**SERVICE CALCULATION (CEC RULE 70)**

| ITEM # | DESCRIPTION | | LOAD WATTS | TOTAL LOAD - WATTS |
|---|---|---|---|---|
| 1 | **DETERMINE LOADS** | | | |
| | 2 - LS-15R RECEPTACLE | 12A x 120V | 1,440 | 2,880 |
| | 22 - LS-20R RECEPTACLE | 16A x 120V | 1,920 | 42,240 |
| | 2 - 6-50R WINCH RECEPTACLES | 40A x 240V | 9,600 | 19,200 |
| | 5 - 6-50R BUYER OUTLETS | 40A x 240V | 9,600 | 48,000 |
| | 1 - 6-50R MAIL-OUT RECEPT | 40A x 240V | 9,600 | 9,600 |
| | 1 - 6-50R ELEC BLDG OUTLET | 40A x 240V | 9,600 | 9,600 |
| | 16 - 400W HPS LIGHT POLE | 3 x 480W OR 2 x 480W | 1,440/960 | 7,680 |
| | 1 - 5KW ELECT BLDG HEATER | 5000 | 5,000 | 5,000 |
| | 1 - LIGHTING CONTACTOR | 200 | 200 | 200 |
| | | TOTAL CONNECTED LOAD | | 144,400 |
| 2 | **FEEDER LOADS** | | | |
| | 1. 4 HIGHEST RATED RECEPTACLES AT 100% | | | |
| | 4-50A RECEPTACLES | 4 x 40A x 240V x 100% | 9,600 | 38,400 |
| | 2. NEXT 4 HIGHEST RATED RECEPTACLES AT 65% | | | |
| | 4-50A RECEPTACLES | 4 x 40A x 240V x 65% | 6,240 | 24,960 |
| | 3. NEXT 5 HIGHEST RATED RECEPTACLES AT 50% | | | |
| | 1-40A RECEPTACLE | 1 x 40A x 240V x 50% | 4,800 | |
| | 4-20A RECEPTACLES | 4 x 16A x 120V x 50% | 3,840 | 8,640 |
| | 4. NEXT 16 HIGHEST RATED RECEPTACLES AT 25% | | | |
| | 16-20A RECEPTACLES | 16 x 16A x 120V x 25% | 7,680 | 7,680 |
| | 5. NEXT 20 HIGHEST RATED RECEPTACLES AT 20% | | | |
| | 2-20A RECEPTACLES | 2 x 16A x 120V x 20% | 768 | |
| | 2-15A RECEPTACLES | 2 x 12A x 120V x 20% | 576 | 1,344 |
| | 6. 16 x 480W HPS LIGHT POLES @ 100% | | 7,680 | 7,680 |
| | 6. HEATER IN ELECTRICAL ROOM 5KW @ 240V x 100% | | 5,000 | 5,000 |
| | 7. LIGHTING CONTACTOR | | 200 | 200 |
| | | TOTAL | | 93,904 |
| 3 | **ADD 25% SPARE CAPACITY FOR FUTURE LOADS** | | | |
| | 93,904 x 25% | | | 23,476 |
| | | TOTAL | | 117,380 |
| 4 | **DETERMINE SERVICE SIZE OF PANEL 'A'** | | | |
| | 117,380W/240V = 489A x 1.25 = 611A | | | |
| | **SERVICE FOR PANEL 'A' TO BE 800A, 120/240V, 1ϕ, 3W** | | | |
| | **MINIMUM CONDUCTOR SIZE TABLE 2 - 2 RUNS 3#350 MCM** | | | |
| 5 | **WEST WHARF 407 HAS A LOAD OF 87A AT 240V, 1ϕ** | | | |
| 6 | **EAST WHARF 403 HAS A LOAD OF 123A AT 240V, 1ϕ** | | | |
| 7 | **MARGINAL WHARF 406/409 HAS A LOAD OF 391A AT 240V, 1ϕ** | | | |
| 8 | **COMBINED WHARVES HAVE A LOAD OF 458A AT 240V, 1ϕ** | | | |
| 9 | **COMBINED WHARF AT 80% DERATING OF 800A M.C.B. HAS A LOAD OF 573A AND ALLOWING FOR 25% EXPANSION HAS A LOAD OF 716A.** | | | |

