



MINISTRY OF PUBLIC WORKS FORT PROSPECT CENTRAL AREA PUMP STATION Fort Hill Road, Devonshire

DRAWING LIST	-
4832/004/03	TOPOGRAPHIC SURVEY
FP01	SITE PLAN ELEVATIONS
FP02	PLANS & SECTIONS
E1	EXISTING CONTROL ROOM LAYOUT
E2	PROPOSED CONTROL ROOM LAYOUT
E3	EXISTING SITE PLAN
E4	PROPOSED SITE PLAN
E5	PUMP STATION ELECTRICAL FLOOR PLANS
E6	EXISTING SINGLE LINE DIAGRAM
E7	PROPOSED SINGLE LINE DIAGRAM
E8	EXISTING SCHEDULES & LEGEND
E9	PROPOSED SCHEDULES/SPECIFICATIONS
E10	ELECTRICAL SPECIFICATIONS

KEY MAP



FP0



COVER

PROJECT NAME: FORT PROSPECT CENTRAL AREA PUMP STATION FORT HILL ROAD DEVONSHIRE PARISH

PROJECT NUMBER:

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	02/01/17

NO REVISION BY APP DATE

ISSUED FOR: PLANNING APP 02/01/17

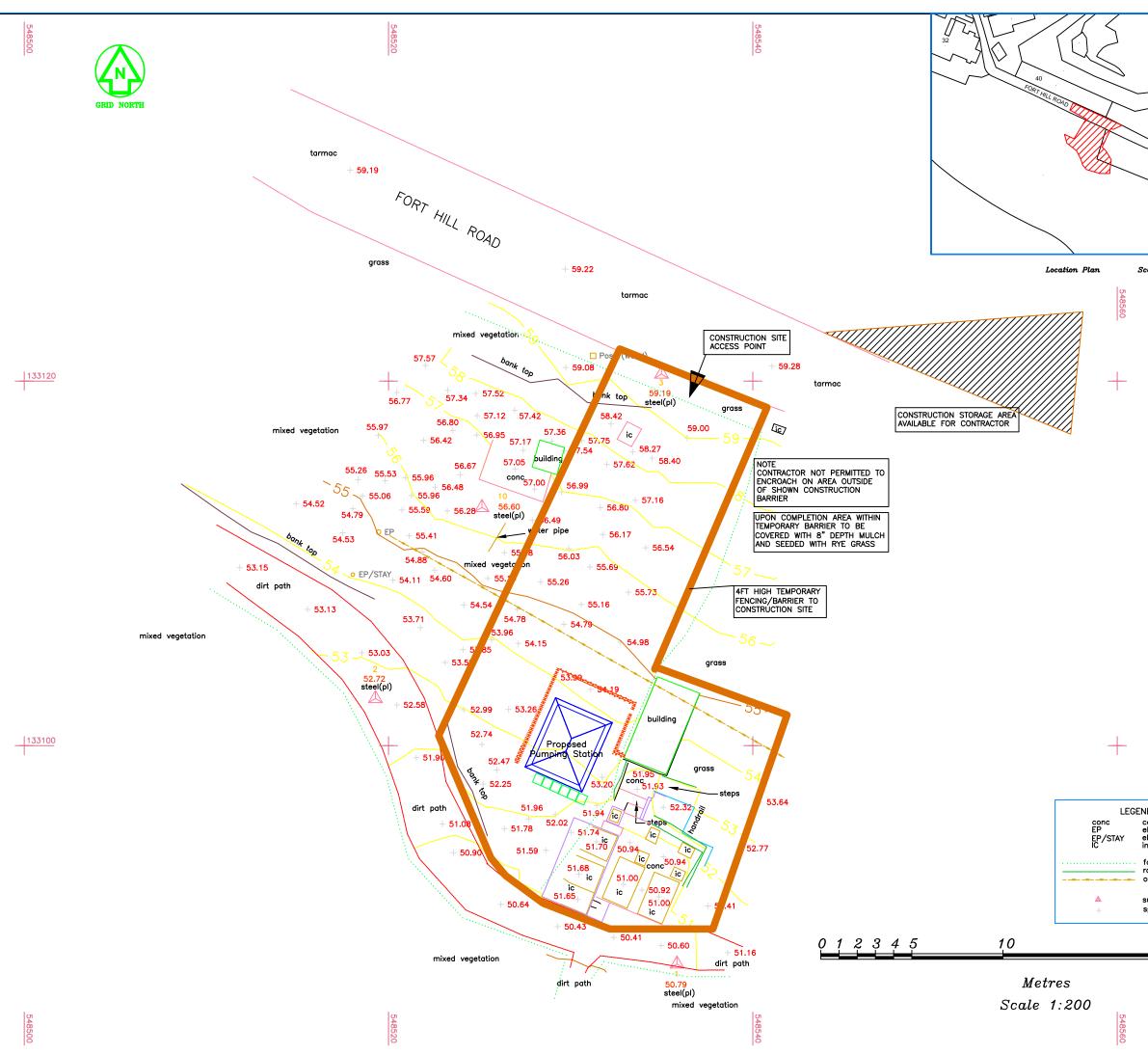
WORKS & ENGINEERING

Water Section

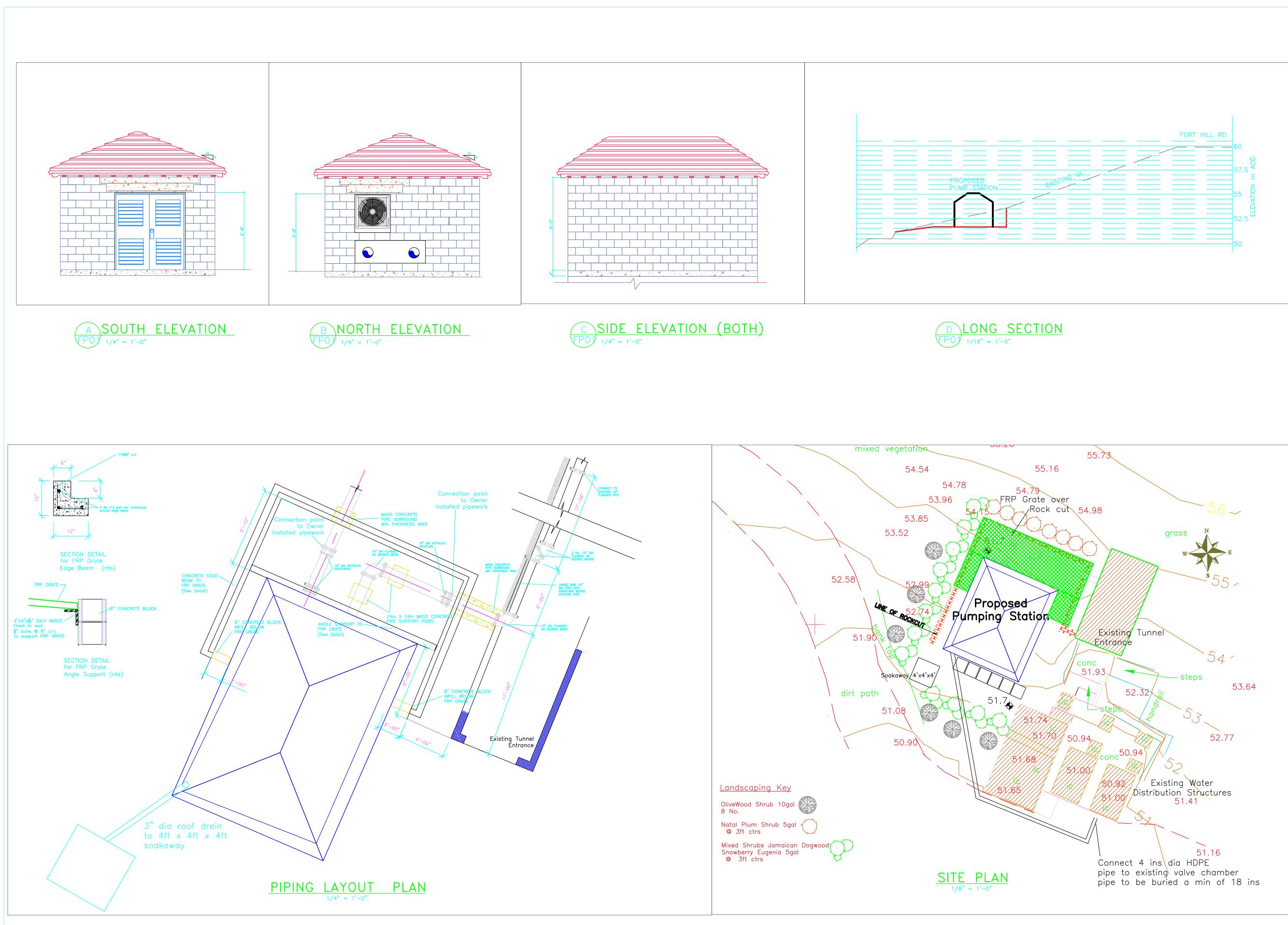
THE MINISTRY OF PUBLIC WORKS

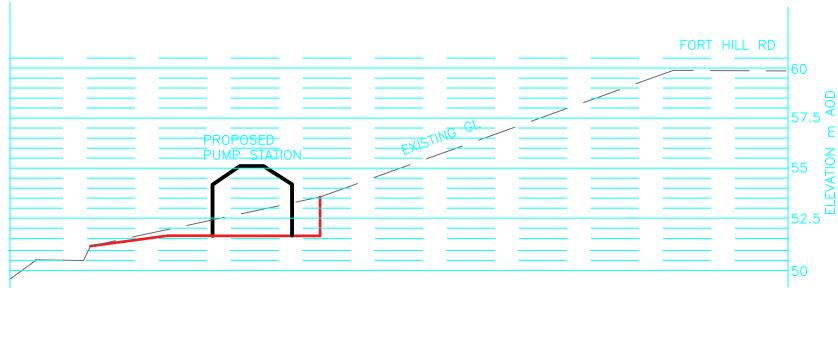
P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295–5151

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P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295–5151

> DEPARTMENT of WORKS & ENGINEERING

Water Section

ISSUED FOR: Planning SubmissiorMay 2017

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FORT PROSPECT CENTRAL AREA PUMP STATION

