

**BUILDINGS SPECIFICATIONS AND GENERAL NOTES**

**ROOF TYPE & SLOPE**

GABLE 4:12  
 SHED 3:12  
 N/A  
 OTHER \_\_\_\_\_

**VAPOUR BARRIER**

N/A  
 4 MIL  
 6 MIL  
 TUCK TAPE  
 OTHER \_\_\_\_\_

NOTES: \_\_\_\_\_

**BUILDING VENTILATION**

**LOUVERS**  
 N/A  
 12' X 12' MANUALLY ADJ.  
 18' X 18' MANUALLY ADJ.  
 24' X 24' MANUALLY ADJ.  
 OTHER \_\_\_\_\_  
 w/LOUVER HOOD  
 w/LOUVER HOOD  
 w/LOUVER HOOD

**FANS**  
 N/A  
 12' X 12' EXHAUST FAN  
 24' X 24' EXHAUST FAN  
 OTHER \_\_\_\_\_  
 XP 12 - 1 120 / 1 / 60  
 XP 24 - 1 120 / 1 / 60

ALL FANS c/w HOOD AND BIRD SCREEN  
 HVAC  
 HEATERS

NOTES: HVAC OPENINGS 1- 20" x 20", 4-16" X 16" C/W HOODS

**ROOF VENTILATION**

RIDGE VENT  
 6' THROAT x \_\_\_\_\_ LENGTH  
 9' THROAT x \_\_\_\_\_ LENGTH

CHAIN OPERATED w/MANUAL DAMPER AND BIRD SCREEN  
 WHIRLYBIRD  
 ROOF VENTS  
 OTHER \_\_\_\_\_

**MATERIAL & BUILDING COLOUR**

ASTM-A653 / A792 SS GRADE 37 22 GAUGE STEEL PREPATED

WALL REGENT GRAY (QC8730) ROOF REGENT GRAY (QC8730)  
 TRIM REGENT GRAY (QC8730) DOOR REGENT GRAY (QC8730)

ASTM A792SS GRADE 37 AZ 50 22 GAUGE GALVALUME

WALL GALVALUME ROOF GALVALUME  
 TRIM GALVALUME DOOR WARM GRAY

NOTES: \_\_\_\_\_

**WALL THICKNESS**

INTERLOCKING STRUCTURAL RIB PANELS  
 3 1/2"  2" Z CHANNEL  
 4 1/2"  DRYWALL OR OTHERS  
 5 1/2"

FINAL WALL THICKNESS (INCHES) **5 1/2**

NOTES: \_\_\_\_\_

**FOUNDATION**

BY OTHERS  SKID (STEEL)  
 BY METALEX  CONCRETE  
 SKID SKIRTING 22ga  
 SKID BACKSHEETING 18ga  UNDER SKID INSULATION

NOTES: \_\_\_\_\_

**DESIGN DATA**

N/A APPROXIMATE BUILDING WEIGHT: 16547 LBS  
 P-ENG DWGS REQUIRED

GROUND SNOW= 1.7 kPa WIND 1/10 = 0.24 kPa  
 RAIN SURCHARGE= 0.1 kPa WIND 1/50 = 0.36 kPa

**INTERIOR LINING**

N/A  
 WHITE  
 PLAIN  
 24 GA FLUTED ALUM  20 GA 10% PERF. ALUM  
 22 GA FLUTED STEEL  20 GA 33% PERF. ALUM

NOTES: \_\_\_\_\_

**WINDOWS**

N/A  
 38" X 36" DBL. GLAZED  
 48" X 36" DBL. GLAZED

SLIDING c/w SCREEN AND WINDOW FLASHING w/DRIP

NOTES: \_\_\_\_\_

**OTHERS**

2 EAVESTROUGH PAINTED REGENT GRAY (QC8730)  
 4 DOWNSPOUT PAINTED REGENT GRAY (QC8730)  
 2 STEEL ICE RAKE PAINTED REGENT GRAY (QC8730)  
 9 TIE ROD ANGLE 2" x 2"  9 TIE ROD EXT.

ROOF TRUSSES  
 PARTITION WALL  
 VESSEL CUT OUT \_\_\_\_\_ DIAM.  
 REMOVABLE WALL PANEL  
 REMOVABLE ROOF PANEL  
 RIB STIFFENERS FOR GABLE WALLS  RIB STIFFENERS FOR ROOF OR INSULATION RIB 18ga  
 CONTAINMENT FLASHING

NOTES: ADD APPROXIMATELY 8 METERS OF DOWNSPOUT (SHIP LOOSE)

**GENERAL NOTES**

INCLUDE 7 HVAC OPENINGS AND 5 CABLE TRAY OPENINGS

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**INSULATION**

BUILDING  
 N/A  OTHER \_\_\_\_\_  
 FIBERGLASS  
 ROXUL RHT 40

WALLS  
 R12  R12  
 R20  R20  
 R24  R24  
 R32  R32  
 R36  R36

ROOF  
 R12  R12  
 R20  R20  
 R24  R24  
 R32  R32  
 R36  R36

VESSEL INSULATION  
 N/A  0.020 PLAIN CORRUGATED ALUM.  
 1.5" FIBERGLASS  OTHER \_\_\_\_\_

NOTES: \_\_\_\_\_

**DOORS**

3' X 7' 20 GA STEEL HC  6' X 7' 20 GA STEEL HC  
 3' X 7' 20 GA STEEL PU  6' X 7' 20 GA STEEL PU  
 3' X 7' 18 GA STEEL PS  2 6' X 7' 16 GA STEEL PS  
 c/w IWG WINDOW, CHECK CHAIN, WEATHER STRIPPING and

6 CANOPY 20 ga steel galvaneal finished - Painted REGENT GRAY (QC8730)  
 2 doubles, 3 singles & approximately 2 custom size

2 HYDRAULIC CLOSURE  EXPANDABLE FRAME  
 SNIFFER PORT  KICK PLATE  
 2 REMOV. TRANSOM PANEL 31 1/2" HIGH  
 ROLL UP DOOR  
 OVER HEAD DOOR  
 2 OTHER 88TP PANIC HARDWARE

NOTES: \_\_\_\_\_

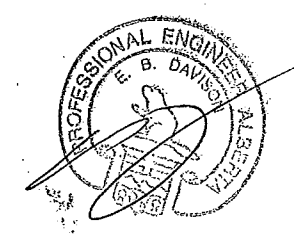
**OTHERS**

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 CONTAINMENT FLASHING

NOTES: ADD APPROXIMATELY 8 METERS OF DOWNSPOUT (SHIP LOOSE)

**P-ENG STAMP**



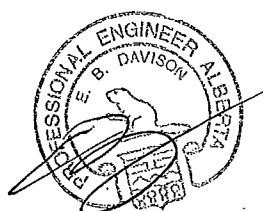
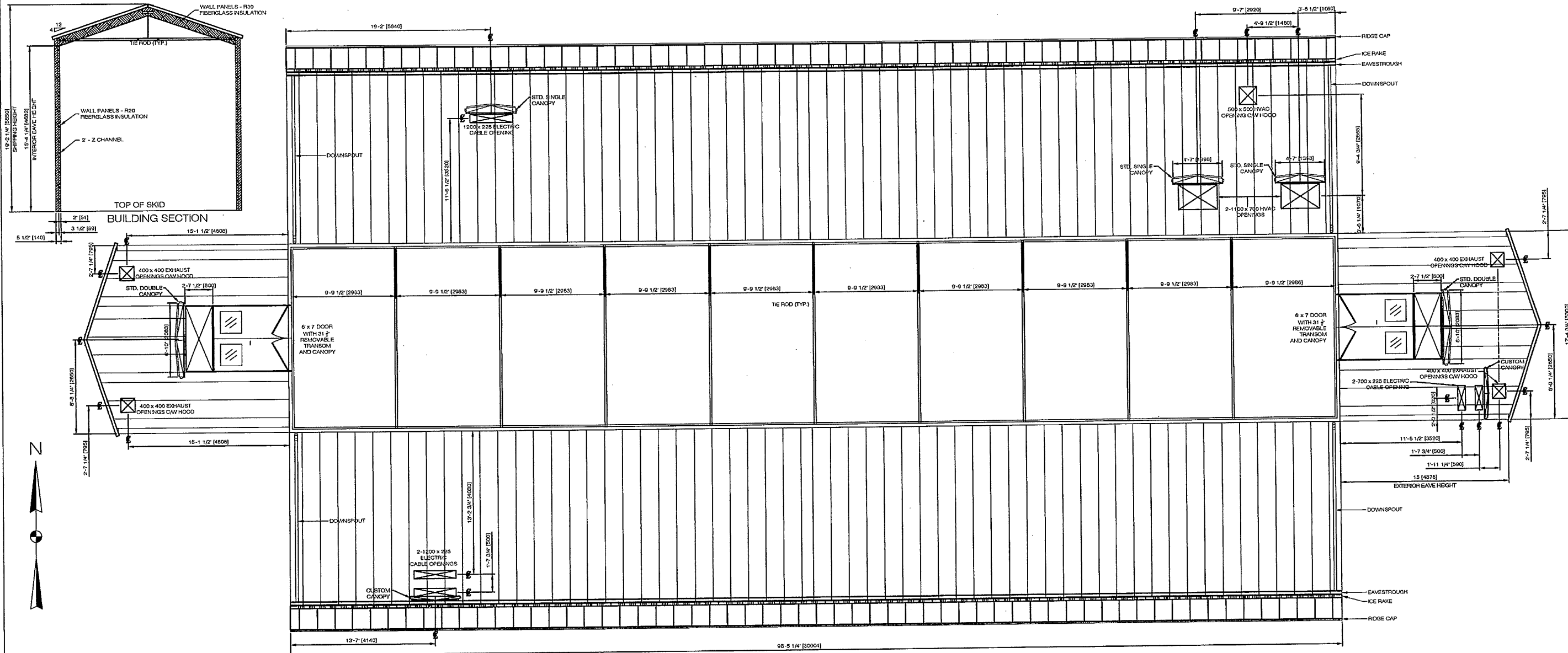
REV	DESCRIPTION	DRAWN BY	DATE
1	ISSUED FOR CONSTRUCTION - CHANGED CORNERS DIMENSION AND UPDATED PANELS LAYOUT	FS	2014.09.15
0	ISSUED FOR CONSTRUCTION	GC	2014.09.04
C	IFA - MOVE CABLE TRAY LOCATIONS, ADD UNDER SKID INSULATION TO CHECKLIST	GC	2014.06.12
B	IFA - ADD THE CANOPIES ABOVE CABLE TRAY OPENING, UPDATED THE INT. LINING AND EAVESTROUGH GAUGE	FS	2014.04.03
A	ISSUED FOR APPROVAL	FS	2014.03.14

**METALEX**  
**METAL BUILDINGS INC.**  
 4204 - 46 Avenue, PO Box 1058  
 Stettler, AB T0C 2L0  
 P - 403.742.1300 | F - 403.742.1308  
 E - info@mmbi.ca | W - www.mmbi.ca

PROJECT: EES-21  
 LOCATION: KEYSTONE HARDISTY TANK TERMINAL  
 DWG NO.: 141043-S  
 SHEET NO.: 1 OF 3

CLIENT: Sabre Instrument Services Ltd.  
 TITLE: 5300mm x 3000mm x 4875mm  
 SELF FRAME BUILDING  
 GABLE STYLE  
 4:12 PITCH

SCALE: NTS



REV	DESCRIPTION	DRAWN BY	DATE
1	ISSUED FOR CONSTRUCTION - CHANGED CORNERS DIMENSION AND UPDATED PANELS LAYOUT	FS	2014.09.15
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REV	DESCRIPTION	DRAWN BY	DATE

REVISIONS

**METALEX**  
**METAL BUILDINGS INC.**  
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PROJECT:	EES-21
LOCATION:	KEYSTONE HARDISTY TANK TERMINAL
DWG NO.:	141043-S
SHEET NO.:	2 OF 3
SCALE:	NTS

CLIENT:	Sabre Instrument Services Ltd.
TITLE:	5300mm x 3000mm x 4875mm SELF FRAME BUILDING GABLE STYLE 4:12 PITCH

**1.0 GENERAL**

- 1.1 THE ARCHITECTURAL DRAWINGS ARE INTENDED TO PROVIDE DESIGN INFORMATION TO A QUALIFIED SELF FRAMED BUILDING DESIGNER REGISTERED AS A PROFESSIONAL ENGINEER IN THE PROVINCE OF ALBERTA. UPSIDE ENGINEERING TAKES NO RESPONSIBILITY FOR THE RESULTING BUILDING STRUCTURE ITSELF OR ITS PERFORMANCE CHARACTERISTICS. THE DESIGNER/FABRICATOR CHOSEN VIA COMPETITIVE BID PROCESS SHALL BE RESPONSIBLE FOR ISSUING AUTHENTICATED DRAWINGS FOR ALL BUILDING ELEMENTS. THIS SHALL INCLUDE BUT MAY NOT BE LIMITED TO: BUILDING STRUCTURE, WALL REINFORCEMENT AS REQUIRED FOR EQUIPMENT, ROOF HANGERS, AND ANY BUILDING MOUNTED SUPPORTS FOR MECHANICAL AND ELECTRICAL, SPECIFIC INSULATING DETAILS, DOORS, WINDOWS, FANS, LOUVERS, HEATERS, HVAC EQUIPMENT (AND DUCTING IF REQUIRED), VENTS (AND OPERATORS), FLASHING, ICE RAKES, EAVESTROUGH, UTILITY ELECTRICAL (LIGHTS, SWITCHES, RECEPTACLES ETC) AND ANY OTHER COMPONENT SPECIFIED IN THE PURCHASE ORDER AND ITS ACCOMPANYING SCOPE OF WORK. ALL SUCH DOCUMENTS SHALL BE MADE AVAILABLE TO UPSIDE ENGINEERING FOR REVIEW/COMMENT PRIOR TO CONSTRUCTION.
- 1.2 BUILDING SHALL BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING:
  - 1.2.1 ALBERTA BUILDING CODE (2006).
  - 1.2.2 UEL/TCPL SPEC. 25472-130-3PS-AKBP-P0001 - PRE-ENGINEERED BUILDING SPECIFICATION.
  - 1.2.3 TCPL SPEC. 25472-100-3PS-AKBP-W0003 - ELECTRICAL EQUIPMENT SHELTER (EES) AND VFD EQUIPMENT SHELTER (VES) SPECIFICATION.
- 1.3 ALL DIMENSIONS ARE IN MILLIMETERS.
- 1.4 FLOOR, WALL AND ROOF PENETRATIONS/OPENINGS NOT SHOWN ON THE DRAWINGS ARE TO BE CUT, FLASHED AND WEATHER SEALED ON SITE. ALL CABLE TRAY WALL PENETRATIONS TO BE PROVIDED WITH A CANOPY.
- 1.5 MANDOORS SHALL BE 915x2134 U.N.O. AND INCLUDE A 610x750 SAFETY GLASS WINDOW.
- 1.6 EAVE GUTTERS:
  - 0.91mm (20 GA) PRE-PAINTED GALVANIZED STEEL, COLOUR QC8730 GREY.
- 1.7 DOWNSPOUTS:
  - 0.91mm (20 GA) PRE-PAINTED GALVANIZED STEEL, 100mm SQUARE SHAPE, COLOUR QC8730 GREY.
- 1.8 ICE RAKE:
  - CONTINUOUS PRE-PAINTED GALVANIZED ANGLE C/W VERTICAL RODS COLOUR QC8730 GREY.
- 1.9 DOOR CANOPIES:
  - STRUCTURALLY SUPPORTED 1.2 (18 GA) PRE-PAINTED GALVANIZED STEEL, COLOUR QC8730 GREY. ALLOW ADEQUATE SPACE ABOVE DOOR FOR PLACEMENT OF EXTERIOR LIGHT FIXTURE.
- 1.10 FLASHING:
  - PRE-PAINTED GALVANIZED COLOUR QC8730 GREY.
- 1.11 TRIMS AND ACCENTS:
  - COLOUR QC8730 GREY.
- 1.12 ALL SCREWS SHALL BE NUMBER 14 PREDRILLED METAL SCREWS COMPATIBLE WITH THE SHEETING AND SHALL NOT CAUSE CORROSION OR STAINING OF THE SHEETING.
- 1.13 ALL VENDOR DRAWINGS SHALL INCLUDE DETAILED INFORMATION INDICATING STRUCTURAL MEMBERS, ANCHOR BOLTS AND FOUNDATION LOADINGS. ALL VENDOR DRAWINGS TO BE AUTHENTICATED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF ALBERTA.

**2.0 SELF-FRAMED CONSTRUCTION**

- 2.1 ALL SELF-FRAMED BUILDINGS TO BE GABLE TYPE WITH 0.76 (22 GA) MIN GALVANIZED STEEL WALL PANELS WITH R20 FIBERGLASS INSULATION AND 0.76 (22 GA) MIN GALVANIZED STEEL ROOF PANELS WITH R30 FIBERGLASS INSULATION AND 6 MIL VAPOR BARRIER.
- 2.2 EXTERIOR WALL AND ROOF PANELS:
  - PANEL RIBS AT 400 MAX O.C.
  - PANELS SHALL BE PRE-PAINTED QC8730 GREY
  - TRIM AND DOORS SHALL BE PRE-PAINTED QC8730 GREY
- 2.3 INTERIOR LINER SHALL BE PRE-FINISHED GALVANIZED SHEET STEEL, MIN 0.76 (22 GA) WITH ZINC COATING, V-RIB PROFILE.

**3.0 DESIGN BASIS**

- 3.1 SITE METEOROLOGICAL CONDITIONS, ELEVATION AND EARTHQUAKE ZONE DATA.
- 3.2 THE FOLLOWING DATA IS BASED ON ALBERTA BUILDING CODE INFORMATION FOR HARDISTY, ALBERTA.

DESIGN TEMPERATURE	
JANUARY 2.5%	-33°C
JANUARY 1.0%	-35°C
JULY 2.5% DRY	30°C
JULY 2.5% WET	19°C
DEGREE DAYS BELOW 18	5900
GROUND FROST PENETRATION	N/A
RAINFALL	
15 MINUTE RAINFALL	20mm
ONE DAY RAINFALL (%)	76mm
ANNUAL RAINFALL	325mm
MOIST INDEX	0.48
TOTAL ANNUAL PERCIPITATION	425mm
DRIVING RAIN WIND PRESSURE (1/5)	140Pa
DESIGN SNOW LOAD	
1/50 Ss	1.7kPa
1/50 Sr	0.1kPa
DESIGN WIND LOAD	
HOURLY WIND PRESSURE (1/10)	0.24kPa
HOURLY WIND PRESSURE (1/50)	0.36kPa
SEISMIC DATA	
Se(0.2)	0.12
Se(0.5)	0.06
Se(1.0)	0.02
Se(2.0)	0.01
PGA	0.06

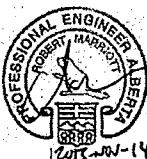
REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-07-002	LOW VOLTAGE-EES-21 BUILDING PLAN AND ELEVATIONS
4663-02-02-07-004	LOW VOLTAGE-EES-22 BUILDING PLAN AND ELEVATIONS
4663-02-02-07-006	OFFICE BUILDING PLAN
4663-02-02-07-008	MEDIUM VOLTAGE-VES-21 BUILDING PLAN

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
0A	2013-04-09	ISSUED FOR REVIEW (UEL PROJ# 2012016)	2197104	CHR	JMS	COU	DRP	DCB	UPSIDE
0B	2013-05-15	ISSUED FOR BID (UEL PROJ# 2012016)	2197104	ADB	JMS	COU	KGS	DCB	UPSIDE
0C	2013-05-28	RE-ISSUED FOR BID (UEL PROJ# 2012016)	2197104	ADB	JMS	COU	KGS	DCB	UPSIDE
0D	2013-11-14	ISSUED FOR DESIGN (UEL PROJ# 2012016)	2197104	ADB	JMS	ROS	RCM	DCB	UPSIDE

**NOT FOR CONSTRUCTION**

SDN#: 25472-130-A1-0000-P0001  
UEL#: 2012016-1ED-ACH-000-0001-01

PROFESSIONAL ENGINEER/RPT: \_\_\_\_\_ PERMIT/ ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

**PROFESSIONAL ENGINEER ALBERTA**  
  
 PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. \_\_\_\_\_ DATE \_\_\_\_\_ PERMIT NUMBER: \_\_\_\_\_

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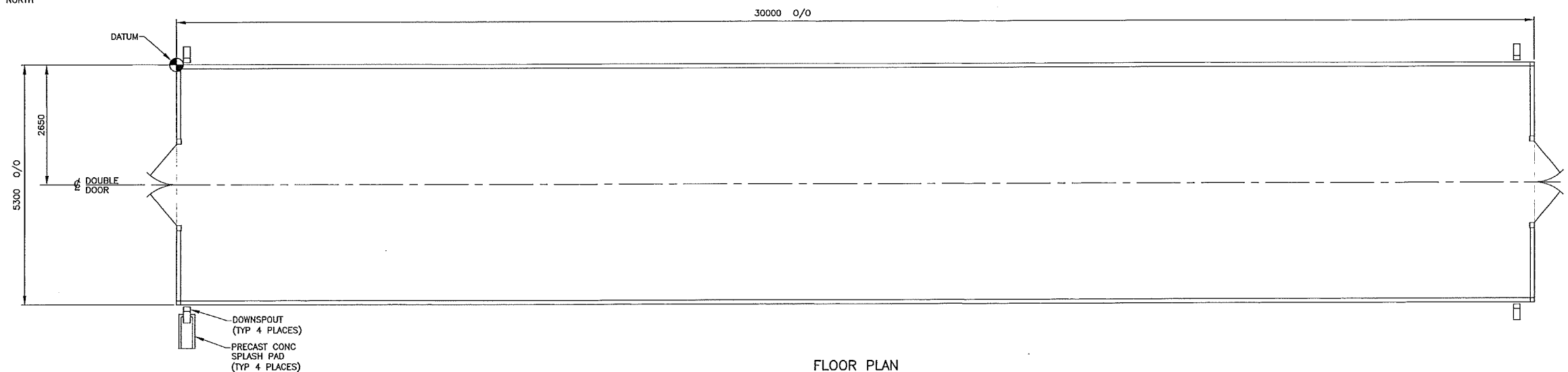
KEYSTONE HARDISTY TANK TERMINAL  
 CHARGE: \_\_\_\_\_ DISCIPLINE # 02

SCALE: \_\_\_\_\_ NTS DRAWING No: 4663-02-02-07-001 REV: 0D

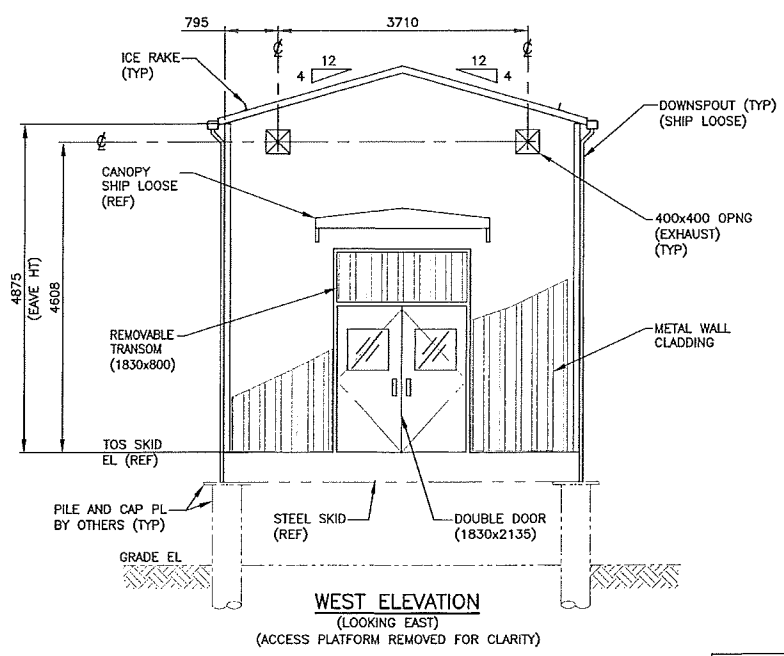
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- NOTES:**
- FOR BUILDING GENERAL NOTES REFER TO DWG No 4663-02-02-07-001.
  - FOR ELECTRICAL EQUIPMENT LAYOUT REFER TO DWG No 4663-06-02-03-016.
  - ACCESS PLATFORMS SHALL BE DESIGNED, FABRICATED AND INSTALLED BY OTHERS.
  - BUILDING HVAC SYSTEM SHALL BE DESIGNED, SUPPLIED AND INSTALLED BY OTHERS.

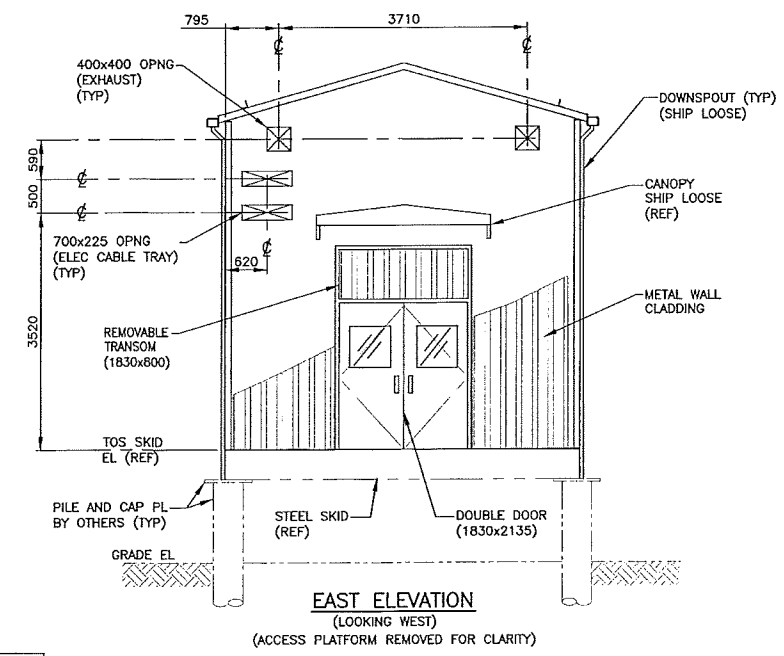


**FLOOR PLAN**



**WEST ELEVATION**

(LOOKING EAST)  
(ACCESS PLATFORM REMOVED FOR CLARITY)



**EAST ELEVATION**

(LOOKING WEST)  
(ACCESS PLATFORM REMOVED FOR CLARITY)

- NOTES:**
- VENDOR TO ADD CANOPIES OVER ALL WALL PENETRATIONS FOR CABLE TRAY, HVAC DUCTING, DOORS, AND REMOVABLE WALL PANELS

**NOT FOR CONSTRUCTION**

SDN#: 25472-130-A1-0000-P0002  
UEL#: 2012016-1ED-ACH-000-0002-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-07-001	BUILDING GENERAL NOTES
4663-02-02-07-003	LOW VOLTAGE-EES-21 BUILDING - ELEVATIONS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
QA	2013-05-10	ISSUED FOR REVIEW (UEL PROJ# 2012016)	2197104	ADB	JMS	CDU	KGS	DCB	UPSIDE
OB	2013-05-29	ISSUED FOR BID (UEL PROJ# 2012016)	2197104	ADB	JMS	CDU	KGS	DCB	UPSIDE
OC	2014-02-10	ISSUED FOR DESIGN (UEL PROJ# 2012016)	2197104	CMR	NFC	RDS	RGM	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PROFESSIONAL ENGINEER  
A. ROBERT MARRIOTT  
P. ENG. (MECH.)  
2014-03-10

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

REV. No. DATE PERMIT NUMBER:

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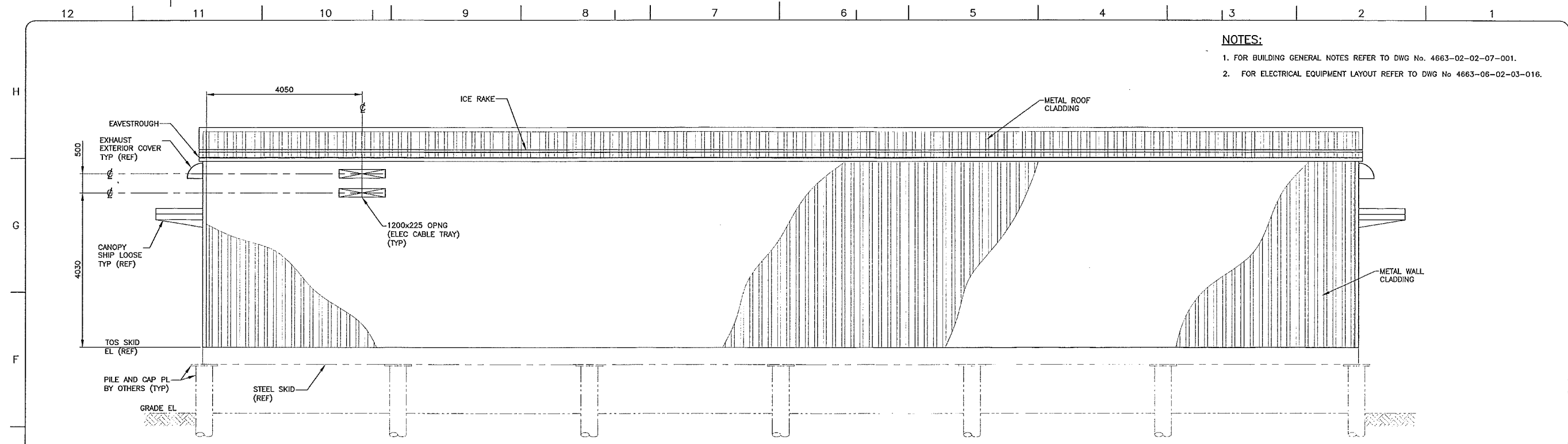
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KEYSTONE HARDISTY TANK TERMINAL

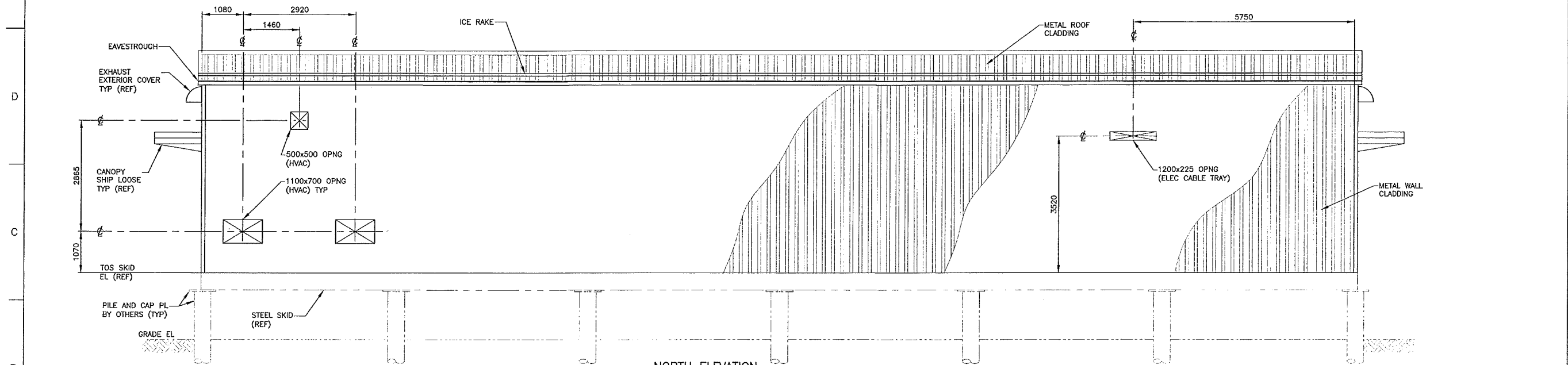
CHAIRMAN: 4663 CHAIRMAN: DISCIPLINE # 02

**LOW VOLTAGE-EES-21 BUILDING  
PLAN AND ELEVATIONS**

SCALE: 1:50 DRAWING No: 4663-02-02-07-002 REV: 0C



**SOUTH ELEVATION**  
(LOOKING NORTH)  
(ACCESS PLATFORM REMOVED FOR CLARITY)



**NORTH ELEVATION**  
(LOOKING SOUTH)  
(ACCESS PLATFORM REMOVED FOR CLARITY)

- NOTES:**
1. FOR BUILDING GENERAL NOTES REFER TO DWG No. 4663-02-02-07-001.
  2. FOR ELECTRICAL EQUIPMENT LAYOUT REFER TO DWG No. 4663-06-02-03-016.

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-07-001	BUILDING GENERAL NOTES
4663-02-02-07-002	LOW VOLTAGE-EES-21 BUILDING - PLAN AND ELEVATIONS

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
QA	2013-05-09	ISSUED FOR REVIEW (UEL PROJ# 2012016)	
OB	2013-05-29	ISSUED FOR BID (UEL PROJ# 2012016)	
OC	2014-02-10	ISSUED FOR DESIGN (UEL PROJ# 2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	ADB	JMS	CDU	KGS	DCB	UPSIDE
2197104	ADB	JMS	CDU	KGS	DCB	UPSIDE
2197104	CMR	NFC	RDS	RGH	DCB	UPSIDE

**NOT FOR CONSTRUCTION**

PROFESSIONAL ENGINEER/RPT: \_\_\_\_\_ PERMIT/ ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

PROFESSIONAL ENGINEER ALBERTA  
ROBERT MARRIOTT  
2014-02-10

PERMIT TO PRACTICE  
UPS OF ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. No. \_\_\_\_\_ DATE: \_\_\_\_\_ PERMIT NUMBER: \_\_\_\_\_

SDN#: 25472-130-A2-0000-P0001  
UEL#: 2012016-1ED-ACH-000-0003-01

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KEYSTONE HARDISTY TANK TERMINAL  
FIA # 4663 CHANGE: \_\_\_\_\_ DISCIPLINE # 02

**LOW VOLTAGE-EES-21 BUILDING ELEVATIONS**

SCALE 1:50 DRAWING No. 4663-02-02-07-003 REV 0C

**1.0 GENERAL**

- 1.1 ALL NOTES ON THIS DRAWING ARE TO BE READ IN CONJUNCTION WITH ALL RELEVANT DESIGN DRAWINGS AND PROJECT DOCUMENTS, INCLUDING THE FOLLOWING SPECIFICATIONS:
  - 25472-130-3PS-5000-P0001 STRUCTURAL STEEL SPECIFICATION
  - 25472-130-3PS-5000-P0001 STRUCTURAL DESIGN CRITERIA SPECIFICATION
  - 25472-130-3PS-AKBP-P0001 PRE-ENGINEERED BUILDING SPECIFICATION
- 1.2 THE EXISTING PLANT COORDINATE SYSTEM TO BE USED TO REFERENCE LOCATIONS.
- 1.3 ALL CODES, STANDARDS AND SPECIFICATIONS REFERENCED ON THIS DRAWING TO BE THE LATEST EDITION INCLUDING ADDENDA AND SUPPLEMENTS, IF ANY. IF A CONFLICT EXISTS BETWEEN THE REFERENCED CODES, STANDARDS, DRAWINGS OR SPECIFICATIONS, THE MORE STRINGENT ARE TO BE APPLIED.
- 1.4 UNLESS NOTED OTHERWISE, ALL DIMENSIONS ARE METRIC UNITS (MILLIMETERS) WITH ELEVATIONS IN METERS.
- 1.5 "DESIGN DRAWINGS" REFER TO THE ENGINEERED, SEALED (AS REQUIRED), DATED, SIGNED AND ISSUED FOR CONSTRUCTION OR DESIGN.
- 1.6 ALL STEEL SECTIONS DESIGNATIONS, LOADS, FORCES, AND MOMENTS ARE TO BE SPECIFIED IN SI UNITS PER CANADIAN INSTITUTE OF STEEL CONSTRUCTION (CISC) HANDBOOK.
- 1.7 DESIGN OF STEEL STRUCTURES TO CONFORM TO THE REQUIREMENTS OF CSA S16 "LIMIT STATES DESIGN OF STEEL STRUCTURES".
- 1.8 DETAILING, FABRICATION, DELIVERY AND ERECTION OF STEEL STRUCTURES TO CONFORM TO THE REQUIREMENTS OF CSA S16 "LIMIT STATES DESIGN OF STEEL STRUCTURES".
- 1.9 WELDED CONNECTIONS SHALL BE SHOP WELDED WHERE POSSIBLE.
- 1.10 ALL MEMBERS WITH THE WEB IN THE HORIZONTAL PLANE TO HAVE PROVISION FOR DRAINAGE OF WATER, IF ENDS ARE NOT OPEN, 13mm DIA HOLES AT 1500 c/c TO BE DRILLED ON THE CENTERLINE OF THE WEB FOR THE FULL LENGTH OF THE MEMBER, WITH A MINIMUM OF ONE HOLE PER BEAM.
- 1.11 MONORAILS AND PERMANENT LIFTING LUGS TO HAVE ALLOWABLE LIFTING CAPACITIES CLEARLY STENCILED (MIN 50mm HIGH) IN A CONTRASTING COLOR TO THAT OF THE COATING. LETTERING FOR MONORAILS TO BE CLEARLY LEGIBLE FROM OPERATING LEVEL.
- 1.12 ALL HSS MEMBERS TO BE CAPPED GAS-TIGHT AT OPEN ENDS, SEALED WITH 6mm CLOSURE PLATE AND FULLY SEAL WELDED.
- 1.13 THE UNDERSIDE OF BUILDING SKIDS TO BE INSULATED WITH SPRAY-ON URETHANE, 75mm THICK MINIMUM, WITH FIRE RETARDANT CONFORMING TO ASTM E84.

**2.0 MATERIALS**

- 2.1 STRUCTURAL STEEL:
  - W, STRUCTURAL TEES, AND S SHAPES = CSA G40.21, GRADE 350W
  - RECTANGULAR AND SQUARE HSS SECTIONS = CSA G40.21, GRADE 350W CLASS C
  - ANGLES, PLATES & CHANNELS = CSA G40.21, GRADE 300W
- 2.2 FLOOR PLATE, KICK PLATE, RAILINGS, AND MISCELLANEOUS STEEL:
  - CSA G40.21, GRADE 300W
- 2.3 GRATING AND STAIR TREADS:
  - ASTM A 1011/A 1011M STRUCTURAL STEEL GRADE ASTM A36, TYPE 1.
- 2.4 GUSSET PLATES:
  - CSA G40.21, GRADE 300W. MINIMUM THICKNESS 10mm
- 2.5 LIFTING LUG AND LIFTING EYE PLATES:
  - CSA G40.21, GRADE 350WT, CAT. 4, OR ALTERNATIVELY GRADE 350W IF CLEARLY MARKED THAT LIFT OPERATIONS ARE ONLY PERMITTED AT TEMPERATURES ABOVE -7°C.
- 2.6 HIGH STRENGTH BOLTS, NUTS, AND WASHERS:
  - ASTM A325, TYPE 1, ASTM A563 NUTS, ASTM F463 WASHERS. (GALVANIZED FOR PAINTED AND FIREPROOFED STRUCTURES)
- 2.7 THREADED ANCHOR RODS (FOR EQUIPMENT HOLD DOWN):
  - ASTM A307, GRADE A (NON-GALVANIZED)
- 2.8 WELDING ELECTRODES, FILLER METAL AND FLUX:
  - CSA W48, E49XX
- 2.9 STEEL TYPES OTHER THEN THOSE LISTED ABOVE MAY BE CONSIDERED BASED ON SPECIAL NEEDS AND SHALL BE ONLY BE USED WITH APPROVAL OF OWNER. UPSIDE ENGINEERING LTD IS TO BE INFORMED OF ANY SUCH DEVIATIONS PRIOR TO ASSEMBLY.

**3.0 CONNECTION DESIGNS**

- 3.1 DESIGN, DETAILING, AND FABRICATION OF ALL CONNECTIONS TO CONFORM TO CSA S16 "LIMIT STATES DESIGN OF STEEL STRUCTURES" AND CISC "HANDBOOK OF STEEL CONSTRUCTION".
- 3.2 ALL FORCES AND MOMENTS SHOWN ON THE DESIGN DRAWINGS ARE FACTORED VALUES (PER LIMIT STATES DESIGN). ALL CONNECTION DESIGN FORCES ARE TO BE REVERSIBLE AND ACT CONCURRENTLY.
- 3.3 IF CONNECTION DETAILS OR FORCES ARE NOT SHOWN ON THE DESIGN DRAWINGS, CONNECTIONS TO BE DESIGNED BY P. ENG REGISTERED IN THE PROVINCE OF ALBERTA TO RESIST THE FOLLOWING:
  - 3.3.1 BEAM SHEAR CONNECTIONS TO BE DESIGNED TO RESIST THE FACTORED REACTION FROM THE UNIFORM BEAM LOAD THAT WOULD CREATE A BENDING MOMENT EQUAL TO THE BENDING CAPACITY OF THE LATERALLY SUPPORTED SECTION BUT NOT LESS THAN HALF THE FACTORED SHEAR RESISTANCE OF THE MEMBER CONNECTED.
  - 3.3.2 VERTICAL BRACING CONNECTIONS TO BE DESIGNED FOR 50% CAPACITY OF NET SECTION IN TENSION OR 100% OF THE COMPRESSION CAPACITY OF THE COMPRESSION BRACING, WHICHEVER GOVERNS THE MEMBER SELECTION.

**4.0 WELDED CONNECTIONS**

- 4.1 WELDED PROCEDURES, MATERIALS AND QUALITY STANDARDS ARE TO CONFORM TO THE REQUIREMENTS OF CSA W59, "WELDED STEEL CONSTRUCTION (METAL ARC WELDING)".
- 4.2 ALL WELDING, WHETHER IN THE SHOP OR IN THE FIELD, ARE TO BE PERFORMED BY A FABRICATOR AND/OR AN ERECTOR CERTIFIED TO CSA W47.1 "CERTIFICATION OF COMPANIES FOR FUSION WELDING OF STEEL".
- 4.3 ALL WELDERS TO BE CWB CERTIFIED AND TO HAVE A CERTIFICATION TICKET AVAILABLE FOR REVIEW UPON REQUEST.
- 4.4 FOR WELDED CONNECTIONS MINIMUM FILLET WELD SIZE TO BE 6mm AND ALL JOINTS ARE ASSUMED FULLY WELDED UNO.
- 4.5 WHENEVER THE WELD MAY BE SUBJECTED TO LOAD, PLUG OR SLOT WELDS ARE NOT BE USED WITHOUT THE PRIOR APPROVAL FROM UPSIDE ENGINEERING LTD.
- 4.6 INSPECTION OF WELDING TO BE UNDERTAKEN BY A THIRD PARTY INSPECTOR CERTIFIED BY THE CANADIAN WELDING BUREAU TO THE REQUIREMENTS OF CSA STANDARD W178.1 "CERTIFICATION OF WELDING INSPECTION ORGANIZATIONS".
- 4.7 ALL WELDS TO BE 100% VISUALLY INSPECTED IN ACCORDANCE WITH CSA W59.
- 4.8 IN ADDITION TO VISUAL INSPECTION, THE FOLLOWING NON-DESTRUCTIVE TESTING TO BE CONDUCTED. OTHER METHODS MAY BE USED IF APPROVED BY UPSIDE ENGINEERING LTD.
  - 4.8.1 ALL MEMBER SPLICES TO BE TESTED 100% USING ULTRASONIC METHODS IN ACCORDANCE WITH CSA W59.
  - 4.8.2 COMPLETE PENETRATION WELDS TO BE TESTED AT RANDOM ACCOUNTING FOR NOT LESS THAN 10% OF THE TOTAL LENGTH PER WORK PACKAGE USING ULTRASONIC METHODS IN ACCORDANCE WITH CSA W59.
  - 4.8.3 10% OF GROOVE OR BUTT AND FILLET WELDS TO HAVE MAGNETIC PARTICLE INSPECTION (MPI) EXCEPT FILLETS WELDS ON LIFTING LUGS, WHICH SHALL HAVE 100% MPI.
- 4.9 ALL INSPECTION AND TESTING REPORTS TO BE MADE AVAILABLE TO UPSIDE ENGINEERING LTD. HOWEVER, ALL NON-COMFORMANCE REPORTS TO BE FORWARDED TO UPSIDE ENGINEERING LTD IMMEDIATELY AFTER THE COMPLETION OF THE INSPECTION AND TESTING.
- 4.10 IN ADDITION TO THE ABOVE NOTED INSPECTION AND TESTING PERFORMED BY THE CONTRACTOR, THE OWNER MAY, AT THE OWNER'S OWN COST, RETAIN A THIRD PARTY TO WITNESS OR CONDUCT INDEPENDENT INSPECTION AND TESTING. THE CONTRACTOR TO PROVIDE ACCESS (AT NO ADDITIONAL COST) FOR THE THIRD PARTY INSPECTOR TO DO THIS WORK.
- 4.11 ANY WELDING DEFECTS TO BE CORRECTED BY THE CONTRACTOR AT THE CONTRACTOR'S OWN COST.

**5.0 BOLTED CONNECTIONS**

- 5.1 ALL BOLTS TO BE ASTM A325 TYPE 1. BOLTS SHALL BE GALVANIZED FOR PAINTED AND FIREPROOFED STRUCTURES, UNLESS NOTED OTHERWISE ON DESIGN DRAWINGS, BLACK BOLTS MAY BE USED FOR UNPAINTED STRUCTURES.
- 5.2 ALL BOLTED CONNECTIONS TO BE "BEARING TYPE" UNLESS NOTED OTHERWISE ON DESIGN DRAWINGS.
- 5.3 "SLIP CRITICAL" CONNECTIONS TO BE USED WHENEVER VIBRATORY, DYNAMIC OR CRITICAL LOAD REVERSAL OCCURS AND SHALL BE NOTED ON THE DESIGN DRAWINGS.
- 5.4 DESIGN OF BOLTED CONNECTIONS TO ASSUME THAT BOLTS HAVE THREADS INCLUDED IN THE SHEAR PLANE, UNLESS THREADS EXCLUDED BOLT VALUES ARE APPROVED BY UPSIDE ENGINEERING LTD.
- 5.5 UNLESS NOTED OTHERWISE ON DESIGN DRAWING, BOLTS ARE NOT TO BE LESS THAN 19mm DIA.
- 5.6 BOLT HOLES FOR STEEL TO STEEL CONNECTIONS TO BE 2mm LARGER THAN THE BOLT DIAMETER. EXCEPT THAT 22mm HOLES MAY BE USED FOR 19mm DIA. BOLTS.

- 5.8 ALL BRACING CONNECTIONS TO HAVE A MINIMUM OF 2 BOLTS PER LONGITUDINAL BOLT LINE ALONG THE LONGITUDINAL AXIS OF THE MEMBER.
- 5.9 ALL CROSS BRACING TO BE CONNECTED AT POINT OF INTERSECTION.
- 5.10 FASTEN HORIZONTAL BRACING TO INTERMEDIATE BEAMS TO ELIMINATE SAG.
- 5.11 ALL DOUBLE ANGLE BRACING TO BE INTERCONNECTED AT A SPACING NOT TO EXCEED 1200mm. INTERCONNECTION TO CONSIST OF FILLER PLATE (MIN 10mm THICK) AND A MINIMUM OF ONE 19mm DIA A325 BOLT, SNUG TIGHT.
- 5.12 ALL STRUCTURAL CONNECTIONS (EXCEPT FOR DESIGNATED CONNECTIONS USED TO ACCOMMODATE MOVEMENT, STAIR TREAD BOLTING, AND FOUNDATION ANCHOR BOLT CONNECTIONS) TO BE TENSIONED BY PROPER INSTALLATION USING THE TURN-OF-NUT METHOD PER CSA S16.
- 5.13 FOR "EXPANSION" SLOTTED CONNECTIONS, WHEN INDICATED ON DESIGN DRAWINGS, USE HORIZONTAL LONG SLOT COMPLETE WITH ONE HEAVY HEX NUT AND ONE 8mm THICK STRUCTURAL PLATE WASHER. NUT TO BE SNUG TIGHTENED THEN BACKED OFF 1/4 TURN BEFORE DAMAGING THREADS.
- 5.14 FOR "FIT-UP" SLOTTED CONNECTIONS, WHEN INDICATED ON DESIGN DRAWINGS (WHEN CONNECTING TO CONCRETE, MASONRY, OR EXISTING STEEL), USE HORIZONTAL LONG SLOT COMPLETE WITH ONE 8mm THICK STRUCTURAL PLATE WASHER AND ONE HEAVY HEX NUT FULLY TIGHTENED USING TURN-OF-NUT METHOD.

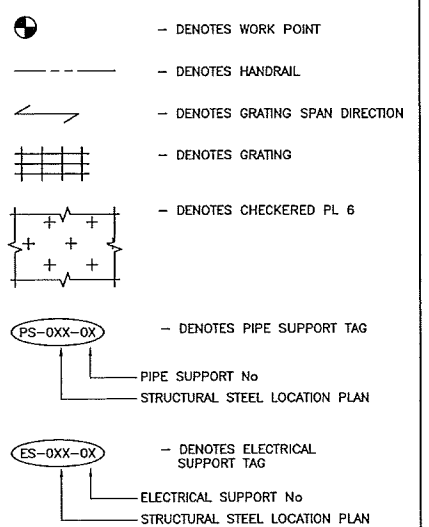
**6.0 FLOORING AND GRATING**

- 6.1 ALL OPEN FLOORING AND STAIR TREADS TO BE SERRATED GALVANIZED GRATING, WITH MINIMUM BEARING BARS OF 32mmx4.8mm SPACED AT 30mm WITH CROSS BARS AT 102mm C/C U.N.O.
- 6.2 SOLID FLOORING TO BE MINIMUM 6mm THICK CHECKERED PLATE WITH A NON-SLIP RAISED PATTERN.
- 6.3 SMOOTH SOLID PLATE FLOORING TO BE MINIMUM 6mm THICK COATED WITH ANTI-SLIP PAINT AND TO BE USED ONLY WITH THE APPROVAL OF UPSIDE ENGINEERING LTD IN SITUATIONS WHERE IT IS REQUIRED DUE TO MAINTENANCE REASONS.

**7.0 PROTECTIVE SURFACE COATINGS**

- 7.1 ALL COATINGS FOR STRUCTURAL STEEL, GRATING AND REPAIRS TO CONFORM TO TES-COAT-P1.
- 7.2 ALL STRUCTURAL STEEL TO BE PAINTED.
- 7.3 ALL HANDRAIL, KICK PLATES, LADDERS, LADDER CAGES AND MONORAILS TO BE PAINTED SAFETY YELLOW.
- 7.4 ALL BUILDINGS TO BE PAINTED.
- 7.5 SURFACES SPECIFIED AS GALVANIZED TO BE HOT DIP GALVANIZED IN ACCORDANCE WITH CSA G164, "HOT DIP GALVANIZING OF IRREGULARLY SHAPED ARTICLES". WELDED JOINTS IN GALVANIZED SECTIONS TO BE FULLY SEALED WITH 5mm FILLET WELD IN ADDITION TO STRUCTURAL WELDING SHOWN. TOUCH UP ALL FIELD WELDS AS PER PROJECT SPECIFICATIONS.
- 7.6 GALVANIZED BOLTS, NUTS AND WASHERS TO BE USED FOR ALL PAINTED STRUCTURES.
- 7.7 APPROPRIATE REMEDIAL MEASURES TO BE TAKEN AFTER GALVANIZING BOLTS, NUTS AND HARDWARE. THEY INCLUDE, BUT ARE NOT LIMITED TO, RE-TAPPING THE NUTS TO ENSURE THEY FIT PROPERLY AFTER GALVANIZING.
- 7.8 ALL SHOP COATINGS TO BE EXCLUDED FROM AREAS WITHIN 50mm OF JOINTS TO BE FIELD WELDED. COATINGS OTHER THAN THE CLASS A OR B COATINGS SPECIFIED IN CSA S16 TO BE EXCLUDED FROM AREAS WITHIN 50mm OF THE FAYING SURFACES FOR "SLIP-CRITICAL" BOLTED CONNECTIONS. THE FABRICATOR TO CERTIFY THE COATING CLASS AND INDICATE IT ON THE FABRICATION DRAWING.
- 7.9 FIELD WELDS AND ANY DAMAGE TO PAINTED STEEL SURFACES TO BE TOUCHED-UP WITH MATCHING PAINT.

**LEGEND:**



REFERENCE DRAWINGS		REVISION			APPROVAL						PROFESSIONAL ENGINEER/RPT		PERMIT/ ENG. APPROVAL	
DRAWING No	TITLE	REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	DATE	DATE	
-	-	00	2013-11-08	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	ADB	NFC	KGS	ROM	DCB	UPSIDE			

PROFESSIONAL ENGINEER  
ALBERTA  
ROBERT HADDOCK  
2013-11-08

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

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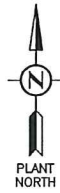
upside  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
FA # 4663 CHAINAGE: DISCIPLINE # 02

STRUCTURAL STEEL  
GENERAL NOTES

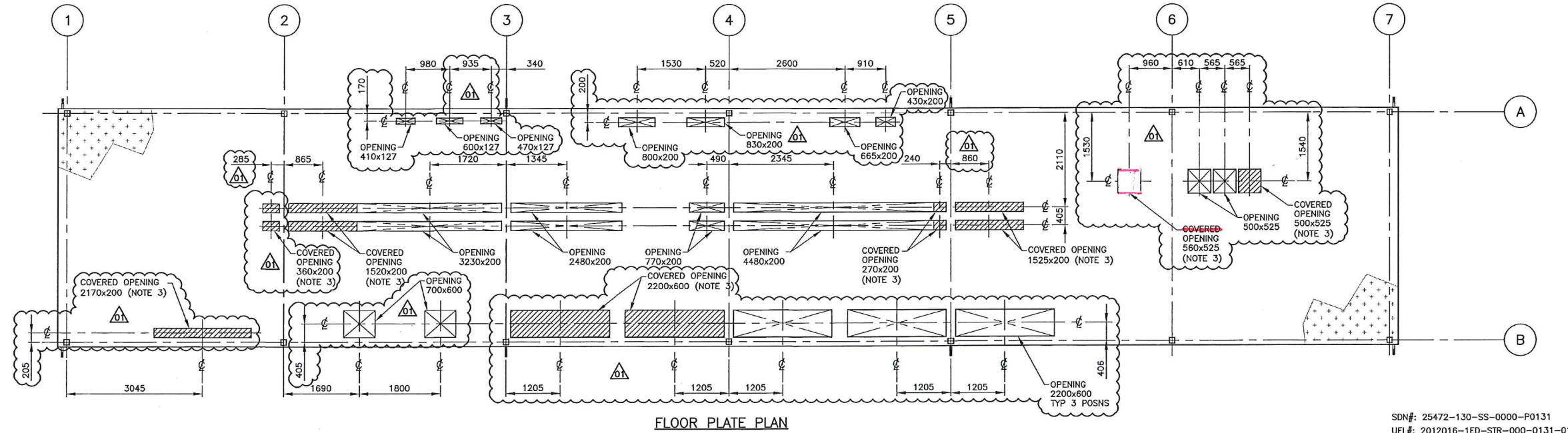
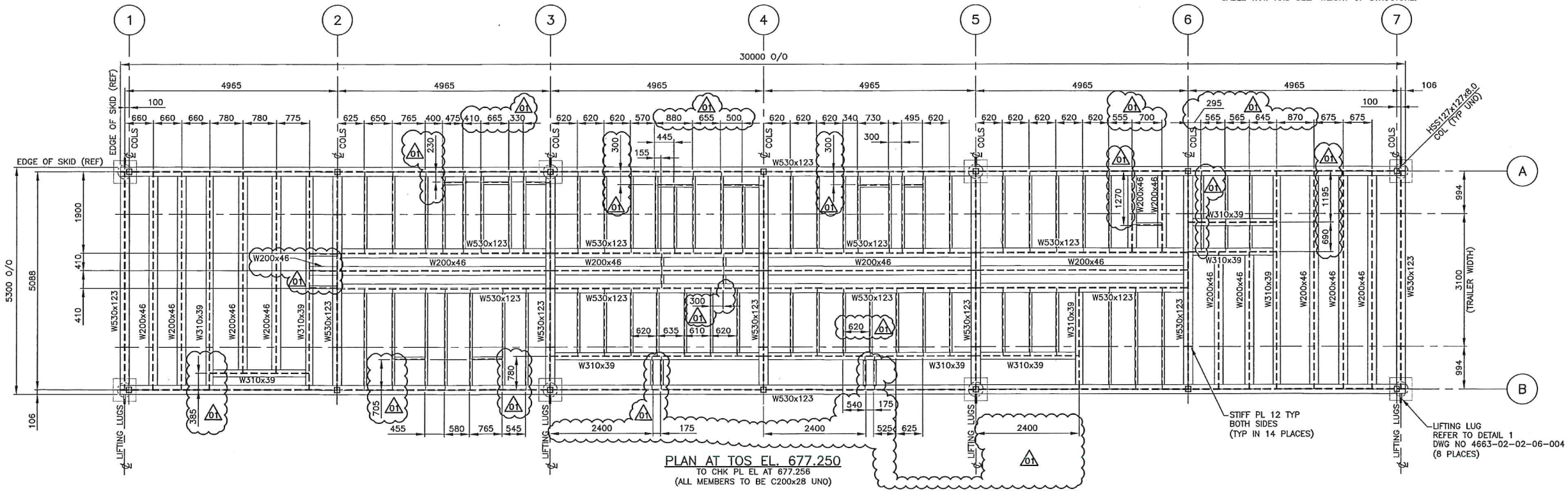
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**NOTES:**

- FOR STRUCTURAL STEEL GENERAL NOTES REFER TO DRAWING 4663-02-00-06-001.
- FOR STRUCTURAL STEEL STANDARD FLOOR PLATE AND GRATING DETAILS REFER TO DRAWING 4663-02-00-06-005.
- FOR REMOVABLE COVER PLATE DETAILS REFER TO DETAIL 13 ON DRAWING 4663-02-00-06-005.
- ALL OPENINGS IN FLOOR PLATE TO BE VERIFIED BY VENDOR.
- SKID DESIGNED FOR LIVE LOAD = 4.8 kPa. DEAD LOAD = WEIGHT OF EQUIPMENT, CABLE TRAY AND SELF WEIGHT OF STRUCTURE.



**FLOOR PLATE PLAN**

SDN#: 25472-130-SS-0000-P0131  
UEL#: 2012016-1ED-STR-000-0131-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-00-06-026	STRUCTURAL STEEL LOCATION PLAN
4663-02-02-06-002	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLANS
4663-02-02-06-003	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN AND ELEVATION
4663-02-02-06-004	LOW VOLTAGE-EES-21 STRUCTURAL STEEL ELEVATIONS, SECTIONS AND DETAILS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-10	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	ADB	NFC	RDS	RGM	DCB	UPSIDE
01	2014-02-26	RE-ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	ADB	NFC	RDS	RGM	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

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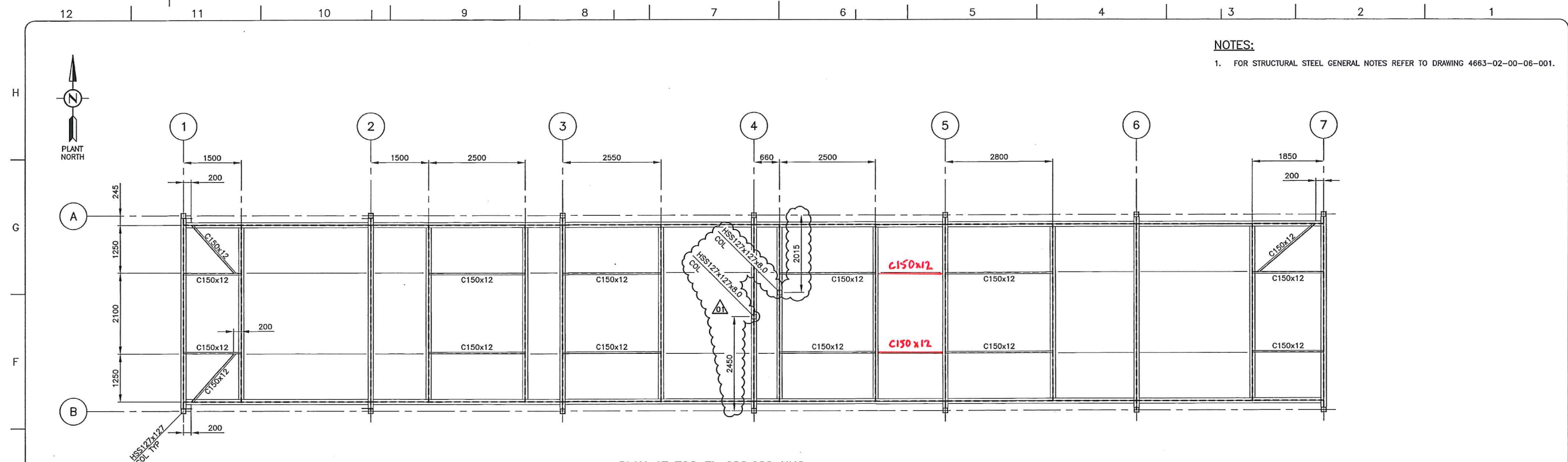
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

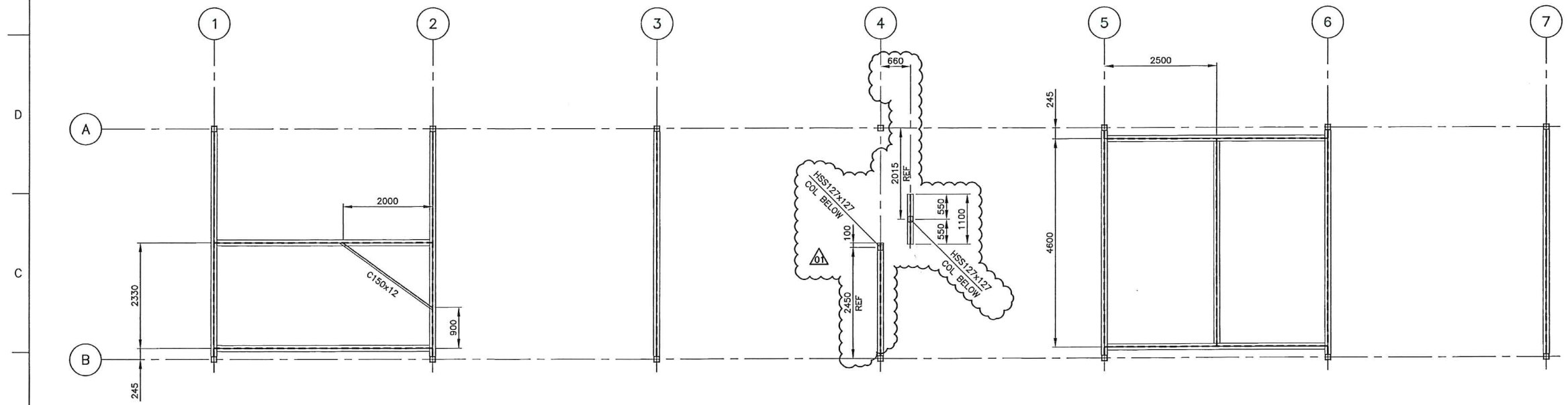
FA # 4663 CHAINAGE: \_\_\_\_\_ DISCIPLINE # 02

LOW VOLTAGE-EES-21  
STRUCTURAL STEEL PLAN

SCALE 1:50 DRAWING No 4663-02-02-06-001 REV 01



PLAN AT TOS EL 680.680 UNO  
(ALL MEMBERS TO BE W200x27 UNO)



PLAN AT TOS EL 681.180 UNO  
(ALL MEMBERS TO BE W200x27 UNO)

NOTES:  
1. FOR STRUCTURAL STEEL GENERAL NOTES REFER TO DRAWING 4663-02-00-06-001.

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-06-001	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN
4663-02-02-06-004	LOW VOLTAGE-EES-21 STRUCTURAL STEEL ELEVATIONS, SECTIONS AND DETAILS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-10	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	ADB	NFC	RDS	RGM	DCB	UPSIDE
01	2014-02-26	RE-ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	CMR	NFC	RDS	RGM	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT.	PERMIT/ ENG. APPROVAL
	DATE
PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	
REV. No.	DATE
DATE	PERMIT NUMBER:

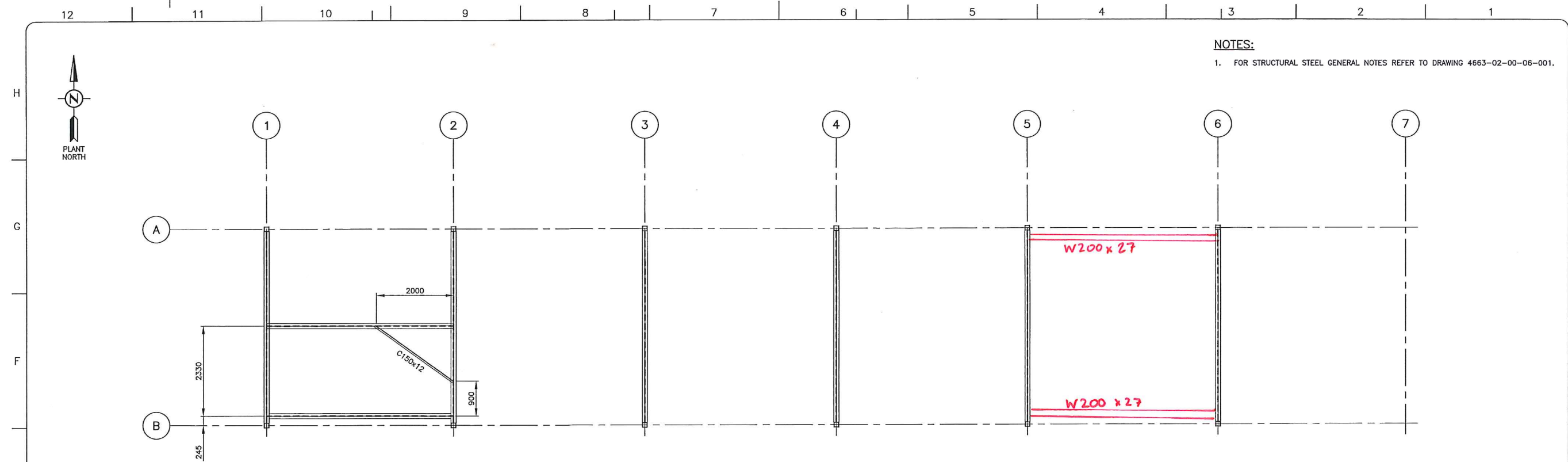
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FA # 4663	DISCIPLINE # 02
LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLANS	
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	REV 01

TC\_A1\_BR.DWG 594X841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

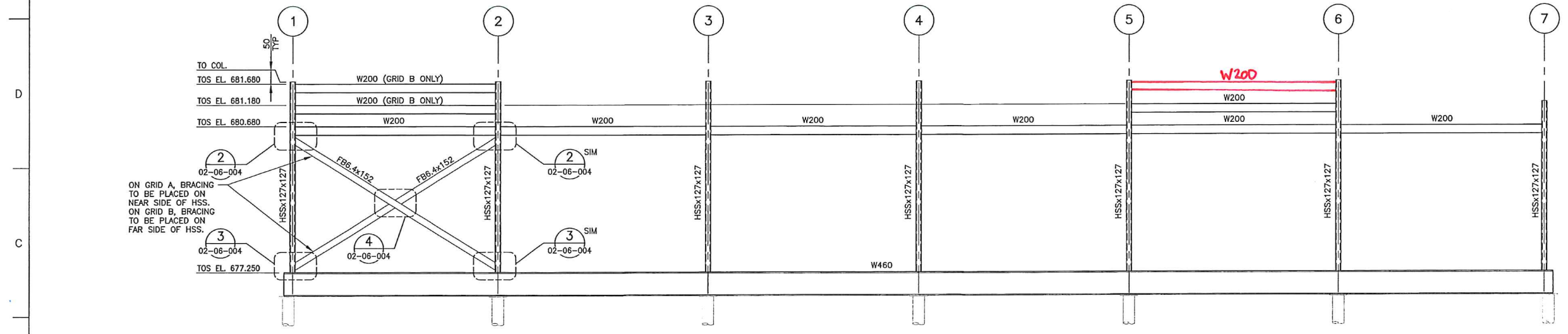
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**NOTES:**  
 1. FOR STRUCTURAL STEEL GENERAL NOTES REFER TO DRAWING 4663-02-00-06-001.

**PLAN AT TOS EL. 681.680 UNO**  
 (ALL MEMBERS TO BE W200x27 UNO)



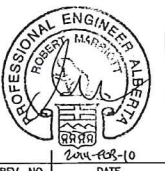
**ELEVATION AT GRID A & B**  
 (LOOKING NORTH)



SDN#: 25472-130-SS-0000-P0133  
 UEL#: 2012016-1ED-STR-000-0133-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-06-001	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN
4663-02-02-06-004	LOW VOLTAGE-EES-21 STRUCTURAL STEEL ELEVATIONS, SECTIONS AND DETAILS

REVISION		
REV No	DATE	DESCRIPTION
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APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	ADB	NFC	RDS	RGM	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
	DATE: _____ PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers,          Geologists and Geophysicists of Alberta</small>
REV. No. _____	PERMIT NUMBER: _____

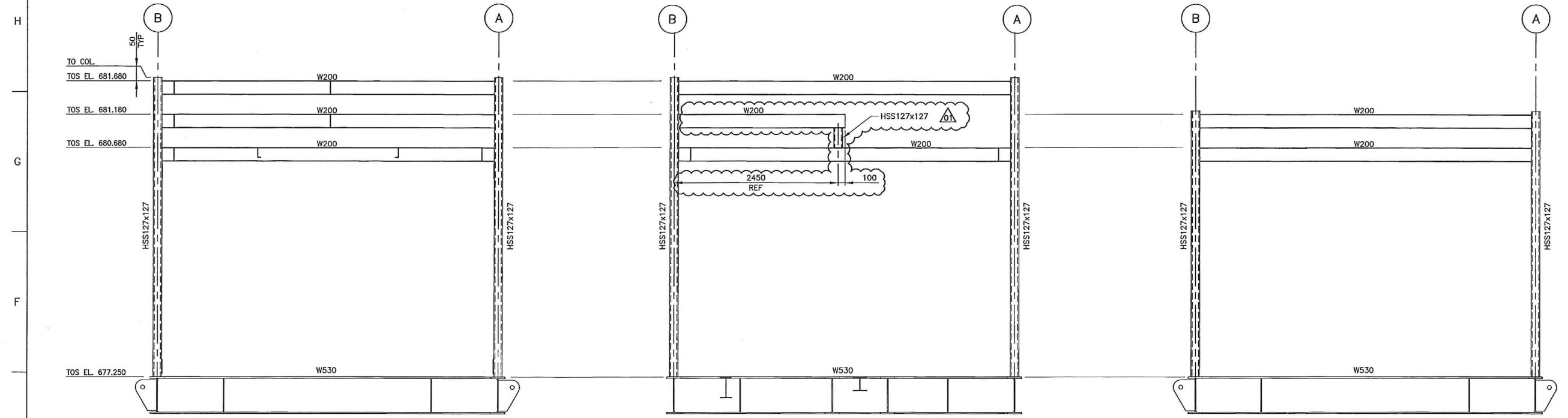
 	
KEYSTONE HARDISTY TANK TERMINAL	
FIA # 4663	DISCIPLINE # 02
LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN AND ELEVATION	
SCALE 1:50	DRAWING No 4663-02-02-06-003
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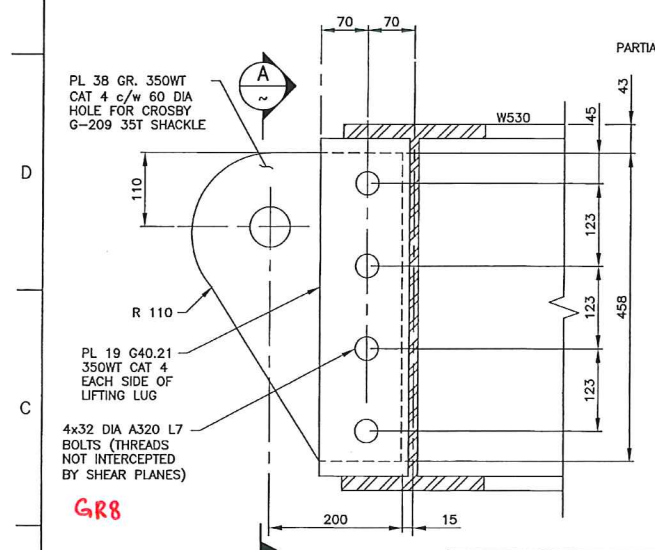
**NOTES:**  
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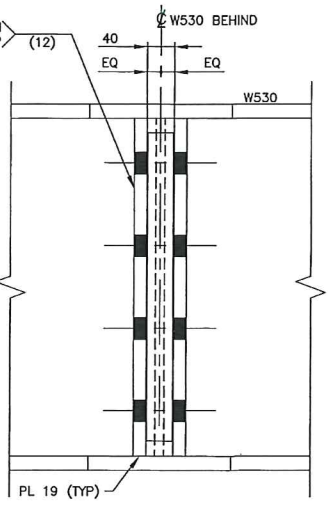
**ELEVATION AT GRID 1,2,3,5 & 6**  
(LOOKING WEST)

**ELEVATION AT GRID 4**  
(LOOKING WEST)

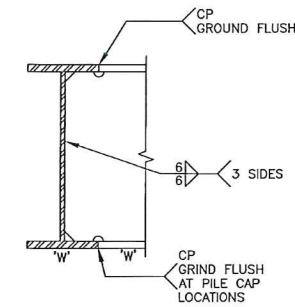
**ELEVATION AT GRID 7**  
(LOOKING WEST)



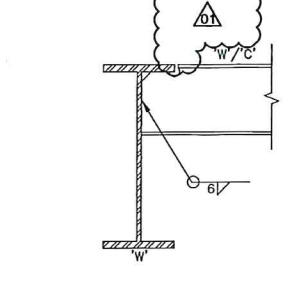
**DETAIL 1**  
SCALE 1:5 02-06-001



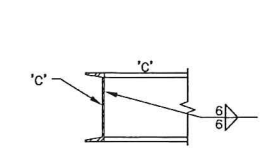
**SECTION A**  
SCALE 1:5



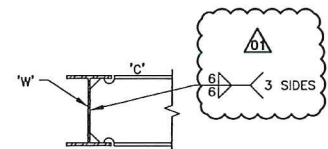
**W530 TO W530 CONNECTION DETAIL**  
SCALE 1:10



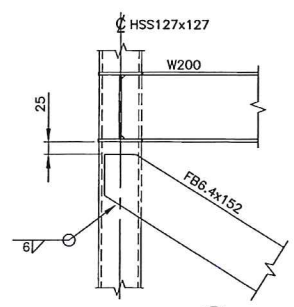
**TYPICAL UNEQUAL DEPTH BEAM/CHANNEL TO BEAM CONNECTION DETAIL**  
SCALE 1:10



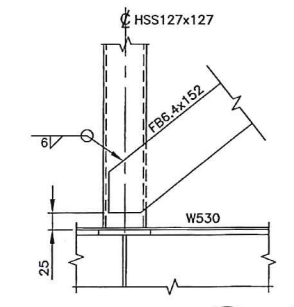
**TYPICAL EQUAL DEPTH CHANNEL TO CHANNEL CONNECTION DETAIL**  
SCALE 1:10



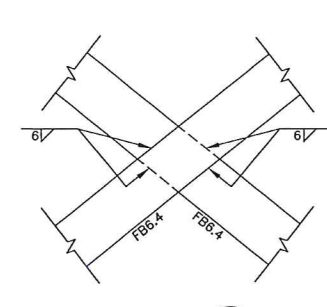
**TYPICAL EQUAL DEPTH CHANNEL TO BEAM CONNECTION DETAIL**  
SCALE 1:10



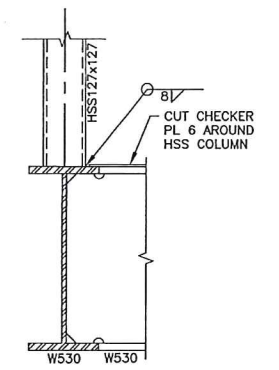
**DETAIL 2**  
SCALE 1:10 02-06-003



**DETAIL 3**  
SCALE 1:10 02-06-003



**DETAIL 4**  
SCALE 1:10 02-06-003



**TYPICAL HSS127x127 TO W530 CONNECTION**  
SCALE 1:10

SDN#: 25472-130-SS-0000-P0134  
 UEL#: 2012016-1ED-STR-000-0134-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-02-02-06-001	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-10	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	
01	2014-02-26	RE-ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	

PROFESSIONAL ENGINEER/RPT: **ROBERT MARRICCHIO**  
 PERMIT/ ENG. APPROVAL: **PERMIT TO PRACTICE UPSIDE ENGINEERING LTD.**  
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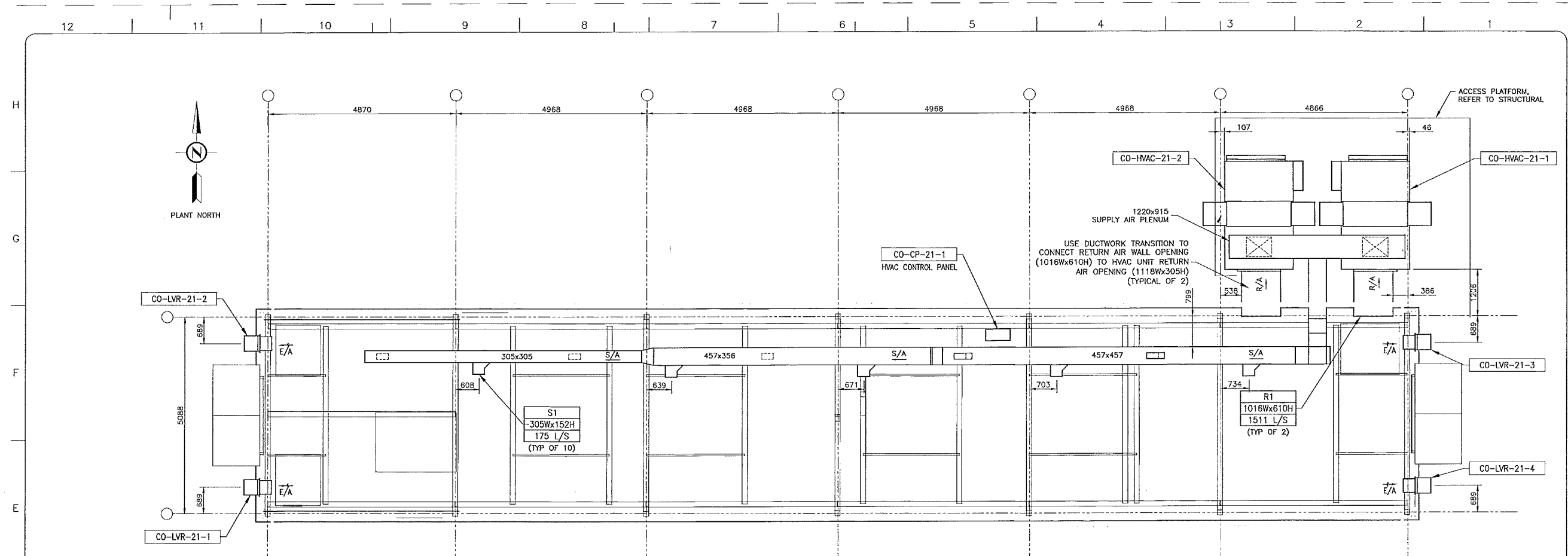
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KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHANGE: DISCIPLINE # 02

**LOW VOLTAGE-EES-21 STRUCTURAL STEEL ELEVATIONS, SECTIONS AND DETAILS**

SCALE 1:30 DRAWING No 4663-02-02-06-004 REV 01



PLAN VIEW - CO-EES-21  
LOW VOLTAGE ELECTRICAL EQUIPMENT SHELTER

HVAC EQUIPMENT SCHEDULE - LOW VOLTAGE EES (BUILDING CO-EES-21)										
TAG	DESCRIPTION	QTY.	POWER	MOTOR	ELECTRIC HEAT	UNIT CURRENT	SUPPLY AIR FLOW	OUTSIDE AIR FLOW	ESP	COMMENTS
CO-HVAC-21-1/2	BUILDING HEATING/COOLING UNIT	2	480V/3 PHASE/60Hz	7.5 HP	20.0 KW	51.4A	1746 L/S	235 L/S	500Pa	10.0 TON R410A SCROLL COMPRESSOR, FULL ECONOMIZER, HERESITE COATED COILS, LOW AMBIENT OPERATION TO -40°C, HIGH EFFICIENCY FILTERS
CO-LVR-21-1/2/3/4	BUILDING PRESSURE RELIEF DAMPER	4	--	--	--	--	437 L/S	--	--	SIZE: 12"Hx12"W, SETTING: +0.1" W.C.

