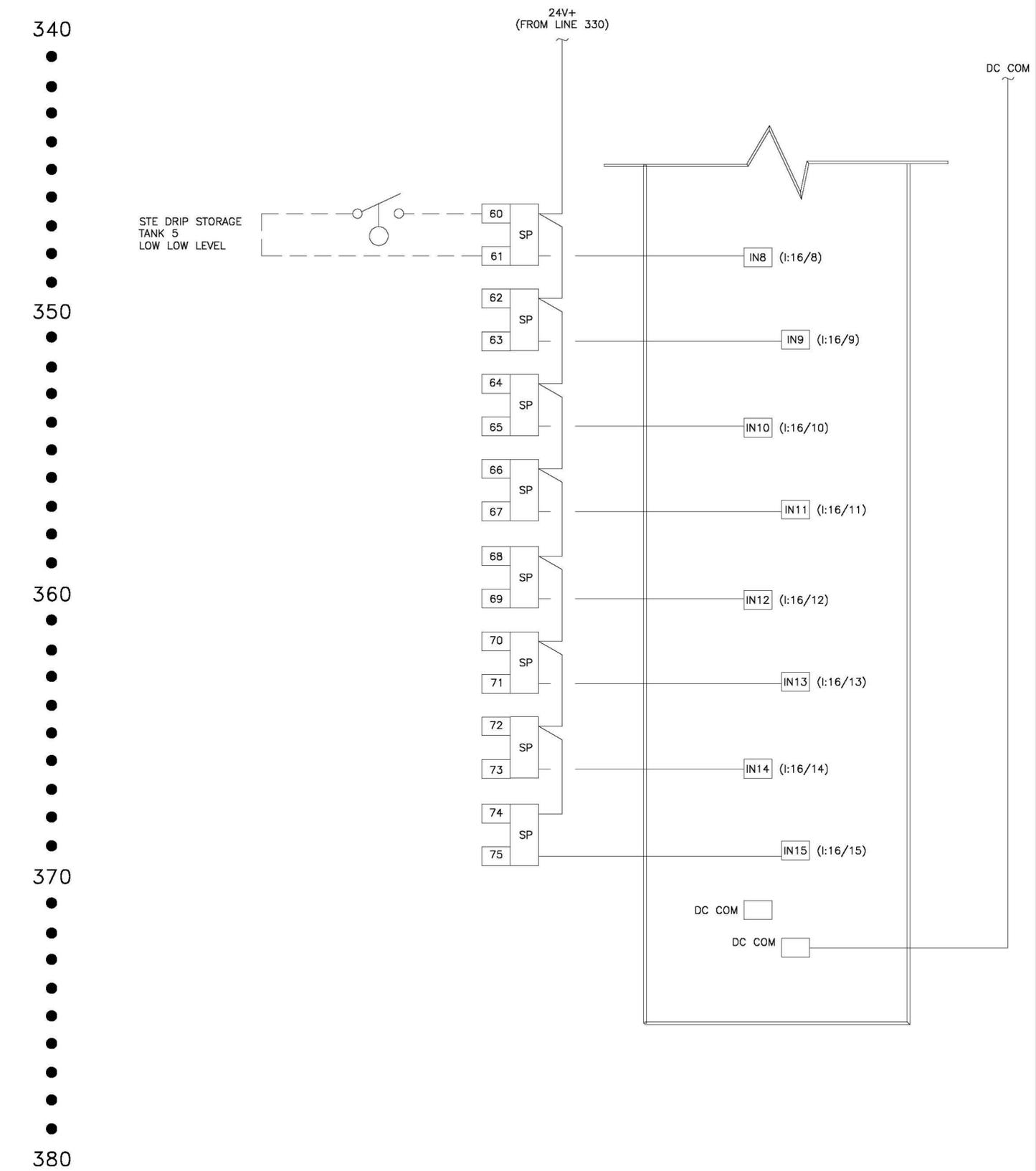
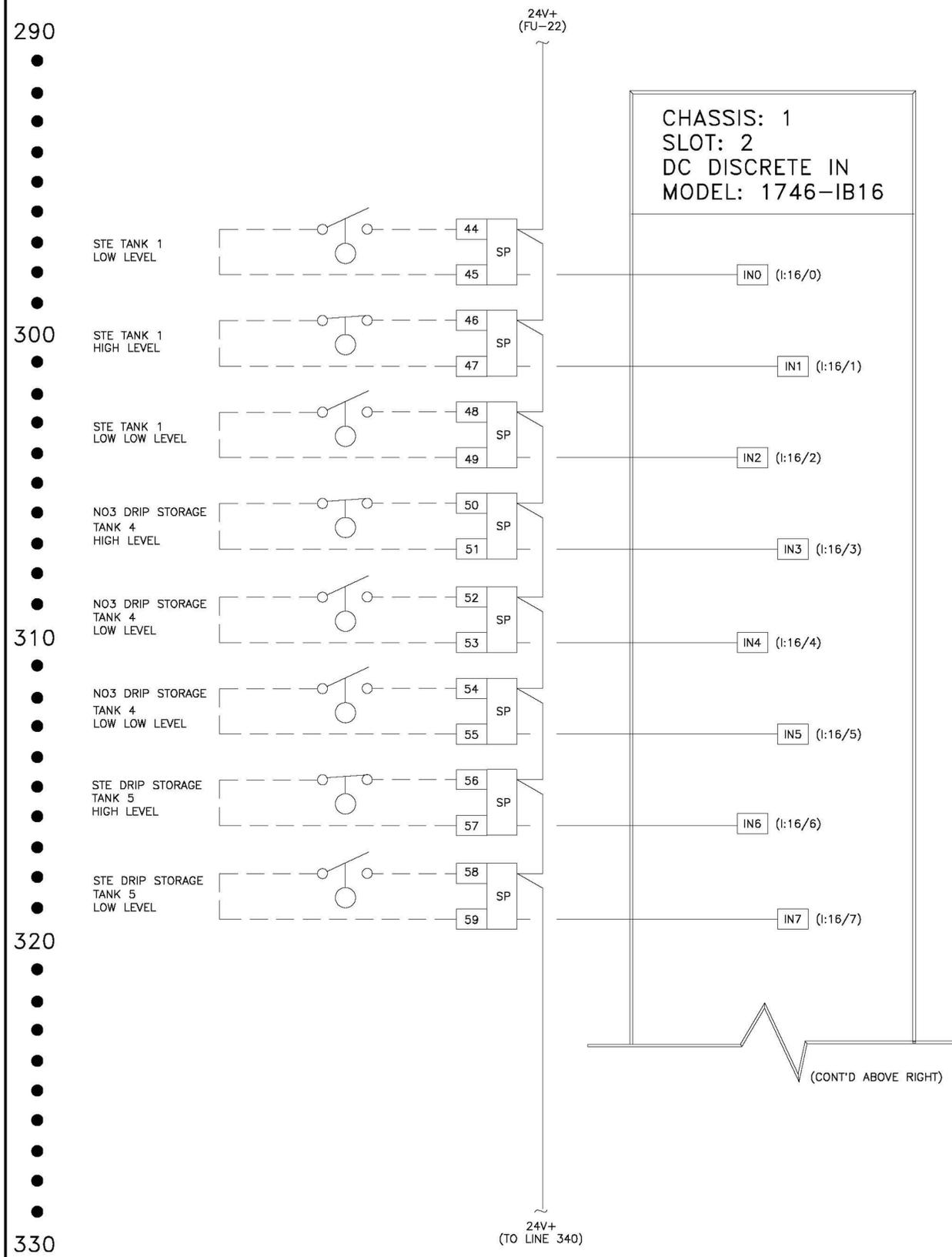
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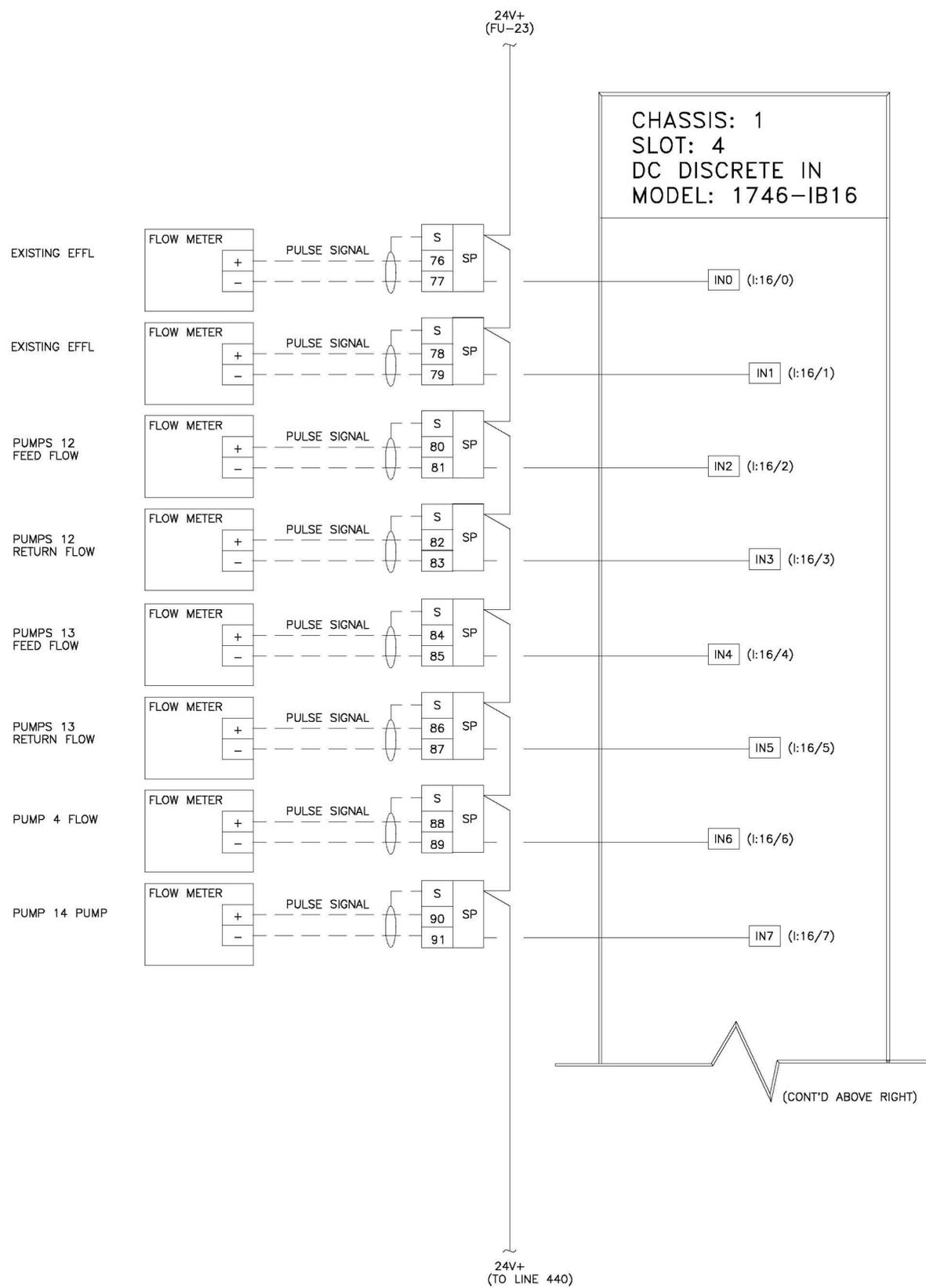
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DI MODULE 2