**PANEL 'A' - VOLTAGE DROP/WIRE SIZE CALCULATIONS**

| RECEPTACLE/ LOAD WATTS | RATING AMPS | VOLTS | CIRCUIT | RATED CURRENT | DISTANCE METER (m) | VOLTAGE DROP | WIRE SIZE |
|---|---|---|---|---|---|---|---|
| R1/1440 | 15 | 120 | A-8 | 12 | 3 | <3% | 2#12 |
| R2/1440 | 15 | 120 | A-10 | 12 | 3 | <3% | 2#12 |
| R3/1920 | 20 | 120 | A-5 | 16 | 40 | <3% | 2#8 |
| R4/1920 | 20 | 120 | A-11 | 16 | 40 | <3% | 2#8 |
| R5/1920 | 20 | 120 | A-21 | 16 | 75 | <3% | 2#6 |
| R6/1920 | 20 | 120 | A-23 | 16 | 75 | <3% | 2#6 |
| R7/1920 | 20 | 120 | A-29 | 16 | 75 | <3% | 2#6 |
| R8/1920 | 20 | 120 | A-31 | 16 | 75 | <3% | 2#6 |
| R9/1920 | 20 | 120 | A-37 | 16 | 100 | <3% | 2#4 |
| R10/1920 | 20 | 120 | A-39 | 16 | 100 | <3% | 2#4 |
| R11/1920 | 20 | 120 | A-41 | 16 | 100 | <3% | 2#4 |
| R12/1920 | 20 | 120 | A-43 | 16 | 100 | <3% | 2#4 |
| R13/1920 | 20 | 120 | A-49 | 16 | 125 | <3% | 2#3 |
| R14/1920 | 20 | 120 | A-51 | 16 | 125 | <3% | 2#3 |
| R15/1920 | 20 | 120 | A-57 | 16 | 125 | <3% | 2#3 |
| R16/1920 | 20 | 120 | A-59 | 16 | 125 | <3% | 2#3 |
| R17/1920 | 20 | 120 | A-38 | 16 | 150 | <3% | 2#3 |
| R18/1920 | 20 | 120 | A-40 | 16 | 150 | <3% | 2#3 |
| R19/1920 | 20 | 120 | A-42 | 16 | 150 | <3% | 2#3 |
| R20/1920 | 20 | 120 | A-44 | 16 | 150 | <3% | 2#3 |
| R21/1920 | 20 | 120 | A-50 | 16 | 175 | <3% | 2#2 |
| R22/1920 | 20 | 120 | A-52 | 16 | 175 | <3% | 2#2 |
| R23/1920 | 20 | 120 | A-58 | 16 | 175 | <3% | 2#2 |
| R24/1920 | 20 | 120 | A-60 | 16 | 175 | <3% | 2#2 |
| | | | | | | | |
| W01/9600 | 50 | 240 | A-12,14 | 40 | 3 | <3% | 3#8 |
| W02/9600 | 50 | 240 | A-1,3 | 40 | 40 | <3% | 3#8 |
| W1/9600 | 50 | 240 | A-13,15 | 40 | 70 | <3% | 3#6 |
| B1/9600 | 50 | 240 | A-17,19 | 40 | 75 | <3% | 3#6 |
| B2/9600 | 50 | 240 | A-33,35 | 40 | 100 | <3% | 3#3 |
| B3/9600 | 50 | 240 | A-45,47 | 40 | 125 | <3% | 3#3 |
| B4/9600 | 50 | 240 | A-34,36 | 40 | 150 | <3% | 3#2 |
| B5/9600 | 50 | 240 | A-46,48 | 40 | 175 | <3% | 3#1 |
| W2/9600 | 50 | 240 | A-62,64 | 40 | 185 | <3% | 3#1 |
| | | | | | | | |
| LIGHT L1/960 | 15 | 120 | A-7 | 8 | 50 | <3% | 2#10 |
| LIGHT L1/480 | 15 | 120 | A-9 | 4 | 50 | <3% | 2#12 |
| LIGHT L2/960 | 15 | 120 | A-25 | 8 | 85 | <3% | 2#8 |
| LIGHT L2/480 | 15 | 120 | A-27 | 4 | 85 | <3% | 2#10 |
| LIGHT L3/960 | 15 | 120 | A-53 | 8 | 135 | <3% | 2#6 |
| LIGHT L3/480 | 15 | 120 | A-55 | 4 | 135 | <3% | 2#8 |
| LIGHT L4/960 | 15 | 120 | A-54 | 8 | 185 | <3% | 2#6 |
| LIGHT L4/480 | 15 | 120 | A-56 | 4 | 185 | <3% | 2#6 |
| LIGHT P7B/960 | 15 | 120 | A-61 | 8 | 125 | <3% | 2#6 |
| LIGHT P7A/960 | 15 | 120 | A-66 | 8 | 215 | <3% | 2#4 |
| | | | | | | | |
| CONTACTOR/200 | 15 | 120 | A-2 | 1.7 | 3 | <3% | 2#12 |
| HEATER/5KW | 30 | 240 | A-4,6 | 21 | 3 | <3% | 2#10 |

