

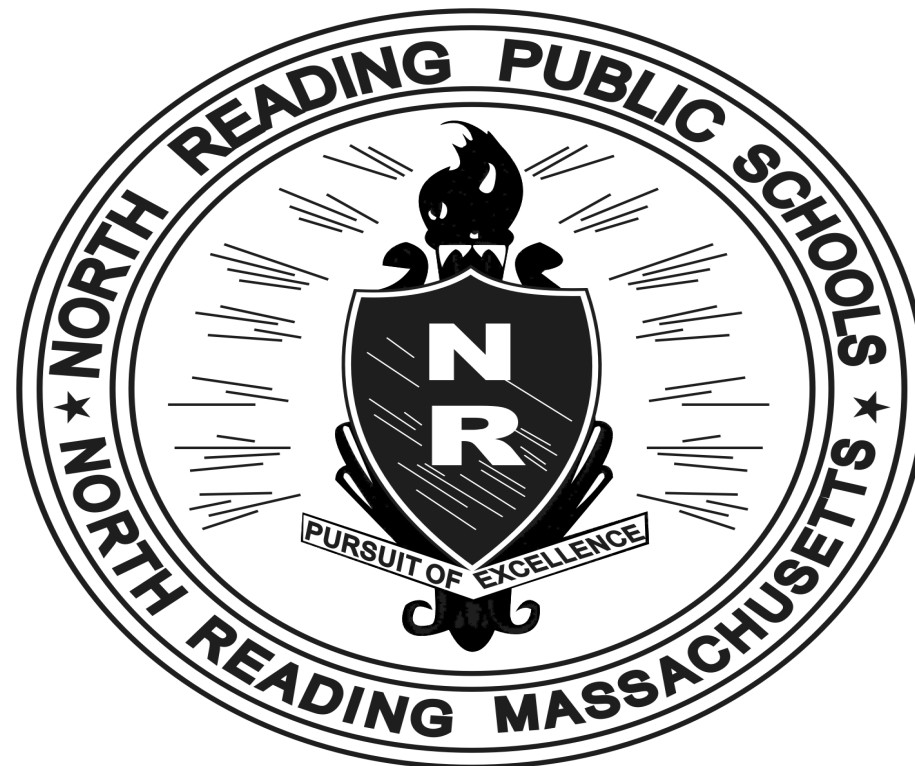
APPENDIX B

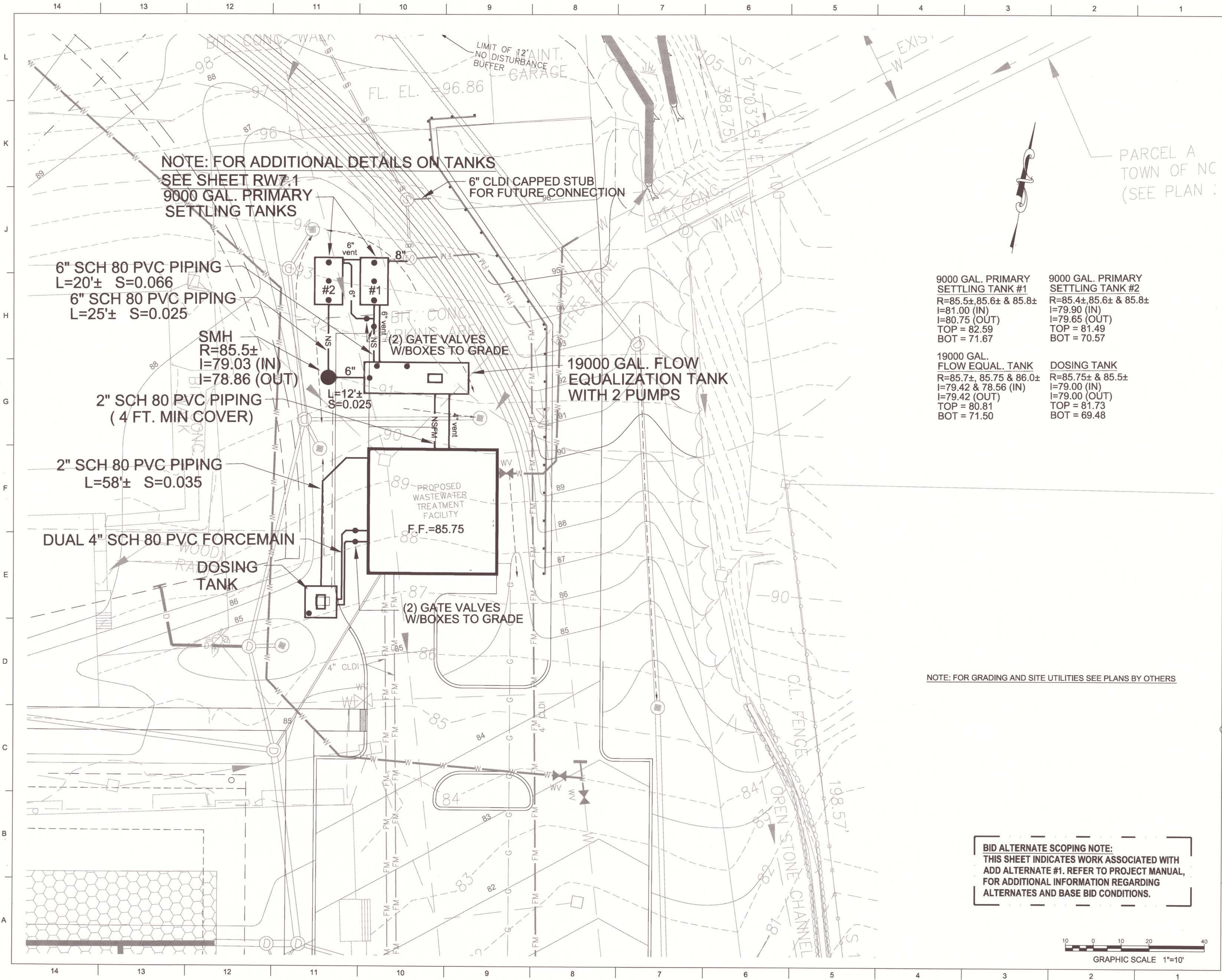
**SELECTED DESIGN PLANS FOR THE WWTF
DRAWINGS NOT TO SCALE**

**NORTH READING PUBLIC SCHOOLS
NORTH READING MIDDLE AND HIGH SCHOOL
WASTEWATER TREATMENT FACILITY
CONTRACT OPERATION AND MAINTENANCE SERVICES
REQUEST FOR PROPOSAL**

FEBRUARY 14, 2020

RFP No. 20 – 02





**NOTE: FOR ADDITIONAL DETAILS ON TANKS
SEE SHEET RW7.1
9000 GAL. PRIMARY
SETTLING TANKS**

**6" SCH 80 PVC PIPING
L=20'± S=0.066
6" SCH 80 PVC PIPING
L=25'± S=0.025**

**SMH
R=85.5±
I=79.03 (IN)
I=78.86 (OUT)**

**2" SCH 80 PVC PIPING
(4 FT. MIN COVER)**

**2" SCH 80 PVC PIPING
L=58'± S=0.035**

DUAL 4" SCH 80 PVC FORCEMAIN

**DOSING
TANK**

**6" CLDI CAPPED STUB
FOR FUTURE CONNECTION**

**(2) GATE VALVES
W/BOXES TO GRADE**

**19000 GAL. FLOW
EQUALIZATION TANK
WITH 2 PUMPS**

**(2) GATE VALVES
W/BOXES TO GRADE**

**9000 GAL. PRIMARY
SETTLING TANK #1
R=85.5±, 85.6± & 85.8±
I=81.00 (IN)
I=80.75 (OUT)
TOP = 82.59
BOT = 71.67**

**9000 GAL. PRIMARY
SETTLING TANK #2
R=85.4±, 85.6± & 85.8±
I=79.90 (IN)
I=79.65 (OUT)
TOP = 81.49
BOT = 70.57**

**19000 GAL.
FLOW EQUAL. TANK
R=85.7±, 85.75 & 86.0±
I=79.42 & 78.56 (IN)
I=79.42 (OUT)
TOP = 80.81
BOT = 71.50**

**DOSING TANK
R=85.75± & 85.5±
I=79.00 (IN)
I=79.00 (OUT)
TOP = 81.73
BOT = 69.48**

NOTE: FOR GRADING AND SITE UTILITIES SEE PLANS BY OTHERS

**BID ALTERNATE SCOPING NOTE:
THIS SHEET INDICATES WORK ASSOCIATED WITH
ADD ALTERNATE #1. REFER TO PROJECT MANUAL,
FOR ADDITIONAL INFORMATION REGARDING
ALTERNATES AND BASE BID CONDITIONS.**



ME
MARTIN ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS. 01867
PHONE: 781-944-4888
e-mail: me@meeengineering.com

PROJECT MANAGER
100 William St., Suite 200
Reading, MA 01867
P: 781-944-4888
F: 781-944-4889
www.meeengineering.com

PROJECT NO.
11-617

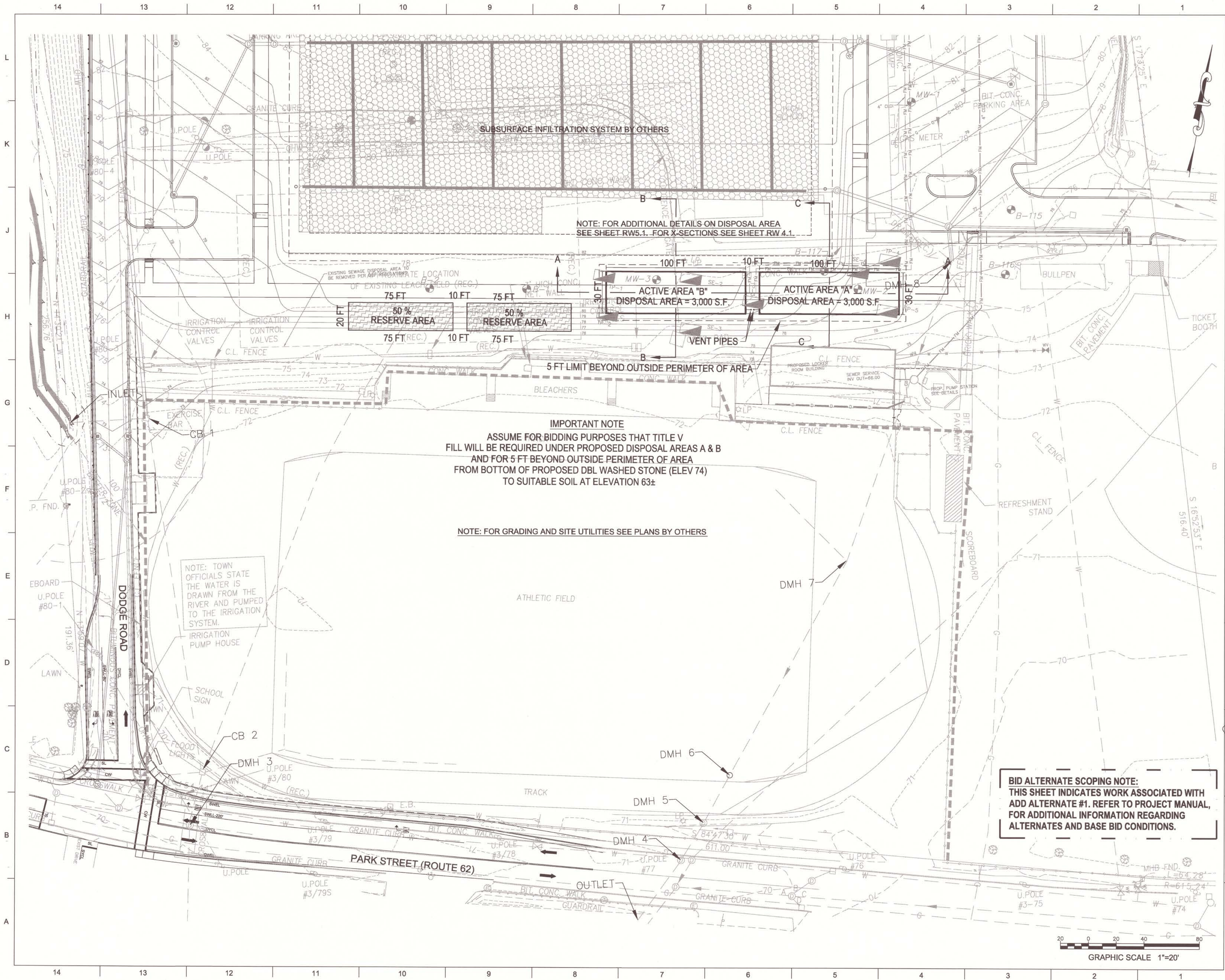
NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

REVISION	DATE

SHEET TITLE:
WWTP SITE PLAN

SHEET #
RW1.1



IMPORTANT NOTE
ASSUME FOR BIDDING PURPOSES THAT TITLE V
FILL WILL BE REQUIRED UNDER PROPOSED DISPOSAL AREAS A & B
AND FOR 5 FT BEYOND OUTSIDE PERIMETER OF AREA
FROM BOTTOM OF PROPOSED DBL WASHED STONE (ELEV 74)
TO SUITABLE SOIL AT ELEVATION 63±

NOTE: FOR GRADING AND SITE UTILITIES SEE PLANS BY OTHERS

**NOTE: FOR ADDITIONAL DETAILS ON DISPOSAL AREA
SEE SHEET RW5.1. FOR X-SECTIONS SEE SHEET RW 4.1.**

BID ALTERNATE SCOPING NOTE:
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ADD ALTERNATE #1. REFER TO PROJECT MANUAL,
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ALTERNATES AND BASE BID CONDITIONS.

ME
MARITIME ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS. 01867
PHONE: 781-944-6888
e-mail: me@mengineering.com
Read Document Engineering & Land Surveying

PROJECT MANAGER
John A. McLaughlin, P.E.
175 William St. 2nd Fl.
Reading, MA 01867
P: 781-944-6888
F: 781-944-6889
E: jmc@mea.com

ARCHITECT
Dwight A. Whittemore, AIA
175 William St. 2nd Fl.
Reading, MA 01867
P: 781-944-6888
F: 781-944-6889
E: dwh@dwainc.com

Project No: **11-617**

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

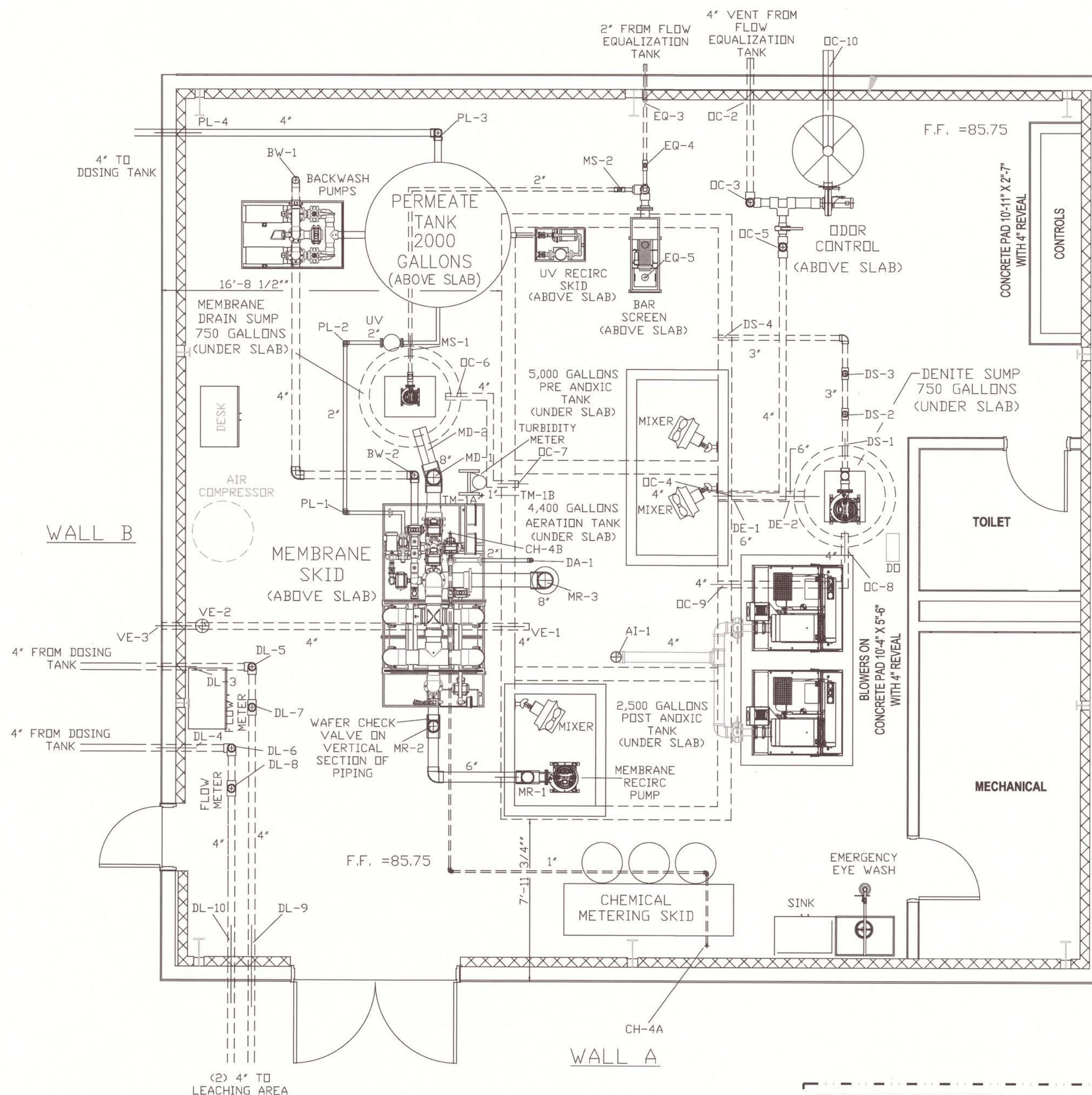
CONSOLIDATED SET

REVISION	DATE	BY	CHK

DATE: 4/26/2013
DRAWN BY: GDS
SCALE: 1"=20'
CHKD BY: DEM

SHEET TITLE:
DISPOSAL AREA SITE PLAN

SHEET #:
RW2.1



CRITICAL NOTE:
FINAL OFFSETS FOR ELECTRICAL CONDUITS & PROCESS PIPING WILL BE ESTABLISHED AFTER THE FOUNDATION WALL IS POURED IN PLACE AND AS BUILT LOCATIONS ARE PROVIDED TO THE DESIGN ENGINEER. FINAL OFFSETS TO BE VERIFIED IN WRITING BY DESIGN ENGINEER BEFORE ANY INSTALLATION OF ANY CONDUITS OR PROCESS PIPING.

- GENERAL NOTES:**
1. MARKINGS SUCH AS CH-4A, DL-9, DS-4 ETC. ARE DESIGNATIONS FOR PROCESS PIPING STUB UPS. SEE SHEET RW 4.1 FOR DIMENSIONAL OFFSETS, DESCRIPTION, PIPE SIZES AND INVERTS.
 2. ALL PROCESS PIPING INSIDE WWTP UNLESS INDICATED OTHERWISE SHALL BE SCH 80 PVC.

BID ALTERNATE SCOPING NOTE:
THIS SHEET INDICATES WORK ASSOCIATED WITH ADD ALTERNATE #1. REFER TO PROJECT MANUAL, FOR ADDITIONAL INFORMATION REGARDING ALTERNATES AND BASE BID CONDITIONS.