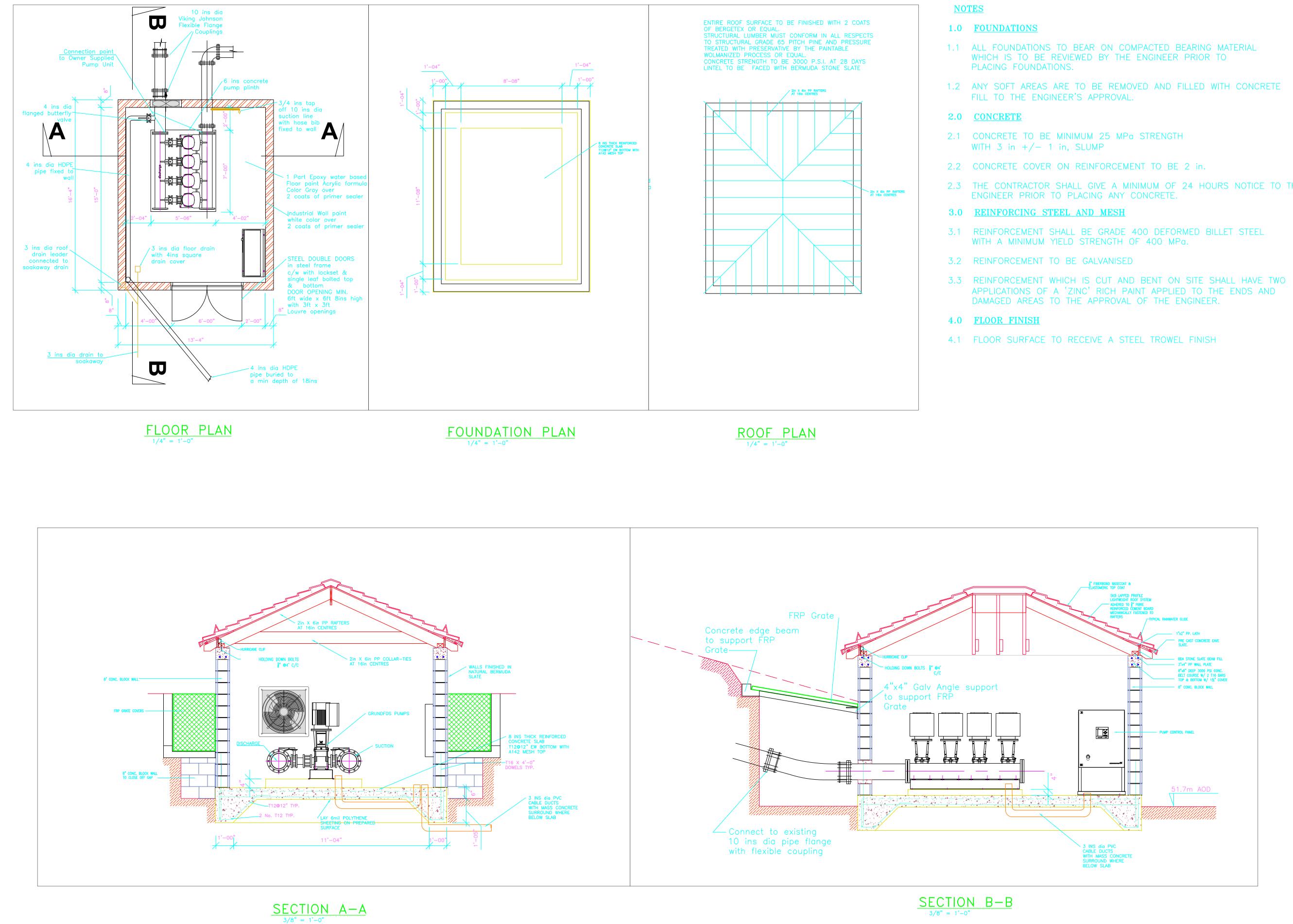
Fort Hill Road

Devonshire Site Plan

Elevations

FP-01





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2.3 THE CONTRACTOR SHALL GIVE A MINIMUM OF 24 HOURS NOTICE TO THE

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THE MINISTRY OF PUBLIC WORKS

P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295-5151

> DEPARTMENT of WORKS & ENGINEERING

Water Section

ISSUED FOR: Planning SubmissiorMay 2017

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SCALE: AS SHOWN

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PROJECT NUMBER:

PROJECT NAME:

FORT PROSPECT CENTRAL AREA PUMP STATION

Fort Hill Road

Devonshire

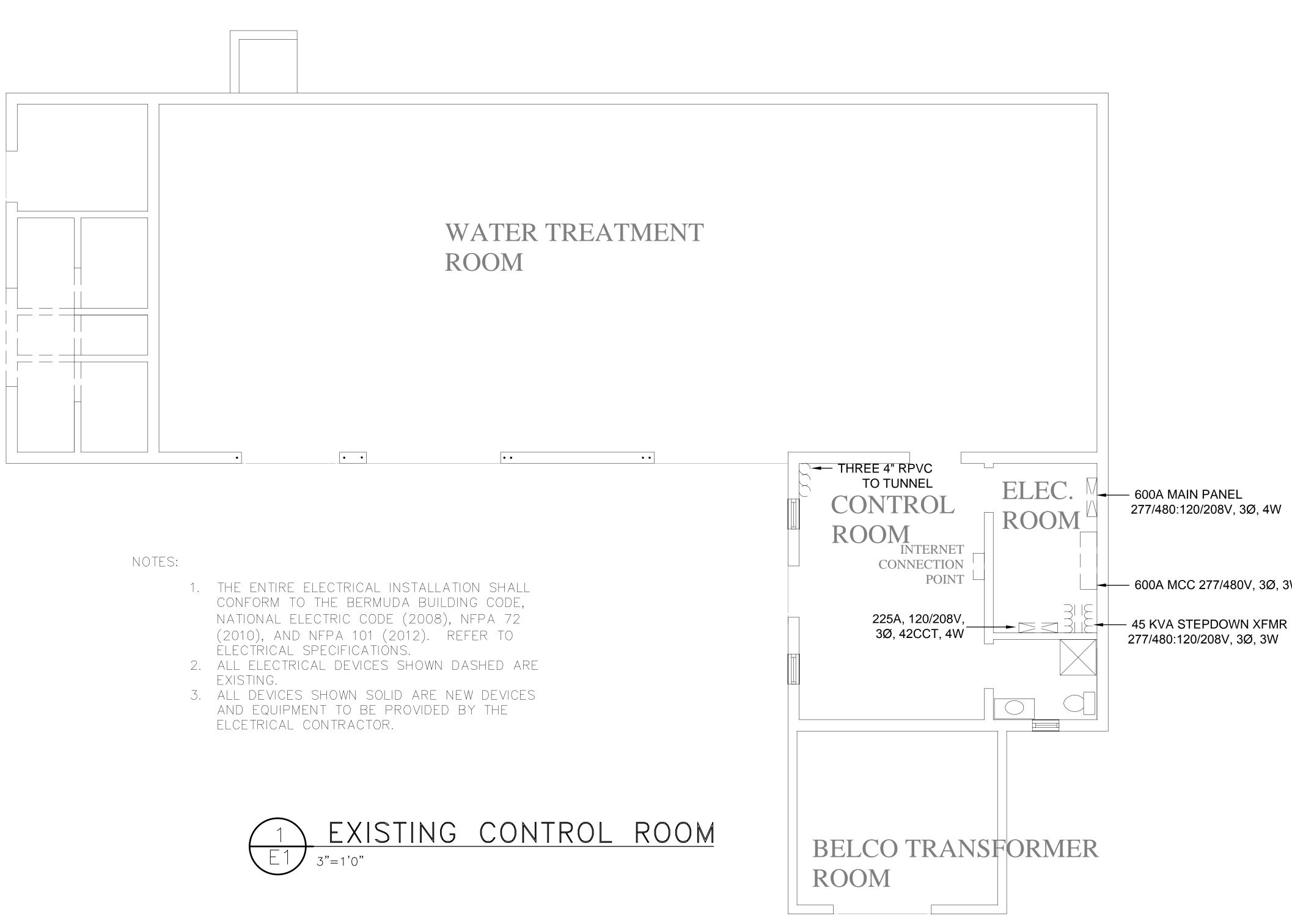
Plans

& Sections

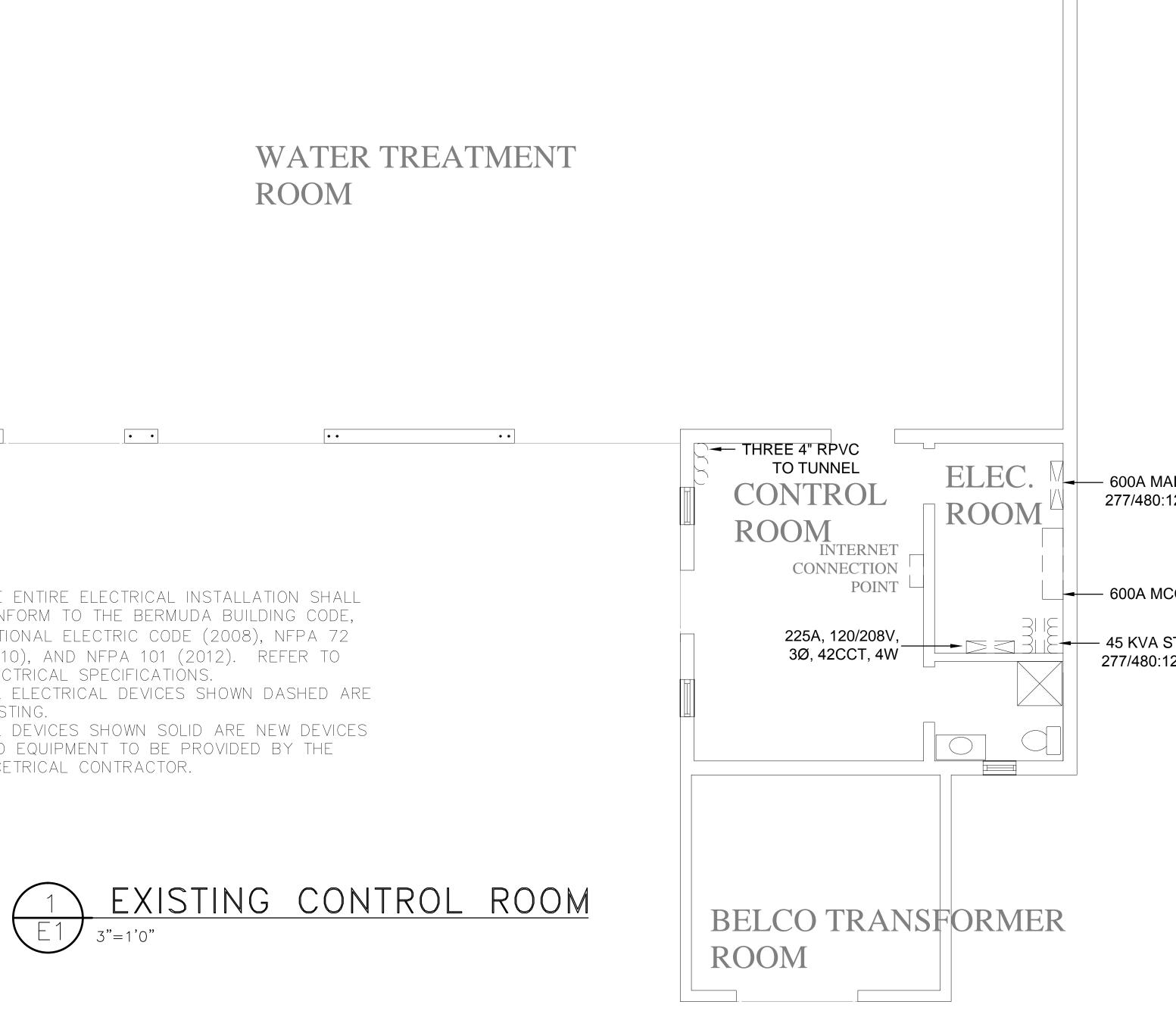
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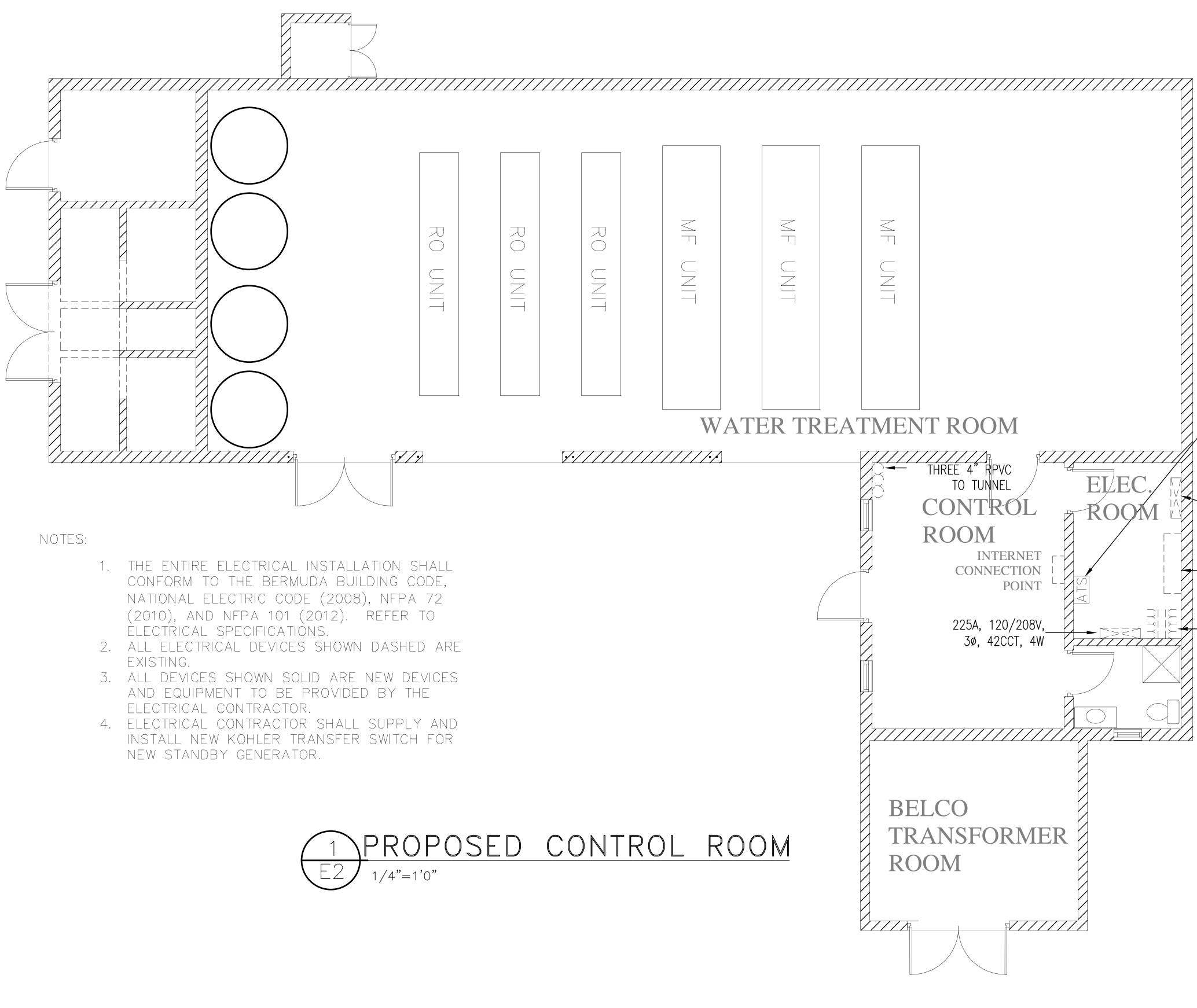


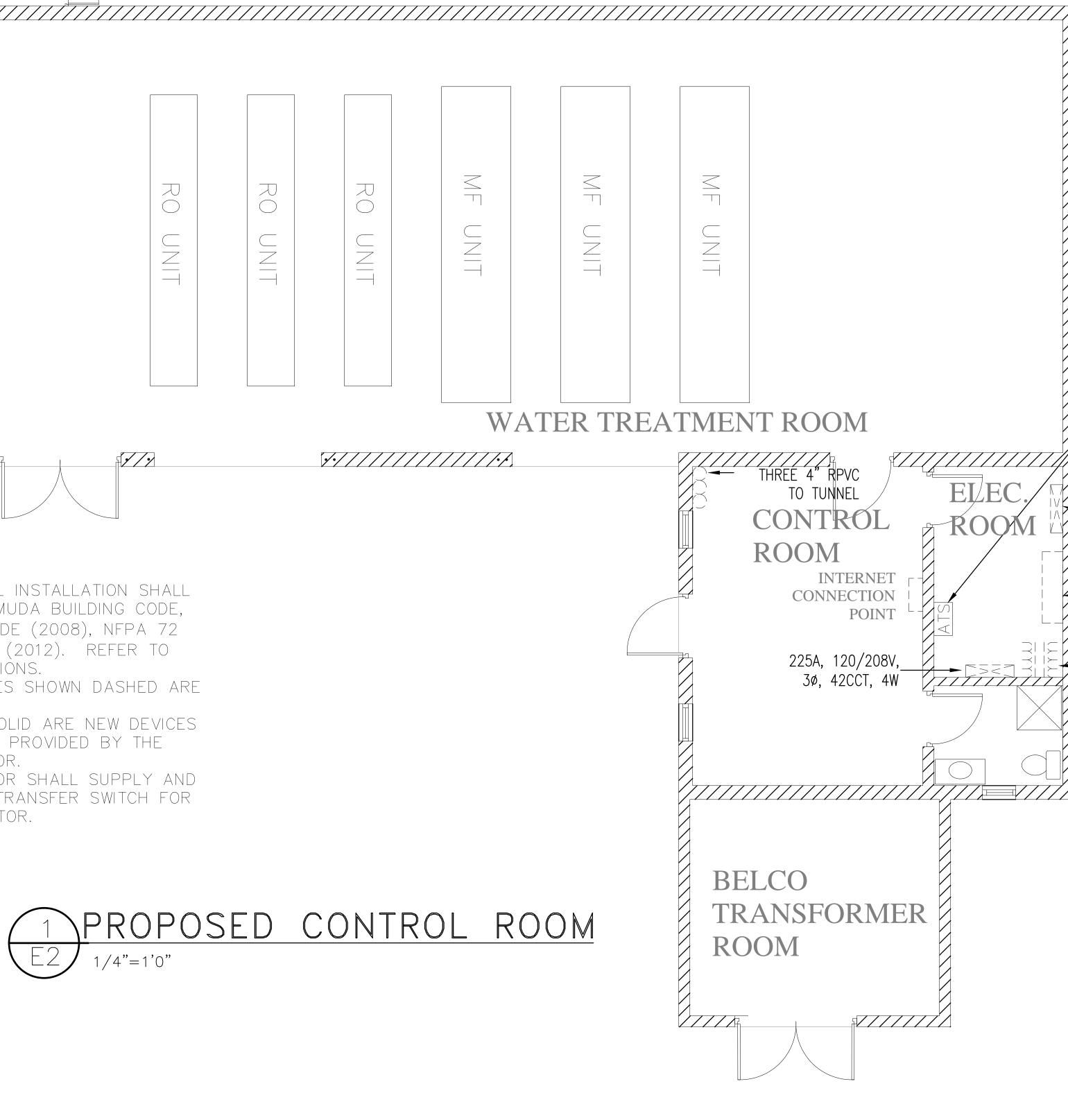
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THE MINIST Public WC	
P.O. Box HM525 Hamilton Phone: (441)29	
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WORKS & ENGI	
Water Se	ction
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277/480:120/208V, 3Ø, 4W