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430



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MODEL: 1746-IB16

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12/09	---
12/09	---
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DATE	BY
APPROVED	---

Name: _____ Date: _____
Florida Professional Engineer's Registration Number: _____

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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

DI MODULE 3

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: I-4

File: G:\44237-001\PA\14337-001\Drawings\0005 Design - C12\Information\4-1 DI MODULE 3.rvt, Sheet: 12/07/2009 11:49 AM

490

24V+
(FU-24)

CHASSIS: 1
SLOT: 5
RELAY OUTPUT
MODEL: 1746-OW16

24V-
(COM)

VDC1

(0:25/0) OUT0

19-01



START PUMP 1

(0:25/1) OUT1

19-02



START PUMP 2

(0:25/2) OUT2

19-03



START PUMP 3

(0:25/3) OUT3

19-04



START PUMP 4

(0:25/4) OUT4

19-05



START PUMP 5

(0:25/5) OUT5

19-06



START PUMP 6

(0:25/6) OUT6

19-07



START PUMP 7

(0:25/7) OUT7

19-06



START PUMP 8

24V+
(TO LINE 540)

(CONT'D ABOVE RIGHT)

24V-
(COM)

530

540

(24V+)
(FROM LINE 530)



VDC1

(0:25/8) OUT8

19-01



START PUMP 9

(0:25/9) OUT9

19-02



START PUMP 10

(0:25/10) OUT10

19-03



START PUMP 11

(0:25/11) OUT11

19-04



START PUMP 12

(0:25/12) OUT12

19-05



START PUMP 13

(0:25/13) OUT13

19-06



START PUMP 14

(0:25/14) OUT14

19-07



START PUMP 15

(0:25/15) OUT15

19-06



START BLOWER

24V-
(COM)

550

560

570

580

PLT DATE: 12/07/2008 3:08 PM BY: GSCOTT

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3	100% SUBMITTAL	12/09	-	-
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DESIGNED	-
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PROJ. ENGR.	-

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 Florida Professional Engineer's Registration Number: _____

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DO MODULE 1

THE SCALE BAR
 SHOWN BELOW
 MEASURES ONE
 INCH LONG ON
 THE ORIGINAL
 DRAWING.