ME
MARTIN ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS 01867
TEL: 978.485.1000
FAX: 978.485.1001
WWW.MARTINENGINEERING.COM

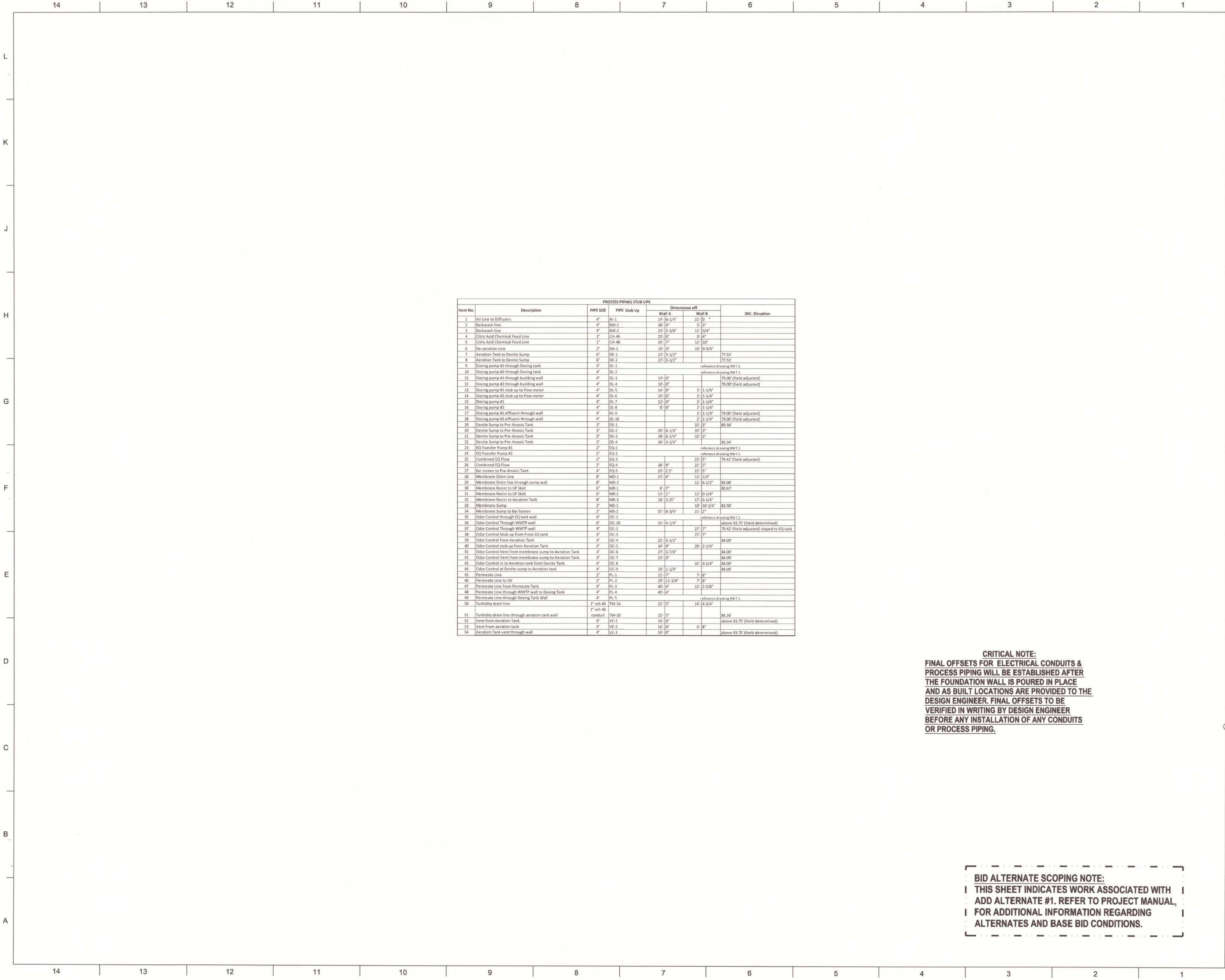
ARCHITECTS / PROJECT MANAGERS
D&W
1000 ROUTE 1
NORTH READING, MA 01864
TEL: 978.485.1000
FAX: 978.485.1001
WWW.DANDW.COM

Project No. 11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOBOLATED SET
REVISION: Date:
DATE: 4/26/2013 SCALE: 1"=2'
DRAWN BY: GDS CHECKED BY: DEM

SHEET TITLE:
WWTP
EQUIPMENT
& PIPING
LAYOUT
PLAN
SHEET #:
RW3.1



PROCESS PIPING STUB UPS						
Item No.	Description	PIPE SIZE	PIPE Stub Up	Dimensions off		INV. Elevation
				Wall A	Wall B	
1	Air Line to Diffusers	4"	AI-1	14'-6 1/4"	21'-0 "	
2	Backwash line	4"	BW-1	38'-0"	5'-3"	
3	Backwash line	4"	BW-2	23'-5 3/8"	11'-3/4"	
4	Citric Acid Chemical Feed Line	1"	CH-4A	25'-0"	0'-4"	
5	Citric Acid Chemical Feed Line	1"	CH-4B	20'-7"	12'-10"	
6	De-aeration Line	2"	DA-1	19'-3"	16'-9 3/4"	
7	Aeration Tank to Denite Sump	6"	DE-1	22'-5 1/2"		77.51'
8	Aeration Tank to Denite Sump	6"	DE-2	22'-5 1/2"		77.51'
9	Dosing pump #1 through Dosing tank	4"	DL-1			reference drawing RW7.1
10	Dosing pump #2 through Dosing tank	4"	DL-2			reference drawing RW7.1
11	Dosing pump #1 through building wall	4"	DL-3	14'-0"		79.00' (field adjusted)
12	Dosing pump #2 through building wall	4"	DL-4	10'-0"		79.00' (field adjusted)
13	Dosing pump #1 stub up to flow meter	4"	DL-5	14'-0"	3'-1 1/4"	
14	Dosing pump #2 stub up to flow meter	4"	DL-6	10'-0"	2'-1 1/4"	
15	Dosing pump #1	4"	DL-7	12'-0"	3'-1 1/4"	
16	Dosing pump #2	4"	DL-8	8'-0"	2'-1 1/4"	
17	Dosing pump #1 effluent through wall	4"	DL-9		3'-1 1/4"	79.00' (field adjusted)
18	Dosing pump #2 effluent through wall	4"	DL-10		2'-1 1/4"	79.00' (field adjusted)
19	Denite Sump to Pre-Anoxic Tank	3"	DS-1		32'-3"	83.58'
20	Denite Sump to Pre-Anoxic Tank	3"	DS-2	26'-6 1/4"	32'-3"	
21	Denite Sump to Pre-Anoxic Tank	3"	DS-3	28'-6 1/4"	32'-3"	
22	Denite Sump to Pre-Anoxic Tank	3"	DS-4	30'-3 3/4"		83.34'
23	EQ Transfer Pump #1	2"	EQ-1			reference drawing RW7.1
24	EQ Transfer Pump #2	2"	EQ-2			reference drawing RW7.1
25	Combined EQ Flow	2"	EQ-3	22'-5"		79.42' (field adjusted)
26	Combined EQ Flow	2"	EQ-4	38'-9"	22'-5"	
27	Bar screen to Pre-Anoxic Tank	4"	EQ-5	33'-2 5/8"	22'-5"	
28	Membrane Drain Line	8"	MD-1	23'-4"	12'-1 1/4"	
29	Membrane Drain line through sump wall	6"	MD-2		11'-6 1/2"	83.08'
30	Membrane Recirc to UF Skid	6"	MR-1	8'-7"		83.67'
31	Membrane Recirc to UF Skid	6"	MR-2	11'-1"	12'-0 1/4"	
32	Membrane Recirc to Aeration Tank	8"	MR-3	18'-3 25"	17'-6 1/4"	
33	Membrane Sump	2"	MS-1		10'-10 1/4"	83.58'
34	Membrane Sump to Bar Screen	2"	MS-2	37'-6 3/4"	21'-2"	
35	Odor Control through EQ tank wall	4"	OC-1			reference drawing RW7.1
36	Odor Control Through WWTP wall	6"	OC-10	31'-4 1/4"		above 93.75' (field determined)
37	Odor Control Through WWTP wall	4"	OC-2		27'-7"	79.42' (field adjusted) sloped to EQ tank
38	Odor Control Stub-up from From EQ tank	4"	OC-3			
39	Odor Control from Aeration Tank	4"	OC-4	22'-5 1/2"		84.09'
40	Odor Control stub up from Aeration Tank	4"	OC-5	34'-9"	29'-2 1/4"	
41	Odor Control Vent from membrane sump to Aeration Tank	4"	OC-6	27'-3 7/8"		84.09'
42	Odor Control Vent from membrane sump to Aeration Tank	4"	OC-7	23'-0"		84.09'
43	Odor Control in to Aeration tank from Denite Tank	4"	OC-8		32'-3 1/4"	84.09'
44	Odor Control at Denite sump to Aeration tank	4"	OC-9	18'-1 1/4"		84.09'
45	Permeate Line	2"	PL-1	21'-7"	7'-8"	
46	Permeate Line to UV	2"	PL-2	29'-11 3/4"	7'-8"	
47	Permeate Line from Permeate Tank	4"	PL-3	40'-4"	12'-2 5/8"	
48	Permeate Line through WWTP wall to Dosing Tank	4"	PL-4	40'-4"		
49	Permeate Line through Dosing Tank Wall	4"	PL-5			reference drawing RW7.1
50	Turbidity drain line	1" sch 40 conduit	TM-1A	22'-5"		14'-4 3/4"
51	Turbidity drain line through aeration tank wall	1" sch 40 conduit	TM-1B	22'-5"		84.26'
52	Vent from Aeration Tank	4"	VE-1	16'-0"		above 93.75' (field determined)
53	Vent from aeration tank	4"	VE-2	16'-0"	0'-8"	
54	Aeration Tank vent through wall	4"	VE-3	16'-0"		above 93.75' (field determined)

CRITICAL NOTE:
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BID ALTERNATE SCOPING NOTE:
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MEAMARTINAGE ENGINEERING ASSOCIATES, INC.131 MAIN STREETREADING, MASS 01867Phone: 978.449.7000Fax: 978.449.7001www.martinage-engineering.com

ARCHITECTS & PROJECT MANAGERSSouth Reading, VT 05493P: 802.883.6333F: 802.883.6333www.dwarchitects.com

DW ARCHITECTS & PROJECT MANAGERSPO BOX 100000SOUTH READING, VT 05493

Project No:
11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

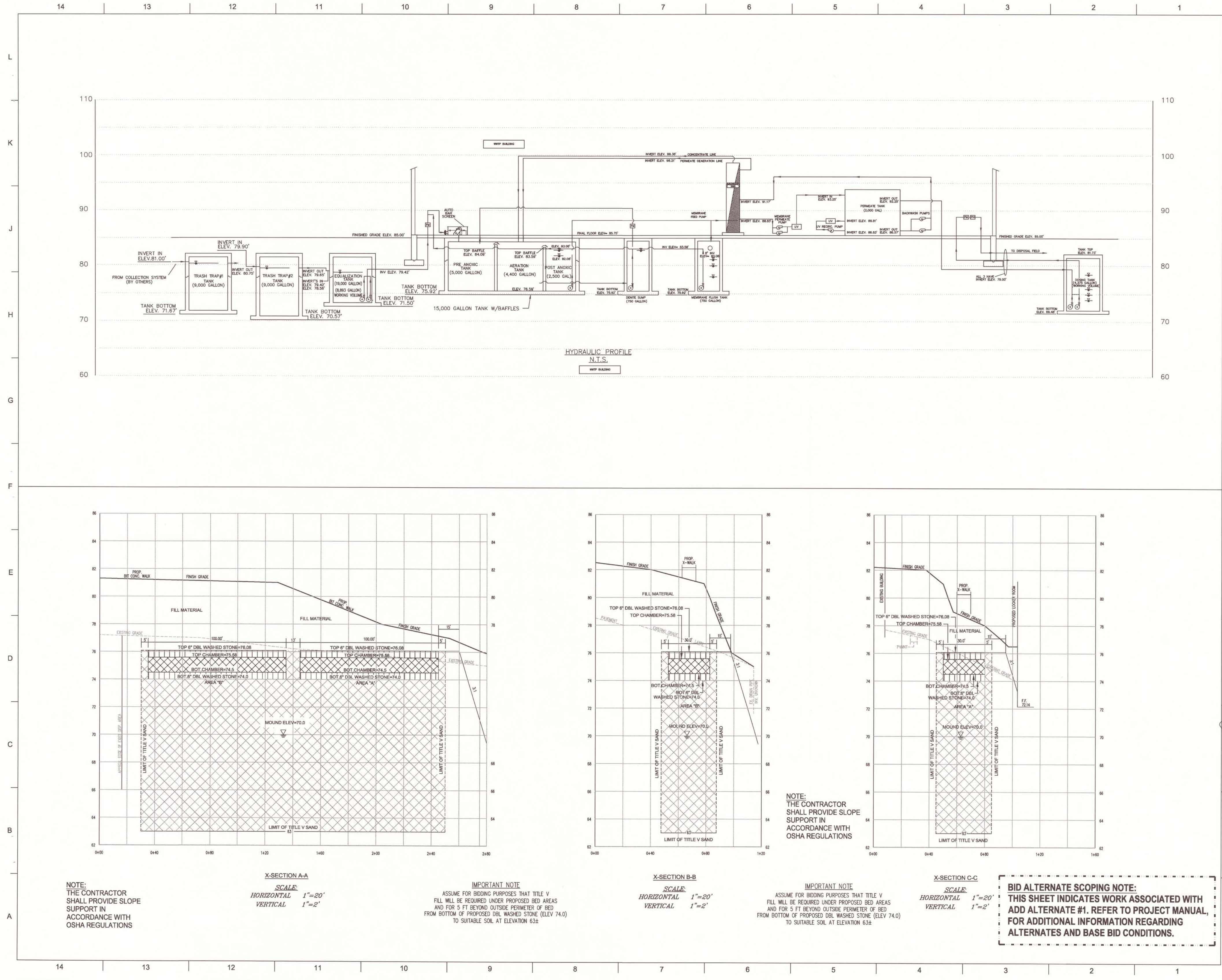
REVISION:

	Date:

DATE: 4/26/2015
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SCALE: NTA
CHECK BY: DEM

SHEET TITLE:
WWTP
PROCESS
PIPING STUB
UP TABLE

SHEET #:
RW4.1



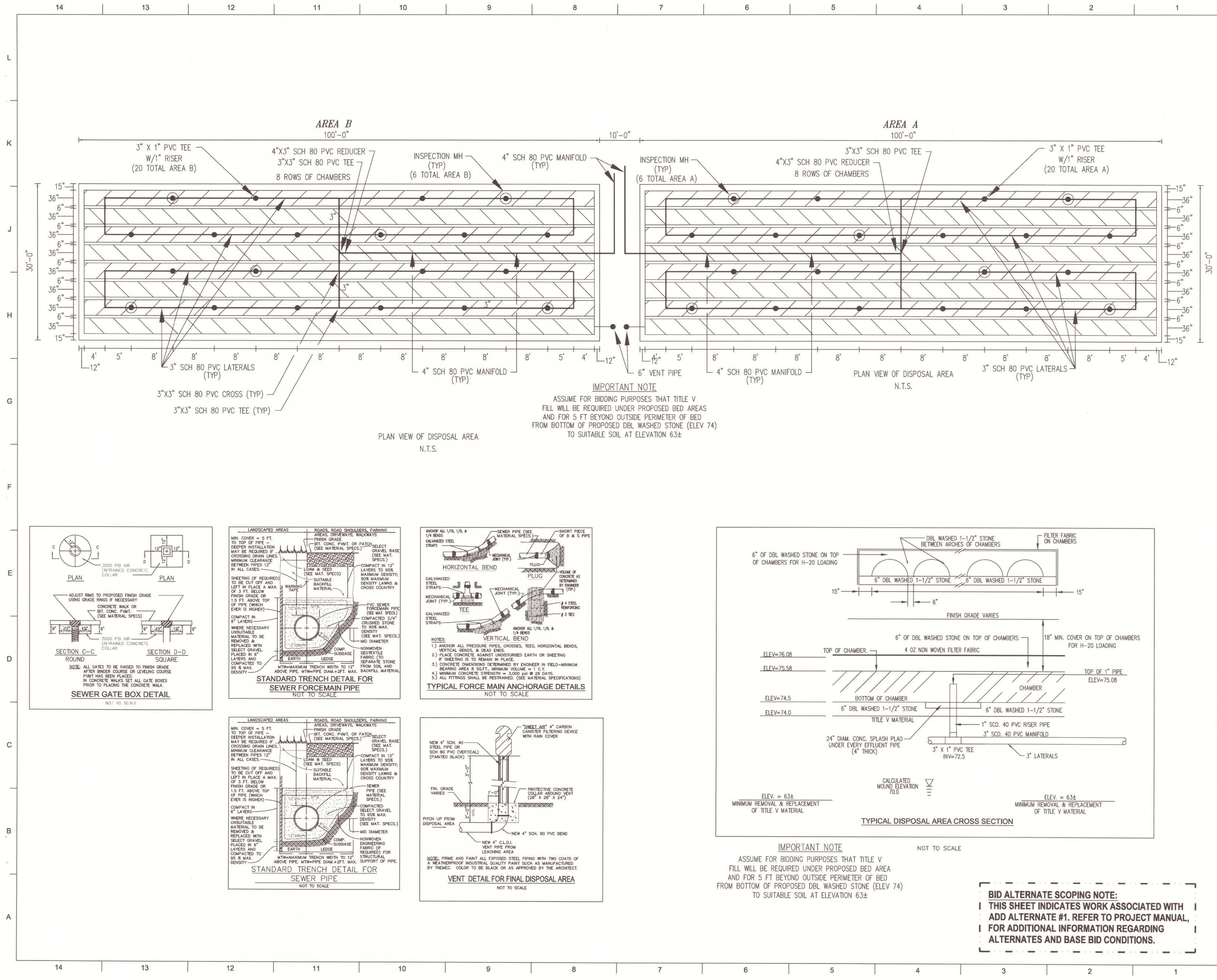
MEAMARTINAGE ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS 01867
PHONE: 781-944-1888
e-mail: meam@martinage-engineering.com
Read: Instrumental Engineer & Land Surveyor

David M. Martin, P.E.
1719 Williams St. Suite 200
Reading, MA 01867
P: 781.944.1888
F: 781.944.1889
dmm@martinage-engineering.com
www.martinage-engineering.com

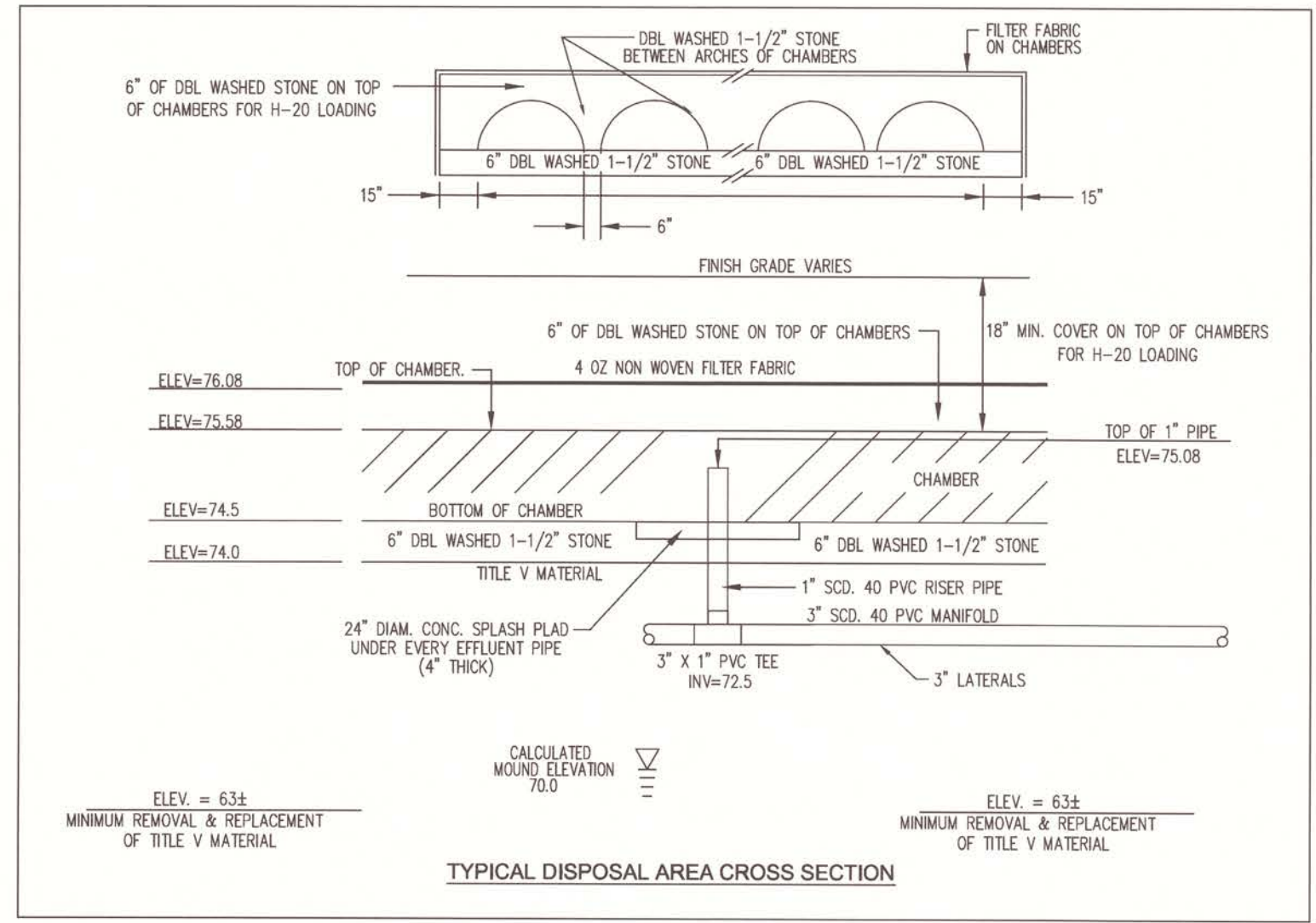
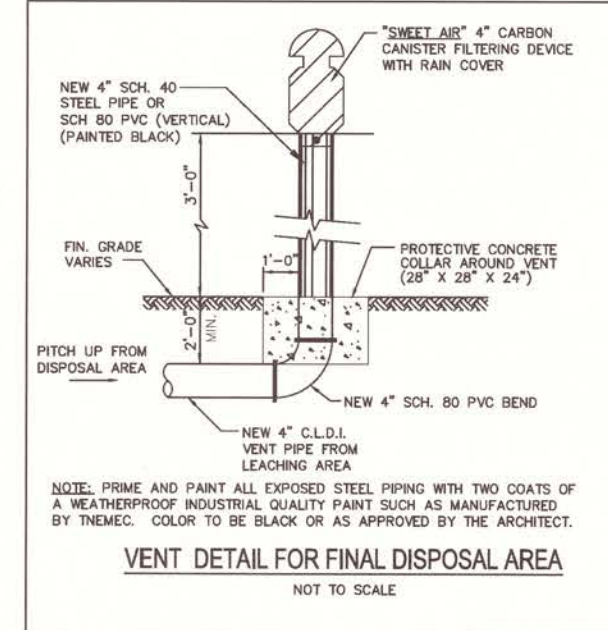
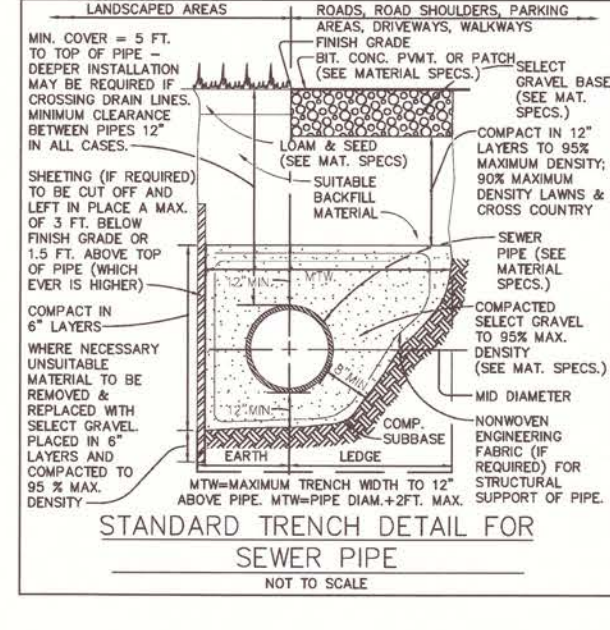
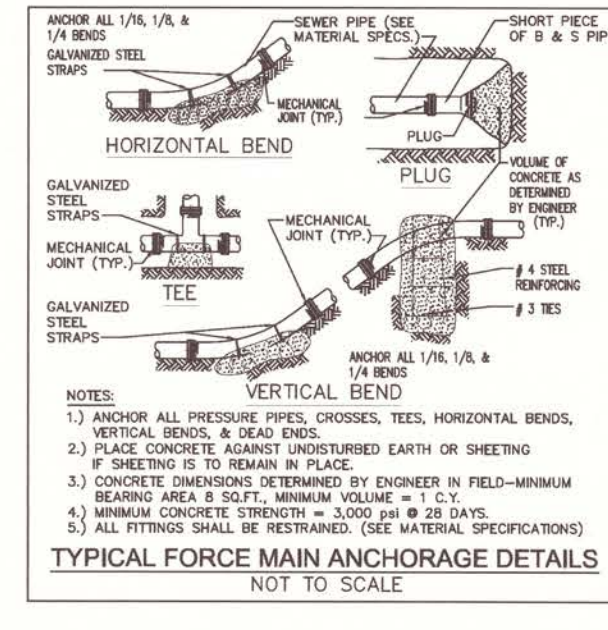
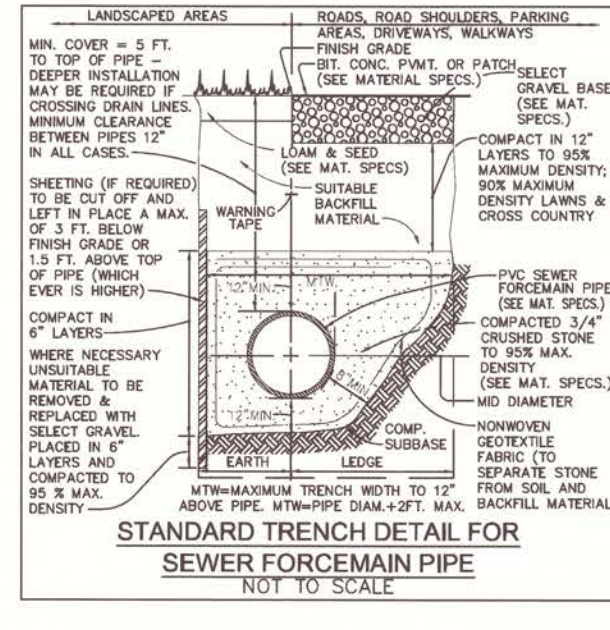
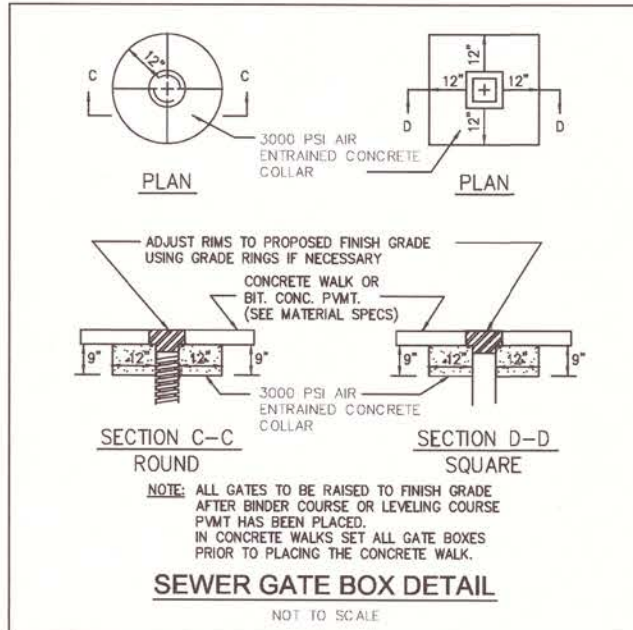
Project No:
11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET
REVISION: DATE:
DATE: 4/26/2013 SCALE: N.T.S.
DRAWN BY: GDS/JEM CHECKED BY: DEM
SHEET TITLE:
HYDRAULIC
PROFILE &
DISPOSAL
AREA
X-SECTIONS
SHEET #:
RW5.1