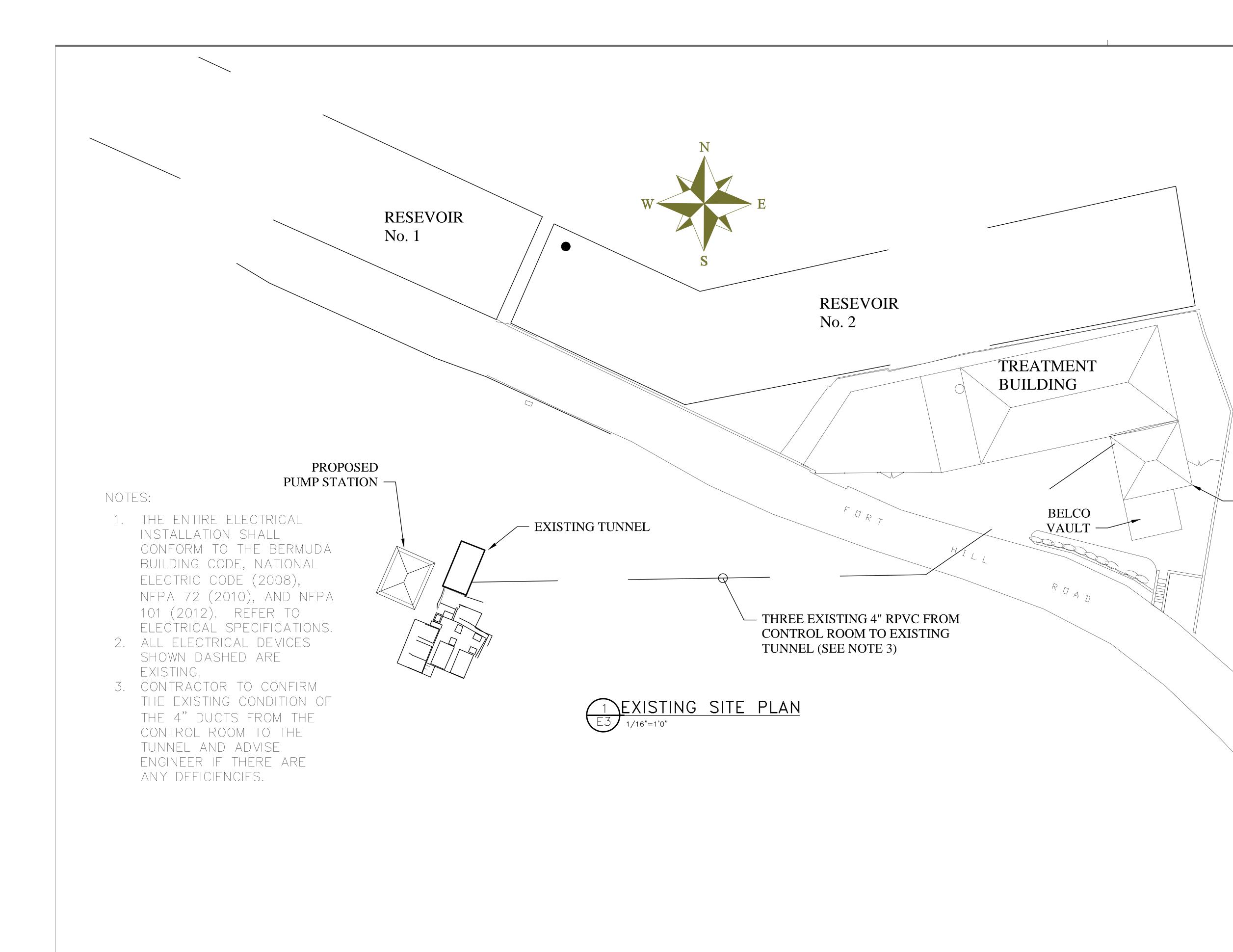
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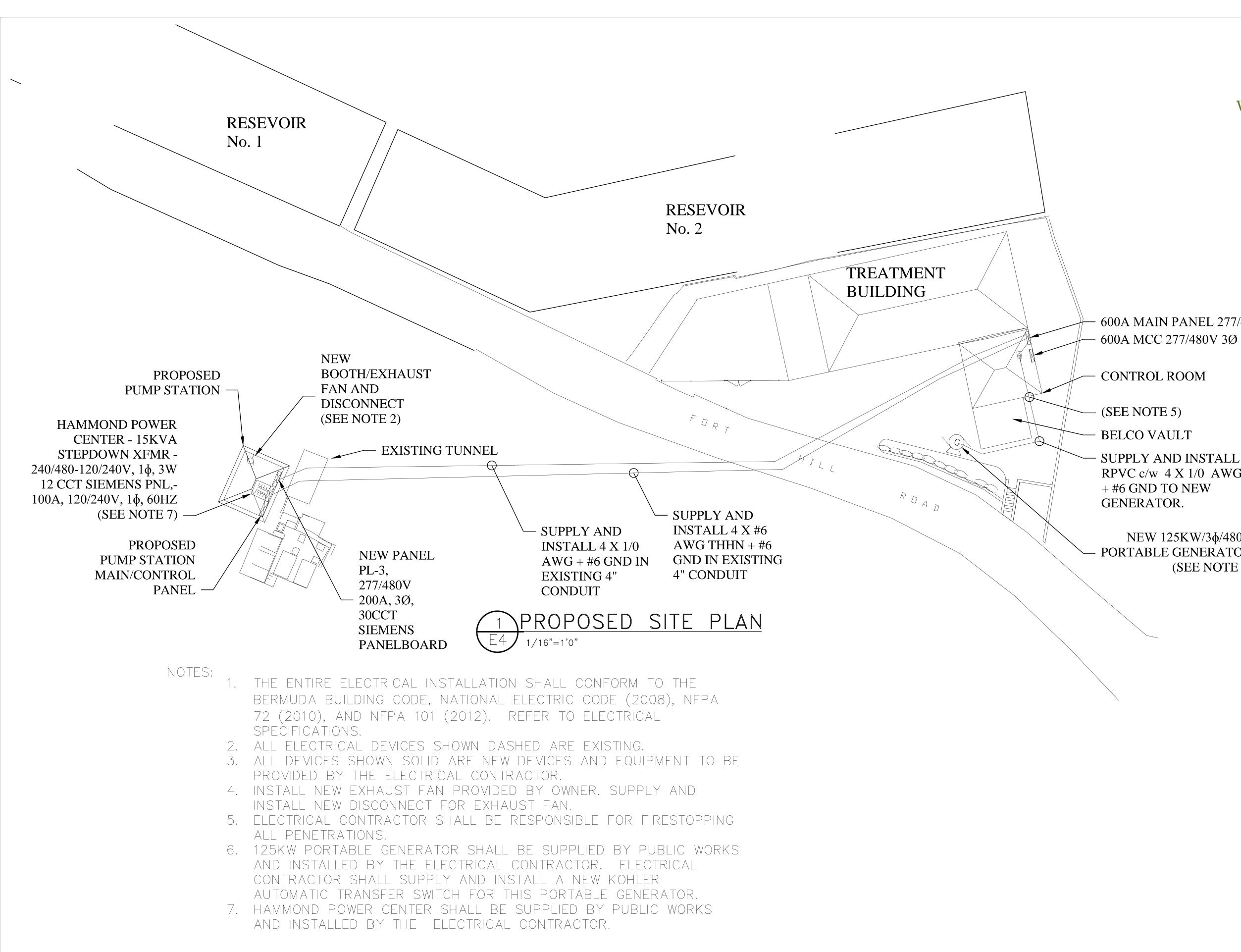


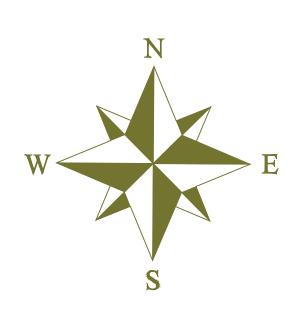
	THE MINISTRY OF PUBLIC WORKS
	P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295—5151
	DEPARTMENT OF WORKS & ENGINEERING
	Water Section
	REMI SUBAIR BERMUDA
– NEW AUTOMATIC TRANSFER	ISSUED FOR: PLANNING 9/27/16
SWITCH SUPPLIED BY ELECTRICAL CONTRACTOR (SEE NOTE 4)	AMENDMENTS: NO: REVISION APP DATE:
600A MAIN PANEL 277/480:120/208V, 3ø, 4W	
600A MCC 277/480V, 3ø, 3W	1 PLANNING 10/10/16
	SCALE: 1/4"=1'-0"
45 KVA STEPDOWN XFMR 277/480:120/208V, 3ø, 3W	SURVEY PREPARED BY: DATE: RS 10/10/1
	DESIGNPREPARED BY:DATE:RS10/10/1CHECKED BY:DATE:RS10/10/1
	DRAWING PREPARED BY: DATE: RS 10/10/1
	CHECKED BY: DATE: RS 10/10/1 APPROVED BY:
	RS Project number:
	PROJECT NAME: PROSPECT WATER DEPOT REMOTE MONITORING FORT PROSPECT 14 HEADQUARTERS HILL DEVONSHIRE
	DRAWING FILE NO: ACAD R-12
	SHEET TITLE: EXISTING CONTROL ROOM LAYOUT PLAN
	SHEET NUMBER:
	E2



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CONTROL ROOM





- 600A MAIN PANEL 277/480V 3Ø

- SUPPLY AND INSTALL NEW 2" RPVC c/w 4 X 1/0 AWG THHN

NEW 125KW/3¢/480V - PORTABLE GENERATOR (SEE NOTE 6)

THE MINISTRY OF PUBLIC WORKS

P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295-5151

DEPARTMENT OF WORKS AND ENGINEERING

Water Section



ISSUED FOR:	
AMENDMENTS:	
NO: REVISION	APP DATE:
A PLANNING	10/OCT/16
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RS	10/OCT/10
APPROVED BY:	

PROJECT NUMBER: 50816

PROJECT NAME:

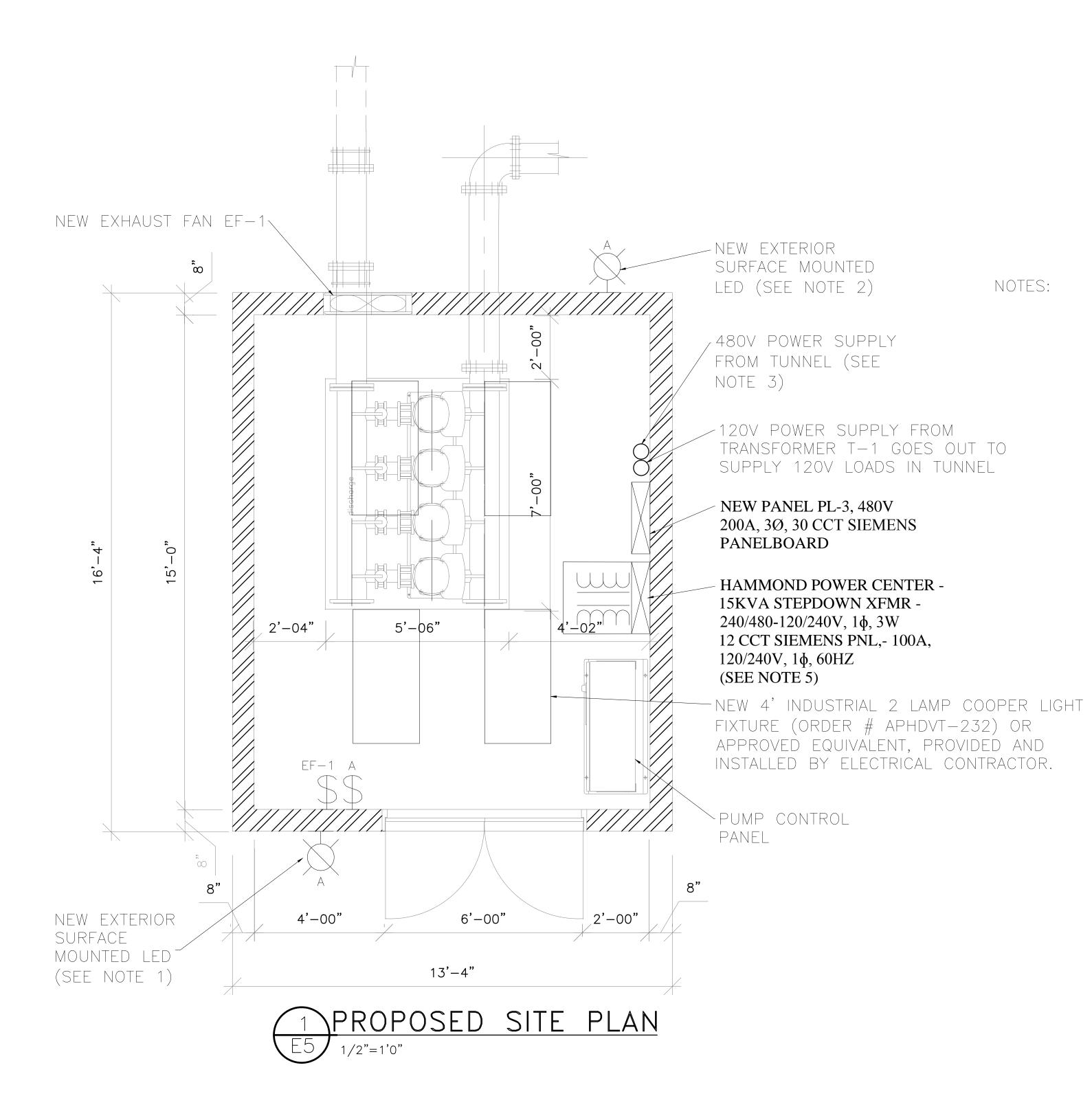
PROSPECT PUMP STATION

FORT PROSPECT 14 HEADQUARTERS HILL DEVONSHIRE

DRAWING FILE NO: K:WATER SECTION\PROSPECT\DATA MONITORING

SHEET TITLE: PROPOSED SITE PLAN

SHEET NUMBER: REVISION E4 1



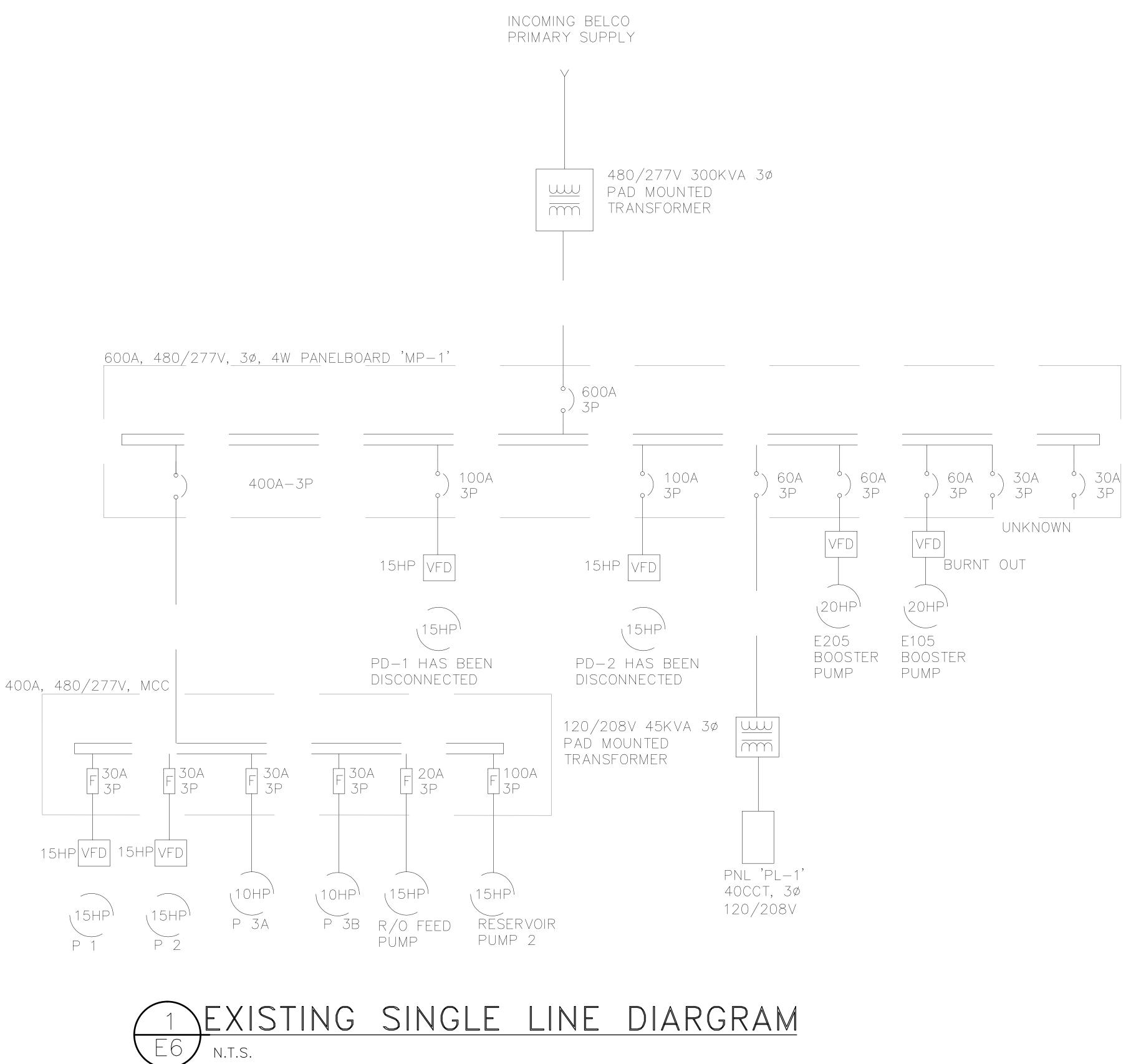
- 1. THE ENTIRE ELECTRICAL INSTALLATION SHALL CONFORM TO THE BERMUDA BUILDING CODE, NATIONAL ELECTRIC CODE (2008), NFPA 72 (2010), AND NFPA 101 (2012). REFER TO ELECTRICAL SPECIFICATIONS.
- 2. ELECTRICAL CONTRACTOR SHALL PROVIDE AND INSTALL NEW LITHONIA LED WALL PACK (ORDER # OLW-23) OR APPROVED EQUIVALENT.
- 3. NEW 2" CONDUIT CHANNELED FROM TUNNEL SHALL BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- 4. NEW 2" CONDUIT CHANNELED BACK TO TUNNEL SHALL BE SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- 5. HAMMOND POWER CENTER SHALL BE SUPPLIED BY PUBLIC WORKS AND INSTALLED BY THE ELECTRICAL CONTRACTOR.

	441)295–5151
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Water	Section
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	10/10/16
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	DATE: 10/10/1
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APPROVED BY: RS PROJECT NUMBER: PROJECT NAME: FORT PRO	10/10, DATE: 10/10,

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E5



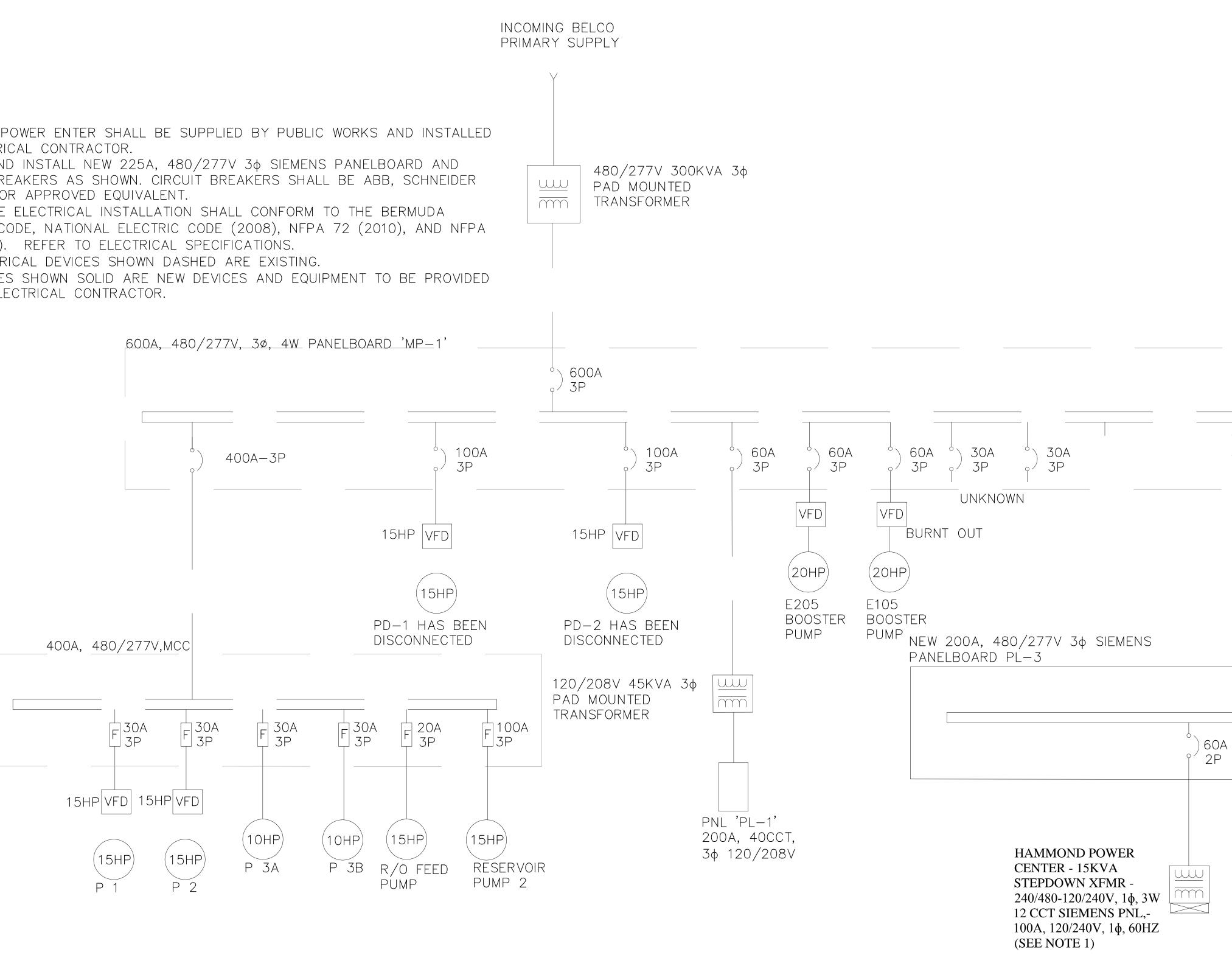
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	THE MINISTRY PUBLIC WORKS	
	P.O. Box HM525 Hamilton HMCX Phone: (441)295-5151	Bermuda
	DEPARTMENT OF WORKS & ENGINEERING	
	Water Section	2
	PROFESSION No. 168 ELECTRICAL	AGINEER
	ISSUED FOR: -	
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	<u>design</u> prepared by: RS Checked by: RS	DATE: 10/10/16 DATE: 10/10/16
	<u>Drawing</u> prepared by: RS checked by:	DATE: 10/10/16 DATE:
	RS Approved by: RS	10/10/16
	PROJECT NUMBER:	
	PROJECT NAME: FORT PROSPEC CENTRAL AREA PUMP STATION 14 FORT HILL ROAD	T
	DEVONSHIRE Drawing file no:	
	SHEET TITLE: EXISTING SINGLE LINE DIAGRAM	
	SHEET NUMBER:	REVISION