DATE	DECEMBER 2009
H & S JOB NUMBER	44237-001
CONTRACT NUMBER	
DRAWING NUMBER	I-5

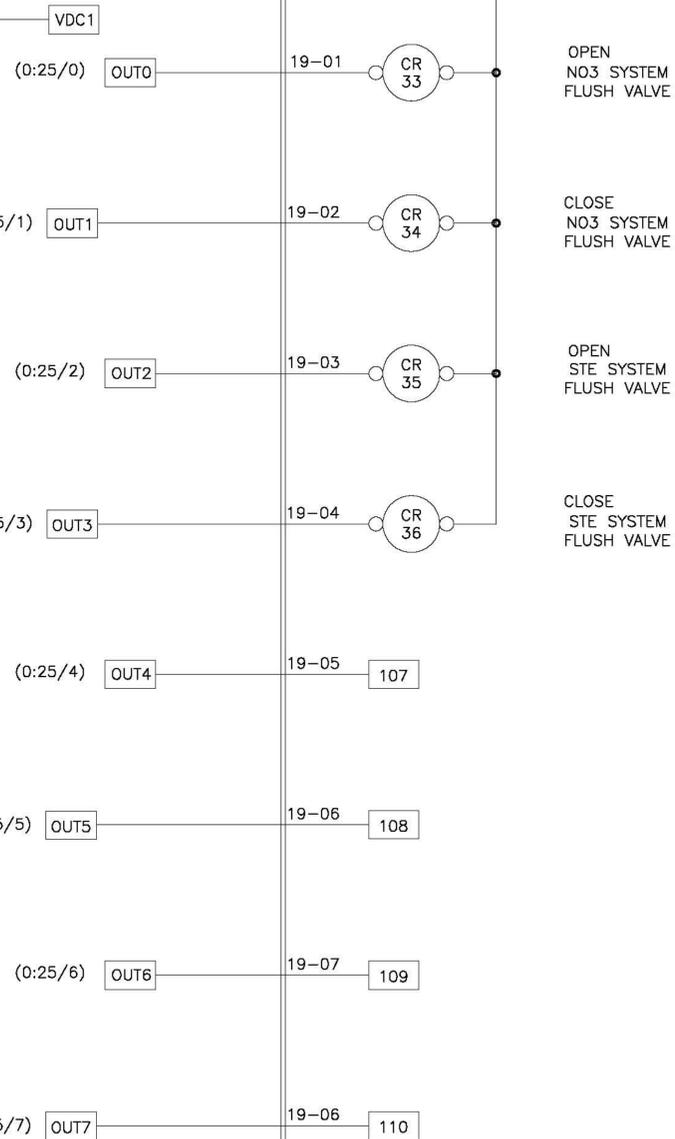
File # 0:\44237-001\PA\14337-001\Drawings\0005 Design - C12\Instrumentation\5-DO MODULE 1_Sched by Richard.H. Shaw.dwg - 12/09/2008 14:47 AM

590

24V+
(FU-25)

CHASSIS: 1
SLOT: 6
RELAY OUTPUT
MODEL: 1746-OW16

24V-
(COM)



600

610

620

630

24V+
(TO LINE 640)

(CONT'D ABOVE RIGHT)

640

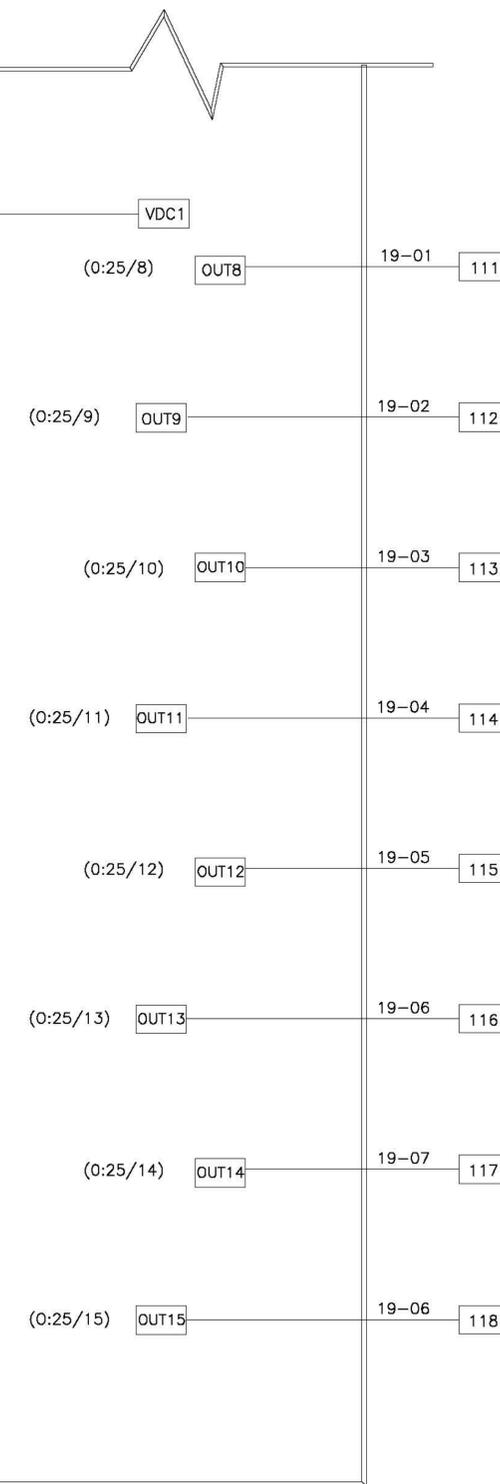
(24V+)
(FROM LINE 630)

650

660

670

680



Plot Date: 12/07/2009 3:09 PM By: GSCOTT

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APPROVED	-

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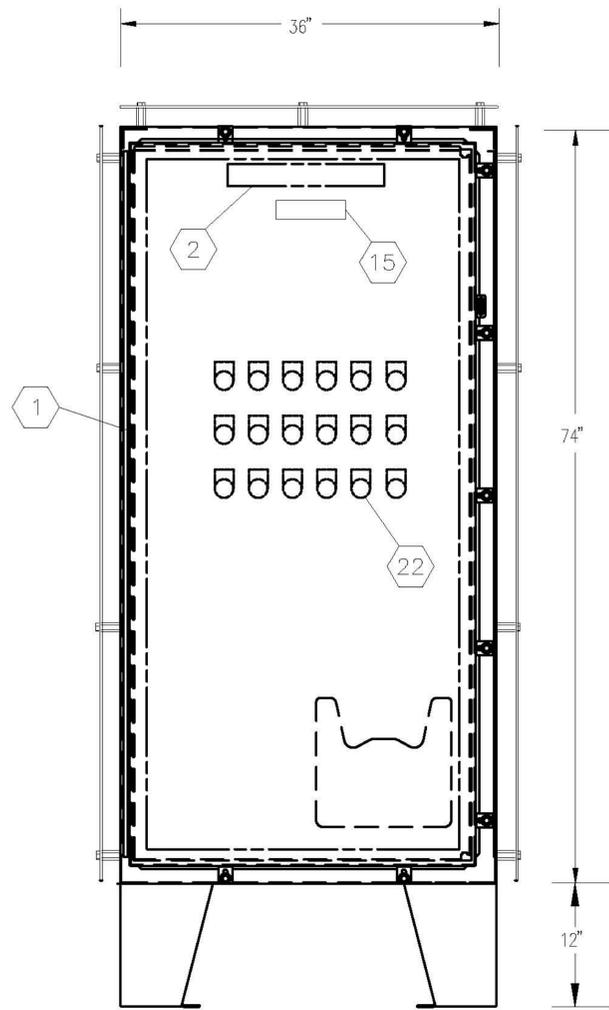
FLORIDA DEPARTMENT OF HEALTH
 FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