IMPORTANT NOTE
ASSUME FOR BIDDING PURPOSES THAT TITLE V
FILL WILL BE REQUIRED UNDER PROPOSED BED AREAS
AND FOR 5 FT BEYOND OUTSIDE PERIMETER OF BED
FROM BOTTOM OF PROPOSED DBL WASHED STONE (ELEV 74)
TO SUITABLE SOIL AT ELEVATION 63±



IMPORTANT NOTE
ASSUME FOR BIDDING PURPOSES THAT TITLE V
FILL WILL BE REQUIRED UNDER PROPOSED BED AREA
AND FOR 5 FT BEYOND OUTSIDE PERIMETER OF BED
FROM BOTTOM OF PROPOSED DBL WASHED STONE (ELEV 74)
TO SUITABLE SOIL AT ELEVATION 63±

BID ALTERNATE SCOPING NOTE:
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ALTERNATES AND BASE BID CONDITIONS.

MECA
MASS ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS 01867
PHONE: 781-944-4825
e-mail: meca@mea-engineering.com
Read: Environmental Engineering & Land Surveying

ARCHITECTS & PROJECT MANAGERS
DWM
100 STATE STREET
FLOOR 10
BOSTON, MA 02109
PHONE: 617-452-1234
FAX: 617-452-1235
www.dwmarchitects.com

Project No: **11-617**

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

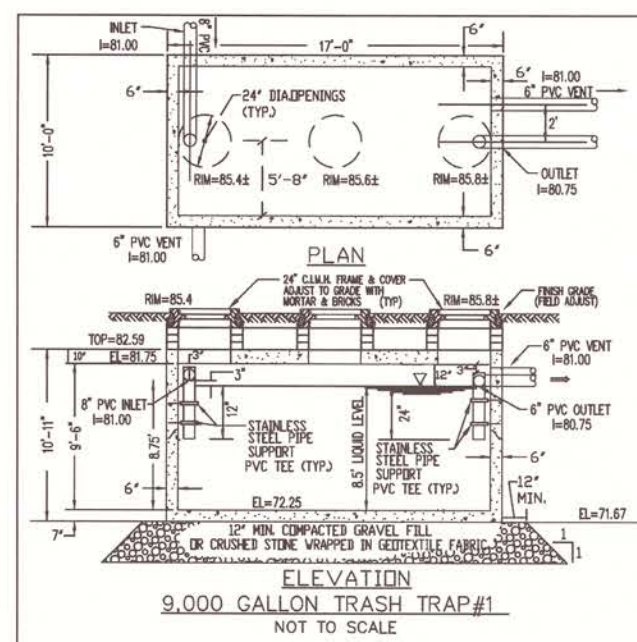
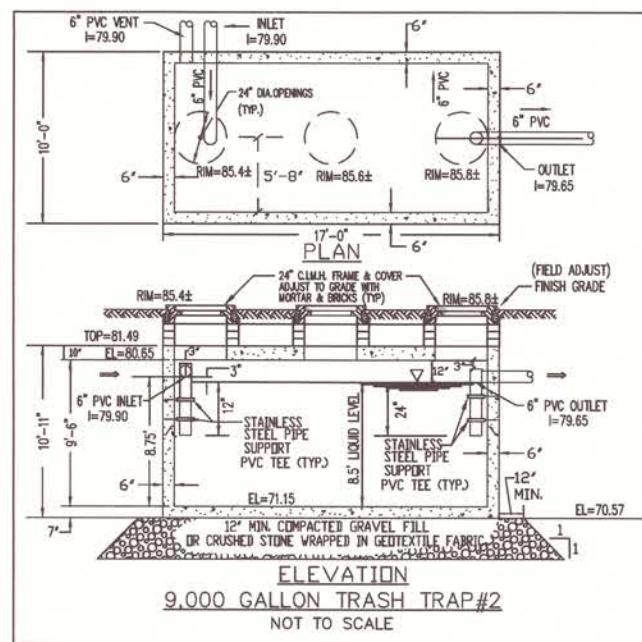
REVISION	Date

DATE: 4/26/2013 SCALE: N.T.S.
DRAWN BY: GDS CHECKED BY: DEM

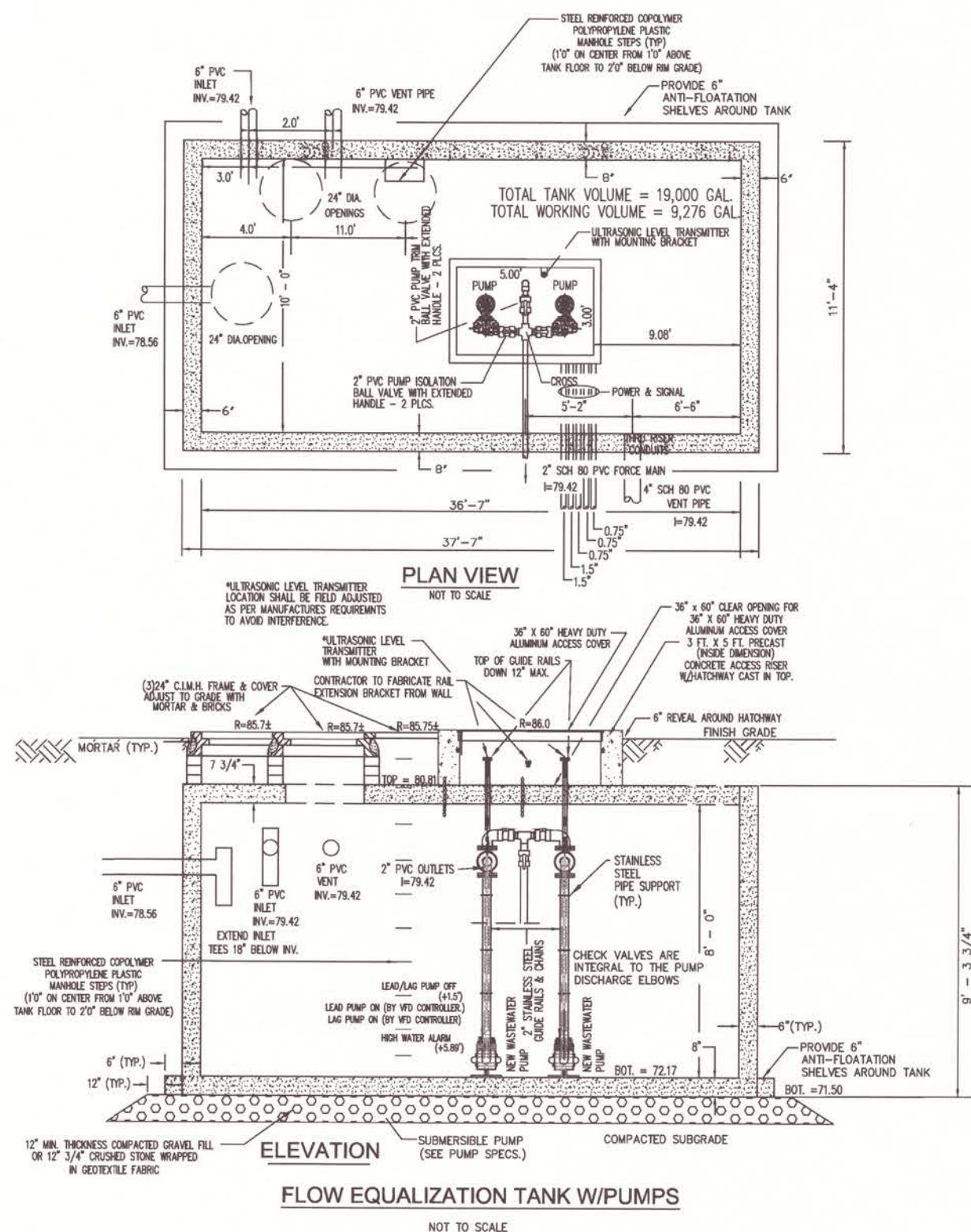
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SHEET #:

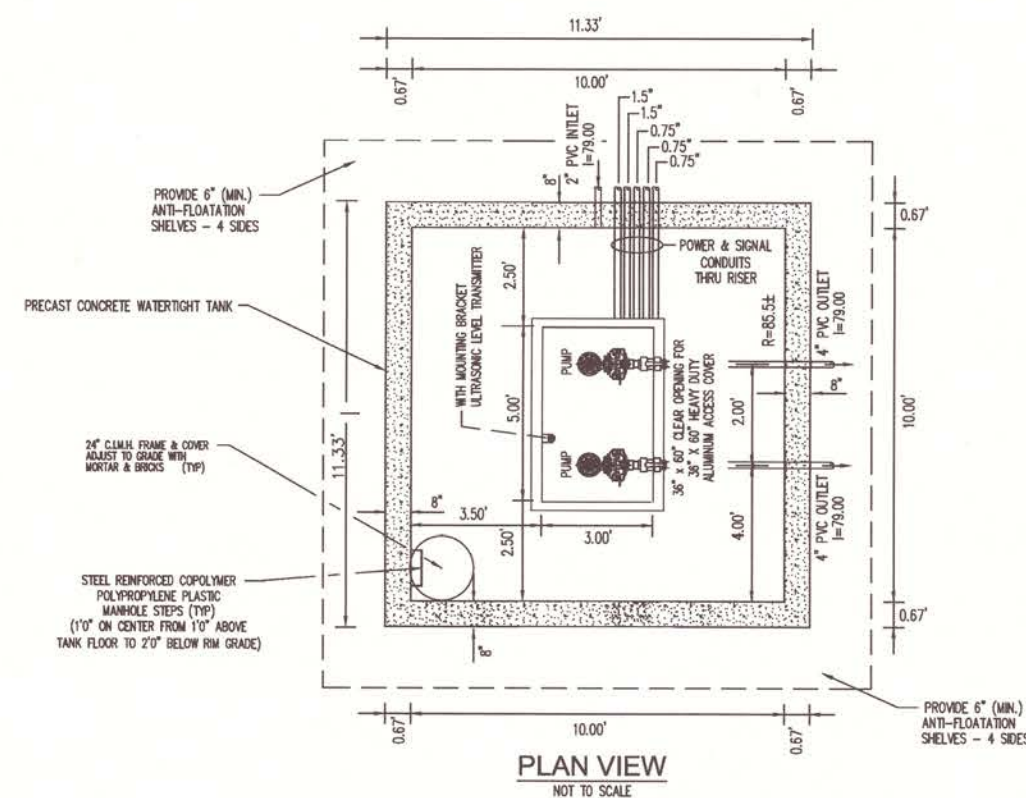
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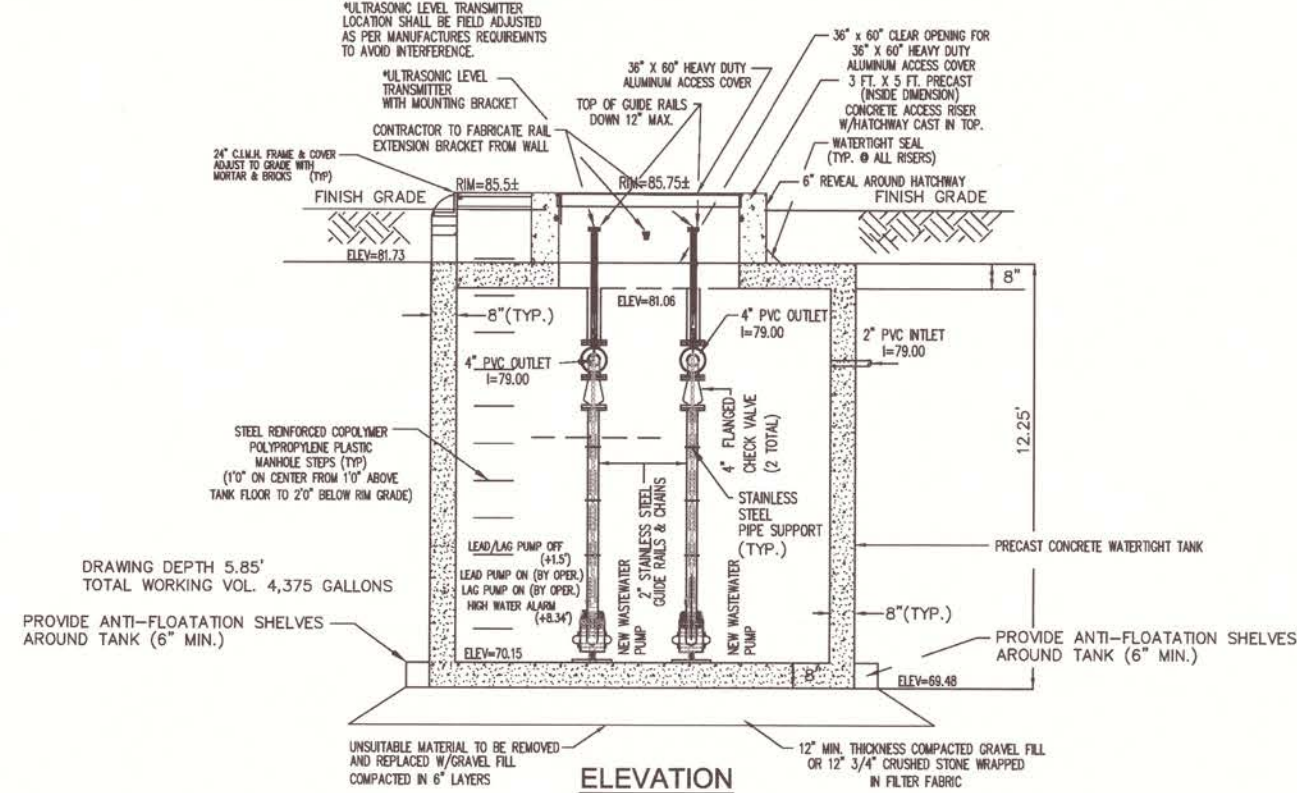
NOTE:
1. ALL PIPE & CONDUIT PENETRATIONS (EXCEPT WHERE INDICATED) SHALL BE SEALED WITH RESILIENT RUBBER BOOT INSTALLED BY THE PRECAST MANUFACTURER.



NOTE:
1. ALL PIPE & CONDUIT PENETRATIONS (EXCEPT WHERE INDICATED) SHALL BE SEALED WITH RESILIENT RUBBER BOOT INSTALLED BY THE PRECAST MANUFACTURER.
2. CONTRACTOR TO VERIFY DRAWING VOLUME AND PUMP SETTINGS WITH THE ENGINEER PRIOR TO STARTUP.



NOTE:
1. ALL PIPE & CONDUIT PENETRATIONS (EXCEPT WHERE INDICATED) SHALL BE SEALED WITH RESILIENT RUBBER BOOT INSTALLED BY THE PRECAST MANUFACTURER.
2. CONTRACTOR TO VERIFY DRAWING VOLUME AND PUMP SETTINGS WITH THE ENGINEER PRIOR TO STARTUP.