AIR DEVICE SCHEDULE - LOW VOLTAGE EES (BUILDING CO-EES-21)		
EQUIPMENT No.	MANUFACTURER	DESCRIPTION
S1 305Wx152H 175 L/S	E.H. PRICE (OR EQUAL) INDUSTRIAL LOUVERED FACE SUPPLY MODEL No: 12x6/152G L/N/R/B12	SIZE :- 12x6 BORDER STYLE :- SURFACE MOUNT, 32mm STANDARD BLADE ORIENTATION :- FRONT BLADE PARALLEL TO LONG DIMENSION FASTENINGS :- COUNTER SUNK SCREW HOLES BLADES :- INDIVIDUALLY ADJUSTABLE FRONT BLADES, GANGED REAR BLADES. FINISH :- B12 WHITE
R1 1016Wx610H 1511 L/S	RETURN AIR GRILLE 16 GAUGE, 40x24 GALVANIZED WIRE MESH	SIZE :- 40x24 MOUNTING FRAME:- 50mm 16 GAUGE GALVANIZED METAL U-FRAME, c/w WELDED MITERED CORNERS, GASKET SEAL BETWEEN FRAME AND DUCT. FASTENING:- SELF DRILLING AND TAPPING SHEET METAL SCREWS

- GENERAL NOTES**
- ALL MATERIALS AND CONSTRUCTION PROCEDURES SHALL BE IN ACCORDANCE WITH THE FOLLOWING LATEST EDITIONS (UNLESS NOTED OTHERWISE) INCLUDING ADDENDUMS AND SUPPLEMENTS OF:
    - ASHRAE HANDBOOKS, STANDARDS AND GUIDELINES
    - SMACNA STANDARDS
    - PROJECT SPECIFICATIONS
  - IN CASE OF DISCREPANCY BETWEEN THESE NOTES, THE CONTRACT SCOPE DRAWINGS AND SPECIFICATIONS, CONSULT THE ENGINEER OF RECORD FOR CLARIFICATION.
  - ALL COORDINATES AND ELEVATIONS ARE METRIC MEASUREMENT.
  - PRIOR TO FABRICATION OF DUCTWORK, CHECK ALL AVAILABLE SPACES, HEIGHTS AND POSSIBLE CONFLICTS WITH OTHER TRADES.
  - DUCTWORK SIZES ARE FOR NET FREE AREA (INTERNAL). SHEETMETAL THICKNESS, INSULATION AND CLADDING MATERIALS SHALL BE ADDED TO ALL DIMENSIONS AND ELEVATIONS.
  - ALL HVAC ELEVATIONS ARE REFERENCED FROM TOP OF STRUCTURAL STEEL OR TO TOP OF FINISHED FLOOR UNLESS NOTED OTHERWISE.
  - OVERALL EQUIPMENT DIMENSIONS AND CONNECTION DIMENSIONS SHALL BE MEASURED AND VERIFIED WITH APPROVED IFC VENDOR DRAWINGS.
  - DUCTWORK PENETRATING BUILDING EXTERIOR WALLS & ROOF SHALL BE FRAMED OPENINGS c/w RAIN HOOD, CONTINUOUS SEALANT AND FLASHING. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS.
  - ICE FALL PROTECTION SHALL BE SUPPLIED AND INSTALLED ON ALL BUILDING EAVE ELEVATIONS (BY OWN) FOR THE FOLLOWING:
    - EXTERIOR SUPPLY, EXHAUST AND RETURN AIR DUCTWORK WITHIN 8'-0" OF BUILDING WALL PANELS.
  - ALL EXTERIOR DUCTWORK SHALL BE CONSTRUCTED WITH SLOPED TOP SIDE TO PREVENT SNOW ACCUMULATION.

SDN#: 25472-130-P1-0000-P0254  
UEL#: 2012016-1EC-GAD-000-0254-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
--	--

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-23	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	KW	MLC	MLC	RDS	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-APR-24

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5908

THE ASSOCIATION OF PROFESSIONAL ENGINEERS,  
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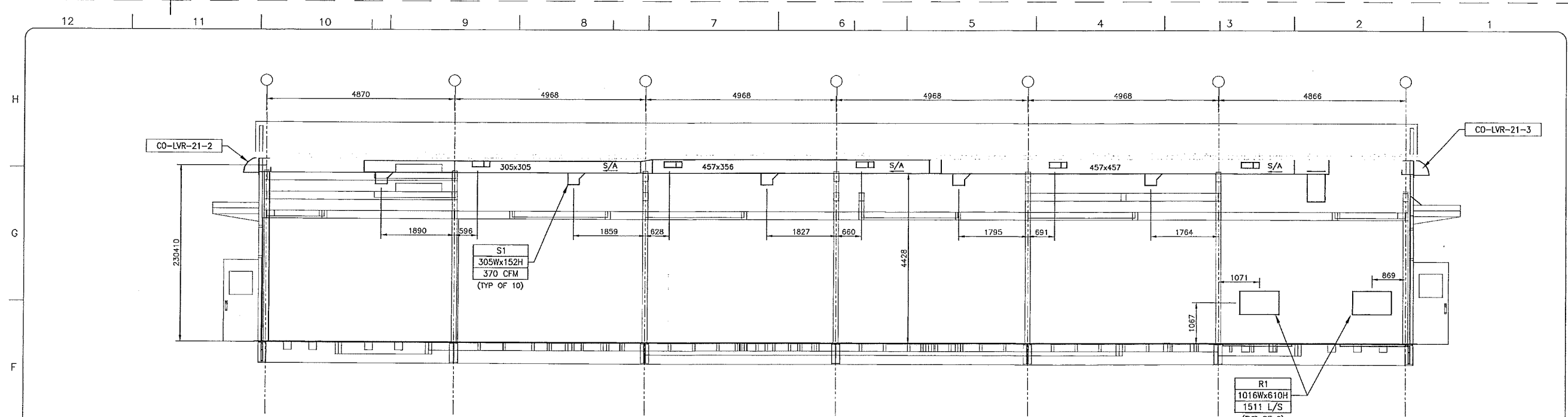
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

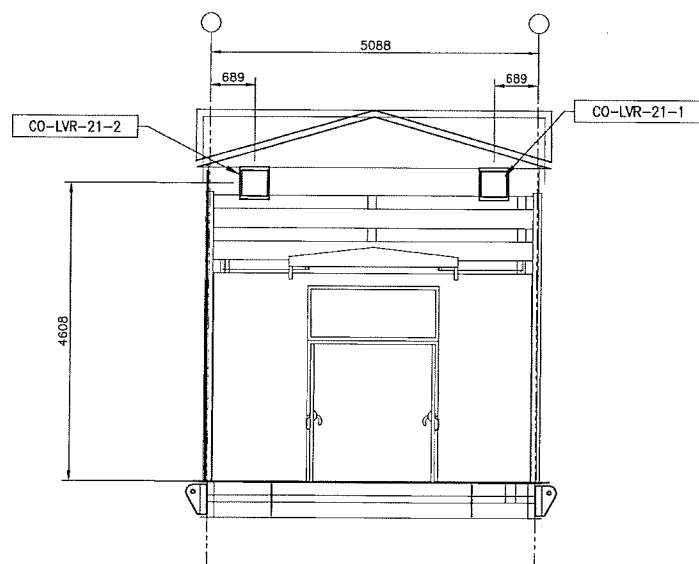
FA # 4663 CHARGE# DISCIPLINE # 02

LOW VOLTAGE CO-EES-21 BUILDING  
HVAC EQUIPMENT & DUCTWORK LAYOUT

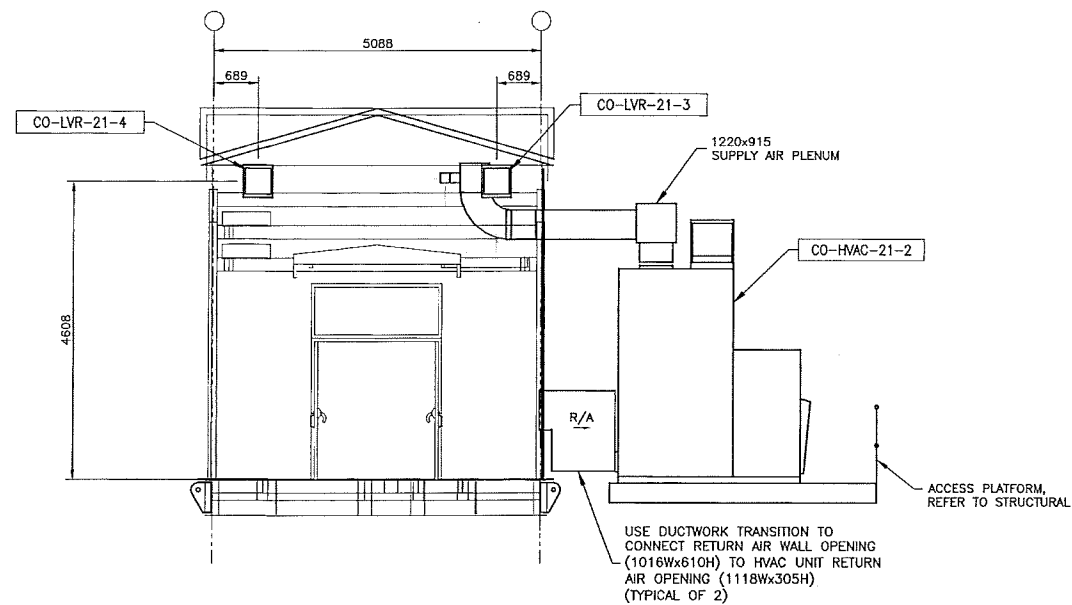
SCALE 1:50 DRAWING No 4663-01-00-03-254 REV 00



SOUTH ELEVATION - CO-EES-21  
LOW VOLTAGE ELECTRICAL EQUIPMENT SHELTER



WEST ELEVATION - CO-EES-21  
LOW VOLTAGE ELECTRICAL EQUIPMENT SHELTER



EAST ELEVATION - CO-EES-21  
LOW VOLTAGE ELECTRICAL EQUIPMENT SHELTER

SDN#: 25472-130-P1-0000-P0255  
UEL#: 2012016-1EC-GAD-000-0255-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
--	--

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-23	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	KEW	MLC	MLC	RDS	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: MICHAEL GARIBAY  
PERMIT/ ENG. APPROVAL: DATE: \_\_\_\_\_

2014-APR-24

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

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KEYSTONE HARDISTY TANK TERMINAL  
FA # 4663 CHANAGE: \_\_\_\_\_ DISCIPLINE # 02

LOW VOLTAGE CO-EES-21 BUILDING  
HVAC EQUIPMENT & DUCTWORK LAYOUT

SCALE 1:50 DRAWING No 4663-01-00-03-255 REV 00

BILL OF MATERIAL					
ITEM	QTY	DESCRIPTION	MANUFACTURER	MODEL	SCOPE OF SUPPLY
H 1	1	NORMAL POWER, 480V SWITCHBOARD	EATON		OWNER
2	1	EMERGENCY POWER, 480V SWITCHBOARD	EATON		OWNER
3	1	NORMAL POWER MCC	EATON	FREEDOM 2100	OWNER
4	1	EMERGENCY POWER MCC	EATON	FREEDOM 2100	OWNER
5	3	PANEL, TERMINAL CONTROL	POLYPHASE		OWNER
G 6	2 (1)	PANEL, COMMUNICATION	POLYPHASE		OWNER
7	1	PANEL, SERVICE ENTRANCE	POLYPHASE		OWNER
8	1	PANEL, HVAC CONTROL	SOUTHAMPTON-TRANE		OWNER
* 9	1	<del>PANEL, SWITCHBOARD-MIMIC</del>			<del>OWNER</del>
* 10	1	PANEL, COMMUNICATION	POLYPHASE		OWNER
F 11					
12	2	PANEL, HEAT TRACING	THERMON	TC1818A	OWNER
* 13	1	PANEL, TANK GAUGING	ROSEMOUNT	RAPTOR FCU 2160	OWNER
14	1	100A BREAKER W/ ENCLOSURE	EATON / C-H	GHC1100 C/W SGN1100 1/2 N100	
15	1	PANELBOARD, 120 V, 100 A, 1φ, 3W, 35 CCT	AMETEK	FPB	OWNER
16	1	PANELBOARD, 208/120 V, 225 A, 3φ, 4W, 42 CCT, 225 A MAIN BREAKER	CUTLER-HAMMER	P10B4C2-42ED	BUILDING VENDOR
17	1	PANELBOARD, 480/277 V, 225 A, 3φ, 4W, 42 CCT	CUTLER-HAMMER	P20L4C1-42	BUILDING VENDOR
E 18					
19					
20	1	TRANSFORMER, 45 kVA, 480-480Y/277 V,	HAMMOND	NMK045KKC	BUILDING VENDOR
21	1	TRANSFORMER, 45 kVA, 480-208Y/120 V,	HAMMOND	NMK045KBC	BUILDING VENDOR
22	2	TRANSFORMER, 75 kVA, 480-480Y/277 V,	HAMMOND	NMK075KKC	BUILDING VENDOR
23	1	TRANSFORMER, 10 kVA, 480-120 V	SOLA	63-29-310-B	BUILDING VENDOR
D 24					
25	2	RECEPTACLE -- SINGLE, INTERIOR	CRH CRH HUBBELL	FD 2 DS-21 HBL 5261 I	
26	26	LIGHT, FLUORESCENT	METALUX	DMF-232-120V-E8B1	BUILDING VENDOR
27	7	LIGHT, HPS	LUMARK	HPWP-GL-70-MT-LL	BUILDING VENDOR
28	2	LIGHT, EMERGENCY/EXIT	LUMACELL	RG12S144E2MQ12W	BUILDING VENDOR
C 29	6	SWITCH, LIGHT -- 15 A, 3-WAY	CROUSE-HINDS HUBBELL	ENCLOSURE: FD BOX COVERPLATE: DS185 SWITCH: 1203I	BUILDING VENDOR
30	6	RECEPTACLE --- DUPLEX, INTERIOR	CROUSE-HINDS HUBBELL	ENCLOSURE: FD BOX COVERPLATE: WR10-1 RECEPTACLE: HBL5261I DS 23 326 21	BUILDING VENDOR
31	26	RECEPTACLE --- DUPLEX, GFCI	CROUSE-HINDS HUBBELL	ENCLOSURE: FD BOX COVERPLATE: WR10-1 RECEPTACLE: GFS18A WPI010M10 GFS08LA	BUILDING VENDOR
32	3	GROUND BUSBAR (EQUIPMENT)	BURNDY	BBB14412F	BUILDING VENDOR
33	2	GROUND BUSBAR, ISOLATING (INSTRUMENT)	BURNDY	BBB14412F	BUILDING VENDOR
B 34	1	FOAM SYSTEM MCC			OWNER

\* - NOT SUPPLIED

BILL OF MATERIAL					
ITEM	QTY	DESCRIPTION	MANUFACTURER	MODEL	SCOPE OF SUPPLY
35	4	SMOKE DETECTOR, COMPLETE WITH RELAY MODULE	KIDDE	P1235CA SM120X	BUILDING VENDOR
36	4	HEAT DETECTOR, 140°F	FENWAL	12-X27120-000-140	BUILDING VENDOR
37	1	ALARM STROBE, RED, 120 VAC	CROUSE-HINDS	XBL16UL12060RYNN	BUILDING VENDOR
38	2	DOOR SWITCH, REED TYPE	GRI	4400-A	BUILDING VENDOR
39	1	TEMPERATURE TRANSMITTER (INSIDE)	ROSEMOUNT	644HAK6M5Q4G1 WITH INTEGRAL 3-WIRE RTD (PT-100) FOR AMBIENT TEMPERATURE MEASUREMENT	BUILDING VENDOR
40	1	TEMPERATURE TRANSMITTER (OUTSIDE)	ROSEMOUNT	3144 PDI1K6B4M5F5Q4XA	TBD
41	1	ESD STATION, C/W CLEAR COVER GUARD	ALLEN-BRADLEY CRUSADER INDUSTRIES	ENCLOSURE: 800T-1T2 PUSHBUTTON: 800T-FXJT-6D2 CONTACT BLOCK: 800T-XD2 FRONT GUARD PUSHBUTTON STATION COVER	BUILDING VENDOR
42	1	JUNCTION BOX (PHOTOCELL)	HAMMOND	EJ664 OR EQUAL	BUILDING VENDOR
43	1	PHOTOCELL, 120 VAC, MANUALLY ADJUSTABLE WITH INTERPOSING RELAY	INTERMATIC	K1121	BUILDING VENDOR
44	2	PORTABLE CARBON DIOXIDE FIRE EXTINGUISHER		15 LB ULC RATED 10B:C	BUILDING VENDOR
45	2	EMERGENCY HORN, 120 VAC	EDWARDS	5530M-120NS	BUILDING VENDOR
46	1	UPS, 10 kVA, 480 V, 3φ, 3W INPUT, 120 V, 1φ, 2W, OUTPUT	AMETEK		OWNER
47	1	BATTERY BANK, 60 MIN, 20 YEAR	AMETEK/EAST PENN	60AVR96-11SL	OWNER
48	1	SWITCH, DISCONNECT -- 200A	CUTLER-HAMMER	SFDN200	OWNER
49					
50	2	ELECTRIC UNIT HEATER C/W REMOTE THERMOSTAT, ON/OFF SWITCH, AND WALL MOUNT BRACKET	CALORITECH	GX307 AND WB1540	BUILDING VENDOR
51	2	60A DISCONNECT	CUTLER-HAMMER	1 HD362 NF	
52					
53					
54					
55		LADDER TYPE ALUMINUM CABLE TRAY, STRAIGHT SECTION, 900 mm WIDE, 188 mm SIDE RAILS, 229 mm RUNG SPACING, NEMA VE 1, 20C+.			BUILDING VENDOR
56		LADDER TYPE ALUMINUM CABLE TRAY, STRAIGHT SECTION, 600 mm WIDE, 188 mm SIDE RAILS, 229 mm RUNG SPACING, NEMA VE 1, 20C+.			BUILDING VENDOR
57		LADDER TYPE ALUMINUM CABLE TRAY, STRAIGHT SECTION, 450 mm WIDE, 188 mm SIDE RAILS, 229 mm RUNG SPACING, NEMA VE 1, 20C+.			BUILDING VENDOR
58		90° HORIZONTAL ELBOW, LADDER TYPE TRAY, 900 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR
59		90° HORIZONTAL ELBOW, LADDER TYPE TRAY, 600 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR
60		45° HORIZONTAL ELBOW, LADDER TYPE TRAY, 600 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR
61		90° VERTICAL OUTSIDE, LADDER TYPE TRAY, 900 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR
62		HORIZONTAL TEE, LADDER TYPE TRAY, 600 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR
63		HORIZONTAL TEE, LADDER TYPE TRAY, 900 mm WIDE, 188 mm SIDE RAILS, 600 mm BENDING RADIUS.			BUILDING VENDOR

NOTES:  
1. REFER TO CABLE TRAY LAYOUT DWG. Nos. 4663-06-02-03-019, 4663-06-02-03-021 AND 4663-06-02-03-022 FOR TRAY TAGS.

SDN# 25472-130-E2-0000-P0017  
UEL# 2012016-1EF-ELD-000-0017-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-01-001 to 009	CO-MCC-01 480V SINGLE LINE DIAGRAM SHEETS 1 TO 9
4663-06-02-01-019 to 029	CO-MCC-03 480V SINGLE LINE DIAGRAM SHEETS 1 TO 11
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT
4663-06-02-03-021	CO-EES-21 CABLE TRAY & GNDING LAYOUT, TRAYS AT EL.681.687 & EL.681.187
4663-06-02-03-022	CO-EES-21 CABLE TRAY & GNDING LAYOUT, TRAYS AT EL.680.687 & EL.680.187
4663-06-01-001	CO-SWBD-01 480V SINGLE LINE DIAGRAM NORMAL POWER SWITCHBOARD
4663-06-01-002	CO-SWBD-02 480V SINGLE LINE DIAGRAM EMERGENCY POWER SWITCHBOARD

REVISION		
REV No	DATE	DESCRIPTION
00	2013-12-06	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
01	2014-01-16	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
02	2014-04-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	SKC	PLR	SRL	JED	DCB	UPSIDE	
2197104	BEM	PLR	AMA	JED	DCB	UPSIDE	
2197104	MAA	PLR	SRL	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-APP-07

REV. NO. DATE PERMIT NUMBER:

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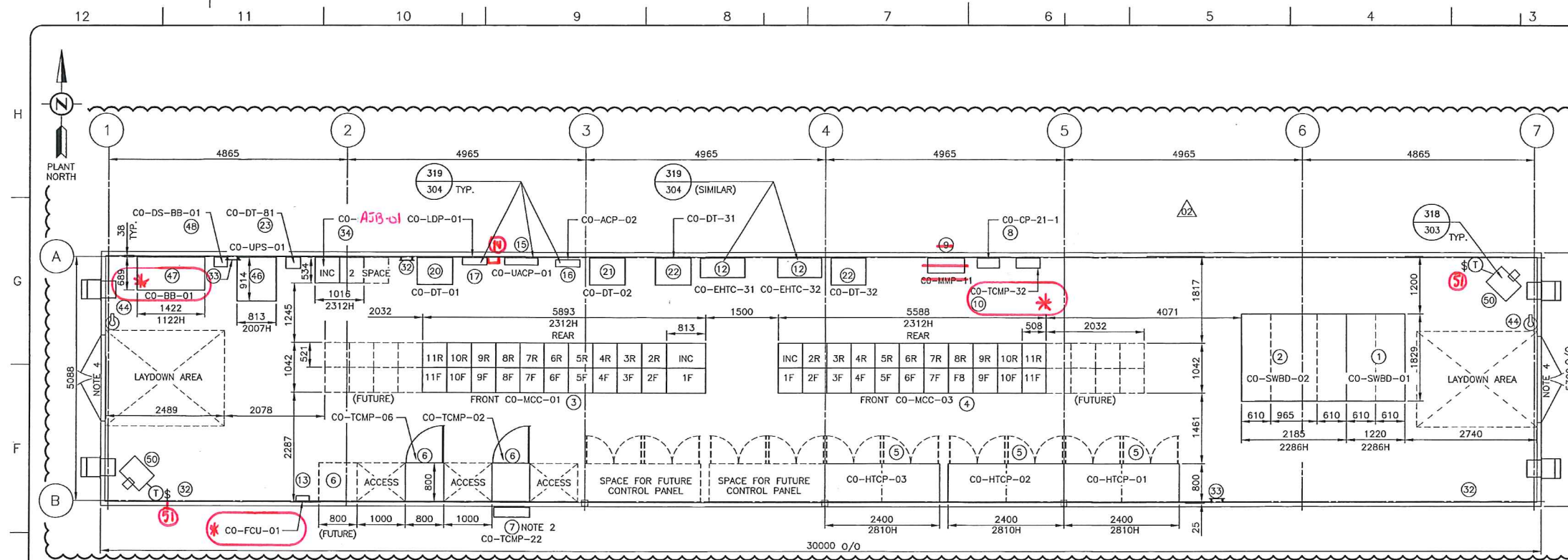
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KEYSTONE HARDISTY TANK TERMINAL

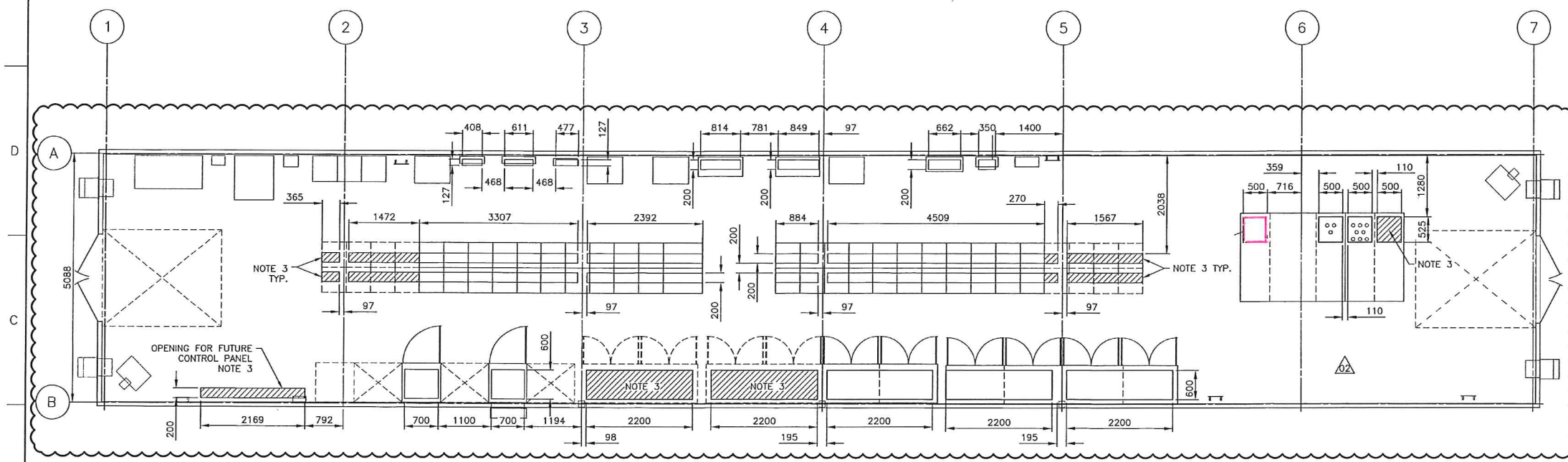
FA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21  
ELECTRICAL EQUIPMENT  
BILL OF MATERIAL

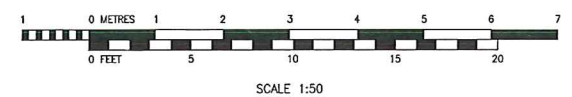
SCALE N.T.S. DRAWING No 4663-06-02-03-017 REV 02



EQUIPMENT LAYOUT



FLOOR CUT-OUTS



- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS.
  2. LOCATE BEHIND CO-TCMP-02 PANEL.
  3. PROVIDE COVER PLATE OVER FLOOR CUTOUT FOR FUTURE EQUIPMENT.
  4. PROVIDE REMOVABLE TRANSOM ABOVE DOOR.

\* NOT INSTALLED

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-017	CO-EES-21 ELECTRICAL EQUIPMENT BILL OF MATERIAL
4663-02-02-06-001	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL PLAN
4663-02-02-06-002	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL PLAN
4663-02-02-06-003	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL ELEVATIONS
4663-02-02-06-004	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL ELEVATIONS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-09-27	ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	SKC	PLR	SRL	JED	DCB	UPSIDE
01	2014-01-16	RE-ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	MAF	PLR	SRL	JED	DCB	UPSIDE
02	2014-04-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	MAA	PLR	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: JAMES DOODY  
 PERMIT/ENG. APPROVAL: JAMES DOODY  
 PERMIT TO PRACTICE, UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 2014 APR 07

SDN# 25472-130-E2-0000-P0016  
 UEL# 2012016-1EF-ELD-000-0016-01

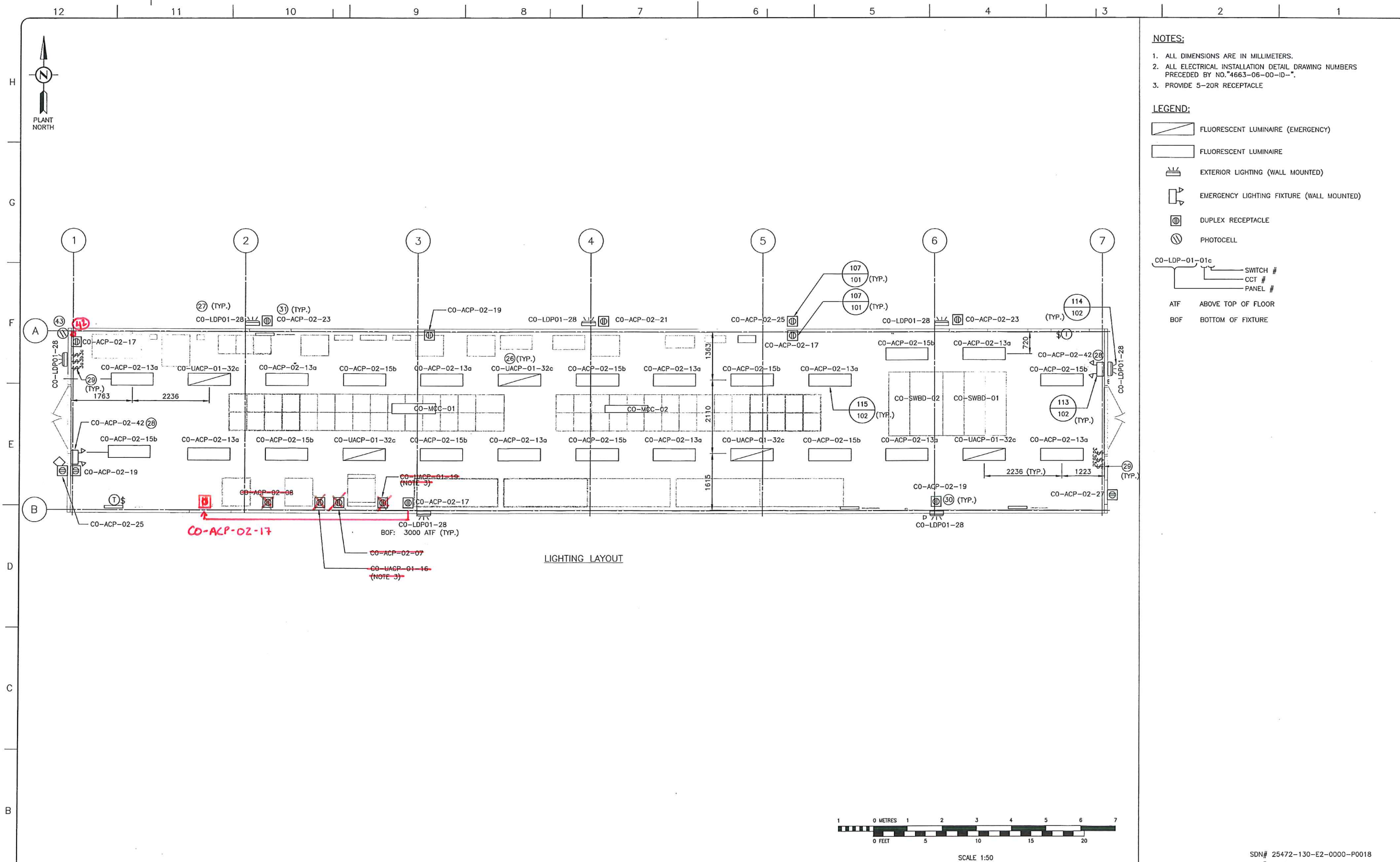
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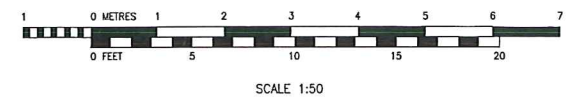
KEYSTONE HARDISTY TANK TERMINAL  
 DISCIPLINE # 06

CO-EES-21  
 ELECTRICAL EQUIPMENT LAYOUT  
 AND FLOOR CUT-OUTS

SCALE 1:50 DRAWING No 4663-06-02-03-016 REV 02



- NOTES:**
- ALL DIMENSIONS ARE IN MILLIMETERS.
  - ALL ELECTRICAL INSTALLATION DETAIL DRAWING NUMBERS PRECEDED BY NO. 4663-06-00-ID-#.
  - PROVIDE 5-20R RECEPTACLE
- LEGEND:**
- FLUORESCENT LUMINAIRE (EMERGENCY)
  - FLUORESCENT LUMINAIRE
  - EXTERIOR LIGHTING (WALL MOUNTED)
  - EMERGENCY LIGHTING FIXTURE (WALL MOUNTED)
  - DUPLEX RECEPTACLE
  - PHOTOCELL
- CO-LDP-01-01c SWITCH #  
CCT #  
PANEL #
- ATF ABOVE TOP OF FLOOR  
BOF BOTTOM OF FIXTURE



SDN# 25472-130-E2-0000-P0018  
UEL# 2012016-1EF-ELD-000-0018-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-05-001	CO-LDP-01 (480 V) LIGHTING DISTRIBUTION PANEL SCHEDULES
4663-06-00-05-003	CO-EES-21 CO-ACP-02 AND CO-UACP-01 DISTRIBUTION PANEL SCHEDULES
4663-06-02-03-017	CO-EES-21 ELECTRICAL EQUIPMENT BILL OF MATERIAL

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-07	ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	MJM	PLR	MJM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

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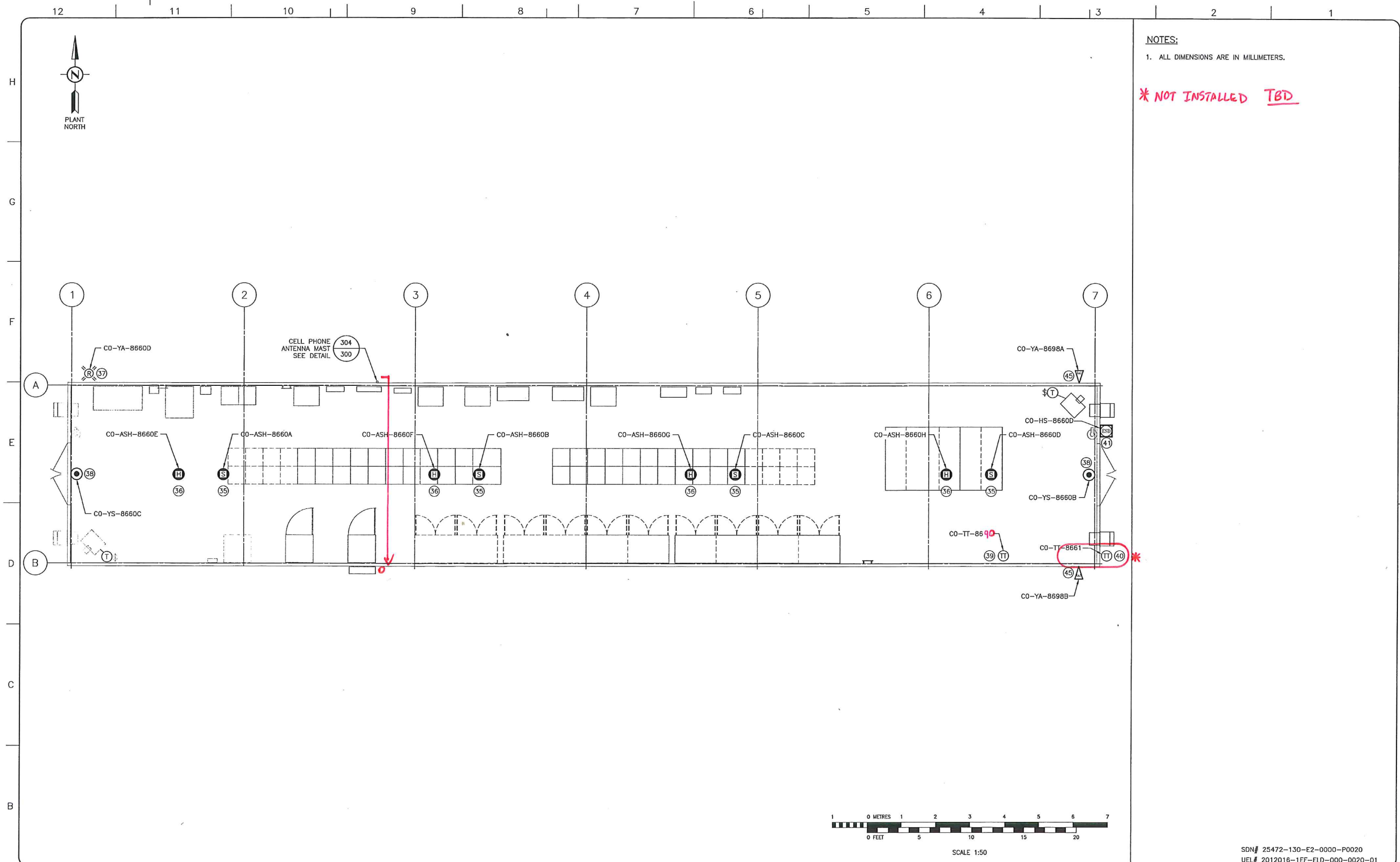
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAIRMAN: DISCIPLINE # 06

CO-EES-21  
LIGHTING AND LOW VOLTAGE UTILITIES LAYOUT

SCALE 1:50 DRAWING No 4663-06-02-03-018 REV 00



NOTES:  
 1. ALL DIMENSIONS ARE IN MILLIMETERS.  
 \* NOT INSTALLED TBD

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-017	CO-EES-21 ELECTRICAL EQUIPMENT BILL OF MATERIAL
4663-05-03-SC-012	CO-HTCP-01, PLC-11/00, SLOT 09, DISCRETE INPUT, I/O WIRING DIAGRAM (SHEET 1 OF 2)
4663-05-03-SC-013	CO-HTCP-01, PLC-11/00, SLOT 09, DISCRETE INPUT, I/O WIRING DIAGRAM (SHEET 2 OF 2)
4663-05-03-SC-014	CO-HTCP-01, PLC-11/00, SLOT 10, DISCRETE OUTPUT - STATIC I/O WIRING DIAGRAM
4663-05-03-SC-019	CO-HTCP-01, PLC-11/01, SLOT 05, ANALOG INPUT - SINGLE ENDED I/O WIRING DIAGRAM
4663-05-03-SC-025	CO-HTCP-01, PLC-11/01, SLOT 09, DISCRETE INPUT, I/O WIRING DIAGRAM (SHEET 2 OF 2)

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-07	ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	MAA	PLR	MJM	MSD	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: [Signature]

PERMIT/ ENG. APPROVAL: [Signature]

DATE: [Blank]

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

2014 APR-07

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E2-0000-P0020  
 UEL# 2012016-1EF-ELD-000-0020-01

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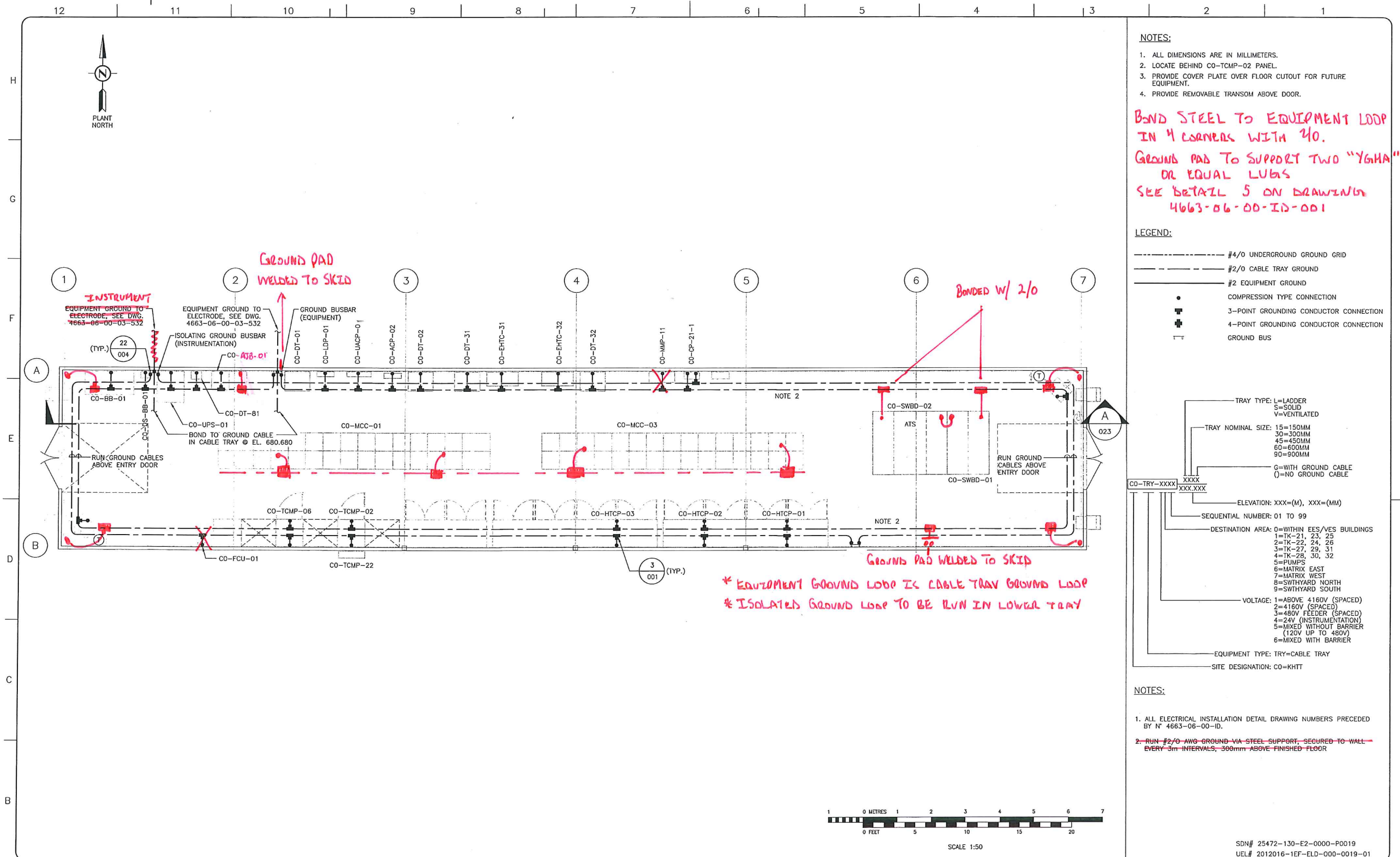
KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 06

CO-EES-21  
 INSTRUMENTATION DEVICES  
 LAYOUT

SCALE 1:50 DRAWING No 4663-06-02-03-020 REV 00





**NOTES:**

- ALL DIMENSIONS ARE IN MILLIMETERS.
- LOCATE BEHIND CO-TCMP-02 PANEL.
- PROVIDE COVER PLATE OVER FLOOR CUTOUT FOR FUTURE EQUIPMENT.
- PROVIDE REMOVABLE TRANSOM ABOVE DOOR.

**BOND STEEL TO EQUIPMENT LOOP IN 4 CORNERS WITH 40.**  
**GROUND PAD TO SUPPORT TWO "Y6HA" OR EQUAL LUGS**  
**SEE DETAIL 5 ON DRAWING 4663-06-00-ID-001**

**LEGEND:**

- #4/0 UNDERGROUND GROUND GRID
- #2/0 CABLE TRAY GROUND
- #2 EQUIPMENT GROUND
- COMPRESSION TYPE CONNECTION
- ⊥ 3-POINT GROUNDING CONDUCTOR CONNECTION
- ⊥ 4-POINT GROUNDING CONDUCTOR CONNECTION
- ⊥ GROUND BUS

TRAY TYPE: L=LADDER  
 S=SOLID  
 V=VENTILATED

TRAY NOMINAL SIZE: 15=150MM  
 30=300MM  
 45=450MM  
 60=600MM  
 90=900MM

G=WITH GROUND CABLE  
 ()=NO GROUND CABLE

ELEVATION: XXX=(M), XXX=(MM)

SEQUENTIAL NUMBER: 01 TO 99

DESTINATION AREA: 0=WITHIN EES/VES BUILDINGS  
 1=TK-21, 23, 25  
 2=TK-22, 24, 26  
 3=TK-27, 29, 31  
 4=TK-28, 30, 32  
 5=PUMPS  
 6=MATRIX EAST  
 7=MATRIX WEST  
 8=SWIHYARD NORTH  
 9=SWIHYARD SOUTH

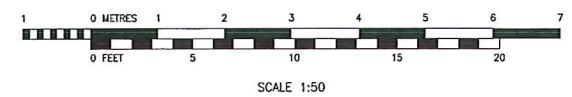
VOLTAGE: 1=ABOVE 4160V (SPACED)  
 2=4160V (SPACED)  
 3=480V FEEDER (SPACED)  
 4=24V (INSTRUMENTATION)  
 5=MIXED WITHOUT BARRIER (120V UP TO 480V)  
 6=MIXED WITH BARRIER

EQUIPMENT TYPE: TRY=CABLE TRAY

SITE DESIGNATION: CO=KHTT

**NOTES:**

- ALL ELECTRICAL INSTALLATION DETAIL DRAWING NUMBERS PRECEDED BY N° 4663-06-00-ID.
- RUN #2/0 AWG GROUND VIA STEEL SUPPORT, SECURED TO WALL EVERY 3m INTERVALS, 300mm ABOVE FINISHED FLOOR



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-017	CO-EES-21 ELECTRICAL EQUIPMENT BILL OF MATERIAL
4663-02-02-06-001	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL PLAN
4663-02-02-06-002	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL PLAN
4663-02-02-06-003	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL ELEVATIONS
4663-02-02-06-004	LOW VOLTAGE-EES-21 - STRUCTURAL STEEL ELEVATIONS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-07	ISSUED FOR CONSTRUCTION (UEL PROJ.# 2012016)	2197104	MAH	PLR	AMZ	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: [Signature]

PERMIT/ENG. APPROVAL: [Signature]

DATE: \_\_\_\_\_

PROFESSIONAL ENGINEER ALBERTA  
 2014 APR-07

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-E2-0000-P0019  
 UEL# 2012016-1EF-ELD-000-0019-01

**TransCanada**  
 In business to deliver

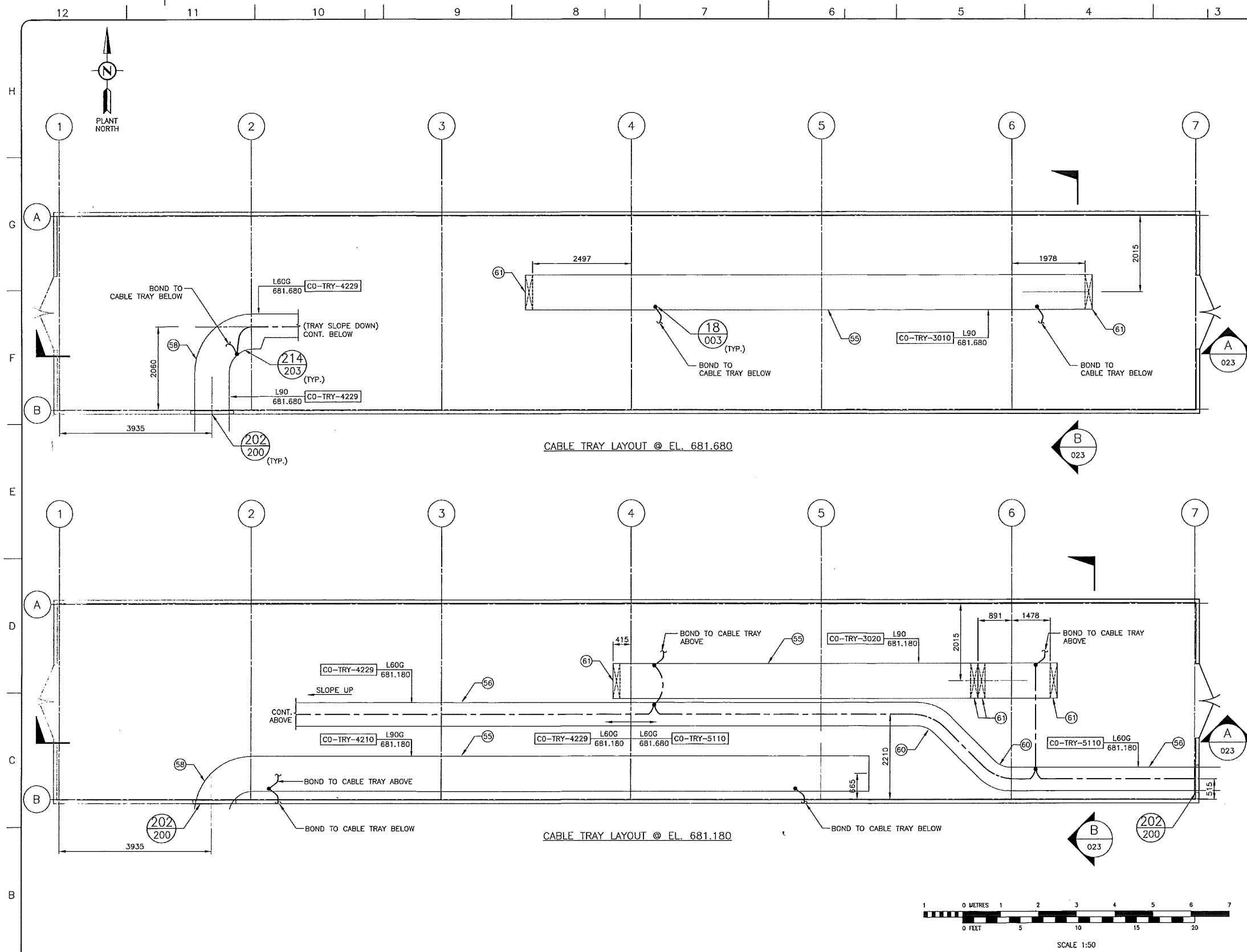
**upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

CHAIRMAN: [Signature] DISCIPLINE # 06

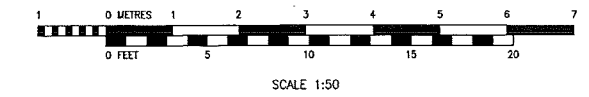
CO-EES-21  
 ELECTRICAL EQUIPMENT  
 GROUNDING LAYOUT

SCALE 1:50 DRAWING No 4663-06-02-03-019 REV 00



- LEGEND:**
- #4/0 UNDERGROUND GROUND GRID
  - #2/0 CABLE TRAY GROUND
  - #2 EQUIPMENT GROUND
  - COMPRESSION TYPE CONNECTION
  - ⊥ 3-POINT GROUNDING CONDUCTOR CONNECTION
  - ⊥ 4-POINT GROUNDING CONDUCTOR CONNECTION
  - ⊥ GROUND BUS
- TRAY TYPE: L=LADDER  
S=SOLID  
V=VENTILATED
- TRAY NOMINAL SIZE: 15=150MM  
30=300MM  
45=450MM  
60=600MM  
90=900MM
- G=WITH GROUND CABLE  
( )=NO GROUND CABLE
- ELEVATION: XXX=(M), XXX=(MM)
- SEQUENTIAL NUMBER: 01 TO 99
- DESTINATION AREA: 0=WITHIN EES/VES BUILDINGS  
1=TK-21, 23, 25  
2=TK-22, 24, 26  
3=TK-27, 29, 31  
4=TK-28, 30, 32  
5=PUMPS  
6=MATRIX EAST  
7=MATRIX WEST  
8=SWTHYARD NORTH  
9=SWTHYARD SOUTH
- VOLTAGE: 1=ABOVE 4160V (SPACED)  
2=4160V (SPACED)  
3=480V FEEDER (SPACED)  
4=24V (INSTRUMENTATION)  
5=MIXED WITHOUT BARRIER (120V UP TO 480V)  
6=MIXED WITH BARRIER
- EQUIPMENT TYPE: TRY=CABLE TRAY
- SITE DESIGNATION: CO=KHTT

- NOTES:**
- ALL ELECTRICAL INSTALLATION DETAIL DRAWING NUMBERS PRECEDED BY N° 4663-06-00-10.
  - ALL DIMENSIONS TO BE FROM CENTER LINE OF CABLE TRAY TO BUILDING GRID LINE AS SHOWN.



SDN#: 25472-130-E2-0000-P0021  
UEL#: 2012016-1EF-ELD-000-0021-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-022	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, TRAYS AT EL.680.687 & 680.187
4663-06-02-03-023	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, ELEVATIONS, SECTIONS & DETAILS
4663-06-02-03-017	CO-EES-21 CABLE TRAY AND GROUNDING BILL OF MATERIAL
4663-06-02-03-016	ELECTRICAL EQUIPMENT LAYOUT
4663-02-02-06-001	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN
4663-02-02-07-002	LOW VOLTAGE-EES-21 BUILDING PLAN AND ELEVATIONS
4663-02-02-07-003	LOW VOLTAGE-EES-21 BUILDING ELEVATIONS

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-04-07	ISSUED FOR CONSTRUCTION ( UEL PROJ# 2012016 )	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	MAA	PLR	MAA	SRD	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-APR-07

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

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In business to deliver

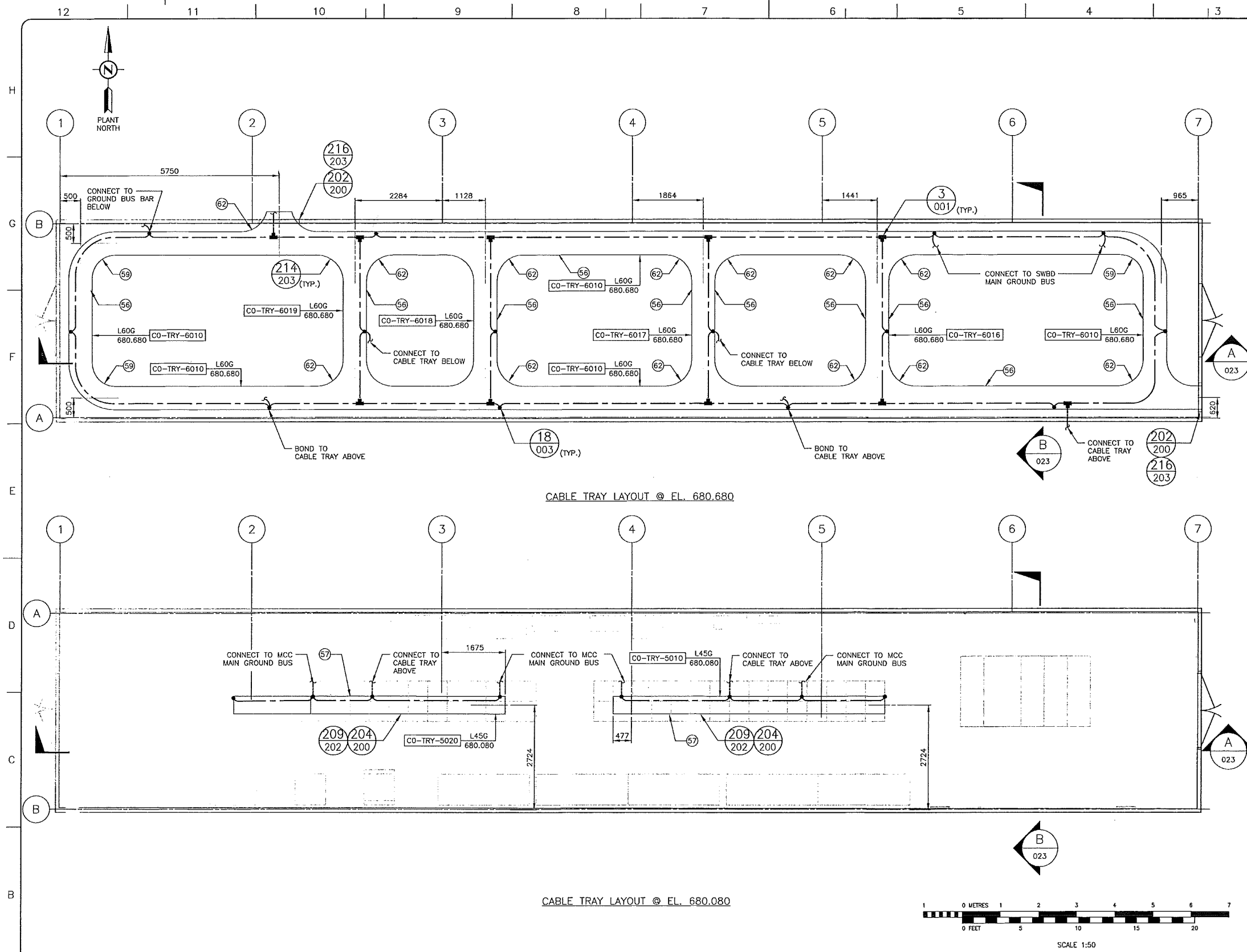
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 06

CO-EES-21  
CABLE TRAY, CABLING AND GROUNDING LAYOUT  
PLAN AT EL 681.680 AND 681.180

SCALE 1:50 DRAWING No 4663-06-02-03-021 REV 00



**LEGEND:**

- #4/0 UNDERGROUND GROUND GRID
- #2/0 CABLE TRAY GROUND
- #2 EQUIPMENT GROUND
- COMPRESSION TYPE CONNECTION
- ⊕ 3-POINT GROUNDING CONDUCTOR CONNECTION
- ⊕ 4-POINT GROUNDING CONDUCTOR CONNECTION
- ⊕ GROUND BUS

TRAY TYPE: L=LADDER  
S=SOLID  
V=VENTILATED

TRAY NOMINAL SIZE: 15=150MM  
30=300MM  
45=450MM  
60=600MM  
90=900MM

G=WITH GROUND CABLE  
( )=NO GROUND CABLE

ELEVATION: XXX=(M), XXX=(MM)

SEQUENTIAL NUMBER: 01 TO 99

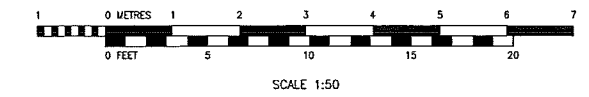
DESTINATION AREA: 0=WITHIN EES/VES BUILDINGS  
1=TK-21, 23, 25  
2=TK-22, 24, 26  
3=TK-27, 29, 31  
4=TK-28, 30, 32  
5=PUMPS  
6=MATRIX EAST  
7=MATRIX WEST  
8=SWTHYARD NORTH  
9=SWTHYARD SOUTH

VOLTAGE: 1=ABOVE 4160V (SPACED)  
2=4160V (SPACED)  
3=480V FEEDER (SPACED)  
4=24V (INSTRUMENTATION)  
5=MIXED WITHOUT BARRIER  
(120V UP TO 480V)  
6=MIXED WITH BARRIER

EQUIPMENT TYPE: TRY=CABLE TRAY

SITE DESIGNATION: CO=KHTT

- NOTES:**
- ALL ELECTRICAL INSTALLATION DETAIL DRAWING NUMBERS PRECEDED BY N° 4663-06-00-ID.
  - ALL DIMENSIONS TO BE FROM CENTER LINE OF CABLE TRAY TO BUILDING GRID LINE AS SHOWN.



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT
4663-06-02-03-017	CO-EES-21 CABLE TRAY AND GROUNDING BILL OF MATERIAL
4663-06-02-03-021	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, TRAYS AT EL.681.687 & 681.185
4663-06-02-03-023	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, ELEVATIONS, SECTIONS & DETAILS
4663-02-02-06-001	LOW VOLTAGE-EES-21 STRUCTURAL STEEL PLAN
4663-02-02-07-002	LOW VOLTAGE-EES-21 BUILDING PLAN AND ELEVATIONS
4663-02-02-07-003	LOW VOLTAGE-EES-21 BUILDING ELEVATIONS

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-07	ISSUED FOR CONSTRUCTION ( UEL PROJ# 2012016 )	2197104	MAA	PLR	AAA	YDED	L-DCB,ca	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

2014-APR-07

REV. No. DATE PERMIT NUMBER:

SDN#: 25472-130-E2-0000-P0022  
UEL#: 2012016-1EF-ELD-000-0022-01

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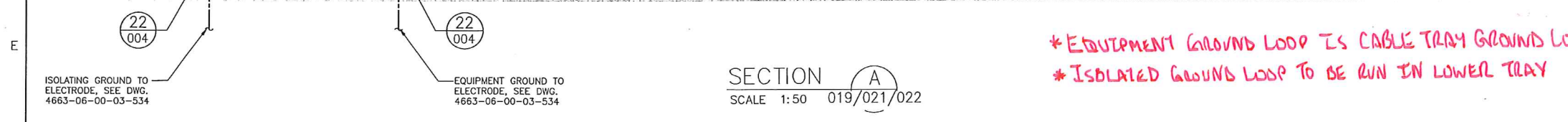
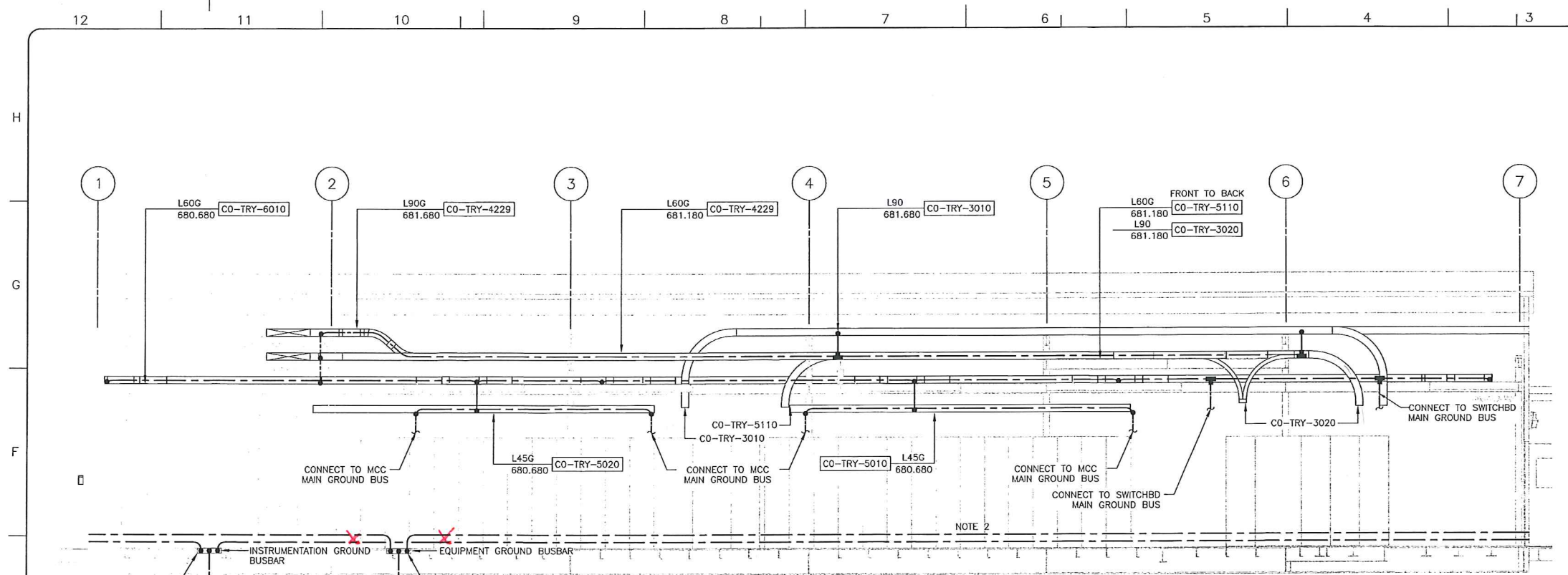
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21  
CABLE TRAY, CABLE AND GROUNDING LAYOUT  
PLAN AT EL. 680.680 AND 680.080

SCALE 1:50 DRAWING No 4663-06-02-03-022 REV 00



\* ALL TRAY TO TRAY JUMPERS ARE TO BE 2/0.  
 \* BOND STEEL IN 4 CORNERS WITH 2/0.

\* EQUIPMENT GROUND LOOP IS CABLE TRAY GROUND LOOP  
 \* ISOLATED GROUND LOOP TO BE RUN IN LOWER TRAY

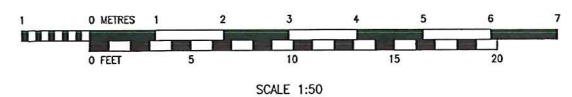
**LEGEND:**

- #4/0 UNDERGROUND GROUND GRID
- #2/0 CABLE TRAY GROUND
- #2 EQUIPMENT GROUND
- COMPRESSION TYPE CONNECTION
- 3-POINT GROUNDING CONDUCTOR CONNECTION
- 4-POINT GROUNDING CONDUCTOR CONNECTION
- CABLE TRAY SIZE
- CABLE TRAY VOLTAGE (HV, MV, LV)
- c/W BARRIER
- HV - 15kV
- MV - 4.16kV
- LV - 480V & BELOW

CO-TRY-XXXX 600 MV WB EL. XXX.XXX

CABLE TRAY BOTTOM ELEVATION  
CABLE TRAY NUMBER

- NOTES:**
- ALL ELECTRICAL INSTALLATION DETAIL DRAWING NUMBERS PRECEDED BY N° 4663-06-00-ID.
  - RUN #2/0 AWG GROUND VIA STEEL CHANNEL SECURED TO WALL EVERY 3 m INTERVALS, 300 mm ABOVE FINISHED FLOOR
  - ALL DIMENSIONS TO BE FROM CENTER LINE OF CABLE TRAY TO BUILDING GRID LINE AS SHOWN.



SDN#: 25472-130-E2-0000-P0023  
 UEL#: 2012016-1EF-ELD-000-0023-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-021	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, TRAYS AT EL.681.687 & 681.187
4663-06-02-03-022	CO-EES-21 CABLE TRAY AND GNDING LAYOUT, TRAYS AT EL.680.687 & 680.187 SECTIONS AND DETAILS

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-07	ISSUED FOR CONSTRUCTION (UEL PROJ# 2012016)	2197104	MAA	PLR	AAA	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-APR-04

REV. NO. DATE PERMIT NUMBER:

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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

CHAIRMAN: 4663 CHAIRMAN: DISCIPLINE # 06

CO-EES-21  
 CABLE TRAY LAYOUT  
 ELEVATIONS, SECTIONS AND DETAILS

SCALE 1:50 DRAWING No 4663-06-02-03-023 REV 00

NAME: CO-UACP-01		PHASES: 1		BUS SIZE: 100 A		LOCATION: CO-EES-21		MAIN BREAKER: N/A			
VOLTAGE: 120 V		WIRES: 2		MOUNTING: SURFACE		FEEDER: 2#3, 1#6 GND 27mm EMT (CO-P-2200)					
DESCRIPTION	LOAD (WATTS)	FUSE SIZE (AMPS)	BRKR SIZE (AMPS)	CCT. NO.	L		CCT. NO.	BRKR SIZE (AMPS)	FUSE SIZE (AMPS)	LOAD (WATTS)	DESCRIPTION
CO-HTCP-01 CONTROL POWER	290	20	30	1			2	30	20	50	CO-HTCP-01 (FIRE/BEACON SUPPLY)
CO-HTCP-02 CONTROL POWER	110	20	30	3			4	30	20	0	SPARE
CO-HTCP-03 CONTROL POWER	200	20	30	5			6	30	20	0	SPARE
CO-EJB-21-2 CONTROL POWER	50	20	30	7			8	30	20	0	SPARE
CO-EJB-22-2 CONTROL POWER	50	20	30	9			10	30	20	0	SPARE
CO-EJB-23-2 CONTROL POWER	50	20	30	11			12	30	20	100	CO-FCU-01 TANK MASTER FIELD COMMUNICATION UNIT
CO-EJB-24-2 CONTROL POWER	50	20	30	13			14	30	20	200	CO-TCMP-32
CO-EJB-25-2 CONTROL POWER	50	20	30	15			16	30	20	100	CO-TCMP-06 CONTROL POWER
CO-EJB-26-2 CONTROL POWER	200	20	30	17			18	30	20	120	CO-TCMP-12 CONTROL POWER (CCTV TOWER 12)
CO-TCMP-02 CONTROL POWER	200	20	30	19			20	30	20	20	CO-TCMP-30 CONTROL POWER
CO-TCMP-10 CONTROL POWER (CCTV TOWER 10)	140	20	30	21			22	30	20	250	CO-TCMP-31 CONTROL POWER
CO-TCMP-13 CONTROL POWER (CCTV TOWER 13)	120	20	30	23			24	30	20	200	CO-CP-21-1
CO-SWBD-01 CONTROL POWER	20	20	30	25			26	30	20	0	SPARE
CO-SWBD-02 CONTROL POWER	20	20	30	27			28	30	20	40	SMOKE DETECTORS (CO-EES-21)
CO-MCC-01 CONTROL POWER	20	20	30	29			30	30	20	360	INTERIOR EMERGENCY LIGHTS (CO-EES-21)
CO-MCC-03 CONTROL POWER	20	20	30	31			32	30	30	2800	<del>FOAM CONTROL PANEL CO-MCC-05</del> <b>AJB-01</b>
MAIN GATE EAST PANEL CONTROL POWER	100	20	30	33			34	40	40	3395	CO-UACP-03
MAIN GATE WEST PANEL CONTROL POWER	40	20	30	35							
LEFT SIDE (WATTS)		1730		TOTAL (WATTS):		9365		76.35		RIGHT SIDE (WATTS)	

EXTERNAL IODA ENCLOSED BREAKER  
BOM # 14

NOTES:  
1. ALL EQUIPMENT & CABLE TAGS SHALL BEGIN WITH 130-KSHIT-CO-...