E6

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NOTE;

- 1) HAMMOND POWER ENTER SHALL BE SUPPLIED BY PUBLIC WORKS AND INSTALLED BY ELECTRICAL CONTRACTOR.
- 2) SUPPLY AND INSTALL NEW 225A, 480/277V 3¢ SIEMENS PANELBOARD AND CIRCUIT BREAKERS AS SHOWN. CIRCUIT BREAKERS SHALL BE ABB, SCHNEIDER ELECTRIC OR APPROVED EQUIVALENT.
- 3) THE ENTIRE ELECTRICAL INSTALLATION SHALL CONFORM TO THE BERMUDA BUILDING CODE, NATIONAL ELECTRIC CODE (2008), NFPA 72 (2010), AND NFPA 101 (2012). REFER TO ELECTRICAL SPECIFICATIONS.
- 4) ALL ELECTRICAL DEVICES SHOWN DASHED ARE EXISTING.
- 5) ALL DEVICES SHOWN SOLID ARE NEW DEVICES AND EQUIPMENT TO BE PROVIDED BY THE ELECTRICAL CONTRACTOR.





PROPOSED SINGLE LINE DIARGRAM



SHEET NUMBER:

E7

PROPOSED SINGLE LINE DIAGRAM

SHEET TITLE:

RAWING FILE NO:

DEVONSHIRE

FORT PROSPECT **CENTRAL AREA PUMP STATION** 14 FORT HILL ROAD

ROJECT NAME:

PROJECT NUMBER:

175A 3P

(75HP)

PROPOSED

PUMPING

STATION

(OWNER

SUPPLIED)

NEW

1	PLANNING	10/10/16
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RS		10/10/16
	ROVED BY:	
RS		

APP DATE:

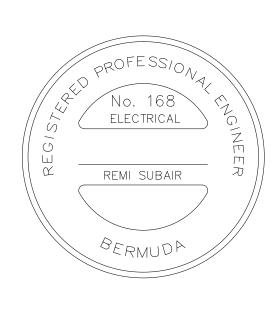
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AMENDMENTS:

NO: REVISION

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3P



Water Section

DEPARTMENT OF WORKS & ENGINEERING



P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295-5151

THE MINISTRY OF PUBLIC WORKS

	MOTOR CONTROL SCHEDULE																					
	DISC AT MOTOR STARTER													CON	TROL	S		CON	TACTS			
MOTOR NUMBER	DESCRIPTION	HORSEPOWER	FULL LOAD AMPS	KILOWATTS	VOLTAGE	PHASE	FED FROM	OVERCURRENT PROTECTION	FEEDER	REQUIRED	ТҮРЕ	ТҮРЕ	SIZE	VFD	FWD/REV/STOP START/STOP	HND/OFF/AUTO		CNTRL XFMR	NORMALLY OPEN		REMARKS	
BP-1	BOOSTER PUMP				460	3	MP-1	60A-3P		•				•								
BP-2	BOOSTER PUMP				460	3	MP-1	60A-3P		•				•								
CP-1	CLEANING PUMP	10		3	460	3	МСС		3#12-3/4"C	•												
CP-2	CLEANING PUMP	10		3	460	3	МСС		3#12-3/4"C	•												
EF-1	R/O FEED PUMP	15			460	1	мсс		2#12-3/4"C	•												
EF-2	RESERVOIR #2 PUMP				460	1	МСС		2#12-3/4"C	•												
P-1	P1	15			460	1	мсс		2#12-3/4"C					•								
P-2	P2	15			460	1	мсс		2#12-3/4"C	•				•								

	120 <u>,</u> 3		VOLT				PANEL location <u>bsmt</u> . feeder <u>xx</u>	<u>ELEC</u> .RM					COPPI E MTD	ER BUS	
CIR	BKR		WIRE	E.									ATTAGE	BKR	CIR
		Aø	Bø	Cø	LIG	REC	REMARKS		MIS	REC	LIG	Аø	Bø		
1	20						CHEM RM LTGS	CNTRL RM LIGS						20	2
	20						AC CONDENSOR							20	4
								TOWN L MON ST						20	6
_7/	20						DOM WTR PUMP	SENSOR LIGHTS						20	8
								CNTRL RM REC						20	10
11	20						COMP HEAT REC	PLANT RM REC						20	12
13	20						FIRE/SEC ALARM	PLANT RM REC						20	14
15	20						 R/O MONITOR ST	AUX CNTRL PNL						20	16
17	20						CONTR RM REC	S101 DIV VALVE						20	18
19	20						PRDCT MON ST	100&200 C PNL						20	20
21	20						 PNL RM REC/LTG	300 CNTRL PNL						20	22
23	20						 PLANT RM LTGS	PLANT RM LTG						20	24
25	20						CHLN BST PUMP							20	26
27	20						SOLENOIDS F&B	FLOW METERS						20	28
29	20													20	30
31	20						 CHM AC/EXHST	CHLN SOLENOID						20	32
33	20						EMERGENCY LTGS	CHL G/LVL ALRM						20	34
35	20						MAIN PLC PNL	LVL TRNSMITTERS						20	36
37⁄	20							AC CNTRL PANEL							38⁄
<u> </u>	20						 ROOF LATE FAIN	AC CHIRL PANEL							
41	20														42
	ALS													тот	ALS
	TOTAL						 BØ TOTAI	_=				CØ T	OTAL=		
	NEL TO														
	MARKS														

1 EXISTING MOTOR, LIGHTING & PANEL SCHEDULES N.T.S.

SPACE
SPACE
SPACE
30 AMP SPACE
60 AMP 30 AMP
60 AMP 60 AMP
100 AMP 3ø, 60HZ 100 AMP 3ø, 60
400 AMP 3ø, 60HZ
600 AMP 3ø, 60HZ MAIN BREAKE

SPACE

POWER	LIGHTING
	SURFACE MOUNTED 2X4 FLUORESCENT (TWO T8 LAMPS
QUAD RECEPTACLE	EB EMERGENCY DC BATTERY PACK WITH REMOTE HEADS
MOTOR WITH DISCONNECT	EXTERIOR LED
RANSFORMER	\$ SINGLE POLE SWITCH
DANEL / MCC	\$ TWO POLE SWITCH
(J) JUNCTION BOX	
VFD VARIABLE SPEED DRIVE	
F FUSE	
FUSED DISCONNECT SWITCH	

	-
	_
60HZ	_
	_
KER	
<u> </u>	
	-
MPS)	
PACK	

DEPARTMI WORKS & EN	
Water S	Section
PROFESS PROFESS No. 16 ELECTRIC CO W REMI SUB SERMU	
ISSUED FOR: -	_
AMENDMENTS: NO: REVISION	APP DATE:
1 PLANNING	10/10/1
SCALE: N.T.S.	
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DESIGN PREPARED BY: RS	DATE: 10/10/1
CHECKED BY: RS	DATE: 10/10/1
<u>Drawing</u> prepared by: RS	DATE: 10/10/1
CHECKED BY: RS	DATE: 10/10/1
APPROVED BY: RS	
PROJECT NUMBER:	
PROJECT NAME:	
FORT PRO CENTRAL PUMP STA 14 FORT HILL I DEVONSHIRE	AREA ATION
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THE MINISTRY OF PUBLIC WORKS

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	MOTOR CONTROL SCHEDULE																							
										DIS MO	C AT TOR	STA	RTER	ER CONTROLS						CONT				
MOTOR NUMBER	DESCRIPTION	HORSEPOWER	FULL LOAD AMPS	KILOWATTS	VOLTAGE	PHASE	FED FROM	OVERCURRENT PROTECTION	FEEDER	REQUIRED	TYPE	ТҮРЕ	SIZE	VFD	FWD/REV/STOP	START/STOP			CNTRL XFMR	PILOT LIGHT	NORMALLY OPEN	NORMALLY CLOSED	REMARKS	
BP-1	BOOSTER PUMP				460	3	MP-1	60A-3P		•				•										
BP-2	BOOSTER PUMP				460	3	MP-1	60A-3P		•				•										
PS-1	NEW PUMPING STATION				460			175A-3F	3#1 AWG	•														
CP-1	CLEANING PUMP	10		3	460	3	мсс		3#12-3/4"C	•														
CP-2	CLEANING PUMP	10		3	460	3	мсс		3#12-3/4"C	•														
EF-1	R/O FEED PUMP	15			460	1	МСС		2#12-3/4"C	•														
EF-2	RESERVOIR #2 PUMP				460	1	МСС		2#12-3/4"C	•														
P-1	P1	15			460	1	мсс		2#12-3/4"C	•				•										
P-2	P2	15			460	1	МСС		2#12-3/4"C	•				•										

27 <u>7/480</u> VOLTS _ <u>3</u> PHASE _4WIRE								PANEL location <u>pumpi</u> feeder	<u>ng s</u> tation				A. BUS SED_MTG	SING	
CIR	BKR	W/ Aø	ATTAGI Bø	E Cø	LTG	REC	MIS	REMARKS	REMARKS	MIS	REGLI	-G <mark>AØ</mark>	/ATTAGE Bø Cø	BKR	CIR
1		7.07	8,	0,				PUMPING ST.							2
3	175														4
5															6
7	60							CDP							8
9	00														10
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19															20
21															22
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25															26
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TOT	ALS													TOT	ALS
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PAN	VEL TO	DTAL=													
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	12	<u>20/24</u> (1 3
CIR	BKR	W/ AØ
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тот	ALS	
Аø	TOTAL	_=
PAN	IEL TO	DTAL=

REMARKS:



600 AMP 277/480V 3Ø, 60HZ MAIN PANEL

SPACE				
SPACE				
SPACE				
30 AMP	SPACE			
60 AMP	30 AMP			
60 AMP	60 AMP			
100 AMP 3ø, 60HZ	100 AMP 3ø, 60HZ			
400 AMP 3ø, 60HZ				
600 AMP 3ø, 60HZ MAIN BREAKER				
SPACE				