DOSING PUMP STATION DETAIL
NOT TO SCALE

BID ALTERNATE SCOPING NOTE:
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MECA
MASTING ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS. 01867
PHONE: 781-844-6805
e-mail: meca@mece-engineering.com
Read - Environmental Engineers & Land Surveyors

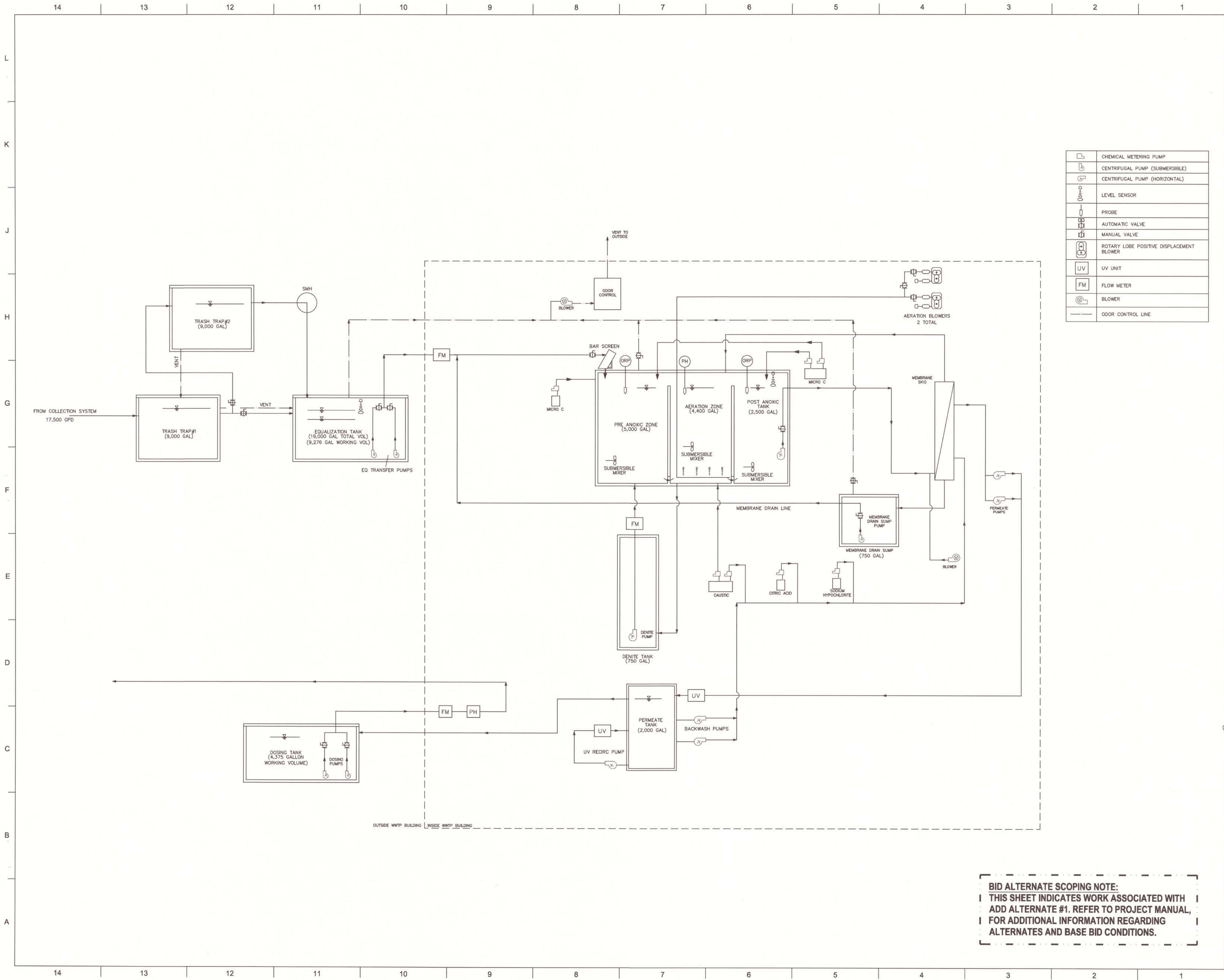
ARCHITECTS
DANA & WHITTAKER
100 WASHINGTON ST., 2ND FLOOR
READING, MA 01867
P: 781-844-6805
F: 781-844-6806
E: dwhittaker@dana-whittaker.com
www.dana-whittaker.com

Project No.
11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET
REVISION: DATE:
DATE: 4/26/2013
SCALE: N.T.S.
DRAWN BY: GDS
CHECKED BY: DEM

SHEET TITLE:
OUTSIDE UNDERGROUND TANKAGE DETAILS
SHEET #:
RW7.1



	CHEMICAL METERING PUMP
	CENTRIFUGAL PUMP (SUBMERSIBLE)
	CENTRIFUGAL PUMP (HORIZONTAL)
	LEVEL SENSOR
	PROBE
	AUTOMATIC VALVE
	MANUAL VALVE
	ROTARY LOBE POSITIVE DISPLACEMENT BLOWER
	UV UNIT
	FLOW METER
	BLOWER
	ODOR CONTROL LINE

BID ALTERNATE SCOPING NOTE:
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MEAMARTINAGE ENGINEERING ASSOCIATES, INC.
133 MAIN STREET
READING, MASS 01867
PHONE: 781-944-4808
e-mail: meam@martinaget-engineering.com
Bridges, Roads, Buildings, & Land Development

PROJECT MANAGER
199 William St., 2nd Fl.
Reading, MA 01867
P: 781.944.4808
F: 781.944.4815
mea@martinaget-engineering.com
www.martinaget-engineering.com

DICKINSON & WHITTIER
ARCHITECTS, INC.

Project No.
11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

REVISION:	Date:

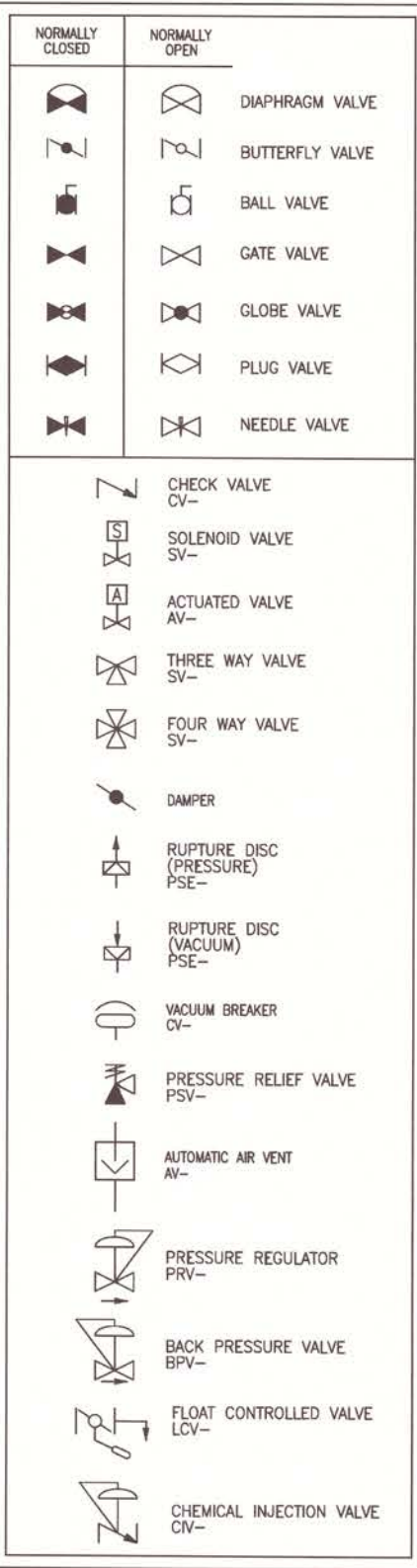
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4/26/2013	N.T.S.

DRAWN BY:	CHECKED BY:
QDS	DEM

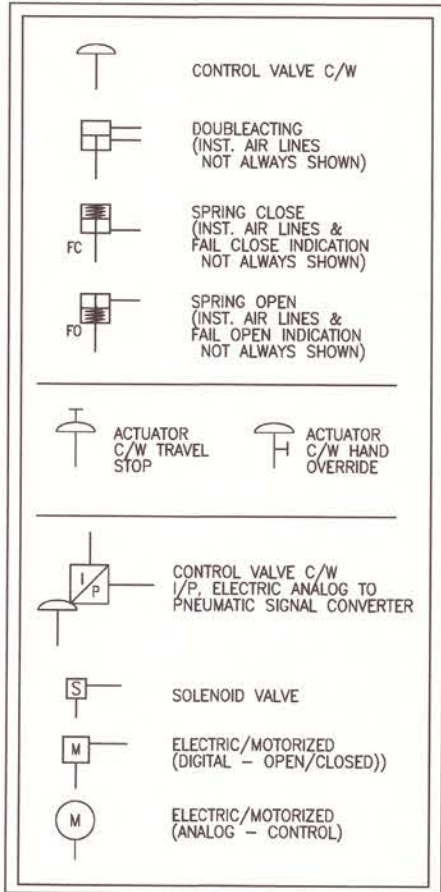
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WWTP
PROCESS
FLOW
DIAGRAM

SHEET #:
RW9.1

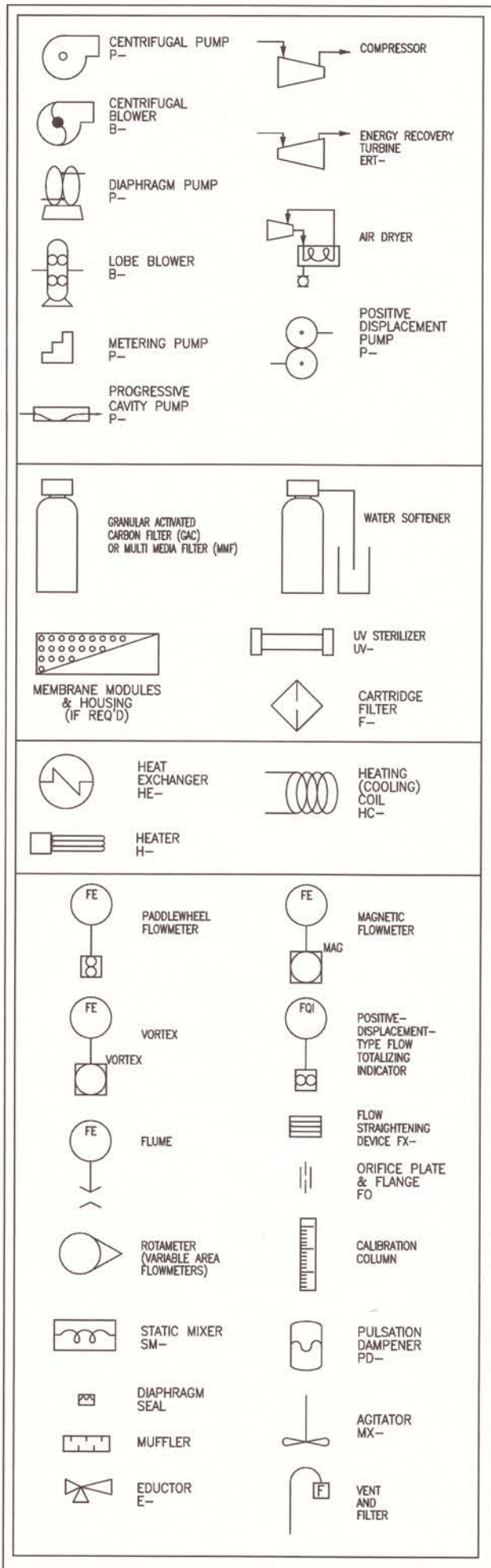
VALVE SYMBOLS



VALVE ACTUATORS



EQUIPMENT SYMBOLS



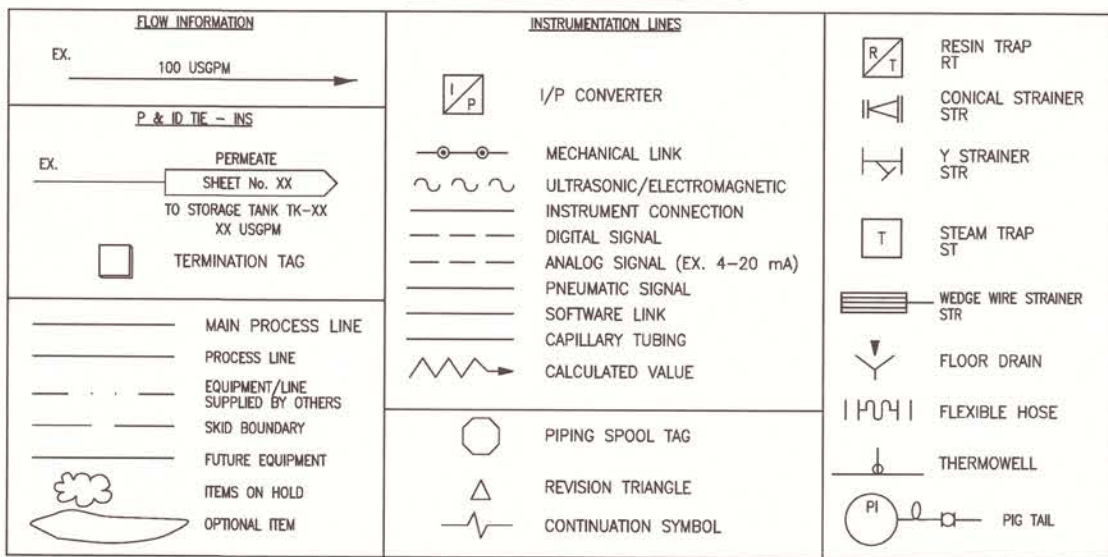
INSTRUMENT IDENTIFICATION

MEASURED OR INITIATING VARIABLE	PRIMARY ELEMENT	TRANSMITTER	INDICATOR	RECORDER	CONTROLLER (NOTE 2)	RECORDING CONTROLLER	SWITCH (NOTE 2)	NOTIFYING SWITCH (NOTE 2)	TRANSFER SWITCH (NOTE 2)	ALARM (NOTE 2)	GLASS VIEWING DEVICE	COMPUTER/INFORMATION	PILOT LIGHT (NOTE 2)
ANALYSIS (NOTE 1)	AE	AT	AIT	AI	AR	AC	ARC	AS	AS	AY	AA	AY	AL
ANALYSIS RATIO													
ANALYSIS SCAN	AE	AT	AIT	AI	AR	AC	ARC	AS	AS	AY	AA	AY	AL
ANALYSIS INSTANTANEOUS (MOMENTARY)	AME				AMC		AMS	AMY	AMA				
CONDUCTIVITY/RESISTIVITY	CE	CT	CTT	CI	CR	CC	CIC	CS	CIS	CY	CA	CY	CL
CONDUCTIVITY RATIO													
VOLTAGE													
FLOW RATE	FE	FT	FTT	FI	FR	FC	FRF	FS	FIS	FY	FA	FG	FL
FLOW RATIO													
FLOW QUANTITY													
HAND (MANUAL)													
CURRENT													
POWER													
TIME													
TIME QUANTITY													
LEVEL	LE	LT	LTT	LI	LR	LC	LRC	LS	LIS	LY	LA	LG	LL
MOTOR (ELECTRICAL)													
PRESSURE/VACUUM	PE	PT	PTT	PI	PR	PC	PRC	PS	PIS	PY	PA	PY	PL
PRESSURE DIFFERENTIAL	PDE	PDT	PDTT	PDI	PRD	PDC	PRDC	PDS	PDS	PDY	PDA	PDY	PDL
RADIATION	RE	RT	RTT	RI	RR	RC	RRC	RS	RIS	RY	RA		RL
SPEED/FREQUENCY	SE	ST	STT	SI	SR	SC	SRC	SS	SIS	SY	SA	SY	SL
RATE OF SPEED CHANGE													
TEMPERATURE	TE	TT	TTT	TI	TR	TC	TRC	TS	TIS	TY	TA	TY	TL
TEMPERATURE DIFFERENTIAL	TDE	TDT	TDTT	TDI	TRD	TDC	TRDC	TDS	TDS	TDY	TA	TDY	TDL
VIBRATION	VE	VT	VTT	VI	VR			VS	VIS	VY	VA	VY	VL
MULTIVARIABLE	UE	UT	UTT	UI	UR			US	UIS	UY	UA	UY	UL
POSITION													
EVENT/STATUS													

NOTES:

1. THE DESCRIPTION OF AN ANALYTICAL VARIABLE FUNCTION (PH, SiO₂, O₂, ETC.) SHALL BE SHOWN OUTSIDE THE INSTRUMENT. EXAMPLE: ASL pH
2. ADD THE SUFFIX L (LOW), LL (LOW-LOW), H (HIGH), HH (HIGH-HIGH), HL (HIGH-LOW), AS REQUIRED. EXAMPLE: PSL, FAL

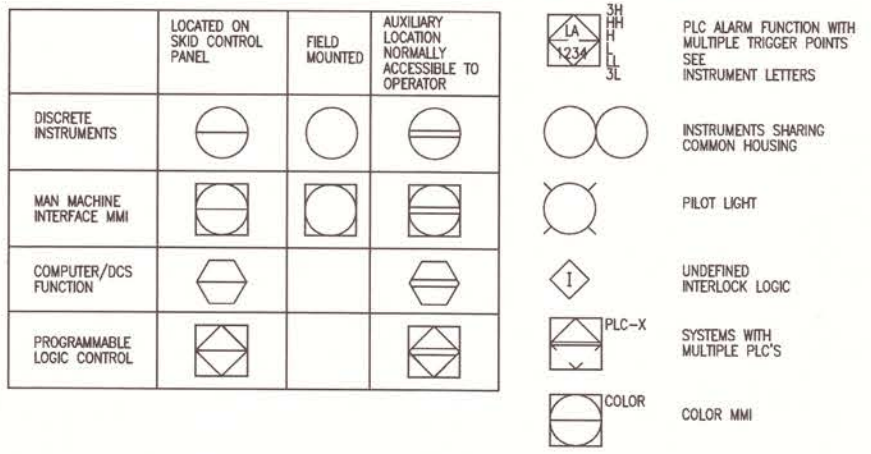
LINE SYMBOLS & MISC.



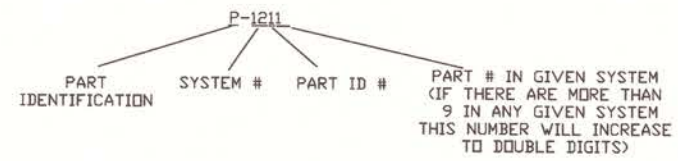
COMMON ABBREVIATIONS

EQUIPMENT	VALVE	MISCELLANEOUS
FC FLOW SIGHT GLASS	CV CHECK VALVE	FC FAIL CLOSED
LG LEVEL SIGHT GLASS	FV AUTOMATIC VALVE	FO FAIL OPEN
M MOTOR	FCV AUTOMATIC CONTROL VALVE	I/P ELECTRIC ANALOG TO PNEUMATIC SIGNAL CONVERTER
SG SIGHT GLASS	LCV LEVEL CONTROL VALVE	IAS INSTRUMENT AIR SUPPLY
TK TANK	TCV TEMPERATURE CONTROL VALVE	SP SET POINT
	BPV BACK PRESSURE VALVE	NC NORMALLY CLOSED
	HCV HAND CONTROL VALVE	NO NORMALLY OPEN
	HV HAND VALVE	MCC MOTOR CONTROL CENTER
	SV SAMPLE VALVE	MAG MAGNETIC
	YY SOLENOID FOR PNEUMATIC CONTROL OF AUTOMATIC VALVE	
	MFV MULTIFUNCTION VALVE (COMBINATION RELIEF & BACK PRESSURE VALVE FOR METERING PUMPS)	

GENERAL INSTRUMENT OR CONTROL SYMBOLS



P&ID NUMBERING



PART IDENTIFICATION ABBREVIATIONS

- AG -AERATION GRID
- ATV -AUTOMATIC THROTTLING VALVE
- AV -OPEN/SHUT AUTOMATIC VALVE
- BL -BLOWER
- C -CENTRIFUGE
- CMF -COMPRESSOR
- CV -CHECK VALVE
- DAF -DISSOLVED AIR FLUTATION
- DO -DISSOLVED OXYGEN
- FL -FLOCCULATOR
- FM -FLOW METER
- HE -HEAT EXCHANGER
- JA -JET AERATION
- LS -LEVEL SENSOR
- MI -MIXER
- MV -MANUAL VALVE
- DRP -OXIDATION REDUCTION POTENTIAL
- P -PUMP
- PH -PH
- PM -POLYMER CHEM FEED SYSTEM
- PSV -PRESSURE SAFETY VALVE
- T -TANK
- TB -TURBIDITY

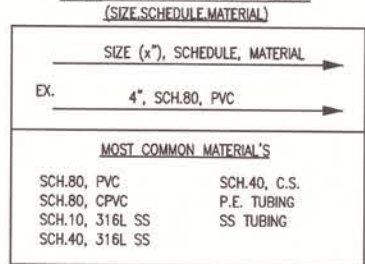
SYSTEM

1. ANAEROBIC DIGESTER
2. PH ADJUST SKID
3. CENTRIFUGE
4. INFLUENT CENTRATE SKID
5. AMMONIA SCRUBBER
6. PRE-AERATION FEED PUMP
7. PRE-AERATION
8. PRE-AERATION BLOWERS
9. PRE-AERATION CHEMICAL FEED SKID
10. PRE DAF
11. CHEMICAL REACTION TANK
12. POST DAF
13. DAF COMPRESSORS
14. PRE DAF SLUDGE TANKS
15. PRE DAF SLUDGE BLOWER
16. POST DAF SLUDGE
17. POST DAF SLUDGE BLOWER
18. PRE DAF CENTRIFUGE
19. POST DAF CENTRIFUGE
20. CENTRATE TANK
21. FINE SCREEN
22. MBR FEED
23. MBR REACTOR #1
24. MBR REACTOR #2
25. MBR BLOWERS
26. PERMEATE
27. CIP
28. ACTIVATED CARBON
29. FINAL PH ADJUST
30. PRE AERATION FEED HEAT EXCHANGER

PART ID #

0. MEMBRANE
1. PUMP
2. INSTRUMENT
3. VALVE
4. TANK
5. MISC EQUIPMEN

LINE DESIGNATION



BID ALTERNATE SCOPING NOTE:

THIS SHEET INDICATES WORK ASSOCIATED WITH ADD ALTERNATE #1. REFER TO PROJECT MANUAL, FOR ADDITIONAL INFORMATION REGARDING ALTERNATES AND BASE BID CONDITIONS.