**1 E3 SERVICE & VOLTAGE DROP CALCULATIONS**
SCALE N.T.S.

SCALE : N.T.S.

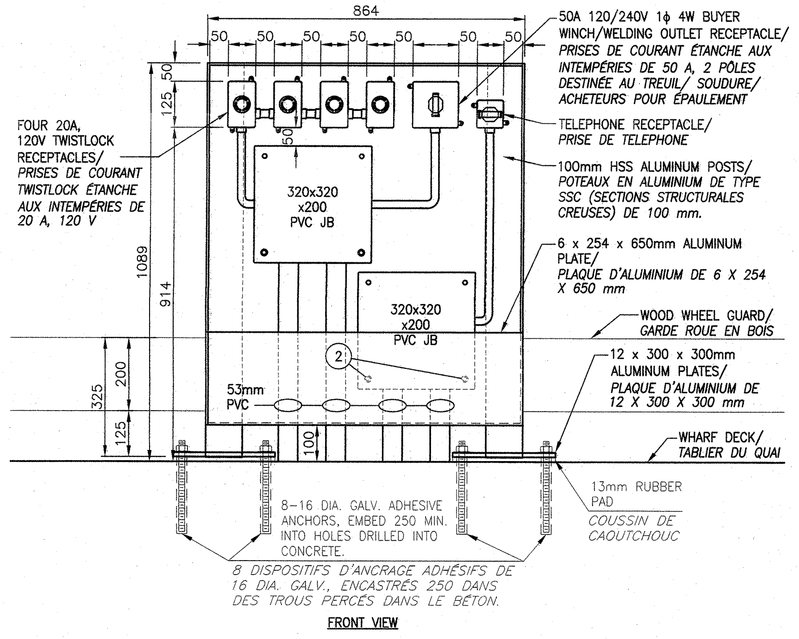
**PANEL: A**

POWER SUPPLY:120/240V,1PH,3W
MAINS:800A
NUMBER OF CCTS: 84

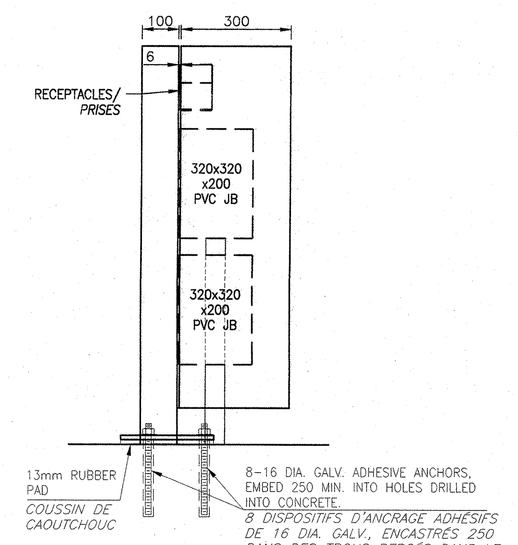
| DESCRIPTION | WATTAGE A | WATTAGE B | # P | BKR AMP | CIRCUIT | | | BKR AMP | # P | WATTAGE A | WATTAGE B | DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POLE L1 | 4800 | | 2 | 50 | 1 | a | 2 | 15 | 1 | 200 | | CONTACTOR - PHOTOCELL |
| WELDING OUTLET W02 | | 4800 | | | 3 | b | 4 | 30 | 2 | | 2500 | ELECTRICAL BUILDING |
| GFI POLE L1 - RECEPT R3 | 1920 | | 1 | 20 | 5 | a | 6 | | | 2500 | | 5 KW HEATER |
| POLE L1 - FULL LTH | | 960 | 1 | 15 | 7 | b | 8 | 20 | 1 | | 1440 | ELECT BLDG - RECEPT R1 GFI |
| POLE L1 - SEASONAL LTH | 480 | | 1 | 15 | 9 | a | 10 | 20 | 1 | 1440 | | ELECT BLDG - RECEPT R2 GFI |
| GFI POLE L2 - RECEPT R4 | | 1920 | 1 | 20 | 11 | b | 12 | 50 | 2 | | 4800 | ELECTRICAL BUILDING |
| WINCH W1 | 4800 | | 2 | 50 | 13 | a | 14 | | | 4800 | | WELDING OUTLET W01 |
| | | 4800 | | | 15 | b | 16 | 20 | 1 | | | |
| POLE L2 | 4800 | | 2 | 50 | 17 | a | 18 | 20 | 1 | | | |
| BUYERS OUTLET B1 | | 4800 | | | 19 | b | 20 | 20 | 1 | | | |
| GFI POLE L2 - RECEPT R5 | 1920 | | 1 | 20 | 21 | a | 22 | 20 | 1 | | | |
| GFI POLE L2 - RECEPT R6 | | 1920 | 1 | 20 | 23 | b | 24 | 20 | 1 | | | |
| POLE L2 - FULL LTH | 1920 | | 1 | 15 | 25 | a | 26 | 20 | 1 | | | |
| POLE L2 - SEASONAL LTH | | 1920 | 1 | 15 | 27 | b | 28 | | | | | |
| GFI POLE L2 - RECEPT R7 | 1920 | | 1 | 20 | 29 | a | 30 | | | | | |
| GFI POLE L2 - RECEPT R8 | | 1920 | 1 | 20 | 31 | b | 32 | | | | | |
| SHROUD S1 | 4800 | | 2 | 50 | 33 | a | 34 | 50 | 2 | 4800 | | SHROUD S2 |
| BUYERS OUTLET B2 | | 4800 | | | 35 | b | 36 | | | | 4800 | BUYERS OUTLET B4 |
| GFI SHROUD S1 - RECEPT R9 | 1920 | | 1 | 20 | 37 | a | 38 | 20 | 1 | 1920 | | SHROUD S2 - RECEPT R17 GFI |
| GFI SHROUD S1 - RECEPT R10 | | 1920 | 1 | 20 | 39 | b | 40 | 20 | 1 | | 1920 | SHROUD S2 - RECEPT R18 GFI |