<u>4</u> 0 VOLTS _ PHASE _ WIRE	PANEL_ct location_pump_st feeder_xx			<u>– sta</u> tion					A. :ED_ MT		SING		
VATTAGE BØ CØ	-LTG	REC	MIS	REMARKS	REMARKS	MIS	REC	LTG	W Aø	'ATTAG Bø	E Cø	BKR	CIR
	0			INTERIOR									2
	0			EXTERIOR									4
			0	EXHAUST FAN									6
													8
													10
													12
TOTALS													
BØ TOTAL= CØ TOTAL=													
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POWER	LIGHTING
DUPLEX RECEPTACLE	SURFACE MOUNTED 2X4 FLUORESCENT (TWO T8 LAMPS)
	EMERGENCY DC BATTERY PACK WITH REMOTE HEADS
MOTOR WITH DISCONNECT	EXTERIOR LED
	SINGLE POLE SWITCH
DANEL / MCC	TWO POLE SWITCH
(J) JUNCTION BOX	
VFD VARIABLE SPEED DRIVE	
F FUSE	
FUSED DISCONNECT SWITCH	

1 PROPOSED MOTOR, LIGHTING & PANEL SCHEDULES N.T.S.

E9	NUMBER:
E9	

ELECTRICAL SPECIFICATIONS

REVISION

1

SHEET TITLE:

DRAWING FILE NO:

DEVONSHIRE

FORT PROSPECT CENTRAL AREA PUMP STATION 14 FORT HILL ROAD

PROJECT NAME:

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DEPARTMENT OF WORKS & ENGINEERING

Water Section

PROFESSION

No. 168 ELECTRICAL

REMI SUBAIR

FLECTRICAL SPECIFICATIONS

1.DEFINITIONS

.1"Provide" or "supply and Install" mean "provide and install, inclusive of all labour, materials, installation, testing, and connections, for the item referenced.'

2.GENERAL

.1 This specification and any addenda hereto form part of the contract documents and shall be read in conjunction with them. Work shall include the furnishing of all labour and materials, unless specified otherwise, to complete and put into operating condition all electrical systems as indicated on the drawings and specified

.2It is the intent of the work to provide complete, neatly finished, and operational systems and any labour material, permits, licenses, approvals and inspections required for completion of the work, whether specifically mentioned in the drawings or specifications or not, shall be included in the tendered price.

.3Responsibility as to which trade provides required articles or materials rests solely with the general contract trade. Extras will not be considered based on arounds of difference of interpretation of specifications as to which trade involved shall provide certain specialties or materials.

.4The drawings and specifications for the complete works, including all of those related to other trades shall be examined before submitting tenders. All electrical and communications requirements indicated shall be included in the scope of the work.

3.DRAWINGS AND SPECIFICATIONS

.1Drawings and specifications are complementary to each other and what is called for by one shall be binding as if called for by both.

.2Should any discrepancy appear between drawings and specifications that leaves the Electrical Contractor in doubt as to true intent and meaning, obtain ruling from the Engineer before submitting tender, or allow for the most expensive alternative.

4.EXAMINATION OF OTHER DRAWINGS

.1Examine carefully structural, architectural and mechanical drawings, and the work of other trades and satisfy himself that the work under this contract can be satisfactorily carried out without changes to the building as shown on the plans. Should any difficulty arise showing conflict with, or requiring additional work beyond the work of these drawings, bring this matter to the attention of the Engineer before submitting tender.

5.UNIFORMITY OF EQUIPMENT .1Unless otherwise specified, uniformity of manufacturer shall be maintained for any particular item throughout. 6.CODES AND STANDARDS

.1 The entire installation, inclusive of material and labour, shall comply with the requirements of the latest edition of applicable Building Codes and Authorities Having Jurisdiction, the National Electrical Code (NEC), NFPA, regulations of the Government of Bermuda Occupational Health and Safety Act 1982", and Bermuda Fire Service.

7.PERMITS AND INSPECTIONS

.10btain and pay fees for permits and reauired for each staae o work, and upon completion of the entire installation.

.2Furnish to the Engineer a Certificate of Final Inspection and Approval from the Authority's Inspection Department. 8.STANDARDS OF MATERIAL AND

WORKMANSHIP .1 All materials shall be new and of the

quality specified, and shall be UL listed or listed by equivalent agency recognized by the Authority Having Jurisdiction.

.2 All work shall be executed in a neat and workmanlike manner by qualified tradesmen. The Electrical Contractor shall keep a competent foreman and necessary assistants on the site during the progress of the work. .3 All material and installation shall match

existing building standard unless noted otherwise on the drawings 9.ALTERNATE MANUFACTURERS

- .1 All requests for alternates shall be submitted to the Engineer not less than 5 days prior to the close of Tender. .2The contractor shall assume full responsibility for ensuring that alternate
- products meet all space, weight, connection, power, wiring, and performance requirements.
- 10. SHOP DRAWINGS
- .1 The Electrical Contractor shall submit to the Engineer, for review, shop drawings of major electrical equipment. Such equipment shall include, but not be limited to switchgear, panelboards, distribution and protection equipment. transformers, emergency lighting, exit signs, luminaires, ballasts, lamps, and controls, fire alarm system, data/comm. equipment, and devices.
- .2 All drawings shall be submitted in either pdf format by email or hardcopy (hardcopy in triplicate and two copies will be returned to the Electrical Contractor). Submit additional hardcopies for approval as may be required for general contractor, owner, and maintenance manuals.
- .3The Engineer's review of shop drawings is for general design only and will not relieve the Electrical Contractor or suppliers from responsibility for errors, proper fitting, construction of work, and furnishing of materials. Review will not be construed as approving departures from contract document requirements if such departures are not specifically noted. The Electrical Contractor is responsible for verifying all dimensions.

11. GUARANTEE

.1 The Electrical Contractor shall furnish a written guarantee, signed by authorized personnel, stating:

- .1 That all work executed under this contract will be free from defects of material and workmanship for a period of 1 year from date of final acceptance.
- .2The above parties further agree to, at their own expense, repair and replace all such defective work, and other work damaged thereby, which fails or becomes defective during the term of the guarantee warranty provided that such failure is not due to improper
- .3The period of the guarantee specified will in no way supplant any other guarantee of a longer period but be binding on work not otherwise covered.
- 12. OPERATION AND MAINTENANCE MANUALS .1Provide 3 sets of operation and maintenance manuals in 3 ring binders and one digital pdf copy. Include the
- following information: -Names, phone numbers, emails, and addresses of suppliers.
- Technical data, operating manuals, product data, parts lists. Shop drawings reviewed and stamped
- by Engineer. - Certificate of Acceptance from
- Authority's Inspection Department. - Verification Certificate and testing
- report for fire alarm system. -Load balance and meggering reports.
- Written Guarantee and manufacturers' warranties 13. AS-BUILT DRAWINGS
- .1 The Engineer will furnish to the Electrical Contractor one set of drawings to be used for record purposes. The Electrical Contractor shall accurately record on these prints all revisions to the original plans that are made on site during construction.
- .2The Electrical Contractor shall produce at his own expense a set of AutoCAD 2010 (or later) drawings, including all changes to the original tender drawings covered by addenda, change orders, field changes, and job conditions, and turn these over to the Engineer in electronic (pdf and dwg format) and hard copy form. Completed record drawings shall be clearly marked "As-Built Drawings".
- 14. VALUATION OF CHANGES
- .1Provide complete breakdown of material. labour, overhead, profit, etc. when submitting quotations for change or variation notices.
- .2 The hourly rate shall be inclusive of all charges for supervision, variable labour factors, hand tools, payroll burdens, height factors, warranties, storage, rentals, additional bonding, parking, clean-up, as-built drawings, hoisting freight, and delivery, but exclusive of overhead and profit.
- .3The labour hours shall be based on the latest issue of the National Electrical Contractors Association (NECA). 15. COMPLETION OF CONTRACT
- .1 All equipment must be cleaned and tested before acceptance by Engineer. Notify the Engineer when ready for final completion inspection.
- .20ne set of As-built drawings and O&M Manuals shall be turned over to th Engineer for review prior to substantial completion
- .3Substantial completion shall not be granted until all systems are deemed completed to the satisfaction of the Engineer
- 16. EXAMINATION OF THE SITE
- .1Prior to submitting tender, the Electrical Contractor shall carefully examine the site and ascertain all conditions which may affect his trade. No extras will be allowed for work resulting from conditions that should have been noticed and accounted for during a thorough examination of the site. 17. SETTING OUT OF THE WORK
- .1 The Electrical Contractor is responsible for correcting all work completed contrary to the intent of drawings and specifications and shall bear all costs involved in making the corrections. Where intent of drawings and specifications is not clear, obtain clarification from the Engineer before proceeding with work.
- .2The Electrical Contractor shall give work his personal supervision, lay out his own work, do all necessary leveling and measuring or employ a competent Engineer to do so. Figures, full size and detail drawings to take precedence over scale measurements.
- .3The Electrical Contractor shall be responsible for any damage caused to the Owner or any other trade by improper location or carrying out of his
- .4 The Electrical Contractor, in the setting out of his work, shall make reference to architectural, structural, and mechanical drawings. Consult with all relevant trades in setting out locations for conduit runs, lighting fixtures, panel assemblies, and all other electrical equipment, so that conflicts are avoided and symmetrical spacing is maintained. .5 Allow for work after hours as required
- to meet project schedule and coordinate with Owner if applicable. 18. INTERRUPTIONS
- .1 Arrange execution of work to maintain present building operations and to minimize the effect of this work on
- .2 Contractor to coordinate with Owner to avoid interruptions of services during normal building occupied hours. Contractor shall schedule all disruptions and include for premium to perform work associated during unoccupied hours.
- 19. FIRE STOPPING

.1Fire stop all penetrations through fire separations after installation to comply with codes and to provide equal fire separation ratings. Fire stopping systems to be UL listed for the application. Submit shop drawings for approval.

- 20. CUTTING AND PATCHING .1 The general trade will be responsible for all cutting and patching required for Engineer.
- .2Where work done by the Electrical Contractor damages the work of other trades, the Electrical Contractor shall repair and make good such damage to the satisfaction of each trade concerned and the Engineer.

21. CLEAN UP .1Keep the site free during construction

- materials associated with the work of this trade. .2 All waste material shall be disposed of in a safe and environmentally responsible manner and in accordance with Government Regulations. .3Upon completion of work, the electrical installation shall be left in a clean and
- the Engineer. 22. IDENTIFICATION .1Identify all major pieces of equipment,
- labels, white lettering on black background. .2Provide typewritten directories in all new and existing panels. Confirm existing identification and correct where
- necessary. .3Fire alarm breaker to be painted red and clearly identified.
- .4Label all receptacles with panelboard and circuit number (ie. A19, for Panel A, Circuit 19) using P-Touch type labels. Black on white background. For all receptacles other than standard
- 20A duplex receptacles, labels shall .5Label all disconnect switches with mechanical equipment identification number and circuit number.

