

FAULT CURRENT

AVAILABLE FAULT FROM 1,000KVA TRANSFORMERS "T3" AND "T4":

TRANSFORMER IMPEDANCES ARE: "T3"=5.49%, "T4"=5.64%

WORST CASE IS "T3" AT 5.49%:

AVAILABLE FAULT IS $1,000kVA / (0.48kV \times 1.732 \times 0.0549) = 21,910$ AMPERES AT THE TRANSFORMER SECONDARIES.

MAXIMUM MOTOR CONTRIBUTION FROM TWO 400HP MOTORS ON A TRANSFORMER IS $4(477A + 477A) = 3,816A$. THEREFORE, TOTAL AVAILABLE FAULT IS $21,910A + 3,816A = 25,726A$. ALL EQUIPMENT OPERATING AT 480 VOLTS ON TRANSFORMER "T3" OR "T4" SHALL BE RATED FOR A 30,000A FAULT, MINIMUM.

AVAILABLE FAULT FROM 750KVA TRANSFORMER "T5":

TRANSFORMER IMPEDANCE IS 5.67%:

AVAILABLE FAULT IS $750kVA / (0.48kV \times 1.732 \times 0.0567) = 15,910$ AMPERES AT THE TRANSFORMER SECONDARY.

MAXIMUM MOTOR CONTRIBUTION, ASSUMING WORST CASE THAT 100% OF TRANSFORMER CAPACITY IS MOTOR LOAD, IS $4(902A) = 3,608A$. THEREFORE, TOTAL AVAILABLE FAULT IS $15,910A + 3,608A = 19,518A$. ALL EQUIPMENT OPERATING AT 480 VOLTS ON TRANSFORMER "T5" SHALL BE RATED FOR A 22,000A FAULT, MINIMUM.

AVAILABLE FAULT AT PANEL "HV1":

AVAILABLE FAULT AT PANEL "HV" (Ip) = 19,518A (FROM ABOVE)

FAULT AT PANEL "HV1", BUSS METHOD:

$f = (1.732 \times L \times Ip) / (C \times E)$

L=160 FEET OF #1 AWG TO LOAD

Ip=19,518A

C=7,292 FOR #1

E=480V

$f = (1.732 \times 160 \times 19,518) / (7,292 \times 480) = 1.545$

$M = 1 / (1 + f) = 1 / (1 + 1.545) = 0.393$

I at load = Ip x M = 19,518 x 0.393 = 7,671A

PANEL "HV1" AND ASSOCIATED COMPONENTS SHALL BE RATED FOR A 10,000A FAULT, MINIMUM.

AVAILABLE FAULT FROM 75kVA TRANSFORMER "T6" (FEEDING PANEL "LV"):

TRANSFORMER IMPEDANCE IS 4.1%:

AVAILABLE FAULT IS $75kVA / (0.208kV \times 1.732 \times 0.041) = 5,078$ AMPERES AT THE TRANSFORMER SECONDARY.

MAXIMUM MOTOR CONTRIBUTION, ASSUMING WORST CASE THAT 100% OF TRANSFORMER CAPACITY IS MOTOR LOAD, IS $4(208A) = 832A$. THEREFORE, TOTAL AVAILABLE FAULT IS $5,078A + 832A = 5,910A$. ALL EQUIPMENT OPERATING ON TRANSFORMER "T6" AND PANEL "LV" SHALL BE RATED FOR A 10,000A FAULT, MINIMUM.

LOAD SUMMARY

LOAD ON TRANSFORMERS "T3" AND "T4" (AT 480 VOLT, 3 PHASE):	TOTAL LOAD
SEWAGE PUMP (400HP)	583.8A*
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TOTAL	1,167.6A
	2,335.2A

*NEC SECTION 430.122(A) REQUIRES CIRCUIT CONDUCTORS TO BE SIZED FOR 125% OF THE RATED INPUT CURRENT OF ADJUSTABLE SPEED EQUIPMENT. DRIVE INPUT CURRENT = $467A \times 125\% = 583.8A$ DESIGN LOAD.