NAME: CO-ACP-02		PHASES: 3		BUS SIZE: 225 A		LOCATION: CO-EES-21		MAIN BREAKER: 225 A						
VOLTAGE: 120/208 V		WIRES: 4		MOUNTING: SURFACE		FEEDER: 4C # 2/0								
DESCRIPTION	LOAD (WATTS)			BRKR SIZE (AMPS)	CCT. NO.	A B C			CCT. NO.	BRKR SIZE (AMPS)	LOAD (WATTS)			DESCRIPTION
	A	B	C			A	B	C						
CO-HTCP-01 CONTROL POWER	290			15	1				2	15	40			CO-HTCP-01 CABINET LIGHTS
CO-HTCP-02 CONTROL POWER		110		15	3				4	15		40		CO-HTCP-02 CABINET LIGHTS
CO-HTCP-03 CONTROL POWER			200	15	5				6	15			40	CO-HTCP-03 CABINET LIGHTS
CO-TCMP-02 CONTROL POWER	200			15	7				8	15	80			CO-TCMP-06 CONTROL POWER
<b>PHOTOCELL</b>		0		15	9				10	15		140		CO-TCMP-10 HEATER POWER
CO-TCMP-13 HEATER POWER			140	15	11				12	15			140	CO-TCMP-12 HEATER POWER
CO-EES-21 INTERIOR LIGHTS	710			15	13				14	15	0			SPARE
CO-EES-21 INTERIOR LIGHTS		640		15	15				16	15		0		SPARE
CO-EES-21 INTERIOR RECEPTACLE			600	20	17				18	15		0		SPARE
CO-EES-21 INTERIOR RECEPTACLE	600			20	19				20	15		0		SPARE
CO-EES-21 EXTERIOR RECEPTACLE		200		20	21				22	15		140		CO-TCMP-30 HEATER POWER
CO-EES-21 EXTERIOR RECEPTACLE			200	20	23				24	15			140	CO-TCMP-31 HEATER POWER
CO-EES-21 EXTERIOR RECEPTACLE	200			20	25				26	15	200			SITE RECEPTACLE
CO-EES-21 EXTERIOR RECEPTACLE		400		20	27				28	15		200		SITE RECEPTACLE
CO-EJB-04 EXT. RECEP. (CO-TK 21/22)			300	15	29				30	15			200	SITE RECEPTACLE
CO-EJB-05 EXT. RECEP. (CO-TK 23/24)	400			15	31				32	15	0			SPARE
CO-EJB-06 EXT. RECEP. (CO-TK 25/26)		400		15	33				34	15		0		SPARE
SPARE			0	15	35				36	15		0		SPARE
SPARE	0			15	37				38	15	0			SPARE
SPARE		0		15	39				40	15		0		SPARE
SPARE			0	15	41				42	15		20		EMERGENCY/EXIT LIGHT BATTERY PACK
LEFT SIDE (WATTS)		5590	2400	1750	1440	TOTAL (WATTS):		6970	320	520	540	1380 RIGHT SIDE (WATTS)		

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT
4663-06-02-03-017	CO-EES-21 ELECTRICAL EQUIPMENT BILL OF MATERIAL
4663-06-02-03-018	CO-EES-21 LIGHTING AND LOW VOLTAGE UTILITIES LAYOUT

REVISION		
REV No	DATE	DESCRIPTION
00	2014-04-07	ISSUED FOR CONSTRUCTION (UEL PROJ # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	BEM	PLR	MJM	JED	DCB	UPSIDE	
2197104	BEM	LLL	JHM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

SDN# 25472-130-EC-0000-P0003  
UEL# 2012016-1EF-CAB-000-0005-01

**TransCanada**  
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**Upside Engineering Ltd.**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGAGE: DISCIPLINE # 06

CO-EES-21  
CO-ACP-02 AND CO-UACP-01  
DISTRIBUTION PANEL SCHEDULES

SCALE N.T.S. DRAWING No 4663-06-00-05-003 REV 01

NOTES:  
 1. ALL EQUIPMENT & CABLE TAGS SHALL BEGIN WITH 130-KSHT-CO-...

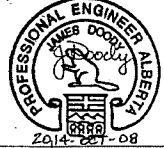
NAME: CO-LDP-01		PHASES: 3		BUS SIZE: 100 A		LOCATION: CO-EES-21		MAIN BREAKER: N/A							
VOLTAGE: 277/480 V		WIRES: 4		MOUNTING: SURFACE				FEEDER: 4C # 4 (CO-P-2120)							
DESCRIPTION	WATTS			BRKR SIZE (AMPS)	CCT NO.	A	B	C	CCT NO.	BRKR SIZE (AMPS)	WATTS			DESCRIPTION	
	A	B	C								A	B	C		
CO-TK-21 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	525			15A/3P	1				2	15A/3P	345			CO-TK-22 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	
		558			3				4			318			
			558		5				6				318		
CO-TK-23 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	384			15A/3P	7				8	15A/3P	378			CO-TK-24 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	
		384			9				10			351			
			351		11				12				378		
CO-TK-25 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	485			15A/3P	13				14	15A/3P	231			CO-TK-26 AREA, GAUGE, PLATFORM AND STAIRS LIGHTING	
		518			15				16			297			
			551		17				18				264		
SOUTH TANK AREA - EAST SIDE LIGHTING	549			15A/3P	19				20	15A/3P				SPARE	
		549			21				22						
			999		23				24						
SPARE				15A/3P	25				26	15A/1P	588			CO-VES-21 EXTERIOR LIGHTING	
					27				28	15A/1P	588			CO-EES-21 EXTERIOR LIGHTING	
					29				30	15A/1P				SPARE	
SPARE				15A/1P	31				32	15A/1P				SPARE	
SPARE				15A/1P	33				34	15A/1P				SPARE	
SPARE				15A/1P	35				36	15A/1P				SPARE	
SPARE				15A/1P	37				38	20A/1P				SPARE	
SPARE				15A/1P	39				40	20A/1P				SPARE	
SPARE				15A/1P	41				42	20A/1P				SPARE	
LEFT SIDE (WATTS)	6411	1943	2009	2459	TOTAL WATTS: 10467					1542	1554	960	4056	RIGHT SIDE (WATTS)	



SDN# 25472-130-EC-0000-P0001  
 UEL# 2012016-1EF-CAB-000-0003-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2013-10-04	ISSUED FOR CONSTRUCTION (UEL PROJ # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ # 2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	MJM	PLR	MJM	JED	DCB	UPSIDE
2197104	BEM	LLL	HMM	MCD	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
 REV. NO. DATE	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 The Association of Professional Engineers, and Geoscientists of Alberta
DATE	PERMIT NUMBER:

 	
KEYSTONE HARDISTY TANK TERMINAL	
PIA # 4663	DISCIPLINE # 06
CO-LDP-01 (480 V) LIGHTING DISTRIBUTION PANEL SCHEDULES	
SCALE N.T.S.	DRAWING No 4663-06-00-05-001
REV 01	


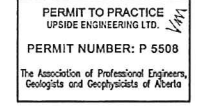
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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-CS-2000	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 SCADA SWITCH SW1101, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	28	
00	CO-CS-2001	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 CONTROL SWITCH SW1121, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	28	
00	CO-CS-2002	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	28	
00	CO-CS-2003	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	28	
00	CO-CS-2010	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 SCADA SWITCH SW1101, CO-EES-21	CABLE TRAY	CO-MFR-B-10 CO-SWBD-01, PQMII, CO-EES-21	37	
00	CO-CS-2011	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 SCADA SWITCH SW1101, CO-EES-21	CABLE TRAY	CO-MFR-B-11 CO-SWBD-02, PQMII, CO-EES-21	35	
00	CO-CS-2012	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 SCADA SWITCH SW1101, CO-EES-21	CABLE TRAY	CO-MFR-B-12 CO-MCC-01, PQMII, CO-EES-21	25	
00	CO-CS-2013	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 SCADA SWITCH SW1101, CO-EES-21	CABLE TRAY	CO-MFR-B-13 CO-MCC-03, PQMII, CO-EES-21	32	
00	CO-CS-2025	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-02 TERMINAL CONTROL PANEL, CO-EES-21	27	
00	CO-CS-2026	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-02 TERMINAL CONTROL PANEL, CO-EES-21	27	
00	CO-CS-2030	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	25	
00	CO-CS-2031	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 RIO SWITCH SW1131, CO-EES-21	CABLE TRAY	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	25	
00	CO-CS-2035	2PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-TCMP-02 TERMINAL SERVER, CO-EES-21	CABLE TRAY	CO-FCU-01 FIELD COMMUNICATION UNIT, CO-EES-21	20	COILED IN TRAY
00	CO-CS-2036	2PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-FCU-01 FIELD COMMUNICATION UNIT, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	35	COILED IN TRAY
00	CO-CS-2050	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2051	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2052	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2053	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	

**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT--"

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:  PERMIT/ ENG. APPROVAL: 

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN#: 25472-130-EW-0000-P0400  
 UEL#: 2012016-1EF-CBS-000-0400-01

**TransCanada**  
 In business to deliver

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21 BUILDING  
 INSTRUMENTATION CABLE SCHEDULE  
 SHEET 1

SCALE N/A DRAWING No 4663-06-03-04-001 REV 00

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-CS-2054	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2055	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2056	4PR	#23 AWG	300	BELDEN 7883A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CONDUIT	CO-TCMP-06 CCTV SWITCH SW1151, CO-EES-21	17	
00	CO-CS-2060	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CABLE TRAY	CO-ACC-21, CO-TCMP-32 ACCESS CONTROL SYSTEM, CO-EES-21	20	COILED IN TRAY
00	CO-CS-2070	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CABLE TRAY	WORKSTATION OUTLET CO-EES-21	17	NO WORKSTATION - NOT INSTALLED
00	CO-CS-2071	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CABLE TRAY	WORKSTATION OUTLET CO-EES-21	17	NO WORKSTATION - NOT INSTALLED
00	CO-CS-2072	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CABLE TRAY	WORKSTATION OUTLET CO-EES-21	17	NO WORKSTATION - NOT INSTALLED
00	CO-CS-2073	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 BUSINESS SWITCH SW1111, CO-EES-21	CABLE TRAY	WORKSTATION OUTLET CO-EES-21	17	NO WORKSTATION - NOT INSTALLED
00	CO-CS-2100	-	-	-	LMR 400, ULTRAFLEX	CELL	N/A	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	CONDUIT	EXTERIOR YAGI ANTENNA CO-EES-21	25	CABLE CONNECTOR: N-MALE
00	CO-CS-2101	-	-	-	RG-400	CELL	N/A	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	CONDUIT	CO-TCMP-02 CELLPHONE SIGNAL BOOSTER, CO-EES-21	20	CABLE CONNECTORS: N-MALE, TNC-MALE
00	CO-CS-2102	-	-	-	RG-400	CELL	N/A	CO-TCMP-02 CELLPHONE SIGNAL BOOSTER, CO-EES-21	CONDUIT	INTERIOR CELL ANTENNA CO-EES-21	20	CABLE CONNECTORS: N-MALE, TNC-MALE
00	CO-CS-2120	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 MEDIA PACK - MP1114, CO-EES-21	CONDUIT	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	10	
00	CO-CS-2121	4PR	#23 AWG	300	BELDEN 121872A	COMMUNICATIONS	24 VDC	CO-TCMP-02 MEDIA PACK - MP1114, CO-EES-21	CONDUIT	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	10	
00	CO-CS-2122	2PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-ACC-21, CO-TCMP-32 GATE ACCESS CONTROLLER, CO-EES-21	CABLE TRAY	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	20	COILED IN TRAY
00	CO-CS-2123	2PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-ACC-21, CO-TCMP-32 GATE ACCESS CONTROLLER, CO-EES-21	CABLE TRAY	CO-TCMP-22 SERVICE ENTRANCE BOX, CO-EES-21	20	COILED IN TRAY
00	CO-I-2201	1PR	#16 AWG	300	ACIC	INSTRUMENTATION	24 VDC	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-TT-8660 INTERIOR AMBIENT TEMPERATURE TRANSMITTER, CO-EES-21	20	
00	CO-I-2202	1PR	#16 AWG	300	ACIC	INSTRUMENTATION	24 VDC	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-TT-8661 EXTERIOR AMBIENT TEMPERATURE TRANSMITTER, CO-EES-21	22	COILED IN TRAY
00	CO-CS-2243	1PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-HTCP-01 TB-COM-RJ45-1, CO-EES-21	CABLE TRAY	CO-MFR-B-10 CO-SWBD-01, PQMII, CO-EES-21	20	

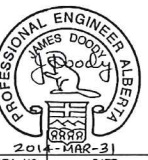
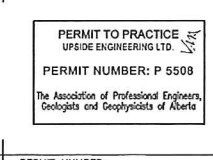
**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT"

SDN#: 25472-130-EW-0000-P0401  
 UEL#: 2012016-1EF-CBS-000-0401-01



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: \_\_\_\_\_ DATE: \_\_\_\_\_  
 PERMIT/ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 | CHANGE: \_\_\_\_\_ | DISCIPLINE # 06  
 CO-EES-21 BUILDING  
 INSTRUMENTATION CABLE SCHEDULE  
 SHEET 2

SCALE: N/A | DRAWING No: 4663-06-03-04-002 | REV: 00



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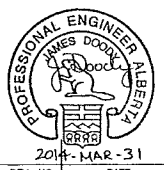
REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-CS-2244	1PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-MFR-B-10 CO-SWBD-01, PQMII, CO-EES-21	CABLE TRAY	CO-MFR-B-11 CO-SWBD-02, PQMII, CO-EES-21	15	
00	CO-CS-2245	1PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-MFR-B-11 CO-SWBD-02, PQMII, CO-EES-21	CABLE TRAY	CO-MFR-B-12 CO-MCC-01, PQMII, CO-EES-21	35	
00	CO-CS-2246	1PR	#22 AWG	300	BELDEN 123107A	COMMUNICATIONS	24 VDC	CO-MFR-B-12 CO-MCC-01, PQMII, CO-EES-21	CABLE TRAY	CO-MFR-B-13 CO-MCC-03, PQMII, CO-EES-21	31	
00	CO-I-2270	1TR	#16 AWG	300	IS	INSTRUMENTATION	24 VDC	CO-EHTC-31 EHT CONTROL PANEL, CO-EES-21	CONDUIT	CO-RTD-01 AMBIENT RTD, CO-EES-21	15	
00	CO-I-2271	1TR	#16 AWG	300	IS	INSTRUMENTATION	24 VDC	CO-EHTC-32 EHT CONTROL PANEL, CO-EES-21	CONDUIT	CO-RTD-02 AMBIENT RTD, CO-EES-21	15	
00	CO-I-2670	6PR	#16 AWG	300	ISOS	INSTRUMENTATION	24 VDC	CO-CP-21-1 HVAC CONTROLL PANEL, CO-EES-21	CABLE TRAY	CO-HVAC-21-1 HVAC UNIT 1, CO-EES-21	30	
00	CO-I-2671	6PR	#16 AWG	300	ISOS	INSTRUMENTATION	24 VDC	CO-CP-21-1 HVAC CONTROLL PANEL, CO-EES-21	CABLE TRAY	CO-HVAC-21-1 HVAC UNIT 1, CO-EES-21	30	
00	CO-I-2675	6PR	#16 AWG	300	ISOS	INSTRUMENTATION	24 VDC	CO-CP-21-1 HVAC CONTROLL PANEL, CO-EES-21	CABLE TRAY	CO-HVAC-21-2 HVAC UNIT 2, CO-EES-21	30	
00	CO-I-2676	6PR	#16 AWG	300	ISOS	INSTRUMENTATION	24 VDC	CO-CP-21-1 HVAC CONTROLL PANEL, CO-EES-21	CABLE TRAY	CO-HVAC-21-2 HVAC UNIT 2, CO-EES-21	30	



**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT--"

SDN#: 25472-130-EW-0000-P0402  
 UEL#: 2012016-1EF-CBS-000-0402-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL									
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY				
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE				

	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
2014-MAR-31	DATE

	
KEYSTONE, HARDISTY TANK TERMINAL	
FIA # 4663	DISCIPLINE # 06
<b>CO-EES-21 BUILDING          INSTRUMENTATION CABLE SCHEDULE          SHEET 3</b>	
SCALE N/A	DRAWING No 4663-06-03-04-003
REV 00	

TIME DESIGNFILE

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-P-2000-1	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
00	CO-P-2000-2	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
00	CO-P-2000-3	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
00	CO-P-2000-4	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
00	CO-P-2000-5	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
01	CO-P-2000-6	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-01 480 V SWITCH BOARD, CO-EES-22	CABLE TRAY	CO-MCC-01 NORMAL POWER MCC, CO-EES-21	35	ALLOW 100% CABLE SPACING
00	CO-C-2000	8	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-01 BREAKER SHUNT TRIP CMD, CO-EES-21	20	
00	CO-C-2001	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-01 BREAKER STATUS, CO-EES-21	20	
00	CO-P-2001-1	3	500 kcmil	1000	<del>TECK90</del> RW9D	POWER	480 Vac	CO-SWBD-01 480 V SWITCHBOARD, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-SWBD-02 480 V SWITCHBOARD, CO-EES-21	20	ALLOW 100% CABLE SPACING AND CONNECT TO AUTOMATIC TRANSFER SWITCH CO-ATS-01
00	CO-P-2001-2	3	500 kcmil	1000	<del>TECK90</del> RW9D	POWER	480 Vac	CO-SWBD-01 480 V SWITCHBOARD, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-SWBD-02 480 V SWITCHBOARD, CO-EES-21	20	ALLOW 100% CABLE SPACING AND CONNECT TO AUTOMATIC TRANSFER SWITCH CO-ATS-01
00	CO-P-2001-3	3	500 kcmil	1000	<del>TECK90</del> RW9D	POWER	480 Vac	CO-SWBD-01 480 V SWITCHBOARD, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-SWBD-02 480 V SWITCHBOARD, CO-EES-21	20	ALLOW 100% CABLE SPACING AND CONNECT TO AUTOMATIC TRANSFER SWITCH CO-ATS-01
00	CO-C-2004	8	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-02 BREAKER SHUNT TRIP CMD, CO-EES-21	20	
00	CO-P-2005-1	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-02 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-03 STANDBY MCC, CO-EES-21	25	ALLOW 100% CABLE SPACING
00	CO-P-2005-2	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-02 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-03 STANDBY MCC, CO-EES-21	25	ALLOW 100% CABLE SPACING
00	CO-P-2005-3	3	500 kcmil	1000	TECK90	POWER	480 Vac	CO-SWBD-02 480 V SWITCH BOARD, CO-EES-21	CABLE TRAY	CO-MCC-03 STANDBY MCC, CO-EES-21	25	ALLOW 100% CABLE SPACING
00	CO-C-2005	30	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-02 BREAKER STATUS, CO-EES-21	20	
00	CO-P-2020	3	#4 AWG	1000	TECK90	POWER	480 Vac	CO-MCC-03 CO-EES-21	CABLE TRAY	CO-DT-01 45 KVA TRANSFORMER, CO-EES-21	40	
00	CO-P-2021	3	#4 AWG	1000	TECK90	POWER	480 Vac	CO-MCC-03 CO-EES-21	CABLE TRAY	CO-DT-02 45 KVA TRANSFORMER, CO-EES-21	35	

**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT--"

SDN#: 25472-130-EW-0000-P0200  
 UEL#: 2012016-1EF-CBS-000-0200-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	BEM	PLR	IRM	JED	DCB	UPSIDE	
2197104	BEM	LLL	IRM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL

2014 OCT 08

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, and Geoscientists of Alberta

**TransCanada**  
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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21 BUILDING  
 POWER AND CONTROL CABLE SCHEDULE  
 SHEET 1

SCALE N/A DRAWING No 4663-06-02-04-001 REV 01

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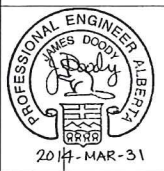
REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-C-2021	2	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YS-8662 - JB PHOTOCELL RELAY BOX, CO-EES-21	20	
00	CO-C-2022	4	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-LDP-01 CONTACTOR IN CO-MCC-03 SOUTH TANK YARD LIGHTING CONTACTOR CMD, CO-EES-21	25	
00	CO-P-2031	3	#2 AWG	1000	TECK90	POWER	480 Vac	CO-MCC-01 CO-EES-21	CABLE TRAY	CO-DT-31 75 KVA TRANSFORMER, CO-EES-21	25	
00	CO-P-2032	3	#2 AWG	1000	TECK90	POWER	480 Vac	CO-MCC-01 CO-EES-21	CABLE TRAY	CO-DT-32 75 KVA TRANSFORMER, CO-EES-21	25	
00	CO-P-2041	3	#10 AWG	600	TECK90	POWER	480 Vac	CO-MCC-03 CO-EES-21	CABLE TRAY	CO-UPS-01 10 KVA UPS, CO-EES-21	40	
00	CO-C-2041	12	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-UPS-01 10 KVA UPS ALARMS & STATUS, CO-EES-21	40	
00	CO-P-2042	3	#10 AWG	600	TECK90	POWER	480 Vac	CO-MCC-01 CO-EES-21	CABLE TRAY	CO-DT-81 15 KVA TRANSFORMER, CO-EES-21	30	
00	CO-C-2045	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MFR-B-12 CO-MCC-01 MULTIFUNCTION RELAY ALARMS, CO-EES-21	35	
00	CO-C-2046	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MFR-B-13 CO-MCC-03 MULTIFUNCTION RELAY ALARMS, CO-EES-21	35	
00	CO-P-2051	3	#8 AWG	600	TECK90	POWER	480 Vac	CO-MCC-03 CO-EES-21	CABLE TRAY	CO-HTR-21-1 EAST BUILDING HEATER, CO-EES-21	30	
00	CO-P-2052	3	#8 AWG	600	TECK90	POWER	480 Vac	CO-MCC-03 CO-EES-21	CABLE TRAY	CO-HTR-21-2 WEST BUILDING HEATER, CO-EES-21	30	
00	CO-C-2061	4	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-HS-8660D ESD STATION, CO-EES-21	25	
00	CO-C-2062	2	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YA-8698A EVACUATION HORN CMD, CO-EES-21	25	
00	CO-C-2063	2	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YA-8698B EVACUATION HORN CMD, CO-EES-21	25	
00	CO-C-2065	2	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YA-8660D FIRE BEACON (RED) CMD, CO-EES-21	25	
00	CO-C-2070	2	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YS-8660B INTRUSION ALARM, CO-EES-21	25	
00	CO-C-2071	2	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YS-8660C INTRUSION ALARM, CO-EES-21	25	
00	CO-C-2090	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-TCMP-02 CO-TCMP-02 ALARM STATUS, CO-EES-21	25	



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SDN#: 25472-130-EW-0000-P0201  
 UEL#: 2012016-1EF-CBS-000-0201-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE

	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
DATE	DATE
REV. NO.	PERMIT NUMBER:

 	
KEystone HARDISTY TANK TERMINAL	
FA # 4663	DISCIPLINE # 06
CO-EES-21 BUILDING POWER AND CONTROL CABLE SCHEDULE SHEET 2	
SCALE N/A	DRAWING No 4663-06-02-04-002
	REV 00

TIME-DESIGNFILE

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-C-2091	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-TCMP-06 CO-TCMP-06 ALARM STATUS, CO-EES-21	28	
01	CO-C-2092	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01	CABLE TRAY	CO-TCMP-32	10	COILED IN TRAY ⚠
00	CO-C-2100	16	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-03 CO-PM-21/22 START / STOP / ESD CMD, CO-EES-21	20	
00	CO-C-2101	16	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-03 CO-PM-21/22 RUN STATUS / REMOTE STATUS, CO-EES-21	20	
00	CO-P-2120	4	#4 AWG	1000	TECK90	POWER	480 Vac	CO-DT-01 45 KVA TRANSFORMER, CO-EES-21	SURFACE	CO-LDP-01 SOUTH TANK YARD LIGHTING DISTRIBUTION PANEL, CO-EES-21	15	
01	CO-P-2120-1	2	#12 AWG	600	RW90 ⚠	POWER	277 Vac	CO-LDP-01 SOUTH TANK YARD LIGHTING DISTRIBUTION PANEL, CO-EES-21	CONDUIT	EXTERIOR LIGHTING CO-EES-21	65	
00	CO-P-2121	4	#2/0 AWG	1000	TECK90	POWER	208 Vac	CO-DT-02 45 KVA TRANSFORMER, CO-EES-21	CABLE TRAY	CO-ACP-02 INDOOR BUILDING LIGHTING PANEL, CO-EES-21	15	ALLOW 100% CABLE SPACING
00	CO-P-2121-1	6	#12 AWG	600	XLPE	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	SWITCH BANK WEST CO-EES-21	15	
01	CO-P-2121-2	9	#12 AWG	600	RW90 ⚠	POWER	120 Vac	SWITCH BANK WEST CO-EES-21	CONDUIT	SWITCH BANK EAST CO-EES-21	40	
01	CO-P-2121-3	6	#12 AWG	600	RW90	POWER	120 Vac	SWITCH BANK EAST CO-EES-21	CONDUIT	INTERIOR LIGHTING CO-EES-21	60	
01	CO-P-2122	2	#12 AWG	600	RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	EMERGENCY LIGHTING CO-EES-21	35	
01	CO-P-2125	2	#12 AWG	600	RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	EXTERIOR RECEPTACLE CO-EES-21	35	
01	CO-P-2126	4	#12 AWG	600	RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	INTERIOR RECEPTACLE EAST CO-EES-21	35	
01	CO-P-2127	4	#12 AWG	600	RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	INTERIOR RECEPTACLE WEST CO-EES-21	15	
00	CO-P-2128	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	SURFACE	PHOTOCELL RELAY JUNCTION BOX CO-EES-21 CO-YS-8662-JB	30	
00	CO-P-2131	4	#2 AWG	1000	TECK90	POWER	480 Vac	CO-DT-31 75 KVA TRANSFORMER, CO-EES-21	SURFACE	CO-EHTC-31, CO-ACP-31 HEAT TRACING PANEL, CO-EES-21	15	
00	CO-C-2131	4	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-EHTC-31 TROUBLE ALARM CO-EES-21	35	
00	CO-P-2132	4	#2 AWG	1000	TECK90	POWER	480 Vac	CO-DT-32 75 KVA TRANSFORMER, CO-EES-21	SURFACE	CO-EHTC-32, CO-ACP-32 HEAT TRACING PANEL, CO-EES-21	15	
00	CO-C-2132	4	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-EHTC-32 TROUBLE ALARM CO-EES-21	35	

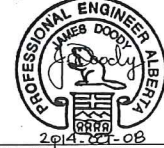
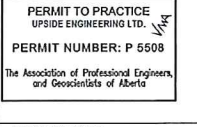
**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE.  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT-"

SDN#: 25472-130-EW-0000-P0202  
 UEL#: 2012016-1EF-CBS-000-0202-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	DATE
2197104	BEM	PLR	IRM	JED	DCB	UPSIDE	
2197104	BEM	LLL	JHM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT:  PERMIT/ ENG. APPROVAL: 

**TransCanada**  
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**Upside Engineering Ltd.**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 DRAWING No: 4663 CHARGE: DISCIPLINE # 06

CO-EES-21 BUILDING  
 POWER AND CONTROL CABLE SCHEDULE  
 SHEET 3

SCALE: N/A DRAWING No: 4663-06-02-04-003 REV: 01

TIME DESIGNFILE

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-P-2142	3	<del>#6 AWG</del> #3 AWG	1000	TECK90 RW90	POWER	480 Vac	CO-DT-81 10 KVA TRANSFORMER, CO-EES-21	CABLE TRAY CONDUIT	CO-MTS-01 MANUAL BYPASS SWITCH, CO-EES-21	15	
00	CO-P-2161	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-CP-21-1 PANEL POWER, SERVICE BOX SB-01A, CO-EES-21	25	
00	CO-C-2161	8	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YS-8661A, YS-8661B, YS-8661C CO-CP-21-1 STATUS, CO-EES-21	25	
00	CO-C-2163	2	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-YA-8661 HVAC CONTROLLER CO-CP-21-1 TRIP CMD, CO-EES-21	25	
00	CO-P-2190	4	#12 AWG	600	TECK90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	35	2 CCTS.
00	CO-P-2191	4	#12 AWG	600	TECK90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-02 TERMINAL CONTROL PANEL, CO-EES-21	40	2 CCTS.
00	CO-P-2192	4	#12 AWG	600	TECK90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	45	
00	CO-P-2194	2	#12 AWG	600	TECK90 RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY CONDUIT	CO-TCMP-02 COMMUNICATION PANEL, CO-EES-21	25	<del>CONNECT TO RECEPTACLE MOUNTED ON CO-TCMP-02</del>
00	CO-P-2195	2	#12 AWG	600	TECK90 RW90	POWER	120 Vac	CO-ACP-02 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY CONDUIT	CO-TCMP-06 COMMUNICATION PANEL, CO-EES-21	20	<del>CONNECT TO RECEPTACLE MOUNTED ON CO-TCMP-06</del>
00	CO-P-2200	3	#3 AWG	1000	TECK90	POWER	120 Vac	CO-UPS-01 480 V UPS, CO-EES-21	CONDUIT	CO-UACP-01 120 VAC UPS DISTRIBUTION PANEL, CO-EES-21	20	
00	CO-P-2201	4	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	30	2 CCTS., 2ND CCT FOR TB-AUX (BEACON/HORNS)
00	CO-P-2202	4	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-02 TERMINAL CONTROL PANEL, CO-EES-21	25	
00	CO-P-2205	2	#12 AWG	600	TECK90 RW90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY CONDUIT	CO-TCMP-02 COMMUNICATION PANEL, CO-EES-21	20	<del>CONNECT TO RECEPTACLE MOUNTED ON CO-TCMP-02</del>
00	CO-P-2206	2	#12 AWG	600	TECK90 RW90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY CONDUIT	CO-TCMP-06 COMMUNICATION PANEL, CO-EES-21	22	<del>CONNECT TO RECEPTACLE MOUNTED ON CO-TCMP-06</del>
00	CO-P-2221	20	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	30	UPS POWER TO CO-HTCP-03 FOR INSTRUMENTS TANK-21 /22/23/24/25/26
00	CO-P-2243	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-01 SWITCHBOARD-01 TERMINAL BLOCK, CO-EES-21	35	
00	CO-P-2244	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-SWBD-02 SWITCHBOARD-02 TERMINAL BLOCK, CO-EES-21	30	
00	CO-P-2245	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MFR-B-12 MULTIFUNCTION RELAY, CO-EES-21	15	

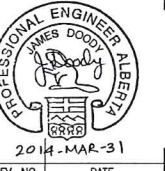
- NOTES:**
- CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE
  - ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHTT-"

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE


PROFESSIONAL ENGINEER/RPT: \_\_\_\_\_ PERMIT/ ENG. APPROVAL: \_\_\_\_\_

DATE: \_\_\_\_\_



PERMIT TO PRACTICE  
UPS DE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

SDN#: 25472-130-EW-0000-P0203  
UEL#: 2012016-1EF-CBS-000-0203-01

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANAGE: \_\_\_\_\_ DISCIPLINE # 06

CO-EES-21 BUILDING  
POWER AND CONTROL CABLE SCHEDULE  
SHEET 4

SCALE N/A DRAWING No 4663-06-02-04-004 REV 00

TIME DESIGNFILE

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-P-2246	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-MCC-03 CO-MFR-B-13 MULTIFUNCTION RELAY, CO-EES-21	25	
00	CO-P-2247	2	#8 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-MCC-05-ATB-01 CO-EES-21	15	
00	CO-P-2248	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-TCMP-32 COMMUNICATION CABINET, GATE ACCESS CONTROLLER	20	COILED IN TRAY
00	CO-P-2253	2	#12 AWG	600	TECK90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CABLE TRAY	CO-FCU-01 TANK GAUGING PANEL, CO-EES-21	20	COILED IN TRAY
01	CO-P-2254-1	2	#12 AWG	600	RW90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	SWITCH BANK WEST CO-EES-21	10	
01	CO-P-2254-2	3	#12 AWG	600	RW90	POWER	120 Vac	SWITCH BANK WEST CO-EES-21	CONDUIT	SWITCH BANK EAST CO-EES-21	40	
01	CO-P-2254-3	2	#12 AWG	600	RW90	POWER	120 Vac	SWITCH BANK EAST CO-EES-21	CONDUIT	INTERIOR LIGHTING CO-EES-21	60	
01	CO-P-2256-1	2	#1 AWG	600	RPVU90 COPPER	POWER	120 Vdc	CB2 BATTERY INPUT CIRCUIT BREAKER CO-UPS-01, CO-EES-21	CONDUIT	CO-BB-01 BATTERY BANK, CO-EES-21	15	FLEXIBLE CABLE, MIN. TEMP. 90°C, HEAT RESISTANT AND FLAME RETARDANT NOT INSTALLED
01	CO-P-2256-2	2	#1 AWG	600	RPVU90 COPPER	POWER	120 Vdc	CB2 BATTERY INPUT CIRCUIT BREAKER CO-UPS-01, CO-EES-21	CONDUIT	CO-BB-01 BATTERY BANK, CO-EES-21	15	FLEXIBLE CABLE, MIN. TEMP. 90°C, HEAT RESISTANT AND FLAME RETARDANT NOT INSTALLED
01	CO-P-2261	2	#12 AWG	600	RW90	POWER	120 Vac	CO-UACP-01 AC DISTRIBUTION PANEL, CO-EES-21	CONDUIT	CO-ASH-8660A SMOKE DETECTOR, CO-EES-21	30	
01	CO-P-2262	2	#12 AWG	600	RW90	POWER	120 Vac	CO-ASH-8660A SMOKE DETECTOR, CO-EES-21	CONDUIT	CO-ASH-8660B SMOKE DETECTOR, CO-EES-21	25	
01	CO-P-2263	2	#12 AWG	600	RW90	POWER	120 Vac	CO-ASH-8660B SMOKE DETECTOR, CO-EES-21	CONDUIT	CO-ASH-8660C SMOKE DETECTOR, CO-EES-21	20	
01	CO-P-2264	2	#12 AWG	600	RW90	POWER	120 Vac	CO-ASH-8660C SMOKE DETECTOR, CO-EES-21	CONDUIT	CO-ASH-8660D SMOKE DETECTOR, CO-EES-21	15	
00	CO-C-2300	20	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-21-1/21-2/21-3/23-1 TANK MIXER START/STOP CMD, CO-EES-21	20	
00	CO-C-2301	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-21-1/21-2/21-3/23-1 TANK MIXER 1 RUN STATUS, CO-EES-21	20	
00	CO-C-2302	20	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-22-1/22-2/22-3/24-1 TANK MIXER 1 START/STOP CMD, CO-EES-21	20	
00	CO-C-2303	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-22-1/22-2/22-3/24-1 TANK MIXER 1 RUN STATUS, CO-EES-21	20	
00	CO-C-2304	20	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-23-2/23-3/25-1/25-2 TANK MIXER 1 START/STOP CMD, CO-EES-21	20	

NOTES:

- CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE
- ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT-"

SDN#: 25472-130-EW-0000-P0204  
UEL#: 2012016-1EF-CBS-000-0204-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	SEM	PLR	IRM	JED	DCB	UPSIDE	
2197104	SEM	LLL	IRM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, and Geoscientists of Alberta

2014-02-08

REV. NO. DATE PERMIT NUMBER:

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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21 BUILDING  
POWER AND CONTROL CABLE SCHEDULE  
SHEET 5

SCALE N/A DRAWING No 4663-06-02-04-005 REV 01

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM	ROUTE			LENGTH (m)	COMMENTS		
		CONDUCTORS		RATING			TYPE	VOLTAGE	FROM			VIA	TO
		QTY.	SIZE	(VOLT)									
00	CO-C-2305	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-23-2/23-3/25-1/25-2 TANK MIXER 1 RUN STATUS, CO-EES-21	20		
00	CO-C-2306	20	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-24-2/24-3/26-1/26-2 TANK MIXER 1 START/STOP CMD, CO-EES-21	20		
00	CO-C-2307	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-24-2/24-3/26-1/26-2 TANK MIXER 1 RUN STATUS, CO-EES-21	20		
00	CO-C-2308	12	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-25-3 TANK MIXER 1 START/STOP CMD, CO-EES-21	20		
00	CO-C-2309	12	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-25-3 TANK MIXER 1 RUN STATUS, CO-EES-21	20		
00	CO-C-2310	12	#14 AWG	600	TECK90	CONTROL	120 Vac	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-26-3 TANK MIXER 1 START/STOP CMD, CO-EES-21	20		
00	CO-C-2311	12	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-01 CO-MXM-26-3 TANK MIXER 1 RUN STATUS, CO-EES-21	20		
00	CO-C-2555	30	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-03 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-05 <b>ATB-01</b> TANK FIRE FOAM STATUS, CO-EES-21	30		
00	CO-C-2556	20	#14 AWG	600	TECK90	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	CABLE TRAY	CO-MCC-05 <b>ATB-01</b> CO-EES-21	35		
01	-	-	-	-	-	-	-	-	-	-	-	⚠	
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01	-	-	-	-	-	-	-	-	-	-	-		
01	-	-	-	-	-	-	-	-	-	-	-		
01	-	-	-	-	-	-	-	-	-	-	-		
00	CO-C-2690	2	#14 AWG	600	<del>TECK90</del> <b>RW90</b>	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> <b>CONDUIT</b>	CO-ASH-8660A SMOKE DETECTOR, CO-EES-21	10		
00	CO-C-2691	2	#14 AWG	600	<del>TECK90</del> <b>RW90</b>	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> <b>CONDUIT</b>	CO-ASH-8660B SMOKE DETECTOR, CO-EES-21	20		
00	CO-C-2692	2	#14 AWG	600	<del>TECK90</del> <b>RW90</b>	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> <b>CONDUIT</b>	CO-ASH-8660C SMOKE DETECTOR, CO-EES-21	15		

**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT-"

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	BEM	PLR	IRM	JED	DCB	UPSIDE	
2197104	BEM	LLL					

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL

SDN#: 25472-130-EW-0000-P0205  
 UEL#: 2012016-1EF-CBS-000-0205-01

**TransCanada**  
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**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 | CHANAGE: | DISCIPLINE # 06

CO-EES-21 BUILDING  
 POWER AND CONTROL CABLE SCHEDULE  
 SHEET 6

SCALE N/A | DRAWING No 4663-06-02-04-006 | REV 01

TIME DESIGNFILE

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REV	CABLE NUMBER	DESCRIPTION			APPLICATION	SYSTEM VOLTAGE (VOLT)	ROUTE			LENGTH (m)	COMMENTS	
		CONDUCTORS		RATING (VOLT)			TYPE	FROM	VIA			TO
		QTY.	SIZE									
00	CO-C-2693	2	#14 AWG	600	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-ASH-8660D SMOKE DETECTOR, CO-EES-21	15		
00	CO-C-2694	2	#14 AWG	600	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-ASH-8660E HEAT DETECTOR, CO-EES-21	20		
00	CO-C-2695	2	#14 AWG	600	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-ASH-8660F HEAT DETECTOR, CO-EES-21	15		
00	CO-C-2696	2	#14 AWG	600	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-ASH-8660G HEAT DETECTOR, CO-EES-21	10		
00	CO-C-2697	2	#14 AWG	600	CONTROL	24 Vdc	CO-HTCP-01 TERMINAL CONTROL PANEL, CO-EES-21	<del>CABLE TRAY</del> CONDUIT	CO-ASH-8660H HEAT DETECTOR, CO-EES-21	15		

**NOTES:**  
 1. CABLE LENGTHS ARE FOR ENGINEERING PURPOSES ONLY AND SHALL NOT BE USED FOR BIDDING ESTIMATING, MEASUREMENT OR CUTTING OF CABLE  
 2. ALL CABLE TAGS SHALL BE PREFIXED BY "130-KSHIT-"

SDN#: 25472-130-EW-0000-P0206  
 UEL#: 2012016-1EF-CBS-000-0206-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

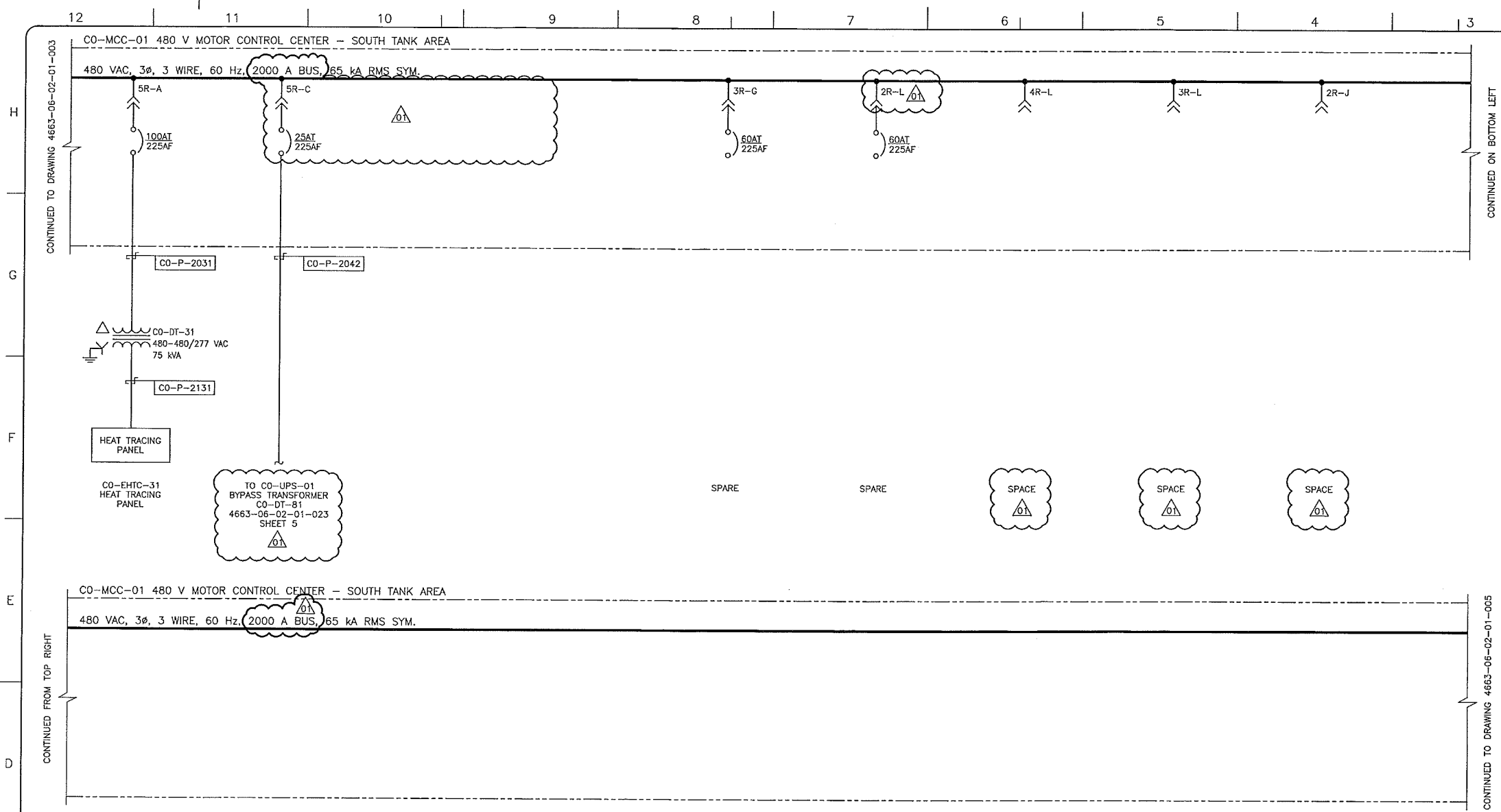
REVISION			APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-03-28	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	PLR	IRM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
	DATE
	DATE
REV. NO.	DATE
PERMIT NUMBER:	DATE

KEYSTONE HARDISTY TANK TERMINAL	
FIA # 4663	DISCIPLINE # 06
CO-EES-21 BUILDING POWER AND CONTROL CABLE SCHEDULE SHEET 7	
SCALE N/A	DRAWING No 4663-06-02-04-007
REV 00	

TIME-DESIGNFILE





**NOTES:**  
 1. ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130-KSHIT-".  
 2. FOR SYMBOL LEGEND SEE DWG. 4663-06-02-01-001 SHEET 1.

**LINETYPE LEGEND**  
 ——— MCC BUS  
 ——— POWER WIRING  
 ——— CONTROL AND CONTROL POWER WIRING  
 —○— MODBUS RS 485  
 - - - - - COMMAND/ALARM/TRIP/STATUS CIRCUIT  
 - - - - - ELECTRICAL EQUIPMENT ENCLOSURE

SDN# 25472-130-E1-0000-P0004  
 UEL# 2012016-1EF-SLD-000-0004-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-06-01-001	CO-SWBD-01 480 V SINGLE LINE DIAGRAM NORMAL POWER SWITCHBOARD
4663-08-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-11-26	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	MAF	PLR	MAB	JED	DCB	UPSIDE
01	2014-01-16	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	PLR	MAB	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: **JAMES DOOLITTLE**  
 PERMIT/ ENG. APPROVAL: **PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508**  
 2014 - JAN - 21  
 REV. NO. DATE PERMIT NUMBER:

**TransCanada** In business to deliver  
**upside Engineering Ltd.**  
 KEystone HARDISTY TANK TERMINAL  
 CHAINAGE: 4663 DISCIPLINE # 06  
**CO-MCC-01**  
**480 V SINGLE LINE DIAGRAM**  
**SHEET 4**  
 SCALE N.T.S. DRAWING No 4663-06-02-01-004 REV 01

12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

CO-MCC-01 480 V MOTOR CONTROL CENTER - SOUTH TANK AREA

480 VAC, 3 $\phi$ , 3 WIRE, 60 Hz, 2000 A BUS, 65 kA RMS SYM.



CONTINUED TO DRAWING 4663-06-02-01-004

CONTINUED ON BOTTOM LEFT

CO-MCC-01 480 V MOTOR CONTROL CENTER - SOUTH TANK AREA

480 VAC, 3 $\phi$ , 3 WIRE, 60 Hz, 2000 A BUS, 65 kA RMS SYM.



CONTINUED FROM TOP RIGHT

**NOTES:**

1. ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130-KSHIT-".
2. FOR SYMBOL LEGEND SEE DWG. 4663-06-02-01-001 SHEET 1.

**LINETYPE LEGEND**

- MCC BUS
- POWER WIRING
- CONTROL AND CONTROL POWER WIRING
- MODBUS RS 485
- - - - - COMMAND/ALARM/TRIP/STATUS CIRCUIT
- - - - - ELECTRICAL EQUIPMENT ENCLOSURE

SDN# 25472-130-E1-0000-P0005  
UEL# 2012016-1EF-SLD-000-0005-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-06-01-001	CO-SWBD-01 480 V SINGLE LINE DIAGRAM NORMAL POWER SWITCHBOARD
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-11-26	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	MAF	PLR	MAB	JED	DCB	UPSIDE
01	2014-01-16	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	PLR	MAB	JED	DCB	UPSIDE

	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
PROFESSIONAL ENGINEER/RPT DATE: 2014 JAN 21	PERMIT/ ENG. APPROVAL DATE:

KEYSTONE HARDISTY TANK TERMINAL			
FA # 4663	CHANGAGE:	DISCIPLINE # 06	
CO-MCC-01 480 V SINGLE LINE DIAGRAM SHEET 5			
SCALE N.T.S.	DRAWING No 4663-06-02-01-005	REV 01	

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**NOTES:**

1. ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130-KSHTT-".

	1F	2F
A	MAIN LUG	CO-MOV-8921 CO-TK-21
B		
C	CONTROL SECTION	CO-MOV-8922 CO-TK-22
D		
E		CO-MOV-8923 CO-TK-23
F		
G		CO-MOV-8924 CO-TK-24
H		
J	CO-MOV-8925 CO-TK-25	
K		
L	CO-MOV-8926 CO-TK-26	
M		


~~CO-MCC-05~~ (FRONT)  
IN BUILDING CO-EES-21



ATB-01

SDN# 25472-130-E2-0000-P0071  
UEL# 2012016-1EF-ELD-000-0081-01

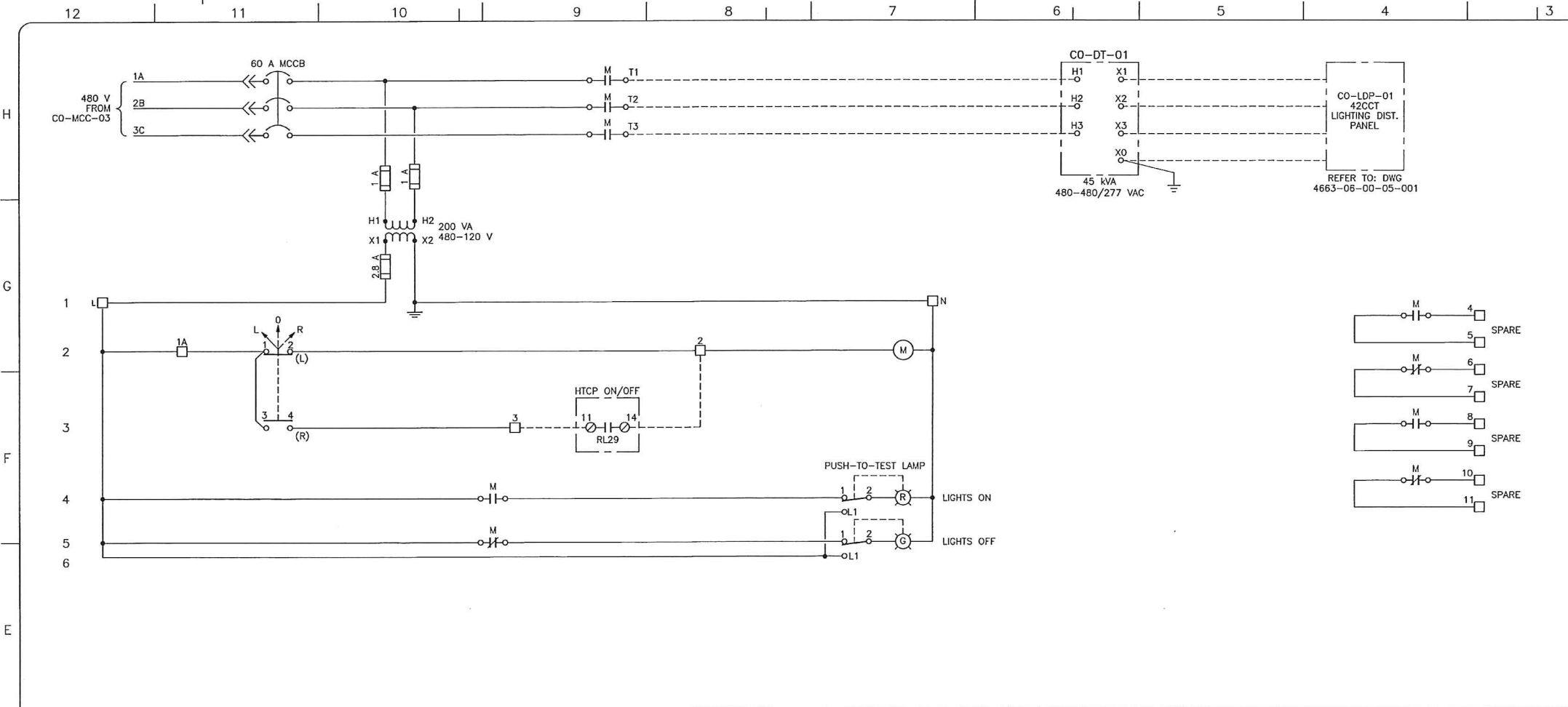
REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAE	PLR	JHM	JED	JDCB	UPSIDE

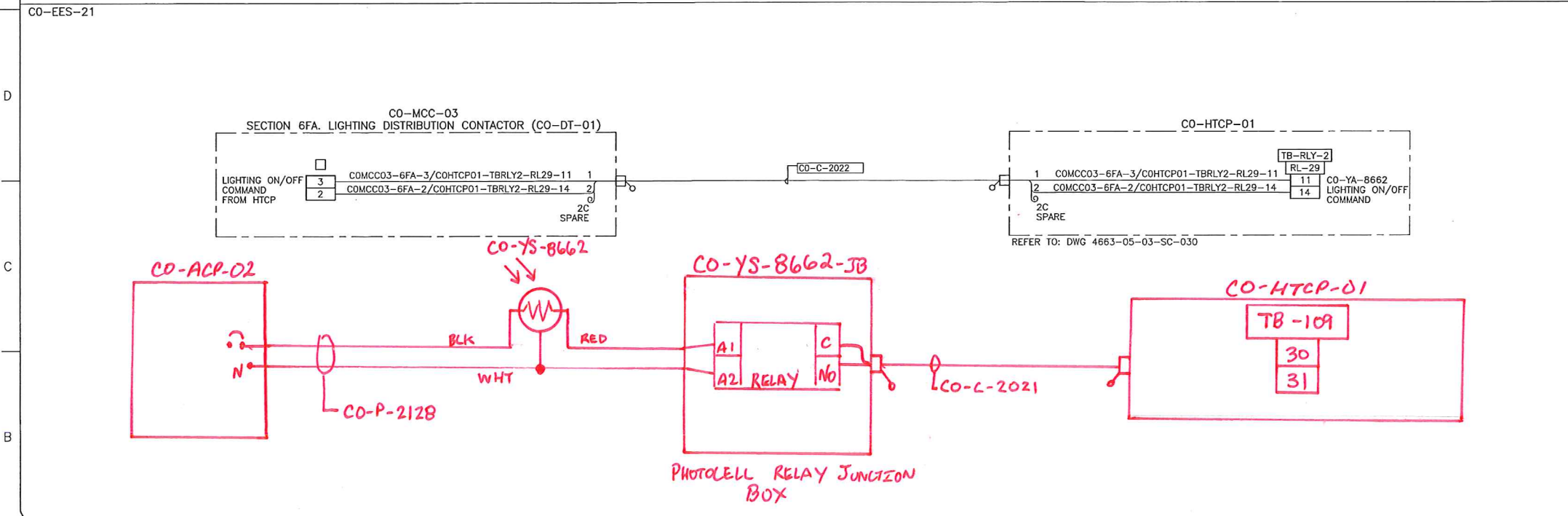
PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
 2014-APR-07	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
REV. NO.	PERMIT NUMBER:

 	
KEYSTONE HARDISTY TANK TERMINAL	
FIA # 4663	DISCIPLINE # 06
<b>CO-MCC-05</b> <b>ELEVATION</b>	
SCALE N.T.S.	REV 00

DESIGN FILE



- NOTES:**
- ALL TAG NUMBERS SHALL BE PREFIXED WITH "130-KHIT-".
- LEGEND:**
- HTCP TERMINAL
  - MCC TERMINAL
  - DEVICE TERMINAL
  - (M) MAGNETIC CONTACTOR COIL
  - (R) INDICATING PILOT LIGHTS (LED)
  - R - RED
  - G - GREEN
  - FIELD WIRING
  - MCC MOTOR CONTROL CENTER
  - EES ELECTRICAL EQUIPMENT SHELTER
  - RL RELAY
  - HTCP TERMINAL CONTROL PANEL
  - TB TERMINAL BLOCK
  - LOR LOCAL OFF REMOTE
  - TECK CABLE CONNECTOR FOR HAZARDOUS AREA
  - TECK CABLE CONNECTOR FOR NON-HAZARDOUS AREA



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-01-028	CO-MCC-03 480V SINGLE LINE DIAGRAM - SHEET 10

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JAP	TAE	HHM	JED	J.DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-APR-04

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E7-0000-P0050  
UEL# 2012016-1EF-EWD-000-0179-01

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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

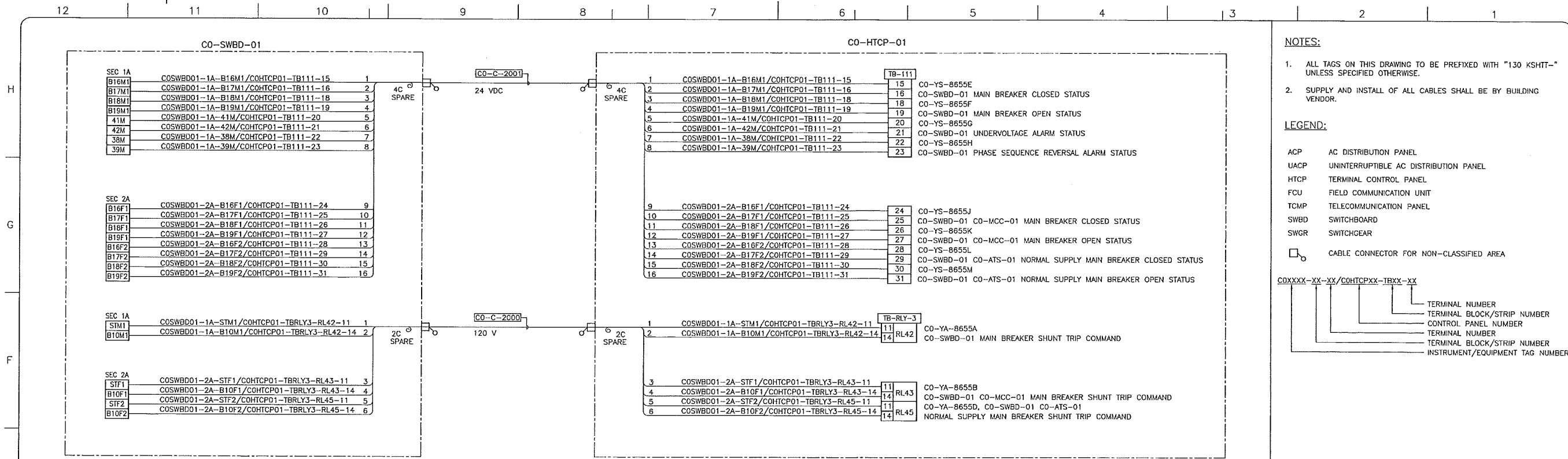
FIA # 4663 CHAINAGE: DISCIPLINE # 06

CO-LDP-01  
SOUTH AREA LIGHTING DISTRIBUTION PANEL  
SCHEMATIC & INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-06-050 REV 00

TC\_A1\_BR.DWG 594X841

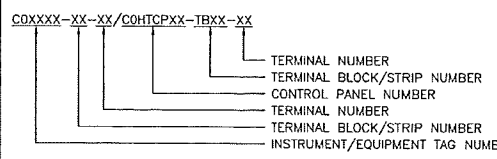
CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



REFER TO DWG 4663-05-03-SC-028 / 031

- NOTES:**
- ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHT-" UNLESS SPECIFIED OTHERWISE.
  - SUPPLY AND INSTALL OF ALL CABLES SHALL BE BY BUILDING VENDOR.

- LEGEND:**
- ACP AC DISTRIBUTION PANEL
  - UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL
  - HTCP TERMINAL CONTROL PANEL
  - FCU FIELD COMMUNICATION UNIT
  - TCMP TELECOMMUNICATION PANEL
  - SWBD SWITCHBOARD
  - SWGR SWITCHGEAR
  - CABLE CONNECTOR FOR NON-CLASSIFIED AREA



REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-19	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-MAR-21

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-EJ-0000-P0135  
UEL# 2012016-1EF-CAB-000-0235-01

**TransCanada**  
In business to deliver

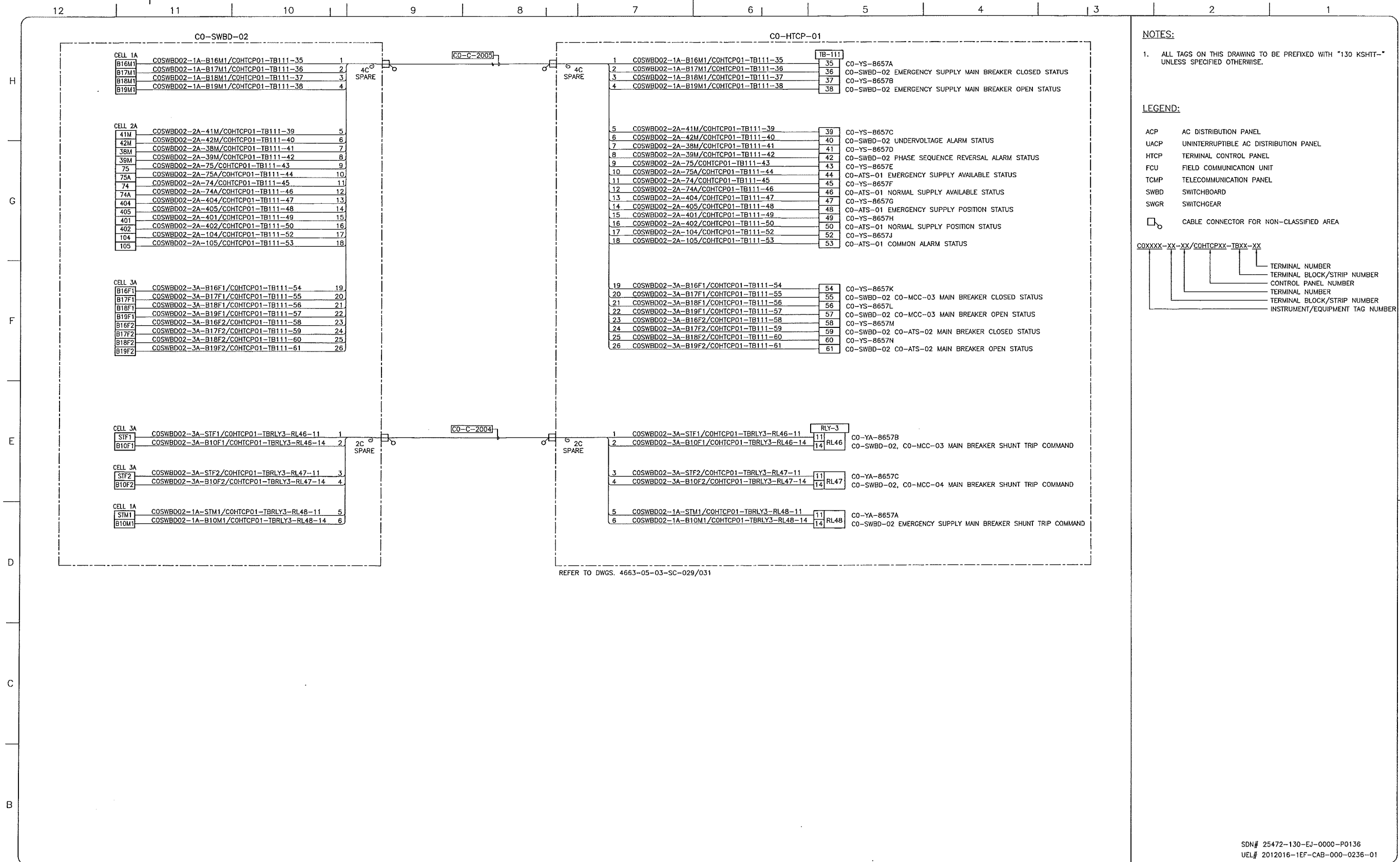
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANAGE: DISCIPLINE # 06

C0-EES-21  
C0-SWBD-01 TO C0-HTCP-01  
INTERCONNECTION WIRING DIAGRAM

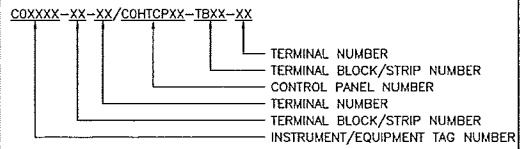
SCALE N.T.S. DRAWING No 4663-06-02-07-135 REV 00



REFER TO DWGS. 4663-05-03-SC-029/031

**NOTES:**  
 1. ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHT-" UNLESS SPECIFIED OTHERWISE.

**LEGEND:**  
 ACP AC DISTRIBUTION PANEL  
 UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL  
 HTCP TERMINAL CONTROL PANEL  
 FCU FIELD COMMUNICATION UNIT  
 TCMF TELECOMMUNICATION PANEL  
 SWBD SWITCHBOARD  
 SWGR SWITCHGEAR  
 □ CABLE CONNECTOR FOR NON-Classified AREA



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT
4663-09-00-01-004	KHT SAFETY PLAN BUILDINGS CO-EES-21, CO-EES-22, CO-YES-21 LAYOUT

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JAP	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT - PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-APR-07

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-EJ-0000-P0136  
 UEL# 2012016-1EF-CAB-000-0236-01

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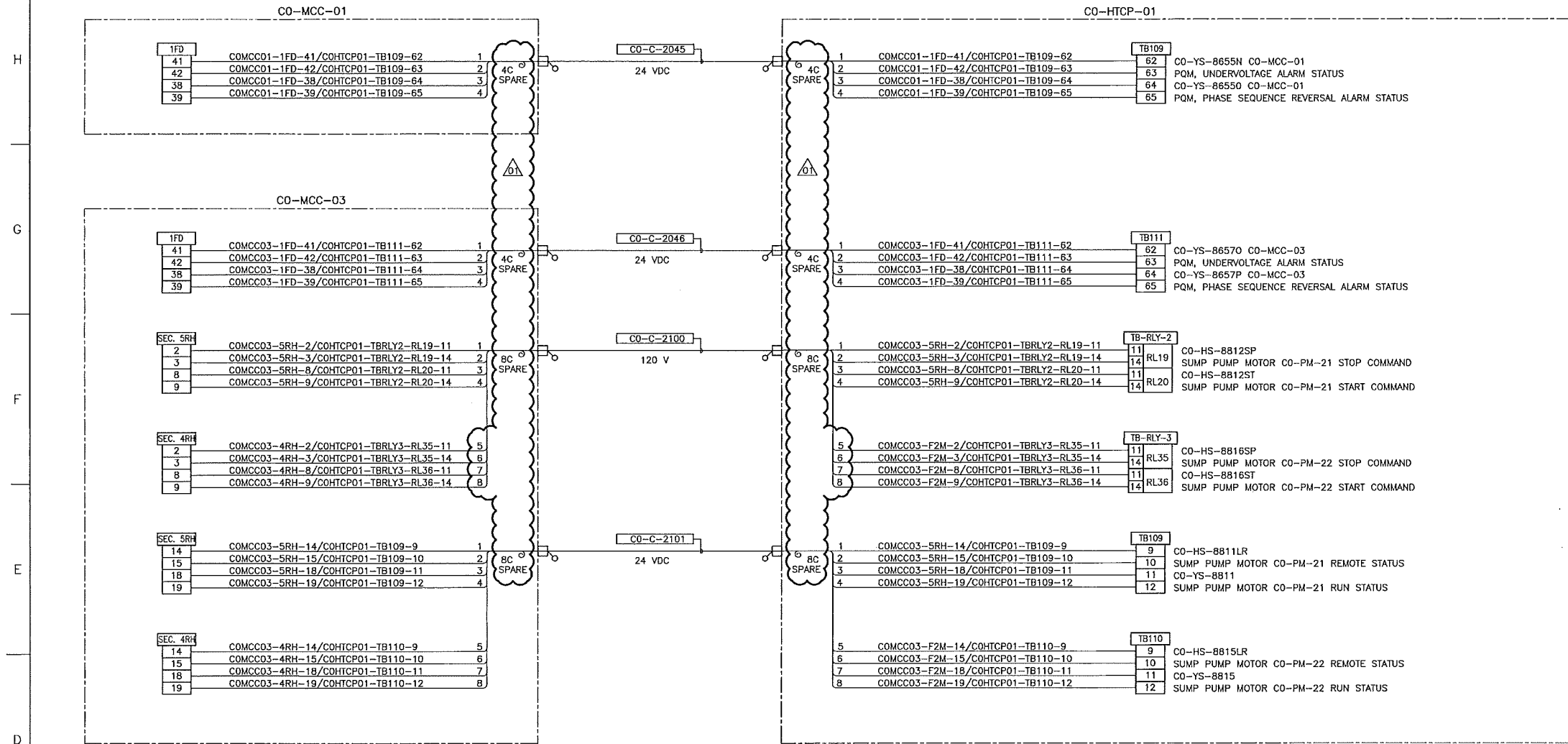
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21  
 CO-SWBD-02 TO CO-HTCP-01  
 INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-136 REV 00



REFER TO DWGS. 4663-06-02-06-201/202

REFER TO DWGS. 4663-05-03-SC-024/025/026/030/031

**NOTES:**

- ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHIT-" UNLESS SPECIFIED OTHERWISE.
- SUPPLY AND INSTALL OF ALL CABLES SHALL BE BY BUILDING VENDOR.

**LEGEND:**

ACP AC DISTRIBUTION PANEL  
 UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL  
 HTCP TERMINAL CONTROL PANEL  
 FCU FIELD COMMUNICATION UNIT  
 TCMP TELECOMMUNICATION PANEL  
 SWBD SWITCHBOARD  
 SWGR SWITCHGEAR

☐ CABLE CONNECTOR FOR NON-Classified AREA

COXXXX-XX-XX/COHTCPXX-TBXX-XX

— TERMINAL NUMBER  
 — TERMINAL BLOCK/STRIP NUMBER  
 — CONTROL PANEL NUMBER  
 — TERMINAL NUMBER  
 — TERMINAL BLOCK/STRIP NUMBER  
 — INSTRUMENT/EQUIPMENT TAG NUMBER

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-19	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012018)	2197104	JIM	TAE	HHM	JED	DCB	UPSIDE
01	2014-10-07	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	LLL	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508

The Association of Professional Engineers, and Geoscientists of Alberta

2014 OCT 08

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-EJ-0000-P0137  
 UEL# 2012016-1EF-CAB-000-0237-01

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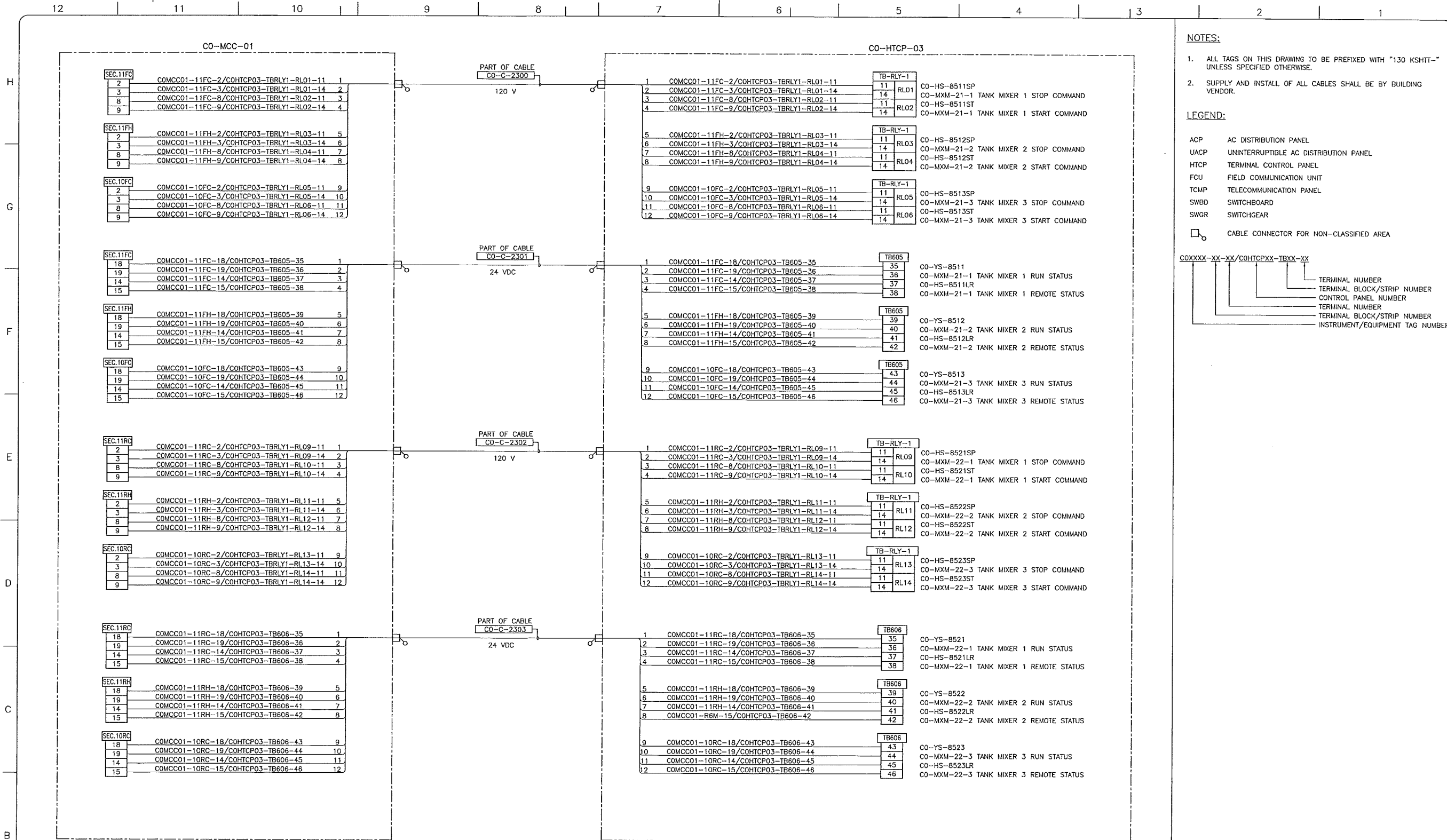
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21  
 CO-MCC-01/03 TO CO-HTCP-01  
 INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-137 REV 01

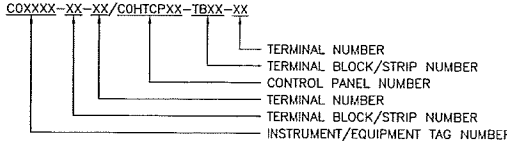


REFER TO DWG 4663-06-02-06-001/002/003  
REFER TO DWG 4663-06-02-06-004/005/006

REFER TO DWGS. 4663-05-03-SC-213/215/232

- NOTES:**
- ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHT-" UNLESS SPECIFIED OTHERWISE.
  - SUPPLY AND INSTALL OF ALL CABLES SHALL BE BY BUILDING VENDOR.

- LEGEND:**
- ACP AC DISTRIBUTION PANEL
  - UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL
  - HTCP TERMINAL CONTROL PANEL
  - FCU FIELD COMMUNICATION UNIT
  - TCMP TELECOMMUNICATION PANEL
  - SWBD SWITCHBOARD
  - SWGR SWITCHGEAR
  - CABLE CONNECTOR FOR NON-CLASSIFIED AREA



REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-
-	-
-	-
-	-
-	-

REVISION		APPROVAL	
REV No	DATE	PROJECT CODE	DRAFTER
00	2014-03-19	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014 MAR 21

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-EJ-0000-P0138  
UEL# 2012016-1EF-CAB-000-0238-01

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**Upside Engineering Ltd.**

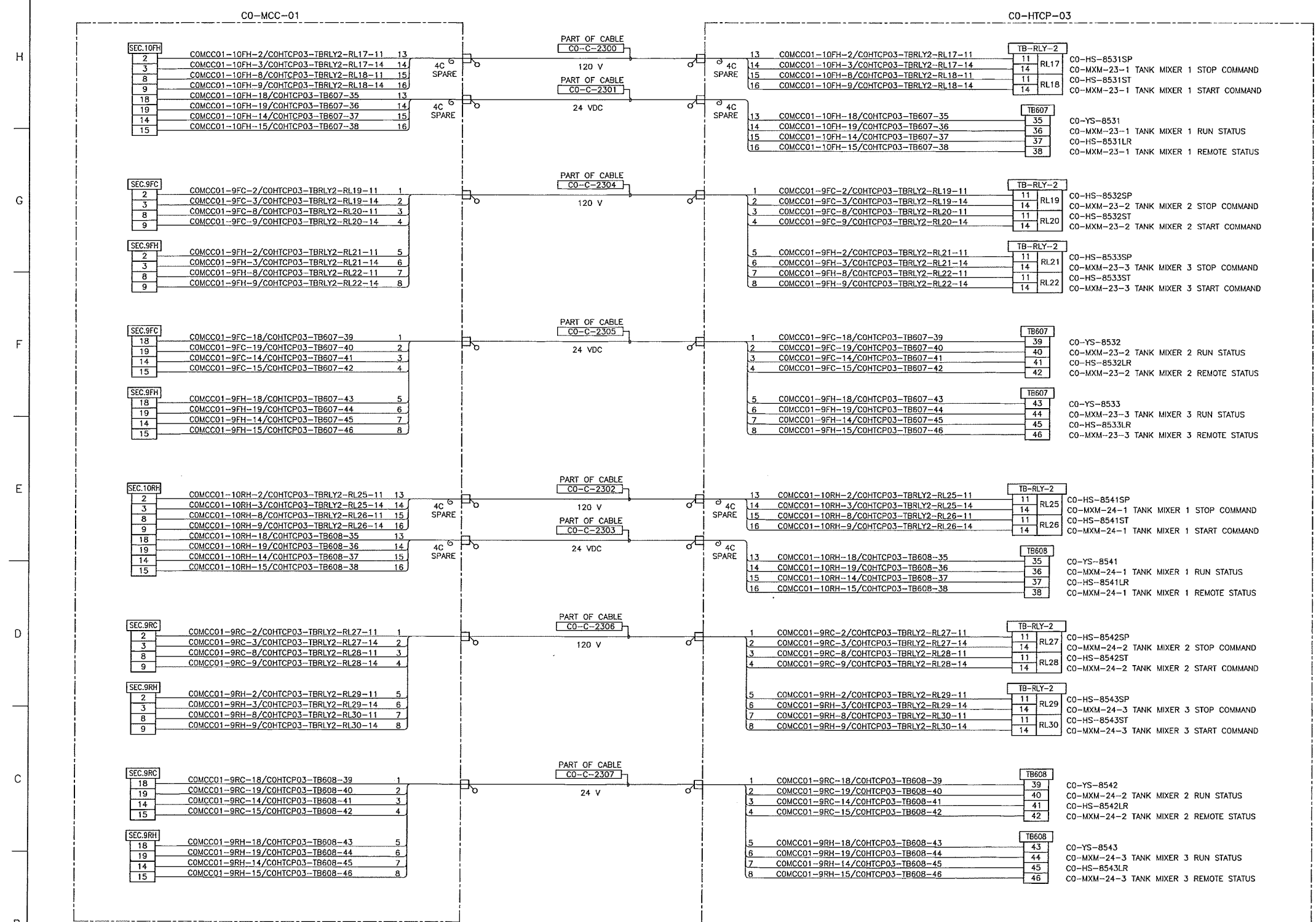
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21  
CO-MCC-01 TO CO-HTCP-03  
INTERCONNECTION WIRING DIAGRAM 1 OF 3

SCALE N.T.S. DRAWING No 4663-06-02-07-138 REV. 00



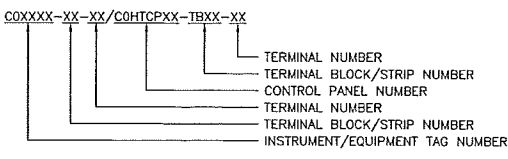


REFER TO DWG 4663-06-02-06-007/008/009  
REFER TO DWG 4663-06-02-06-010/011/012

REFER TO DWG 4663-05-03-SC-217/219/233

- NOTES:**
- ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHIT-" UNLESS SPECIFIED OTHERWISE.
  - SUPPLY AND INSTALL OF ALL CABLES SHALL BE BY BUILDING VENDOR.