DO MODULE 2

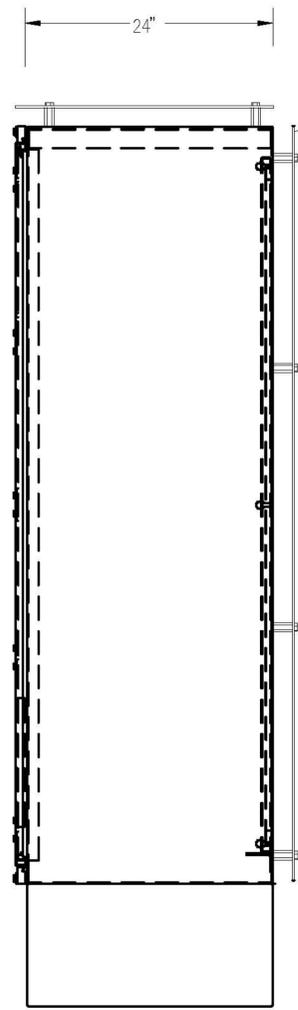
THE SCALE BAR
 SHOWN BELOW
 MEASURES ONE
 INCH LONG ON
 THE ORIGINAL
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DATE	DECEMBER 2009
H & S JOB NUMBER	44237-001
CONTRACT NUMBER	
DRAWING NUMBER	I-6

File: G:\44237-001\PA\14337-001\Drawings\0005 Design - C12\Information\1-8 DO MODULE 2.dwg, Saved by: jacob.mcd, Save date: 12/09/2009 11:47 AM

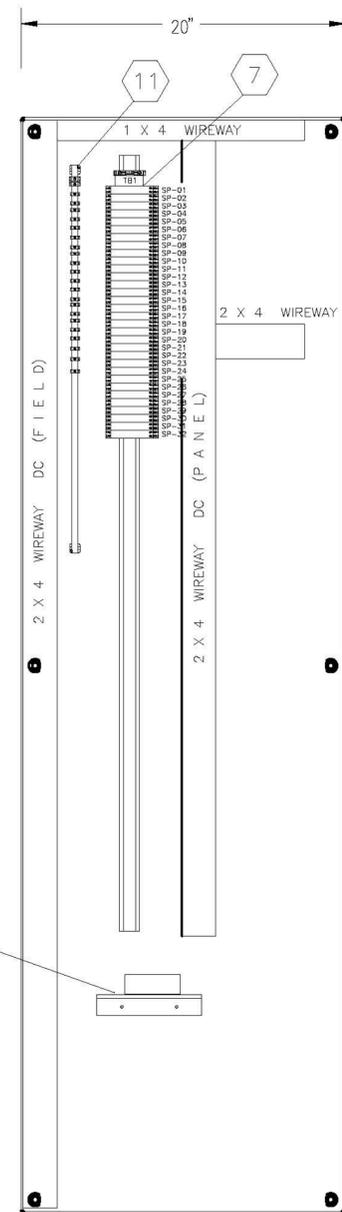


FRONT VIEW

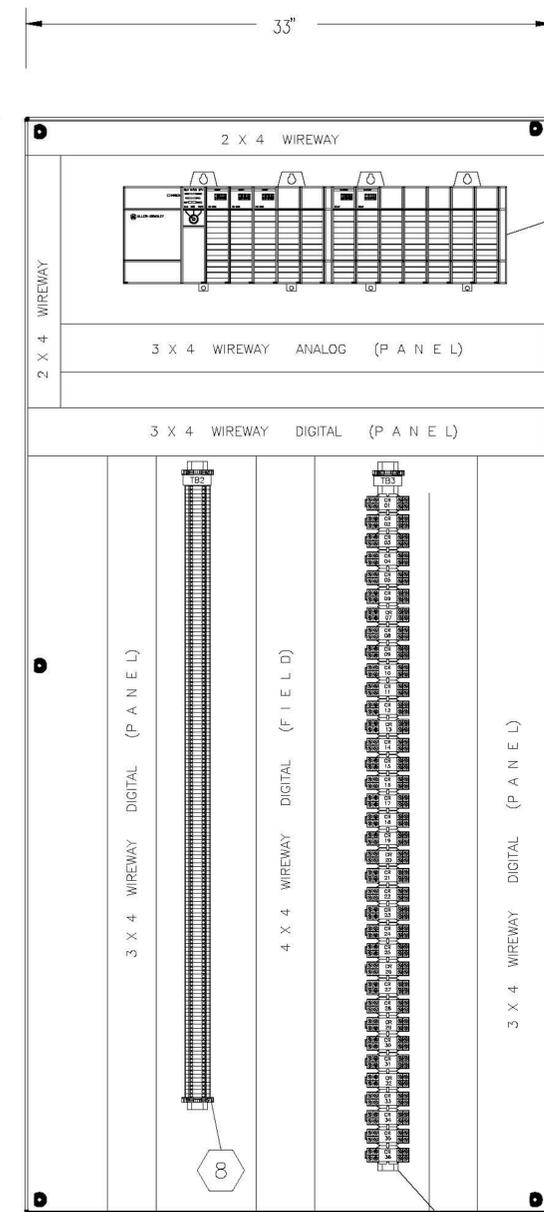


RIGHT SIDE VIEW

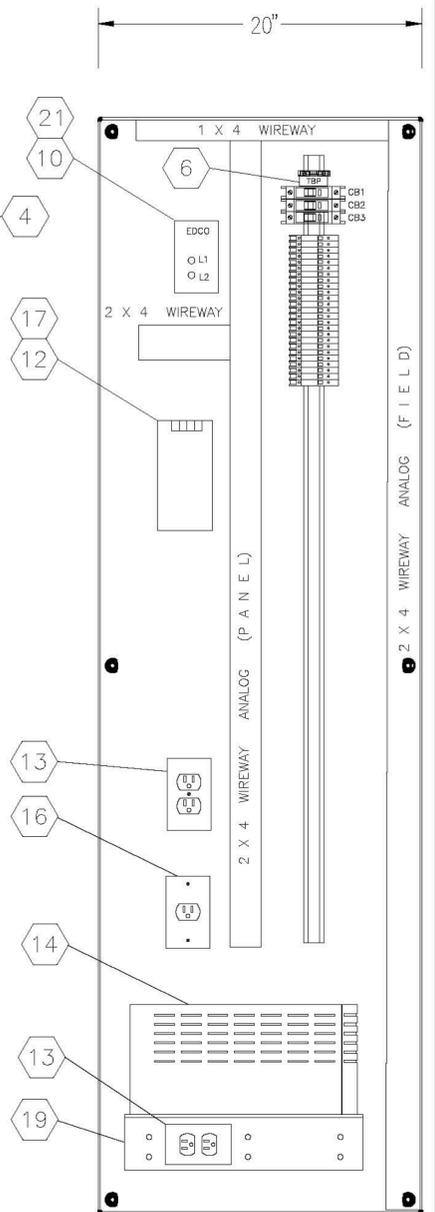
ALUMINUM OR SST
SUNSHIELD (TOP, SIDES, & BACK)