THE 700 AMPERE CIRCUIT CAPACITY TO EACH PUMP IS ADEQUATE FOR THE 583.8 AMPERE LOAD. THE 1,203 AMPERE TRANSFORMER CAPACITY IS ADEQUATE FOR THE 1,167.6 AMPERE TOTAL LOAD.

LOAD ON TRANSFORMER "T5" FOR MCC1 (AT 480 VOLT, 3 PHASE):

SUMP PUMP 1 (1HP)	2.1A
SUMP PUMP 2 (1HP)	2.1A
AERATION BLOWER 1 (75HP)	96.0A
AERATION BLOWER 2 (60HP)	77.0A
COMMUNICATOR 1 (5HP)	7.6A
COMMUNICATOR 2 (5HP)	7.6A
MOTOR ROOM HOIST (1.5HP)	3.0A
AERATION ROOM HOIST (1.5HP)	3.0A
PUMP ROOM HOIST (1.5HP)	3.0A
MANIFOLD ROOM HOIST (2.4HP)	4.8A
INSTRUMENT AIR COMPRESSOR 1 (0.5HP)	1.1A
INSTRUMENT AIR COMPRESSOR 2 (0.5HP)	1.1A
EVAPORATIVE COOLER 1 (5HP)	7.6A
EVAPORATIVE COOLER 2 (5HP)	7.6A
EVAPORATIVE COOLER 3E (1.5HP)	3.0A
EVAPORATIVE COOLER 4E (1.5HP)	3.0A
EVAPORATIVE COOLER 5 (1.5HP)	3.0A
EVAPORATIVE COOLER 6 (3HP)	4.8A
EVAPORATIVE COOLER 7 (1HP)	2.1A
EVAPORATIVE COOLER 8 (5HP)	7.6A
EXHAUST FAN 3 (3HP)	4.8A
EXHAUST FAN 4 (3HP)	4.8A
SURGE TANK COMPRESSOR (5HP)	7.6A
SHOP AIR COMPRESSOR (1.5HP)	3.0A
A/C UNITS (3@21.5A)	104.7A
PANEL "LV" (75kVA, 3Ø TRANSFORMER)	90.2A
PANEL "HV" (SEE SHEET E12)	157.4A
SUBTOTAL	619.6A
25% LARGEST MOTOR (75HP)	24.0A
TOTAL	643.6A

800 AMPERE CIRCUIT CAPACITY OF MCC-1 IS ADEQUATE

LOAD ON SERVICE (AT 13,800 VOLT, 3 PHASE):