- LEGEND:**
- ACP AC DISTRIBUTION PANEL
  - UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL
  - HTCP TERMINAL CONTROL PANEL
  - FCU FIELD COMMUNICATION UNIT
  - TCMP TELECOMMUNICATION PANEL
  - SWBD SWITCHBOARD
  - SWGR SWITCHGEAR
  - CABLE CONNECTOR FOR NON-Classified AREA



REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		
REV No	DATE	DESCRIPTION
00	2014-03-19	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	JIM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-MAR-21

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-EJ-0000-P0139  
UEL# 2012016-1EF-CAB-000-0239-01

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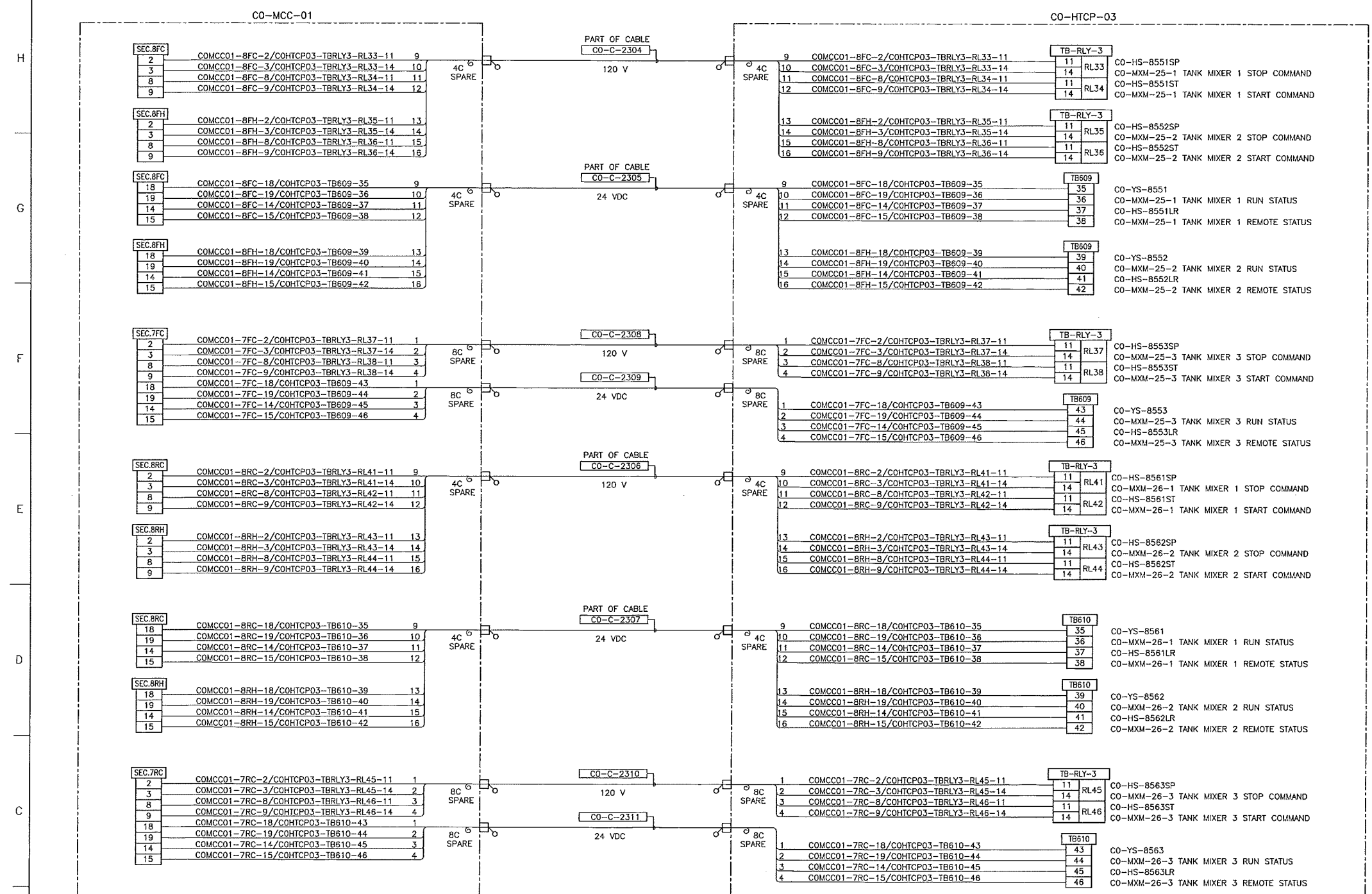
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21  
CO-MCC-01 TO CO-HTCP-03  
INTERCONNECTION WIRING DIAGRAM 2 OF 3

SCALE N.T.S. DRAWING No 4663-06-02-07-139 REV 00



REFER TO DWG 4663-06-02-06-013/014/015  
REFER TO DWG 4663-06-02-06-016/017/018

REFER TO DWG 4663-05-03-SC-221/223/234

- NOTES:**
- ALL TAGS ON THIS DRAWING TO BE PREFIXED WITH "130 KSHIT-" UNLESS SPECIFIED OTHERWISE.
  - SUPPLY AND INSTALL OF ALL CABLES SHALL BE BY BUILDING VENDOR.
- LEGEND:**
- ACP AC DISTRIBUTION PANEL
  - UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL
  - HTCP TERMINAL CONTROL PANEL
  - FCU FIELD COMMUNICATION UNIT
  - TCMP TELECOMMUNICATION PANEL
  - SWBD SWITCHBOARD
  - SWGR SWITCHGEAR
  - CABLE CONNECTOR FOR NON-CLASSIFIED AREA
- COXXXX-XX-XX/COHTCPXX-TBXX-XX
- TERMINAL NUMBER
  - TERMINAL BLOCK/STRIP NUMBER
  - CONTROL PANEL NUMBER
  - TERMINAL NUMBER
  - TERMINAL BLOCK/STRIP NUMBER
  - INSTRUMENT/EQUIPMENT TAG NUMBER

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL							
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-03-19	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	TAE	HHW	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

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UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
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2014-MAR-21

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-EJ-0000-P0140  
UEL# 2012016-1EF-CAB-000-0240-01

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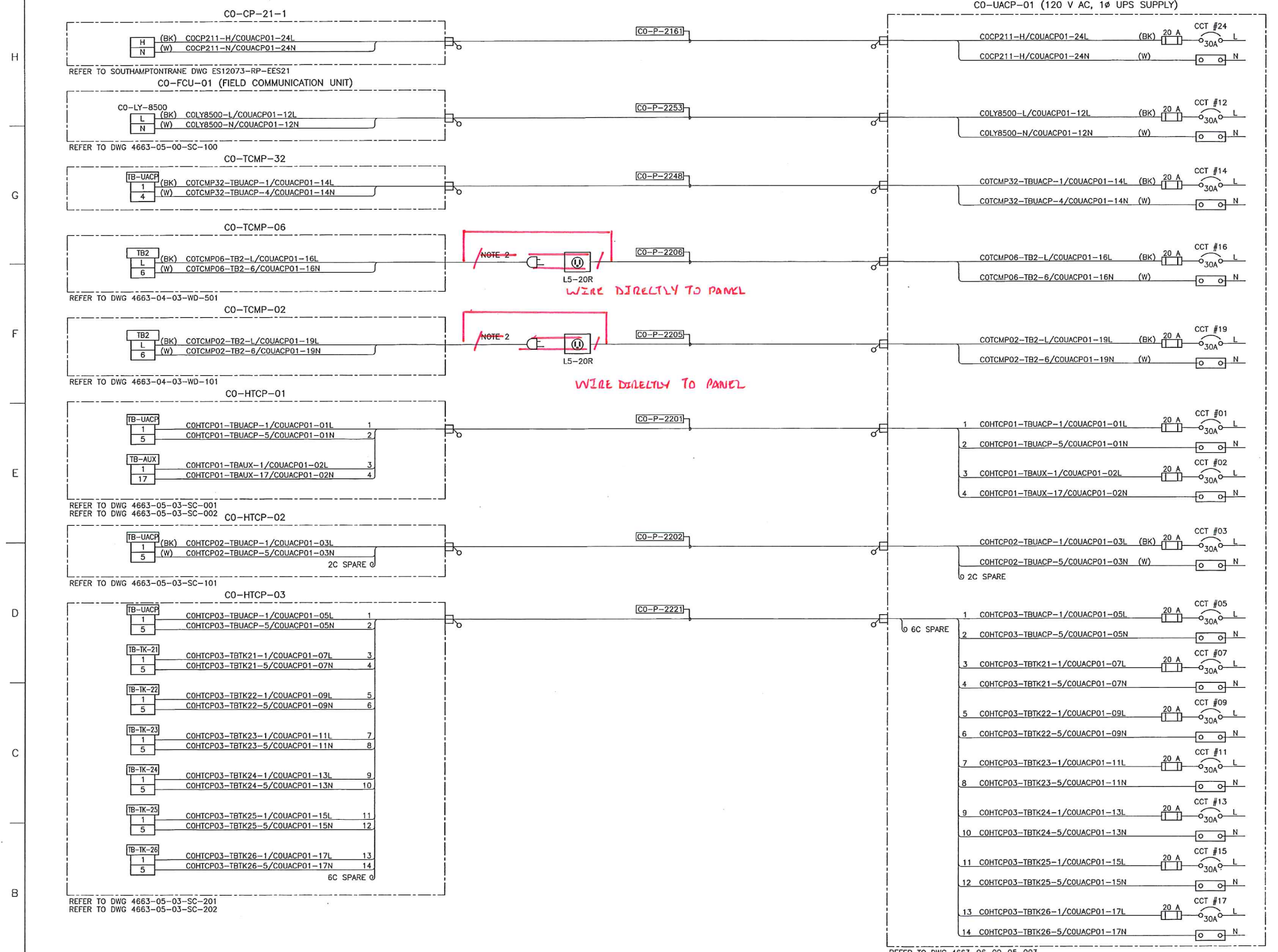
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21  
CO-MCC-01 TO CO-HTCP-03  
INTERCONNECTION WIRING DIAGRAM 3 OF 3

SCALE N.T.S. DRAWING No 4663-06-02-07-140 REV 00



**NOTES:**  
 1. ALL TAGS SHALL BE PREFIXED WITH "130-KSHTT".  
 2. BY PANEL VENDOR.

**LEGEND:**  
 ACP AC DISTRIBUTION PANEL  
 UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL  
 HTCP TERMINAL CONTROL PANEL  
 FCU FIELD COMMUNICATION UNIT  
 CABLE CONNECTOR FOR NON-CLASSIFIED AREA

**COXXXX-XX-XX/COUACP01-XXL**  
 \_\_\_\_\_ CIRCUIT NUMBER (L)LINE/(N)NEUTRAL  
 \_\_\_\_\_ DISTRIBUTION PANEL NUMBER  
 \_\_\_\_\_ TERMINAL NUMBER  
 \_\_\_\_\_ TERMINAL BLOCK/STRIP NUMBER  
 \_\_\_\_\_ INSTRUMENT/EQUIPMENT TAG NUMBER

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-05-003	CO-EES-21 CO-ACP-02 AND CO-UACP-01 DISTRIBUTION PANEL SCHEDULES
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

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2014-APR-07

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E7-0000-P0620  
 UEL# 2012016-1EF-EWD-000-0620-01

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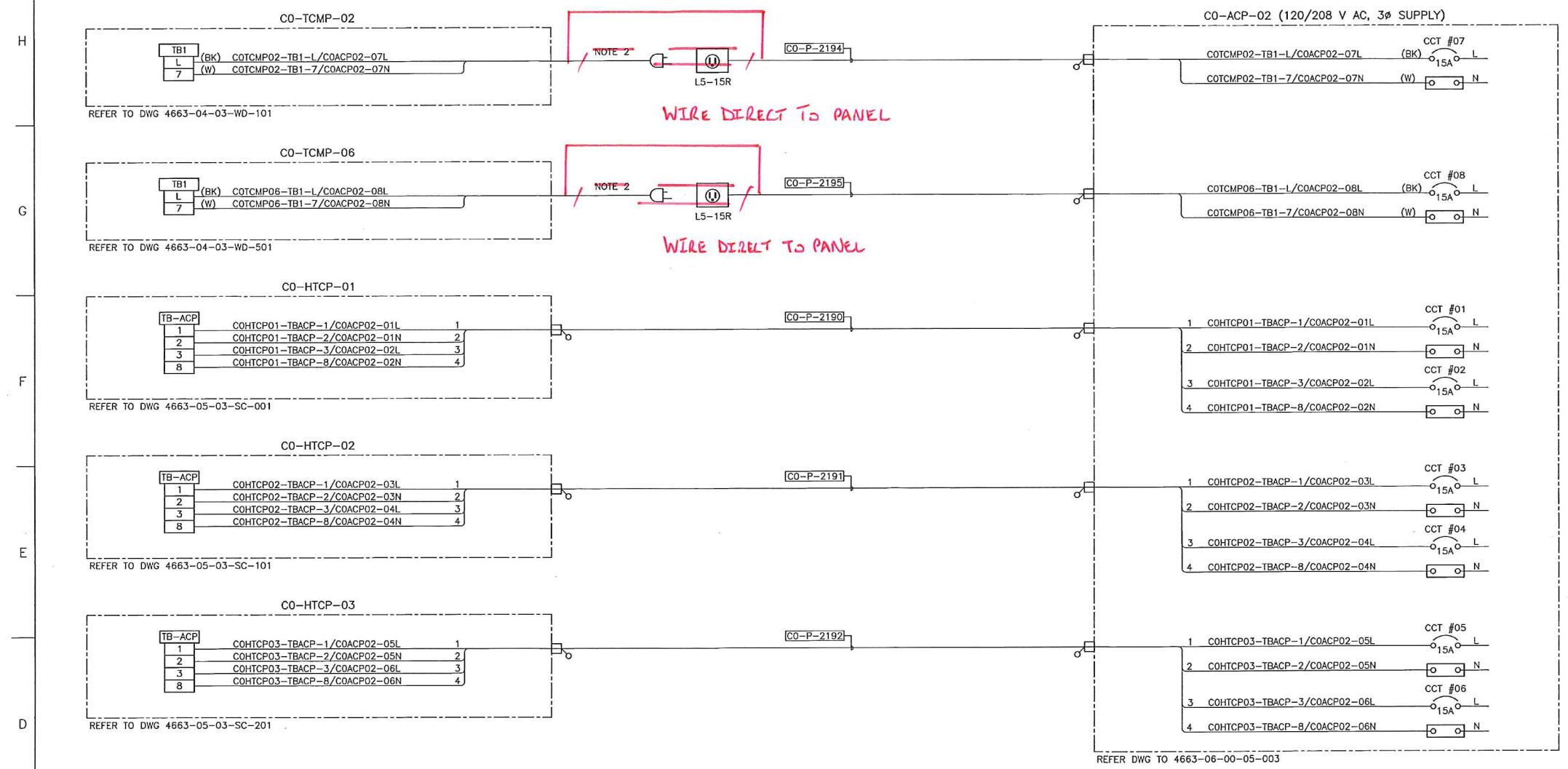
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHAINAGE: DISCIPLINE # 06

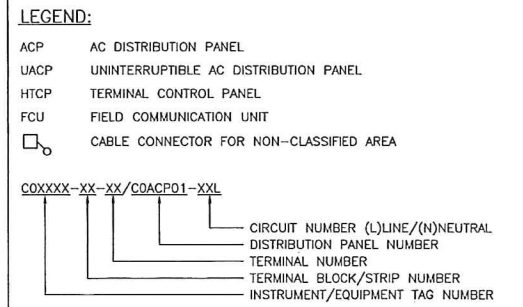
CO-EES-21  
 UPS SUPPLIES TO FCU/TCMP/HTCP  
 INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-010 REV 00

CO-EES-21



- NOTES:**
1. ALL TAGS SHALL BE PREFIXED WITH "130-KSHTT".
  2. BY PANEL VENDOR.



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-02-05-003	CO-EES-21 CO-ACP-02 AND CO-UACP-01 DISTRIBUTION PANEL SCHEDULES

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-14	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

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 PERMIT NUMBER: P 5508  
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2014-MAR-21

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E7-0000-P0621  
 UEL# 2012016-1EF-EWD-000-0621-01

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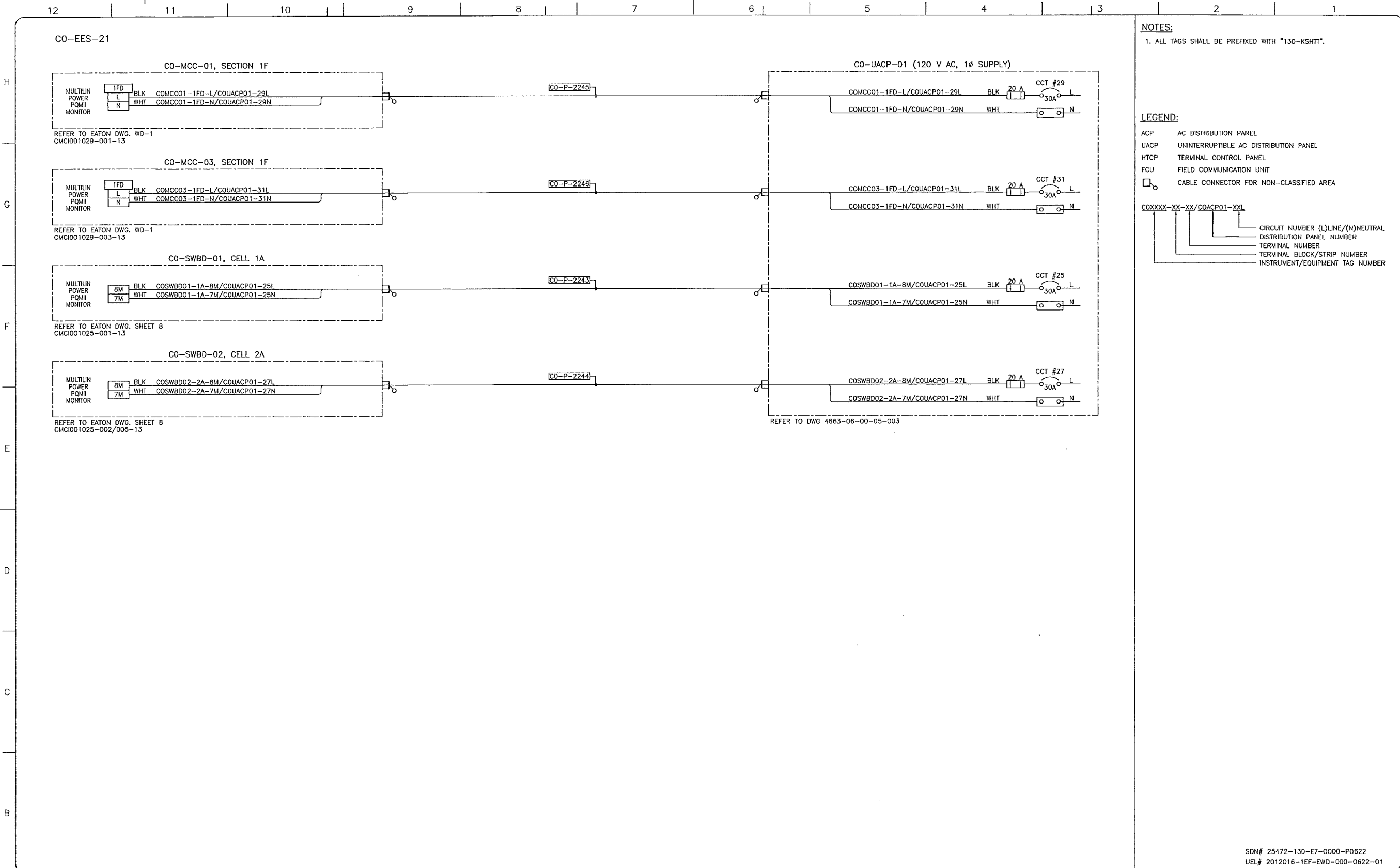
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANAGE: DISCIPLINE # 06

CO-EES-21  
 UTILITY SUPPLIES TO TCMP/HTCP  
 INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-011 REV 00



**NOTES:**  
 1. ALL TAGS SHALL BE PREFIXED WITH "130-KSHIT".

**LEGEND:**  
 ACP AC DISTRIBUTION PANEL  
 UACP UNINTERRUPTIBLE AC DISTRIBUTION PANEL  
 HTCP TERMINAL CONTROL PANEL  
 FCU FIELD COMMUNICATION UNIT  
 □ CABLE CONNECTOR FOR NON-CLASSIFIED AREA

COXXXX-XX-XX/COACP01-XXL  
 ———— CIRCUIT NUMBER (L)/LINE/(N)NEUTRAL  
 ———— DISTRIBUTION PANEL NUMBER  
 ———— TERMINAL NUMBER  
 ———— TERMINAL BLOCK/STRIP NUMBER  
 ———— INSTRUMENT/EQUIPMENT TAG NUMBER

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-05-003	CO-EES-21 CO-ACP-02 AND CO-UACP-01 DISTRIBUTION PANEL SCHEDULES
4663-06-02-03-016	CO-EES-21 ELECTRICAL EQUIPMENT LAYOUT
4663-09-00-01-004	KHIT SAFETY PLAN BUILDINGS CO-EES-21, CO-EES-22, CO-VES-21 LAYOUT

REVISION			APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	TAE	HMM	JED	DCB	UPSIDE	

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PERMIT/ ENG. APPROVAL

DATE

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 PERMIT NUMBER: P 5508  
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2014-APR-04

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E7-0000-P0622  
 UEL# 2012016-1EF-EWD-000-0622-01

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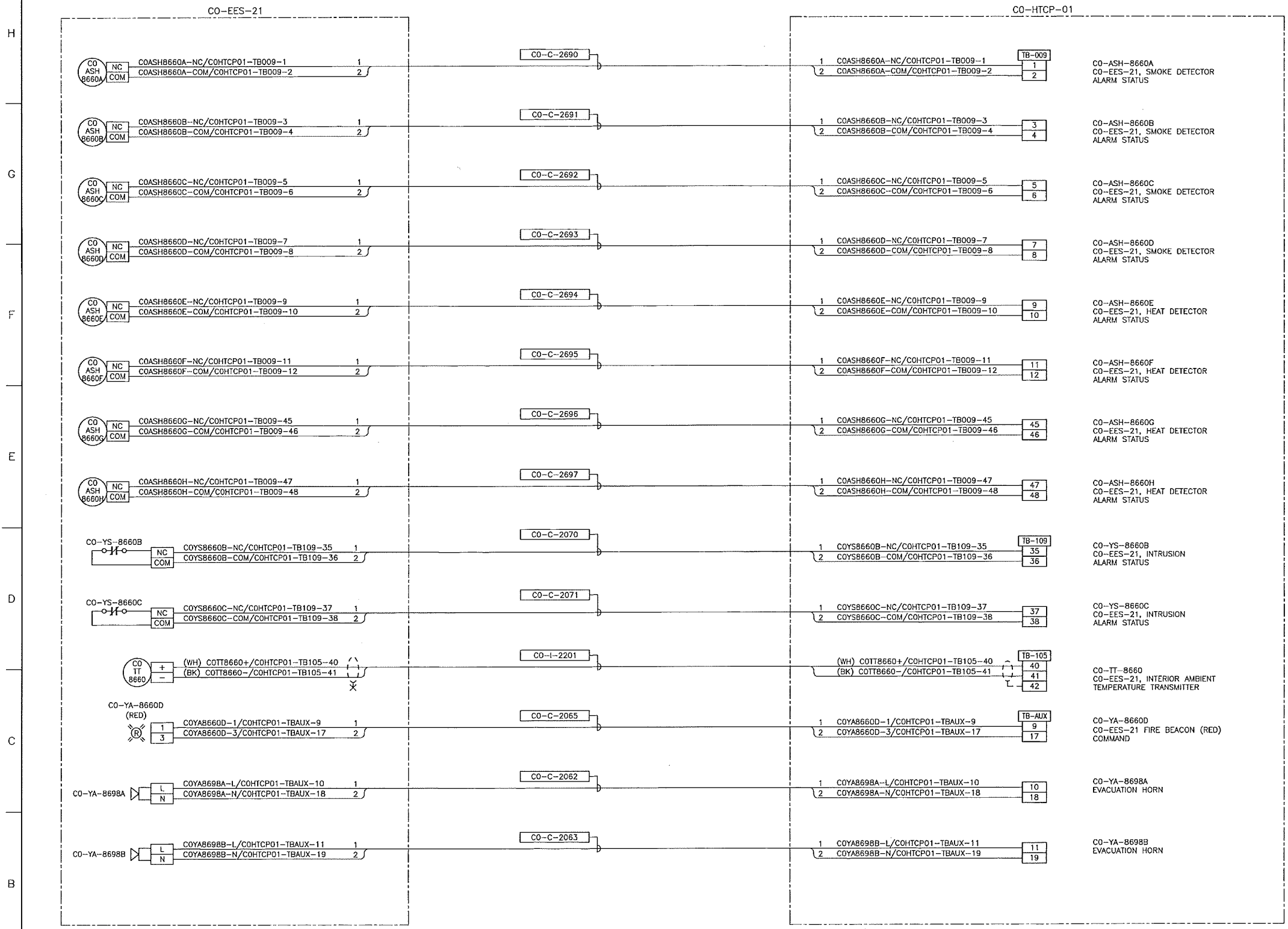
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 06

CO-EES-21  
 UPS SUPPLIES TO MCC & SWBD  
 INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-012 REV 00



- NOTES:**
1. ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  2. SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  3. WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  4. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  5. INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-001.
  6. PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-005.
  7. FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

REFERENCE DWGS. #4663-05-03-SC-012/013/014/019/025

REFERENCE DWG. #

SDN# 25472-130-E7-0000-P0374  
 UEL# 2012016-1EF-EWD-000-0374-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-03-14	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-21

REV. NO. DATE PERMIT NUMBER:

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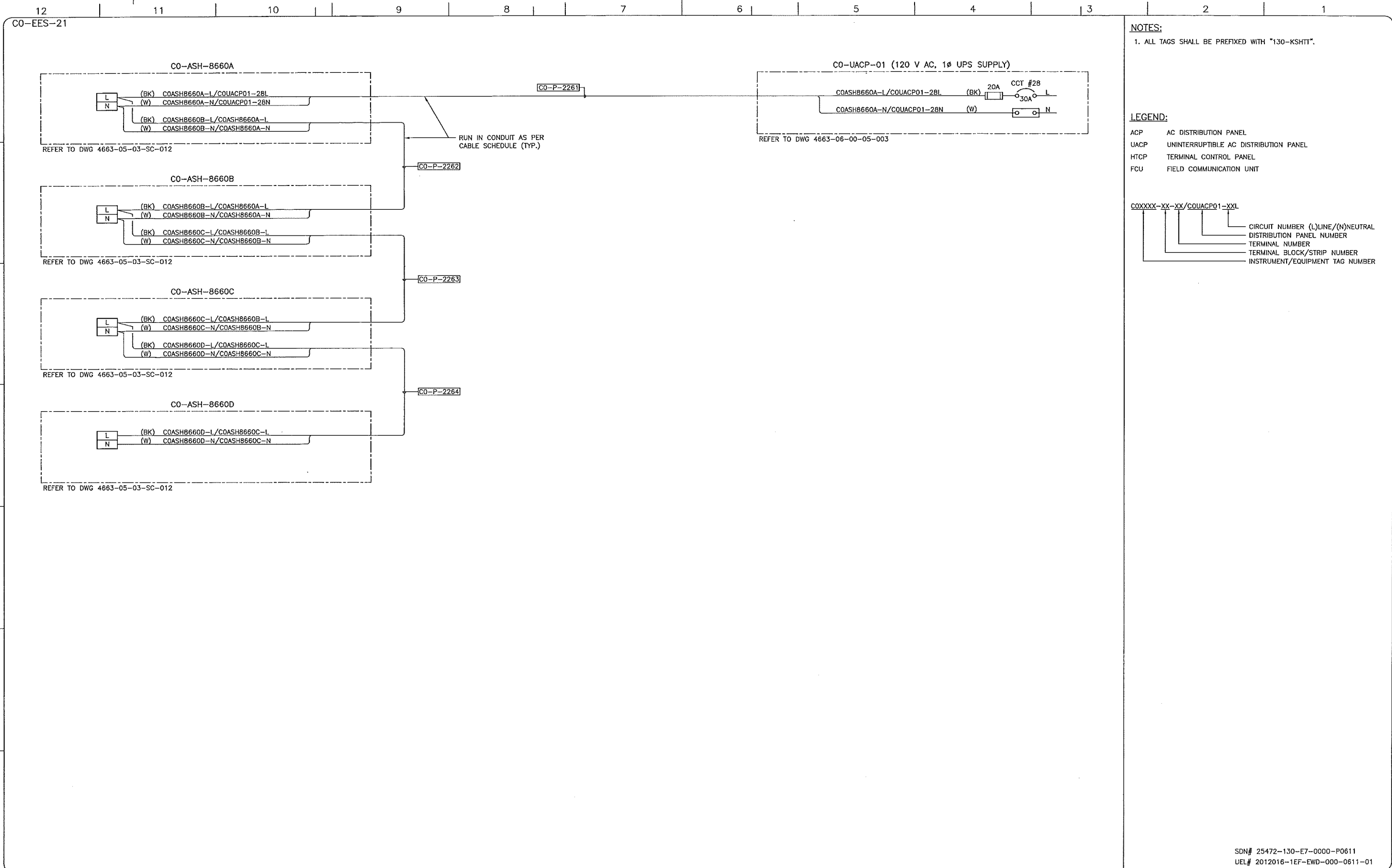
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 06

CO-EES-21  
 BUILDING INSTRUMENT AND CONTROL PANEL CO-HTCP-01  
 INTERCONNECTION WIRING DIAGRAM

SCALE: N.T.S. DRAWING No 4663-06-07-06-024 REV 00



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-09-00-01-004	KHIT SAFETY PLAN BUILDINGS CO-EES-21, CO-EES-22, CO-VES-21 DETAILS
4663-06-00-05-003	CO-EES-21 CO-ACP-02 AND CO-UACP-01 DISTRIBUTION PANEL SCHEDULES
4663-06-02-03-018	CO-EES-21 LIGHTING AND LOW VOLTAGE UTILITIES LAYOUT

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	PROJECT CODE
00	2014-04-04	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104

DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
BEM	TAE	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.

PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-APR-04

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-E7-0000-P0611  
UEL# 2012016-1EF-EWD-000-0611-01

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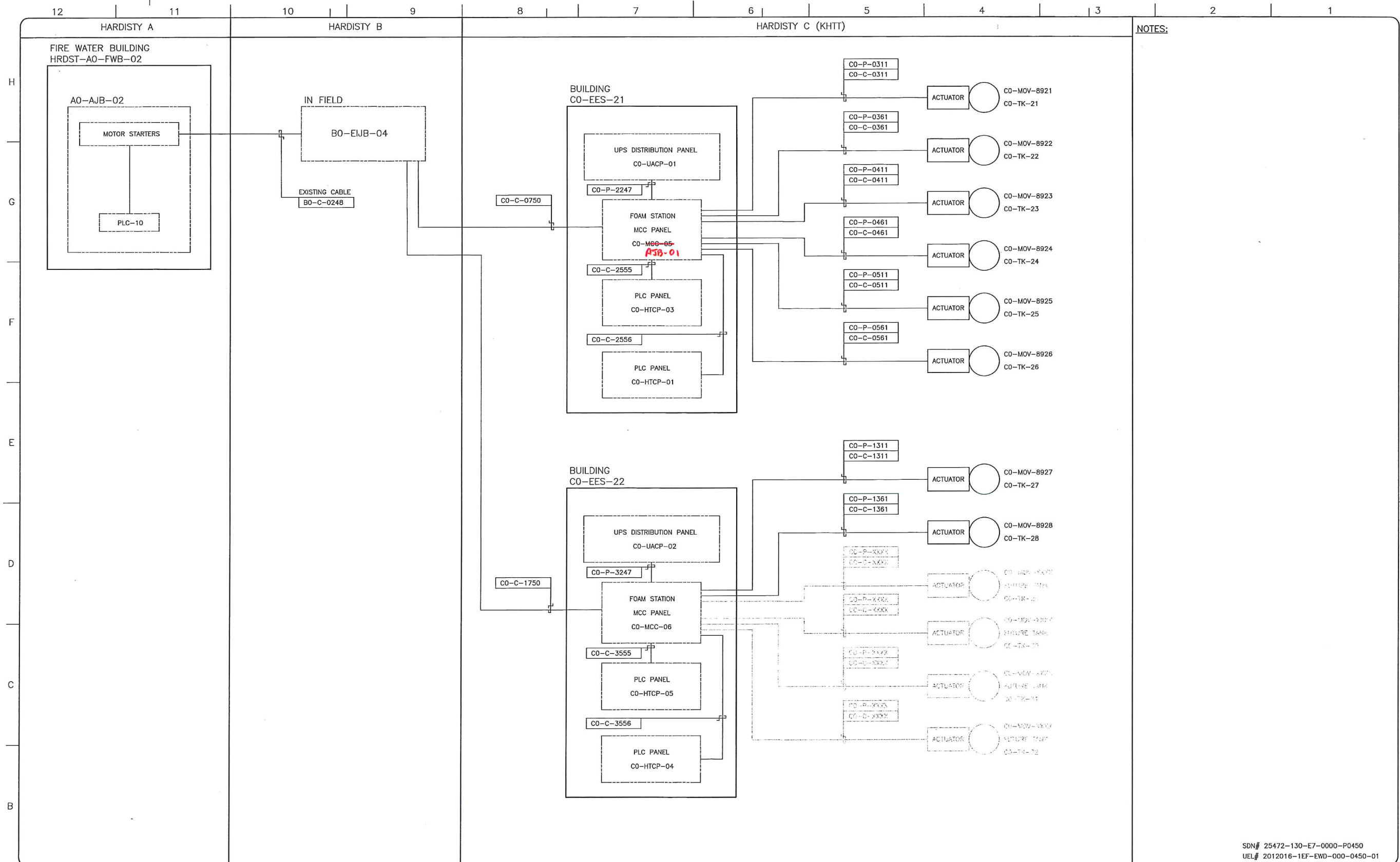
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 06

CO-EES-21  
UPS SUPPLIES TO SMOKE DETECTORS  
INTERCONNECTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-001 REV 00



NOTES:

SDN# 25472-130-E7-0000-P0450  
 UEL# 2012016-1EF-EWD-000-0450-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		DESCRIPTION		APPROVAL						
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY		
00	2014-04-04	2197104	JAP	PLR	JHM	JED	DCB	UPSIDE		

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014 APR 04

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 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
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 Geologists and Geophysicists of Alberta

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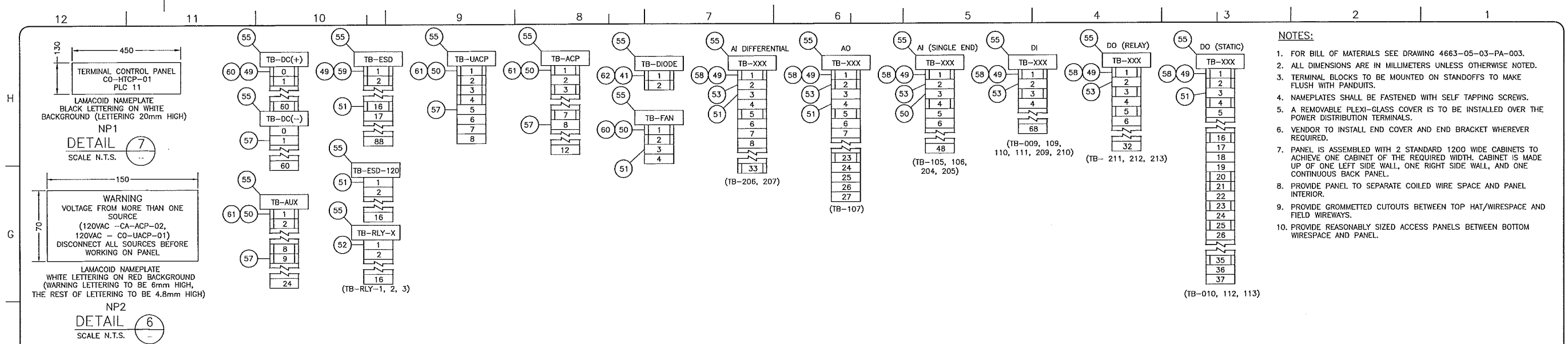
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 08

TANK FOAM SYSTEM  
 TANKS CO-TK-21 TO CO-TK-28  
 BLOCK DIAGRAM

SCALE N.T.S. DRAWING No 4663-06-02-07-330 REV 00





TERMINAL CONTROL PANEL  
CO-HTCP-01  
PLC 11

LAMACOID NAMEPLATE  
BLACK LETTERING ON WHITE  
BACKGROUND (LETTERING 20mm HIGH)

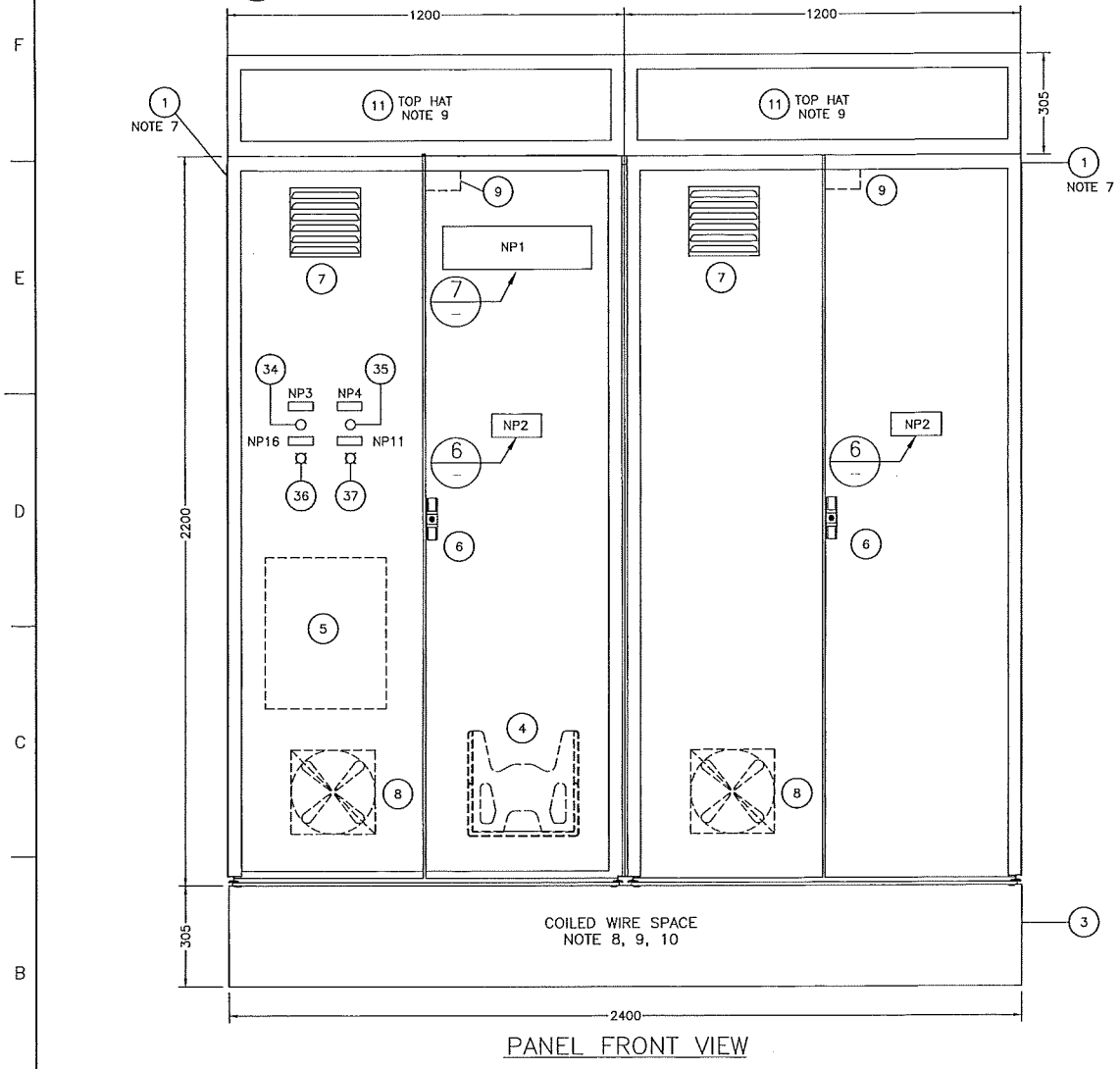
NP1  
DETAIL 7  
SCALE N.T.S.

WARNING  
VOLTAGE FROM MORE THAN ONE  
SOURCE  
(120VAC -CA-ACP-02,  
120VAC -CO-UACP-01)  
DISCONNECT ALL SOURCES BEFORE  
WORKING ON PANEL

LAMACOID NAMEPLATE  
WHITE LETTERING ON RED BACKGROUND  
(WARNING LETTERING TO BE 6mm HIGH,  
THE REST OF LETTERING TO BE 4.8mm HIGH)

NP2  
DETAIL 6  
SCALE N.T.S.

- NOTES:**
- FOR BILL OF MATERIALS SEE DRAWING 4663-05-03-PA-003.
  - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  - TERMINAL BLOCKS TO BE MOUNTED ON STANDOFFS TO MAKE FLUSH WITH PANDUITS.
  - NAMEPLATES SHALL BE FASTENED WITH SELF TAPPING SCREWS.
  - A REMOVABLE PLEXI-GLASS COVER IS TO BE INSTALLED OVER THE POWER DISTRIBUTION TERMINALS.
  - VENDOR TO INSTALL END COVER AND END BRACKET WHEREVER REQUIRED.
  - PANEL IS ASSEMBLED WITH 2 STANDARD 1200 WIDE CABINETS TO ACHIEVE ONE CABINET OF THE REQUIRED WIDTH. CABINET IS MADE UP OF ONE LEFT SIDE WALL, ONE RIGHT SIDE WALL, AND ONE CONTINUOUS BACK PANEL.
  - PROVIDE PANEL TO SEPARATE COILED WIRE SPACE AND PANEL INTERIOR.
  - PROVIDE GROMMETTED CUTOUTS BETWEEN TOP HAT/WIRESPACE AND FIELD WIREWAYS.
  - PROVIDE REASONABLY SIZED ACCESS PANELS BETWEEN BOTTOM WIRESPACE AND PANEL.



NAMEPLATE SCHEDULE					
ITEM	LABEL	TYPE	NAMEPLATE SIZE WxH	LETTER SIZE	COLOR BACKGROUND/LETTER
NP1	PANEL NAMEPLATE (DETAIL 7)	LAMICOID	450mm X 130mm (18" X 5")	20.0mm (0.79")	WHITE/BLACK
NP2	WARNING PLATE (DETAIL 6)	LAMICOID	150mm X 70mm (6" X 2.75")	6.0mm (0.24")/4.8 (0.19")	RED/WHITE
NP3	ESD PUSHBUTTON	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP4	ESD RESET PUSHBUTTON	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP5	PS-1	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP6	PS-2	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP7	PLC-11/00	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP8	PLC-11/01	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP9	PLC-11/02	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP10	WDT RESET PUSHBUTTON	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP11	PLC FAULT	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP12	WDT RELAY	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP13	DIODE MODULE	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP14	120 VAC ESD RELAYS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP15	ESD RELAYS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP16	STATION ESD	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP17	ETHERNET CONNECTORS (TB-ETM)	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP18	MODBUS CONNECTORS (TB-COM)	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP19					
NP20	EQUIPMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP21	INSTRUMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2013-OCT-03

SDN# 25472-130-JC-0000-P0003  
UEL# 2012016-1EF-CAB-000-0001-01

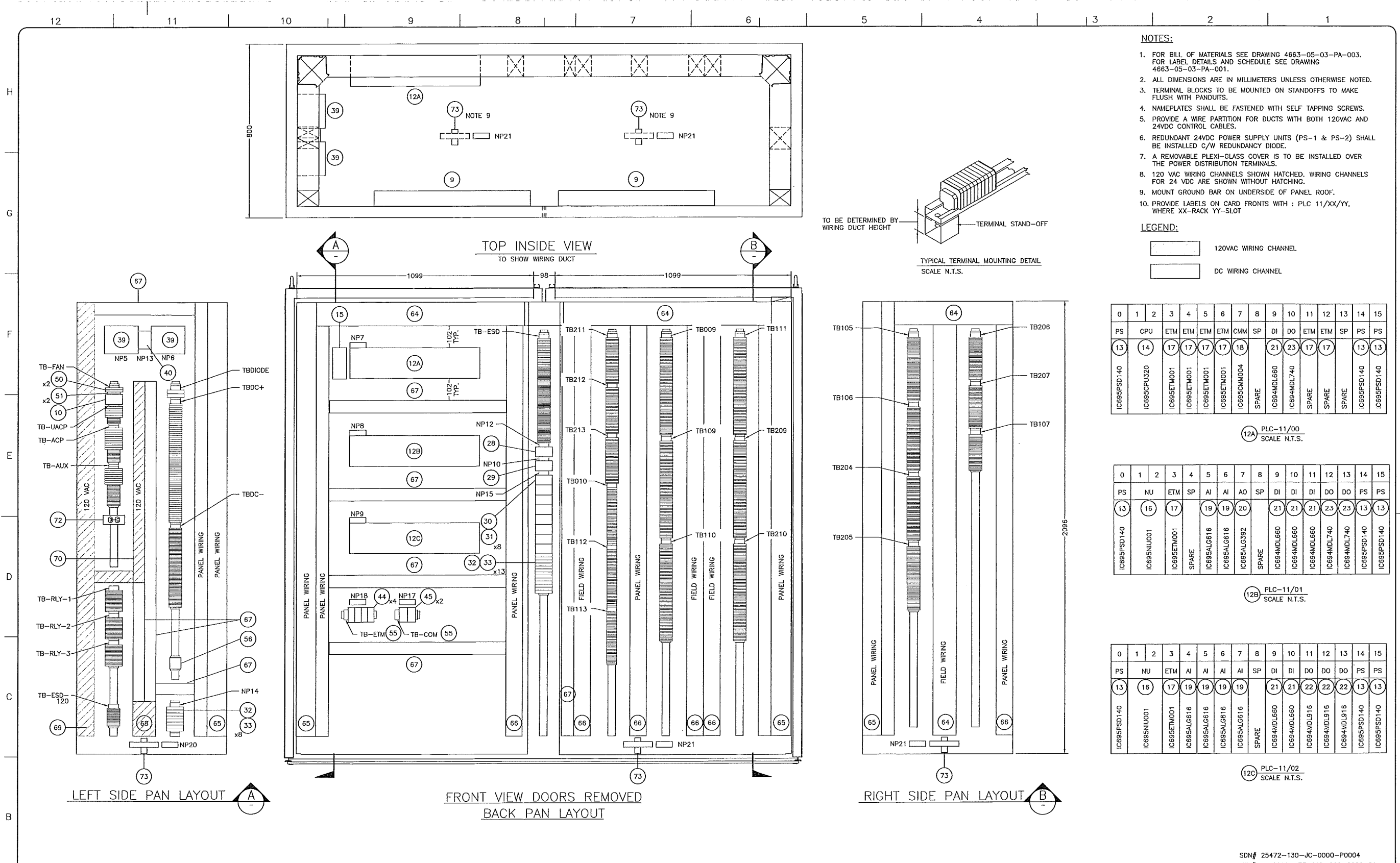
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**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
CHAUNAGE: DISCIPLINE # 05

KHTT CONTROL PANEL  
(CO-HTCP-01), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 1 OF 2

SCALE N.T.S. DRAWING No 4663-05-03-PA-001 REV 00



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			
REV No	DATE	DESCRIPTION	
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	SKC	DNC	SRL	JED	DCB	UPSIDE	
	SKC	DNC	SRL	JED	DCB		

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2013-OCT-03

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-JC-0000-P0004  
UEL# 2012016-1EF-CAB-000-0006-01

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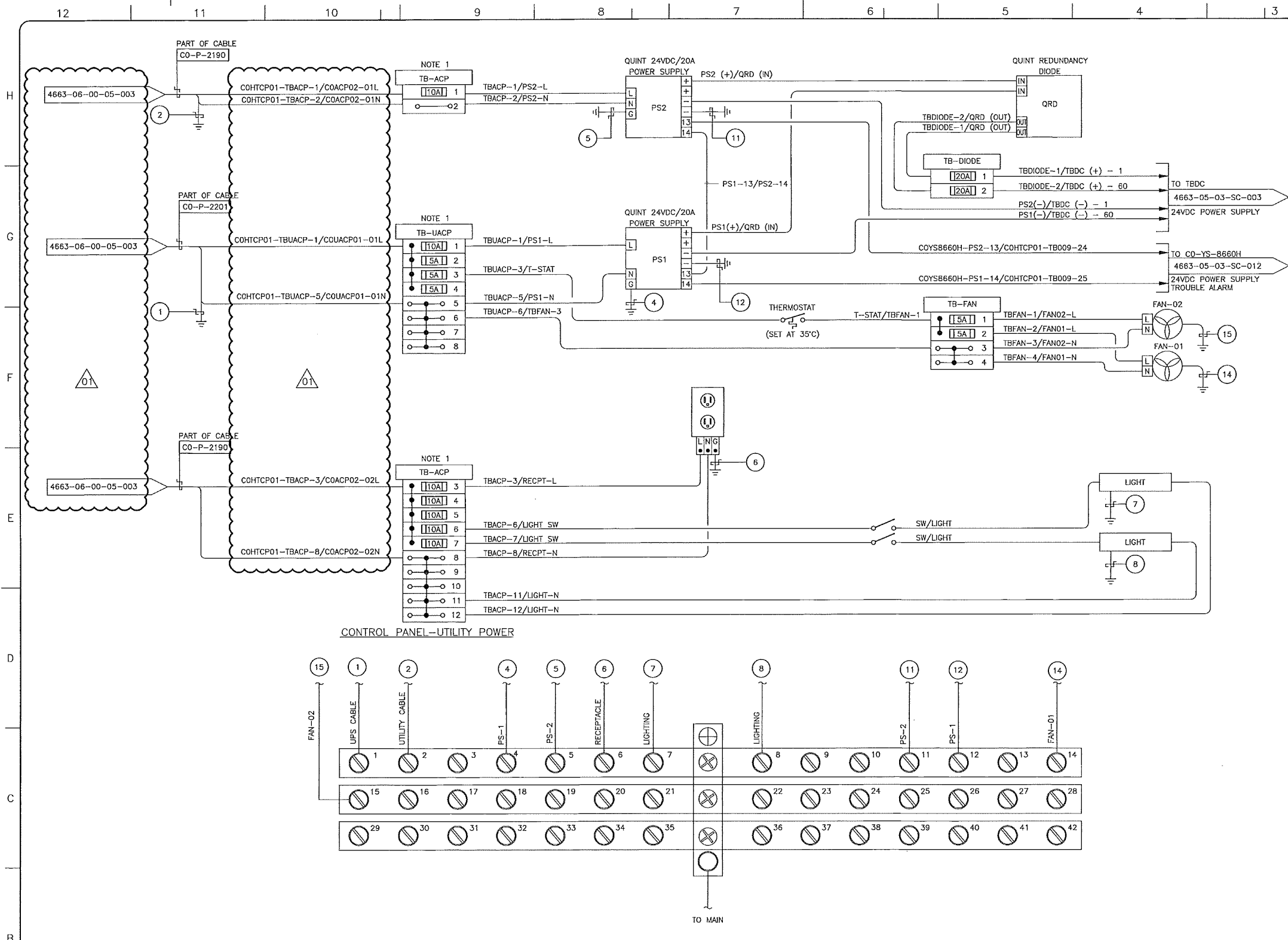
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

KHTT CONTROL PANEL  
(CO-HTCP-01), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 2 OF 2

SCALE 1 : 8 DRAWING No 4663-05-03-PA-002 REV 00



- NOTES:**
1. TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE AWG #12.
  2. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.

- LEGEND:**
- [120A] 4 FUSED TERMINAL
  - 5 THRU TERMINAL
  - (X) GROUND BAR CONNECTION DESIGNATOR (FOR THIS DRAWING ONLY)
  - 4663-05-XX-XX-XXX TO/FROM ARROW
  - (HTCP) HTCP TERMINAL

- ABBREVIATIONS:**
- PS - POWER SUPPLY
  - ACP - AC POWER
  - UACP - UPS AC POWER
  - YS - EVENT STATUS

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
01	2014-02-27	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
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SDN# 25472-130-JC-0000-P0006  
UEL# 2012016-1EF-EWD-000-0010-01

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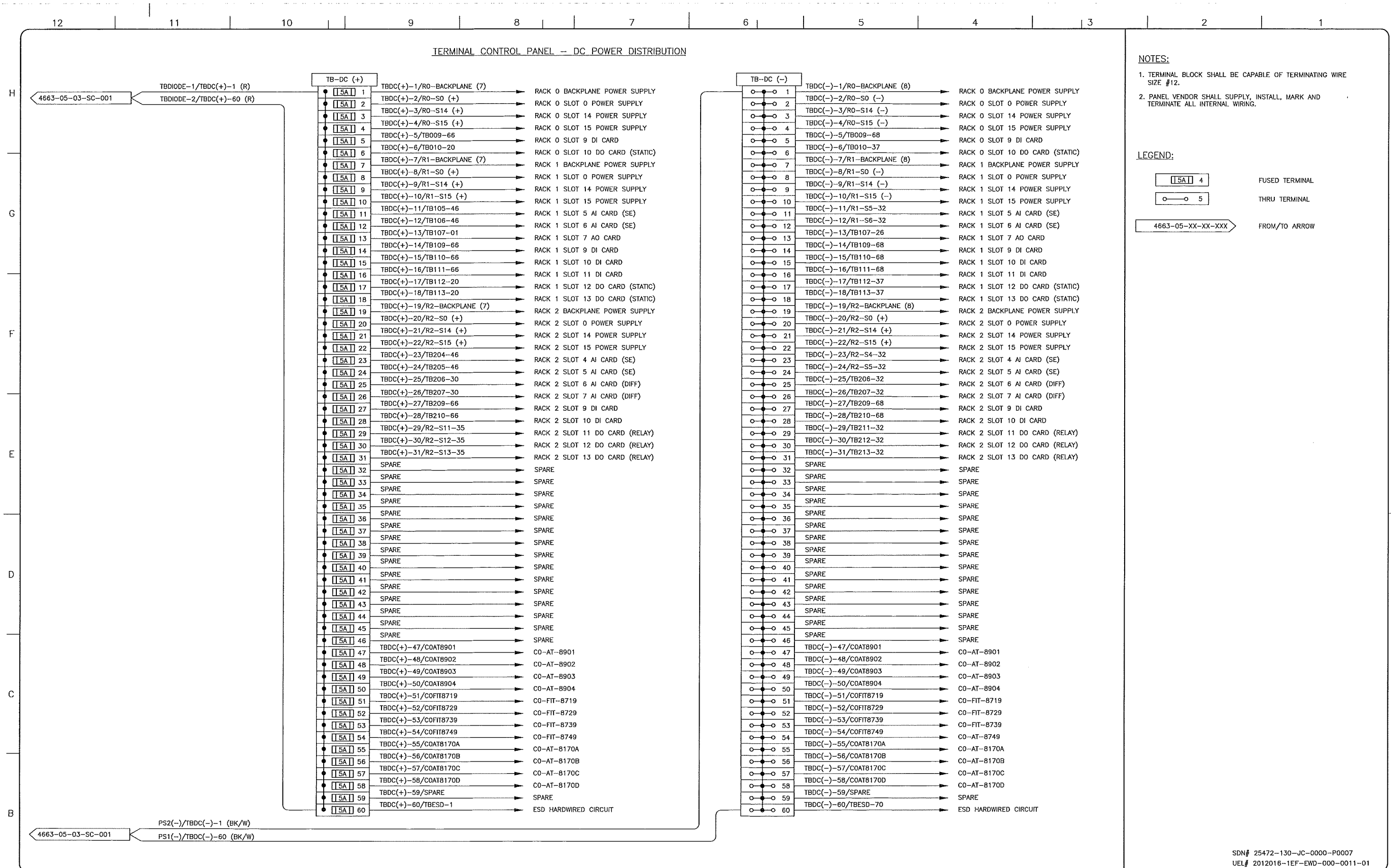
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

KHTT CONTROL PANEL  
CO-HTCP-01 (CO-EES-21)  
AC POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-001 REV 01



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

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SDN# 25472-130-JC-0000-P0007  
UEL# 2012016-1EF-EWD-000-0011-01

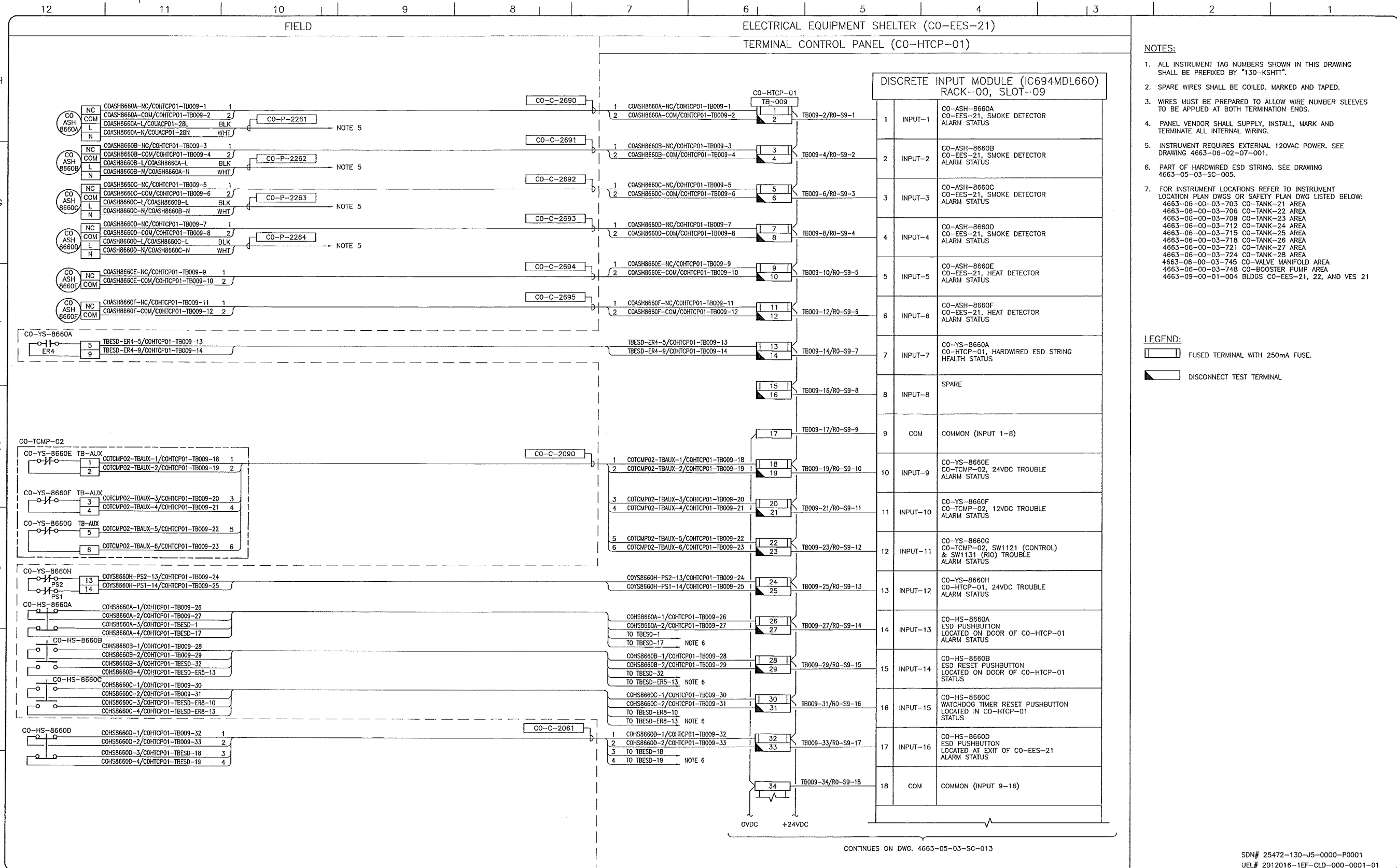
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
FA # 4663 CHARGE: DISCIPLINE # 05

KHIT CONTROL PANEL  
CO-HTCP-01 (CO-EES-21)  
DC POWER DISTRIBUTION WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-003 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-001.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-005.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-013

SDN# 25472-130-J5-0000-P0001  
 UEL# 2012016-1EF-CLD-000-0001-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-27	ISSUED FOR CONSTRUCTION (JEL PROJ. #2012016)	2197104	BEM	DWC	SRL	JED

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

REV. No. DATE PERMIT NUMBER:

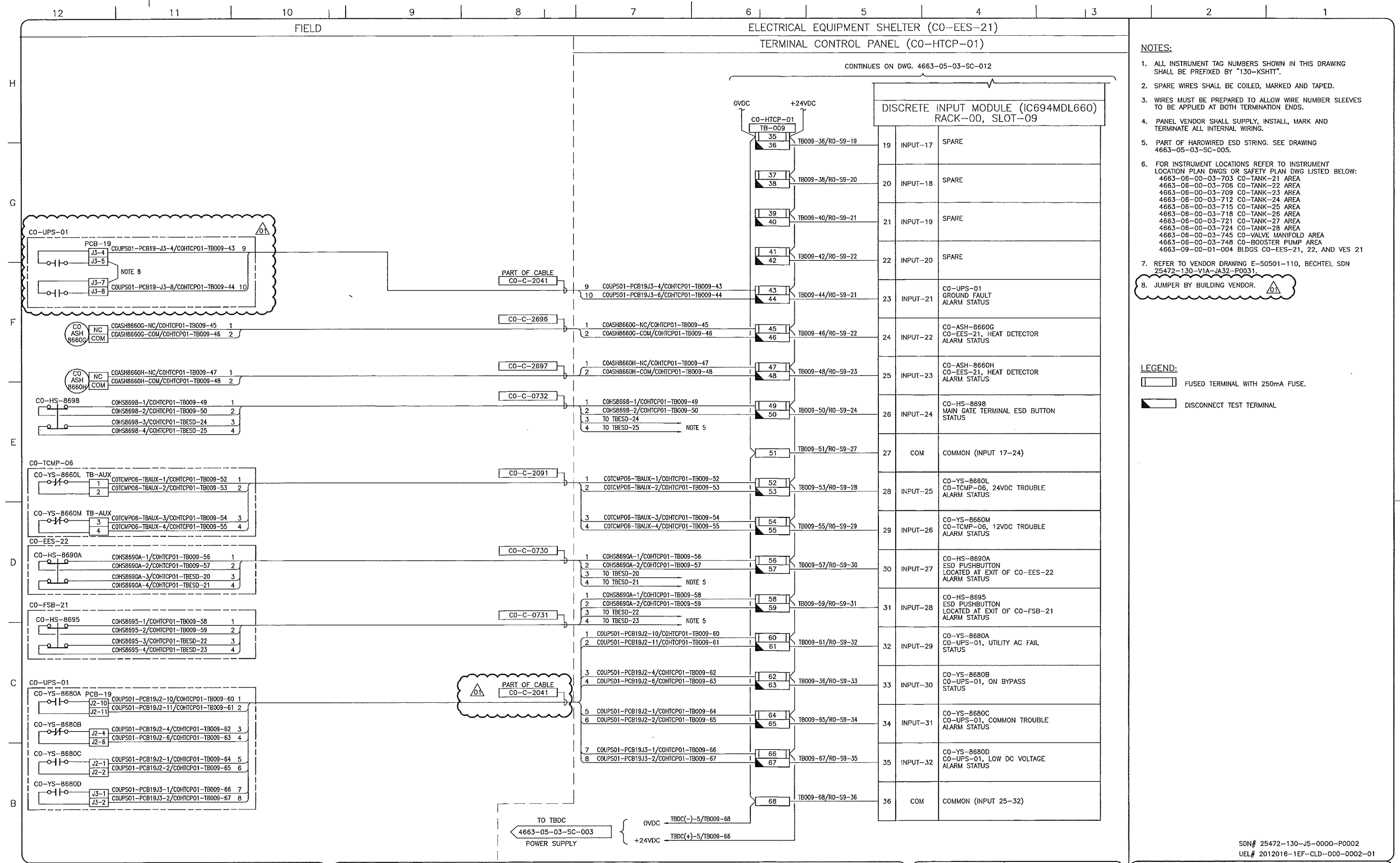
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/00 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-012 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-005.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21
  - REFER TO VENDOR DRAWING E-50501-110, BECHTEL SDN 25472-130-V1A-JA32-P0031.
  - JUMPER BY BUILDING VENDOR.

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0002  
 UEL# 2012016-1EF-CLD-000-0002-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER
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01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	PLR	SRL	JED

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

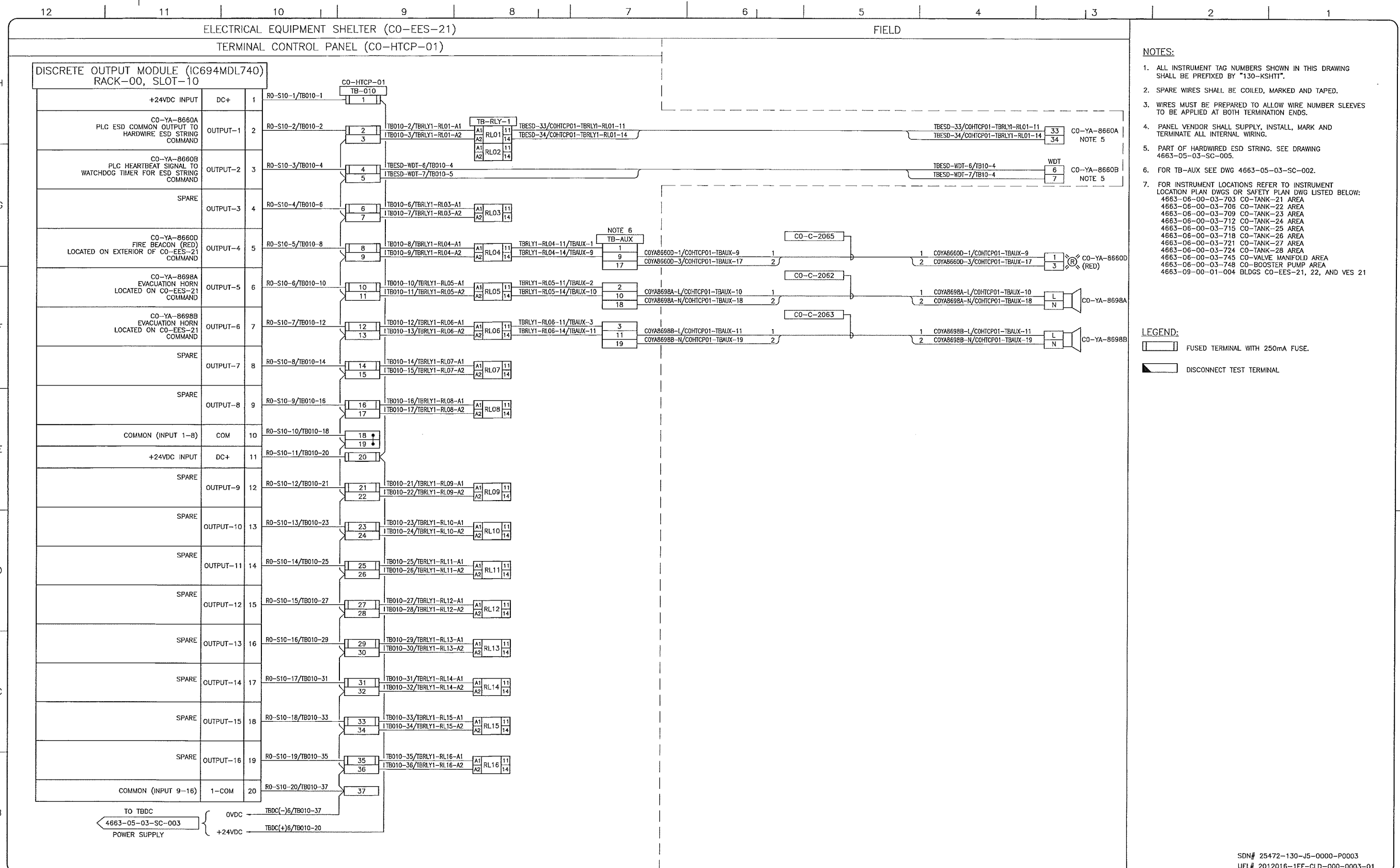
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/00 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-013 REV: 01



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-005.
  - FOR TB-AUX SEE DWG 4663-05-03-SC-002.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-705 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL						
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE
DESCRIPTION		ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)						

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SDN# 25472-130-J5-0000-P0003  
 UEL# 2012016-1EF-CLD-000-0003-01

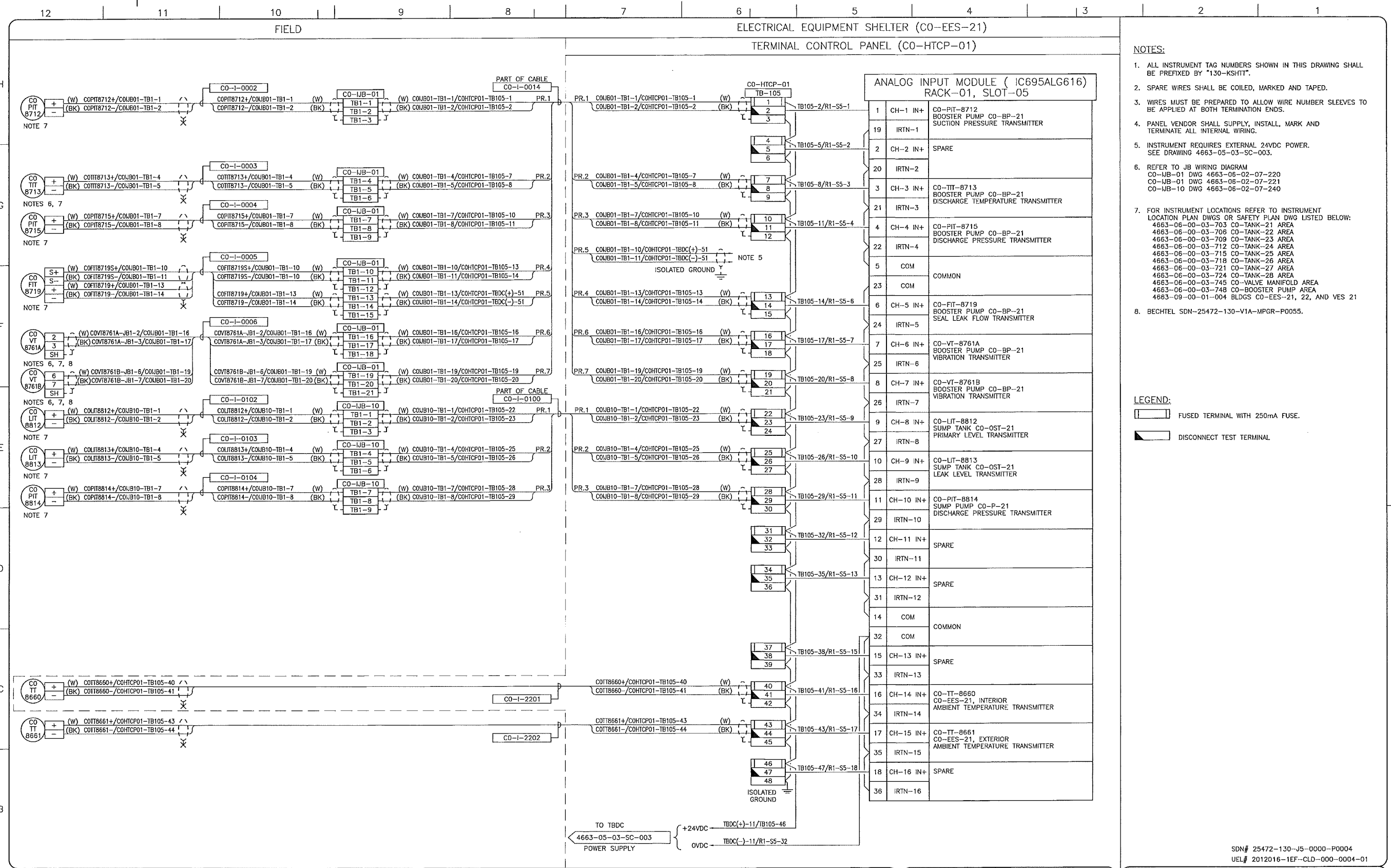
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KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/00 SLOT 10  
 DISCRETE OUTPUT - STATIC  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-014 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DRAWING 4663-05-03-SC-003.
  - REFER TO JB WIRING DIAGRAM  
CO-JB-01 DWG 4663-06-02-07-220  
CO-JB-01 DWG 4663-06-02-07-221  
CO-JB-10 DWG 4663-06-02-07-240
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
4663-06-00-03-703 CO-TANK-21 AREA  
4663-06-00-03-706 CO-TANK-22 AREA  
4663-06-00-03-709 CO-TANK-23 AREA  
4663-06-00-03-712 CO-TANK-24 AREA  
4663-06-00-03-715 CO-TANK-25 AREA  
4663-06-00-03-718 CO-TANK-26 AREA  
4663-06-00-03-721 CO-TANK-27 AREA  
4663-06-00-03-724 CO-TANK-28 AREA  
4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
4663-06-00-03-748 CO-BOOSTER PUMP AREA  
4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21
  - BECHTEL SDN-25472-130-VIA-MPGR-P0055.