NORTH READING MIDDLE-HIGH SCHOOL

19 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

REVISION: DIM:

DATE: SCALE:

DRAWN BY: CWD BY:

GDS DEM

SHEET TITLE:

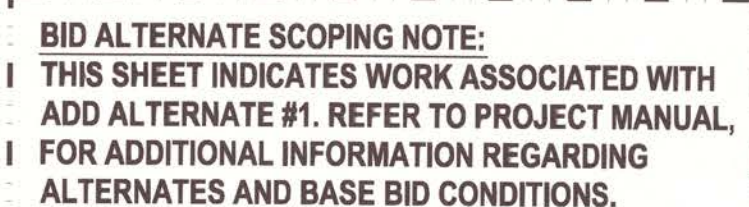
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PROCESS &

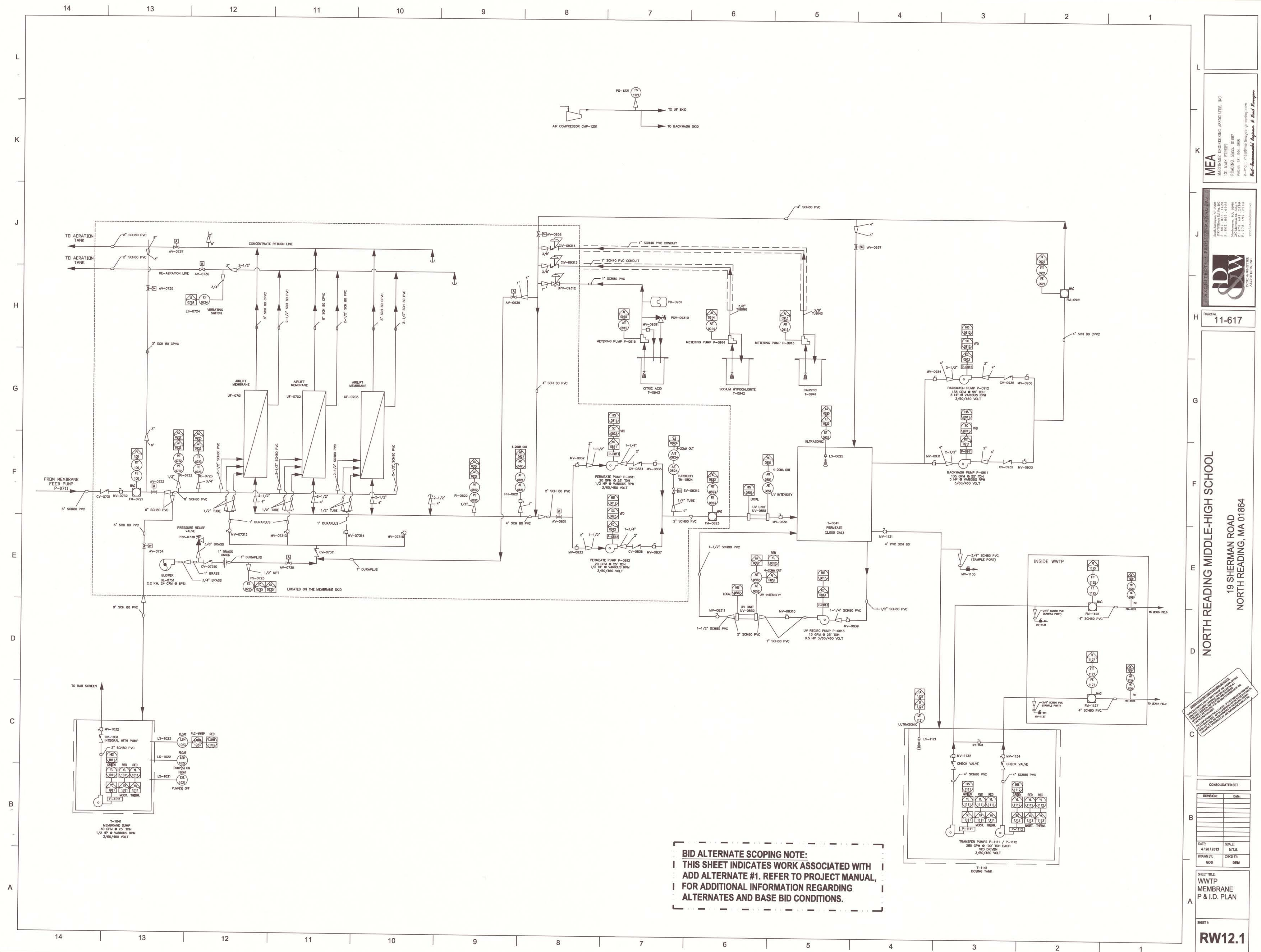
I.D. LEGEND

SHEET #:

RW10.1



RW11.1



IMCA
MARTINAGE ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
READING, MASS. 01867
PHONE: 781-944-4808
e-mail: mca@martinageengineering.com
Best-Environmental Engineers & Lead Engineers

DW
DORR & WHITTIER
ARCHITECTS, INC.

11-617

19 SHERMAN ROAD
NORTH READING, MA 01864

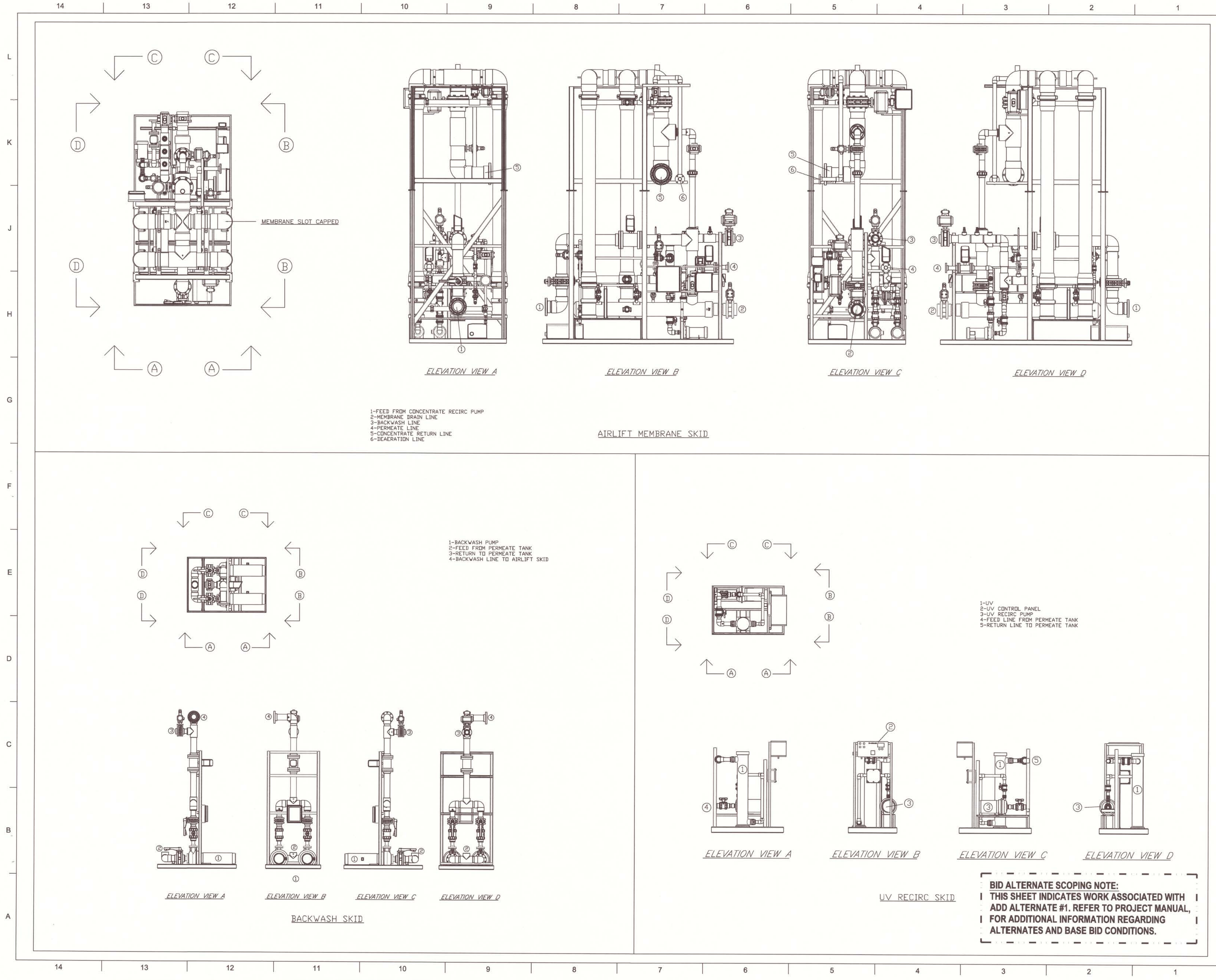
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CONSOLIDATED SET	
Version:	Date:
2013	SCALE: N.T.S.
of:	CHKD BY:
S	DEM

TP
BRANE
D. PLAN

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W12.1



MECA
MARTIN ENGINEERING ASSOCIATES, INC.
131 MAIN STREET
MARTIN, MA 01864
PHONE: 978-449-1400
FAX: 978-449-1401
E-MAIL: meca@martineng.com
Web: martineng.com

ARCHITECTS - PROJECT MANAGERS
DWM
1000 WASHINGTON STREET
DORCHESTER, MA 01919
PHONE: 617-462-1111
FAX: 617-462-1112
E-MAIL: dwm@dwma.com
Web: dwma.com

Project No.
11-617

NORTH READING MIDDLE-HIGH SCHOOL
19 SHERMAN ROAD
NORTH READING, MA 01864

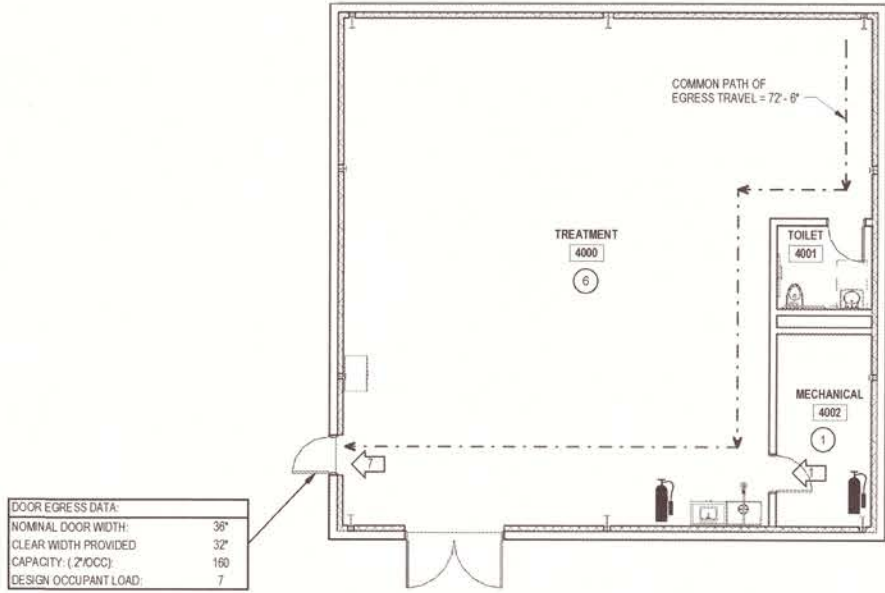
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REVISION	DATE

DATE: 4/28/2013
SCALE: N.T.S.
DRAWN BY: GDS
CHECKED BY: DEM

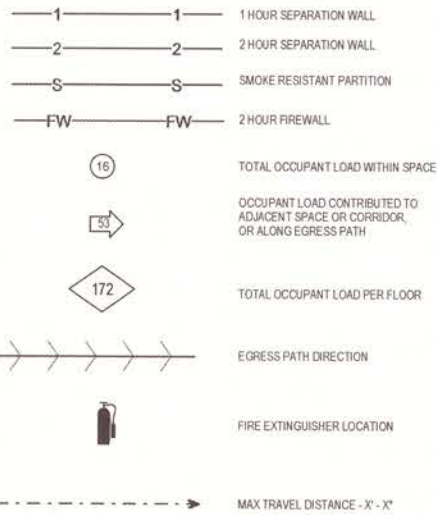
SHEET TITLE:
WWTP
EQUIPMENT
DETAILS

SHEET #:
RW13.1



J6 WWTP CODE SUMMARY LEVEL 1
1/8" = 1'-0"

CODE LEGEND



CODE SUMMARY

Summary of Requirements
Massachusetts State Building Code (CMR 780), 8th Edition

60% Construction Document Set
North Reading Middle & High School

The North Reading Middle School & High School Project (the Project) is a major renovation and new construction of a combination High School and Middle School. Part of this Project requires the construction of a new Waste Water Treatment Plant. This summary is intended to convey compliance of the Waste Water Treatment Plant building with the 8th Edition of the Massachusetts State Building Code (CMR 780). The scope of this summary is limited to the Waste Water Treatment Plant building and a separate summary has been developed for the completed Middle & High School Building Project.

Occupancy Characteristics

The occupancy of the complex will be generally classified as Use Group U (Utility and Miscellaneous) as defined in Section 312. Classification of this use group is typically based on a building not fitting the definition of any other occupancy type. However, it is helpful to note that the code commentary to this section indicates that "A pumphouse for a water or sewage system...are examples of such buildings" (p. 3-51), reinforcing this interpretation.

Physical Characteristics

The building is a one story structure comprising 1840 square feet of area. The building height to the highest point of the roof is 19'-0" above grade.

Construction Type

To satisfy the design intent with the least restrictive construction type, the building will be type IIB construction. Because the building size is less than the tabular area of 6,500 SF and less than the 2 story limit from Table 503, no height or area modifications are required for compliance.

The building is also less than the 7,500 gross square foot threshold that would require a sprinkler system under MGCL c. 146, s. 26G and as such, no sprinkler system is provided.

Fire Resistance Rating of Building Elements

No fire resistance rating of building elements are required based on the Table 601. The small mechanical room does not contain any equipment requiring separation from the rest of the building. Table 6 Means of Egress section of this Summary for rating of egress components.

Means of Egress

Occupant Loads have been calculated based on Table 1004.1 based on the function "Accessory storage areas, mechanical equipment rooms" for both the treatment space and the mechanical room.

Clear widths of the egress doors shall be calculated at 0.2 inches per occupant (for non-sprinkled buildings) (1005.1) based on the occupant egress load for each component indicated on the Code Review Drawings. Typical 30" doors with 32" clear width will satisfy the requirement at all means of egress.

All means of egress will be illuminated per section 1006.

There are no stairways in the building (Section 1009 does not apply).

The common path of egress travel, including travel around permanent process equipment, shall not exceed 75 feet for all other portions of the building. 1014.3.

One means of egress is provided from the treatment area and the mechanical room in accordance with Section 1015.1.

1. The occupant load is less than required per Table 15.1 for U occupancy.
2. The common path of egress travel does not exceed 75 feet as noted above.
3. Additional exits are not required per sections 1015.3, 1015.4, 1015.5, 1015.6, or 1015.6.1.

The maximum length of exit access travel distance shall not exceed 250 feet in accordance with Table 1015.1.

There are no corridors in the building (Section 1016 does not apply).

Two means of egress are not required per Section 1021.1, Ex. 5, because the building complies with Section 1015.1 for 1 means of egress discharging directly to the exterior at the level of exit discharge.

Fire Protection Systems

Sprinkler systems will not be provided as the building does not meet any of the thresholds for similar hazard occupancies described in sections 903.2.1 through 903.2.12. There are no thresholds for group U occupancies and group U is specifically excluded from the requirements of 903.2.1. Additionally, the building does exceed the 7,500 gross square foot threshold per MGCL c. 146, s. 26G.

Portable Fire Extinguishers shall be provided per Sections 906.1 and 906.3.1 for Class A fire hazards. No spaces exceed the tabular values of Table 906.3(1) for Light (Low) Hazard Occupancy, and therefore one fire extinguisher will be provided for each segregated space.

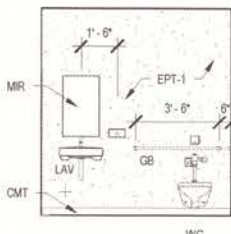
Emergency Power & Lighting

Emergency Power shall be provided by an on-site generator and in accordance with Chapter 27 to provide the illumination levels set forth in Section 1006.3 and 1006.4. Refer to Electrical drawings for additional information related to generator and egress lighting.

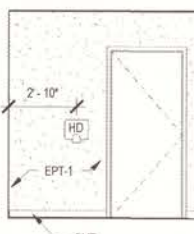
D12 INTERIOR ELEVATION - TOILET 4001, WEST
1/4" = 1'-0"



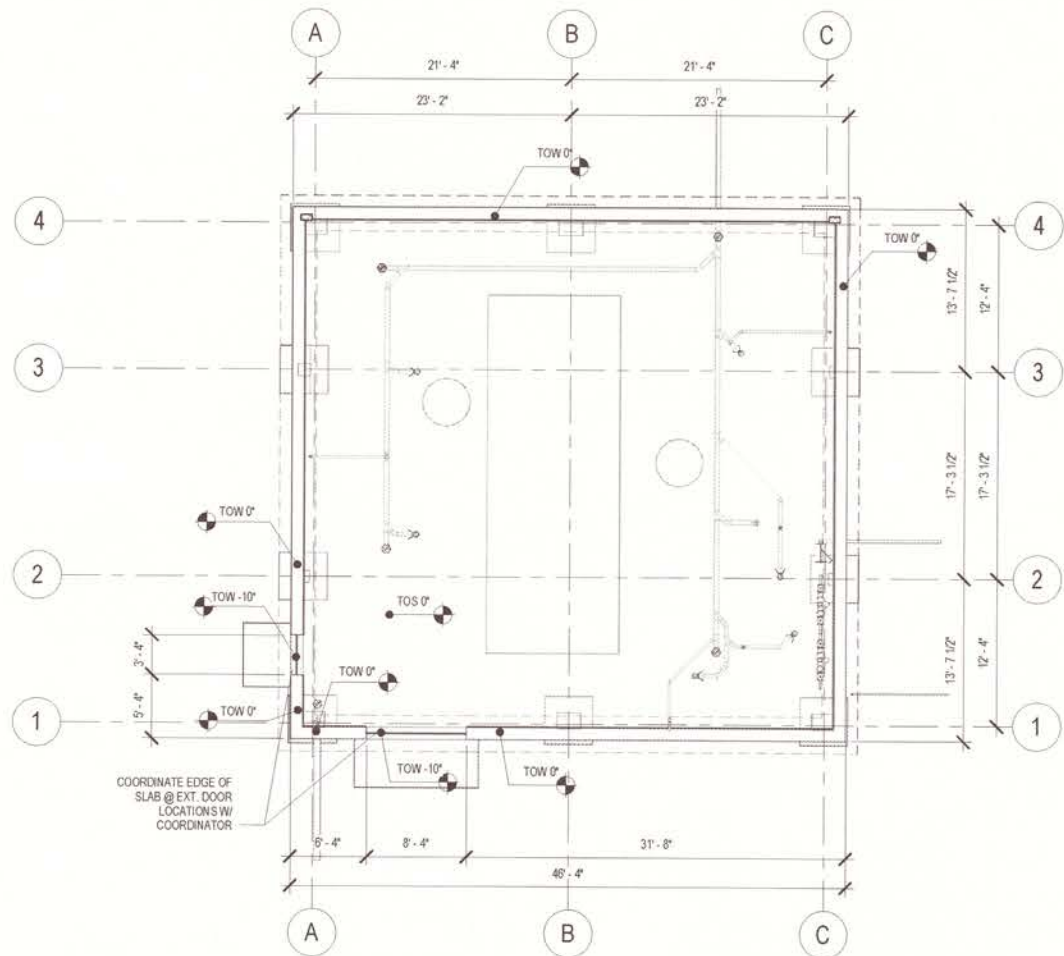
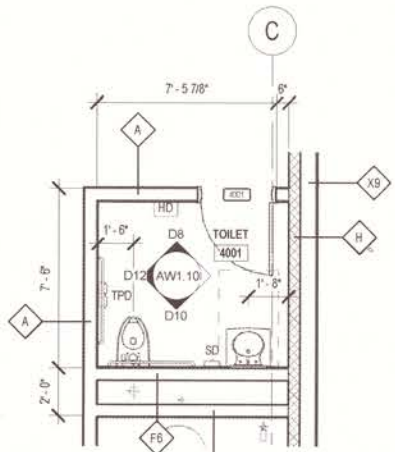
D10 INTERIOR ELEVATION - TOILET 4001, SOUTH
1/4" = 1'-0"



D8 INTERIOR ELEVATION - TOILET 4001, NORTH
1/4" = 1'-0"



D6 ENLARGED TOILET ROOM - 4001
1/4" = 1'-0"

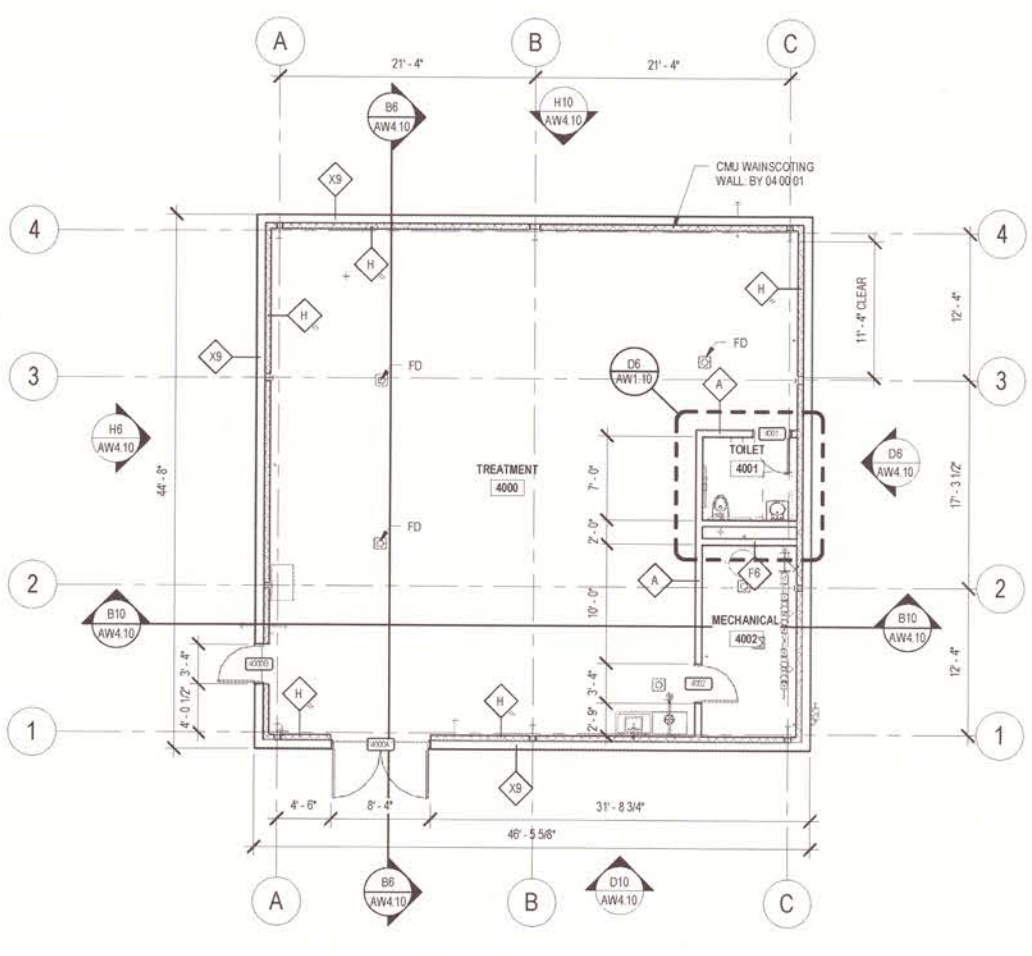


A12 WWTP HORIZONTAL CONTROL PLAN
1/8" = 1'-0"