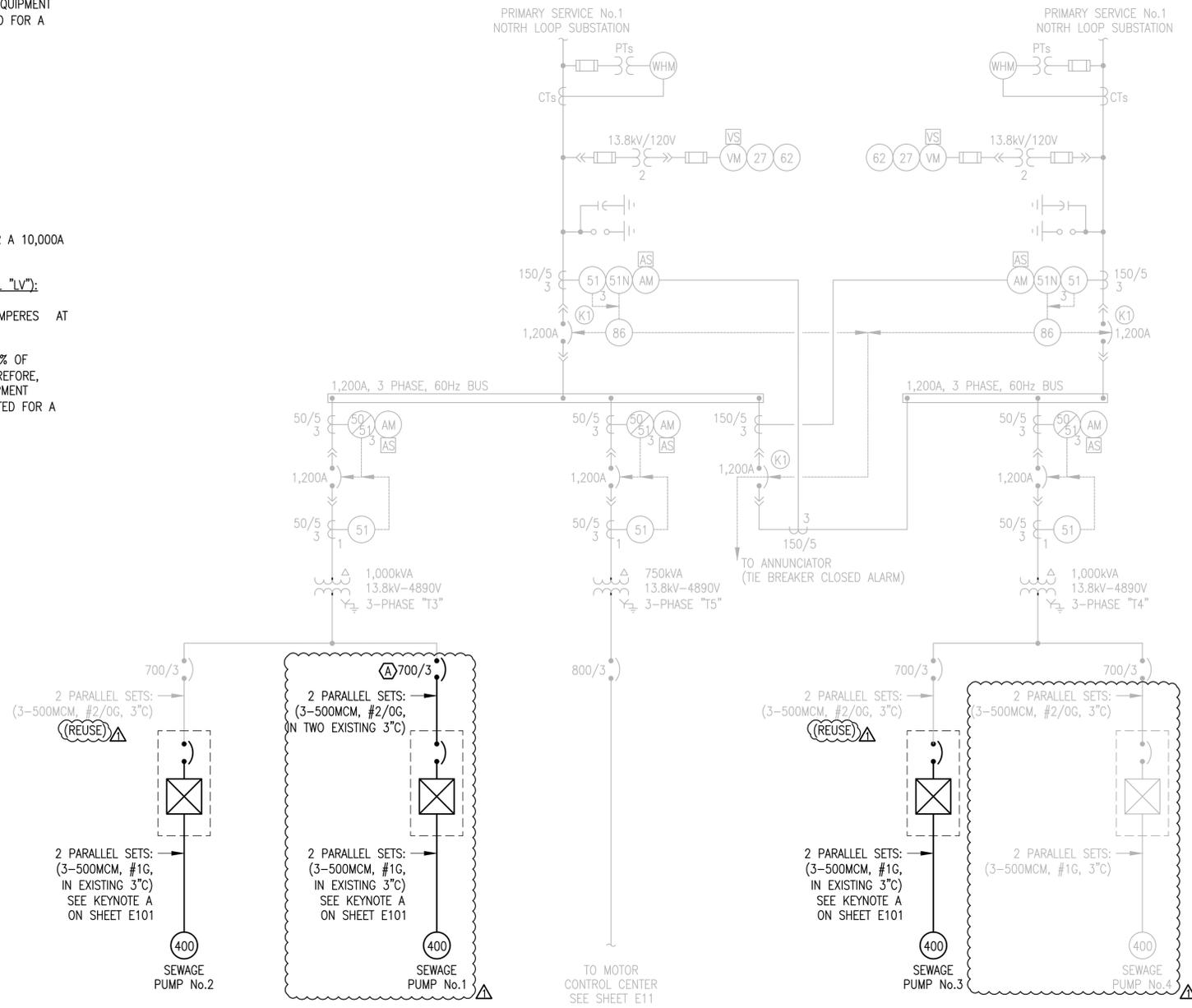
TOTAL LOAD AT 480 VOLT, 3Ø	2,978.8A
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TOTAL LOAD ON 13,800 VOLT SERVICE IS:
 $2,978.8A \times 480V / 13,800V = 104.3A$

1,200 AMPERE SERVICE CAPACITY IS ADEQUATE

KEYNOTES

- A. EXISTING 900 AMPERE CIRCUIT BREAKER FOR PUMP NO.1 IS LOCATED INSIDE TRANSFORMER "T3". IT IS CUTLER-HAMMER CAT. ND312T33W. REPLACE EXISTING 900A RATING PLUG WITH A 700A RATING PLUG CAT. 12NE8700T.



DESIGNED BY:	R.P.C.
DRAWN BY:	R.P.C.
CHECKED BY (DESIGN):	M.F.T.
CHECKED BY (FIELD ENG):	
FIELD BOOK NO.:	

PIMA COUNTY
REGIONAL WASTEWATER RECLAMATION DEPARTMENT

PIMA COUNTY
WASTEWATER RECLAMATION
 201 North Stone Avenue * Tucson, Arizona 85701-1207 * Phone: (520) 740-6500

CONTINENTAL RANCH REGIONAL PUMP STATION UPGRADE DESIGN MAIN SWITCHGEAR SINGLE LINE DIAGRAM

R-2014-079
G-2014-078

Date: SEPT. 8, 2015

HORIZ.: N/A
VERT.: N/A

SHEET NO.: E10
59 OF 91

RICHARD CANNAY ENGINEERING
 12381 E FORT LOWELL ROAD
 TUCSON, ARIZONA 85749
 PHONE: (520) 615-8006
 FAX: (520) 615-6495
 E-MAIL: canney@att.net