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-27	ISSUED FOR CONSTRUCTION (U.E.L. PROJ. #2012016)	2197104	BEM	DMC	SRL	JED

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PERMIT/ ENG. APPROVAL: \_\_\_\_\_

DATE: \_\_\_\_\_

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PERMIT NUMBER: P 5508  
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SDN# 25472-130-J5-0000-P0004  
UEL# 2012016-1EF-CLD-000-0004-01

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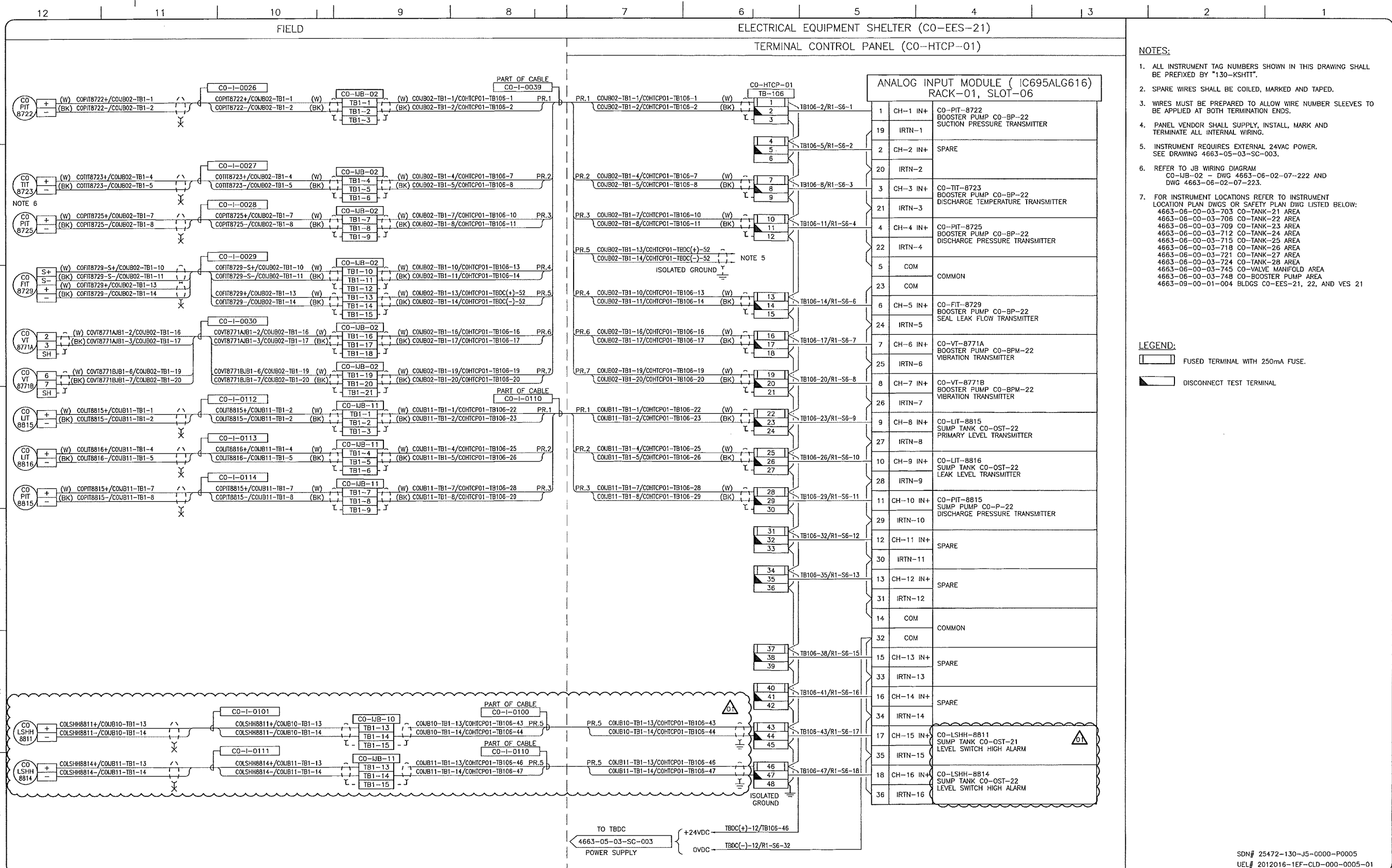
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
CHANGE: \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 05  
ANALOG INPUT - SINGLE ENDED  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-019 REV: 00





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 24VAC POWER. SEE DRAWING 4663-05-03-SC-003.
  - REFER TO JIB WIRING DIAGRAM CO-UB-02 - DWG 4663-06-02-07-222 AND DWG 4663-06-02-07-223.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
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01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

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2014-MAR-12

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0005  
 UEL# 2012016-1EF-CLD-000-0005-01

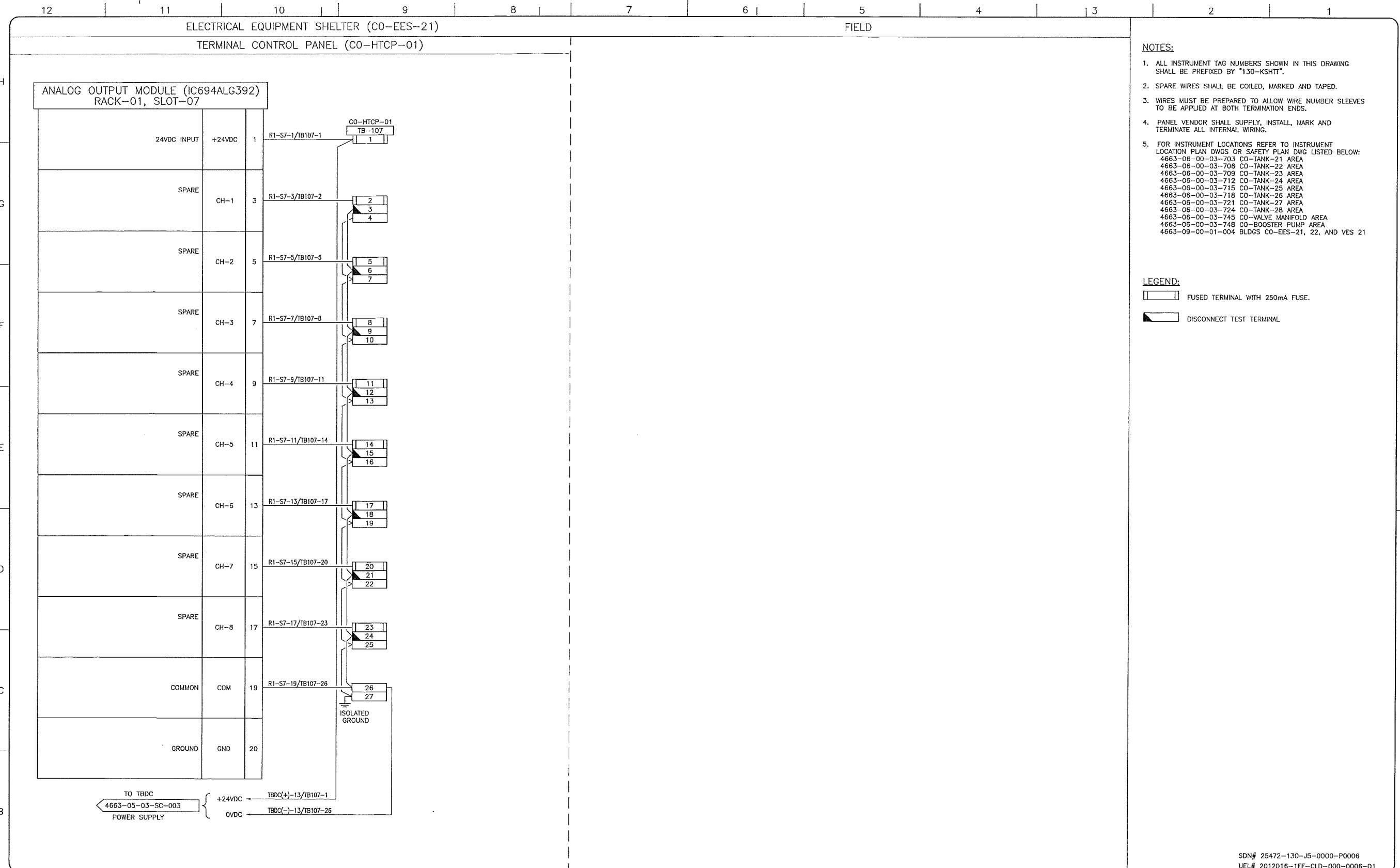
**TransCanada**  
 In business to deliver

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 06  
 ANALOG INPUT - SINGLE ENDED  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-020 REV 01



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-05-00-03-703 CO-TANK-21 AREA  
 4663-05-00-03-706 CO-TANK-22 AREA  
 4663-05-00-03-709 CO-TANK-23 AREA  
 4663-05-00-03-712 CO-TANK-24 AREA  
 4663-05-00-03-715 CO-TANK-25 AREA  
 4663-05-00-03-718 CO-TANK-26 AREA  
 4663-05-00-03-721 CO-TANK-27 AREA  
 4663-05-00-03-724 CO-TANK-28 AREA  
 4663-05-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-05-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0006  
 UEL# 2012016-1EF-CLD-000-0006-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DVC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. 2014-FEB-27 DATE PERMIT NUMBER:

**TransCanada**  
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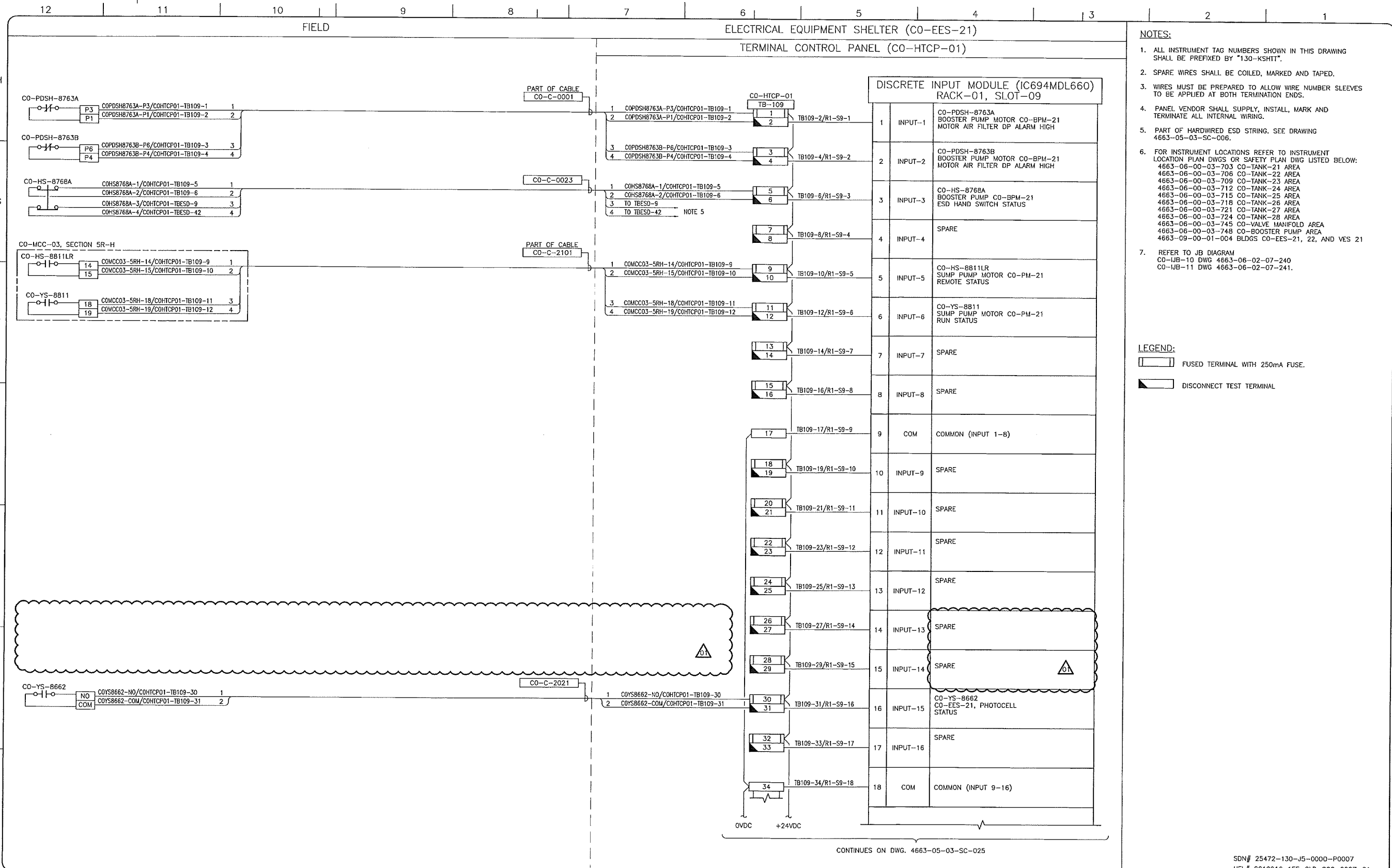
**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 07  
 ANALOG OUTPUT  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-021 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING, SEE DRAWING 4663-05-03-SC-006.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21
  - REFER TO JB DIAGRAM  
 CO-LIB-10 DWG 4663-06-02-07-240  
 CO-LIB-11 DWG 4663-06-02-07-241.

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-025

SDN# 25472-130-J5-0000-P0007  
 UEL# 2012016-1EF-CLD-000-0007-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
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-	-

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-12

REV. NO. DATE PERMIT NUMBER:

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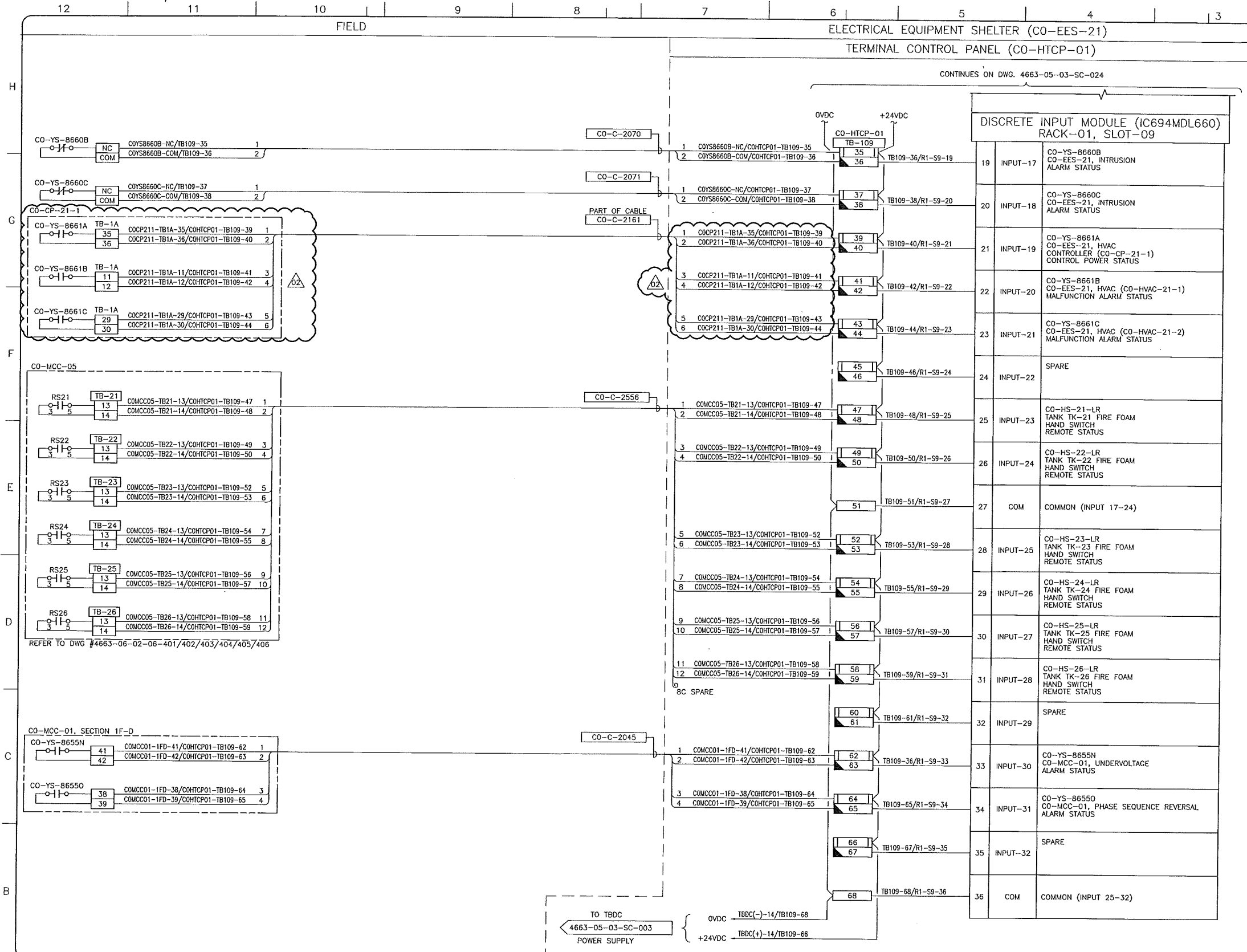
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE: N.T.S. DRAWING NO: 4663-05-03-SC-024 REV: 01



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	HHM	JED	DCB	UPSIDE
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	PLR	HHM	JED	DCB	UPSIDE
02	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JAP	PLR	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-APK-11

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0008  
 UEL# 2012016-1EF-CLD-000-0008-01

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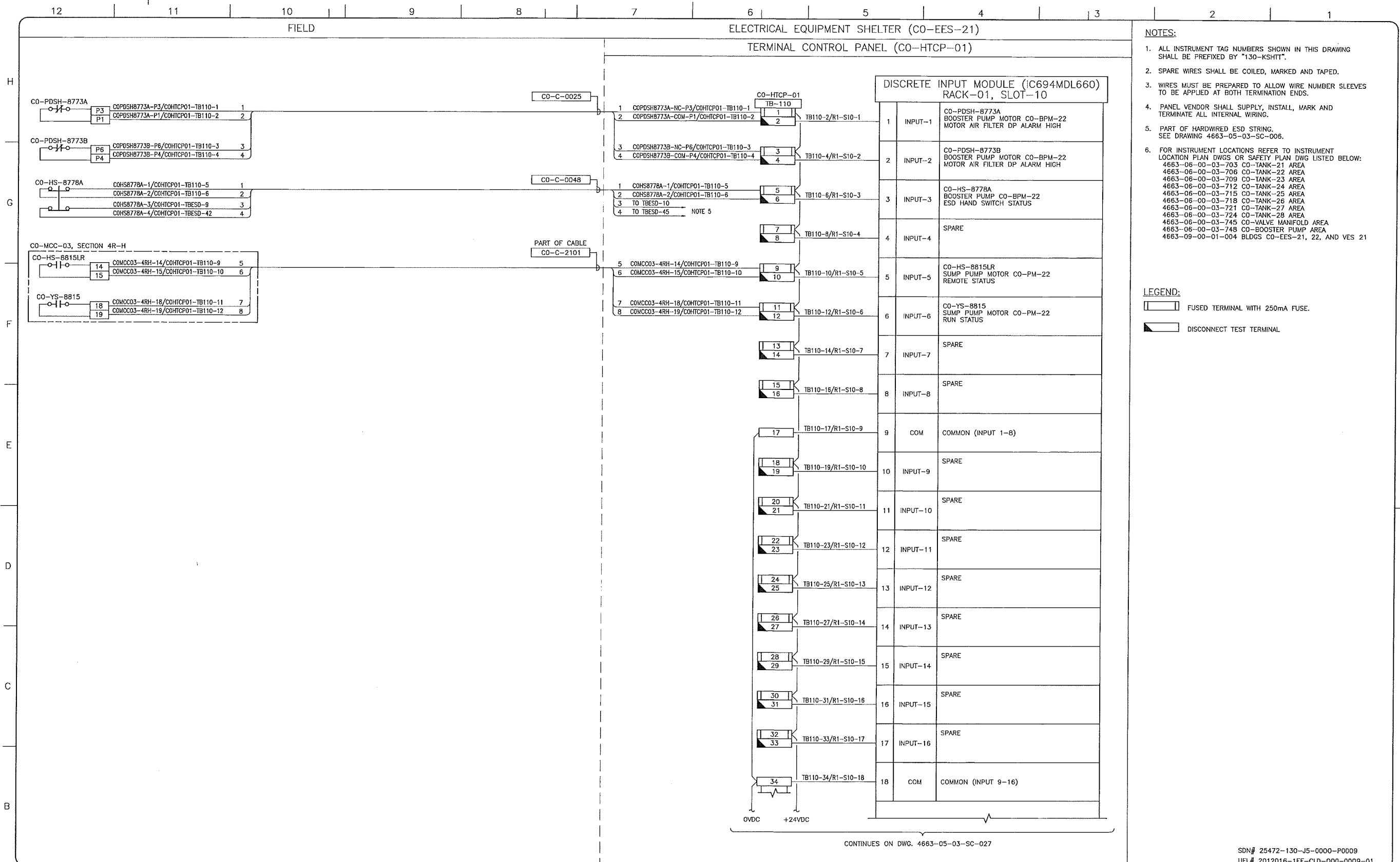
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-025 REV 02



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-006.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-027

SDN# 25472-130-J5-0000-P0009  
 UEL# 2012016-1EF-CLD-000-0009-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
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REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DNC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

**TransCanada**  
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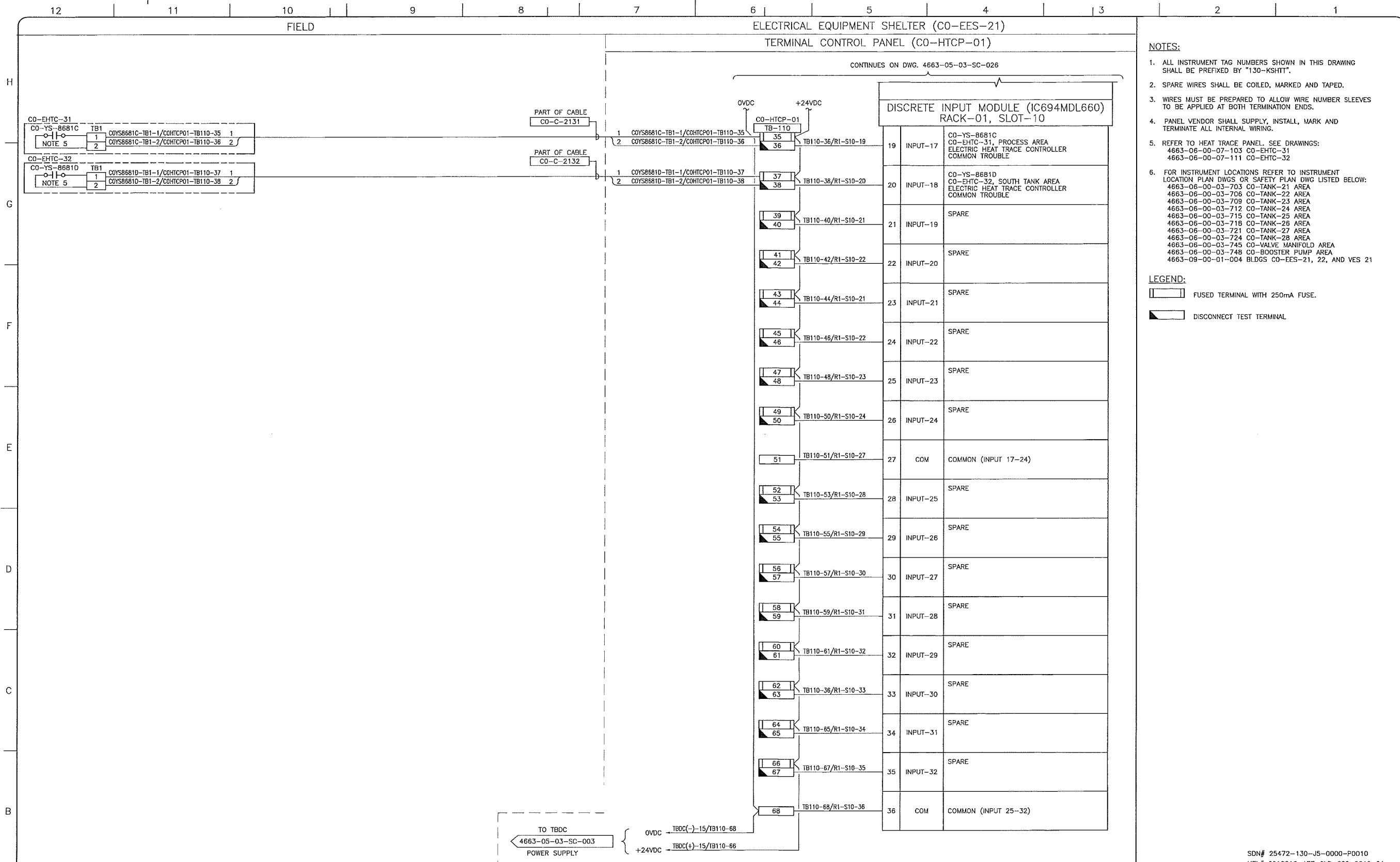
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 10  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-026 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - REFER TO HEAT TRACE PANEL. SEE DRAWINGS: 4663-06-00-07-103 CO-EHTC-31, 4663-06-00-07-111 CO-EHTC-32
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION			APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

DATE: 2014-FEB-27

SDN# 25472-130-J5-0000-P0010  
UEL# 2012016-1EF-CLD-000-0010-01

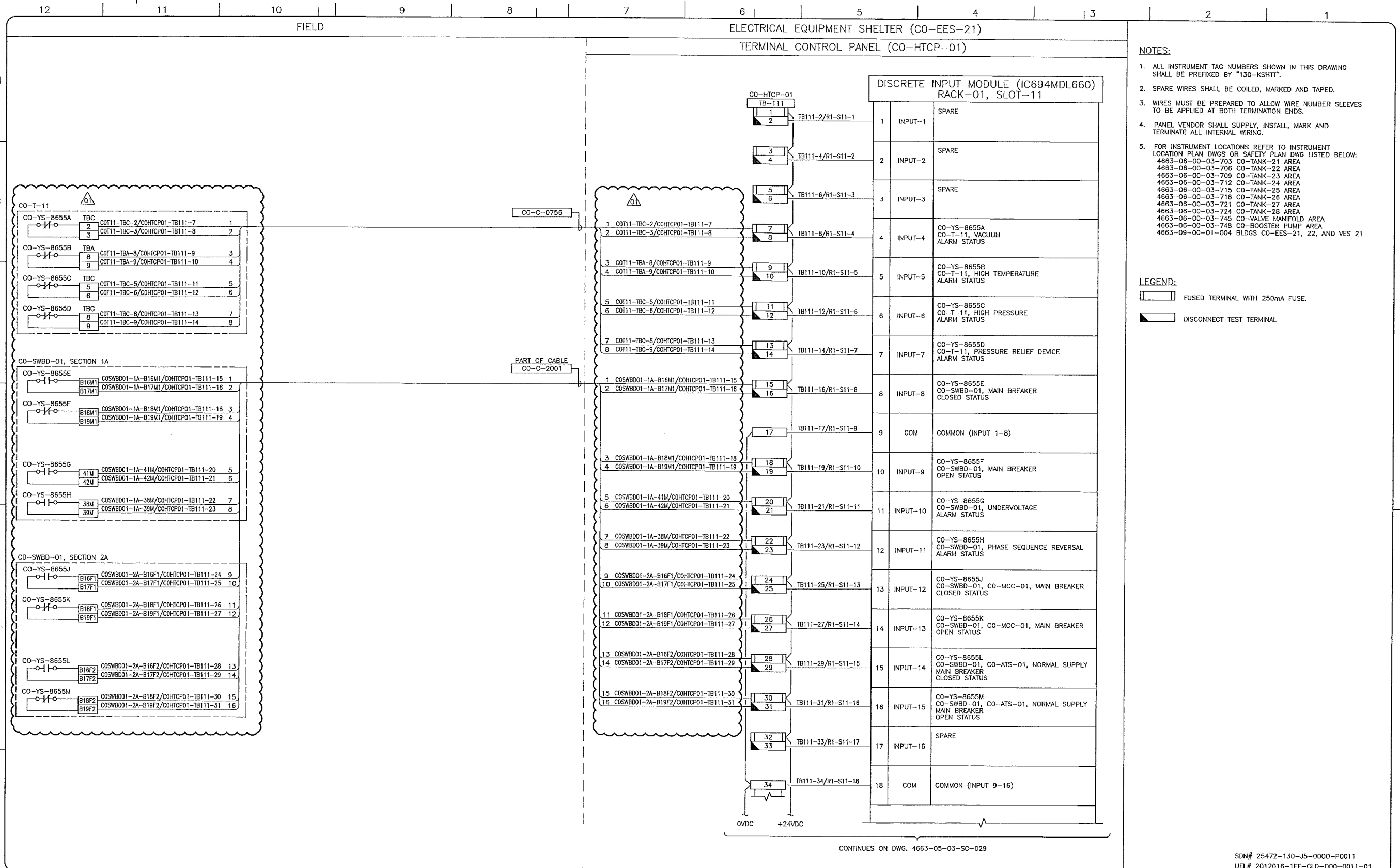
**TransCanada**

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 10  
DISCRETE INPUT  
I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-027 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-029

SDN# 25472-130-J5-0000-P0011  
 UEL# 2012016-1EF-CLD-000-0011-01

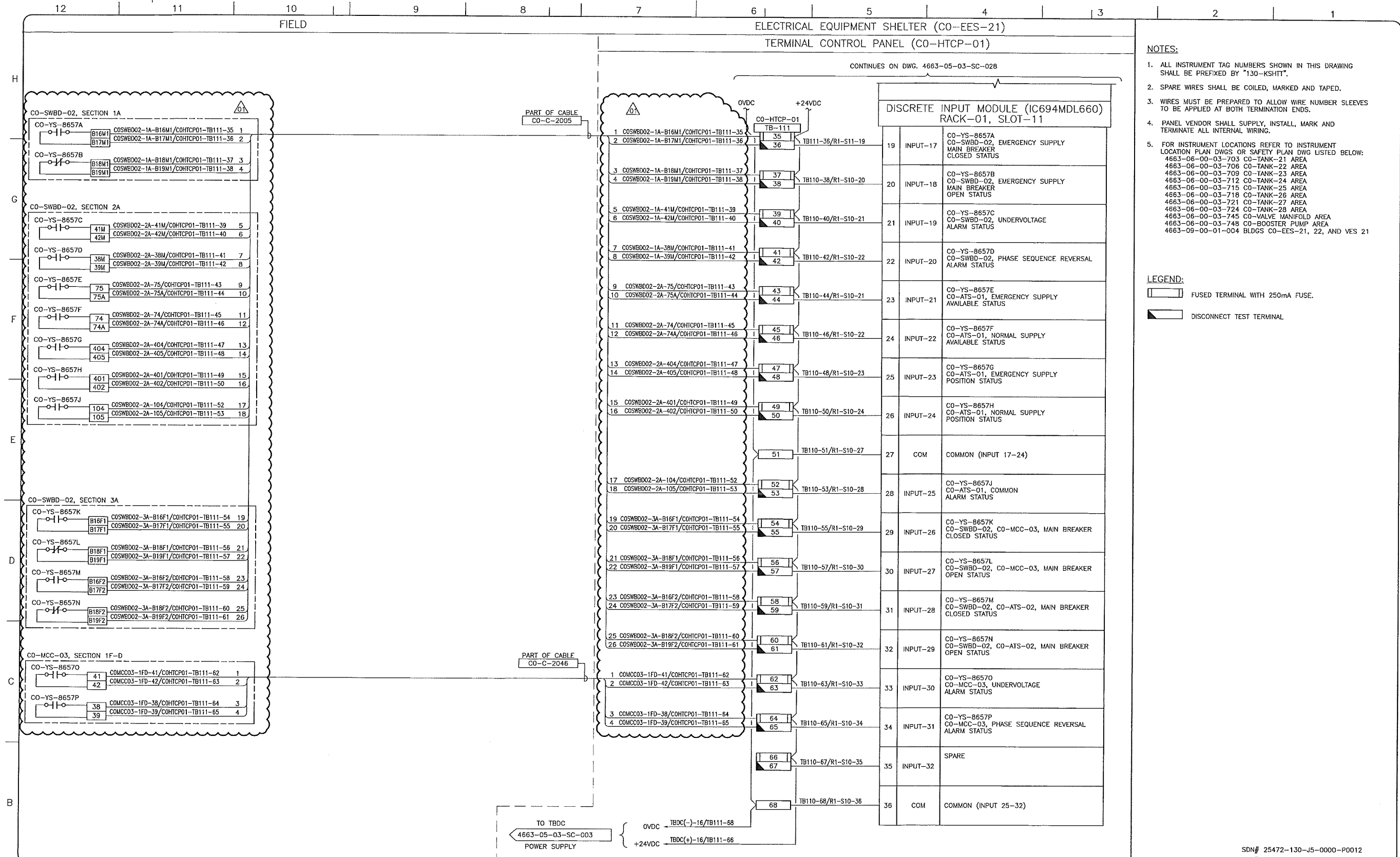
REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROFESSIONAL ENGINEER/RPT		PERMIT/ ENG. APPROVAL	
DATE	SIGNATURE	DATE	SIGNATURE
2014-MAR-12			

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: DISCIPLINE # 05  
 CO-HTCP-01, PLC-11/01 SLOT 11  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-028 REV 01



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-24 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
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 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	PLR	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-12

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0012  
 UEL# 2012016-1EF-CLD-000-0012-01

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*In business to deliver*

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 11  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

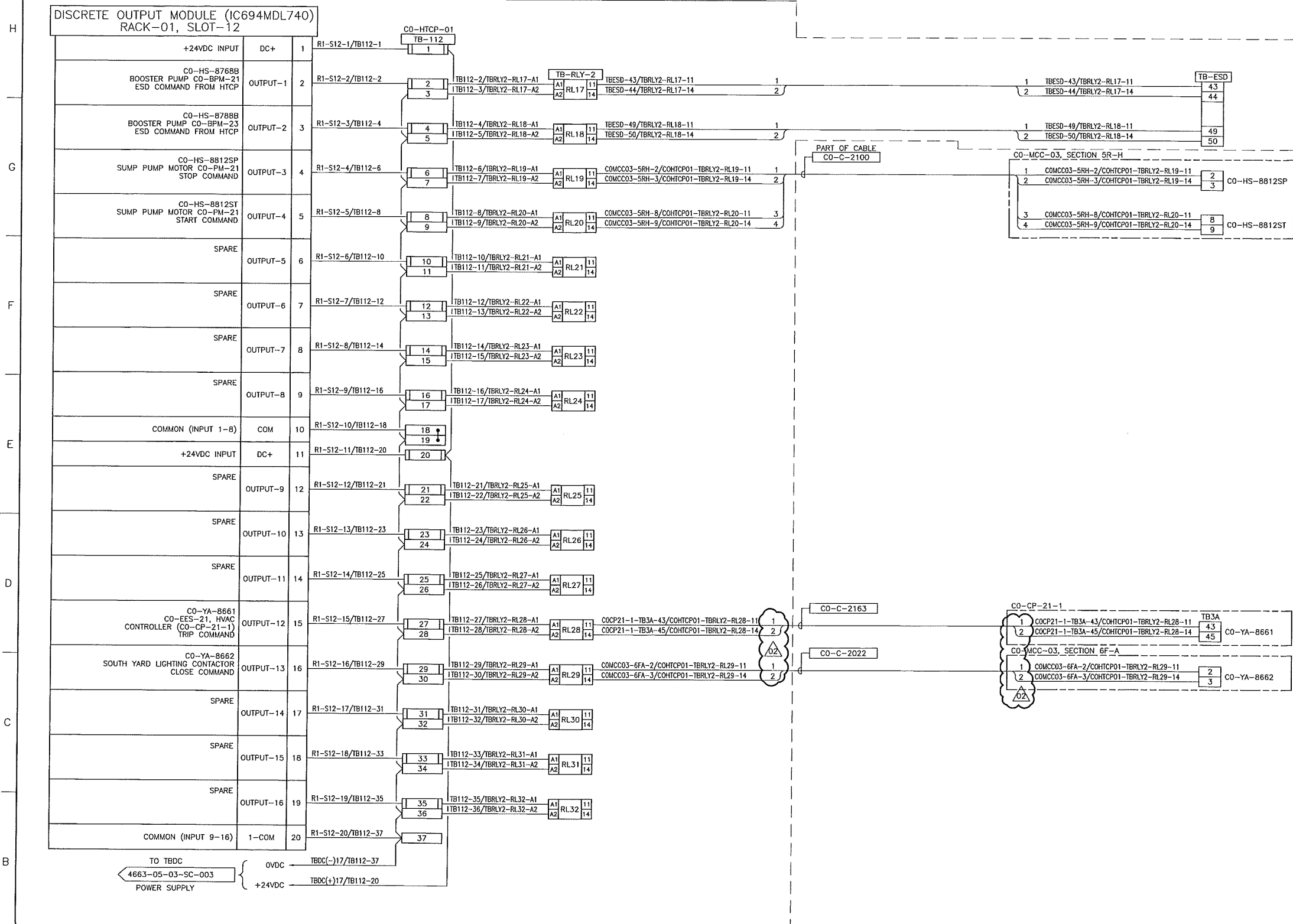
SCALE N.T.S. DRAWING No 4663-05-03-SC-029 REV 01

TC\_A1\_BR.DWG 594X841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)  
 TERMINAL CONTROL PANEL (CO-HTCP-01) FIELD



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
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 4663-06-00-03-706 CO-TANK-22 AREA  
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 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION			
REV No	DATE	DESCRIPTION	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	
02	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

APPROVAL							
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE	
2197104	BEM	PLR	SRL	JED	DCB	UPSIDE	
2197104	JAP	PLR	HHM	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014 APR 11

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0013  
 UEL# 2012016-1EF-CLD-000-0013-01

**TransCanada**  
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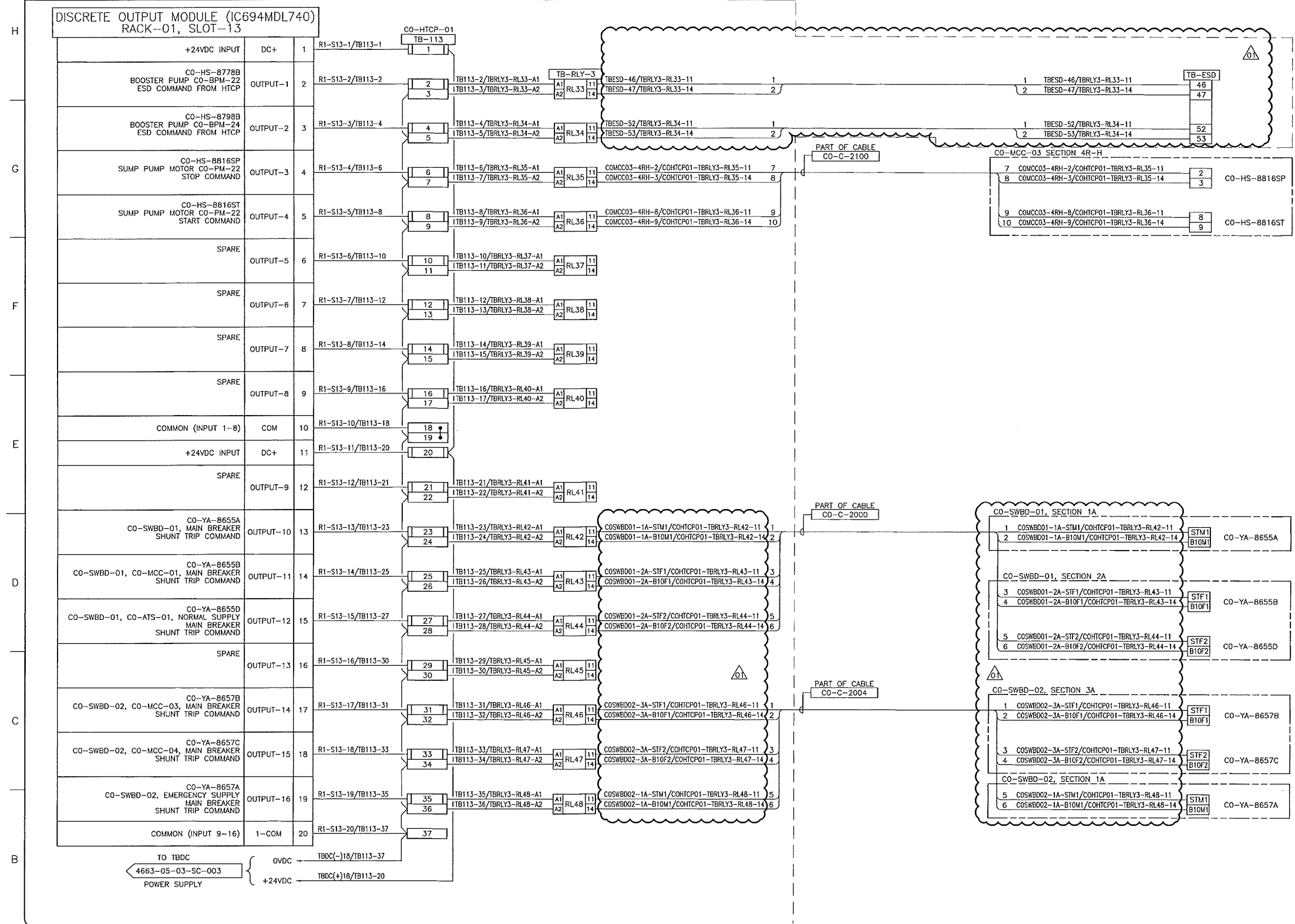
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 12  
 DISCRETE OUTPUT - STATIC  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-030 REV. 02

ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)  
 TERMINAL CONTROL PANEL (CO-HTCP-01) FIELD



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DNC	SRL	JED
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	PLR	SRL	JED

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-MAR-12

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0014  
 UEL# 2012016-1EF-CLD-000-0014-01

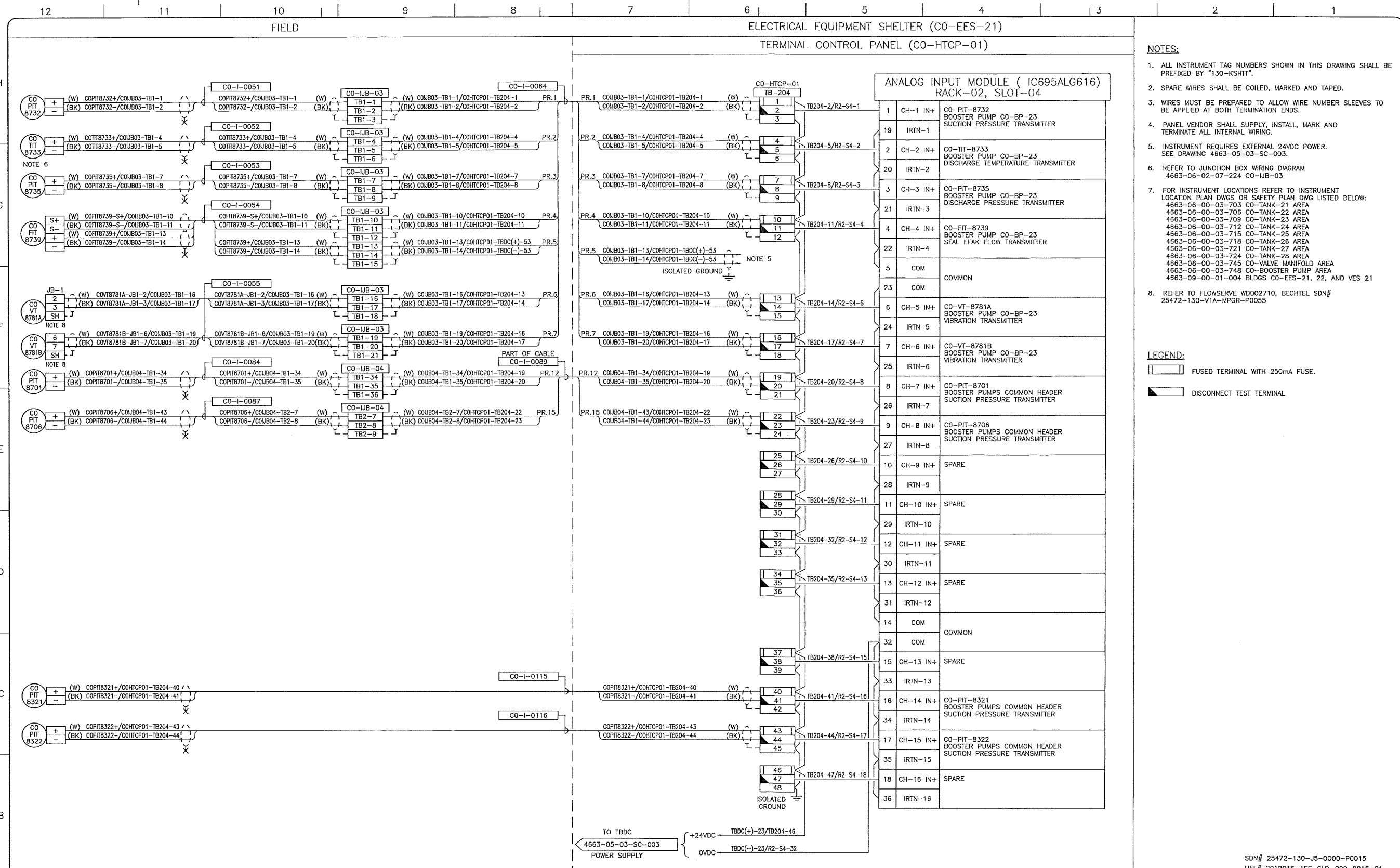
**TransCanada**  
 In business to deliver

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/01 SLOT 13  
 DISCRETE OUTPUT - STATIC  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-031 REV 01



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DRAWING 4663-05-03-SC-003.
  - REFER TO JUNCTION BOX WIRING DIAGRAM 4663-06-02-07-224 CO-IJB-03
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21
  - REFER TO FLOW/SERVE WID002710, BECHTEL SDN# 25472-130-V1A-MPGR-P0055

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0015  
 UEL# 2012016-1EF-CLD-000-0015-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT / ENG. APPROVAL:

DATE: 2014-FEB-27

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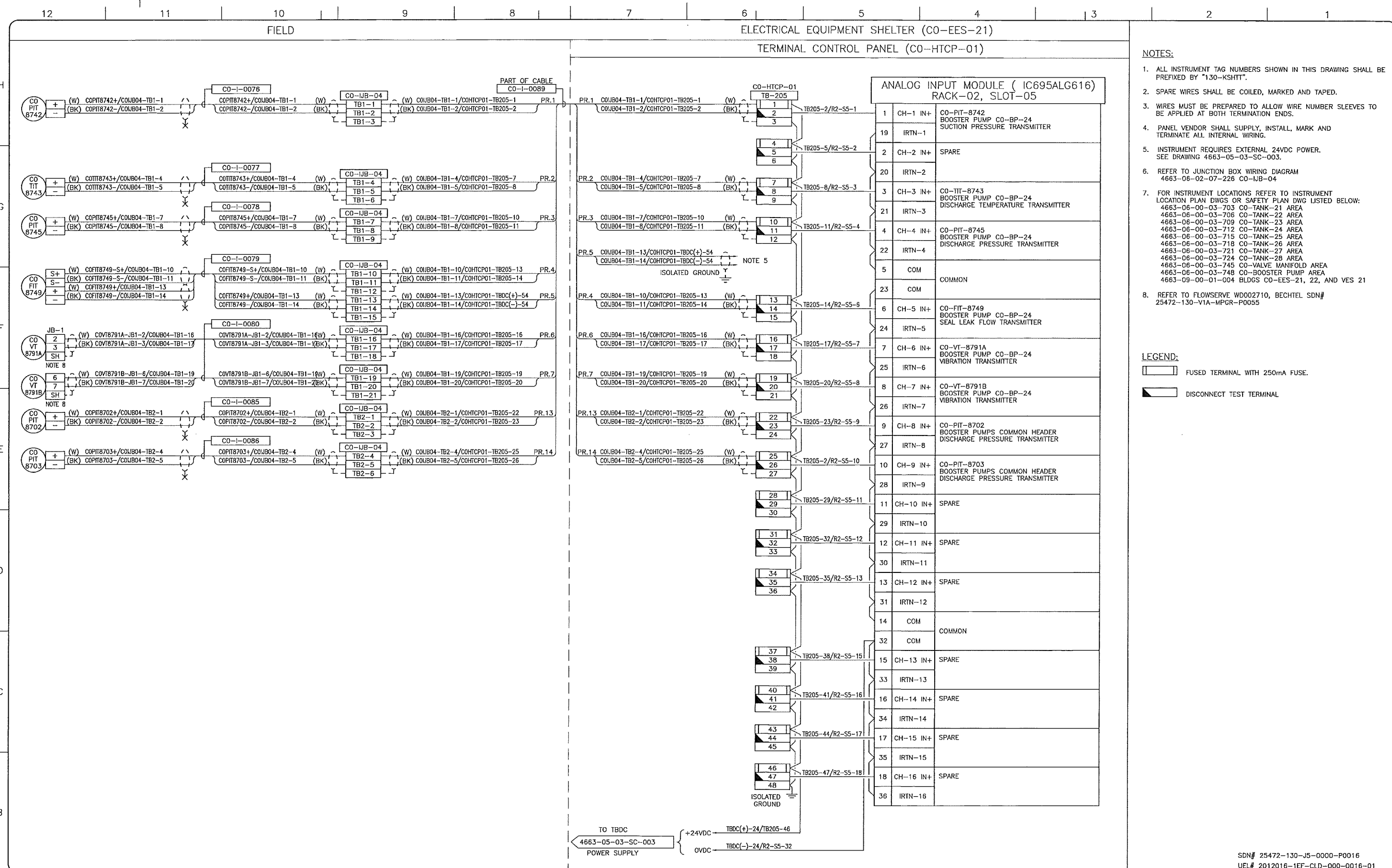
**upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

CHANGE: 05 DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 04  
 ANALOG INPUT - SINGLE ENDED  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-032 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DRAWING 4663-05-03-SC-003.
  - REFER TO JUNCTION BOX WIRING DIAGRAM 4663-06-02-07-226 CO-IJB-04
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21
  - REFER TO FLOWERVE W0002710, BECHTEL SDN# 25472-130-V1A-MPGR-P0055

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0016  
 UEL# 2012016-1EF-CLD-000-0016-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		APPROVAL							
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

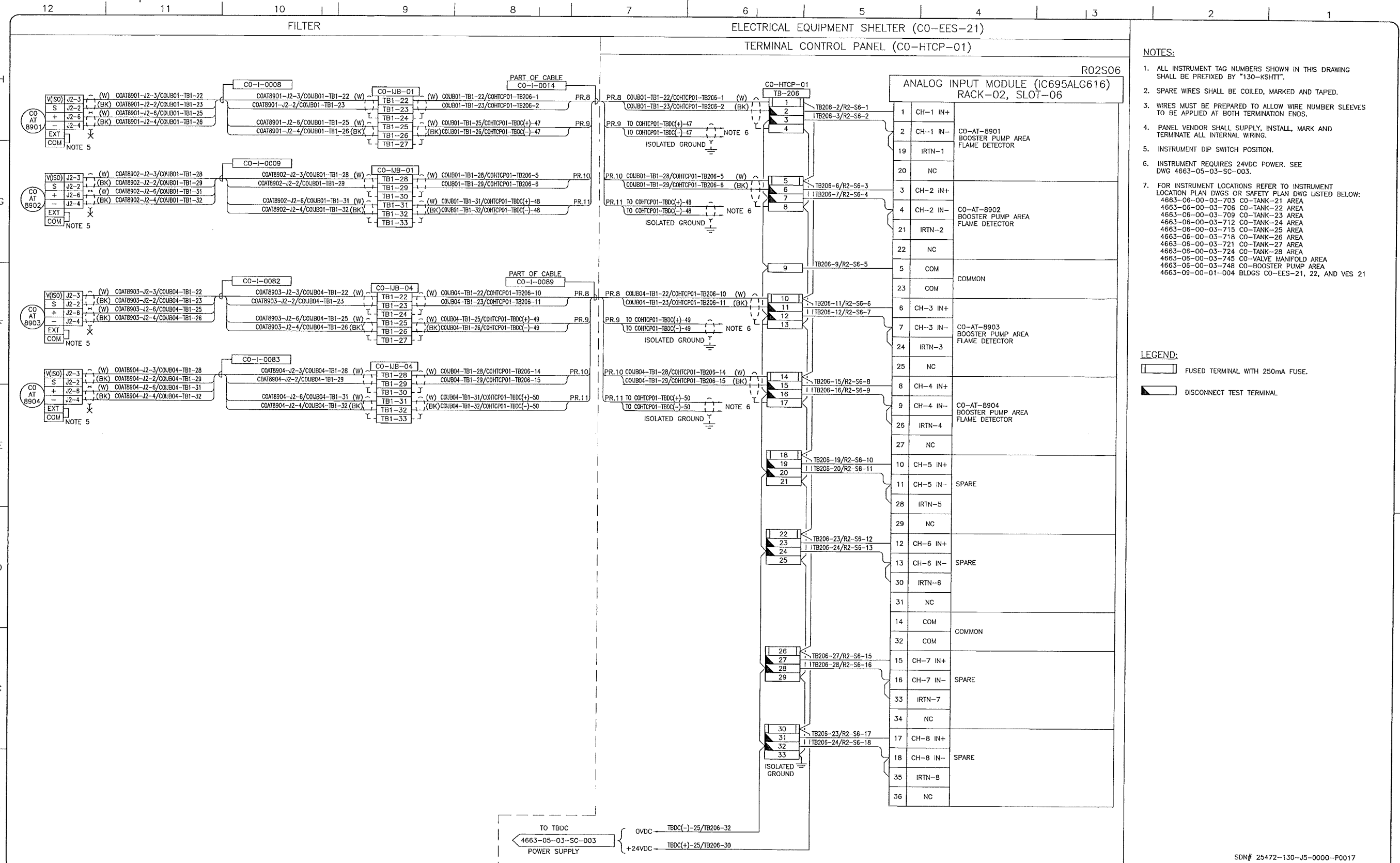
**TransCanada**  
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**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHARGE# DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 05  
 ANALOG INPUT - SINGLE ENDED  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-033 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES 24VDC POWER. SEE DWG 4663-05-03-SC-003.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ENG. APPROVAL: \_\_\_\_\_

PERMIT TO PRACTICE - UPS DE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0017  
 UEL# 2012016-1EF-CLD-000-0017-01

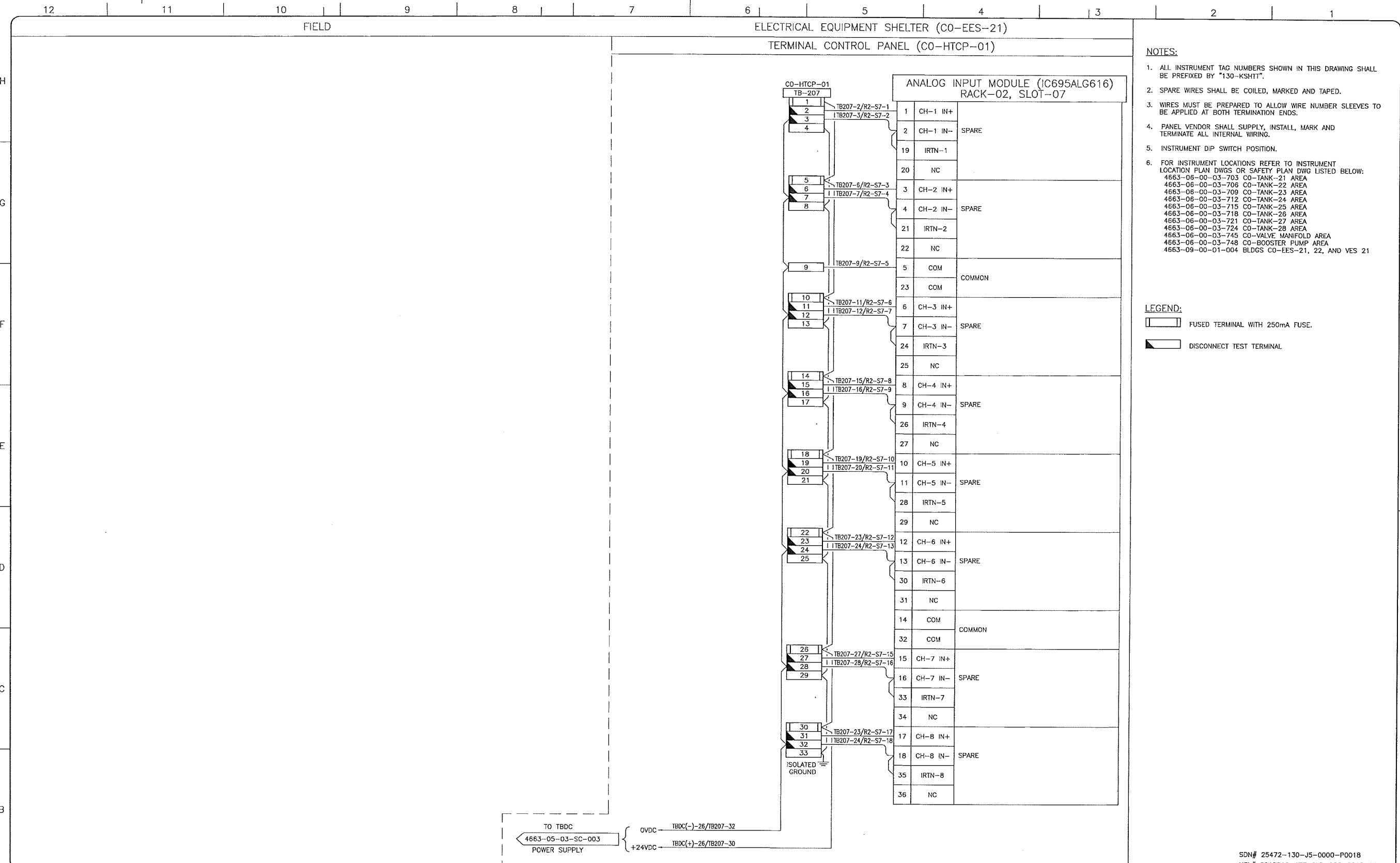
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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHANGE# \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 06  
 ANALOG INPUT - DIFFERENTIAL I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-034 REV 00



- NOTES:**
1. ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  2. SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  3. WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  4. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  5. INSTRUMENT DIP SWITCH POSITION.
  6. FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

**LEGEND:**

FUSED TERMINAL WITH 250mA FUSE.

DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0018  
 UEL# 2012016-1EF-CLD-000-0018-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

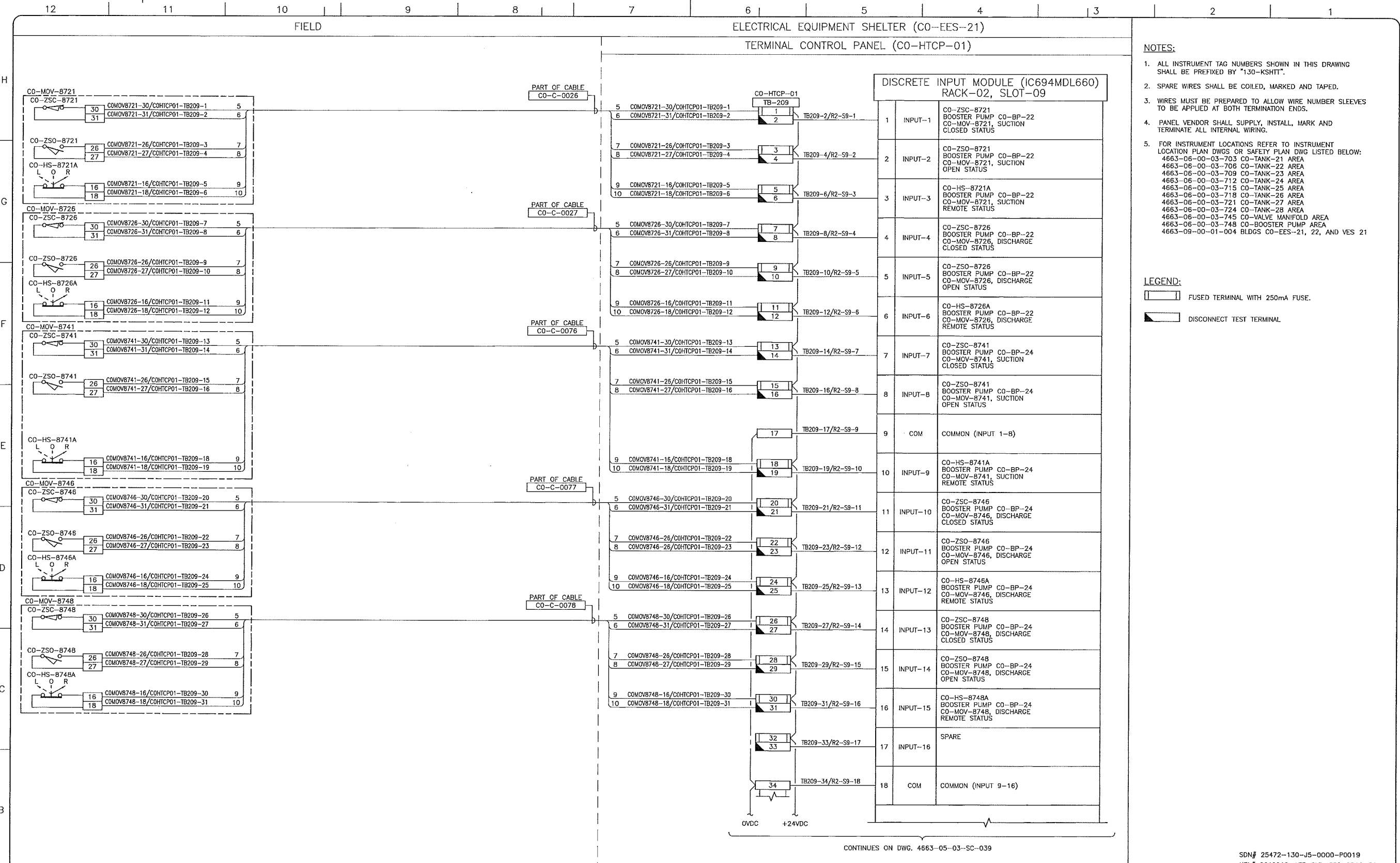
REV. No. DATE PERMIT NUMBER:

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 07  
 ANALOG INPUT - DIFFERENTIAL  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-035 REV 00



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

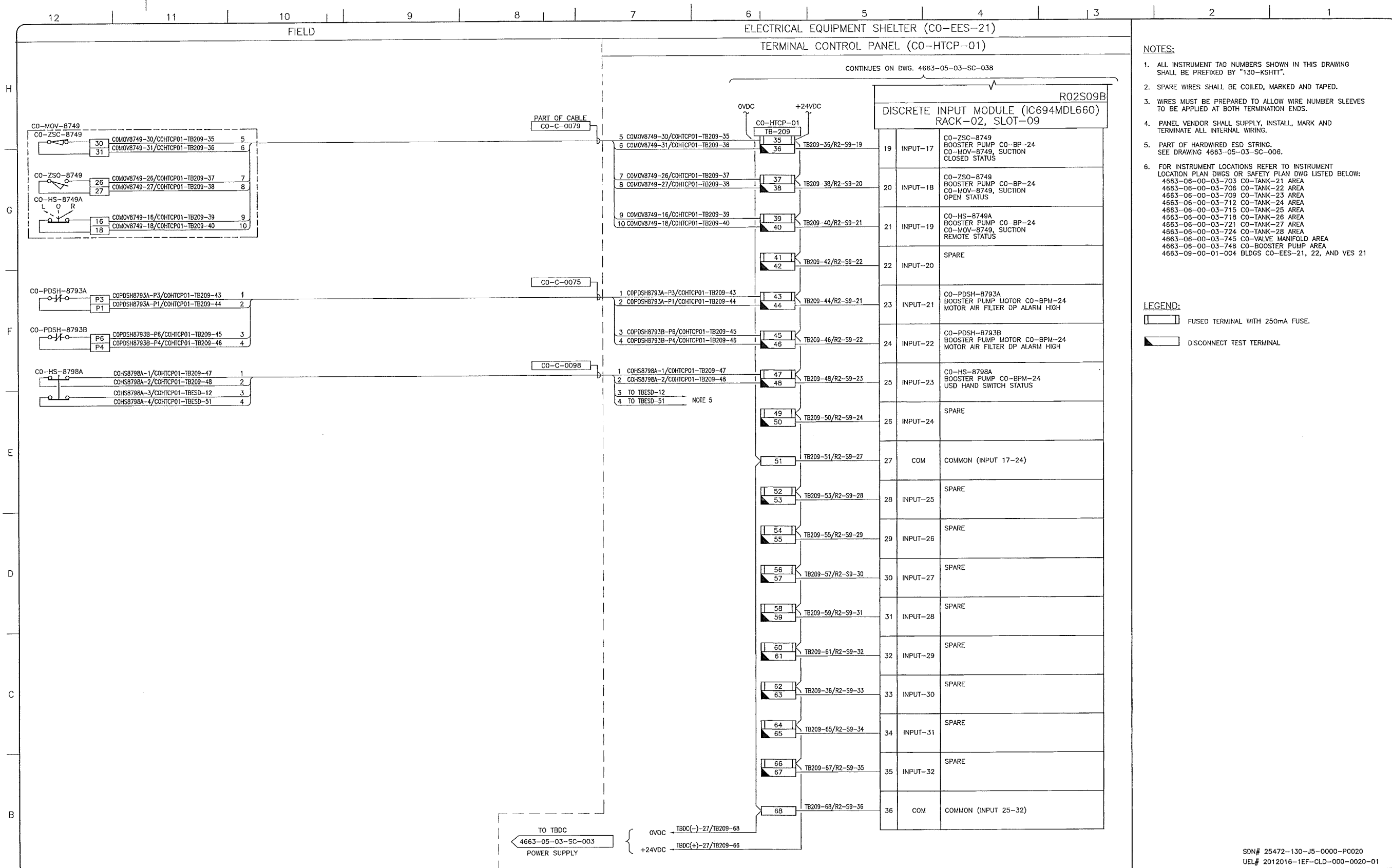
DATE: 2014-FEB-27

SDN# 25472-130-J5-0000-P0019  
UEL# 2012016-1EF-CLD-000-0019-01

KEYSTONE HARDISTY TANK TERMINAL

CO-HTCP-01, PLC-11/02 SLOT 09  
DISCRETE INPUT  
I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-038 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-006.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0020  
 UEL# 2012016-1EF-CLD-000-0020-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE	

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

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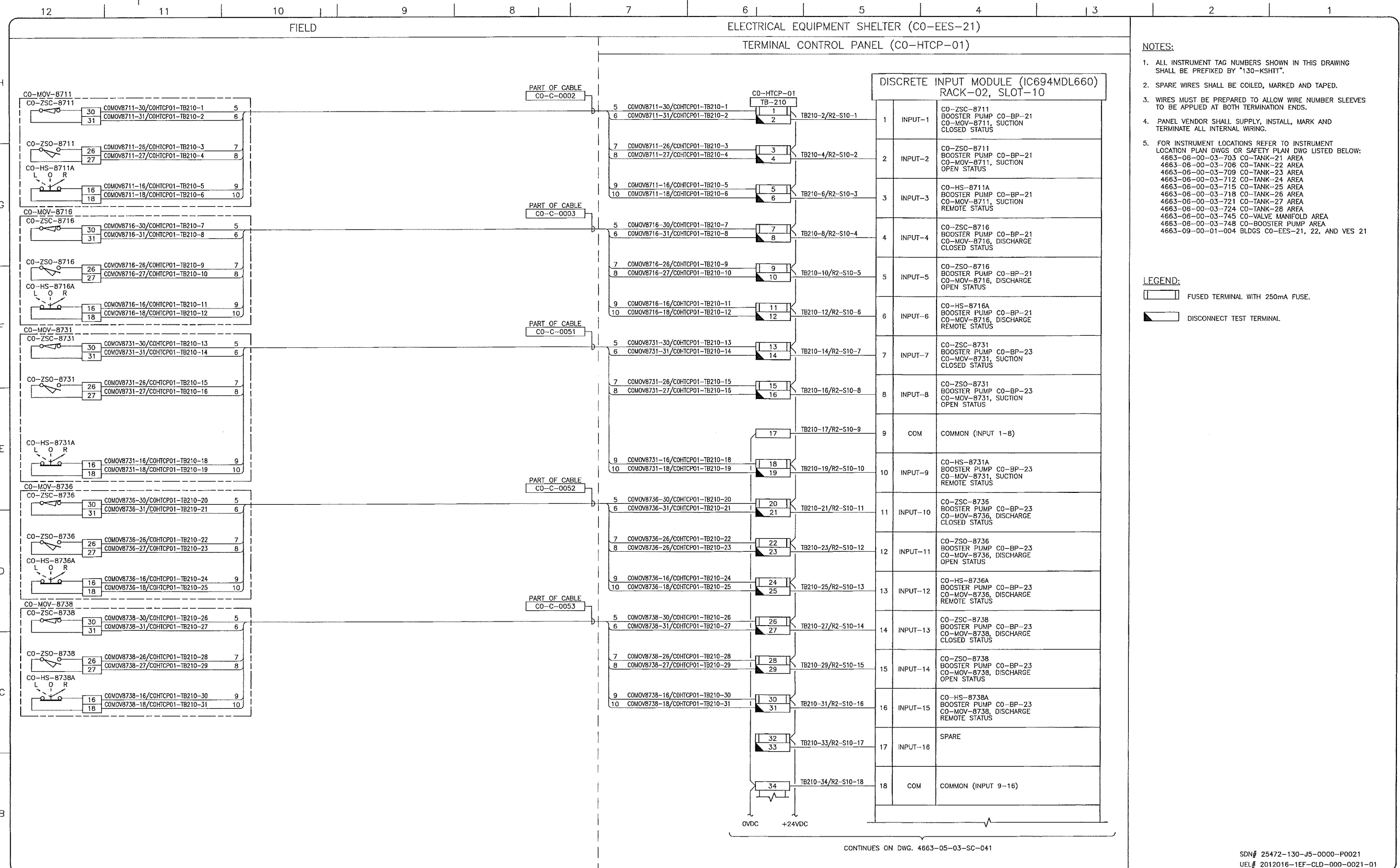
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 09  
DISCRETE INPUT  
I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-039 REV 00





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

**REFERENCE DRAWINGS**

DRAWING No	TITLE

**REVISION**

REV No	DATE	DESCRIPTION
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0021  
 UEL# 2012016-1EF-CLD-000-0021-01

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 Engineering Ltd.