HORIZONTAL CONTROL PLAN
GENERAL NOTES

1. THIS DRAWING IS PROVIDED AS A COMPOSITE LOCATION AND CONTROL PLAN FOR ALL FOUNDATION WALLS AND STRUCTURAL FLOOR SLABS INCLUDING BUT NOT LIMITED TO FACE OF FOUNDATION WALL LOCATIONS, EDGE OF SLAB LOCATIONS, TOP OF WALL ELEVATIONS, TOP OF BRICK SHELVE ELEVATIONS, STEPS IN TOP OF WALL OR BRICK SHELVE, GENERAL LOCATION OF UTILITIES, PASSING THROUGH THE FOUNDATION WALLS, AND DATUM FLOOR ELEVATIONS, AND DERESSED SLAB ELEVATIONS.
2. REFER TO STRUCTURAL DRAWINGS FOR ACTUAL WALL AND SLAB THICKNESS, REINFORCING, FOOTING ELEVATIONS, BASEPLATE ELEVATIONS, AND ADDITIONAL FOUNDATION AND FLOOR SLAB DETAILS.
3. REFER TO PLUMBING, ELECTRICAL, AND CIVIL DRAWINGS FOR COORDINATION OF UTILITY SLEEVES, INVERTS, AND ANY UNDERSLAB SERVICES OR UTILITIES.
4. DATUM FLOOR ELEVATIONS INDICATED ARE TO THE TOP OF SLAB. REFER TO STRUCTURAL DRAWINGS FOR REQUIRED SLAB THICKNESS AND REINFORCING.
5. FINISHED FLOOR ELEVATIONS INDICATED ARE TO THE FINISHED FLOOR. CONTRACTOR SHALL COORDINATE MINOR VARIATIONS IN SLAB DEPTH, IF REQUIRED, TO ACCOMMODATE DIFFERENT FINISHES.
6. ALL ELEVATIONS ON ARCHITECTURAL SHEETS ARE REFERENCED FROM LEVEL 1, WHICH HAS THE PROJECT ELEVATION OF 0'-0". COORDINATION WITH CIVIL, LANDSCAPE, STRUCTURAL, OR OTHER DESIGN DISCIPLINES SHALL ASSUME THAT ARCHITECTURAL ELEVATION OF 0'-0" EQUALS STRUCTURAL ELEVATION 180.0' AS REFERENCED FROM THE PROJECT SURVEY. ARCHITECTURAL ELEVATION 0'-0" IS INTENDED TO MATCH THE EXISTING MIDDLE SCHOOL LEVEL TYPE. THE CONTRACTOR SHALL VERIFY ALL FLOOR ELEVATION TRANSITIONS FROM NEW FLOORS TO EXISTING SLABS TO VERIFY FLUSH AND LEVEL FINISH CONDITIONS.
7. DERESSED SLAB ELEVATIONS INDICATED ARE TO THE TOP OF SLAB. REFER TO STRUCTURAL DRAWINGS FOR REQUIRED SLAB THICKNESS & REINFORCING.
8. FOR PLAN AREAS A, B, C, AND D, TOP EDGE OF ELEVATED SLAB DIMENSION SHALL BE 0" UNLESS OTHERWISE NOTED.
9. ALL STEEL COLUMNS AND FRAMING IN TYPE IIA CONSTRUCTION SHALL BE UNPAINTED TO RECEIVE CONCRETE SPRAY APPLIED FIRE PROOFING UNLESS NOTED OTHERWISE. REFER TO CODE PLANS FOR EXTENT OF TYPE IIA CONSTRUCTION & REQUIRED FIRE PROTECTION RATING.

A6 WWTP LEVEL 1
1/8" = 1'-0"



PLAN GENERAL NOTES

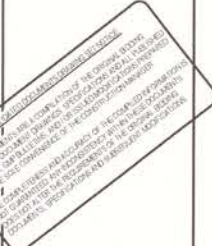
1. ALL INTERIOR BLOCK PARTITIONS ARE TYPE "B", UNLESS NOTED OTHERWISE.
2. WHERE DOORS, WINDOWS, BORROWED LITES, GRILLES, OR OPENINGS OCCUR IT SHALL BE ASSUMED THAT THE WALL CONSTRUCTOR IS THE SAME ABOVE AS ADJACENT, UNLESS NOTED OTHERWISE.
3. WHERE COLUMN LINES ARE SHOWN INSIDE WALLS AND PARALLEL TO THE WALL, IT SHALL BE ASSUMED THAT THE WALL IS CENTERED ON THE COLUMN LINE UNLESS DIMENSIONED OTHERWISE.
4. WHERE ENLARGED PLANS ARE INDICATED, REFER TO ENLARGED PLAN SHEET FOR DIMENSIONS, WALL TYPES, AND DETAIL REFERENCES.
5. REFER TO HORIZONTAL CONTROL PLANS AND STRUCTURAL DRAWINGS FOR SLAB INFORMATION INCLUDING DEPRESSIONS, EDGE DIMENSIONS, AND SHAFT OPENINGS.
6. CONTRACTOR SHALL VERIFY ALL DIMENSIONS OF EXISTING CONDITIONS IN THE FIELD.



THIS SHEET INDICATES WORK ASSOCIATED WITH
ADD ALTERNATE #1. REFER TO PROJECT MANUAL
FOR ADDITIONAL INFORMATION REGARDING
ALTERNATES AND BASE BID CONDITIONS.

NORTH READING MIDDLE-HIGH SCHOOL

19 SHERMAN ROAD
NORTH READING, MA 01864

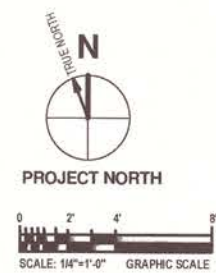


CONSOLIDATED SET

REVISION:	Date:

SHEET TITLE
HORIZONTAL
CONTROL &
FLOOR-WWTP
LEVEL 1

SHEET #
AW1.10



1. **STANDARDIZATION OF THE DATA**

2. **ANALYSIS OF THE DATA**

3. **INTERPRETATION OF THE DATA**

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231. **APPENDICES**

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234. **NOTES**

235. **FOOTNOTES**

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237. **REFERENCES**

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242. **FOOTNOTES**

243. **ENDNOTES**

244. **REFERENCES**

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247. **ACKNOWLEDGMENTS**

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249. **FOOTNOTES**

250. **ENDNOTES**

251. **REFERENCES**

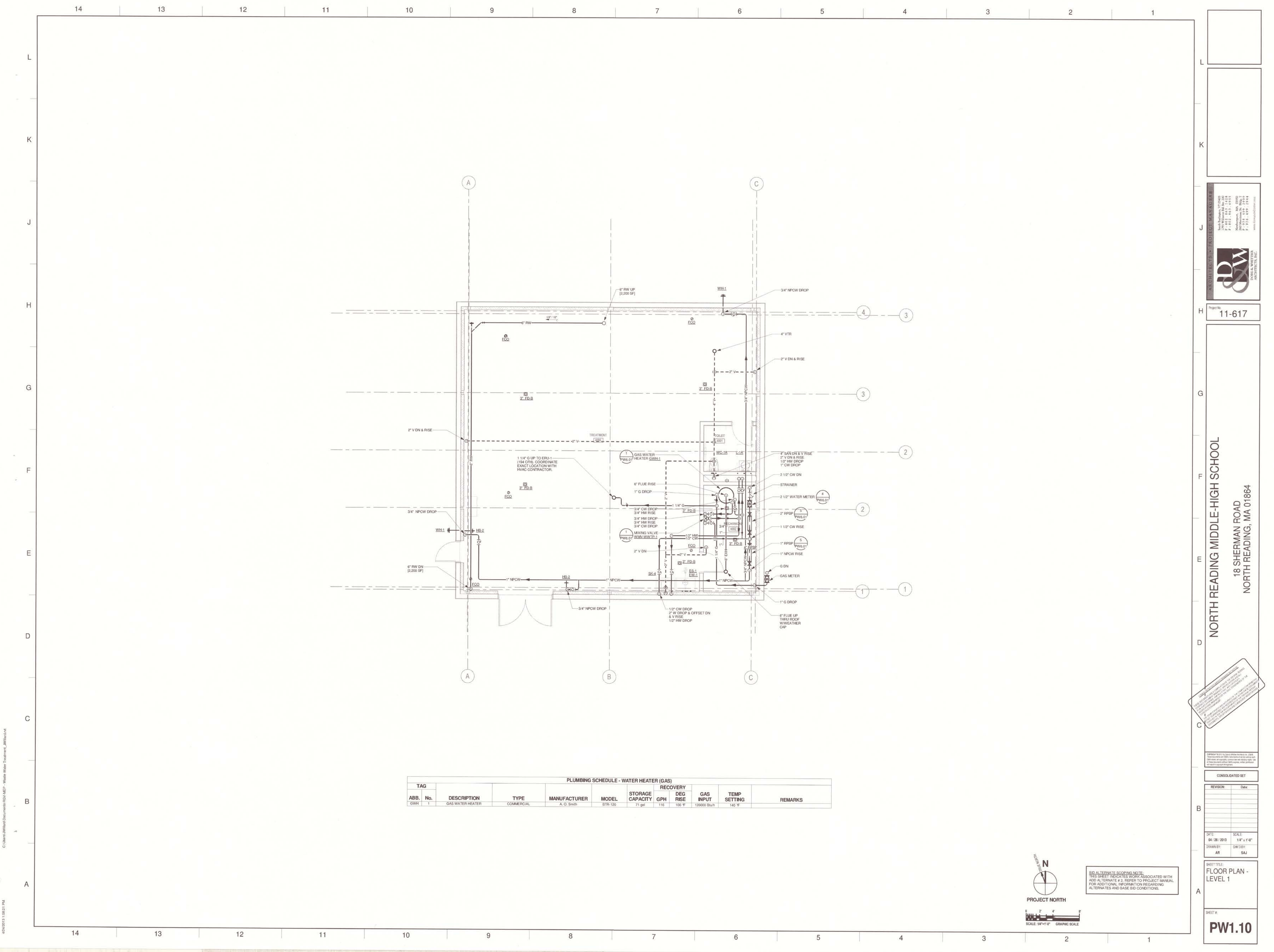
252. **APPENDICES**

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SHEET TITLE:
**UNDERGROUND
PLAN**

SHEET #:

PW1.0U



PLUMBING SCHEDULE - WATER HEATER (GAS)										
TAG		DESCRIPTION	TYPE	MANUFACTURER	MODEL	STORAGE CAPACITY	RECOVERY		GAS INPUT	TEMP SETTING
ABB.	No.						GPH	DEG RISE		
GWH	1	GAS WATER HEATER	COMMERCIAL	A. O. Smith	BTR-120	71 gal	116	100 °F	120000 Btu/h	140 °F



BID ALTERNATE SCOPING NOTE:
THIS SHEET INDICATES WORK ASSOCIATED WITH
ADD ALTERNATE # 2. REFER TO PROJECT MANUAL
FOR ADDITIONAL INFORMATION REGARDING
ALTERNATES AND BASE BID CONDITIONS.

PROJECT MANAGERS
David R. Sullivan, P.E.
P. 978.265.1428
F. 978.265.1428
www.drsullivan.com

DW
DANIEL W. WATSON
ARCHITECTS, INC.
200 Main Street, Suite 200
North Reading, MA 01864
P. 978.499.2444
www.danieldw.com

Project No. **11-617**

NORTH READING MIDDLE-HIGH SCHOOL
18 SHERMAN ROAD
NORTH READING, MA 01864

CONSOLIDATED SET

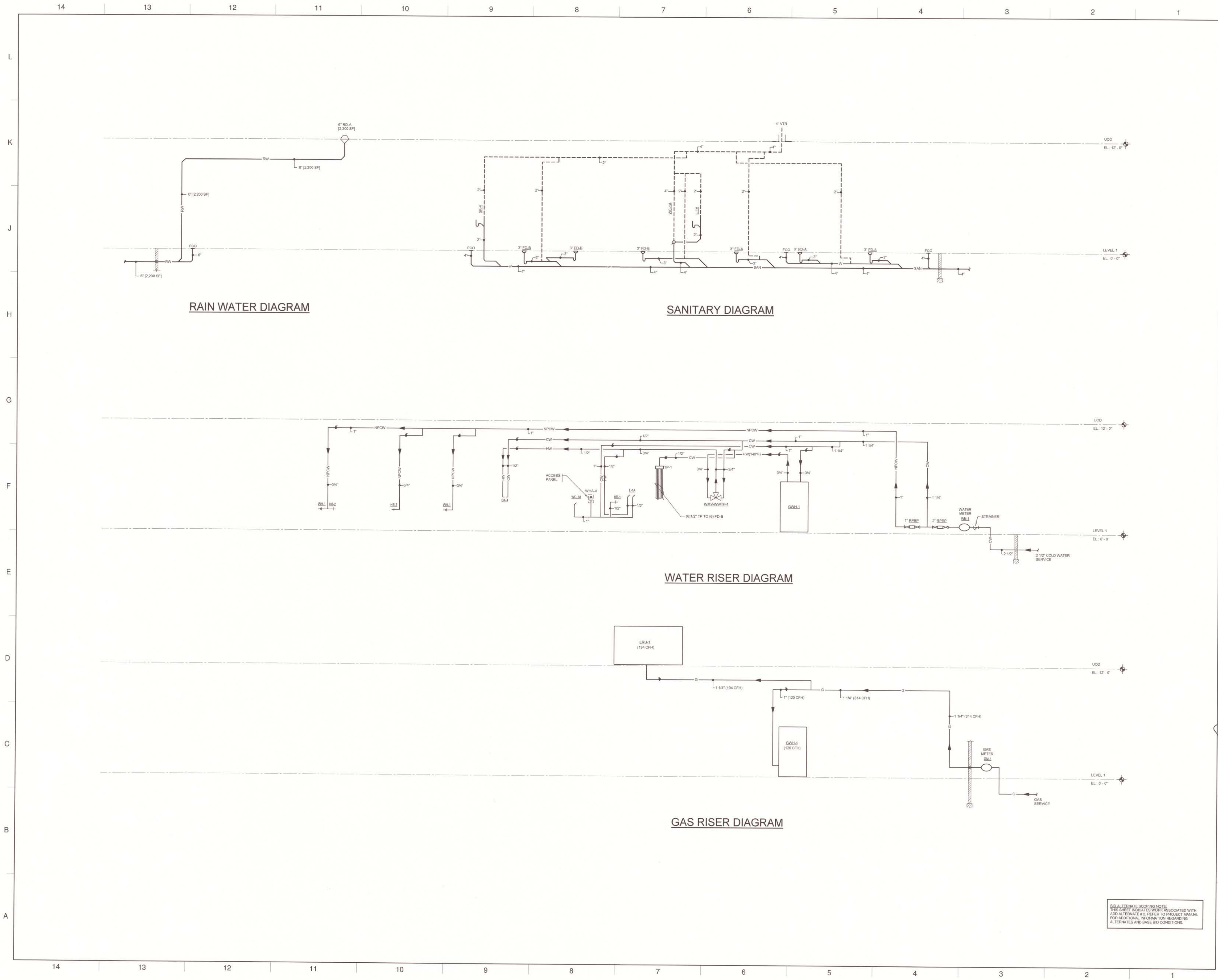
REVISOR:	Date:

DATE: 04/26/2013 SCALE: 1/4" = 1'-0"

DRAWN BY: AR CHECKED BY: SAJ

SHEET TITLE: **FLOOR PLAN - LEVEL 1**

SHEET #: **PW1.10**



RAIN WATER DIAGRAM

SANITARY DIAGRAM

WATER RISER DIAGRAM

GAS RISER DIAGRAM

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ADD ALTERNATE #2. REFER TO PROJECT MANUAL
FOR ADDITIONAL INFORMATION REGARDING
ALTERNATES AND BASE BID CONDITIONS.

PROJECT MANAGER
1000 North Reading Road
North Reading, MA 01864
P: 978.335.1555
F: 978.335.1555
WWW.DWARCHITECTS.COM

ARCHITECTS, INC.

Project No.
11-617

NORTH READING MIDDLE-HIGH SCHOOL

18 SHERMAN ROAD

NORTH READING, MA 01864

CONSOLIDATED SET

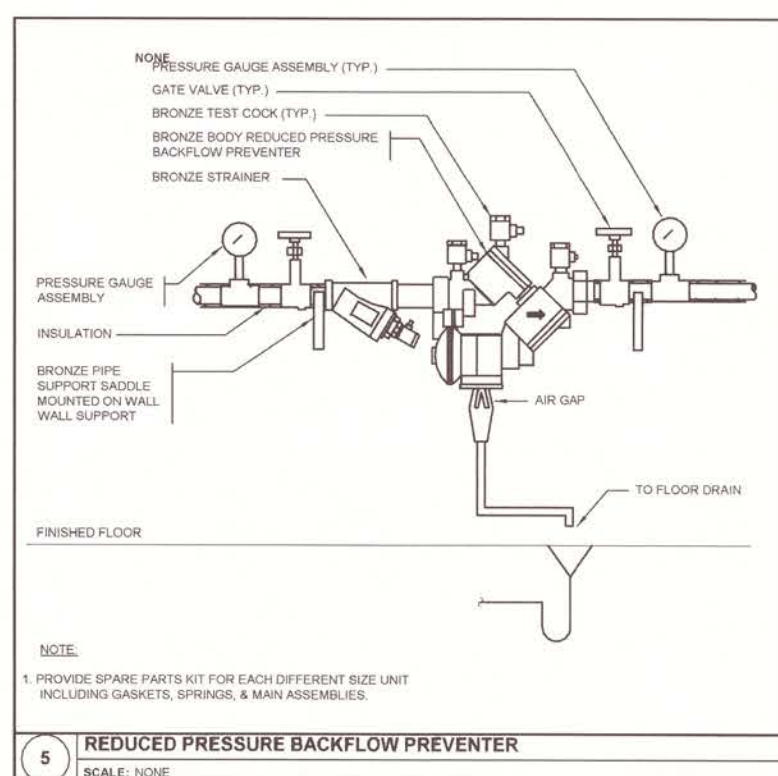
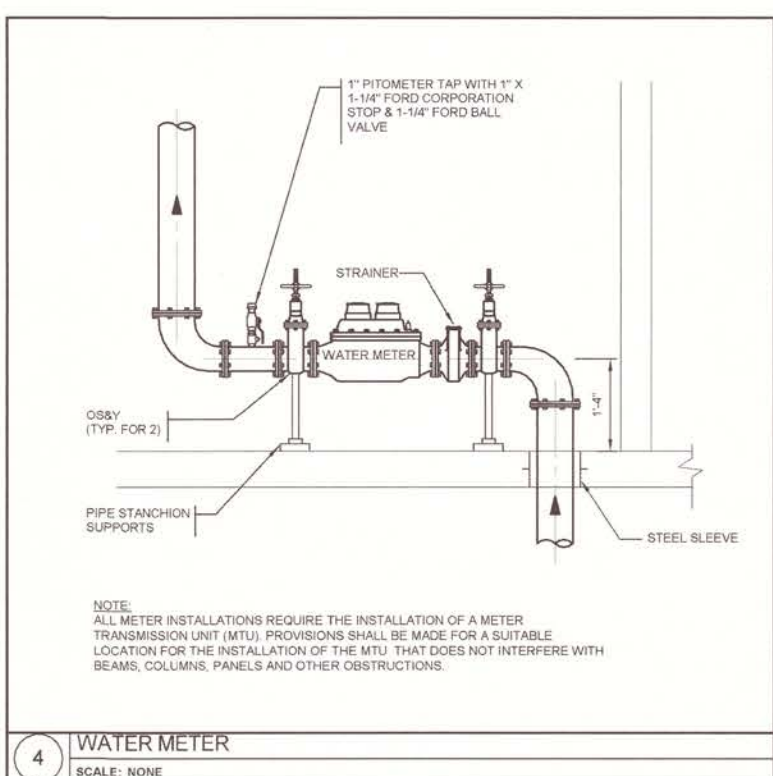
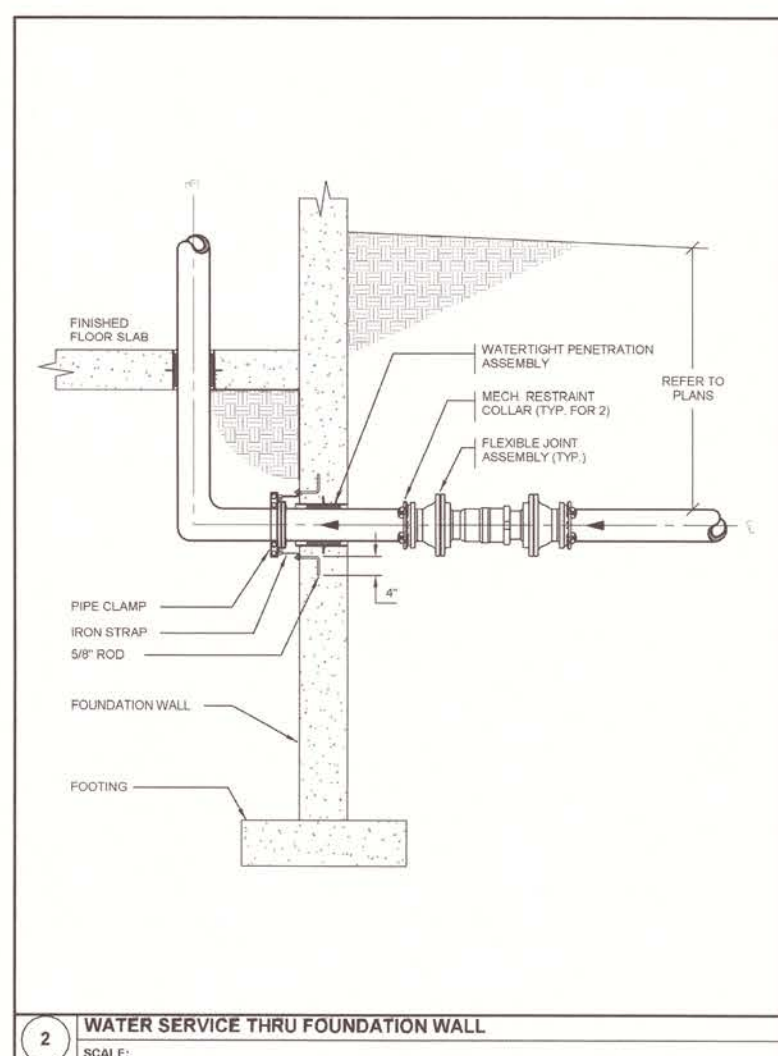
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DATE: 04 / 26 / 2013 SCALE: NTS