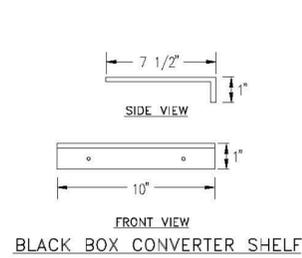
LEFT SUBPANEL



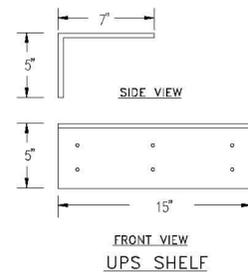
BACK SUBPANEL



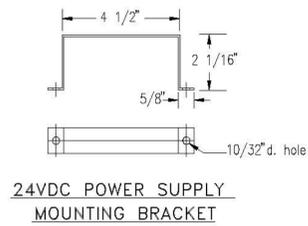
RIGHT SUBPANEL



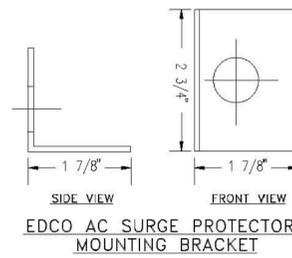
BLACK BOX CONVERTER SHELF



UPS SHELF



24VDC POWER SUPPLY
MOUNTING BRACKET



EDCO AC SURGE PROTECTOR
MOUNTING BRACKET

PLOT DATE: 12/21/2009 3:05 PM BY: S2021

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	BY

NAME:	DATE:
Florida Professional Engineer's Registration Number: ---	

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FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

PANEL ELEVATIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE: DECEMBER 2009
H & S JOB NUMBER: 44237-001
CONTRACT NUMBER:
DRAWING NUMBER: I-7

File: C:\44237-001\PA\14337-001\Drawings\1005 Design - C13\Information\7 Panel Elevations.dwg by: dshahar Date: 12/20/2009 11:56 AM

BILL OF MATERIALS				
ITEM	QTY	DESCRIPTION	MFR	PART NO.
1	1	ENCLOSURE, 74" X 36" X 24", NEMA 4X, 316 S.S.	HOFFMAN	A-74H3624SSLP
	1	INNER PANEL, 68" X 33"	HOFFMAN	TBD
	2	INNER PANEL, 68" X 20"	HOFFMAN	TBD
	1	DEAD FRONT PANEL DOOR	HOFFMAN	TBD
	1	PRINT POCKET	HOFFMAN	TBD
	9	QUICK RELEASE LATCHES	HOFFMAN	TBD
	1	PAD LOCKABLE HASP	HOFFMAN	TBD
	2	FLUORESCENT LIGHT KIT	HOFFMAN	X-LF116D18
3	A/R	WIREWAY (SIZED AS SHOWN)	PANDUIT	- - - - -
4	PLC CONSISTING OF:			
	1	13 SLOT CHASSIS, SLC 500	ALLEN BRADLEY	1746-A13
	1	POWER SUPPLY, 24VDC	ALLEN BRADLEY	1746-P3
	1	SLC 5/05 PROCESSOR	ALLEN BRADLEY	1747-L552
	3	16-POINT DISCRETE INPUT MODULE	ALLEN BRADLEY	1746-IB16
	2	16-POINT DISCRETE OUTPUT MODULE	ALLEN BRADLEY	1746-OW16
	11	CARD SLOT FILLER	ALLEN BRADLEY	1746-N2
1	COMMUNICATIONS CARD	ALLEN BRADLEY	TBD	
5		NOT USED		
6	TBP CONSISTING OF (TAG "TBP"):			
	5	TERMINAL BLOCK	ALLEN BRADLEY	1492-W4
	3	GROUND TERMINAL BLOCK	ALLEN BRADLEY	1492-WG4
	2	FUSED TERMINAL BLOCK, W/BLOWN FUSE INDICATOR	ENTRELEC	111 043.15
	2	FUSE INDICATOR	ENTRELEC	167 075.25
	6	FUSE, 1 AMP (TAG "FU-XX")	LITTLEFUSE	313001
	18	FUSE, 5 AMP (TAG "FU-XX")	LITTLEFUSE	313005
	1	JUMPER BAR	ENTRELEC	173 510.20
	1	END PLATE	ENTRELEC	118 503.27
	2	END CLAMP	ALLEN BRADLEY	1492-EA35
	1	PARTITION PLATE	ALLEN BRADLEY	1492-PP3
	2	CIRCUIT BREAKER, 15 AMP, SINGLE-POLE (TAG "CB-X")	SQUARE-D	QUO-115B
	1	CIRCUIT BREAKER, 30 AMP, SINGLE-POLE (TAG "CB-X")	SQUARE-D	QUO-130B
	7	24	TB1 CONSISTING OF (TAG "TB1"):	
		SIGNAL SURGE SUPPRESSER (TAG "SP-X")	EDCO	TBD
8	145	TB2 CONSISTING OF (TAG "TB2"):		
	1	TERMINAL BLOCK (NUMBERED BLOCKS)	ALLEN BRADLEY	1492-W4
	2	END PLATE	ALLEN BRADLEY	1492-EB3
9	2	END CLAMP	ALLEN BRADLEY	1492-EA35
	4	END CLAMP	ALLEN BRADLEY	1492-EA35
	34	RELAY, 120VAC, 2PDT (TAG "CR-XX")	IDEC	RH2B-UL-AC120V
	34	RELAY SOCKET	IDEC	SH2B-05
10	1	POWER LINE PROTECTOR (TAG "PANEL SURGE PROTECTOR")	EDCO	EMC-240B
11	GROUND BUS CONSISTING OF:			
	1	BUS BAR	WEIDMULLER	34890
	30	SMALL TYPE CLAMP	WEIDMULLER	31650
	2	LARGE TYPE CLAMP	WEIDMULLER	31660
	2	END COVER	WEIDMULLER	29986
12	1	POWER SUPPLY, 24VDC, 10A (TAG "DC POWER SUPPLY")	MEAN WELL	S-240-24
13	2	GFCI DUPLEX RECEPTACLE W/FACE PLATE	PASS&SEYMOUR	1591
	2	SINGLE GANG BOX	STEEL CITY	5836 1 1/2
14	1	UNINTERRUPTIBLE POWER SUPPLY	LIEBERT	POWERSURE 700

BILL OF MATERIALS (CONT'D)				
ITEM	QTY	DESCRIPTION	MFR	PART NO.
15	1	PANEL NAMEPLATE (SEE SCHEDULE TO RIGHT)	TDC	CUSTOM
16	1	SIMPLEX RECEPTACLE W/FACE PLATE SINGLE GANG BOX	HUBBELL	5261
	1		STEEL CITY	5836 1 1/2
17	1	WIRELESS MODEM	TBD	TBD
18	1	MOUNTING BRACKET	-	CUSTOM
19	1	UPS SHELF	-	CUSTOM
20	1	24VDC POWER SUPPLY MTG. BRACKET	-	CUSTOM
21	1	EDCO AC SURGE PROTECTOR MTG. BRACKET	-	CUSTOM
22	1	3-POSITION SELECTOR SWITCHES (ON DEAD FRONT)	A/B	BULLETIN 800
23	1	CLOSED-LOOP PANEL A/C UNIT	MC CLEAN	TBD

PANEL TAG SCHEDULE			
FIRST LINE	SECOND LINE	TYPE	SIZE
PER BOM	PER BOM (IF NEEDED)	WHT W/BLK LETTERS	1/2" x 1" (MIN)

PANEL TAGS
MATERIAL : ADHESIVE BACK, LAMINATED PLASTIC.
LETTERS : 1/4-INCH MINIMUM, HELVETICA MEDIUM, UNLESS OTHERWISE NOTED.