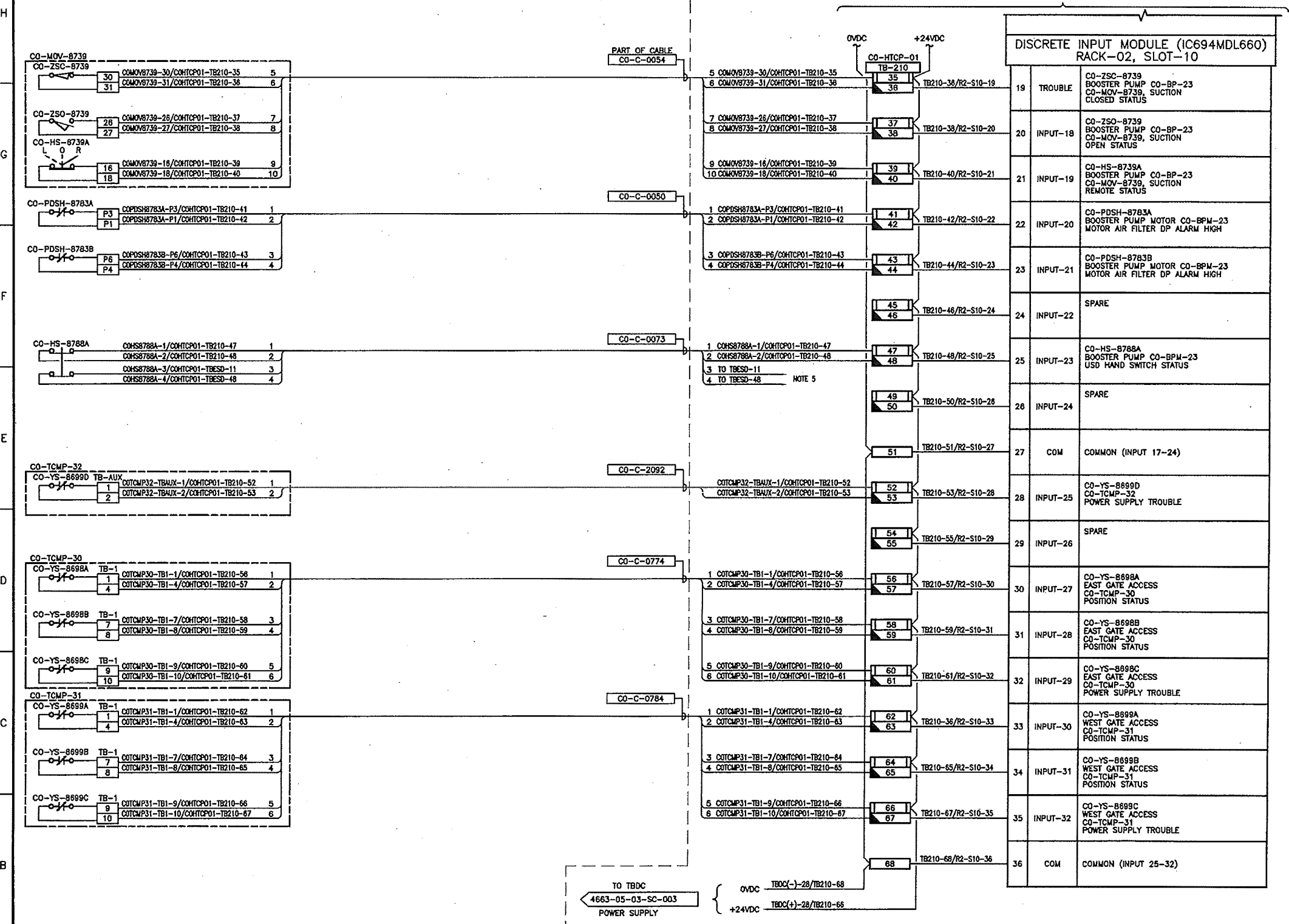
KEYSTONE HARDISTY TANK TERMINAL  
 CHANAGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 10  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-040 REV 00

FIELD ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)  
 TERMINAL CONTROL PANEL (CO-HTCP-01)

CONTINUES ON DWG. 4663-05-03-SC-040



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - PART OF HARDWIRED ESD STRING. SEE DRAWING 4663-05-03-SC-006.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-708 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-727 CO-TANK-29 AREA  
 4663-06-00-03-730 CO-TANK-30 AREA  
 4663-06-00-03-733 CO-TANK-31 AREA  
 4663-06-00-03-736 CO-TANK-32 AREA  
 4663-06-00-03-739 CO-TANK-33 AREA  
 4663-06-00-03-742 CO-TANK-34 AREA  
 4663-06-00-03-745 CO-TANK-35 AREA  
 4663-06-00-03-748 CO-TANK-36 AREA  
 4663-06-00-03-751 CO-TANK-37 AREA  
 4663-06-00-03-754 CO-TANK-38 AREA  
 4663-06-00-03-757 CO-TANK-39 AREA  
 4663-06-00-03-760 CO-TANK-40 AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)
1A	2014-04-17	ISSUED FOR FABRICATION (UEL PROJ. #2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DAC	SRL	JED	DCB	UPSIDE
2197104	BEM	NE	MAB	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT  
 PERMIT/ ENO. APPROVAL  
 DATE  
 PERMIT TO PRACTICE  
 PERMIT NUMBER: P 5508  
 THE ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOLGISTS AND GEOLOGICAL ENGINEERS OF ALBERTA

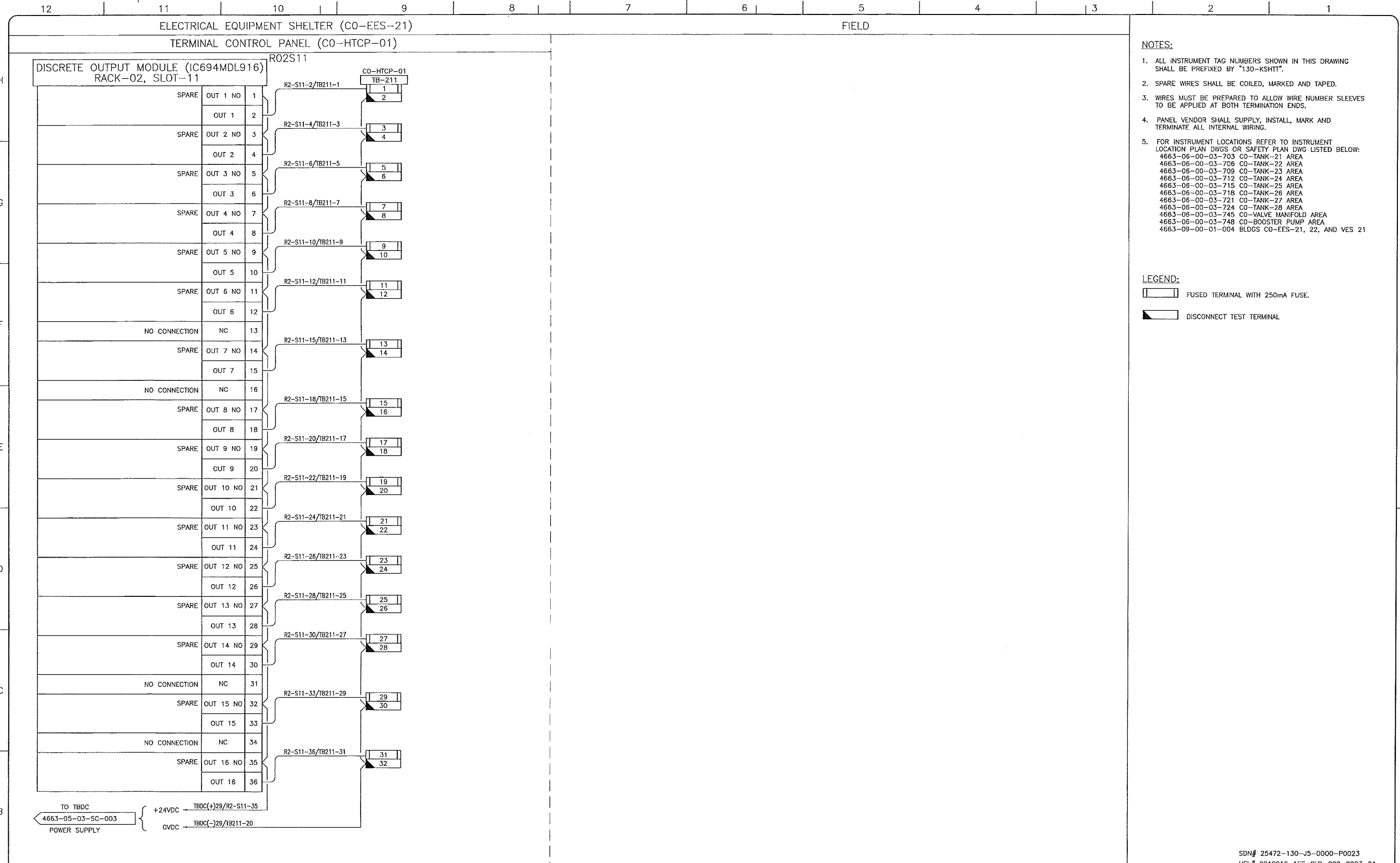
SDN# 25472-130-J5-0000-P0022  
 UEL# 2012016-1EF-CLD-000-0022-01

**TransCanada**  
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**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHANGE# DISCIPLINE / DS  
 CO-HTCP-01, PLC-11/02 SLOT 10  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING NO 4663-05-03-SC-041 REV 1A



REFERENCE DRAWINGS	
DRAWING No	TITLE
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-	-
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-	-
-	-

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0023  
 UEL# 2012016-1EF-CLD-000-0023-01

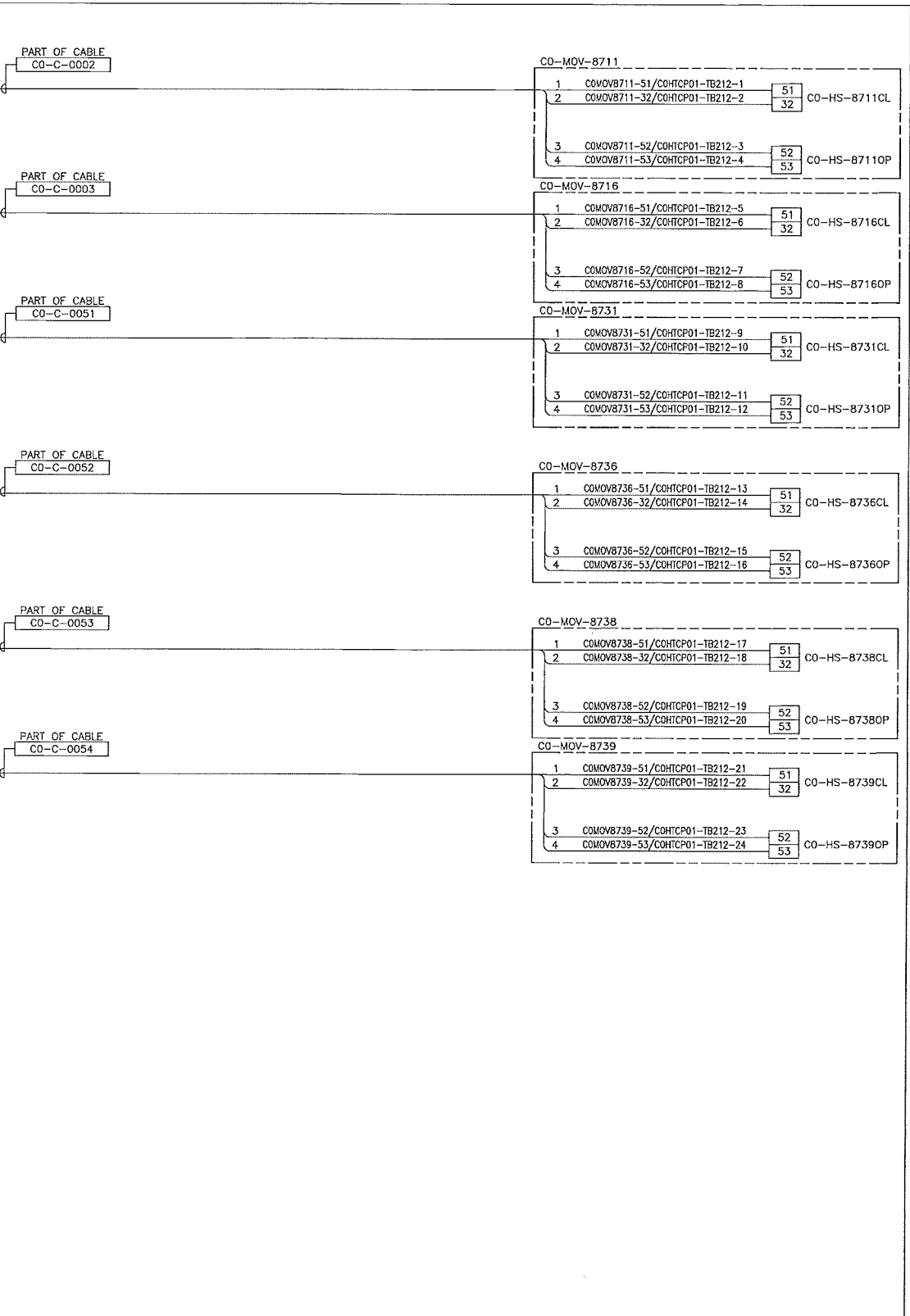
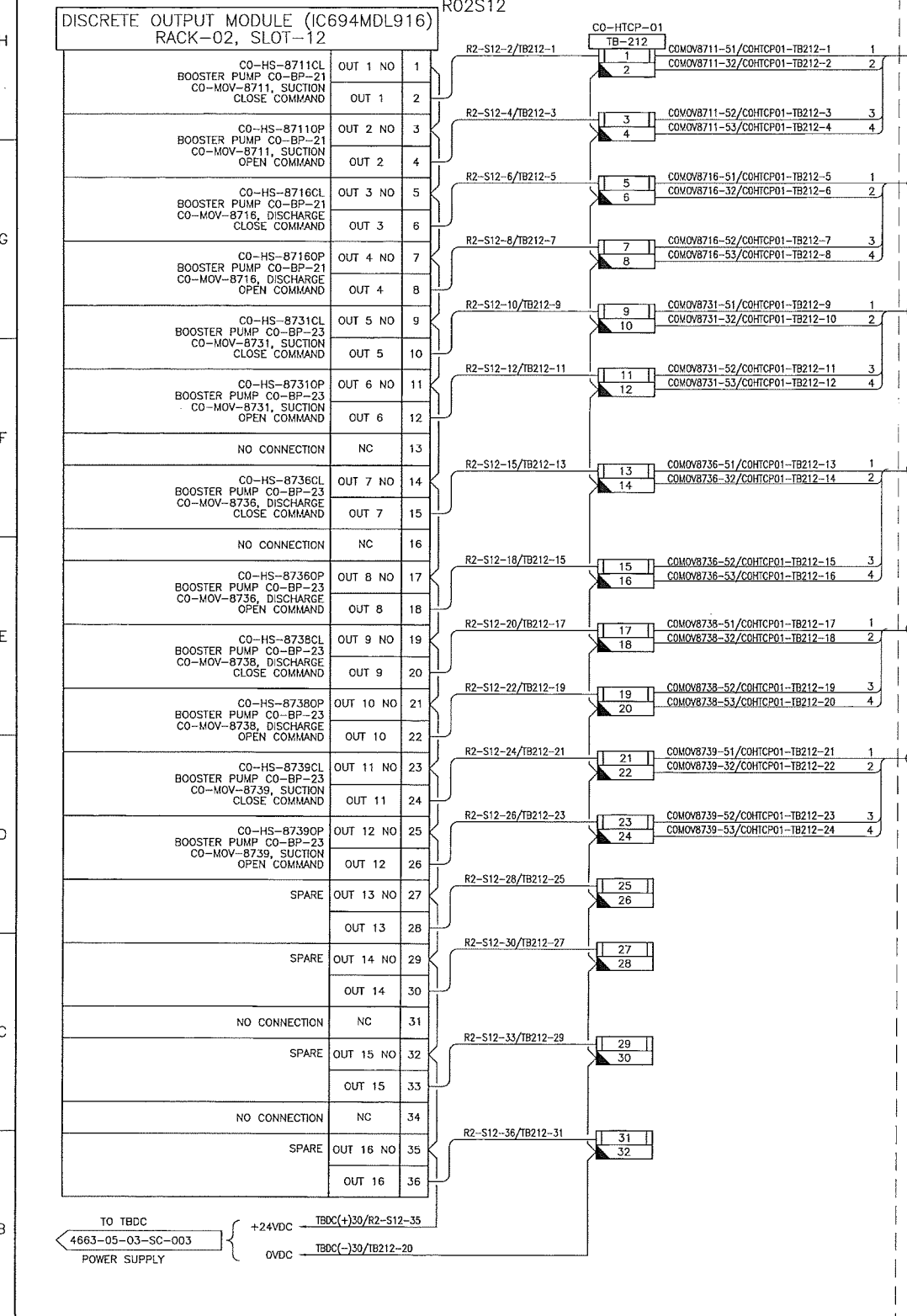
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 11  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-042 REV 00

TERMINAL CONTROL PANEL (CO-HTCP-01)



**NOTES:**

- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
- SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
- WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
- PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
- FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

**LEGEND:**

FUSED TERMINAL WITH 250mA FUSE.

DISCONNECT TEST TERMINAL.

**REFERENCE DRAWINGS**

DRAWING NO	TITLE

**REVISION**

REV NO	DATE	DESCRIPTION
00	2014-02-27	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

SDN# 25472-130-JS-0000-P0024  
 UEL# 2012016-1EF-CLD-000-0024-01

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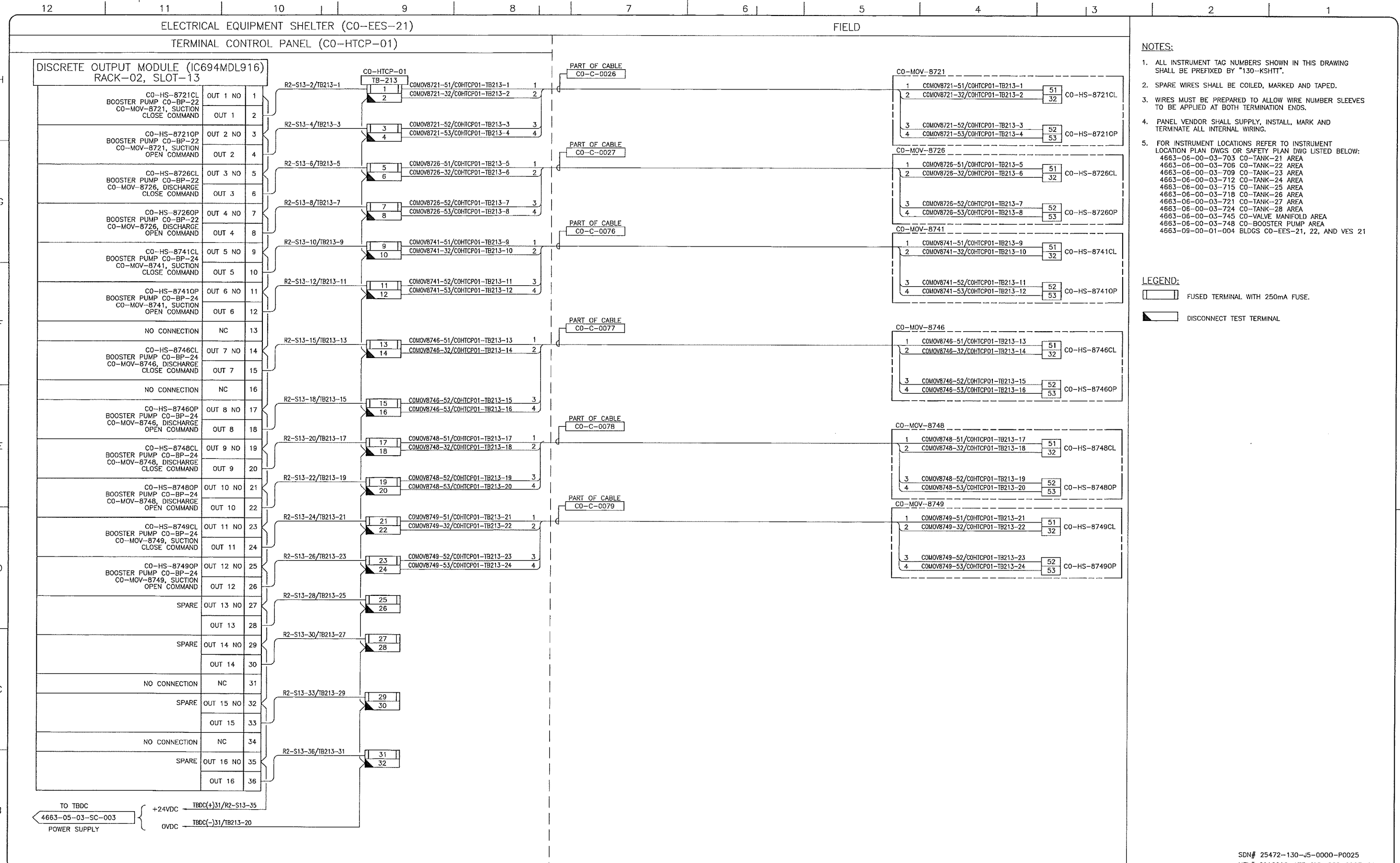
**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 12  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-043 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
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 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

**REFERENCE DRAWINGS**

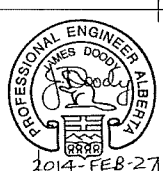
DRAWING No	TITLE

**REVISION**

REV No	DATE	DESCRIPTION
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**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:  PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508

PERMIT/ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-044 REV: 00

SDN# 25472-130-J5-0000-P0025  
UEL# 2012016-1EF-CLD-000-0025-01

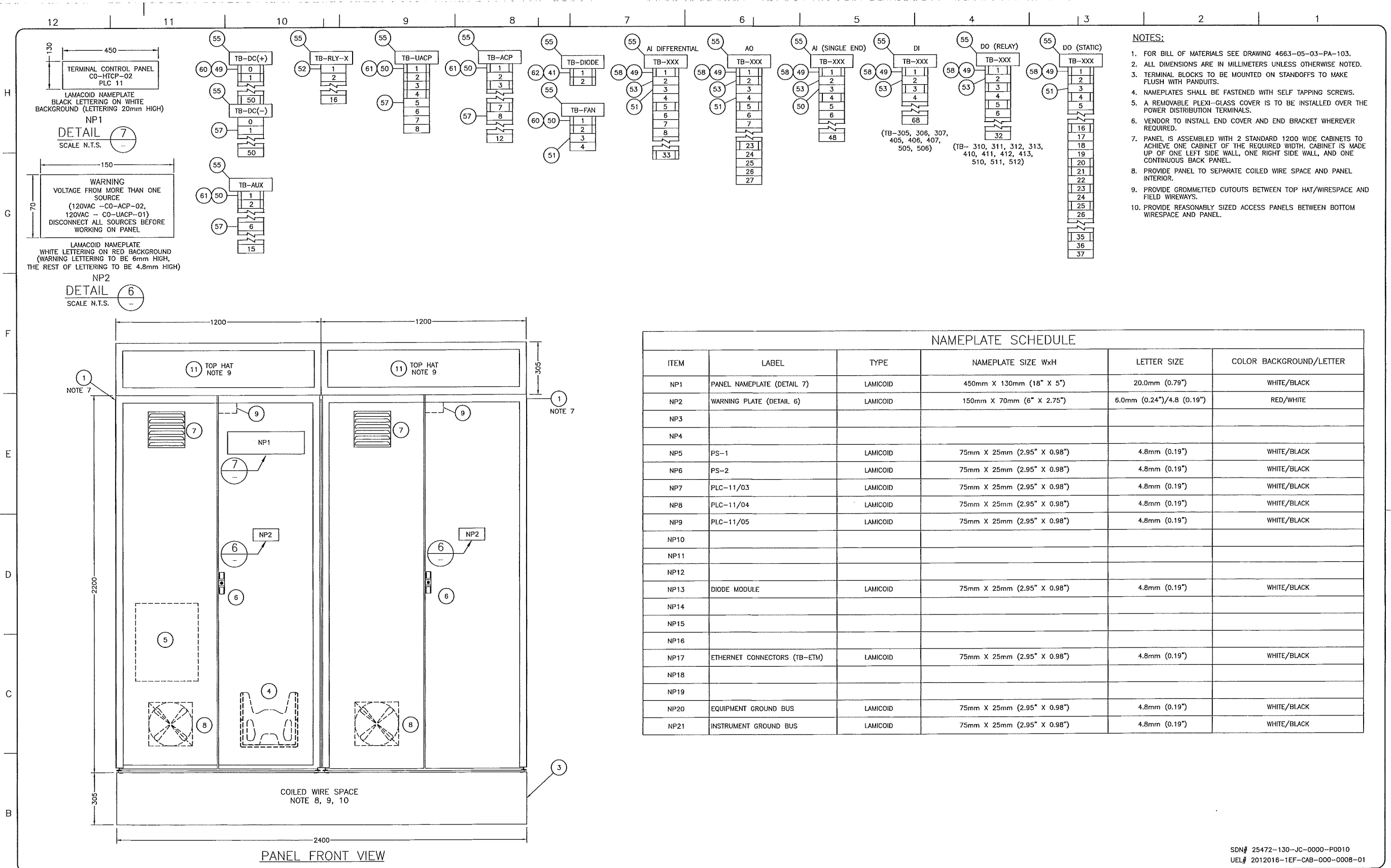
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**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
FIA # 4663 CHANAGE: \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-01, PLC-11/02 SLOT 13  
DISCRETE OUTPUT - RELAY  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-044 REV: 00



- NOTES:**
- FOR BILL OF MATERIALS SEE DRAWING 4663-05-03-PA-103.
  - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  - TERMINAL BLOCKS TO BE MOUNTED ON STANDOFFS TO MAKE FLUSH WITH PANDUITS.
  - NAMEPLATES SHALL BE FASTENED WITH SELF TAPPING SCREWS.
  - A REMOVABLE PLEXI-GLASS COVER IS TO BE INSTALLED OVER THE POWER DISTRIBUTION TERMINALS.
  - VENDOR TO INSTALL END COVER AND END BRACKET WHEREVER REQUIRED.
  - PANEL IS ASSEMBLED WITH 2 STANDARD 1200 WIDE CABINETS TO ACHIEVE ONE CABINET OF THE REQUIRED WIDTH. CABINET IS MADE UP OF ONE LEFT SIDE WALL, ONE RIGHT SIDE WALL, AND ONE CONTINUOUS BACK PANEL.
  - PROVIDE PANEL TO SEPARATE COILED WIRE SPACE AND PANEL INTERIOR.
  - PROVIDE GROMMETTED CUTOUTS BETWEEN TOP HAT/WIRESPACE AND FIELD WIREWAYS.
  - PROVIDE REASONABLY SIZED ACCESS PANELS BETWEEN BOTTOM WIRESPACE AND PANEL.

NAMEPLATE SCHEDULE					
ITEM	LABEL	TYPE	NAMEPLATE SIZE WxH	LETTER SIZE	COLOR BACKGROUND/LETTER
NP1	PANEL NAMEPLATE (DETAIL 7)	LAMICOID	450mm X 130mm (18" X 5")	20.0mm (0.79")	WHITE/BLACK
NP2	WARNING PLATE (DETAIL 6)	LAMICOID	150mm X 70mm (6" X 2.75")	6.0mm (0.24")/4.8 (0.19")	RED/WHITE
NP3					
NP4					
NP5	PS-1	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP6	PS-2	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP7	PLC-11/03	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP8	PLC-11/04	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP9	PLC-11/05	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP10					
NP11					
NP12					
NP13	DIODE MODULE	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP14					
NP15					
NP16					
NP17	ETHERNET CONNECTORS (TB-ETM)	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP18					
NP19					
NP20	EQUIPMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP21	INSTRUMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
				SKC	DAL	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2013-OCT-03

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PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-JC-0000-P0010  
UEL# 2012016-1EF-CAB-000-0008-01

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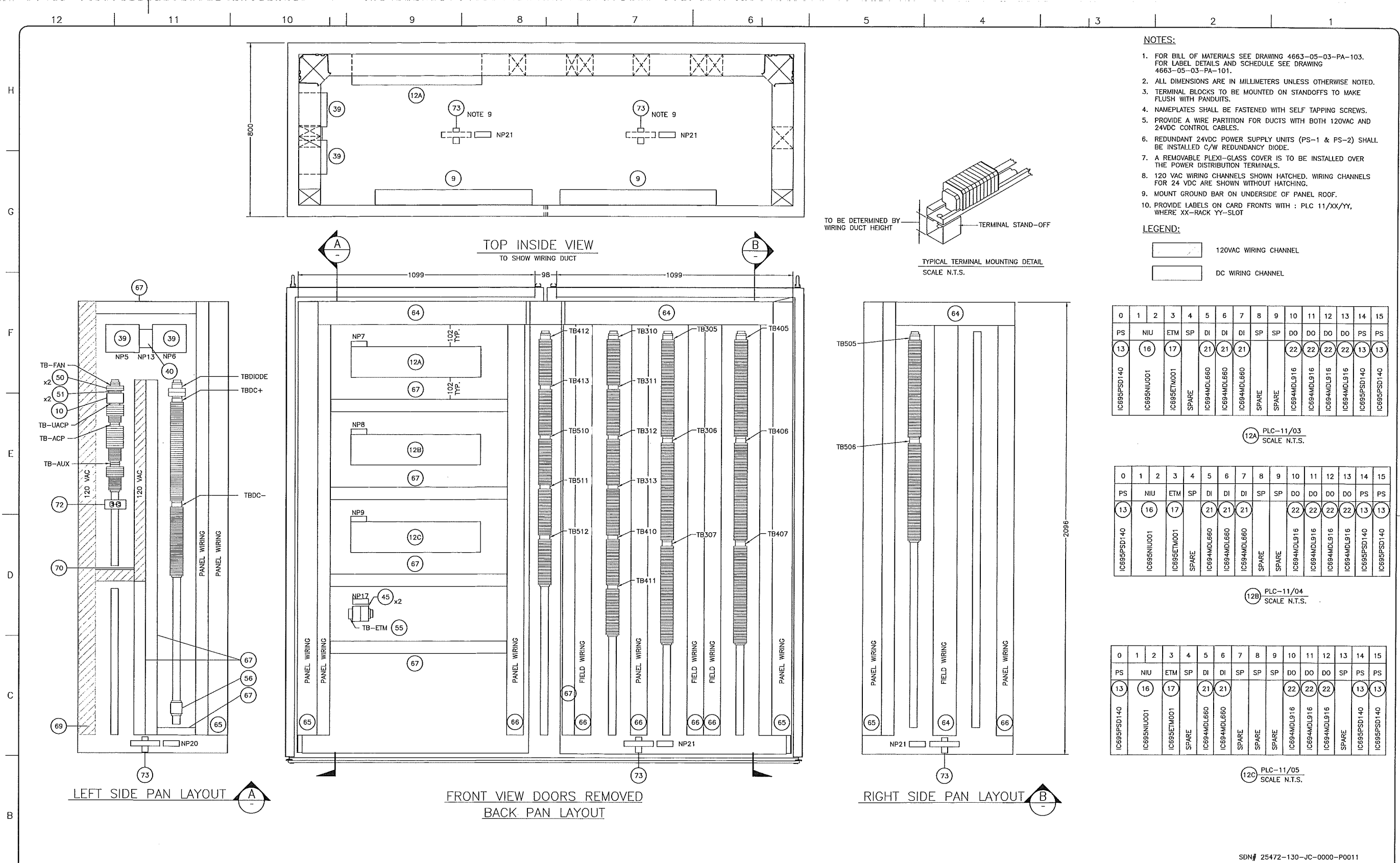
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 05

KHIT CONTROL PANEL  
(CO-HTCP-02), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 1 OF 2

SCALE N.T.S. DRAWING No 4663-05-03-PA-101 REV 00



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2013-OCT-03

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-JC-0000-P0011  
UEL# 2012016-1EF-CAB-000-0009-01

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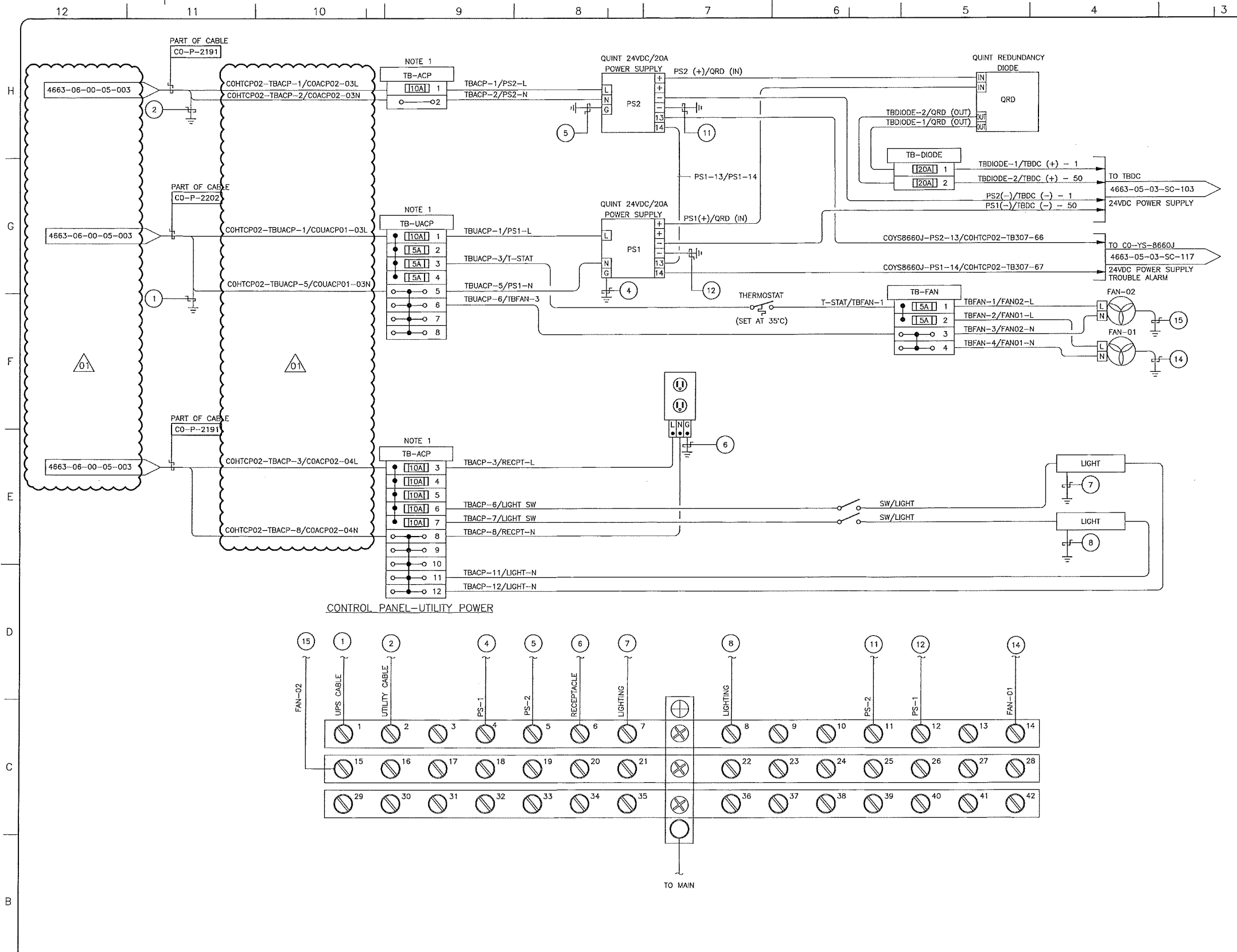
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

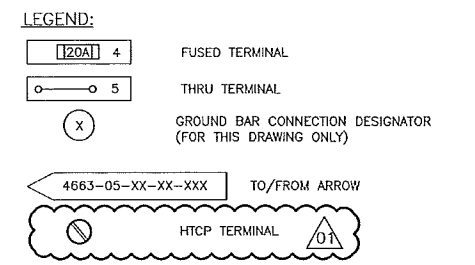
FIA # 4663 CHANNEL: DISCIPLINE # 05

KHTT CONTROL PANEL  
(CO-HTCP-02), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 2 OF 2

SCALE 1 : 8 DRAWING No 4663-05-03-PA-102 REV 00

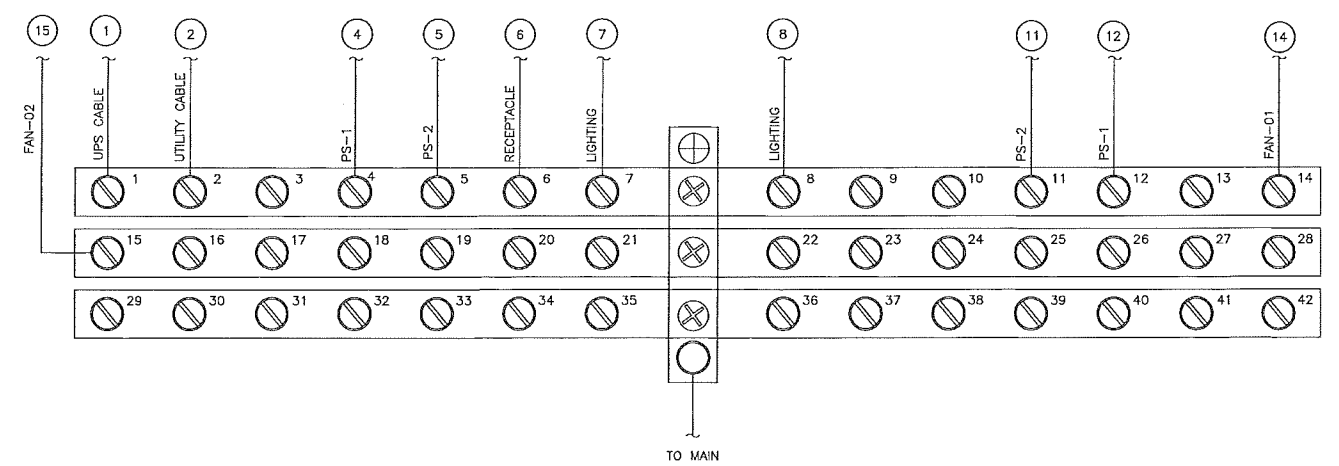


- NOTES:**
1. TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE AWG #12.
  2. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.



- ABBREVIATIONS:**
- PS - POWER SUPPLY
  - ACP - AC POWER
  - UACP - UPS AC POWER
  - YS - EVENT STATUS

**CONTROL PANEL-UTILITY POWER**



SDN# 25472-130-JC-0000-P0015  
UEL# 2012016-1EF-EWD-000-0012-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
01	2014-02-26	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: *[Signature]* DATE: 2014-FEB-27

PERMIT/ ENG. APPROVAL: *[Signature]* DATE: 2014-FEB-27

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UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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Engineering Ltd.

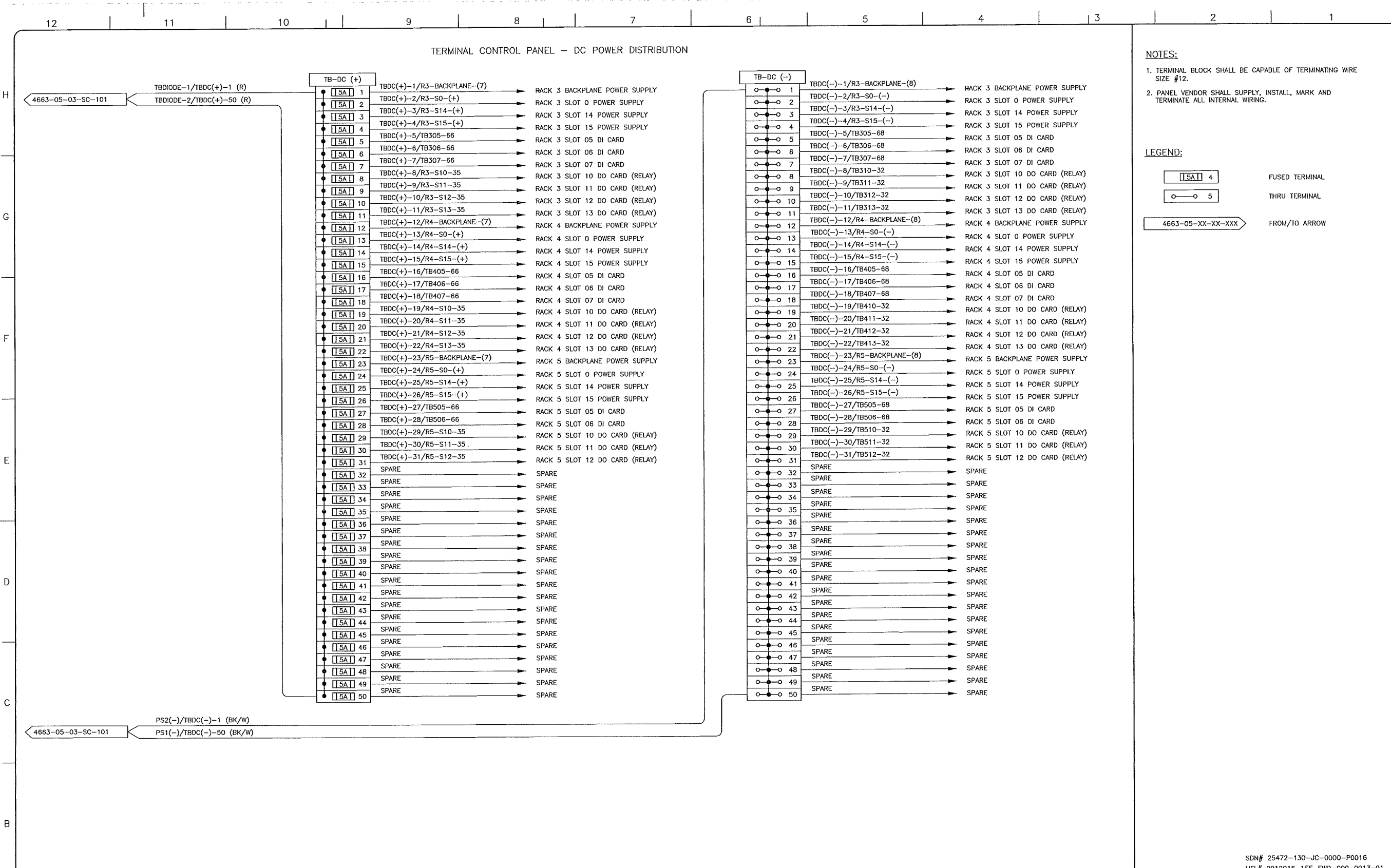
KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

KHT CONTROL PANEL  
CO-HTCP-02 (CO-EES-21)  
AC POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-101 REV 01





**NOTES:**

1. TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE #12.
2. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.

**LEGEND:**

- 1.5A 4 FUSED TERMINAL
- 5 THRU TERMINAL
- 4663-05-XX-XX-XXX FROM/TO ARROW

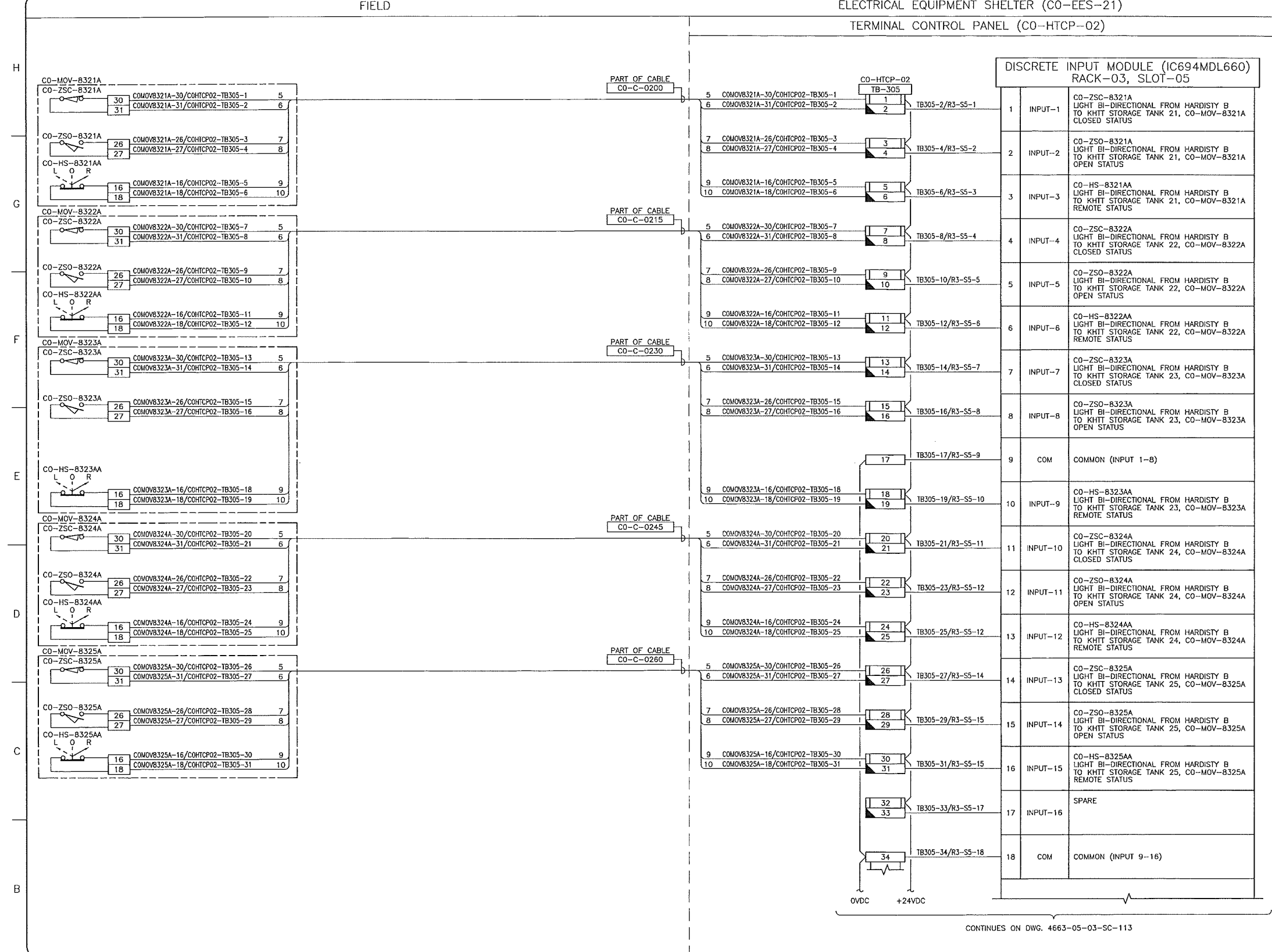
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REFERENCE DRAWINGS	
DRAWING No	TITLE

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REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
	DATE
<b>PERMIT TO PRACTICE</b> UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>	
REV. NO.	DATE
	PERMIT NUMBER:

KEYSTONE HARDISTY TANK TERMINAL			
FIA # 4663	CHARGE:	DISCIPLINE # 05	
KHTT CONTROL PANEL CO-HTCP-02 (CO-EES-21) DC POWER DISTRIBUTION WIRING DIAGRAM			
SCALE N.T.S.	DRAWING No 4663-05-03-SC-103	REV	00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-113

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

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 PERMIT NUMBER: P 5508  
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2014-FEB-27

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SDN# 25472-130-J5-0000-P0026  
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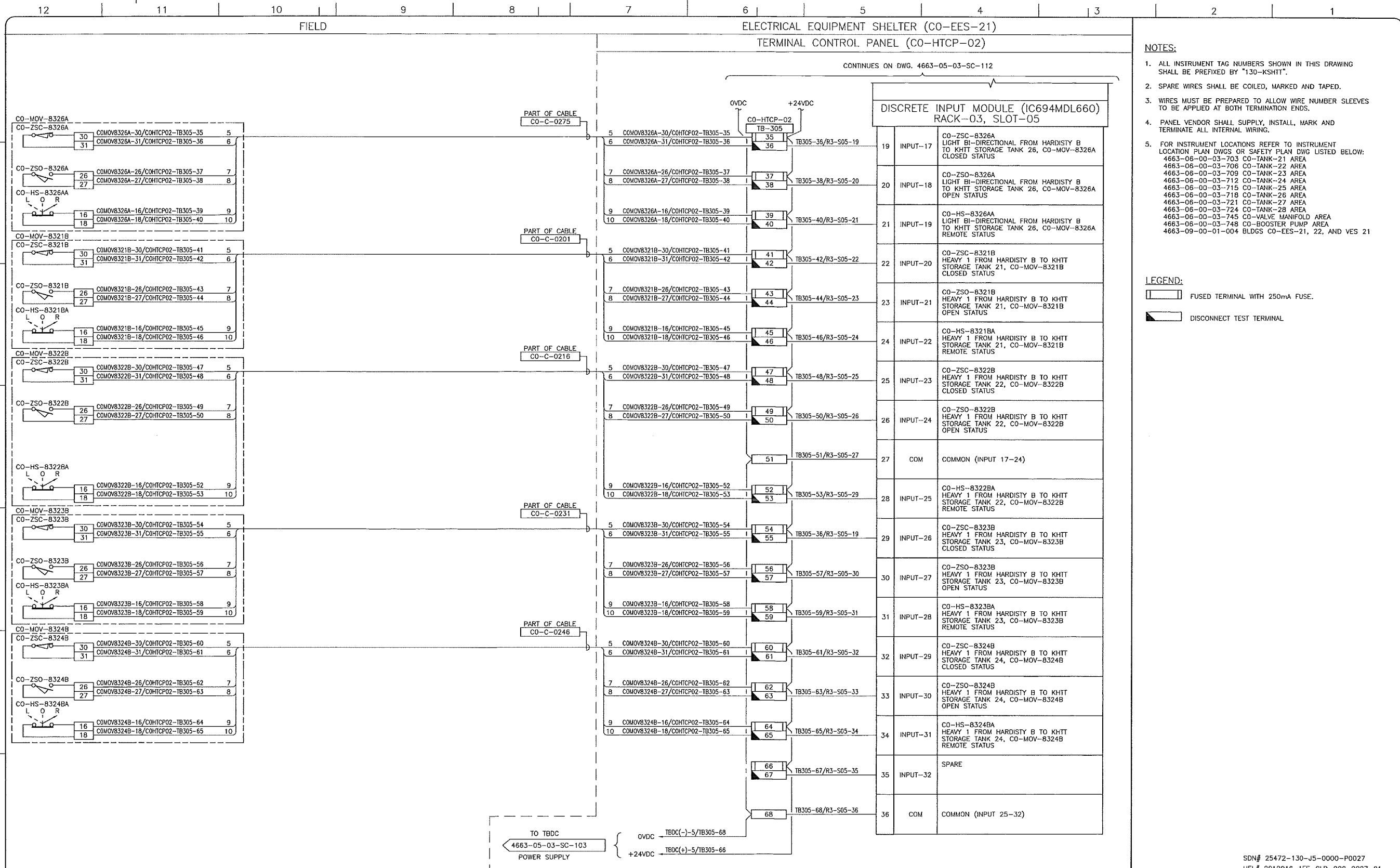
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 05  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-112 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

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 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
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REV. No. DATE PERMIT NUMBER:

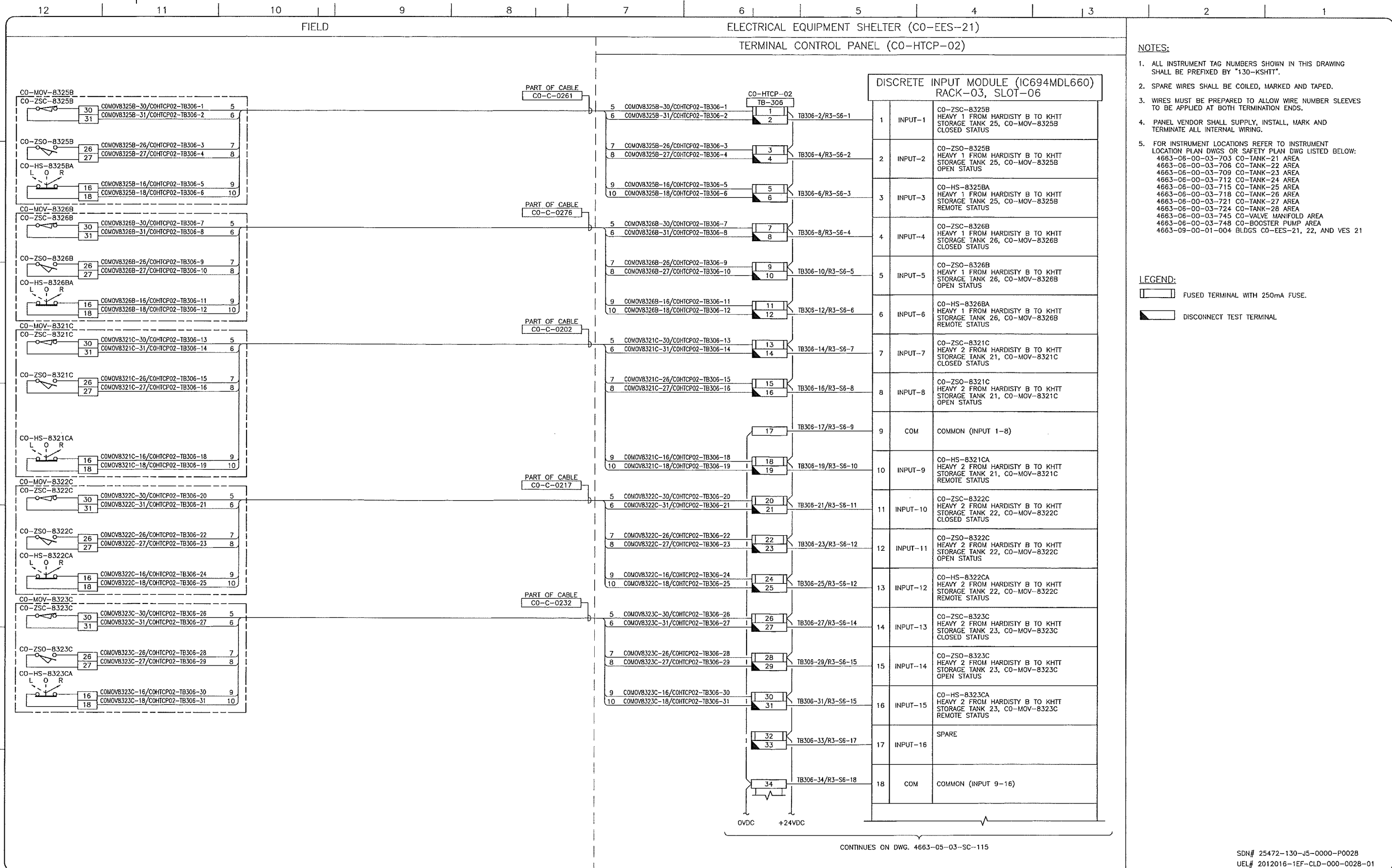
SDN# 25472-130-J5-0000-P0027  
UEL# 2012016-1EF-CLD-000-0027-01

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 05  
DISCRETE INPUT  
I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-113 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-115

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER
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DATE

2014-FEB-27

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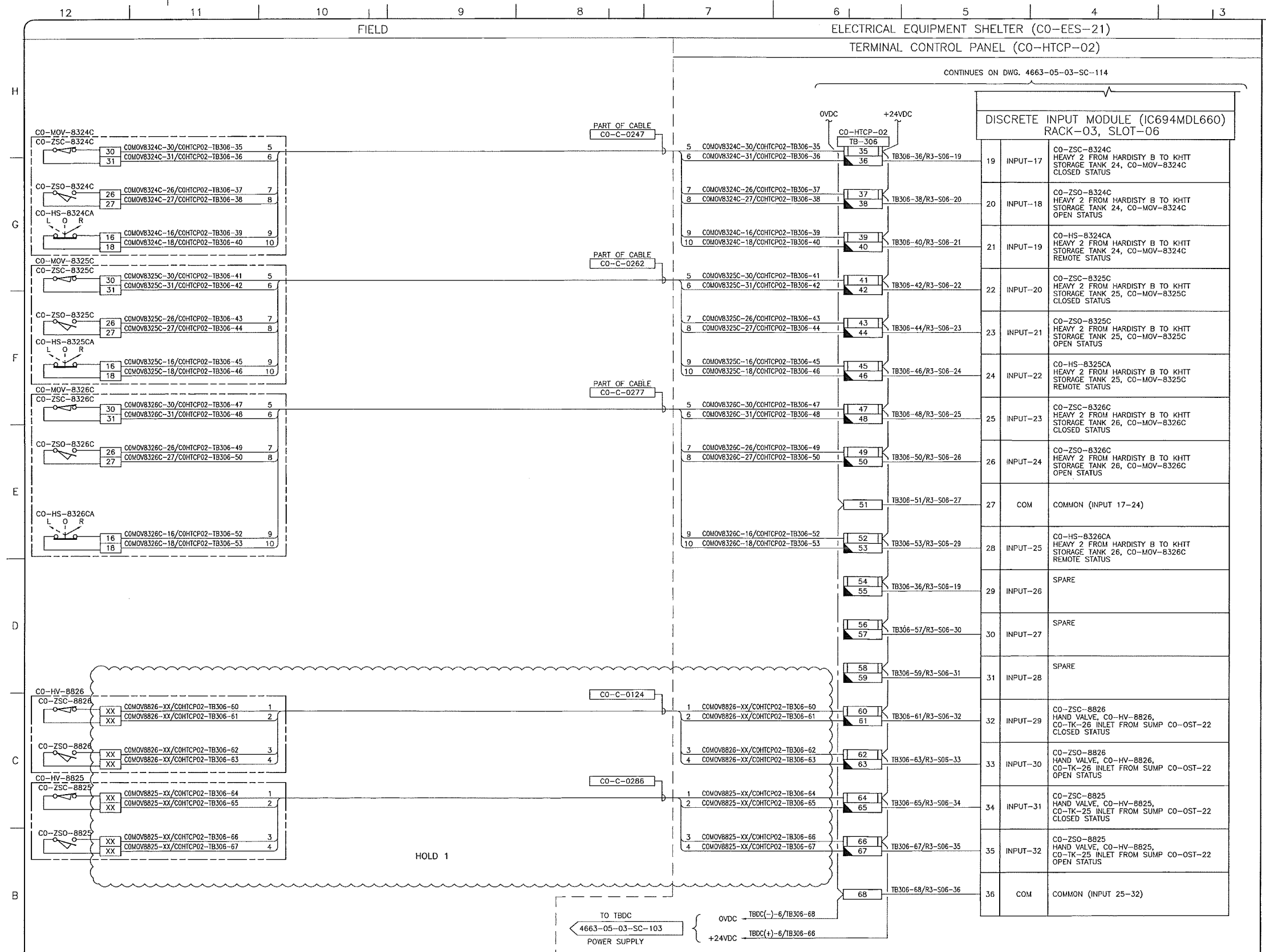
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-114 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

**LEGEND:**

HOLDS LIST	
No.	DESCRIPTION
1	HOLD VALVE TERMINALS TO BE CONFIRMED WITH VENDOR INFORMATION

SDN# 25472-130-J5-0000-P0029  
 UEL# 2012016-1EF-CLD-000-0029-01

**REFERENCE DRAWINGS**

DRAWING No	TITLE
-	-

**REVISION**

REV No	DATE	DESCRIPTION
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

2014-FEB-27

REV. No. DATE PERMIT NUMBER:

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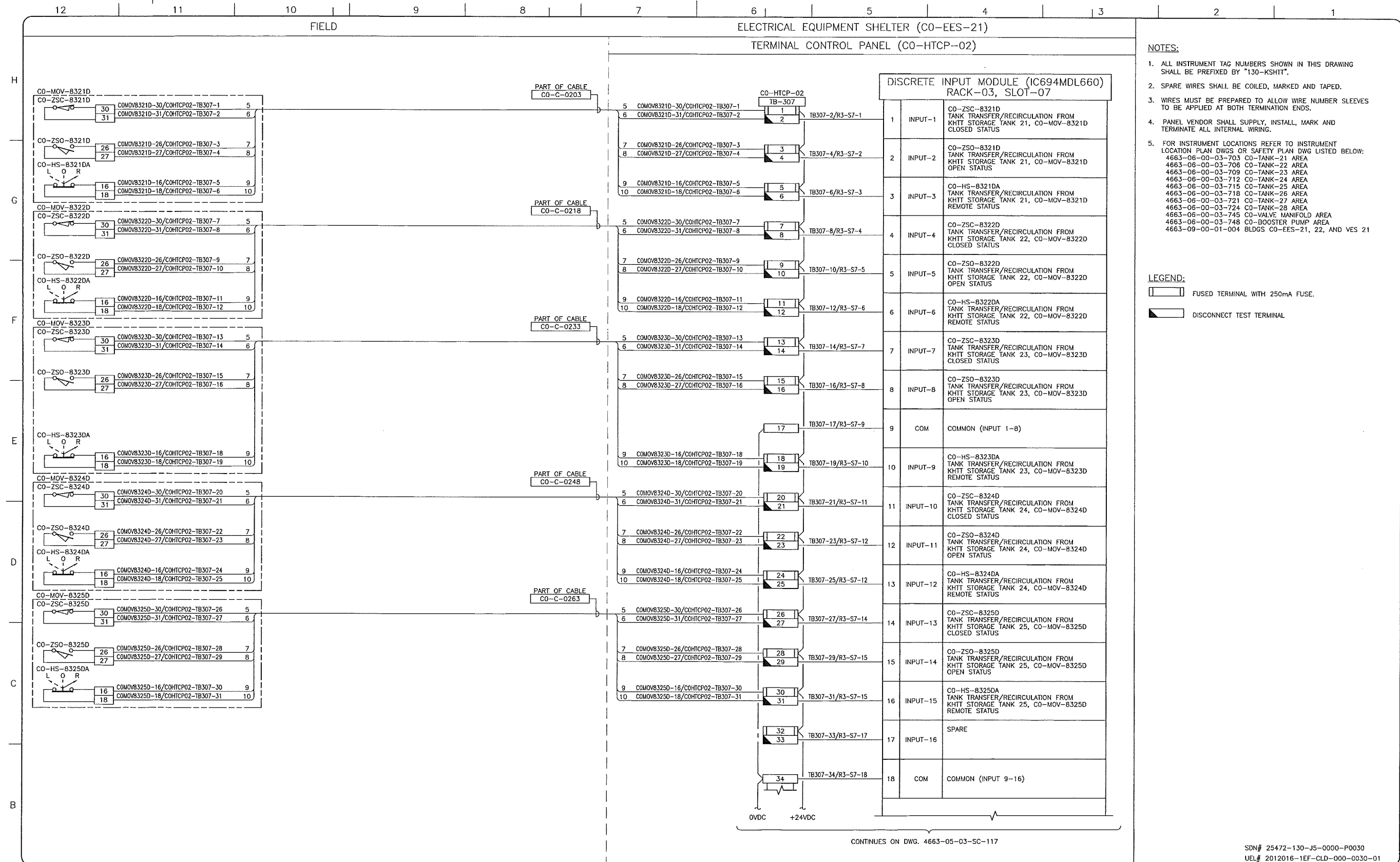
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-115 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
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 4663-06-00-03-706 CO-TANK-22 AREA  
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 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-117

SDN# 25472-130-J5-0000-P0030  
 UEL# 2012016-1EF-CLD-000-0030-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: [Signature]

PERMIT/ ENG. APPROVAL: [Signature]

DATE: 2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 550B  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

**TransCanada**  
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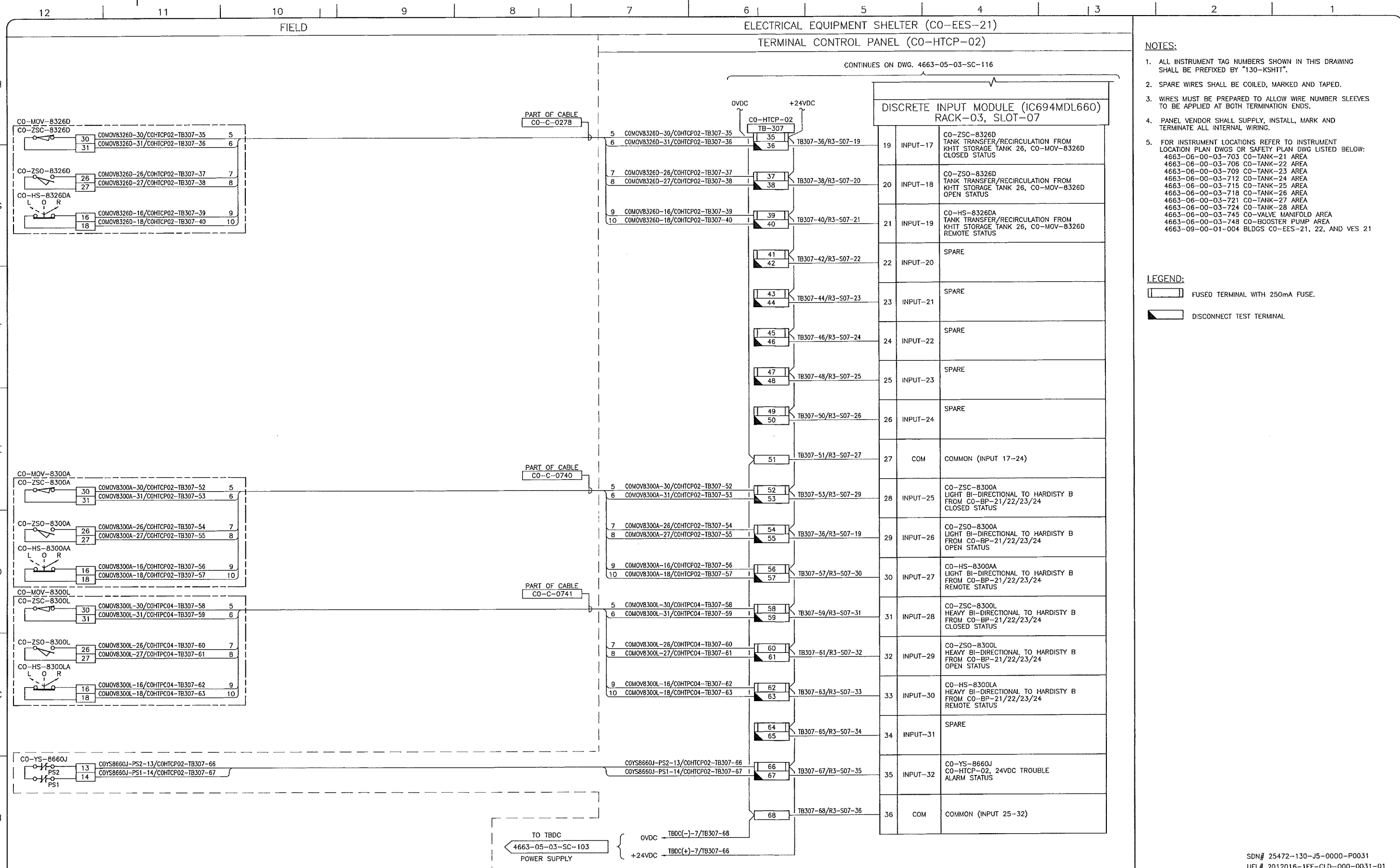
**upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-116 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
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 4663-06-00-03-706 CO-TANK-22 AREA  
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 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0031  
 UEL# 2012016-1EF-CLD-000-0031-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014 FEB 27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. No. DATE PERMIT NUMBER:

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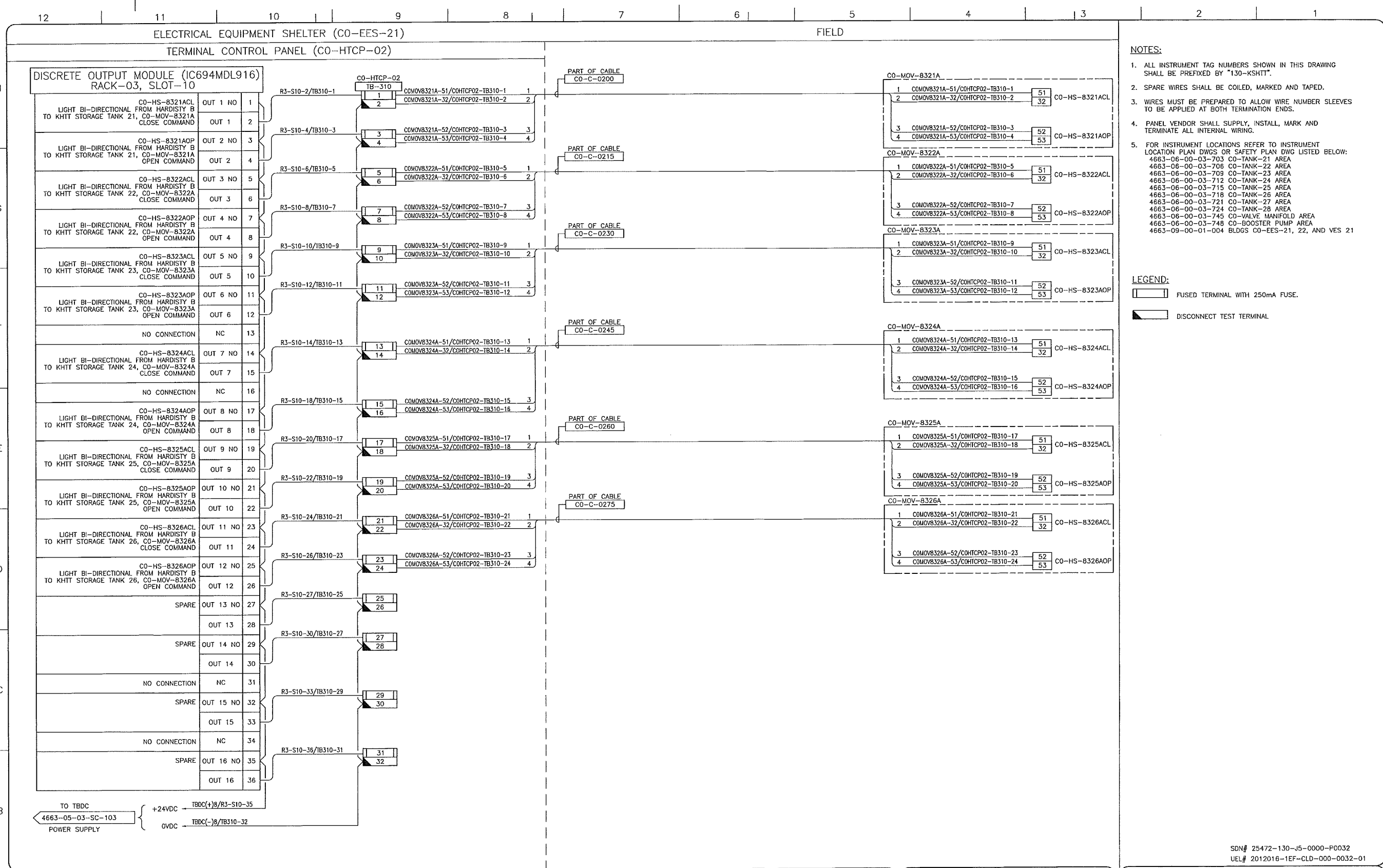
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-117 REV 00



DRAWING No.		REFERENCE DRAWINGS	REVISION		APPROVAL							PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
DRAWING No.	TITLE	REV No.	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY	DATE	
-		00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE		

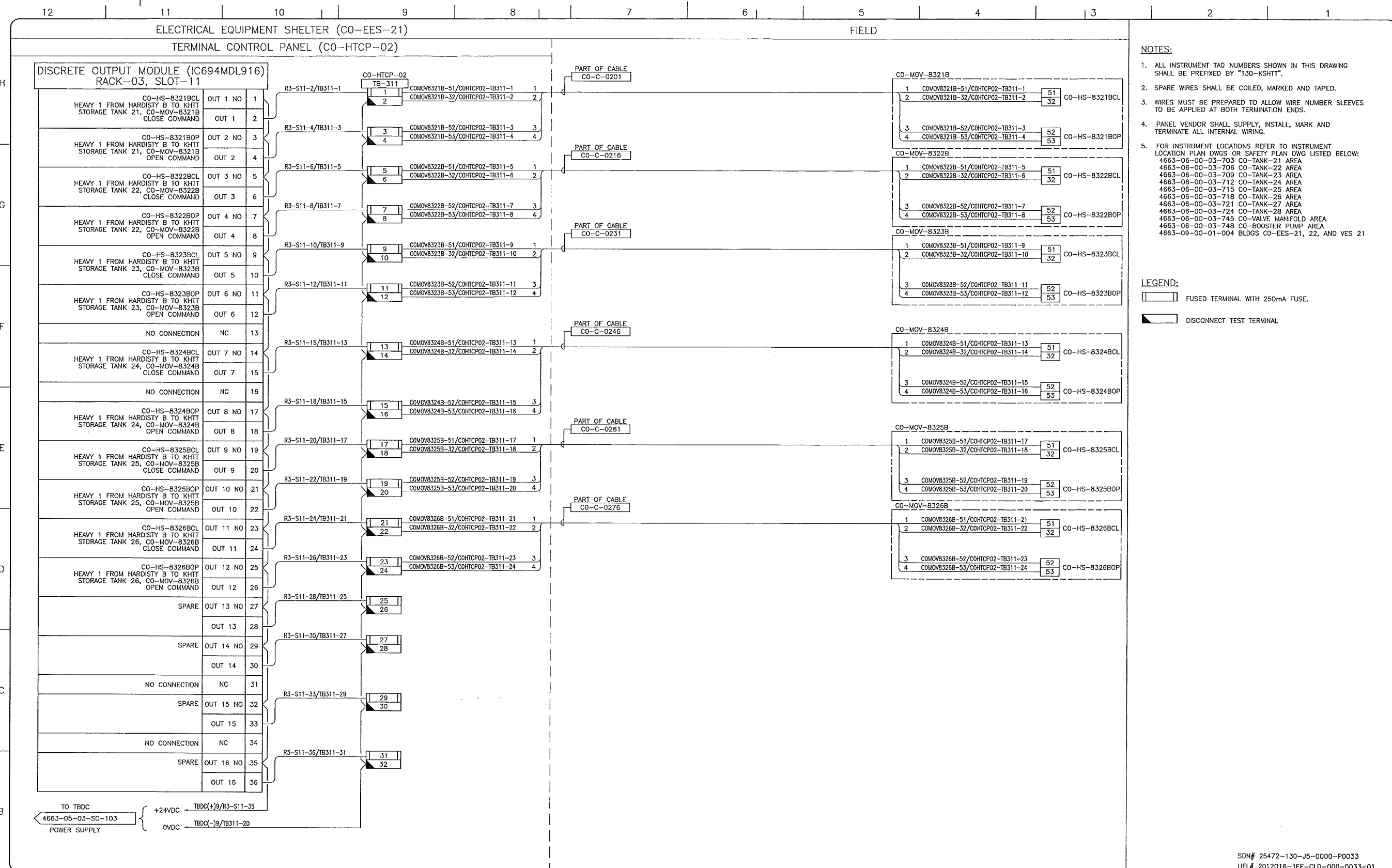
  

	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
--	---

<b>TransCanada</b> <small>In business to deliver</small>			
KEYSTONE HARDISTY TANK TERMINAL			
FILE # 4663	CHANGE:	DISCIPLINE # 05	
CO-HTCP-02, PLC-11/03 SLOT 10 DISCRETE OUTPUT - RELAY I/O WIRING DIAGRAM			
SCALE N.T.S.	DRAWING No 4663-05-03-SC-122	REV 00	





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
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 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0033  
 UEL# 2012016-1EF-CLD-000-0033-01

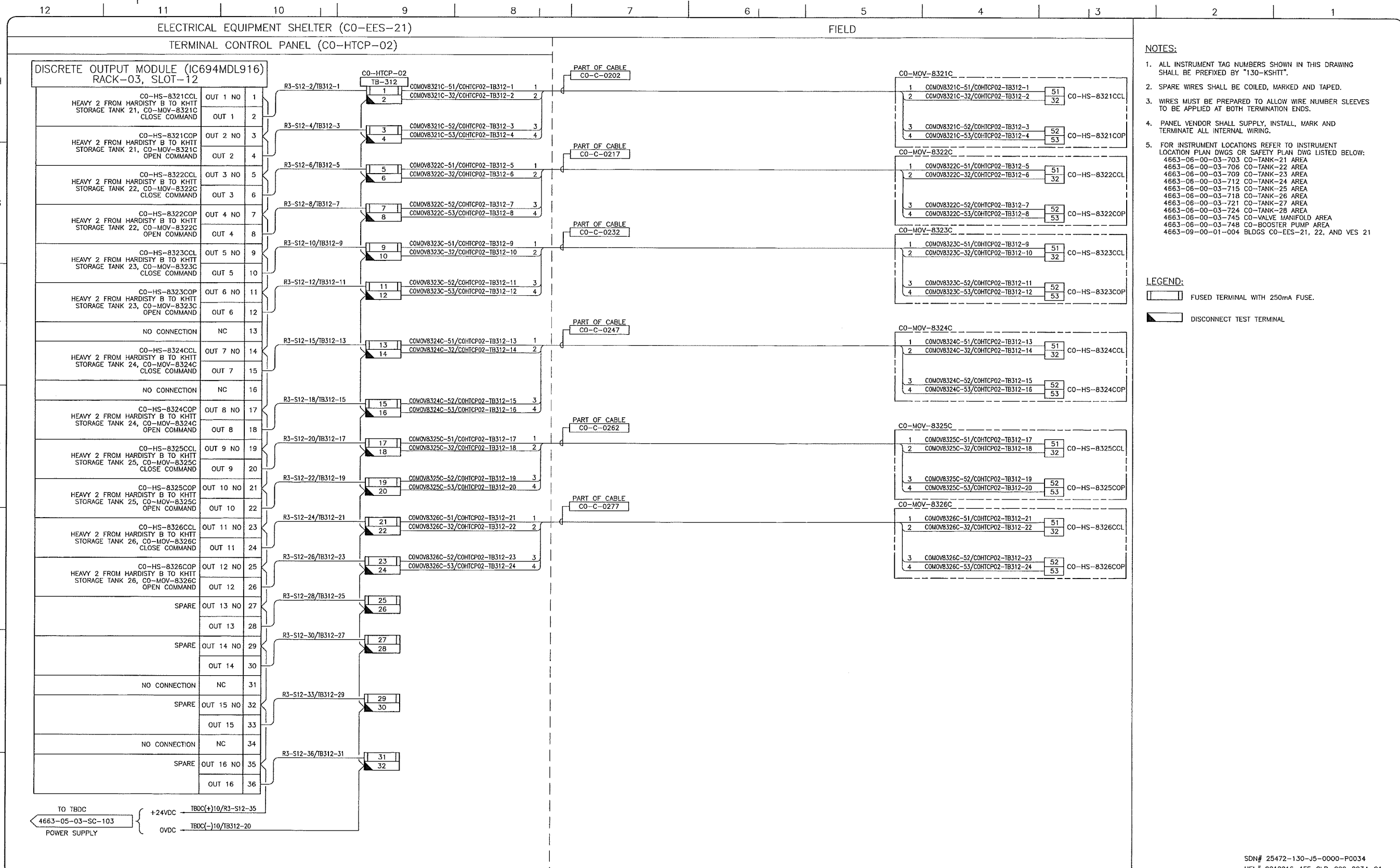
**TransCanada**  
 In business to deliver

**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 PIA # 4663 CHANGE# DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 11  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-123 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0034  
 UEL# 2012016-1EF-CLD-000-0034-01

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**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE# DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 12  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-124 REV 00