DRAWN BY: Author CHECKED BY: Checker

SHEET TITLE:
**RISER
DIAGRAMS**

SHEET #:
PW2.0



ARCHITECTS • PROJECT MANAGERS

South Norwalk, VT 05403
1795 Williams Rd. Ste. 200
P: 802.863.1426
F: 802.863.6955

Newport, RI 01890
260 Merriam St. Bldg. 7
P: 978.499.2944
F: 978.499.2949

www.dorlandwhitner.com

DW

**DORLAND & WHITTNER
ARCHITECTS, INC.**

Project No. 11-617

NORTH READING MIDDLE-HIGH SCHOOL
18 SHERMAN ROAD
NORTH READING, MA 01864

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DATE:	SCALE:
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Author	Checker

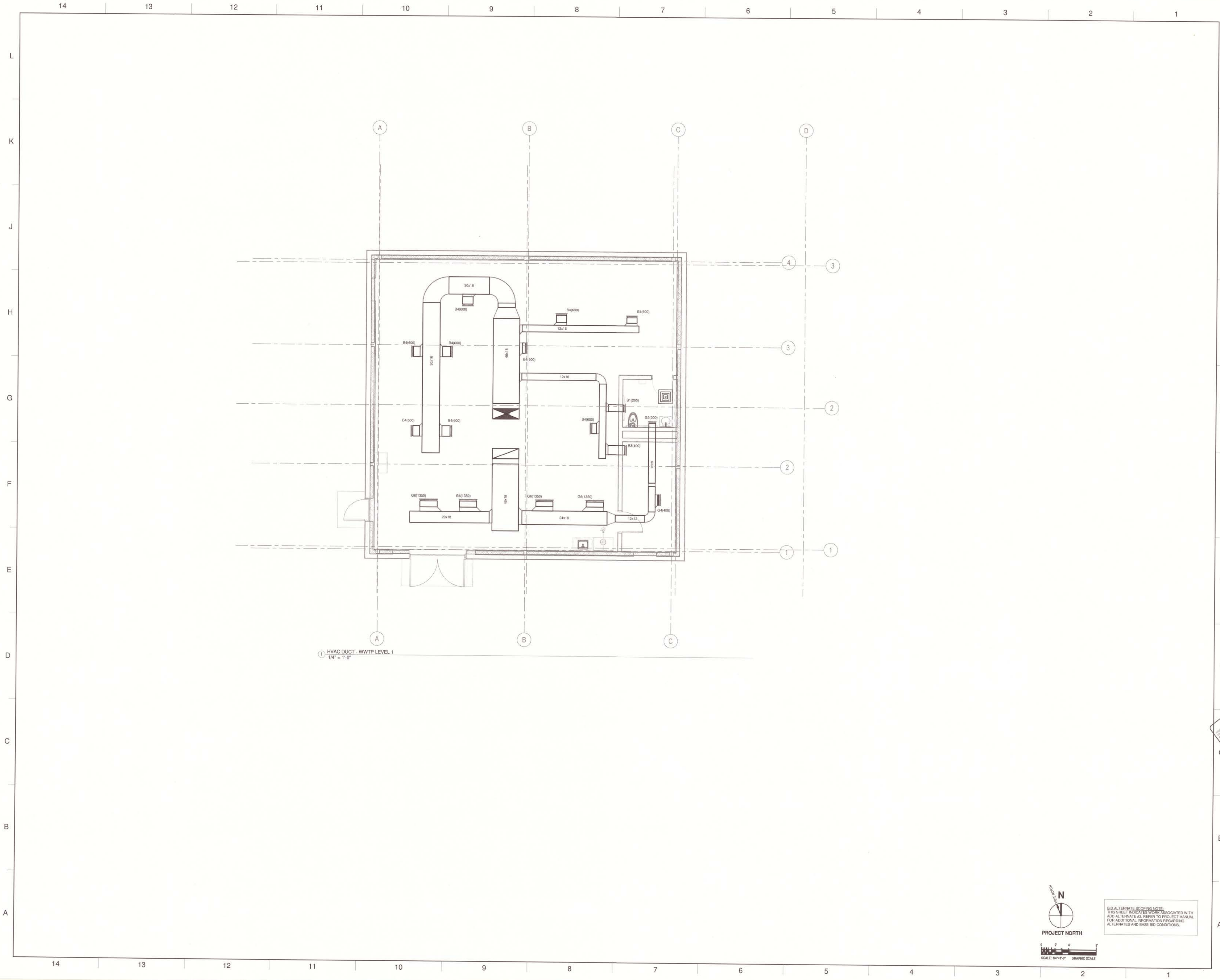
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DETAILS

SHEET #:


PW3.0

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NORTH READING MIDDLE-HIGH SCHOOL

18 SHERMAN ROAD

NORTH READING, MA 01864

CONSOLIDATED SET

REVISION: Date:

DATE: 04/26/2013 SCALE: 1/4" = 1'-0"

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SHEET TITLE:

HVAC FLOOR

PLAN LEVEL 1

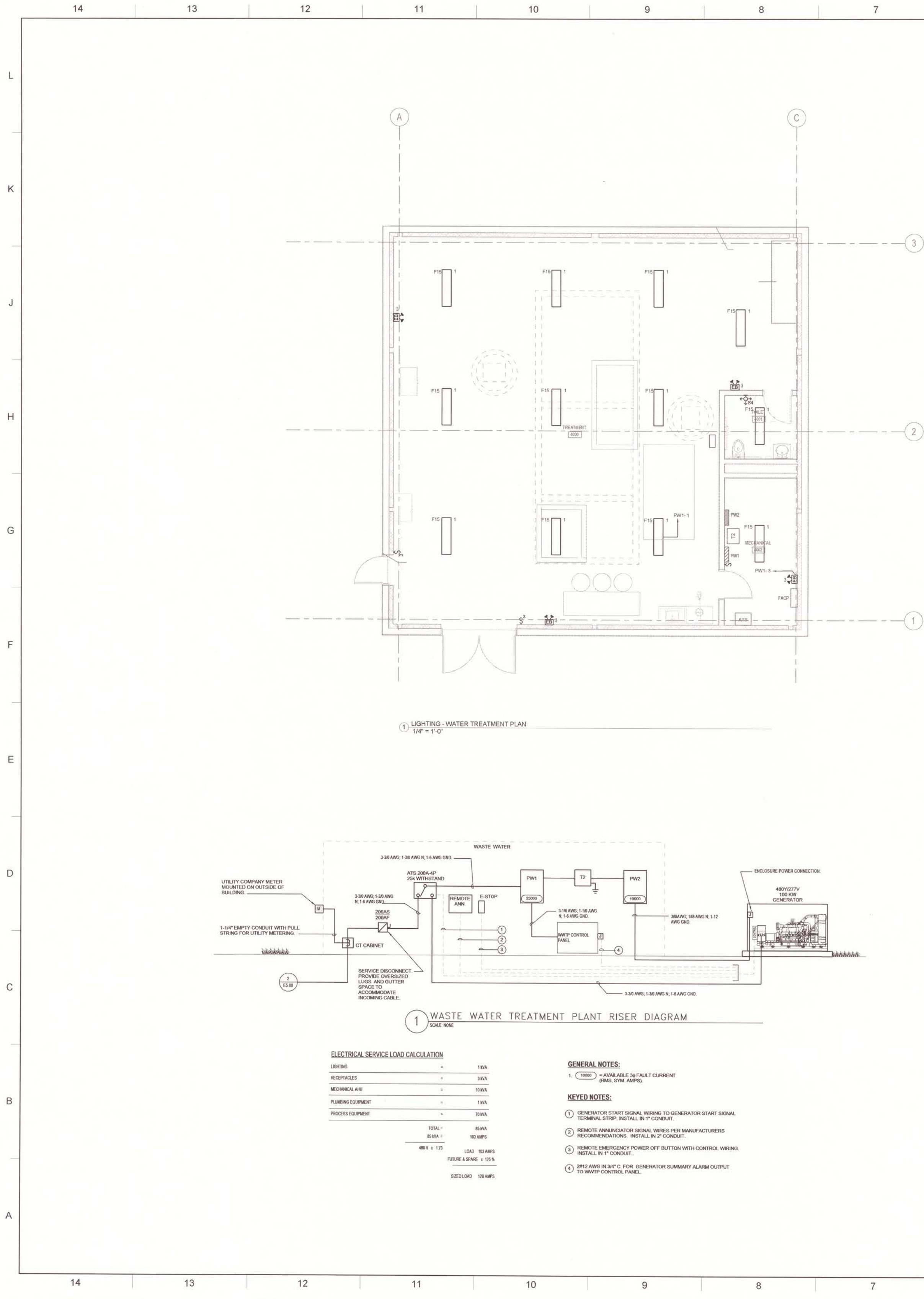
SHEET #:

HW1.10



1. 100% OUTSIDE AIR AND 100% EXHAUST ENERGY RECOVERY UNIT.
2. PROVIDE WITHOUT COOLING COIL.
3. PROVIDE WITH ENTHALPY ENERGY RECOVERY WHEEL.
4. PROVIDE WITH NATURAL GAS FIRED INDIRECT FURNACE FOR HEATING WITH 4:1 MODULATING TURNDOWN.
5. PROVIDE WITH 4" ROOF CURB.
6. PROVIDE WITH MOTOR CONTROL CENTER AND MOTOR STARTERS FOR FANS AND ENERGY RECOVERY WHEELS.
7. PROVIDE WITH 4" MOTOR CONTROL CENTER FOR CHILLER, COILS, AND CONTROLLER. CONTROLLER SHALL BE PROVIDED WITH REQUIRED SENSORS AND PROGRAMMING FOR ENERGY RECOVERY UNIT. CONTROLLER SHALL BE FACTORY PROGRAMMED, MOUNTED AND TESTED. CONTROLLER SHALL HAVE LCD READOUT FOR CHANGING SETPOINTS AND MONITORING UNIT OPERATION.

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ELECTRICAL SHEET NOTES - LIGHTING

- FOR ELECTRICAL LEGEND AND GENERAL NOTES REFER TO DRAWING E01.
- FOR LIGHTING FIXTURE SCHEDULE REFER TO DRAWING E02.
- FOR EXACT LOCATION, QUANTITIES AND MOUNTING HEIGHTS OF ALL LIGHTING FIXTURES REFER TO ARCHITECT'S REFLECTED CEILING PLANS AND ELEVATIONS.
- PROVIDE METAL BARRIERS IN ALL MULTI-GANG SWITCH LOCATIONS.
- ALL EXIT SIGNS SHALL BE CONNECTED TO A CONSTANT, UNSWITCHED SOURCE ON THE EMERGENCY BRANCH.
- CIRCUIT NUMBERS ARE FOR DESCRIPTIVE PURPOSES ONLY. EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD.
- ALL OCCUPANCY SENSOR LOCATIONS ARE APPROXIMATE. REFER TO MANUFACTURERS' INSTALLATION INSTRUCTIONS PRIOR TO INSTALLATION.
- ULTRASONIC CEILING MOUNT SENSORS SHALL BE LOCATED A MINIMUM OF SIX FEET FROM HVAC SUPPLY RETURN VENTS.
- CONTRACTOR IS RESPONSIBLE FOR OCCUPANCY SENSOR PROPER SENSITIVITY AND TIME DELAY SETTINGS (FOR NON-ADAPTIVE PRODUCTS) RECOMMENDED PLACEMENT AND FIELD VERIFICATION OF CIRCUITS WITHIN RESPECT TO POWER PLACEMENT. OCCUPANCY SENSORS MOUNTED OVER THE DOOR MUST BE PLACED ONE FOOT INSIDE THE THRESHOLD.
- OCCUPANCY SENSORS MOUNTED OVER THE DOOR MUST BE PLACED ONE FOOT INSIDE THE THRESHOLD.
- FOR LIGHTING IN MECHANICAL ROOMS AND BACK OF HOUSE AREAS PROVIDE LIGHTING EQUIPMENT THAT REQUIRES SPACE FOR FILTERS. ECT MOUNT LIGHTING AT 8'-0" MAXIMUM UNLESS DUCTWORK AND PIPING CANNOT BE AVOIDED WHERE A FIXTURE IS NEEDED. IN THIS INSTANCE, RAISE OR LOWER THE FIXTURES AS REQUIRED, (NOT LESS THAN 7'-0"). LIGHTING IN THE MECHANICAL SHALL BE SUPPLEMENTED BY CHAIN ALLOW 21 OF SLACK CHAIN AND FEEDER AT EACH FIXTURE FROM DUCT OF PIPING. PROVIDE UNSTRUT BELOW DUCTS WHERE FIXTURE LOCATIONS COINCIDE WITH DUCT RUNS. PROVIDE THREADED RODS FROM STRUCTURAL MEMBERS TO SUPPORT UNSTRUT.

PANEL: PW1

SUPPLY FROM:

BUS AMPS: 225

MAIN: 200

MOUNTING: Surface

ST MAIN:

SUB-FEED LUGS:

FEED-THRU LUGS:

DISTRIBUTION: 480Y/277V

A.I.C. RATING: SEE RISER DIAGRAM

IG GND:

NEUTRAL:

CKT	TYPE	DESCRIPTION	BKR TYPE	TRIP	POLE	A (VIA)	B (VIA)	C (VIA)	POLE	TRIP	BKR TYPE	DESCRIPTION	TYPE	CKT
1	L	LIGHTING	20	1	0.36	1.14			3	30		PANEL PW2 VIA 12 XMR	R	2
3	L	UNSWITCHED LIGHTING	20	1		0	1.14							4
5	M	CONTROL PANEL	150	3				22.17	0.72					6
7						22.17	16.63		3	60		ERU-1	M	8
9								16.63						10
11														12
13														14
15														16
17														18
19														20
21														22
23														24
25														26
27														28
29														30
31														32
33														34
35														36
37														38
39														40
41														42
PHASE LOAD:						40.29	39.93	39.51						
PHASE AMPS:						145.7	144.4	142.65						
PANEL TOTALS														
LOAD TYPE CONNECTED			DEMAND/ADJUSTED			LOAD TYPE KEY			BREAKER TYPE KEY					
M			116.38			R = RECEPTACLE			BLANK = STANDARD			CONNECTED LOAD (VIA): 116.38		
L			0.36			L = LIGHTING			G = GROUND FAULT 30 Ma (EQUIP)			DEMAND LOAD (VIA): 119.74		
						M = MECH/EQUIP			G = GROUND FAULT 5 Ma (PERSONNEL)			CONNECTED AMPS: 144.03		
						K = KITCHEN			I = ARC FAULT			DEMAND AMPS: 144.03		
						C = CONDUIT/INS			S = SLENT TRIP					
						N = NONCONDUCTIOUS			LH = LOOKING HASP					
Notes:														

PANEL: PW2

SUPPLY FROM: T3

BUS AMPS: 100

MAIN: 60

MOUNTING: Surface

ST MAIN:

SUB-FEED LUGS:

FEED-THRU LUGS:

DISTRIBUTION: 208Y/120

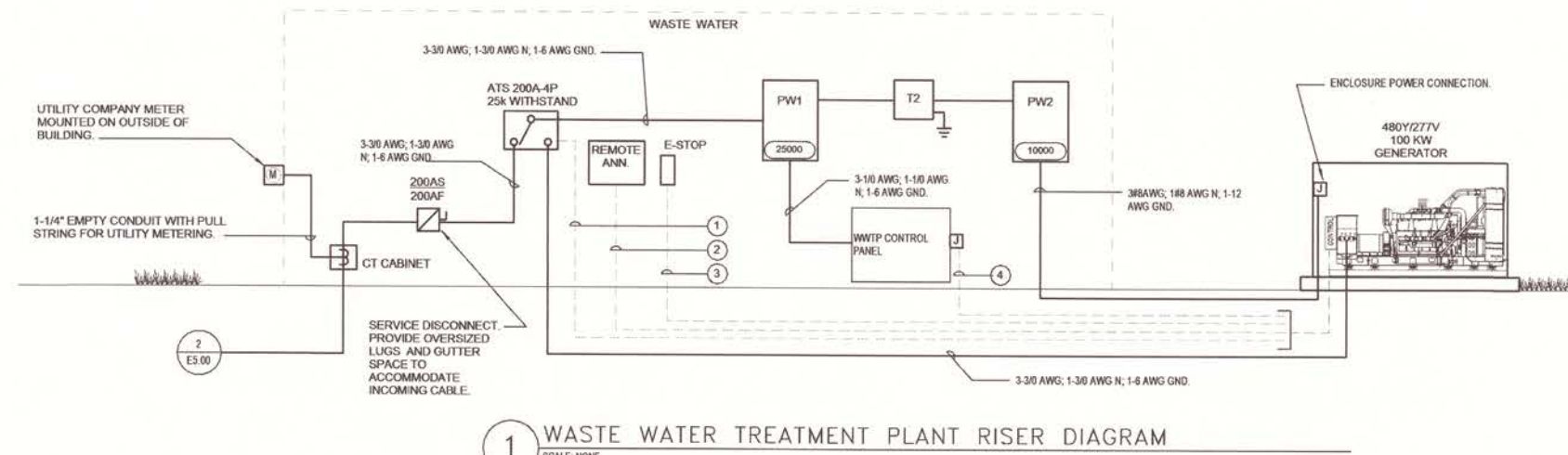
A.I.C. RATING: SEE RISER DIAGRAM

IS GND:

NEUTRAL:

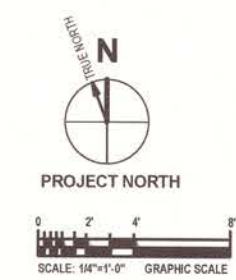
CKT	TYPE	DESCRIPTION	BKR TYPE	TRIP	POLE	A (VIA)	B (VIA)	C (VIA)	POLE	TRIP	BKR TYPE	TYPE	CKT
1	R	RECEPTACLES	20	1	0.36	0.36			1	20	RECEPTACLES	R	2
3	R	RECEPTACLES	20	1		0.36	0.36		1	20	RECEPTACLES	R	4
5	R	RECEPTACLES	20	1			0.36	0.18	1	20	RECEPTACLE	R	6
7	R	RECEPTACLE	20	1	0.18	0.24			1	20	OVH-1	R	8
9	R	ERU-1 RECEPTACLES	20	1		0.18	0.24		1	20	FACP	R	10
11	R	ERU-1 LIGHTING	20	1				0.18					12
13													14
15													16
17													18
19													20
21													22
23													24
25													26
27													28
29													30
31													32
33													34
35													36
37													38
39													40
41													42
PHASE LOAD:						1.14	1.14	0.72					
PHASE AMPS:						10.04	10.04	6					
PANEL TOTALS													
LOAD TYPE CONNECTED						DEMAND/ADJUSTED							
R						3			CONNECTED LOAD (VIA): 3				
									DEMAND LOAD (VIA): 3				
									CONNECTED AMPS: 8.33				
									DEMAND AMPS: 8.33				

Notes:



ELECTRICAL SERVICE LOAD CALCULATION	
LIGHTING	= 1 V/A
RECEPTACLES	= 3 V/A
MECHANICAL AHU	= 10 V/A
PLUMBING EQUIPMENT	= 1 V/A
PROCESS EQUIPMENT	= 70 V/A
TOTAL	= 85 V/A
85 V/A x 1.75	LOAD 150 AMPS
FUTURE & SPARE	= 15% = 22.5 AMPS
SIZED LOAD	172.5 AMPS

- GENERAL NOTES:**
- 10000 = AVAILABLE 30 FAULT CURRENT (848, 574M AMPS)
- KEYED NOTES:**
- GENERATOR START SIGNAL WIRING TO GENERATOR START SIGNAL TERMINAL STRIP. INSTALL IN 1\"
 - REMOTE ANNUNCIATOR SIGNAL WIRES PER MANUFACTURERS RECOMMENDATIONS. INSTALL IN 2\"
 - REMOTE EMERGENCY POWER OFF BUTTON WITH CONTROL WIRING. INSTALL IN 1\"
 - 2#12 AWG IN 3/4\" C. FOR GENERATOR SUMMARY ALARM OUTPUT TO WWTP CONTROL PANEL.



BID ALTERNATE SCORING NOTE:
THIS SHEET INDICATES WORK ASSOCIATED WITH ADD ALTERNATE #2. REFER TO PROJECT MANUAL FOR ADDITIONAL INFORMATION REGARDING ALTERNATES AND BASE BID CONDITIONS.

North Reading, VT 02459
1000 William St., Ste. 200
North Reading, MA 01864
P: 978.332.4851 F: 978.332.4855
www.doherty-architects.com

DOHERTY ARCHITECTS, INC.