PANEL NAMEPLATE	
TYPE	BLK W/WHT LETTERS
SIZE	1" X 3"
1ST.LINE	FDOH DEMONSTRATION PROJECT
2ND.LINE	CONTROL PANEL

PANEL NAMEPLATE
MATERIAL : ADHESIVE BACK, LAMINATED PLASTIC.
LETTERS : 1/2-INCH HELVETICA MEDIUM

PLOT DATE: 12/01/2009 3:00 PM BY: GSCOTT

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	APPROVED

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PROJ. ENGR.	---
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	DATE
	BY
	APPROVED

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TALLAHASSEE, FL 32399-1713
(850)-245-4070

FLORIDA DEPARTMENT OF HEALTH FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY	THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009 H & S JOB NUMBER: 44237-001 CONTRACT NUMBER DRAWING NUMBER: I-8
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FUNCTIONAL CONTROL DESCRIPTIONS

1.01 THE REQUIREMENT

- A. Furnish, test, install and place in satisfactory operation all PLC control strategies, operator interface programming, and related programming as noted herein.
- B. The PLC programming and operator interface is to be fully tested at the manufacturer's shop prior to shipping. Once delivered, the programming is to be checked out prior to operation of the system and is to be demonstrated to the Engineer that the programs perform all functions as intended.
- C. All control functions are to be performed by the PLC. The operator interface is to be used for manual override of equipment, adjustment of setpoints, and to download stored data from the PLC.

1.02 OPERATOR INTERFACE

- A. The PLC shall communicate wirelessly with a laptop computer which shall function as the operator interface. The laptop computer shall be supplied with the PLC control panel and be set up to provide full access to the PLC for operator manual override of all equipment, ability to make adjustments to setpoints, download stored data from the PLC, and make modifications to the PLC program itself as needed.
- B. The PLC shall include a data storage module capable of storing up to a month of data as described herein. The operator interface laptop will be used to download the data on a periodic basis. Data shall be transferable in MS Excel spreadsheet format.
- C. The following displays shall be created and stored on the laptop for operator interface:

Menu Bar – menu bar across the top of each display to provide quick access to any display.

Control Display – tabular display of all pumps, blower, and valves. For each device, provide an ON / OFF / AUTO button (OPEN / CLOSE / AUTO for valves) for point and click control of the equipment. For each device, provide a RED run indicator (open indicator for valves) that is grey when not running (or valve closed). For each pump and blower, provide the totalized runtime value calculated by the PLC (in hours and tenths of hours up to 999,999.9). For each pump with an associated flow meter, provide the totalized flow value calculated by the PLC. For each pump, blower, or valve on timer control, provide indication of time remaining until (or time HH:MM of) next start or, if running, time remaining until the equipment stops (or closes). For each pump whose normal sequence can be interrupted, provide indication of the override (low level shutoff or Pump "X" running interrupt).

Setpoint Display – tabular display(s) for all control setpoints as described herein with simple point and click access to each setpoint that allows value changes by typing in a numeric value and pressing the ENTER key.

Timer Setpoint Display – For all timer setpoints, provide a 24-hour, bar graph format display to show the relative on and off times of each pump and blower.

1.03 PUMP 1 – EXISTING SEPTIC TANK 2 to STE STORAGE TANK 1

- A. Control Description: Pump shall start on LOW level in STE STORAGE TANK 1 and stop on HIGH level in STE STORAGE TANK 1. If PUMP 13 is running as part of its normal timed sequence, delay start of PUMP 1 until that sequence is complete.
- B. Data Storage: Record totalized runtime, daily pump runtime, and number of starts per day.

1.04 PUMP 2 – STE STORAGE TANK 1 TO ste drip storage tank 5

- A. Control Description: Pump shall start on LOW level in STE DRIP STORAGE TANK 5 and stop on HIGH level in STE DRIP STORAGE TANK 5. Pump shall stop on LOW LOW level in STE STORAGE TANK 1 and remain off until LOW level in STE STORAGE TANK 1 is reached. If PUMP 14 is running as part of its normal timed sequence, delay start of PUMP 2 until that sequence is complete.
- B. Data Storage: Record totalized runtime, daily pump runtime, and number of starts per day.

1.05 PUMP 3 – STE STORAGE TANK 1 TO NITRIFICATION UNIT

- A. Control Description: Pump shall start up to 8 times a day and run for a set amount of time. Provide 8 individual start times based on a 24-hour clock format (HH:MM). Provide 1 global cycle duration timer for all 8 start times. The 8 start times and the 1 cycle duration time setpoint shall be adjustable from the operator interface. Pump shall stop on LOW LOW level in STE STORAGE TANK 1 and remain off until LOW level in STE STORAGE TANK 1 is reached.
- B. Data Storage: Record totalized runtime and daily pump runtime.

1.06 PUMP 4 – STE STORAGE TANK 1 TO Hydrosplitter System 1

- A. Control Description: Pump shall start a set number of times a day (up to 24 times) and run for a set amount of time. The number of start times a day and the cycle duration time setpoint shall be adjustable from the operator interface. The PLC shall divide the number of start times a day entered into 1,440 minutes (24 hours) to determine the start times of the pump starting from midnight. For example, if 18 times a day were selected, the pumps would start every 80 minutes (00:00, 01:20, 02:40 21:20, 22:40). For uneven values, the PLC shall round to the nearest minute. Pump shall stop on LOW LOW level in STE STORAGE TANK 1 and remain off until LOW level in STE STORAGE TANK 1 is reached.
- B. Data Storage: Record totalized runtime and daily pump runtime. Receive pulse input from flow meter and record totalized daily volume pumped. One pulse equals one gallon.

1.07 PUMP 5 – STE STORAGE TANK 1 TO in-situ system

- A. Control Description: Pump shall start up to 6 times a day and run for a set amount of time. Provide 6 individual start times based on a 24-hour clock format (HH:MM). Provide 1 global cycle duration timer for all 6 start times. The 6 start times and the 1 cycle duration time setpoint shall be adjustable from the operator interface.
- B. Data Storage: Record totalized runtime and daily pump runtime. Calculate totalized daily volumes pumped based on pump flow rate entered by operator (calculated from pump maximum capacity, frequency, and stroke length set at pump).

1.08 PUMPS 6 through 9 – Hydrosplitter System 2 Recirculation pumps

- A. Control Description: Pumps shall start when PUMP 14 starts and each pump shall run for a set amount of time. Provide 1 global cycle duration timer for all 4 pumps. The cycle duration time setpoint shall be adjustable from the operator interface.
- B. Data Storage: Record totalized runtime and daily pump runtimes.

1.09 PUMPS 10 and 11 – Denite Feed from Tank 3

- A. Control Description: Each pump shall start a set number of times a day (up to 24 times) and run for a set amount of time. The number of start times a day and the cycle duration time setpoint shall be adjustable from the operator interface and both pumps shall run off these same setpoints. The PLC shall divide the number of start times a day entered into 1,440 minutes (24 hours) to determine the start times of the pump starting from 15 minutes after midnight. For example, if 13 times a day were selected, the pumps would start every 110.77 minutes (00:15, 02:06, 03:57 20:33, 22:24). For uneven values, the PLC shall round to the nearest minute as indicated in example.
- B. Data Storage: Record totalized runtime and daily pump runtimes. Calculate totalized daily volumes pumped based on pump flow rate entered by operator (calculated from pump maximum capacity, frequency, and stroke length set at pump).