23. TESTS

- .1 All portions of electrical work shall be tested for satisfactory operation. .2Before energizing any portion of the electrical system, the Electrical Contractor shall perform megger tests problems discovered by such testing shall be corrected by the Electrical shall be provided to the Engineer in
- .3Upon project completion, and check the load balance on all feeders and panels. These checks shall be checking load current balance. If load unbalance exceeds 15 %, the circuits shall be reconfigured as necessary to

balance the loads. 24. PAINTING AND FINISHES I All electrical fittinas, supports,

- rods, channel frames, conduit racks, outlet boxes, brackets, and clamps are to have a galvanized finish or a paint finish over corrosion-resistant primer. .2 All panels shall be factory-finished with spray-on air dry enamel. All enamel primer. Matte or flat type finish paint will not be accepted. All panels or similar factory-finished units that are scratched or marked during installation shall be touched up with matching
- spray-on air dry lacquer and, if required to provide a satisfactory job, shall be completely refinished. .3 All panelboards, pullboxes, and other electrical cabinets and boxes shall be

finished in grey enamel. 25. CONDUIT AND FITTINGS

- .1 All conduit shall be EMT thinwall type. be used in exterior locations only. ENT is not acceptable.
- .2Unless otherwise noted, conduit shall be concealed in all finished areas. In service areas, conduit shall be run on surface unless indicated otherwise.
- .3Surface mounted conduit shall be shall be concentric
- 4Raceways shall be installed free from dents and bruises and shall have their ends capped, plugged, or sealed as
- moisture. .5Fittings and couplings shall be steel
- .6In all areas subject to moisture, watertight fittings must be used.
- .7 All raceways, except where otherwise indicated, shall be sized in accordance with the NEC.
- .8Flexible metal conduit or TECK90 cable transformers, and motor controllers.

26. UNDERGROUND CONDUIT SYSTEMS AND TRENCHING

- .1 All underground conduit systems shall be of approved RPVC Schedule 40 conduit, complete with installed bonding depth required by code. .2Provide pull boxes and manholes as indicated on the drawings and at at
- every 200' length of conduit. Provide bell ends where conduits enter pullboxes and manholes.
- .3Provide 6" clean sand bedding above and 3" below conduits and continuous

- existing operations.

electrical installation. Structural members must not be cut without consent of the

of debris, boxes, packing, and other

finished condition to the satisfaction of

including but not limited to panelboards electrical cabinets, and breakers in CDP type panelboards with engraved lamacoid

include amp rating, phase and voltage.

on all feeders and branch circuits. Any Contractor and the circuits in question retested. The results of all final testing

immediately prior to final inspection and takeover, the Electrical Contractor shall and at distribution centres, load centres carried out by turning on all loads and

shall be applied over corrosion-resistant

PVC conduit or rigid metal conduit shall

installed parallel to structural lines, and, where bends occur in parallel runs, they

necessary to prevent entrance of dirt or

is be utilized for connections to motors,

conductor, and installed at or below the

marking tape 12" below grade. Provide suitable backfill and compaction .4Include in tender for excavation and trenching.

27. WIRE AND CABLE .1 All wire and cable shall be installed in

- conduit .2Lighting and receptacle drops from ceiling mounted distribution box may be
- AC90. AC90 runs in ceiling space shall not exceed 10' in length. .3All building wiring shall be copper,
- minimum conductor size #12AWG and insulation type THHN or THWN rated for 90 degC, except where noted otherwise. Solid conductor #12 and #10, stranded conductors #8 and larger
- .4 All conductors shall be colour coded throughout the installation as follows - Equipment grounding conductor -
- -Neutral conductor white -120/208V phase wires - red, black, and blue
- -120/240V phase wires red and black
- .5 All cables installed underground shall be wet location rated. .6Size all conductors for maximum 2%
- voltage drop. 28. OUTLET BOXES
- .10utlet boxes shall be electro-galvanized steel, sized as required by code. .2Confirm outlet locations and mounting heights with the project coordinator on
- site prior to installation. 29. LOCATION OF OUTLETS .1 The Engineer reserves the right to change the location of outlets to within 10' of points indicated on plans without
- extra charae, provided the Electrical Contractor is advised before installation is made. 30. PULLBOXES AND JUNCTION BOXES
- .1Supply and install pullboxes and junction boxes as required to suit job conditions and shall conform to National Electrical Code requirements
- .2A minimum of one pull box shall be installed for every 100' of conduit. .3No more than two 90 deg bends shall be allowed between pulling locations.
- .4Pullboxes and junction boxes shall be finished in grey enamel over corrosion-resistant primer with screw-on or hinged cover.
- 31. SWITCHES AND RECEPTACLES .1 All switches and receptacles shall be specification commercial grade in white unless otherwise noted.
- .2Duplex receptacles, NEMA type 5-20R, 125V, U ground. .3Switches shall be 20A, 125V, single
- pole, double pole, or three-way switches as indicated. .4Cover plates shall be white high impact
- nylon. .5Where duplex receptacles are exterior mounted or noted as "WP" provide weatherproof double lift spring-loaded cast aluminum cover plates, complete
- with gaskets. 32. SUPPORTS
- .1 All conduit, raceways, and other electrical equipment shall be securely with the National Electrical Code
- .2Where inserts are required in concrete, expansion inserts, lead shield inserts or plastic inserts shall be used in drilled holes. Shot driven pins may be used in structural concrete only with the permission of the Engineer.
- 33. DRY TYPE TRANSFORMERS
- .1Provide 480V:120/208V dry type enclosed floor mounted step-up/step-down transformers. wattage as indicated on the drawings.
- .2Mount transformers on vibration isolation pads. Provide wall mounted brackets and support .3Transformers shall be delta-wye
- configuration, 150 Deg C temperature rise. Insulation class 220 Deg C. .4Indoor mounted transformers shall be
- enclosed in NEMA3R ventilated, self cooled type fabricated from sheet steel with baked on gray enamel finish. .5Outdoor mounted transformers shall be
- housed in NEMA4X non-ventilated enclosures.
- .6Use flexible conduit to make connections to transformer.
- .7Perform tests in accordance with manufacturer's recommendations.
- 34. GROUNDING AND BONDING .1A complete grounding and bonding system shall be supplied and installed in accordance with the National Electrical Code and the Electrical Inspection
- Department. .2 All metal parts not carrying current, including but not limited to, secondary feeder circuits, transformers, electrical and mechanical equipment, panelboard enclosures, metal raceways, pull and junction boxes, shall be properly grounded. Metal raceways shall utilize double locknuts and other fittings where
- necessary to provide ground continuity. .3A separate areen insulated around conductor shall be installed in all raceway feeder runs, flexible conduit,
- and in conduit installed in slab or underground. .4Provide three 10' long copper ground
- rods and solid copper ground conductor and connect to main ground bus in Main Electrical Room.
- .5Ground buses shall be bare copper bar wall mounted on insulators on at 1' aff. $3" \times 1/4"$ copper bus in Main Electrical Room, $2" \times 1/4"$ in all other Electrical Rooms or Closets and Communications Rooms.

- .6Provide #3/0 AWG copper ufer ground loop run in building foundation and connected to structural steel. Terminate both ends of ground loop onto main ground bus.
- 35. STARTERS AND DISCONNECT SWITCHES .1Provide starters and disconnect switches for mechanical equipment as indicated in the Mechanical Equipment Schedule. .2Provide local isolating disconnect switches as required by NEC.
- .3Starters shall be magnetic type with HOA switch, green and red indicating ights, and overload devices sized to suit the load.
- 4Disconnect switches shall be rated 240V, with poles to suit. .5Starters and disconnect switches mounted outdoors shall be housed in
- NEMA4X enclosures. 36. PANELBOARDS AND BREAKERS .1Provide complete panelboard. Unless otherwise indicated new panelboard shal be 277/480V, 3ø, 4W or 120/240V, 1ø,
- 3W solid neutral design with sequence style copper bussing and full capacity neutral with bolt-on circuit breakers. Where double neutrals are indicated on the single line diagram, provide 200% rated neutral panelboards.
- 2Provide all circuit breakers indicated plus a minimum of 4x20A 1P spares in each panel. Circuit breakers to be rated minimum 10kAIC. Unless otherwise indicated.
- .3Panels shall be flush mounted in public areas and surface mounted in service rooms, all complete with all trim, lockable doors and installation hardware.
- 4Updated typewritten panel directories shall be provided for all panels. .5Utilize existing panelboards as indicated
- on the drawing. Reuse existing breakers where possible. Provide new breakers as required. Where new breakers are installed in existing panelboards, breaker manufacturer must match the panelboard manufacturer unless certified by approved testing agency.
- .6Balance panel load for each phase A, B, & C. Allow for relocating circuits within panel board to balance the load.
- 37. LIGHTING SYSTEMS AND CONTROLS .1Provide a complete and fully operational lighting system in conformance with code and UL listing requirements. Luminaires shall be in accordance with the luminaire types shown on the drawings and specifications in the luminaire schedule.
- .2All luminaires shall be complete with lamps, mounting brackets, ballasts, power supplies, and all necessary accessories.
- .3All luminaires shall be aligned, as appropriate, with one another and with structural lines. New and relocated luminaires shall be independently supported by the building structure (not supported by dropped ceilings unless written confirmation provided that the dropped ceiling has been designed and constructed to support the additional weight of the luminaries). Aim and adjust luminaires as directed by the Engineer.
- .4All luminaires shall be cleaned and lamped upon completion of work and prior to final acceptance. Utilize manufacturer's approved or
- 38. DATA/COMMUNICATIONS SYSTEM .1Data/communications cabling and
- equipment to be provided by Others.

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REVISION

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DATE:

DATE:

PROJECT NAME: Fort Hill Road Devonshire

ELECTRICAL

SPECIFICATIONS

SHEET TITLE:

SHEET NUMBER:

E10

RS

RS

<u>DESIGN</u>

PREPARED BY:

CHECKED BY:

CENTRAL AREA PUMP STATION

FORT PROSPECT

10/10/16 RS DRAWING PREPARED BY: DATE: 10/10/16 RS CHECKED BY: DATE: 10/10/16 RS APPROVED BY: DATE: RS 10/10/16 **PROJECT NUMBER:**

ISSUED FOR: -**AMENDMENTS:** I BY APP DATE NO | REVISION 10/10/16 SCALE: AS SHOWN SURVEY PREPARED BY: DATE:

WORKS & ENGINEERING Water Section PROFESS/0 No. 168 ELECTRICAL REMI SUBAIR BERMUDA

THE MINISTRY OF PUBLIC WORKS

P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295–5151

DEPARTMENT of