Project No: **11-617**

NORTH READING MIDDLE-HIGH SCHOOL
18 SHERMAN ROAD
NORTH READING, MA 01864

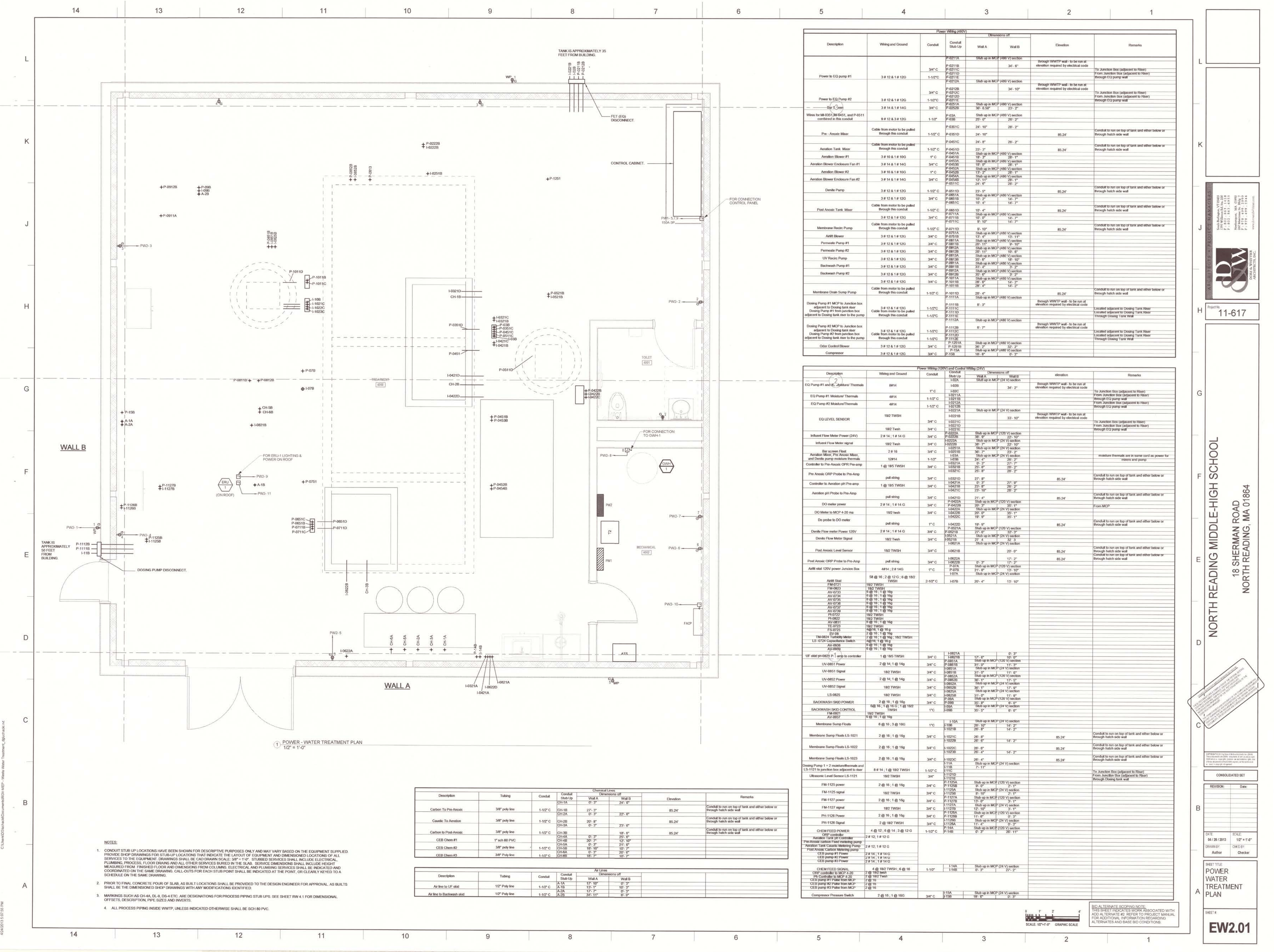
CONSOLIDATED SET

REVISION	Date

DATE: 04/26/2013 SCALE: As Indicated
DRAWN BY: Author CHK'D BY: Checker

SHEET TITLE: **LIGHTING WATER TREATMENT PLAN**

SHEET # **EW1.01**



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- NOTES:
- CONDUIT STUB UP LOCATIONS HAVE BEEN SHOWN FOR DESCRIPTIVE PURPOSES ONLY AND MAY VARY BASED ON THE EQUIPMENT SUPPLIED. PROVIDE SHOP DRAWINGS FOR STUB-UP LOCATIONS THAT INDICATE THE LOCATION OF EQUIPMENT AND DIMENSIONED LOCATIONS OF ALL SERVICES TO THE EQUIPMENT. DRAWINGS SHALL BE ON DRAWING SCALE 3/8" = 1'-0". STUBBED SERVICES SHALL INCLUDE ELECTRICAL, PLUMBING, PROCESS, FLOOR DRAINAGE AND ALL OTHER SERVICES BURIED IN THE SLAB. SERVICE DIMENSIONS SHALL INCLUDE HEIGHT MEASURED FROM FINISHED FLOOR AND DIMENSIONS FROM COLUMNS. ELECTRICAL AND PLUMBING SERVICES SHALL BE INDICATED AND COORDINATED ON THE SAME DRAWING. CALL-OUTS FOR EACH STUB POINT SHALL BE INDICATED AT THE POINT, OR CLEARLY KEYED TO A SCHEDULE ON THE SAME DRAWING.
 - PRIOR TO FINAL CONCRETE POUR OF SLAB, AS BUILT LOCATIONS SHALL BE PROVIDED TO THE DESIGN ENGINEER FOR APPROVAL. AS BUILT SHALL BE THE DIMENSIONED SHOP DRAWINGS WITH ANY MODIFICATIONS IDENTIFIED.
 - MARKINGS SUCH AS CH-4A, DL-6, D5-4 ETC. ARE DESIGNATIONS FOR PROCESS PIPING STUB UPS. SEE SHEET RW 4.1 FOR DIMENSIONAL OFFSETS, DESCRIPTION, PIPE SIZES AND INVERTS.
 - ALL PROCESS PIPING INSIDE WWTP, UNLESS INDICATED OTHERWISE, SHALL BE SCH 80 PVC.

Description	Tubing	Conduit	Chemical Lines		Elevation	Remarks
			Conduit Stub Up	Dimensions off		
Carbon To Pre-Anoxic	3/8" poly line	1-1/2" C	CH-1B	27'-3"	24'-6"	Conduit to run on top of tank and either below or through hatch side wall
			CH-2A	27'-3"	22'-6"	
			CH-3A	20'-8"	23'-6"	
Carbon To Post-Anoxic	3/8" poly line	1-1/2" C	CH-3B	0'-3"	18'-8"	Conduit to run on top of tank and either below or through hatch side wall
			CH-4A	0'-3"	25'-6"	
			CH-4B	20'-3"	12'-10"	
CEB Chem #1	1" sch 80 PVC	1-1/2" C	CH-5A	0'-3"	21'-6"	Conduit to run on top of tank and either below or through hatch side wall
CEB Chem #2	3/8" poly line	1-1/2" C	CH-5B	18'-10"	10'-7"	
CEB Chem #3	3/8" Poly line	1-1/2" C	CH-6B	18'-2"	10'-7"	

Description	Tubing	Conduit	Air Lines		Elevation	Remarks
			Conduit Stub Up	Dimensions off		
Air line to UF skid	1/2" Poly line	1-1/2" C	A-1A	17'-10"	0'-3"	
			A-1B	15'-2"	10'-3"	
			A-2A	17'-3"	0'-3"	
Air line to Backwash skid	1/2" Poly line	1-1/2" C	A-2B	24'-11"	0'-3"	

Description	Wiring and Ground	Conduit	Dimensions off		Elevation	Remarks
			Conduit Stub Up	Wall A	Wall B	
Power to EQ Pump #1	3 # 12 & 1 # 12G	1-1/2" C	P-0211A	Stub up in MCP (180 V) section	34'-6"	through WWTP wall - to be run at elevation required by electrical code
			P-0211B	Stub up in MCP (180 V) section	34'-6"	
			P-0211C	Stub up in MCP (180 V) section	34'-6"	
			P-0212A	Stub up in MCP (180 V) section	34'-6"	
Power to EQ Pump #2	3 # 12 & 1 # 12G	1-1/2" C	P-0212B	Stub up in MCP (180 V) section	34'-10"	through WWTP wall - to be run at elevation required by electrical code
			P-0212C	Stub up in MCP (180 V) section	34'-10"	
			P-0212D	Stub up in MCP (180 V) section	34'-10"	
			P-0212E	Stub up in MCP (180 V) section	34'-10"	
Wees for M-005, M-0451, and P-0511 combined in the conduit	3 # 14 & 1 # 14G	3/4" C	P-0251A	Stub up in MCP (180 V) section	30'-5'-0"	To Junction Box (adjacent to Riser) From Junction Box (adjacent to Riser) through EQ pump wall
			P-0251B	Stub up in MCP (180 V) section	30'-5'-0"	
			P-0251C	Stub up in MCP (180 V) section	30'-5'-0"	
			P-0251D	Stub up in MCP (180 V) section	30'-5'-0"	
Pre-Anoxic Mixer	Cable from motor to be pulled through this conduit	1-1/2" C	P-0351C	Stub up in MCP (180 V) section	28'-2"	Conduit to run on top of tank and either below or through hatch side wall
			P-0351D	Stub up in MCP (180 V) section	28'-2"	
			P-0351E	Stub up in MCP (180 V) section	28'-2"	
			P-0351F	Stub up in MCP (180 V) section	28'-2"	
Aeration Tank Mixer	Cable from motor to be pulled through this conduit	1-1/2" C	P-0451D	Stub up in MCP (180 V) section	28'-2"	Conduit to run on top of tank and either below or through hatch side wall
			P-0451E	Stub up in MCP (180 V) section	28'-2"	
			P-0451F	Stub up in MCP (180 V) section	28'-2"	
			P-0451G	Stub up in MCP (180 V) section	28'-2"	
Aeration Blower Fan #1	3 # 10 & 1 # 10G	1" C	P-0451A	Stub up in MCP (180 V) section	18'-0"	Conduit to run on top of tank and either below or through hatch side wall
			P-0451B	Stub up in MCP (180 V) section	18'-0"	
			P-0451C	Stub up in MCP (180 V) section	18'-0"	
			P-0451D	Stub up in MCP (180 V) section	18'-0"	
Aeration Blower Fan #2	3 # 10 & 1 # 10G	1" C	P-0452A	Stub up in MCP (180 V) section	18'-0"	Conduit to run on top of tank and either below or through hatch side wall
			P-0452B	Stub up in MCP (180 V) section	18'-0"	
			P-0452C	Stub up in MCP (180 V) section	18'-0"	
			P-0452D	Stub up in MCP (180 V) section	18'-0"	
Aeration Blower Fan #3	3 # 14 & 1 # 14G	3/4" C	P-0454B	Stub up in MCP (180 V) section	28'-2"	Conduit to run on top of tank and either below or through hatch side wall
			P-0454C	Stub up in MCP (180 V) section	28'-2"	
			P-0454D	Stub up in MCP (180 V) section	28'-2"	
			P-0454E	Stub up in MCP (180 V) section	28'-2"	
Denite Pump	3 # 12 & 1 # 12G	1-1/2" C	P-0511D	Stub up in MCP (180 V) section	23'-5"	Conduit to run on top of tank and either below or through hatch side wall
			P-0511E	Stub up in MCP (180 V) section	23'-5"	
			P-0511F	Stub up in MCP (180 V) section	23'-5"	
			P-0511G	Stub up in MCP (180 V) section	23'-5"	
Post Anoxic Tank Mixer	Cable from motor to be pulled through this conduit	1-1/2" C	P-0611A	Stub up in MCP (180 V) section	14'-7"	Conduit to run on top of tank and either below or through hatch side wall
			P-0611B	Stub up in MCP (180 V) section	14'-7"	
			P-0611C	Stub up in MCP (180 V) section	14'-7"	
			P-0611D	Stub up in MCP (180 V) section	14'-7"	
Membrane Reactor Pump	Cable from motor to be pulled through this conduit	1-1/2" C	P-0711D	Stub up in MCP (180 V) section	9'-10"	Conduit to run on top of tank and either below or through hatch side wall
			P-0711E	Stub up in MCP (180 V) section	9'-10"	
			P-0711F	Stub up in MCP (180 V) section	9'-10"	
			P-0711G	Stub up in MCP (180 V) section	9'-10"	
Aerit Blower	3 # 12 & 1 # 12G	3/4" C	P-0751A	Stub up in MCP (180 V) section	13'-11"	Conduit to run on top of tank and either below or through hatch side wall
			P-0751B	Stub up in MCP (180 V) section	13'-11"	
			P-0751C	Stub up in MCP (180 V) section	13'-11"	
			P-0751D	Stub up in MCP (180 V) section	13'-11"	
Permeate Pump #1	3 # 12 & 1 # 12G	3/4" C	P-0811A	Stub up in MCP (180 V) section	9'-10"	Conduit to run on top of tank and either below or through hatch side wall
			P-0811B	Stub up in MCP (180 V) section	9'-10"	
			P-0811C	Stub up in MCP (180 V) section	9'-10"	
			P-0811D	Stub up in MCP (180 V) section	9'-10"	
Permeate Pump #2	3 # 12 & 1 # 12G	3/4" C	P-0812A	Stub up in MCP (180 V) section	29'-11"	Conduit to run on top of tank and either below or through hatch side wall
			P-0812B	Stub up in MCP (180 V) section	29'-11"	
			P-0812C	Stub up in MCP (180 V) section	29'-11"	
			P-0812D	Stub up in MCP (180 V) section	29'-11"	
UV Electric Pump	3 # 12 & 1 # 12G	3/4" C	P-0813A	Stub up in MCP (180 V) section	33'-4"	Conduit to run on top of tank and either below or through hatch side wall
			P-0813B	Stub up in MCP (180 V) section	33'-4"	
			P-0813C	Stub up in MCP (180 V) section	33'-4"	
			P-0813D	Stub up in MCP (180 V) section	33'-4"	
Backwash Pump #1	3 # 12 & 1 # 12G	3/4" C	P-0814A	Stub up in MCP (180 V) section	33'-4"	Conduit to run on top of tank and either below or through hatch side wall
			P-0814B	Stub up in MCP (180 V) section	33'-4"	
			P-0814C	Stub up in MCP (180 V) section	33'-4"	
			P-0814D	Stub up in MCP (180 V) section	33'-4"	
Backwash Pump #2	3 # 12 & 1 # 12G	3/4" C	P-0815A	Stub up in MCP (180 V) section	33'-4"	Conduit to run on top of tank and either below or through hatch side wall
			P-0815B	Stub up in MCP (180 V) section	33'-4"	
			P-0815C	Stub up in MCP (180 V) section	33'-4"	
			P-0815D	Stub up in MCP (180 V) section	33'-4"	
Membrane Drain Sump Pump	Cable from motor to be pulled through this conduit	1-1/2" C	P-1011D	Stub up in MCP (180 V) section	28'-4"	Conduit to run on top of tank and either below or through hatch side wall
			P-1011E	Stub up in MCP (180 V) section	28'-4"	
			P-1011F	Stub up in MCP (180 V) section	28'-4"	
			P-1011G	Stub up in MCP (180 V) section	28'-4"	
Dosing Pump #1 MCP to Junction box adjacent to Dosing tank riser	3 # 12 & 1 # 12G	1-1/2" C	P-1111B	Stub up in MCP (180 V) section	8'-3"	through WWTP wall - to be run at elevation required by electrical code
			P-1111C	Stub up in MCP (180 V) section	8'-3"	
			P-1111D	Stub up in MCP (180 V) section	8'-3"	
			P-1111E	Stub up in MCP (180 V) section	8'-3"	
Dosing Pump #2 MCP to Junction box adjacent to Dosing tank riser	3 # 12 & 1 # 12G	1-1/2" C	P-1112B	Stub up in MCP (180 V) section	8'-7"	through WWTP wall - to be run at elevation required by electrical code
			P-1112C	Stub up in MCP (180 V) section	8'-7"	
			P-1112D	Stub up in MCP (180 V) section	8'-7"	
			P-1112E	Stub up in MCP (180 V) section	8'-7"	
Dosing Pump #3 MCP to Junction box adjacent to Dosing tank riser	3 # 12 & 1 # 12G	1-1/2" C	P-1113B	Stub up in MCP (180 V) section	8'-7"	through WWTP wall - to be run at elevation required by electrical code
			P-1113C	Stub up in MCP (180 V) section	8'-7"	
			P-1113D	Stub up in MCP (180 V) section	8'-7"	
			P-1113E	Stub up in MCP (180 V) section	8'-7"	
Older Control Blower	3 # 12 & 1 # 12G	1-1/2" C	P-1251A	Stub up in MCP (180 V) section	32'-2"	Conduit to run on top of tank and either below or through hatch side wall
			P-1251B	Stub up in MCP (180 V) section	32'-2"	
			P-1251C	Stub up in MCP (180 V) section	32'-2"	
			P-1251D	Stub up in MCP (180 V) section	32'-2"	
Compressor	3 # 12 & 1 # 12G	3/4" C	P-158A	Stub up in MCP (180 V) section	18'-6"	Conduit to run on top of tank and either below or through hatch side wall
			P-158B	Stub up in MCP (180 V) section	18'-6"	
			P-158C	Stub up in MCP (180 V) section	18'-6"	
			P-158D	Stub up in MCP (180 V) section	18'-6"	

Description		Wiring and Ground	Conduit	Conduit Stub Up	Wall A 102A	Dimensions off Wall B	elevation	Remarks
EQ Pump #1 and #2 - Modulator/Thermals	8F14		1" C	L-028	Stub up in MCP (24 V) section	34'-2"	through WWTP wall - to be run at elevation required by electrical code	To Junction Box (adjacent to Riser) From Junction Box (adjacent to Riser) through EQ pump wall
EQ Pump #1 Modulator/Thermals	4F14		1-1/2" C	L-021A L-021B L-021C L-021D	Stub up in MCP (24 V) section	34'-2"		From Junction Box (adjacent to Riser) through EQ pump wall From Junction Box (adjacent to Riser) through EQ pump wall
EQ Pump #2 Modulator/Thermals	4F14		1-1/2" C	L-022A L-022B L-022C L-022D	Stub up in MCP (24 V) section	34'-2"		From Junction Box (adjacent to Riser) through EQ pump wall From Junction Box (adjacent to Riser) through EQ pump wall
EO LEVEL SENSOR	182 TWSH		3/4" C	L-0221B L-0221C L-0221D L-0221E	Stub up in MCP (24 V) section	33'-10"	through WWTP wall - to be run at elevation required by electrical code	To Junction Box (adjacent to Riser) From Junction Box (adjacent to Riser) through EQ pump wall
Influent Flow Meter Power (24V)	2 # 14 ; 1 # 14 G	182 TWSH	3/4" C	P-0222A P-0222B P-0222C P-02	Stub up in MCP (120 V) section	38'-9"		Conduit to run on top of tank and either below or through hatch side wall
Influent Flow Meter signal	182 TWSH		3/4" C	L-0222A L-0222B L-0222C L-0222D	Stub up in MCP (24 V) section	38'-9"		From MCP
Bar screen Float Aeration Mixer, Pre-Air Mixer, and Denitr pump modulator thermals	12W14	2 # 16	3/4" C	L-0251A L-0251B L-0251C L-0251D	Stub up in MCP (24 V) section	38'-9"		modulator thermals are in some cord as power for mixer and pump
Conductor to the Anoxic ORP Pre-amp	1 @ 185 TWSH		1-1/2" C	L-0251A L-0251B L-0251C L-0251D	Stub up in MCP (24 V) section	38'-9"		
Pre Anoxic ORP Probe to Pre-Amp		pull string	3/4" C	L-0321D L-0421A L-0421B L-0421C	27'-8" 8'-3" 26'-2" 23'-10"	27'-8" 26'-2" 26'-2" 26'-2"	85'-24"	Conduit to run on top of tank and either below or through hatch side wall
Controller to Aeration pH Pre-amp	1 @ 185 TWSH		3/4" C	L-0421D L-0421B L-0421C L-0421C	21'-4" 8'-3" 26'-2" 23'-10"	21'-4" 26'-2" 26'-2" 26'-2"	85'-24"	Conduit to run on top of tank and either below or through hatch side wall
Aeration pH Probe to Pre-Amp		pull string	3/4" C	P-0422A P-0422B P-0422C P-04	Stub up in MCP (120 V) section	35'-14"		Conduit to run on top of tank and either below or through hatch side wall
DO meter power	2 # 14 ; 1 # 14 G	182 TWSH	3/4" C	L-0422A L-0422B L-0422C L-0422C	Stub up in MCP (24 V) section	35'-14"		From MCP
DO Meter to MCP 4-20 ma	182 TWSH		3/4" C	L-0422B L-0422C L-0422C L-0422C	Stub up in MCP (24 V) section	35'-14"		
DO probe to DO meter		pull string	1" C	L-0422D P-0421A P-0421B P-0421C	19'-0" Stub up in MCP (120 V) section	19'-0" 32'-3"	85'-24"	Conduit to run on top of tank and either below or through hatch side wall
Denitr Flow meter Power 120V	2 # 14 ; 1 # 14 G	182 TWSH	3/4" C	L-0421A L-0421B L-0421C L-0421D	Stub up in MCP (24 V) section	32'-3"		
Denitr Flow Meter Signal	182 TWSH		3/4" C	L-0421B L-0421C L-0421D L-0421E	Stub up in MCP (24 V) section	32'-3"		
Post Anoxic Level Sensor	182 TWSH		3/4" C	L-0621B L-0621B L-0621B L-0621B	Stub up in MCP (24 V) section	29'-0"	85'-24"	Conduit to run on top of tank and either below or through hatch side wall
Post Anoxic ORP Probe to Pre-Amp		pull string	3/4" C	L-0622A L-0622B L-0622C L-0622C	17'-2" 0'-3" 11'-2" 11'-2"	17'-2" 26'-2" 11'-2" 11'-2"	85'-24"	Conduit to run on top of tank and either below or through hatch side wall
Air/it scd 120V power Junction Box	4F14 ; 2 # 14G		1" C	P-07B L-07A L-07A	21'-8" 11'-10" 11'-10"	21'-8" 11'-10" 11'-10"		
Agit Start FM-021 FM-063 AV-023 AV								