1.10 PUMP 12 – NO3 DRIP STORAGE TANK 4 TO NO3 DRIP System

- A. Control Description: Pump shall start up to 6 times a day and run for a set amount of time. Provide 6 individual start times based on a 24-hour clock format (HH:MM). Provide 1 global cycle duration timer for all 6 start times. The 6 start times and the 1 cycle duration time setpoint shall be adjustable from the operator interface. Pump shall stop on LOW LOW level in NO3 DRIP STORAGE TANK 4 and remain off until LOW level in NO3 DRIP STORAGE TANK 4 is reached. Pump shall also start with flush cycle (see VALVE 1 controls).
- B. Data Storage: Record totalized runtime. Record separate daily runtimes for the timed sequence described above and for the flush sequence. Receive pulse inputs from the supply and return flow meters and record totalized daily volume pumped as supply only (subtract return flow from supply flow). One pulse equals one gallon.

1.11 PUMP 13 – STE DRIP STORAGE TANK 5 TO STE DRIP System

- A. Control Description: Pump shall start up to 6 times a day and run for a set amount of time. Provide 6 individual start times based on a 24-hour clock format (HH:MM). Provide 1 global cycle duration timer for all 6 start times. The 6 start times and the 1 cycle duration time setpoint shall be adjustable from the operator interface. Pump shall stop on LOW LOW level in STE DRIP STORAGE TANK 5 and remain off until LOW level in STE DRIP STORAGE TANK 5 is reached. Pump shall also start with flush cycle (see VALVE 2 controls).
- B. Data Storage: Record totalized runtime. Record separate daily runtimes for the timed sequence described above and for the flush sequence. Receive pulse inputs from the supply and return flow meters and record totalized daily volume pumped as supply only (subtract return flow from supply flow). One pulse equals one gallon.

1.12 PUMP 14 – STE STORAGE TANK 1 TO Hydrosplitter System 2

- A. Control Description: Pump shall start a set number of times a day (up to 24 times) and run for a set amount of time. The number of start times a day and the cycle duration time setpoint shall be adjustable from the operator interface. The PLC shall divide the number of start times a day entered into 1,440 minutes (24 hours) to determine the start times of the pump starting from 30 minutes after midnight. For example, if 16 times a day were selected, the pumps would start every 90 minutes (00:30, 02:00, 03:30 21:30, 23:00). For uneven values, the PLC shall round to the nearest minute. Pump shall stop on LOW LOW level in STE STORAGE TANK 1 and remain off until LOW level in STE STORAGE TANK 1 is reached.
- B. Data Storage: Record totalized runtime and daily pump runtime. Receive pulse input from flow meter and record totalized daily volume pumped. One pulse equals one gallon.

1.13 PUMP 15 – NO3 DRIP STORAGE TANK 4 TO GRAVITY SUMP

- A. Control Description: Pump shall start on HIGH level in NO3 DRIP STORAGE TANK 4 and stop on LOW level in NO3 DRIP STORAGE TANK 4. If PUMPS 3 or 13 are running as part of their normal timed sequences, delay start of PUMP 15 until those sequences are complete.
- B. Data Storage: Record totalized runtime, daily pump runtime, and number of starts per day.

1.14 BLOWER – NO3 SYSTEM

- A. Control Description: Blower shall start based on a repeat cycle ON / OFF timer. Separate ON and OFF times, in minutes, shall be provided that are adjustable from the operator interface. If 0 minutes are entered for ON time, the blower shall never run. If 0 minutes are entered for OFF time, the blower shall run continuously.
- B. Data Storage: Record totalized runtime.

1.15 VALVE 1 – NO3 DRIP System FLUSH

- A. Control Description: Once per day, as determined by a flush time setting (HH:MM), the valve shall open. Once the valve is confirmed open, Pump 12 shall start and run for a set amount of time. Once timed out, the pump shall stop first, then the valve shall be closed. If Pump 12 is already running as part of its normal timed sequence, start of the flush cycle shall be delayed until that sequence is complete and the pump has shut off. The flush start time and cycle duration setpoint shall be adjustable from the operator interface.

1.16 VALVE 2 – STE DRIP System Flush

- A. Control Description: Once per day, as determined by a flush time setting (HH:MM), the valve shall open. Once the valve is confirmed open, Pump 13 shall start and run for a set amount of time. Once timed out, the pump shall stop first, then the valve shall be closed. If Pump 13 is already running as part of its normal timed sequence, start of the flush cycle shall be delayed until that sequence is complete and the pump has shut off. The flush start time and cycle duration setpoint shall be adjustable from the operator interface.

1.17 POWER DISTRIBUTION CALCULATION

- A. Control Description: Odd numbered pumps 1–15 and Valve 1 are powered from one pole of the main power feed to the panel. Even numbered pumps, the blower, and Valve 2 are powered from the other pole. Pumps 1, 12, and 13 draw 11 amps. Pumps 2, 3, 4, 6, 7, 8, 9, 14, and 15 draw 5 amps. Pumps 5, 10, and 11, the blower, and the two valves draw less than 1 amp. Logic described above for permissives and selected time settings should minimize the number of pumps running at one time. However, the PLC shall calculate the estimated amp draw (sum of the values listed above) for each pole for the equipment running at any time. If the estimated value exceeds 30 amps, the PLC shall delay start of any additional equipment until the amp draw decreases below 30 amps.
- B. Data Storage: Record highest estimated daily amp draw.

1.18 TIME OF DAY RESET

- A. Control Description: Provide means for operator to enter the hour and minute of the day and then reset the PLC clock to match this time. Display of actual PLC time is to be shown on the Control Display.

PLOT DATE: 12/07/2009 3:09 PM BY: ESCOTT

DESIGNED	—		
DRAWN	—		
CHECKED	—		
PROJ. ENGR.	—		
NO.	ISSUED FOR	DATE	BY
3	100% SUBMITTAL	12/09	—
2	75% SUBMITTAL	12/09	—
1	50% SUBMITTAL	08/09	—

APPROVED	—
Name:	_____
Date:	_____
Florida Professional Engineer's Registration Number:	_____

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FLORIDA DEPARTMENT OF HEALTH
FLORIDA ONSITE SEWAGE NITROGEN REDUCTION STRATEGIES STUDY