| GFI SHROUD S1 - RECEPT R11 | 1920 | | 1 | 20 | 41 | a | 42 | 20 | 1 | 1920 | | SHROUD S2 - RECEPT R19 GFI |
| GFI SHROUD S1 - RECEPT R12 | | 1920 | 1 | 20 | 43 | b | 44 | 20 | 1 | | 1920 | SHROUD S2 - RECEPT R20 GFI |
| POLE L3 | 4800 | | 2 | 50 | 45 | a | 46 | 50 | 2 | 4800 | | POLE L4 |
| BUYERS OUTLET B3 | | 4800 | | | 47 | b | 48 | | | | 4800 | BUYERS OUTLET B5 |
| GFI POLE L3 - RECEPT R13 | 1920 | | 1 | 20 | 49 | a | 50 | 20 | 1 | 1920 | | POLE L4 - RECEPT R21 GFI |
| GFI POLE L3 - RECEPT R14 | | 1920 | 1 | 20 | 51 | b | 52 | 20 | 1 | | 1920 | POLE L4 - RECEPT R22 GFI |
| POLE L3 - FULL LHTH | 960 | | 1 | 15 | 53 | a | 54 | 15 | 1 | 960 | | POLE L4 - FULL LTH |
| POLE L3 - SEASONAL LTH | | 480 | 1 | 15 | 55 | b | 56 | 15 | 1 | | 480 | POLE L4 - SEASONAL LTH |
| GFI POLE L3 - RECEPT R15 | 1920 | | 1 | 20 | 57 | a | 58 | 20 | 1 | 1920 | | POLE L4 - RECEPT R23 GFI |
| GFI POLE L3 - RECEPT R16 | | 1920 | 1 | 20 | 59 | b | 60 | 20 | 1 | | 1920 | POLE L4 - RECEPT R24 GFI |
| LIGHT POLE P7B | 960 | | 1 | 15 | 61 | a | 62 | 50 | 2 | 4800 | | WINCH W2 |
| 5HP 20A | | 3360 | 2 | 50 | 63 | b | 64 | | | | 4800 | |
| WELL PUMP | 3360 | | | | 65 | a | 66 | 25 | 1 | 960 | | LIGHT POLE P7A |
| | | | 2 | 30 | 67 | b | 68 | | | | | |
| | | | | | 69 | a | 70 | | | | | |
| | | | 2 | 40 | 71 | b | 72 | | | | | |
| | | | | | 73 | a | 74 | | | | | |
| | | | 2 | 50 | 75 | a | 76 | | | | | |
| | | | | | 77 | a | 78 | | | | | |
| | | | | | 79 | b | 80 | | | | | |
| | | | | | 81 | a | 82 | | | | | |
| | | | | | 83 | b | 84 | | | | | |
| PHASE LOADS-CHARGE/PHASE: | 45150 | 44160 | | | | | | | | 32940 | 31320 | |
| TOTAL LOAD-CHARGE TOTALS: | 28+95 | | | | | | | | | | | |
| TOTAL PHASE LOADS | 78090 | 75460 | | | | | | | | | | (*) - SWITCHING BREAKER |
| +/- 5% | 73119 | 80614 | | | | | | | | | | (GFI) - GROUND FAULT INTERRUPTING |
| CURRENT (A) @ 240V: | 640 | | | | | | | | | | | (+) - LOCKING BREAKER |