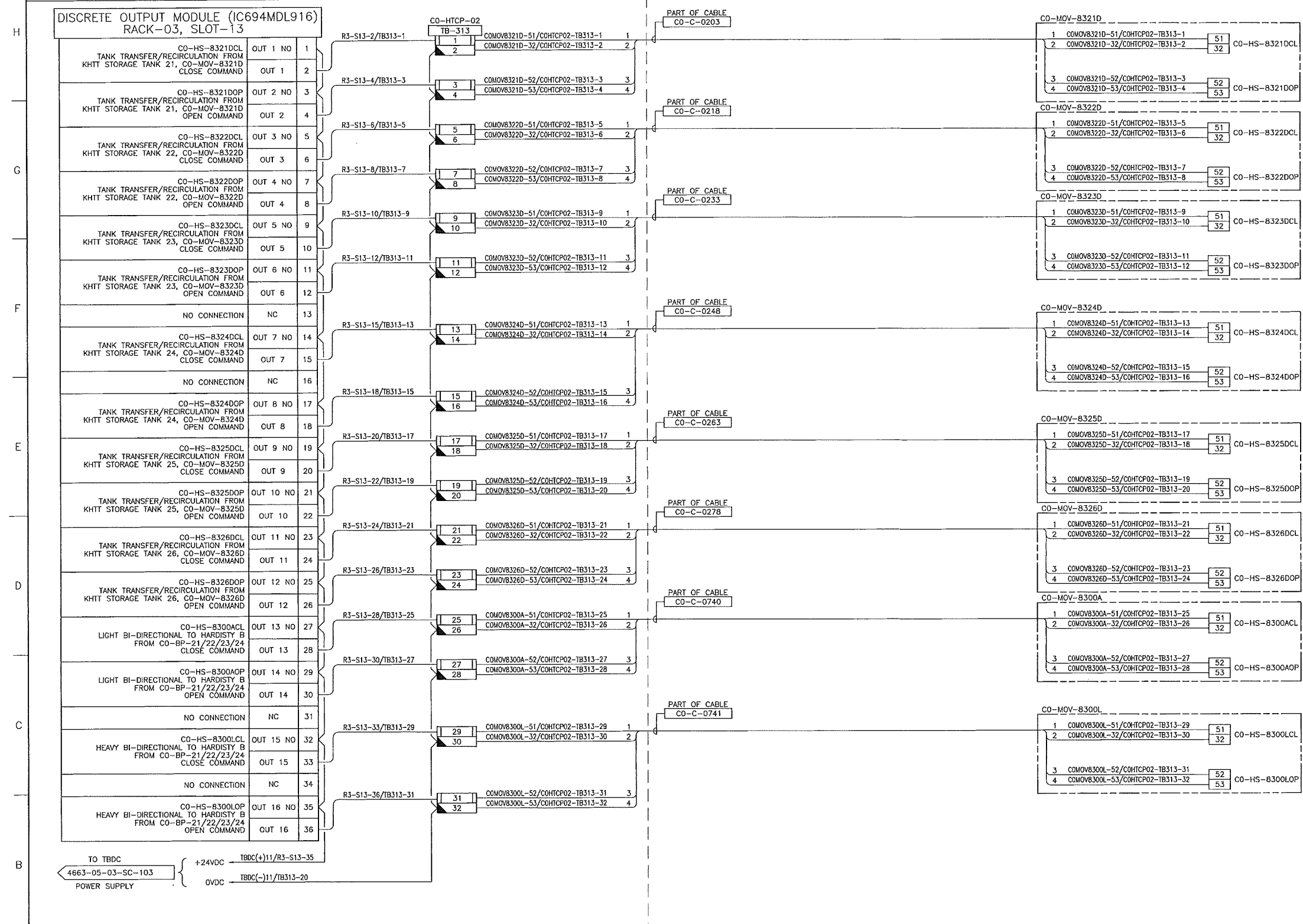
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CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)

FIELD

TERMINAL CONTROL PANEL (CO-HTCP-02)



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHHT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- [Symbol] FUSED TERMINAL WITH 250mA FUSE.
  - [Symbol] DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0035  
 UEL# 2012016-1EF-CLD-000-0035-01

**REFERENCE DRAWINGS**

DRAWING No	TITLE

**REVISION**

REV No	DATE	DESCRIPTION
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

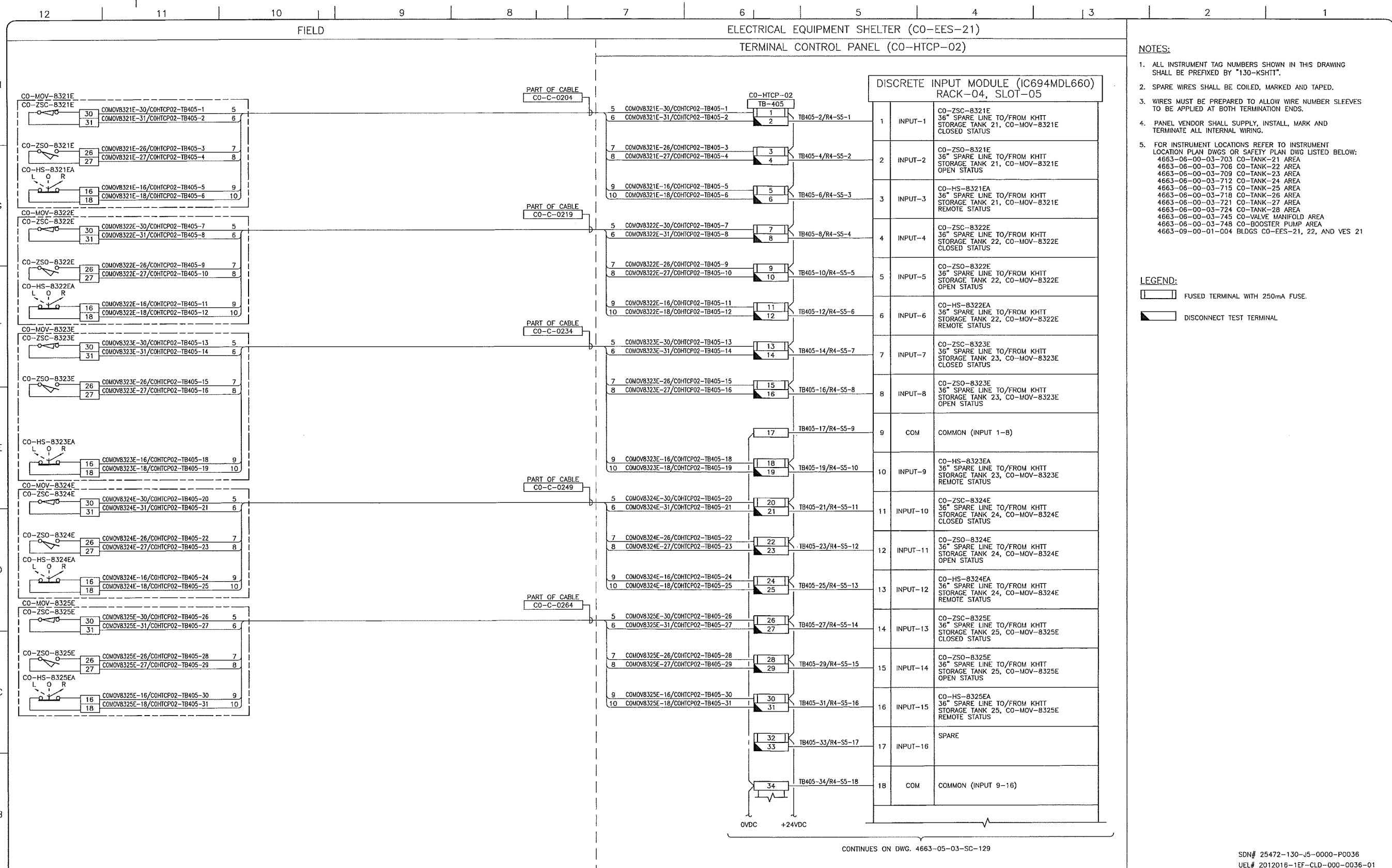
**TransCanada** In business to deliver

**upside** Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL CHAINAGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/03 SLOT 13  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No 4663-05-03-SC-125 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-129

SDN# 25472-130-J5-0000-P0036  
 UEL# 2012016-1EF-CLD-000-0036-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

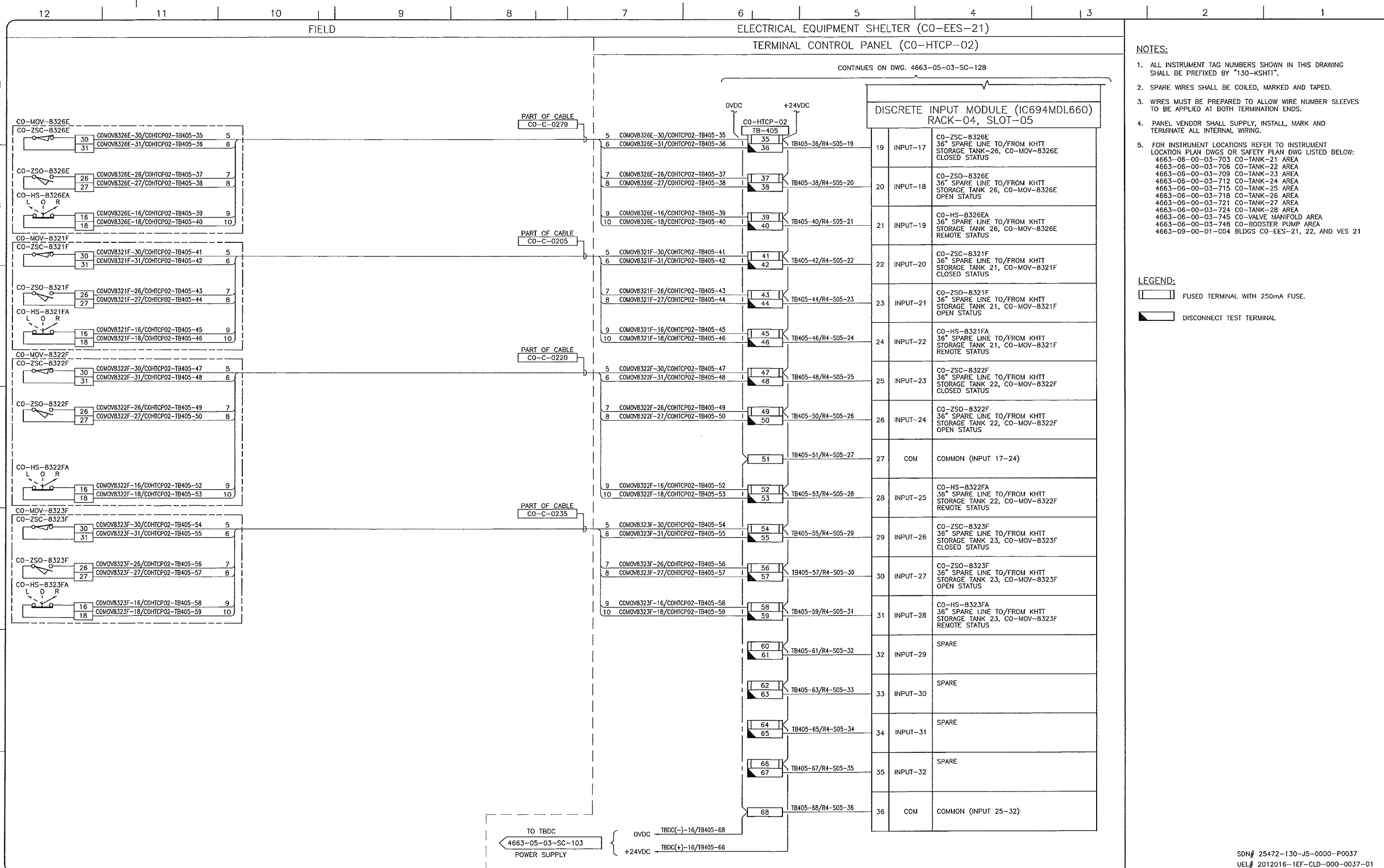
**TransCanada**  
In business to deliver

**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 FX # 4663 CHARGE#: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 05  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-128 REV. 00



REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012018)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENO. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0037  
UEL# 2012018-1EF-CLD-000-0037-01

**TransCanada**  
In business to deliver

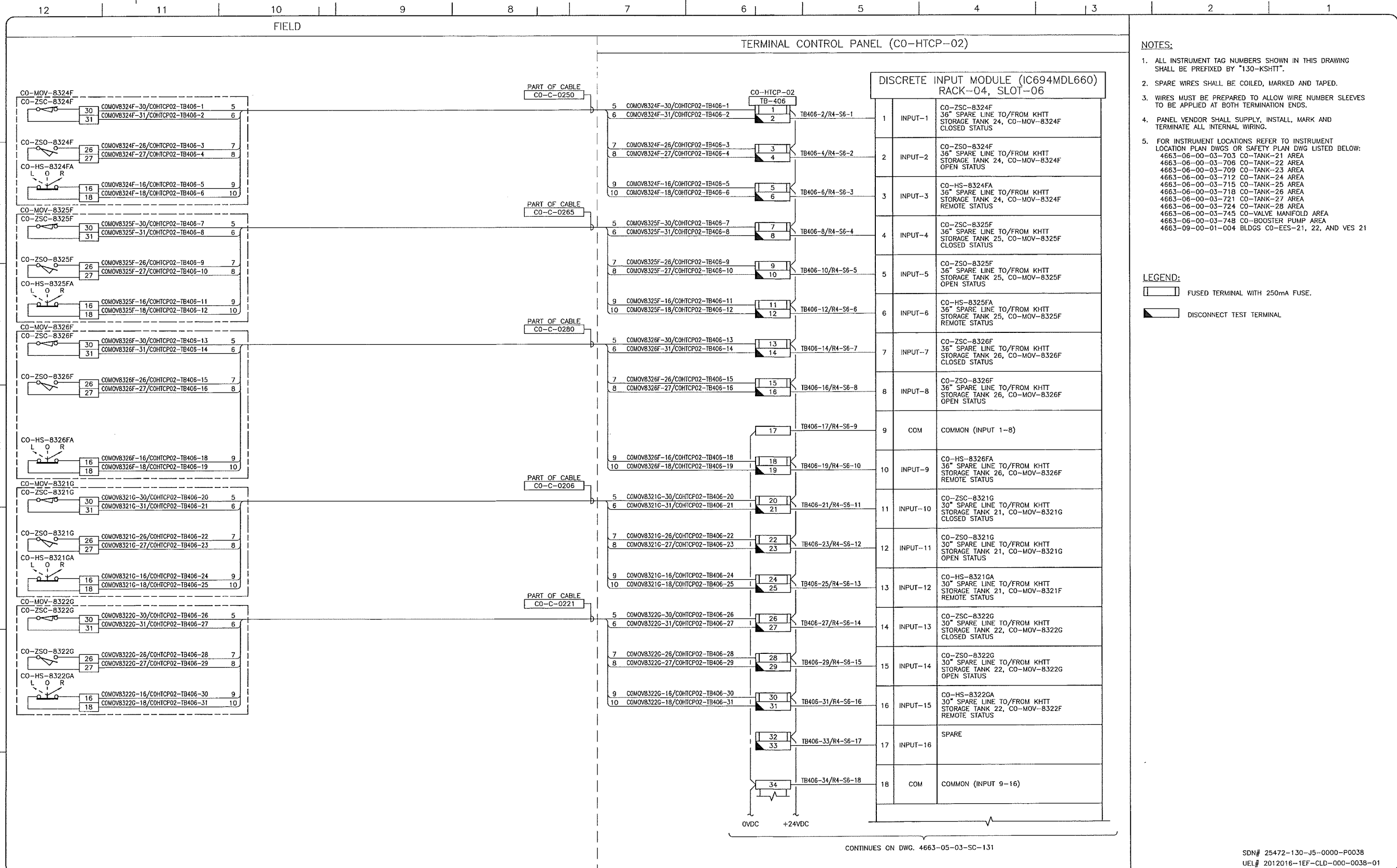
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 05  
DISCRETE INPUT  
I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-129 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-131

SDN# 25472-130-J5-0000-P0038  
 UEL# 2012016-1EF-CLD-000-0038-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

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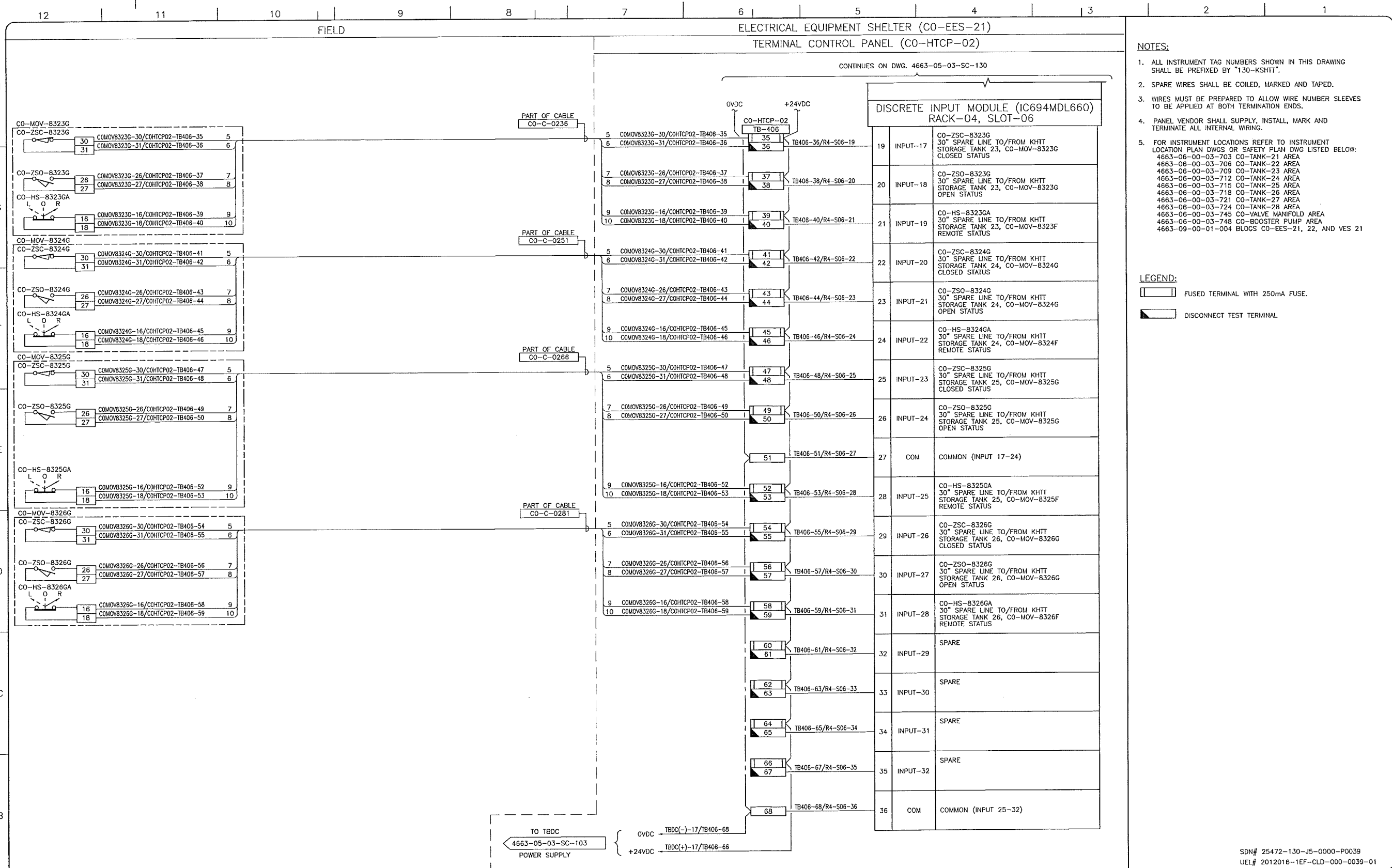
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-130 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0039  
 UEL# 2012016-1EF-CLD-000-0039-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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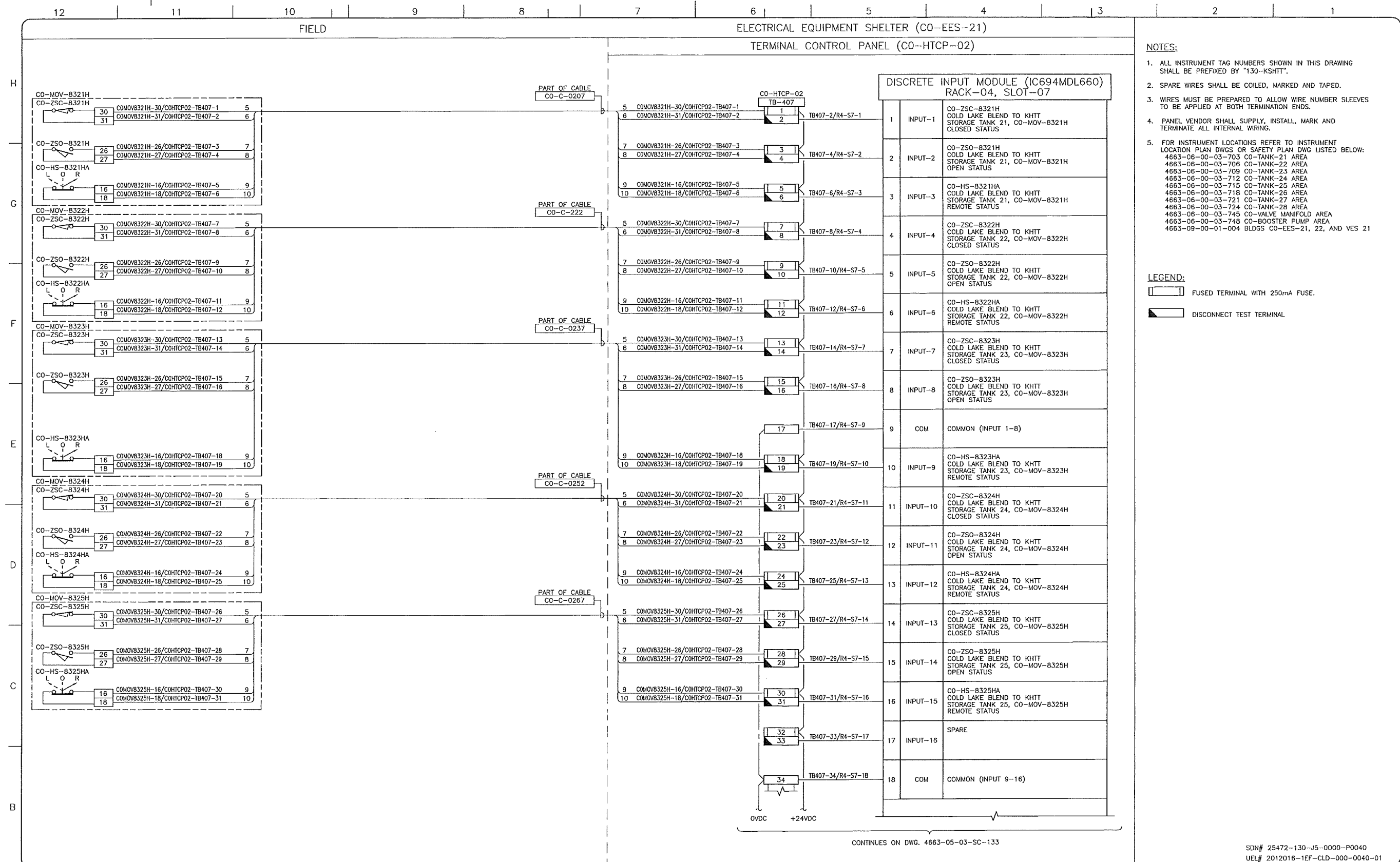
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

CHAINAGE: 4663 DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-131 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-133

SDN# 25472-130-J5-0000-P0040  
 UEL# 2012016-1EF-CLD-000-0040-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL								
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY			
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DWC	SRL	JED	DCB	UPSIDE			

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
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 Geologists and Geophysicists of Alberta

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 Engineering Ltd.

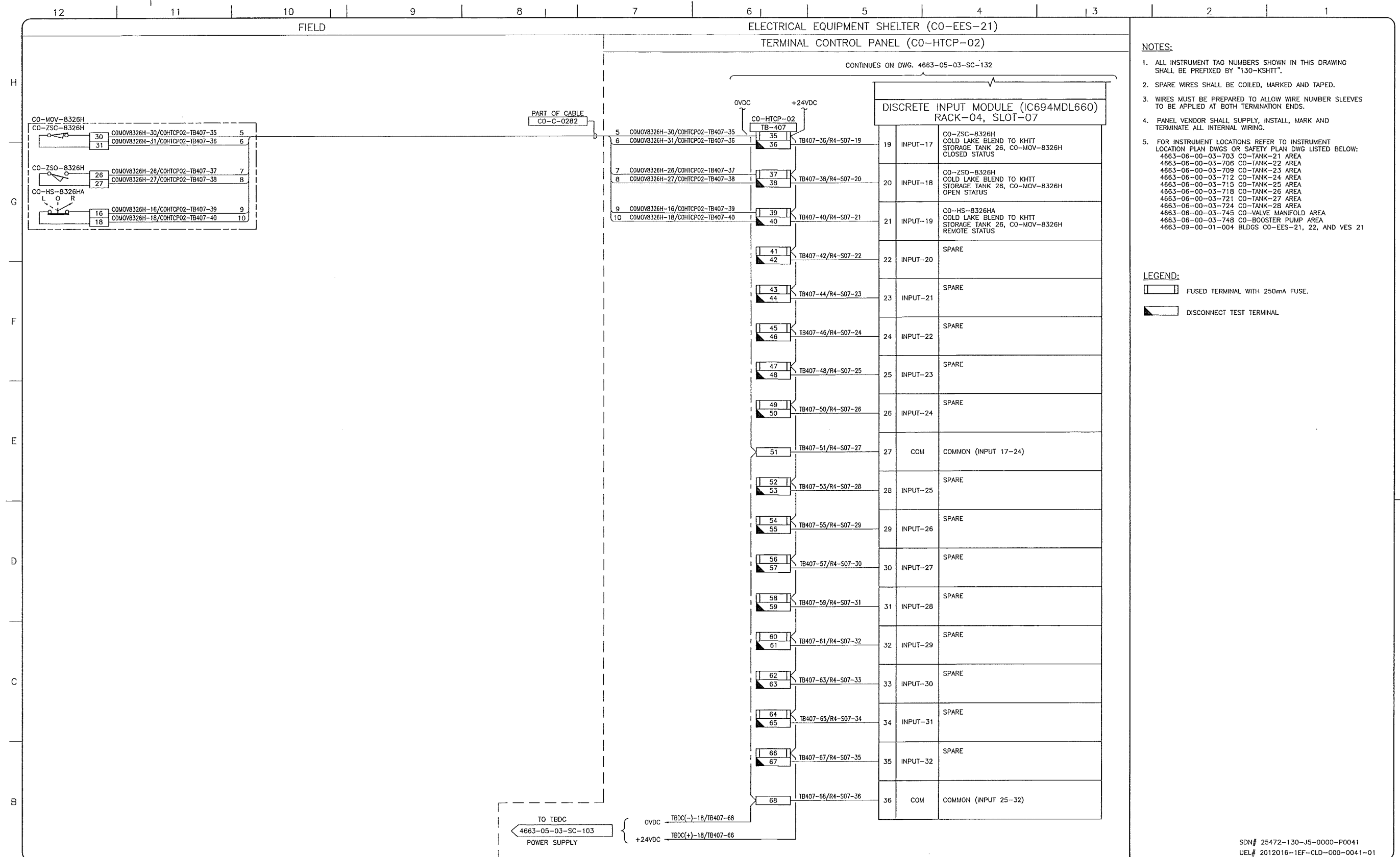
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-132 REV 00





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0041  
 UEL# 2012016-1EF-CLD-000-0041-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. No. DATE PERMIT NUMBER:

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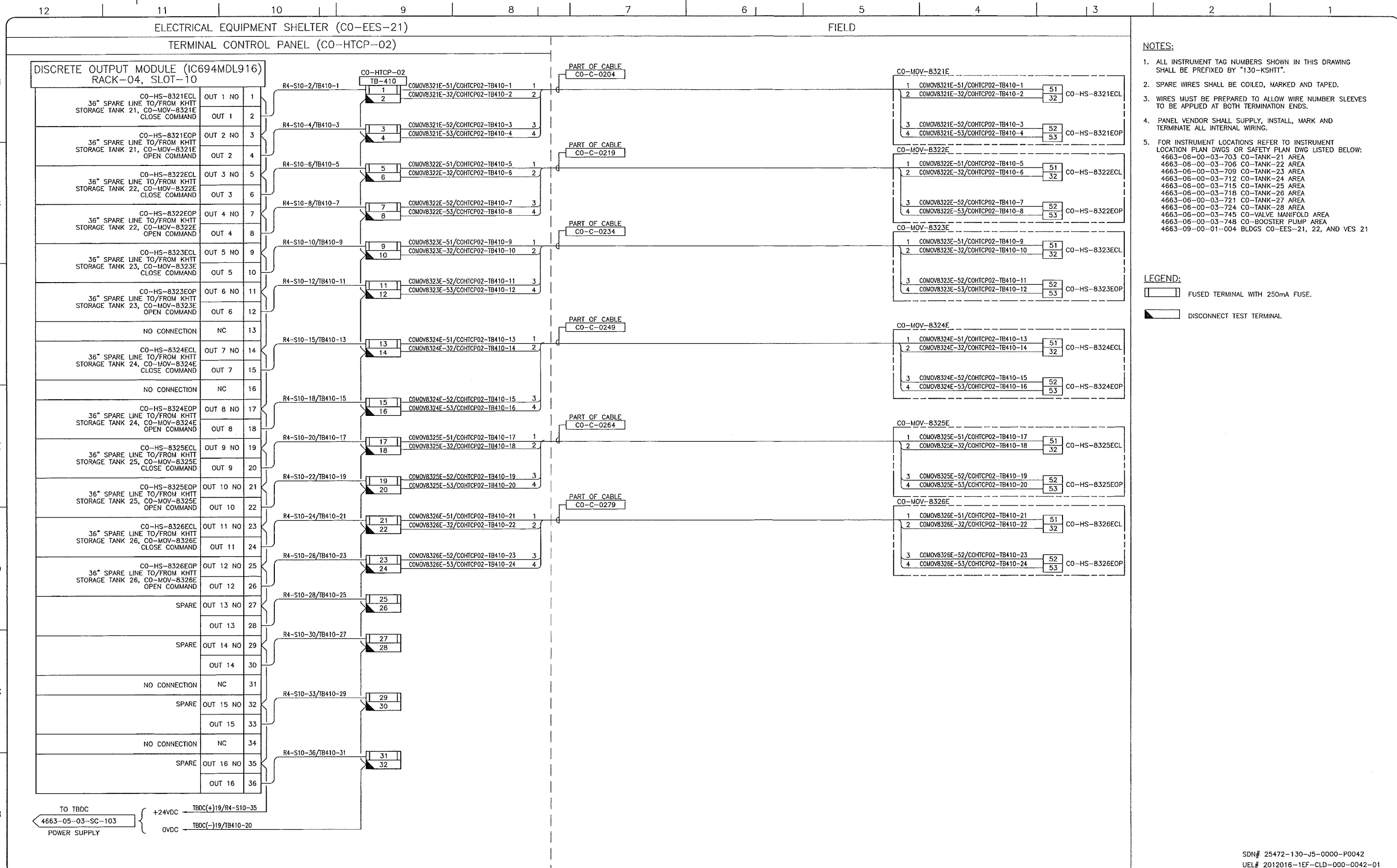
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-133 REV. 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

DATE: 2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0042  
 UEL# 2012016-1EF-CLD-000-0042-01

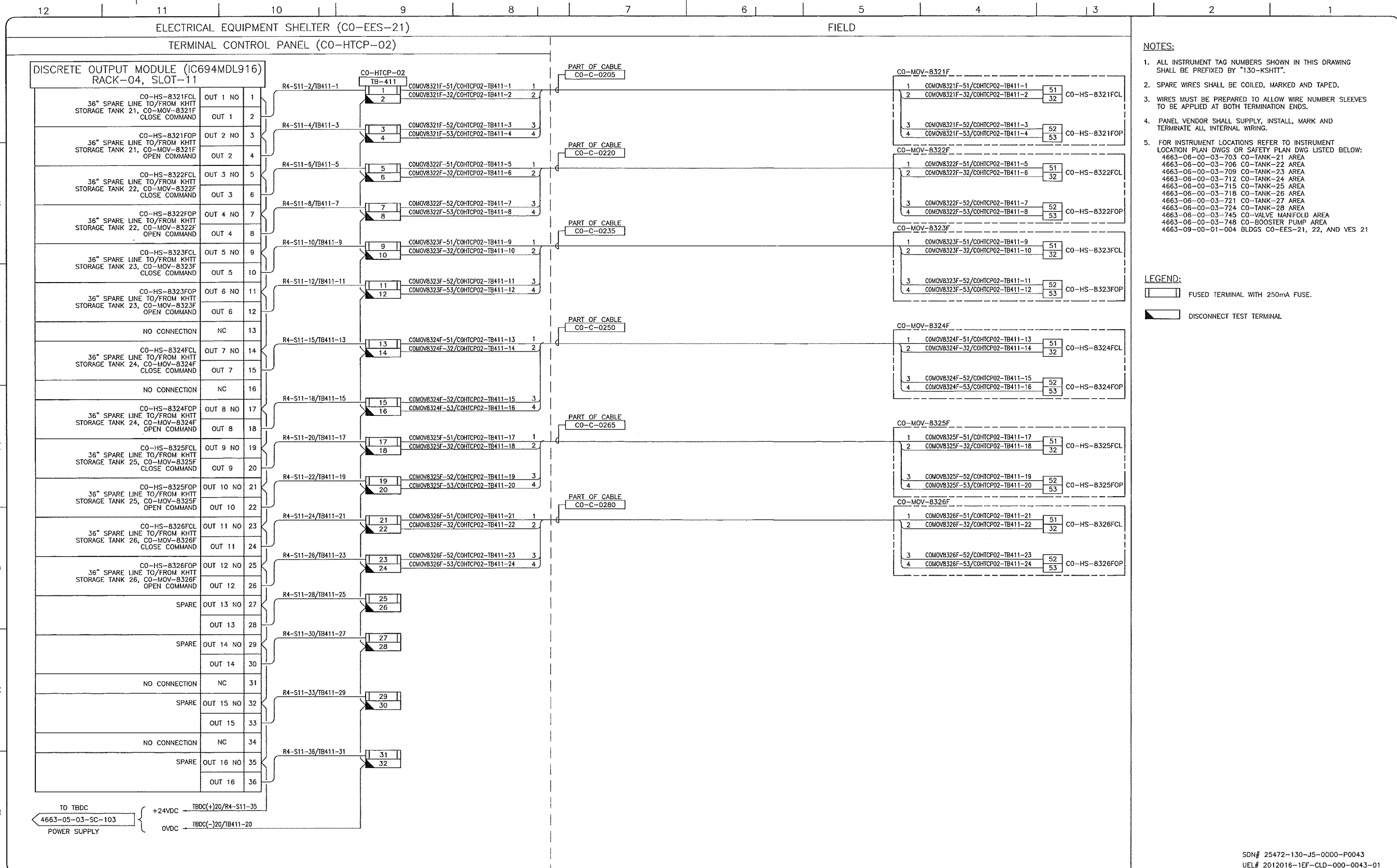
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**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 10  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-138 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
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 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

**REFERENCE DRAWINGS**

DRAWING No	TITLE
-	-

**REVISION**

REV No	DATE	DESCRIPTION
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 6508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0043  
 UEL# 2012016-1EF-CLD-000-0043-01

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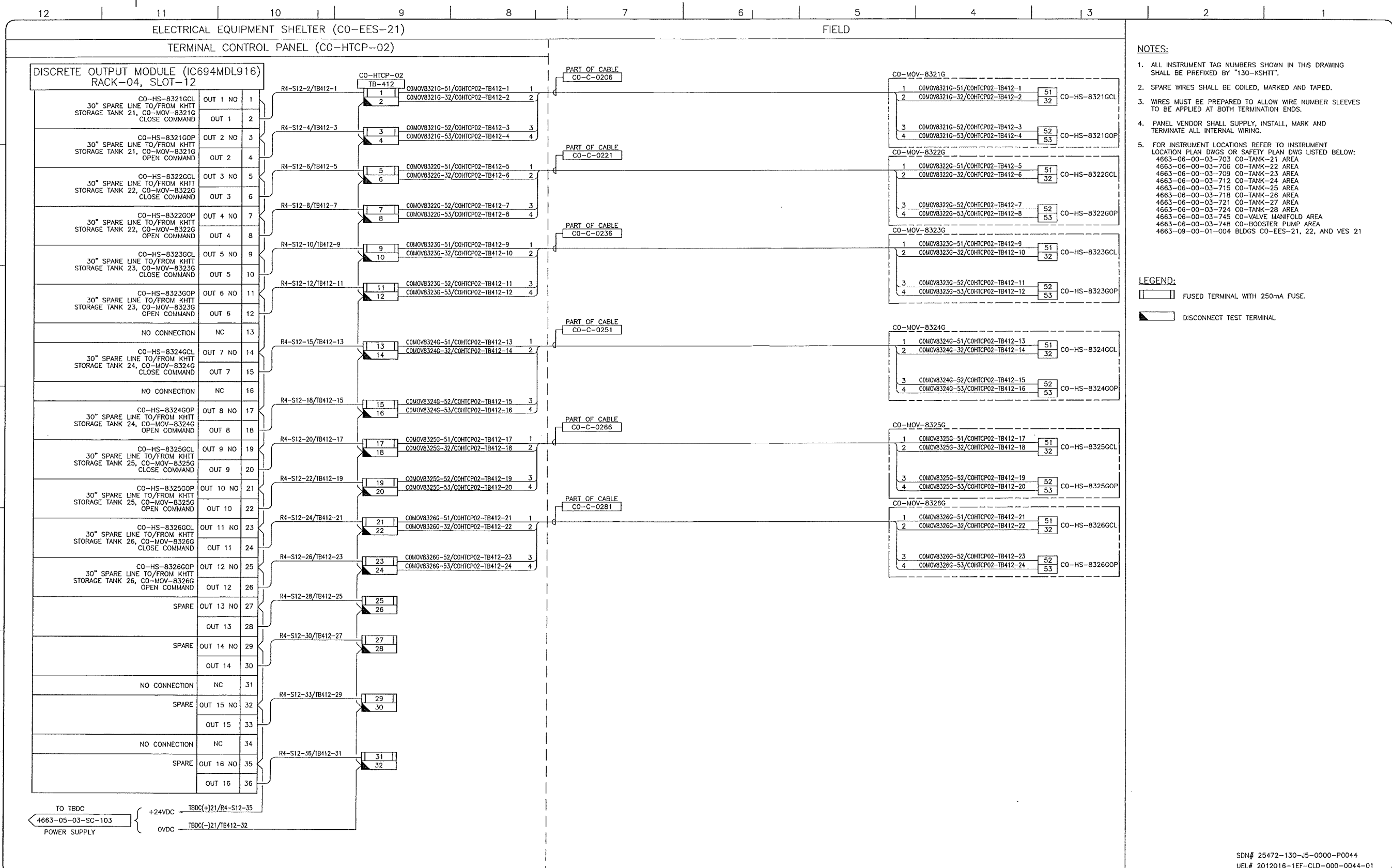
**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 11  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-139 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND YES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0044  
 UEL# 2012016-1EF-CLD-000-0044-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL					
REV	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

DATE: 2014-FEB-27

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

**TransCanada**  
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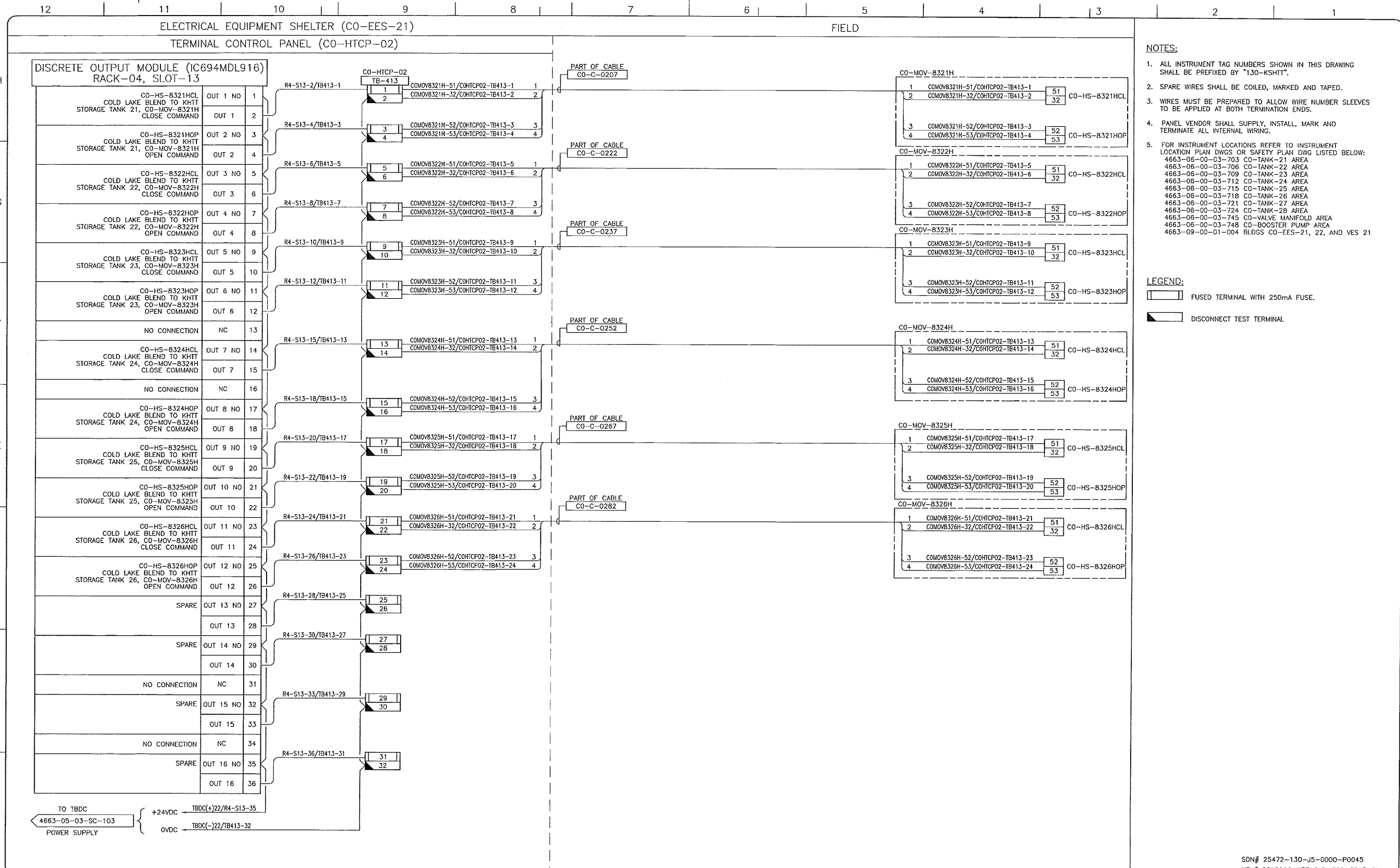
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 12  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-140 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

TO TBDC  
4663-05-03-SC-103  
POWER SUPPLY

+24VDC TBDC(+)/R4-S13-35  
OVDC TBDC(-)/R4-S13-32

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0045  
UEL# 2012016-1EF-CLD-000-0045-01

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Engineering Ltd.

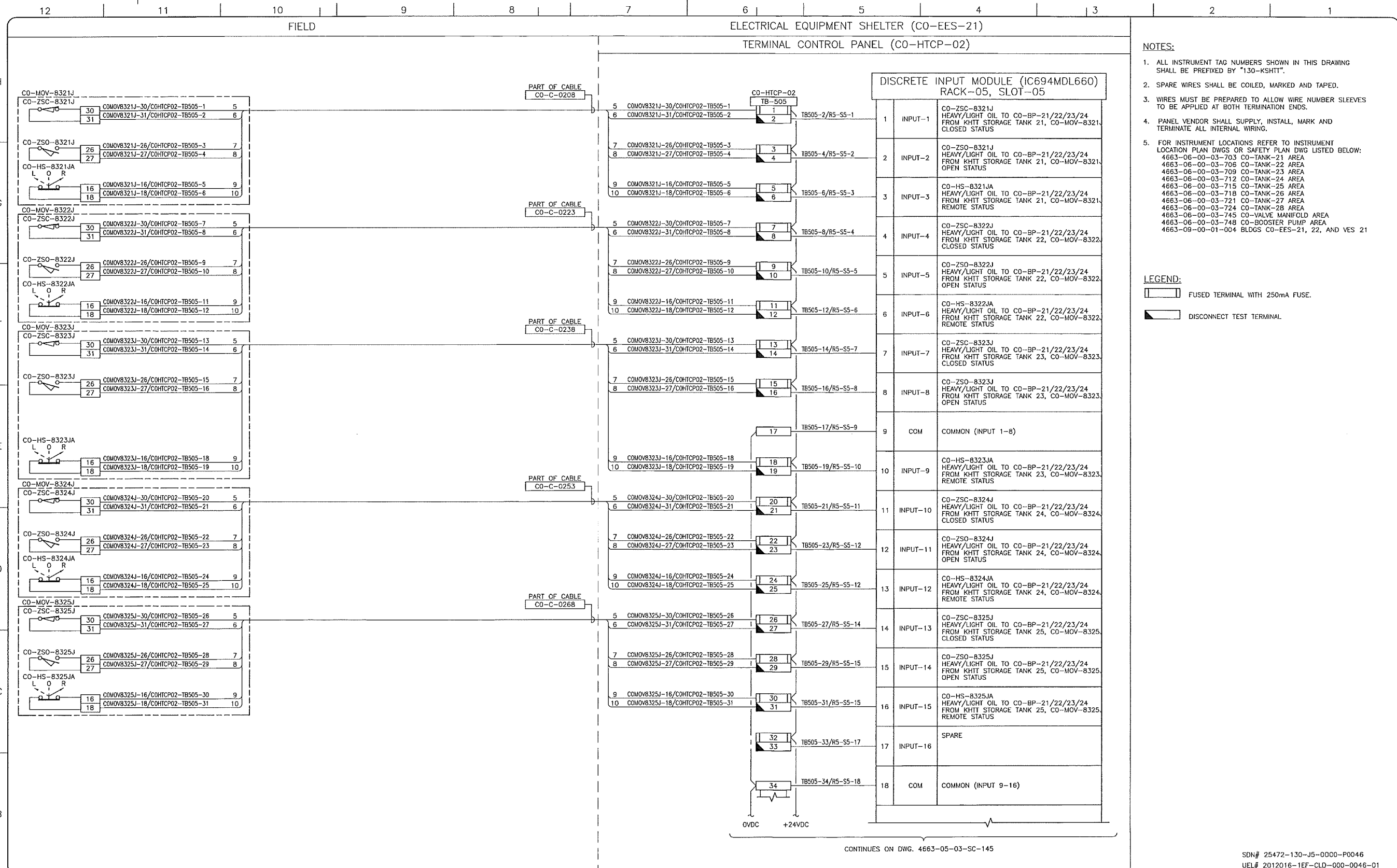
KEYSTONE HARDISTY TANK TERMINAL  
FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/04 SLOT 13  
DISCRETE OUTPUT - RELAY  
I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-141 REV 00

TC\_A1\_BR.DWG 594X841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
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 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-145

SDN# 25472-130-J5-0000-P0046  
 UEL# 2012016-1EF-CLD-000-0046-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
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REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DVC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

**TransCanada**  
 In business to deliver

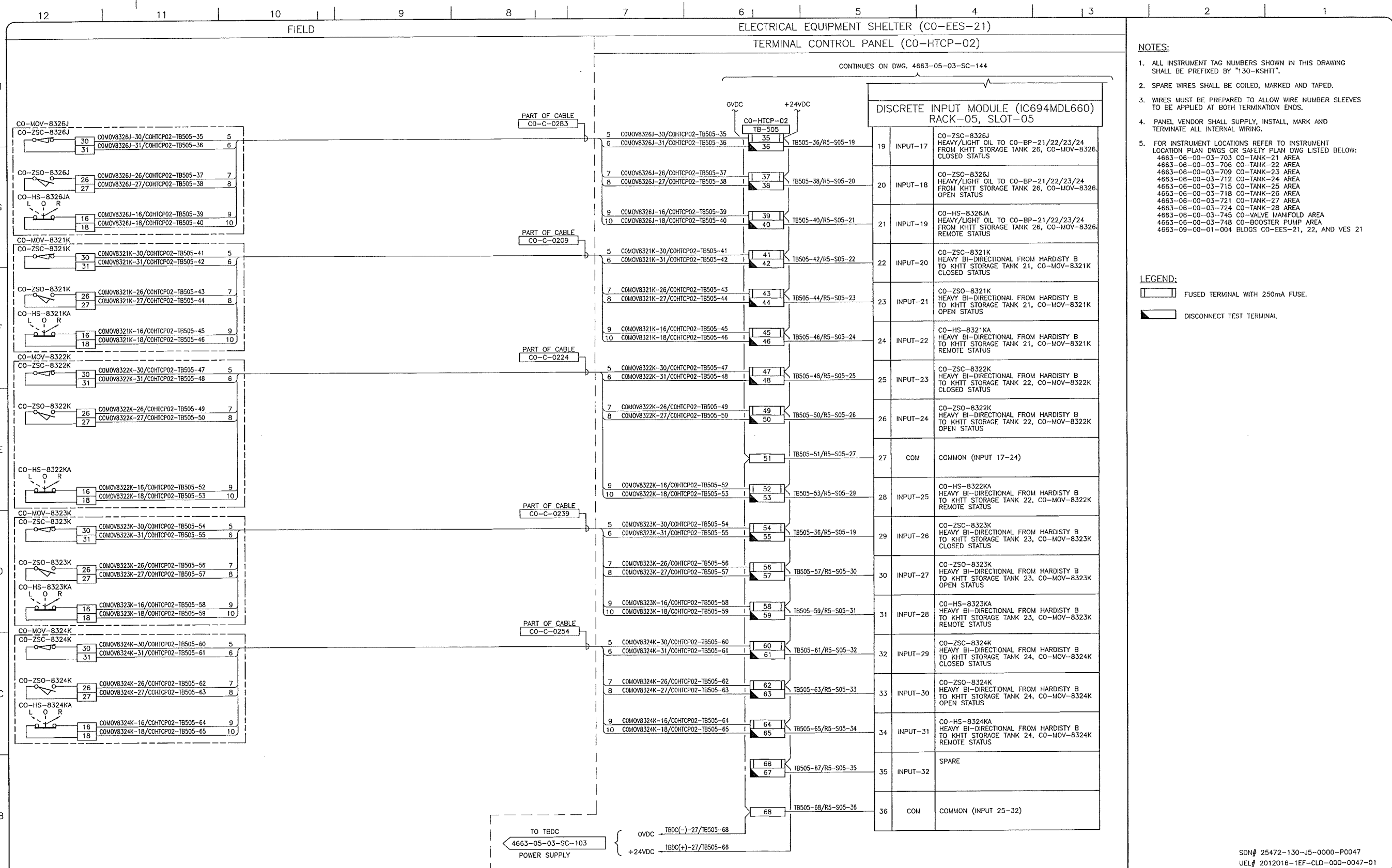
**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

PIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 05  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-144 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
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 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0047  
 UEL# 2012016-1EF-CLD-000-0047-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geoscientists and Geophysicists of Alberta

2014 FEB 27

REV. NO. DATE PERMIT NUMBER:

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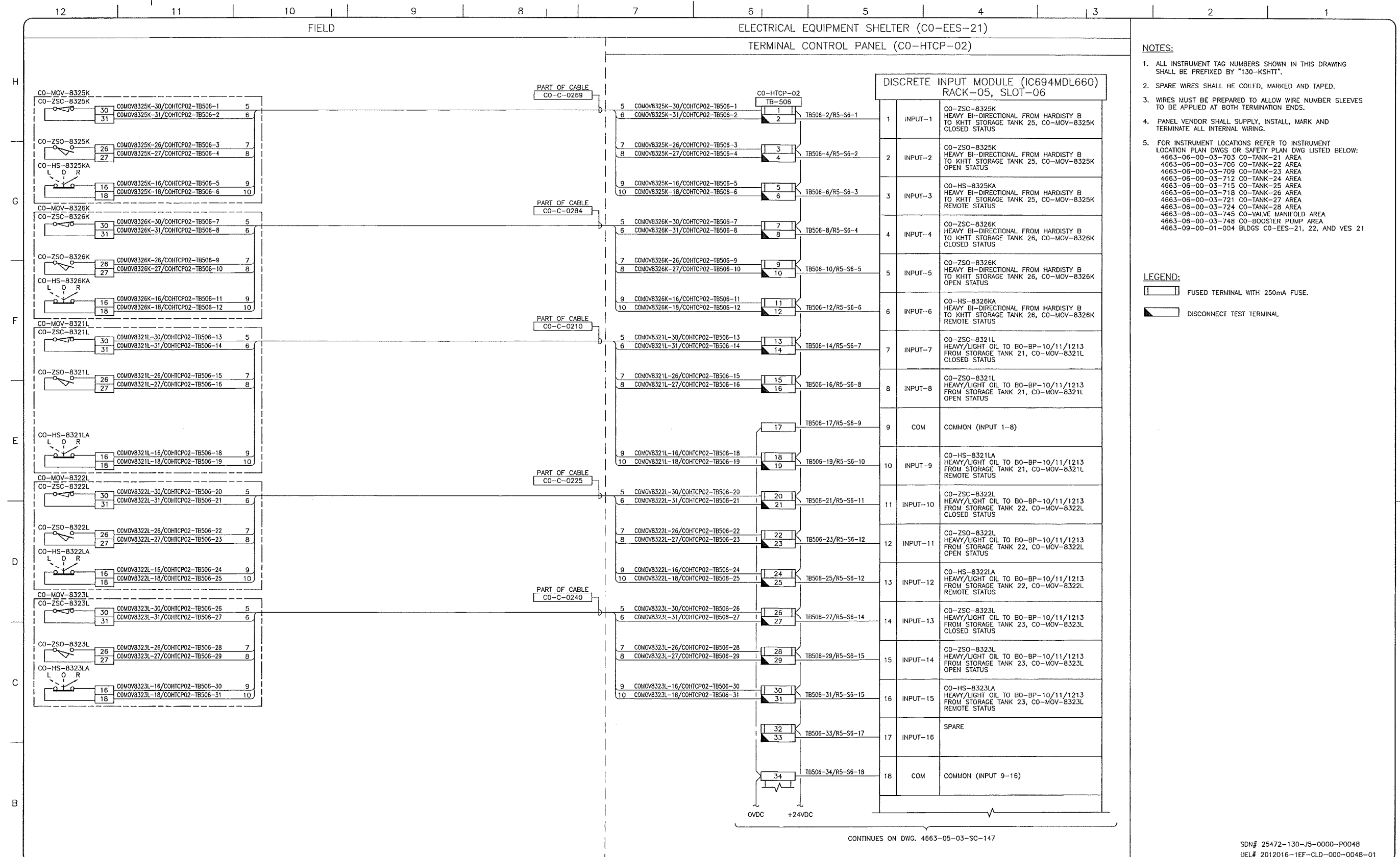
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 05  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-145 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-147

SDN# 25472-130-J5-0000-P0048  
 UEL# 2012016-1EF-CLD-000-0048-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL						
REV No	DATE	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

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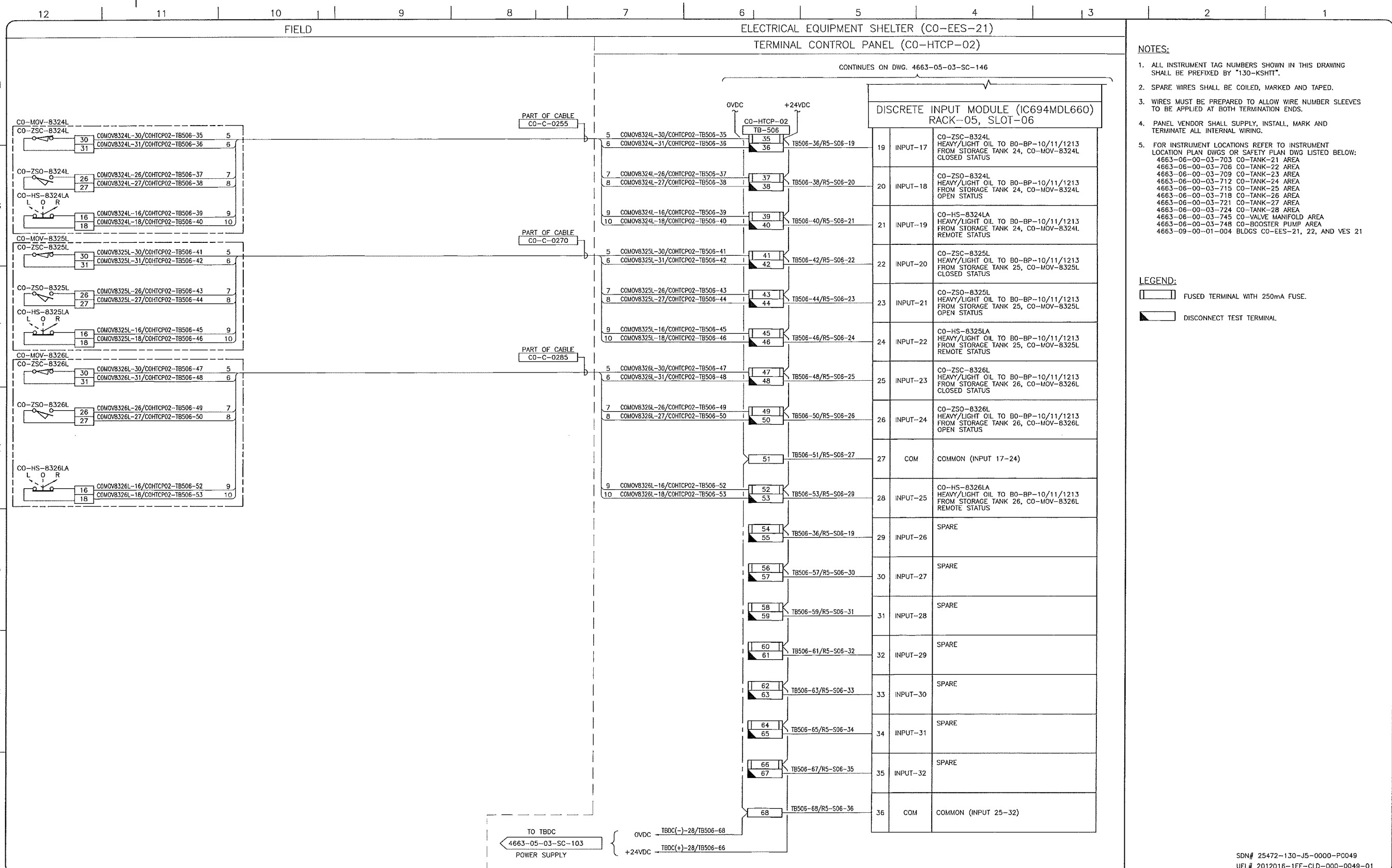
**upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-146 REV: 00





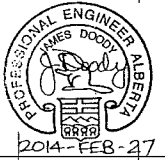
- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-PC049  
 UEL# 2012016-1EF-CLD-000-0049-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEJ	DMC	SRL	JED

PROFESSIONAL ENGINEER/RPT:  PERMIT/ ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

REV. NO. \_\_\_\_\_ DATE: 2014-FEB-27 PERMIT NUMBER: \_\_\_\_\_

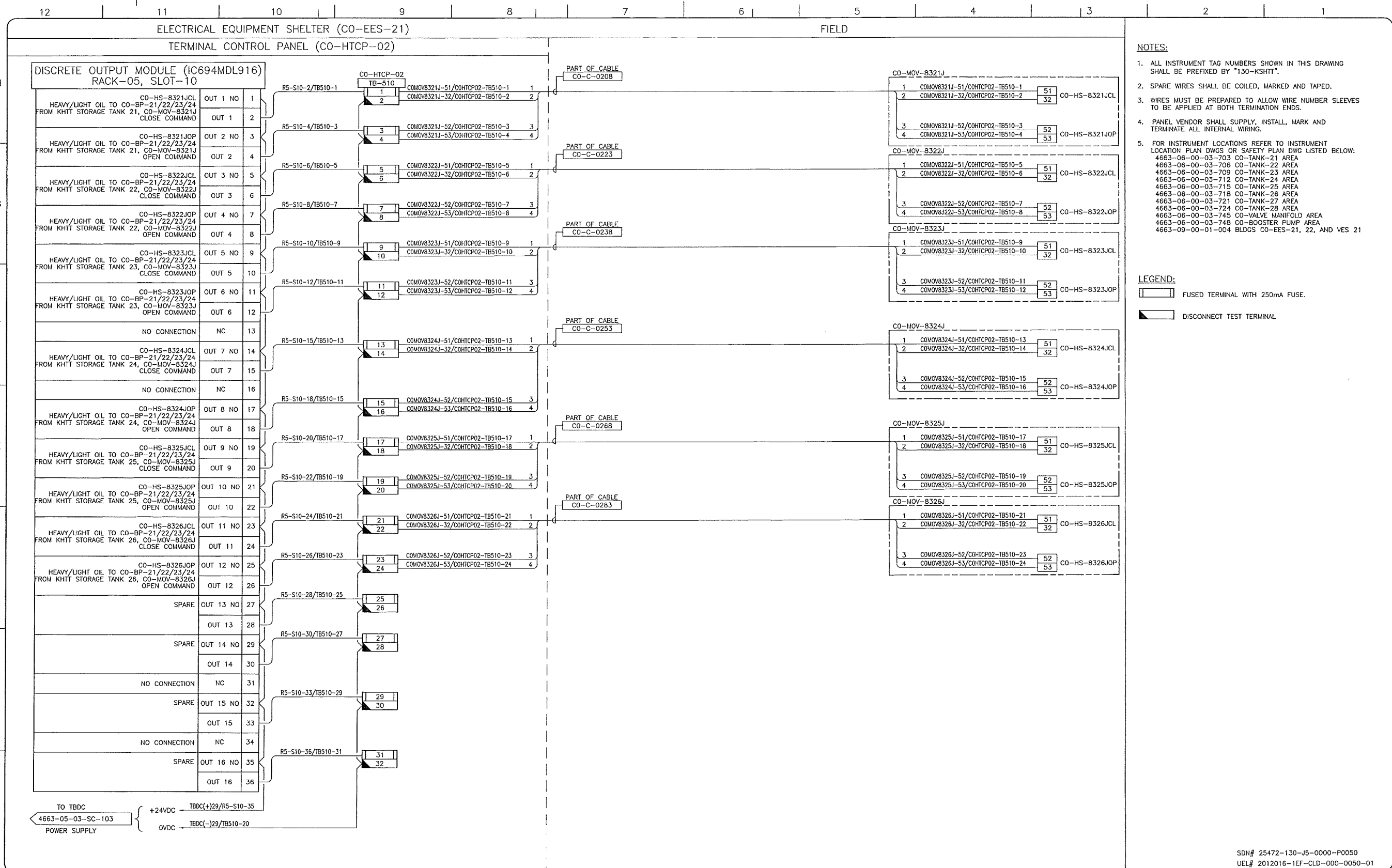
**TransCanada**  
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**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHANGE: \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-147 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0050  
 UEL# 2012016-1EF-CLD-000-0050-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. No. DATE PERMIT NUMBER:

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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANAGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 10  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-154 REV 00

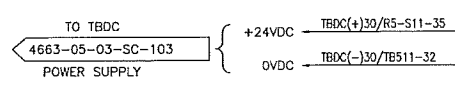
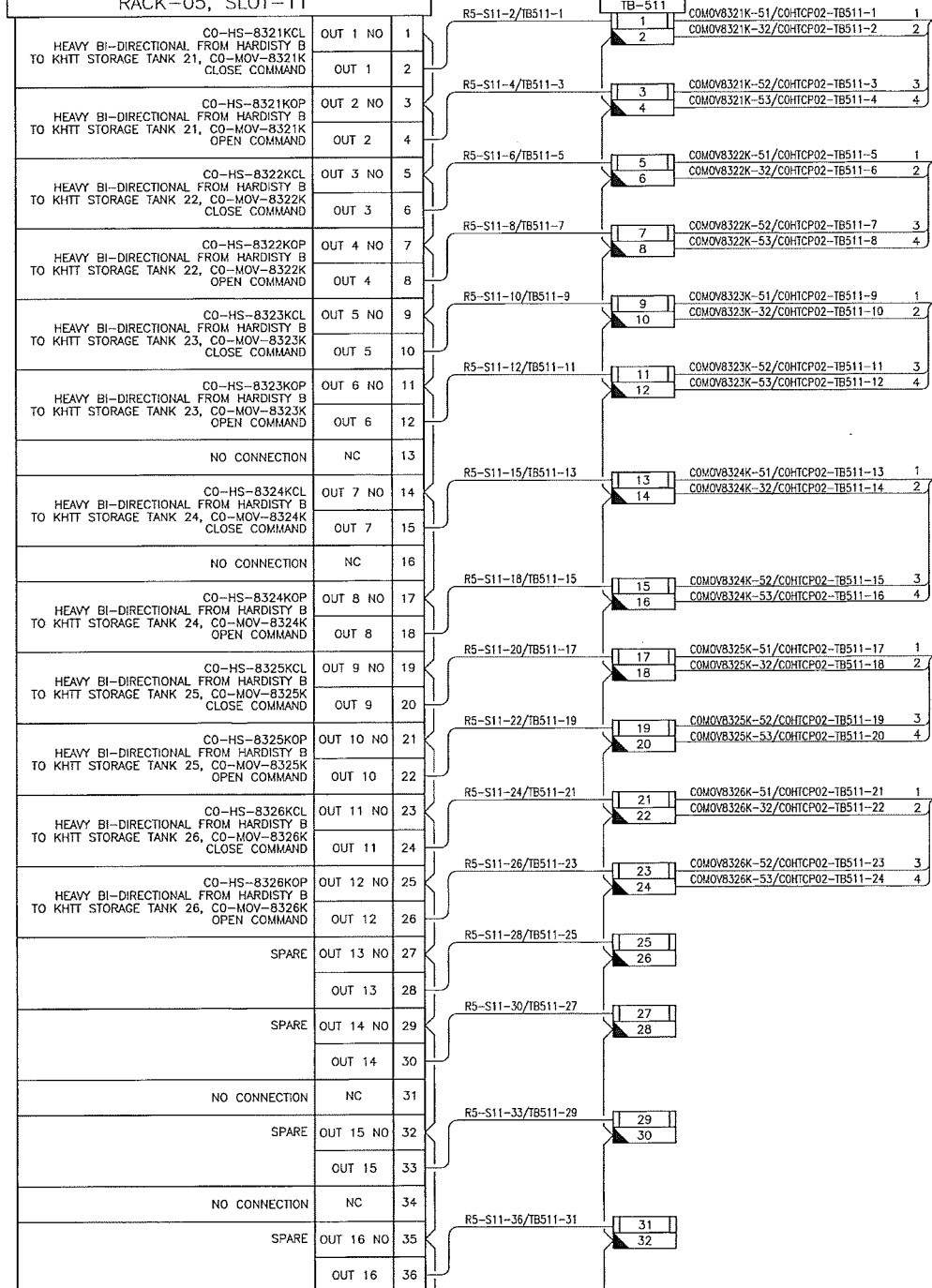
12 11 10 9 8 7 6 5 4 3 2 1

ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)

FIELD

TERMINAL CONTROL PANEL (CO-HTCP-02)

DISCRETE OUTPUT MODULE (IC694MDL916)  
RACK-05, SLOT-11



PART OF CABLE  
CO-C-0209

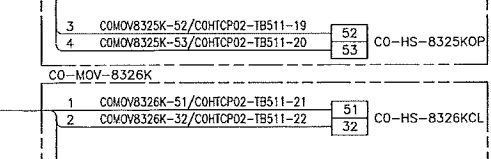
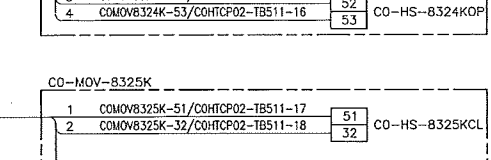
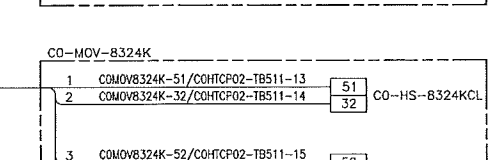
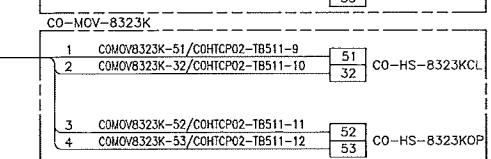
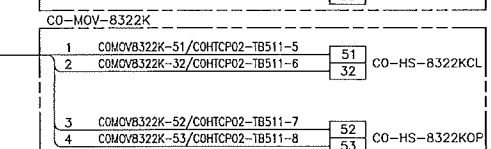
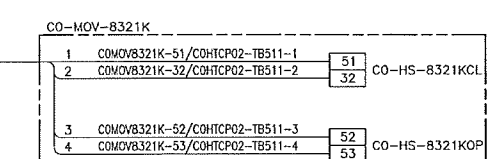
PART OF CABLE  
CO-C-0224

PART OF CABLE  
CO-C-0239

PART OF CABLE  
CO-C-0254

PART OF CABLE  
CO-C-0269

PART OF CABLE  
CO-C-0284



- NOTES:
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
4663-06-00-03-703 CO-TANK-21 AREA  
4663-08-00-03-706 CO-TANK-22 AREA  
4663-08-00-03-709 CO-TANK-23 AREA  
4663-08-00-03-712 CO-TANK-24 AREA  
4663-08-00-03-715 CO-TANK-25 AREA  
4663-06-00-03-718 CO-TANK-26 AREA  
4663-06-00-03-721 CO-TANK-27 AREA  
4663-06-00-03-724 CO-TANK-28 AREA  
4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
4663-08-00-03-748 CO-BOOSTER PUMP AREA  
4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:
- [Symbol] FUSED TERMINAL WITH 250mA FUSE.
  - [Symbol] DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0051  
UEL# 2012016-1EF-CLD-000-0051-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DIAC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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In business to deliver

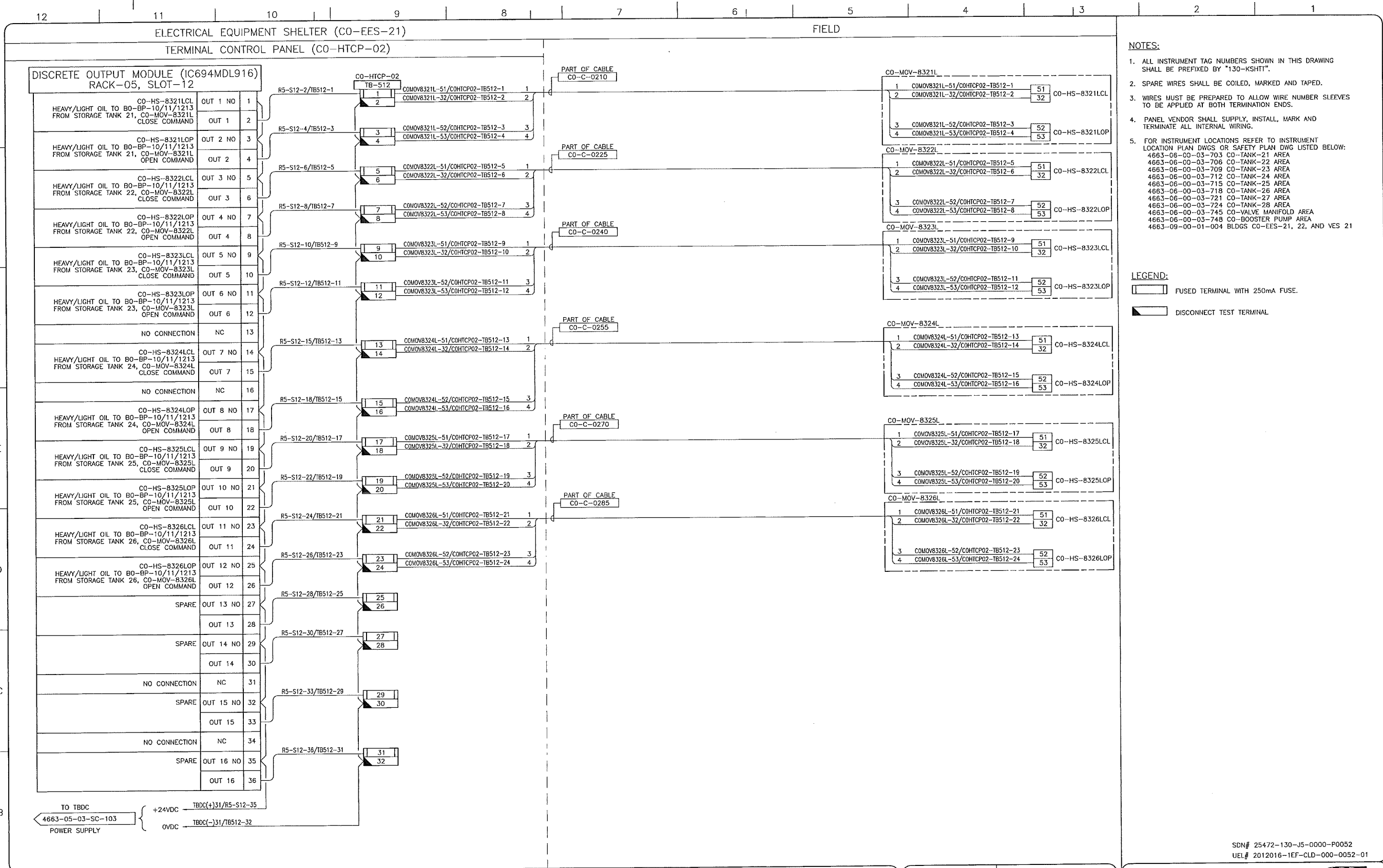
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 11  
DISCRETE OUTPUT - RELAY  
I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-155 REV 00



REFERENCE DRAWINGS	
DRAWING NO	TITLE

REVISION				APPROVAL					
REV	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-26	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-27

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-JS-0000-P0052  
 UEL# 2012016-1EF-CLD-000-0052-01

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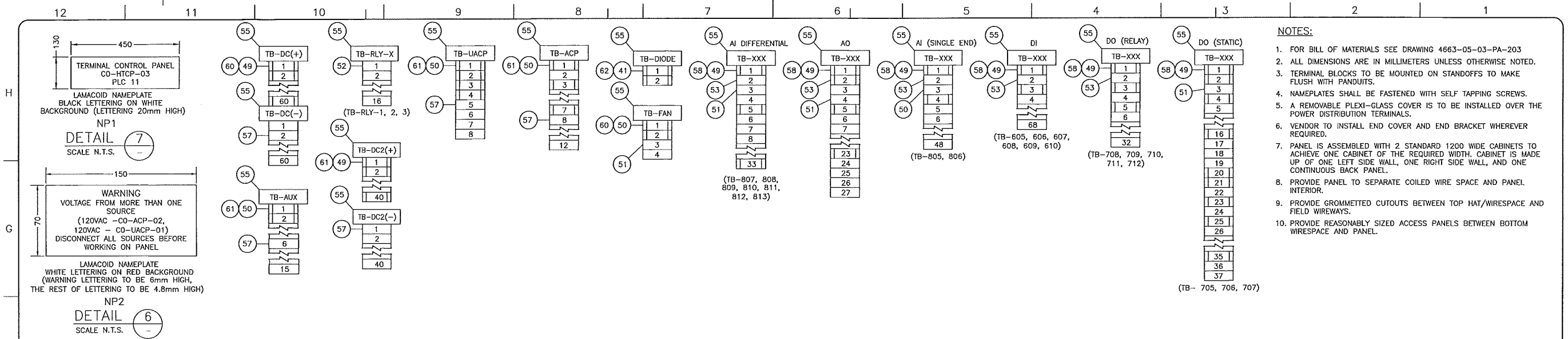
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

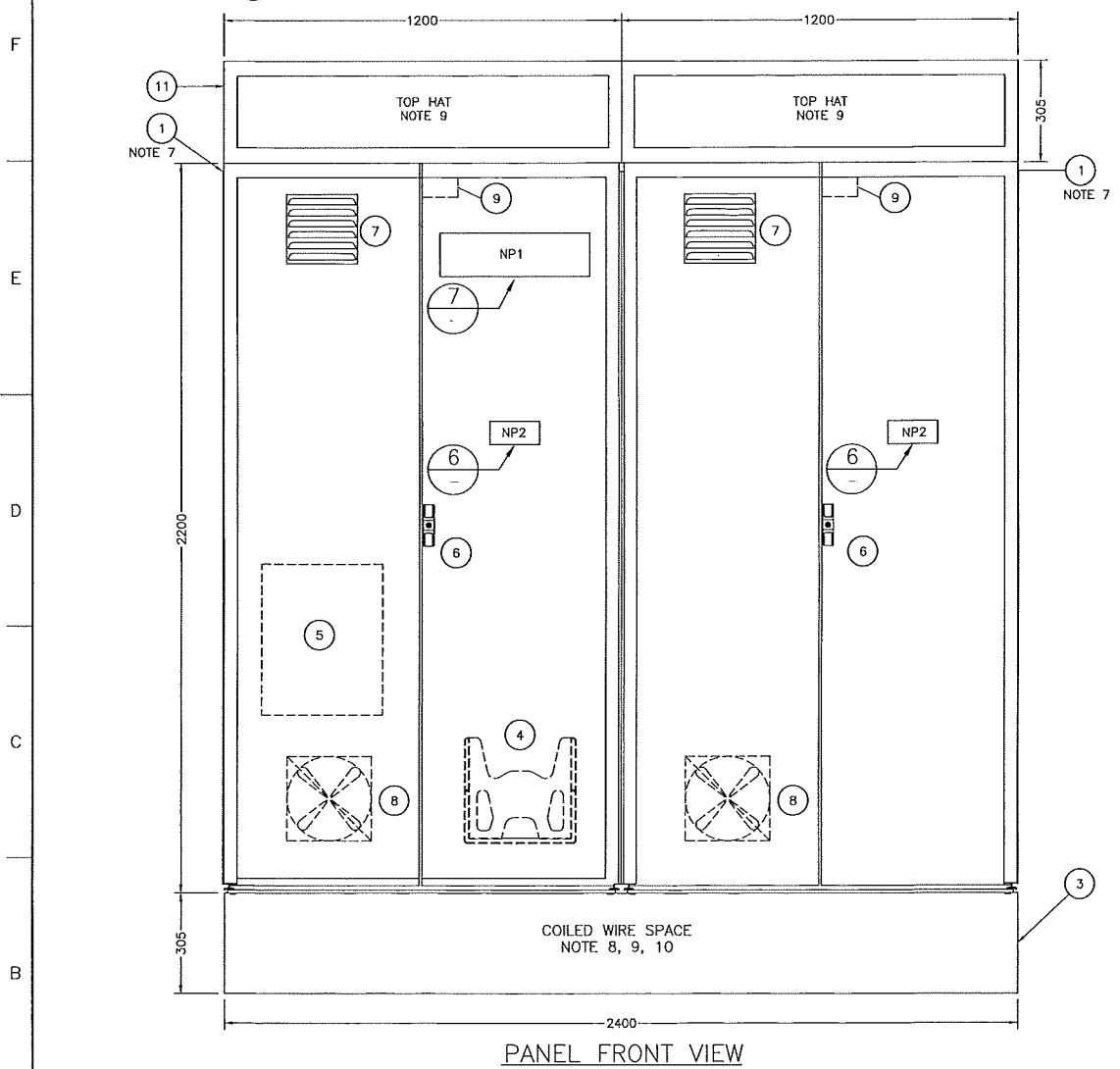
FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-02, PLC-11/05 SLOT 12  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING NO 4663-05-03-SC-156 REV 00



- NOTES:**
- FOR BILL OF MATERIALS SEE DRAWING 4663-05-03-PA-203
  - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  - TERMINAL BLOCKS TO BE MOUNTED ON STANDOFFS TO MAKE FLUSH WITH PANDUITS.
  - NAMEPLATES SHALL BE FASTENED WITH SELF TAPPING SCREWS.
  - A REMOVABLE PLEXI-GLASS COVER IS TO BE INSTALLED OVER THE POWER DISTRIBUTION TERMINALS.
  - VENDOR TO INSTALL END COVER AND END BRACKET WHEREVER REQUIRED.
  - PANEL IS ASSEMBLED WITH 2 STANDARD 1200 WIDE CABINETS TO ACHIEVE ONE CABINET OF THE REQUIRED WIDTH. CABINET IS MADE UP OF ONE LEFT SIDE WALL, ONE RIGHT SIDE WALL, AND ONE CONTINUOUS BACK PANEL.
  - PROVIDE PANEL TO SEPARATE COILED WIRE SPACE AND PANEL INTERIOR.
  - PROVIDE GROMMETTED CUTOUTS BETWEEN TOP HAT/WIRESPACE AND FIELD WIREWAYS.
  - PROVIDE REASONABLY SIZED ACCESS PANELS BETWEEN BOTTOM WIRESPACE AND PANEL.