FUNCTIONAL CONTROL DESCRIPTIONS

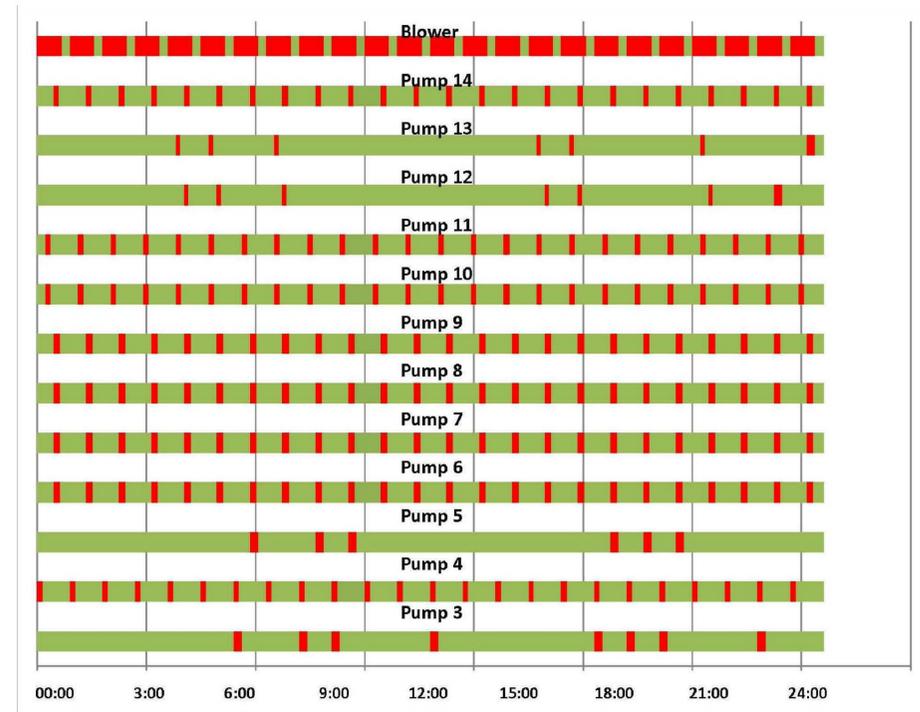
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE: DECEMBER 2009
	H & S JOB NUMBER: 44237-001
	CONTRACT NUMBER
	DRAWING NUMBER: 1-9

File # : G:\44237-001\PA\14337-001\Drawings\Notes Design - C13\Information\Y19 Functional Control Descriptions Sheet 4 by jacobson Date: 12/07/2009 14:44 PM

CONTROL DISPLAY

	Device Control	Status	Total Runtime	Totalized Flow (gal)	Time to Next Start	Cycle Interruption
PUMP 1	Septic Tank 2 to STE Storage Tank 1	ON OFF AUTO RUNNING	005,480.0			No
PUMP 2	STE Storage Tank 1 to STE Drip Storage Tank 5	ON OFF AUTO STOPPED	005,480.0			No
PUMP 3	STE Storage Tank 1 to NO3 Drip Storage Tank 4	ON OFF AUTO STOPPED	000,340.0		06:00	No
PUMP 4	STE Storage Tank 1 to Hydrosplitter System 1	ON OFF AUTO STOPPED	000,080.7	524,453	02:40	No
PUMP 5	STE Storage Tank 1 to In-Situ System	ON OFF AUTO STOPPED	000,111.3	103,024	08:15	
PUMP 6	Hydrosplitter System 2 Recirculation	ON OFF AUTO RUNNING	000,148.5		10.3 min	
PUMP 7	Hydrosplitter System 2 Recirculation	ON OFF AUTO RUNNING	000,148.5		10.3 min	
PUMP 8	Hydrosplitter System 2 Recirculation	ON OFF AUTO RUNNING	000,148.5		10.3 min	
PUMP 9	Hydrosplitter System 2 Recirculation	ON OFF AUTO RUNNING	000,148.5		10.3 min	
PUMP 10	Feed from Denite Feed Tank 3	ON OFF AUTO RUNNING	000,030.0	010,231	03:57	
PUMP 11	Feed from Denite Feed Tank 3	ON OFF AUTO RUNNING	000,030.0	010,231	03:57	
PUMP 12	NO3 Drip Storage Tank 4 to NO3 Drip System	ON OFF AUTO STOPPED	005,480.0	705,480	09:45	Low Level
PUMP 13	STE Drip Storage Tank 5 to STE Drip System	ON OFF AUTO STOPPED	000,340.0	685,301	09:45	No
PUMP 14	STE Storage Tank 1 to STE Hydrosplitter System 2	ON OFF AUTO RUNNING	000,080.7	705,480	10.3 min	No
PUMP 15	NO3 Drip Storage Tank 4 to Gravity Sump	ON OFF AUTO STOPPED	000,111.3			No
BLOWER	NO3 System Air Supply Blower	ON OFF AUTO RUNNING	102,533.6		24.5 min	
VALVE 1	NO3 Drip Storage Tank 4 Flush Valve	OPEN CLOSE AUTO CLOSED			22:30	
VALVE 2	STE Drip Storage Tank 5 Flush Valve	OPEN CLOSE AUTO CLOSED			23:00	
11:43 PLC TIME			Existing System Flows: Meter 1 685,301 Meter 2 685,301			

TIMECHART



SETPOINT DISPLAY

PUMP 3	STE Storage Tank 1 to NO3 Drip Storage Tank 4	Start Times (HH:MM)	Cycle Time (min)	PUMP 4	STE Storage Tank 1 to Hydrosplitter System 1	Number of Starts / Day	Cycle Time (min)
		06 : 00	15			24	10
		08 : 00					
		09 : 00					
		12 : 00					
PUMP 5	STE Storage Tank 1 to In-Situ System	Start Times (HH:MM)	Cycle Time (min)	BLOWER	NO3 System Air Supply Blower	On Time (min)	Off Time (min)
		06 : 30	15			45	15
		08 : 30					
		09 : 30					
		17 : 30					
PUMP 12	NO3 Drip Storage Tank 4 to NO3 Drip System	Start Times (HH:MM)	Cycle Time (min)	PUMPS 10 & 11	Feed from Denite Feed Tank 3	Cycle Time (min)	
		04 : 30	8			24	10
		05 : 30					
		07 : 30					
		15 : 30					
VALVE 1	NO3 Drip Storage Tank 4 Flush Valve	Start Time (HH:MM)	Cycle Time (min)	PUMP 14	STE Storage Tank 1 to STE Hydrosplitter System 2	Start Times (HH:MM)	Cycle Time (min)
		22 : 30	15			24	10
Pump 5 Feed Rate: 05 gph		Pump 10 Feed Rate: 03 gph		PUMP 13		STE Drip Storage Tank 5 to STE Drip System	
Actual Time of Day: 11 : 43		Pump 11 Feed Rate: 03 gph		Start Times (HH:MM)		Cycle Time (min)	
				04 : 15		8	
				05 : 15			
				07 : 15			
				15 : 15			
				16 : 15			
				20 : 15			
				23 : 30		15	
				RESET TIME			

PLOT DATE: 12/21/2009 3:09 PM BY: C5201T

NO.	ISSUED FOR	DATE	BY
3	100% SUBMITTAL	12/09	-
2	75% SUBMITTAL	12/09	-
1	50% SUBMITTAL	08/09	-

DESIGNED	-
DRAWN	-
CHECKED	-
PROJ. ENGR.	-
APPROVED	-

Name:		Date:	
Florida Professional Engineer's Registration Number:	-		

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FUNCTIONAL CONTROL DESCRIPTIONS		

File: C:\44237-000\TPA\44237-001\Functional Control Descriptions.dwg - C:\13\Instrumentation\1-10 FUNCTIONAL CONTROL DESCRIPTIONS.dwg by jkabbat Save date = 12/20/2009 4:01 PM