**2 E3 PANEL SCHEDULES**
SCALE N.T.S.

SCALE : N.T.S.



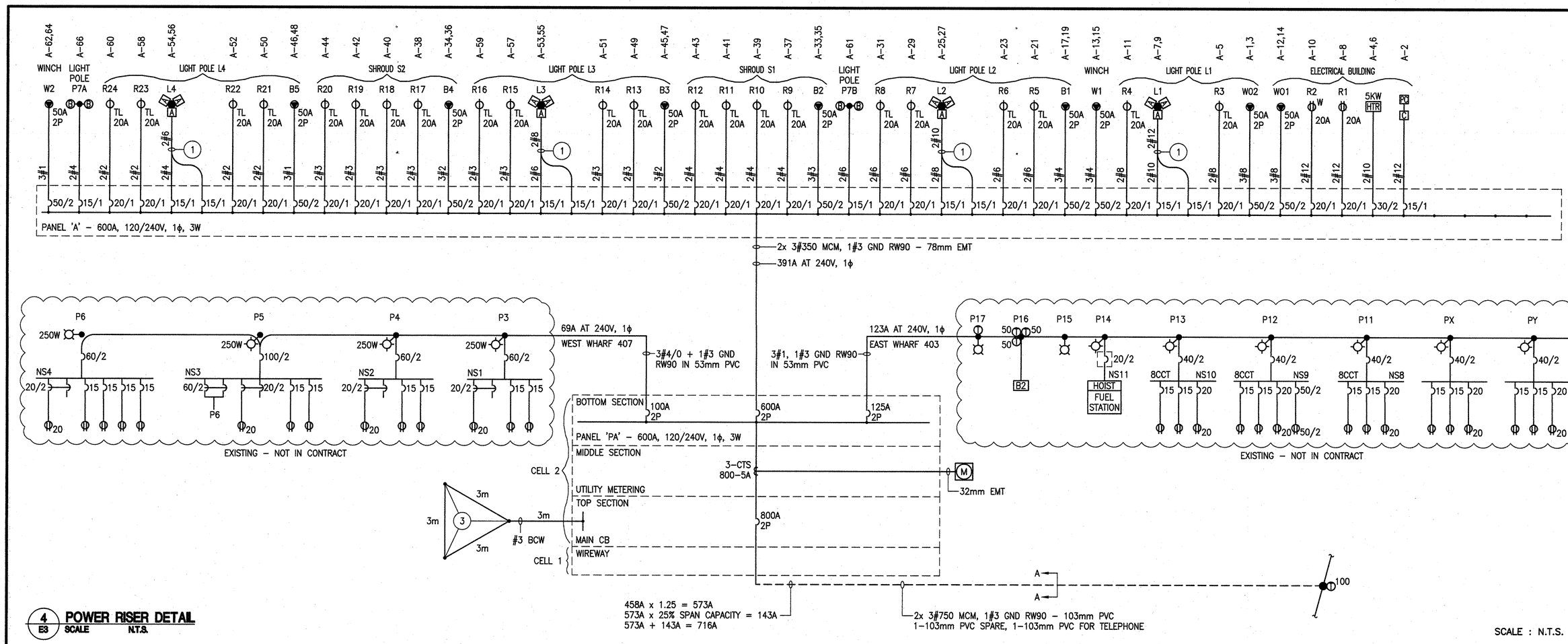

FRONT VIEW




FRONT VIEW

**3 E3 SHROUD DETAIL S1 & S2**
SCALE 1:10

SCALE/ÉCHELLE: 1:10
0mm 100 200 300 400 500 600 700 800 900 1000mm




**4 E3 POWER RISER DETAIL**
SCALE N.T.S.

SCALE : N.T.S.

| NOTES | NOTES | NOTES | NOTES |
|---|---|---|---|
| 1. CONTRACTOR TO RUN ONE (1) EXTRA #12 RW90 WIRE WITH CIRCUITS FOR 24 HOUR POWER FOR FUTURE CCTV CAMERA CONNECTIONS AT TOP OF POLE. | | | |
| 2. PROVIDE 25mm HOLES IN PLATE TO ACCESS JUNCTION BOX SCREWS. | | | |
| 3. 19mm DIA. x 3M LONG COPPER GROUND ROD DRIVEN WITH TOP OF GROUND ROD 1M BELOW GRADE. BOND TO #3 GROUND WIRE WITH COMPRESSION FITTINGS. | | | |

Public Works and Government Services Canada / Travaux Publics et Services gouvernementaux Canada

electrical consultant

RSEL
Electrical Consulting Engineers
564 Prospect St, Fredericton, NB Canada E3B 9M3 • 506.451.0005
rsmith@rsel.nb.ca

North / Nord

Stamp / Etampe
REGISTERED PROFESSIONAL ENGINEER Ralph A. Smith PROVINCE OF NEW BRUNSWICK

| revisions | description | date |
|---|---|---|
| 1 | ISSUED FOR TENDER | 2015.05.25 |

project / projet
**WHARF RECONSTRUCTION STRUCTURES 406 & 409 POINTE-SAPIN**
KENT COUNTY, N.B.

drawing / dessin
**ELECTRICAL POWER SYSTEMS LAYOUTS & DETAILS**

| | | |
|---|---|---|
| designed | RALPH SMITH, P.ENG | conçu |
| date | 2015.05.25 | |
| drawn | JODI PARKER | dessiné |
| date | 2015.05.25 | |
| approved | RALPH SMITH, P.ENG | approuvé |
| date | 2015.05.25 | |
| Tender | | Soumission |
| PWGSC Project Manager | Administrateur de projets TPSGC | |

project number / no. du projet
**R.074536.001**

drawing no. / no. du dessin
**E3 of 6**
1457

PWGSC B1 (2004)

E-DRM/GDD-E: 503283