NAMEPLATE SCHEDULE					
ITEM	LABEL	TYPE	NAMEPLATE SIZE WxH	LETTER SIZE	COLOR BACKGROUND/LETTER
NP1	PANEL NAMEPLATE (DETAIL 7)	LAMICOID	450mm X 130mm (18" X 5")	20.0mm (0.79")	WHITE/BLACK
NP2	WARNING PLATE (DETAIL 6)	LAMICOID	150mm X 70mm (6" X 2.75")	6.0mm (0.24")/4.8 (0.19")	RED/WHITE
NP3					
NP4					
NP5	PS-1	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP6	PS-2	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP7	PLC-11/06	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP8	PLC-11/07	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP9	PLC-11/08	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP10					
NP11					
NP12					
NP13	DIODE MODULE	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP14					
NP15					
NP16					
NP17	ETHERNET CONNECTORS (TB-ETM)	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP18					
NP19					
NP20	EQUIPMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK
NP21	INSTRUMENT GROUND BUS	LAMICOID	75mm X 25mm (2.95" X 0.98")	4.8mm (0.19")	WHITE/BLACK

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DNC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: [Signature]

PERMIT/ ENG. APPROVAL: [Signature]

DATE: [Date]

2013-OCT-03

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-JC-0000-P0017  
UEL# 2012016-1EF-CAB-000-0011-01

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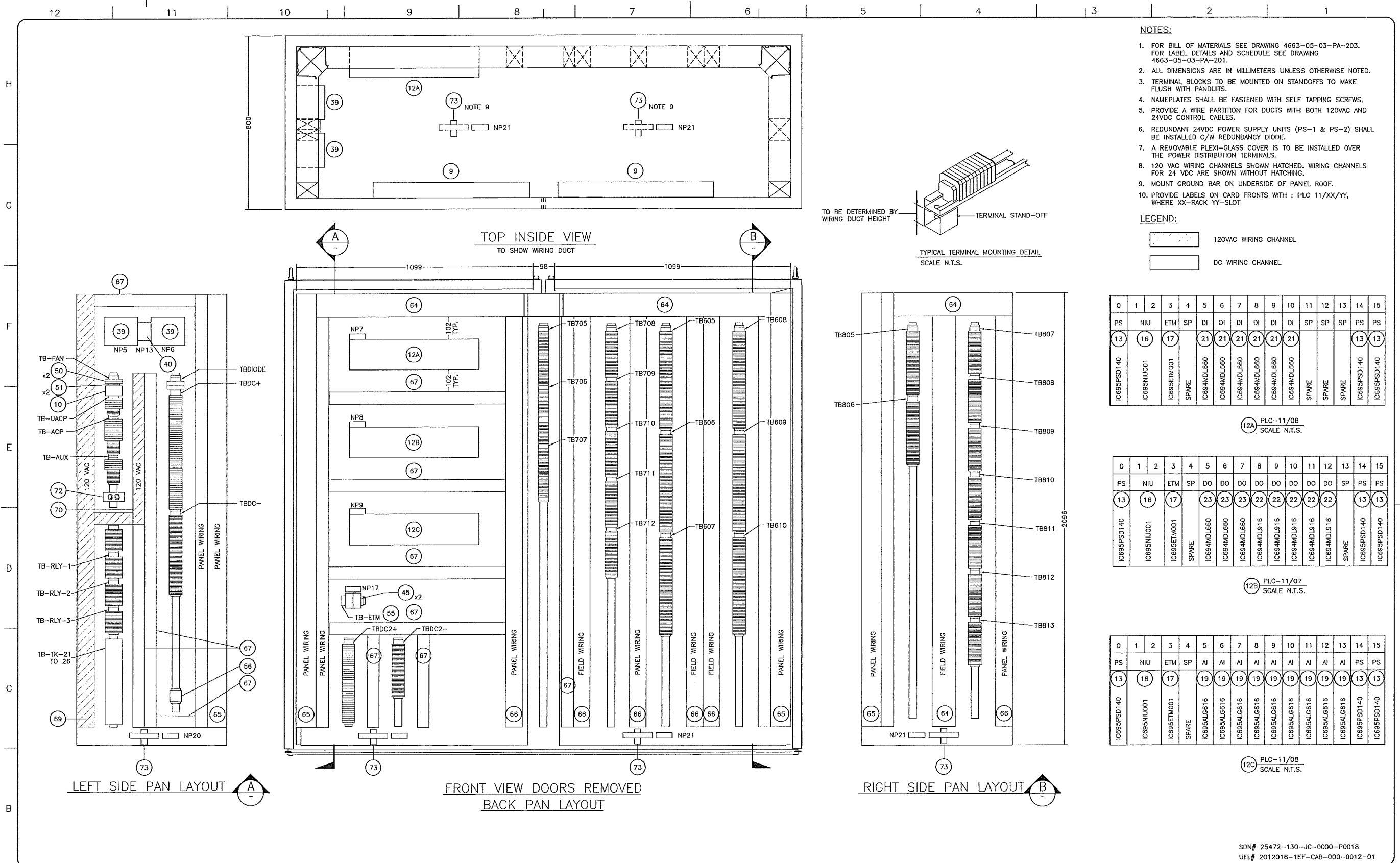
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

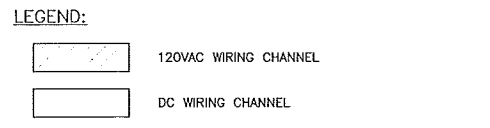
FIA # 4663 CHAINAGE: DISCIPLINE # 05

KHIT CONTROL PANEL  
(CO-HTCP-03), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 1 OF 2

SCALE N.T.S. DRAWING No 4663-05-03-PA-201 REV 00



- NOTES:**
- FOR BILL OF MATERIALS SEE DRAWING 4663-05-03-PA-203. FOR LABEL DETAILS AND SCHEDULE SEE DRAWING 4663-05-03-PA-201.
  - ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  - TERMINAL BLOCKS TO BE MOUNTED ON STANDOFFS TO MAKE FLUSH WITH PANDUITS.
  - NAMEPLATES SHALL BE FASTENED WITH SELF TAPPING SCREWS.
  - PROVIDE A WIRE PARTITION FOR DUCTS WITH BOTH 120VAC AND 24VDC CONTROL CABLES.
  - REDUNDANT 24VDC POWER SUPPLY UNITS (PS-1 & PS-2) SHALL BE INSTALLED C/W REDUNDANCY DIODE.
  - A REMOVABLE PLEXI-GLASS COVER IS TO BE INSTALLED OVER THE POWER DISTRIBUTION TERMINALS.
  - 120 VAC WIRING CHANNELS SHOWN HATCHED. WIRING CHANNELS FOR 24 VDC ARE SHOWN WITHOUT HATCHING.
  - MOUNT GROUND BAR ON UNDERSIDE OF PANEL ROOF.
  - PROVIDE LABELS ON CARD FRONTS WITH : PLC 11/XX/YY, WHERE XX=RACK YY=SLOT



0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PS	NIU	ETM	SP	DI	DI	DI	DI	DI	DI	DI	SP	SP	SP	PS	PS
13	16	17		21	21	21	21	21	21	21				13	13
IC695PSD140	IC695NIU001	IC695ETM001	SPARE	IC695MDL660	IC695MDL660	IC695MDL660	IC695MDL660	IC695MDL660	IC695MDL660	IC695MDL660	SPARE	SPARE	SPARE	IC695PSD140	IC695PSD140

12A PLC-11/06  
SCALE N.T.S.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PS	NIU	ETM	SP	DO	DO	DO	DO	DO	DO	DO	DO	DO	SP	PS	PS
13	16	17		23	23	23	22	22	22	22	22	22		13	13
IC695PSD140	IC695NIU001	IC695ETM001	SPARE	IC695MDL660	IC695MDL660	IC695MDL660	IC695MDL916	IC695MDL916	IC695MDL916	IC695MDL916	IC695MDL916	IC695MDL916	SPARE	IC695PSD140	IC695PSD140

12B PLC-11/07  
SCALE N.T.S.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PS	NIU	ETM	SP	AI	AI	AI	AI	AI	AI	AI	AI	AI	AI	PS	PS
13	16	17		19	19	19	19	19	19	19	19	19	19	13	13
IC695PSD140	IC695NIU001	IC695ETM001	SPARE	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695ALG616	IC695PSD140	IC695PSD140

12C PLC-11/08  
SCALE N.T.S.

**REFERENCE DRAWINGS**

DRAWING No	TITLE

**REVISION**

REV No	DATE	DESCRIPTION
00	2013-10-03	ISSUED FOR CONSTRUCTION (JEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: [Signature]

PERMIT/ ENG. APPROVAL: [Signature]

DATE: [Date]

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-JC-0000-P0018  
UEL# 2012016-1EF-CAB-000-0012-01

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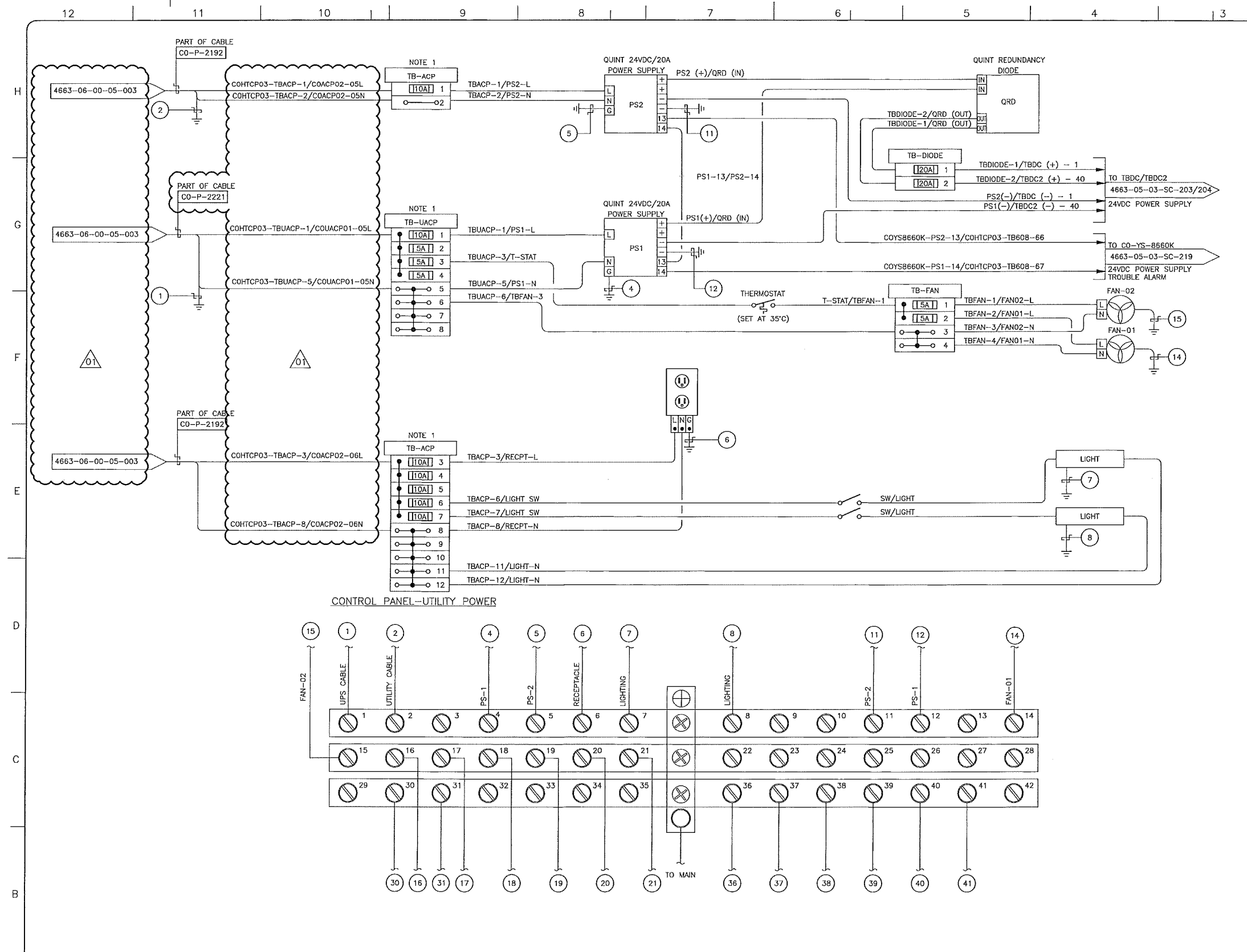
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANAGE: DISCIPLINE # 05

KHTT CONTROL PANEL  
(CO-HTCP-03), PLC-11, (CO-EES-21)  
PANEL LAYOUT SHEET 2 OF 2

SCALE 1 : 8 DRAWING No 4663-05-03-PA-202 REV 00



**NOTES:**

- TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE AWG #12.
- PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.

**LEGEND:**

[120A] 4 FUSED TERMINAL

○ 5 THRU TERMINAL

(X) GROUND BAR CONNECTION DESIGNATOR (FOR THIS DRAWING ONLY)

4663-05-XX-XX-XXX TO/FROM ARROW

**ABBREVIATIONS:**

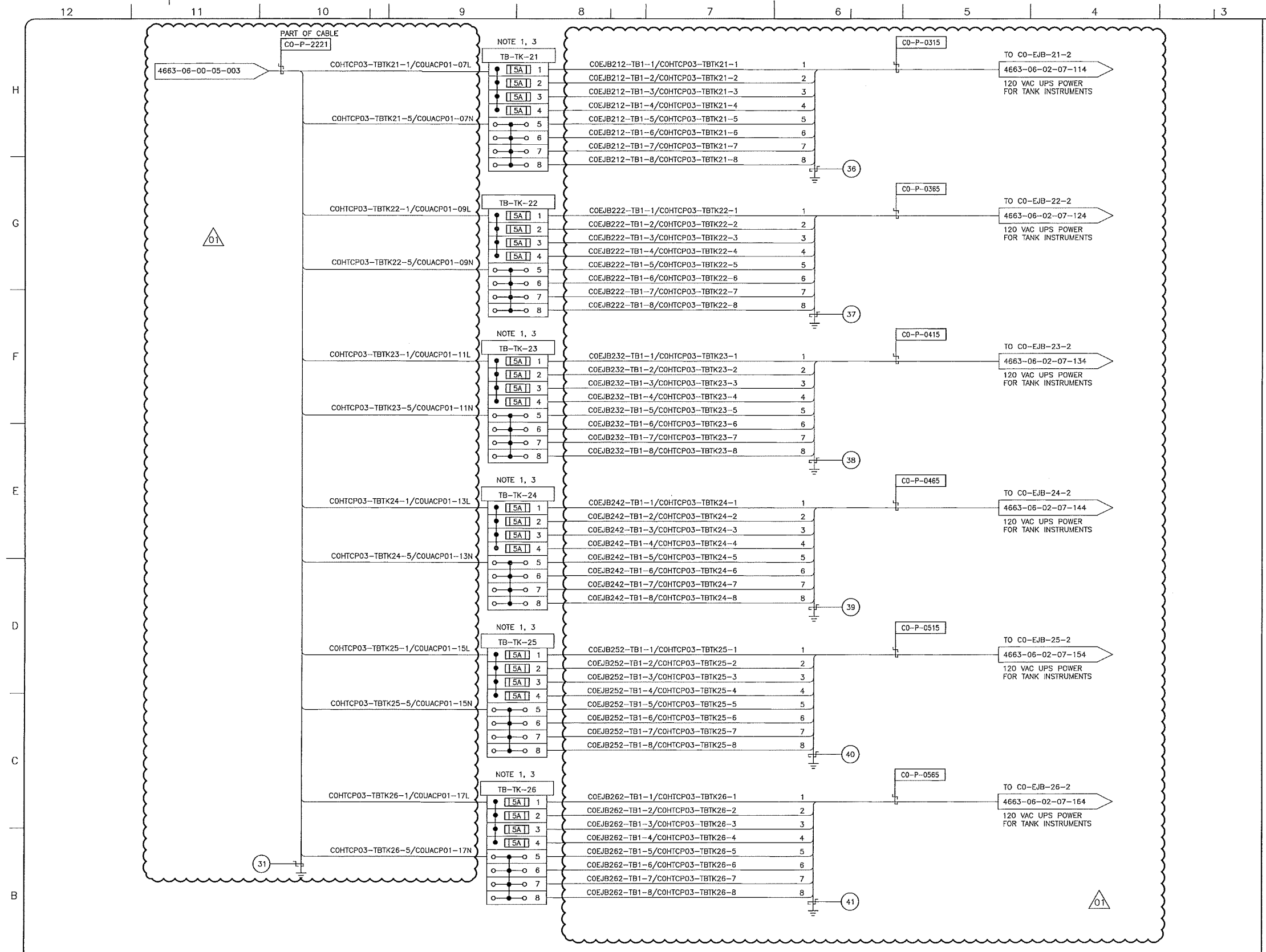
PS - POWER SUPPLY  
 ACP - AC POWER  
 UACP - UPS AC POWER  
 YS - EVENT STATUS

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	
01	2014-02-28	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	

	PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Alberta</small>
--	---

KEystone HARDISTY TANK TERMINAL	
FIA # 4663	DISCIPLINE # 05
<b>KHTT CONTROL PANEL</b> <b>CO-HTCP-03 (CO-EES-21)</b> <b>AC POWER DISTRIBUTION WIRING DIAGRAM</b>	
SCALE N.T.S.	DRAWING No 4663-05-03-SC-201



**NOTES:**

- TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE AWG #12.
- PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
- FINAL FUSE SIZE TO BE COORDINATED WITH VENDOR.

SDN# 25472-130-JC-0000-P0066  
 UEL# 2012016-1EF-EWD-000-0015-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	
01	2014-02-28	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. # 2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	SKC	DWC	SRL	JED	DCB	UPSIDE
2197104	REM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

2014-MAR-5

REV. No. DATE PERMIT NUMBER:

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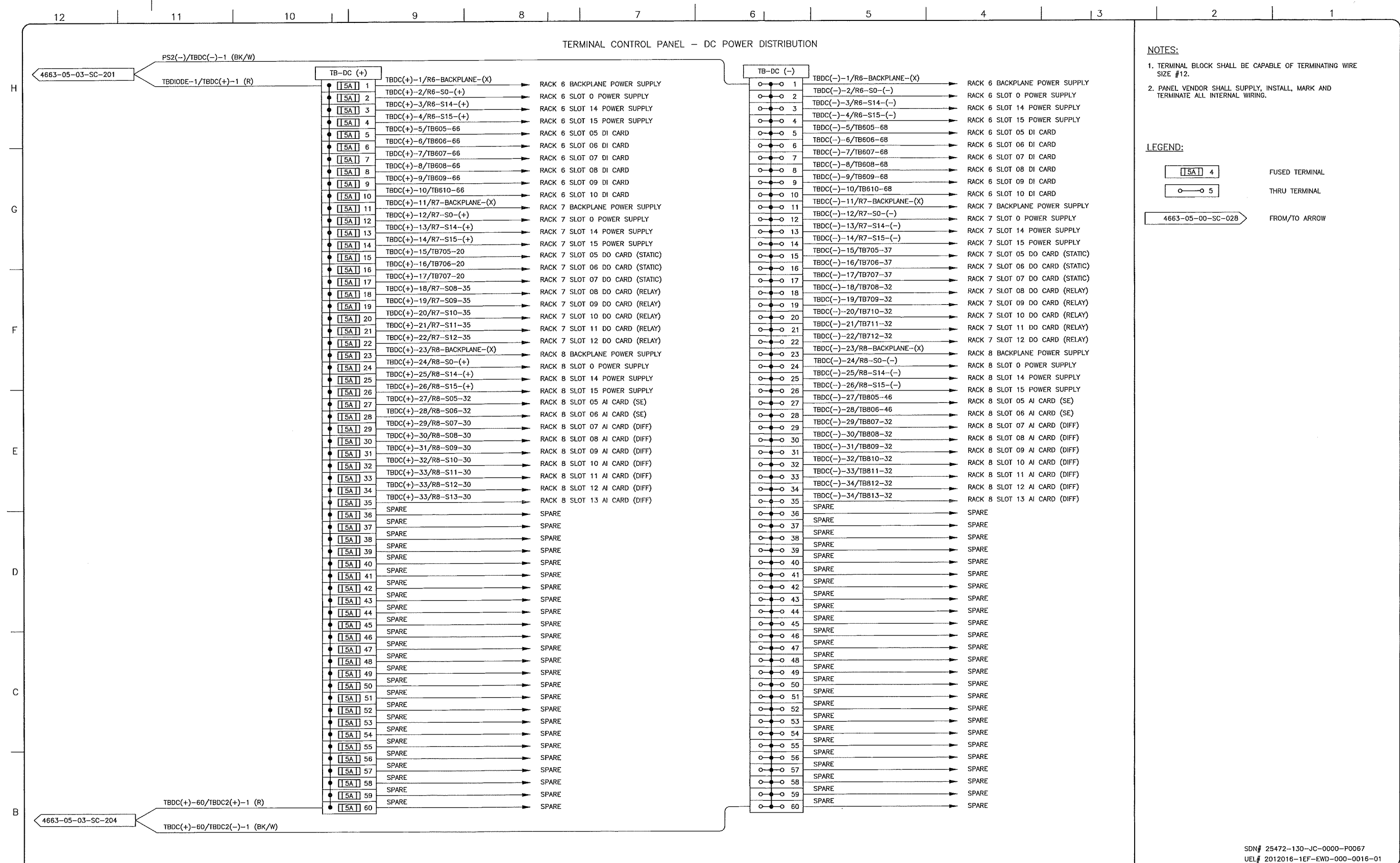
KEYSTONE HARDISTY TANK TERMINAL

CHAIRMAN: 4663 DISCIPLINE # 05

KHTT CONTROL PANEL  
 CO-HTCP-03 (CO-EES-21)  
 AC POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-202 REV 01





- NOTES:**
1. TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE #12.
  2. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
- LEGEND:**
- 15A 4 FUSED TERMINAL
  - 5 THRU TERMINAL
  - 4663-05-00-SC-028 FROM/TO ARROW

SDN# 25472-130-JC-0000-P0067  
 UEL# 2012016-1EF-EWD-000-0016-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
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 PERMIT NUMBER: P 5508

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2013-oct-03

REV. NO. DATE PERMIT NUMBER:

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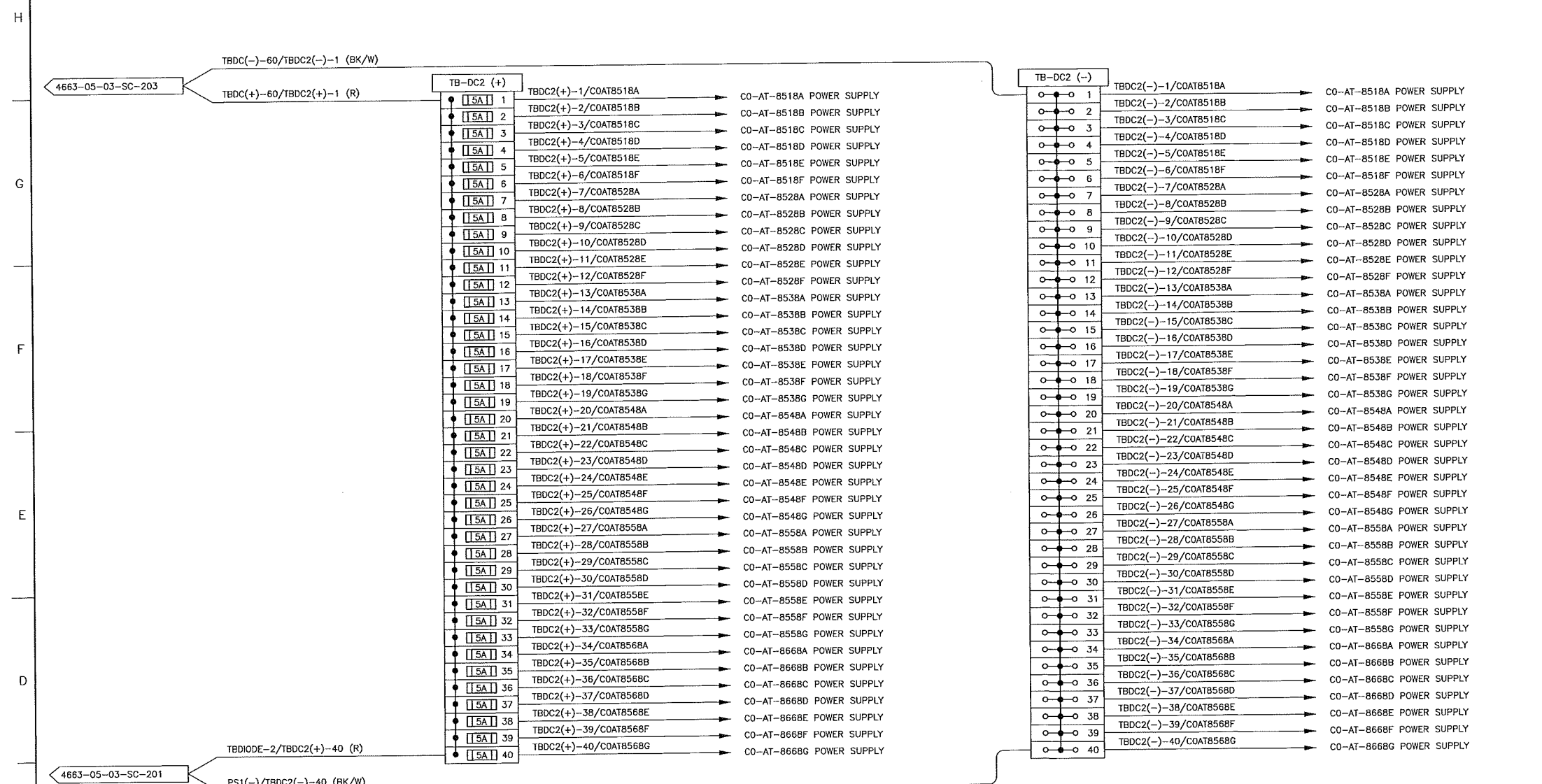
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

KHIT CONTROL PANEL  
 CO-HTCP-03 (CO-EES-21)  
 DC POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-203 REV '00

TERMINAL CONTROL PANEL - DC POWER DISTRIBUTION



**NOTES:**  
 1. TERMINAL BLOCK SHALL BE CAPABLE OF TERMINATING WIRE SIZE #12.  
 2. PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.

**LEGEND:**  
  
 1. FUSED TERMINAL  
 2. THRU TERMINAL  
 3. FROM/TO ARROW

SDN# 25472-130-JC-0000-P0068  
 UEL# 2012016-1EF-EWD-000-0017-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

DATE: 2013-OCT-03

PROFESSIONAL ENGINEER/ALBERTA  
 2013-OCT-03

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
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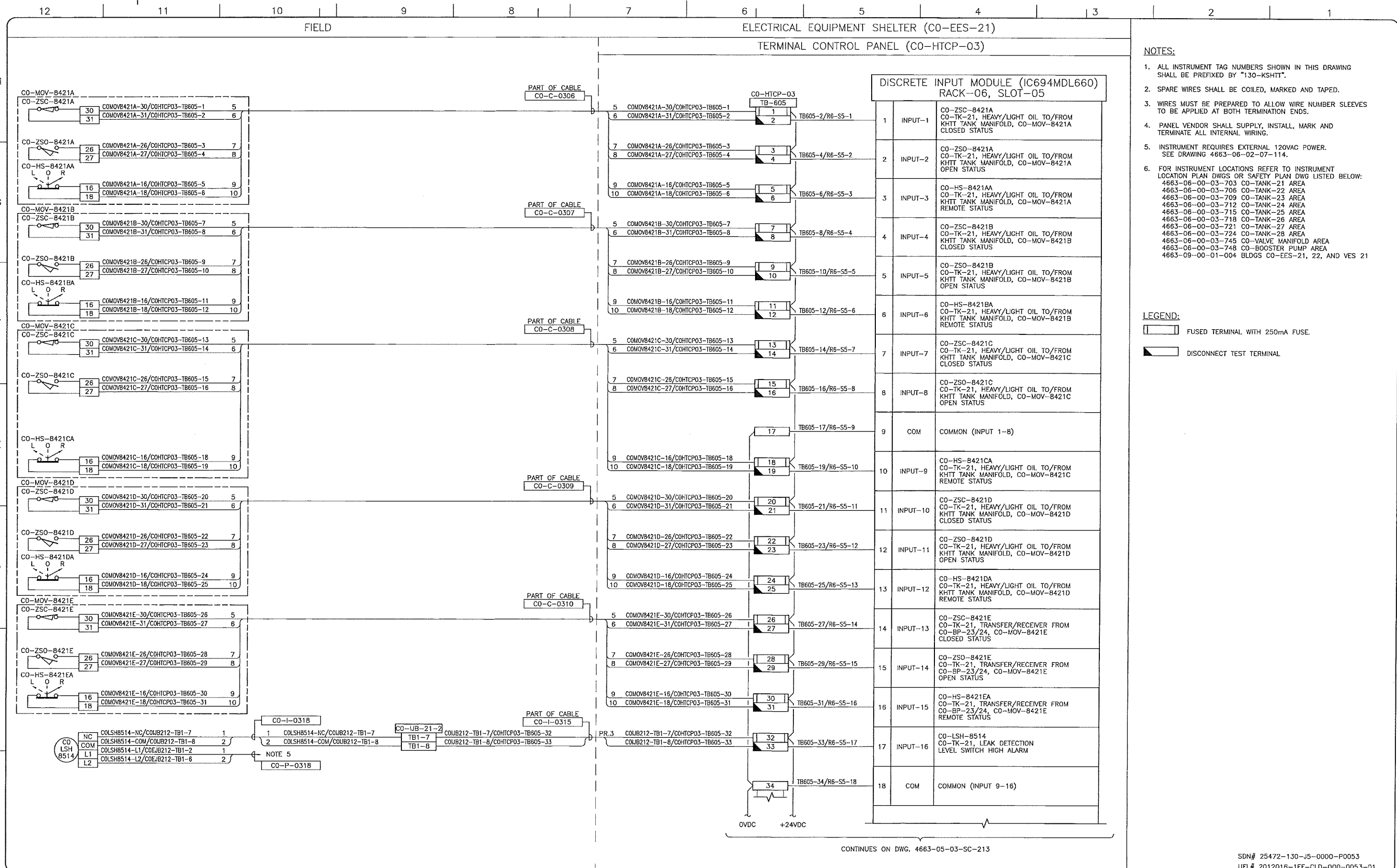
**upside**  
 Engineering Ltd.

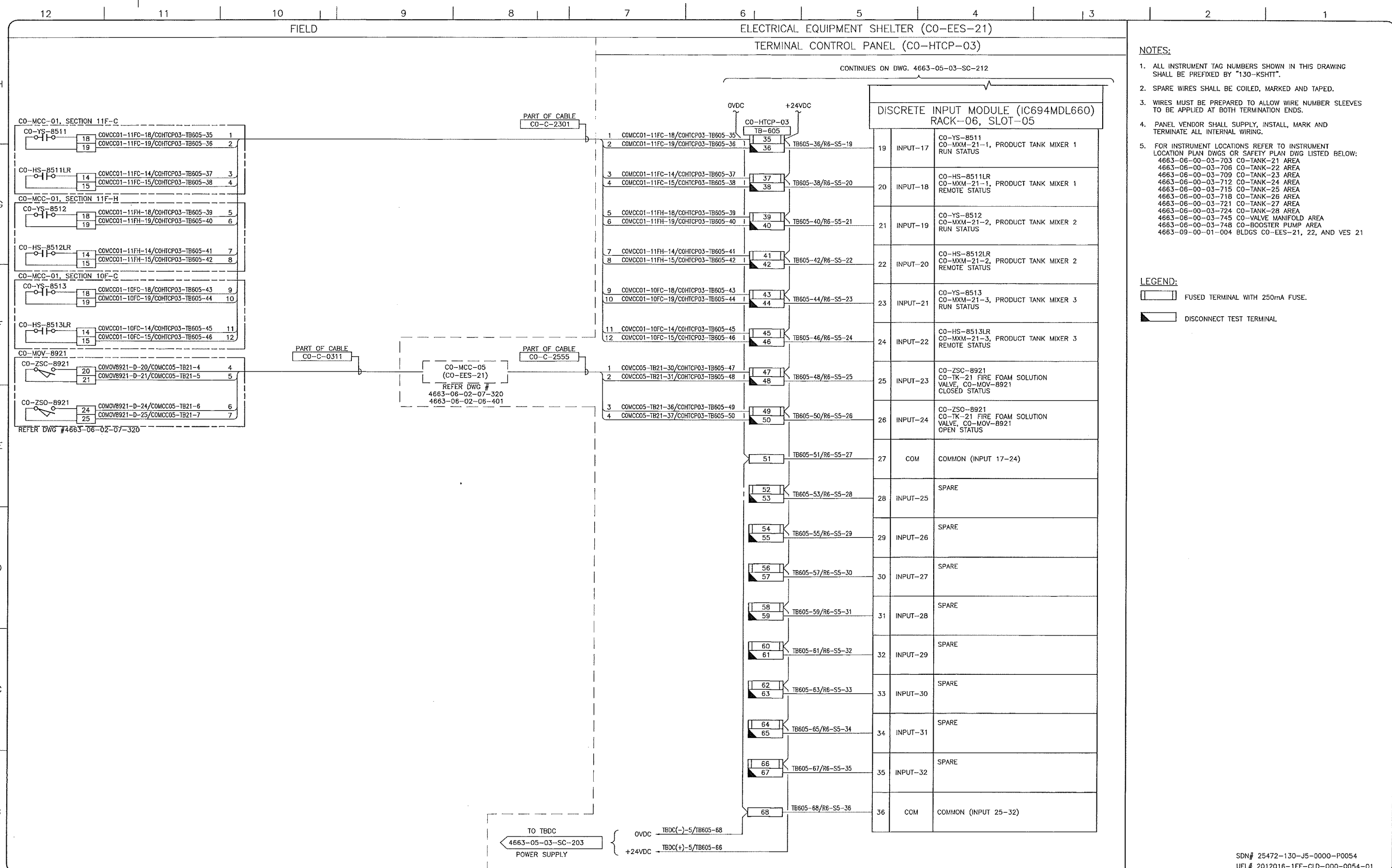
KEYSTONE HARDISTY TANK TERMINAL  
 CHANGE#: DISCIPLINE # 05

FA # 4663

KHIT CONTROL PANEL  
 CO-HTCP-03 (CO-EES-21)  
 DC POWER DISTRIBUTION WIRING DIAGRAM

SCALE: N.T.S. DRAWING No 4663-05-03-SC-204 REV. 00





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0054  
 UEL# 2012016-1EF-CLD-000-0054-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL:

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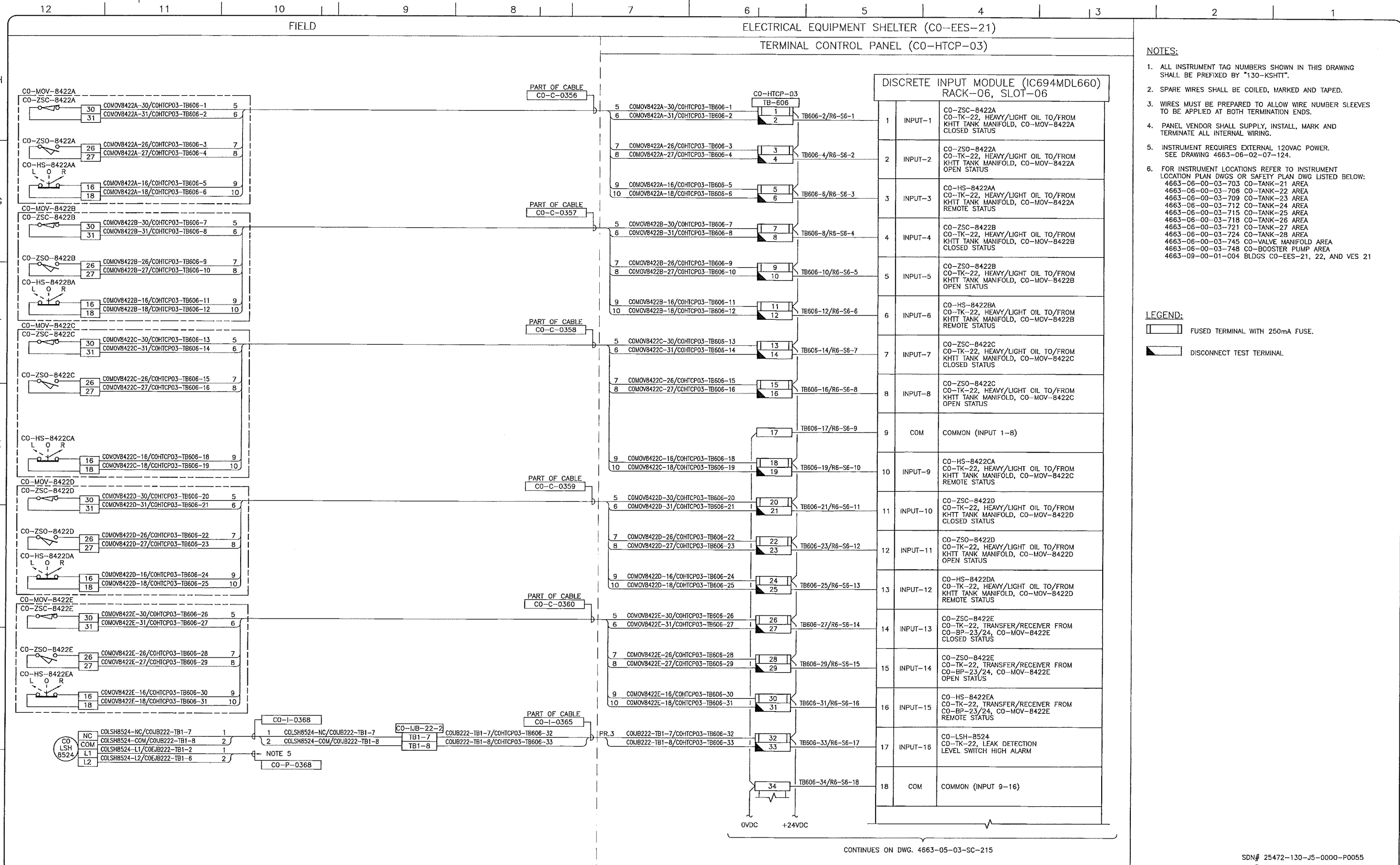
**Upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 05  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-213 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-124.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-215

SDN# 25472-130-J5-0000-P0055  
 UEL# 2012016-1EF-CLD-000-0055-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012018)	2197104	BEM	DWC	SRL	JED

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
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2014-MAR-5

REV. NO. DATE PERMIT NUMBER:

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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

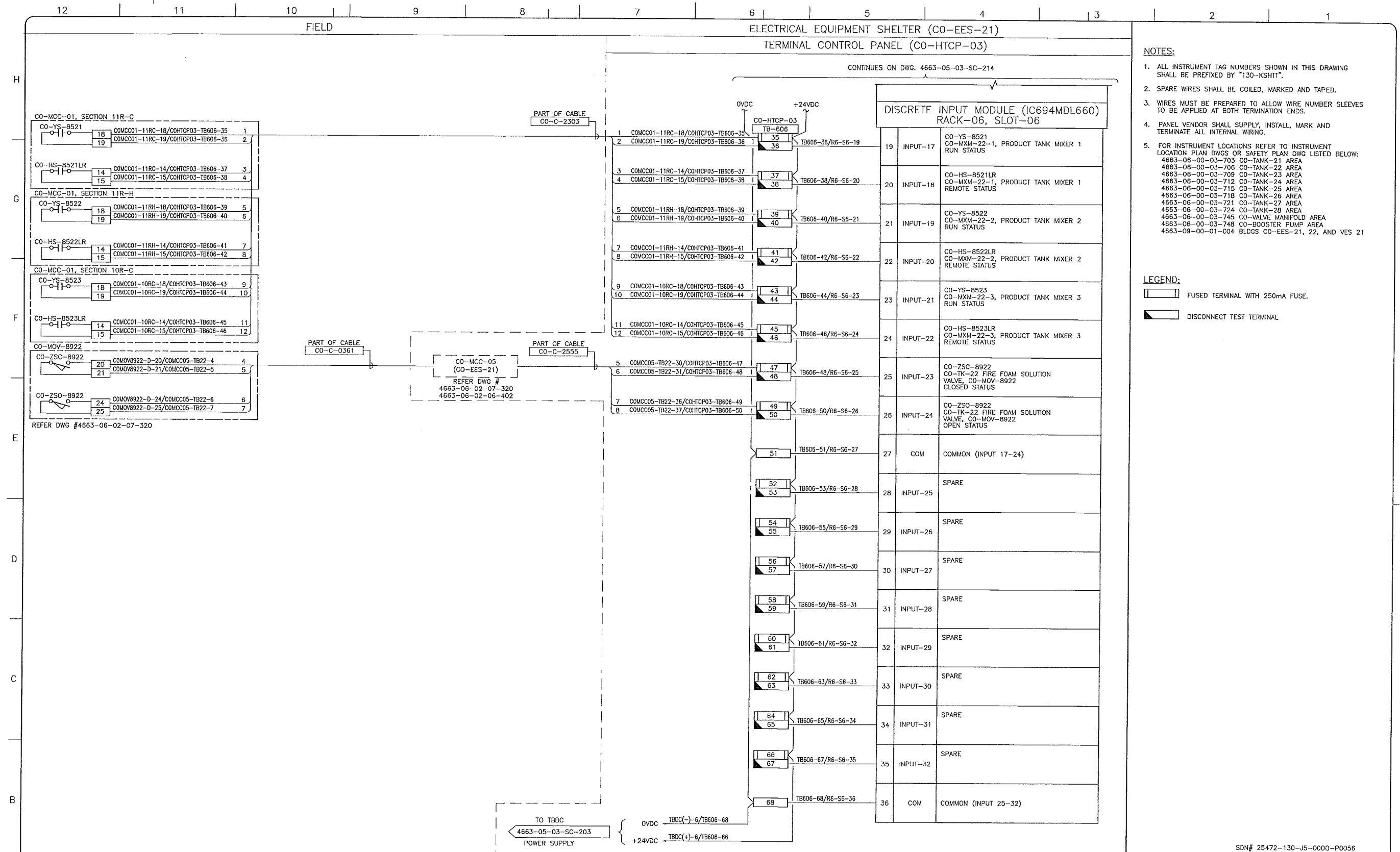
FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-214 REV 00

TC\_A1\_BR.DWG 594X841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
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SDN# 25472-130-J5-0000-P0056  
 UEL# 2012016-1EF-CLD-000-0056-01

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KEYSTONE HARDISTY TANK TERMINAL

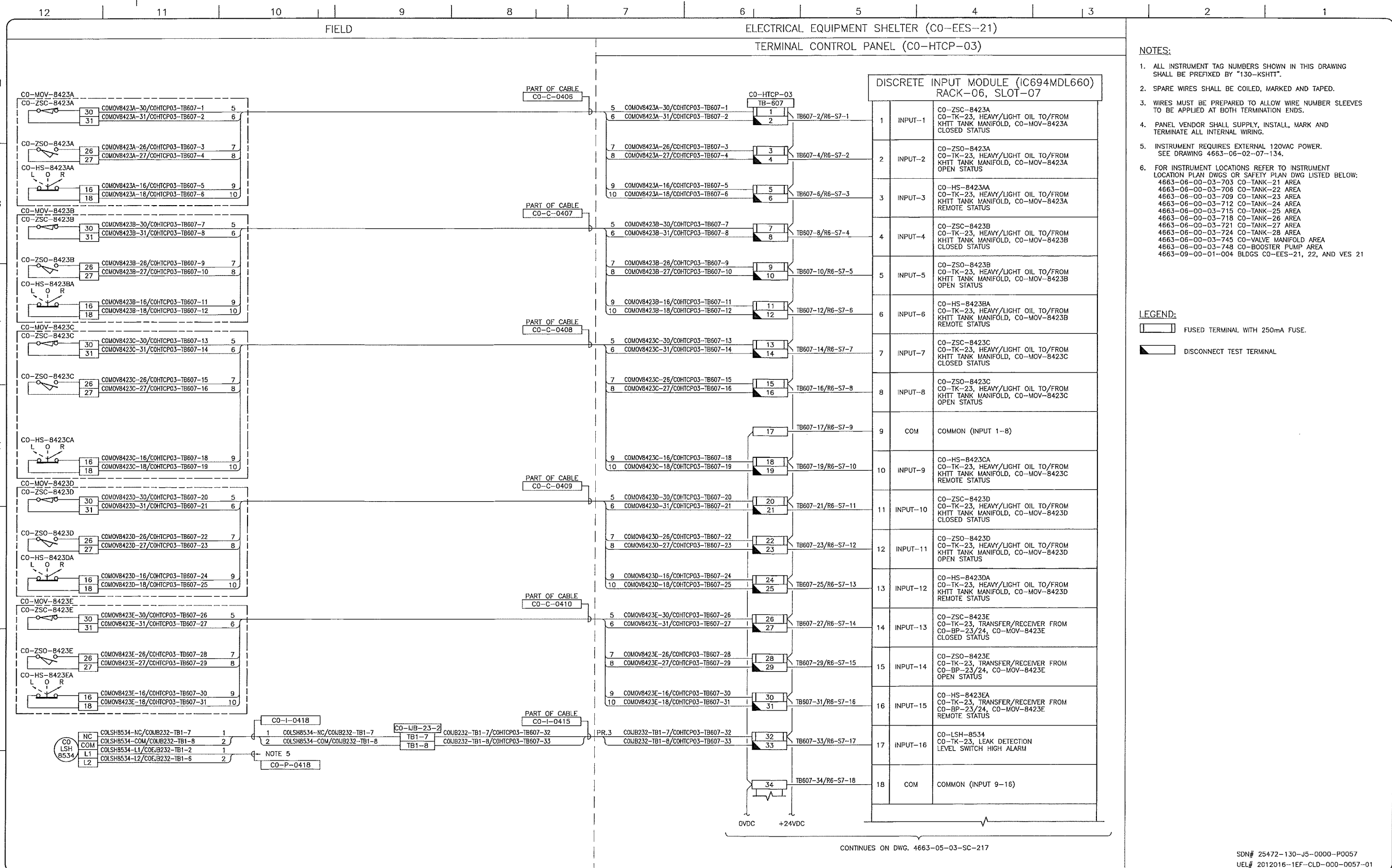
FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 06  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-215 REV: 00

TC\_A1\_BR.DWG 594X841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-134.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-708 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

CONTINUES ON DWG. 4663-05-03-SC-217

SDN# 25472-130-J5-0000-P0057  
 UEL# 2012016-1EF-CLD-000-0057-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	REM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT/ ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

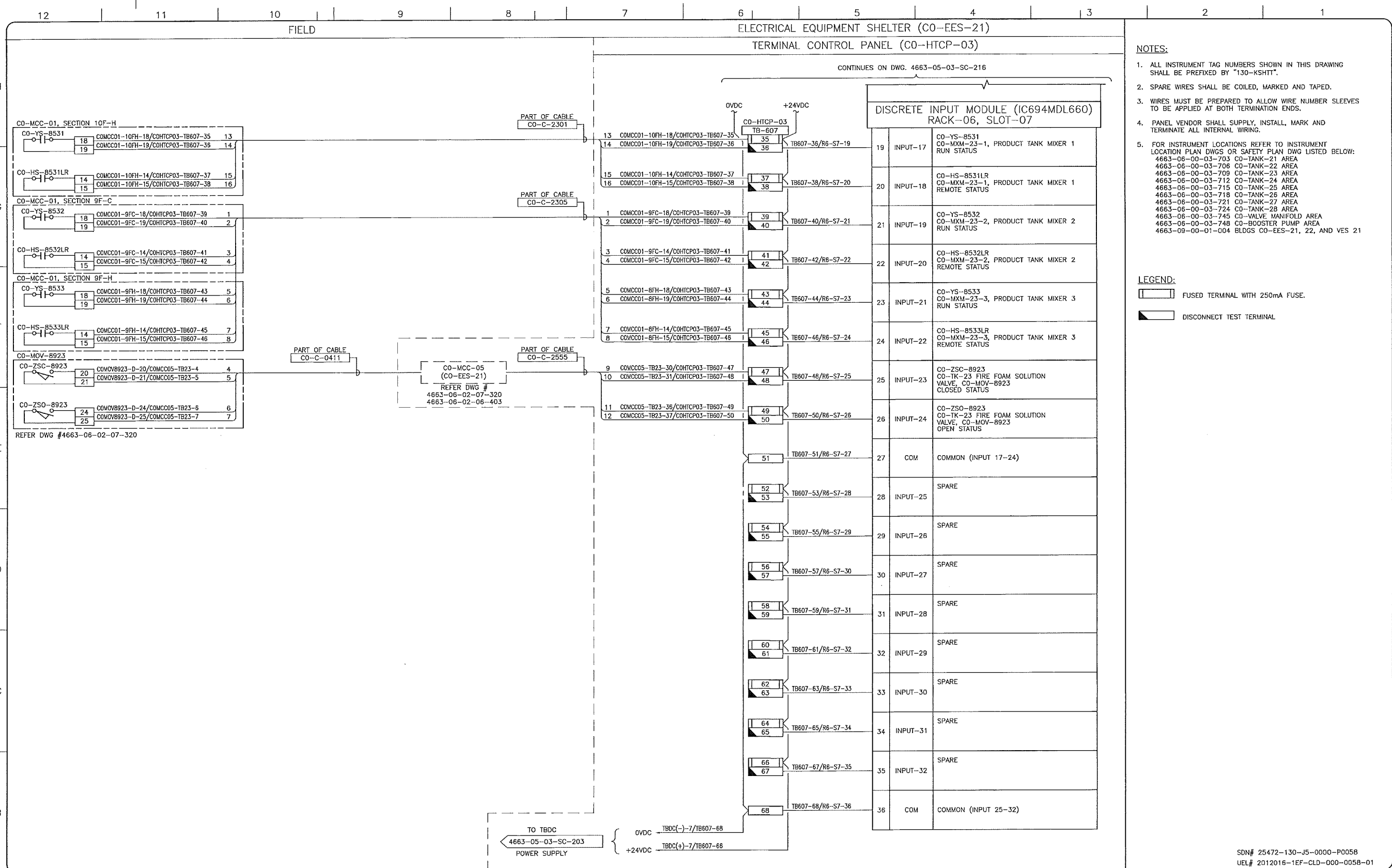
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KEYSTONE HARDISTY TANK TERMINAL  
 FIA # 4663 CHARGE: \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-216 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	PROJECT CODE	DRAFTER
00	2014-02-28	2197104	BEM

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers  
 Geologists and Geophysicists of Alberta

2014-MAR-5

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0058  
 UEL# 2012016-1EF-CLD-000-0058-01

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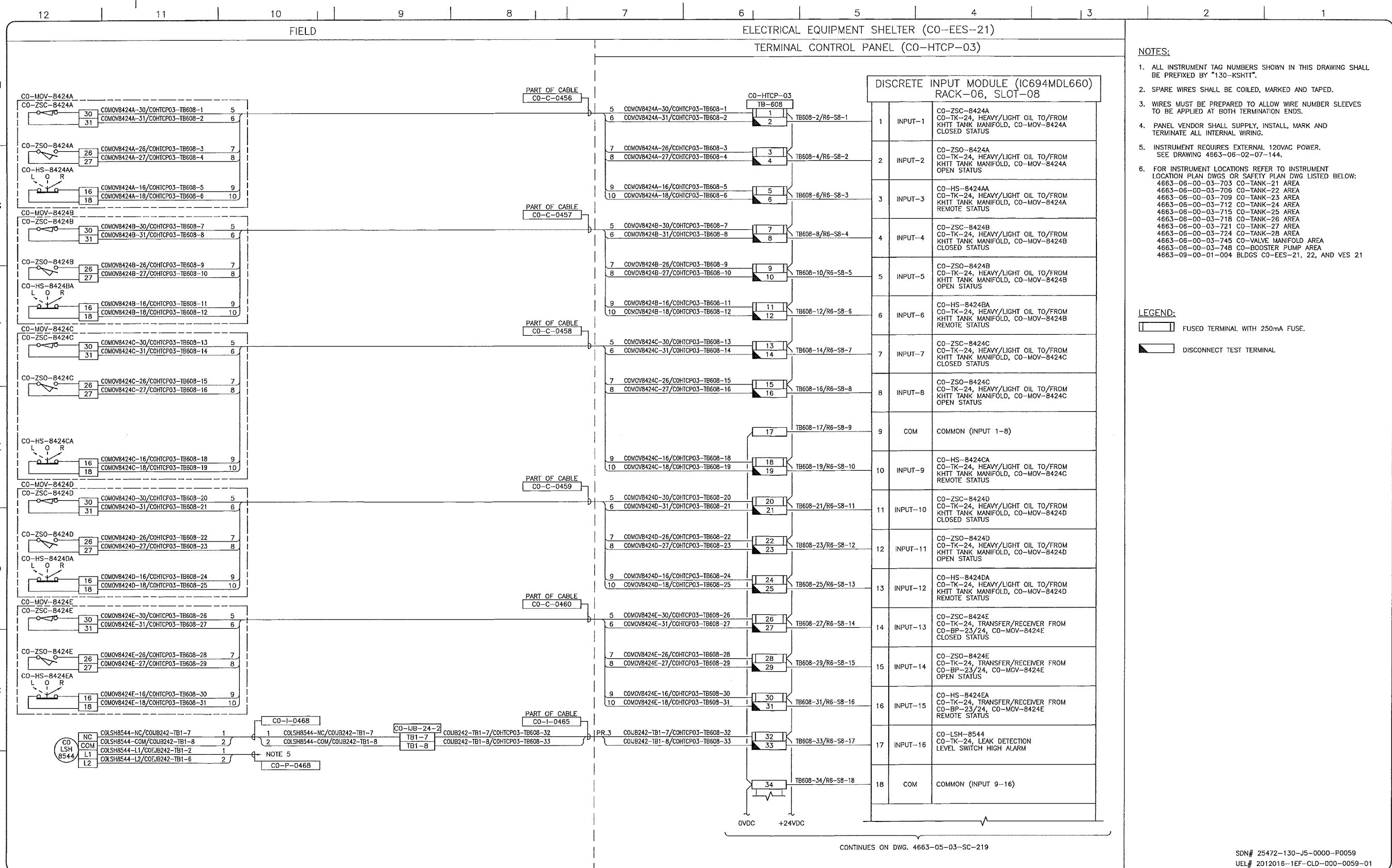
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 07  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-217 REV 00





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-144.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-724 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-219

SDN# 25472-130-J5-0000-P0059  
 UEL# 2012016-1EF-CLD-000-0059-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

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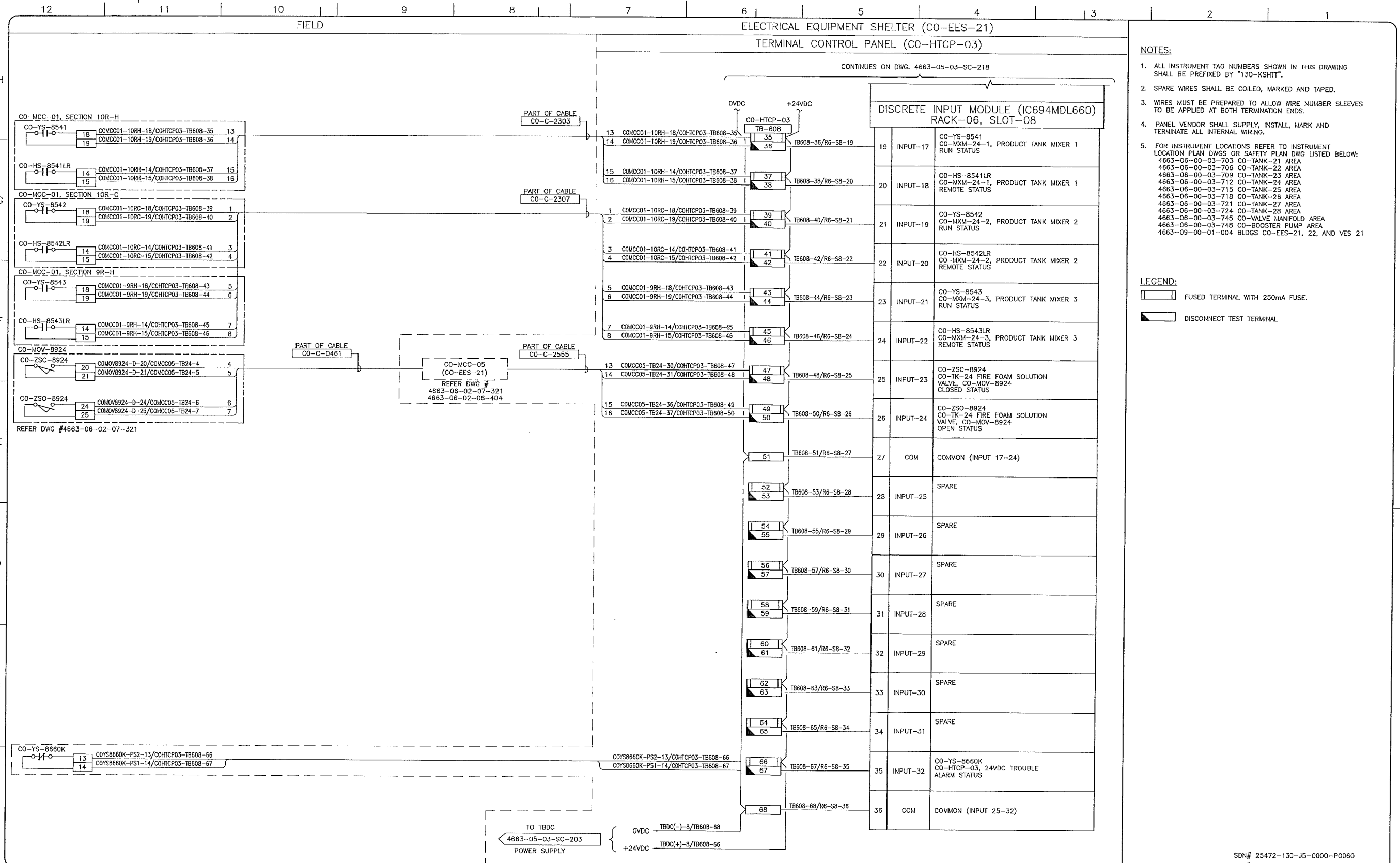
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 08  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-218 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0060  
 UEL# 2012016-1EF-CLD-000-0060-01

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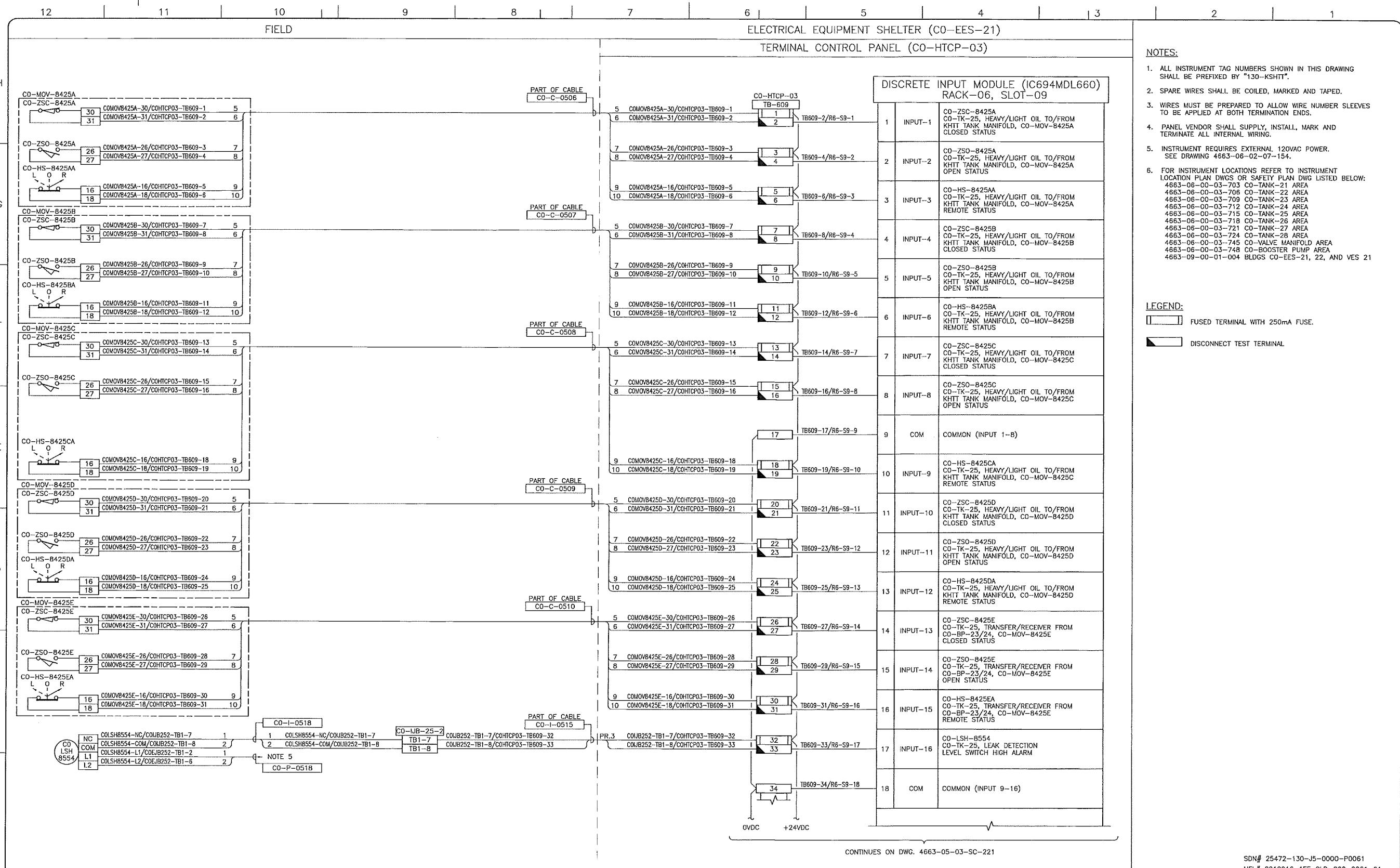
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 08  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-219 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-154.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 12

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-221

SDN# 25472-130-J5-0000-P0061  
 UEL# 2012016-1EF-CLD-000-0061-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL	
REV No	DATE	PROJECT CODE	DRAFTER
00	2014-02-28	2197104	BEM
DESCRIPTION		DESIGNER	DESIGN CHECKER
ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)		SRL	JED
		PROJECT MANAGER	COMPANY
		DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508

2014 MAR 5

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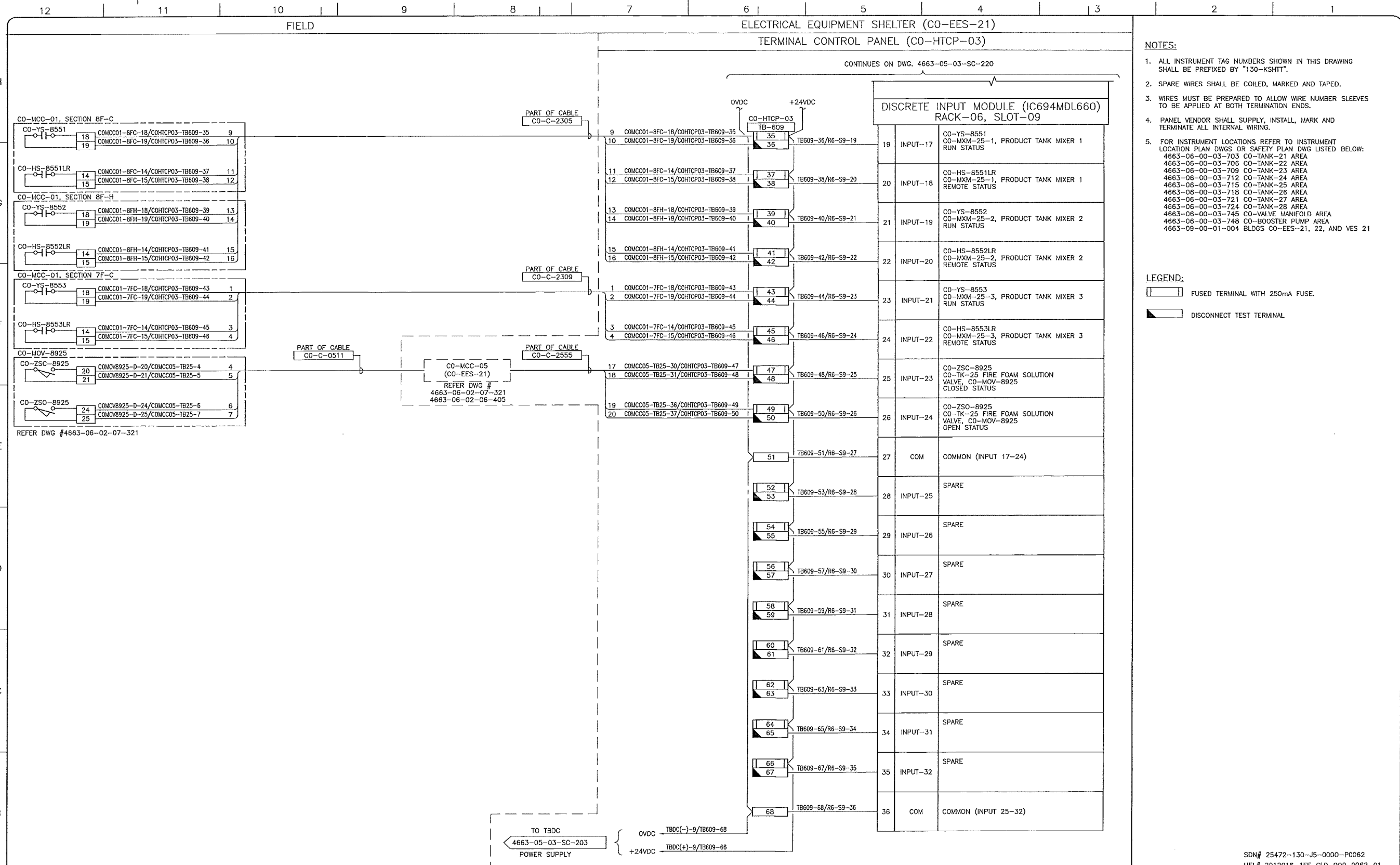
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANNAME: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 1 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-220 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0062  
 UEL# 2012016-1EF-CLD-000-0062-01

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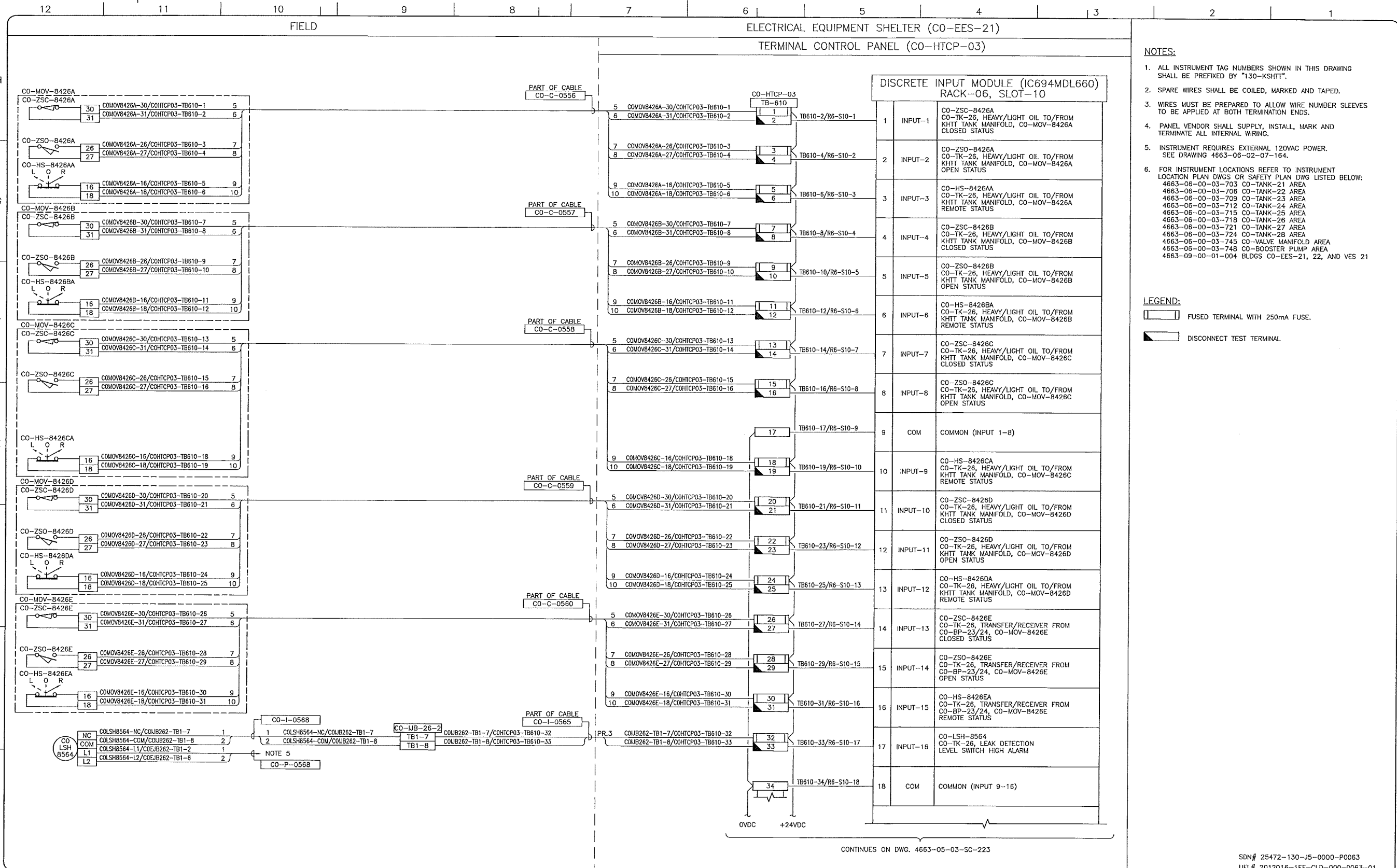
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 09  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-221 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWING 4663-06-02-07-164.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

CONTINUES ON DWG. 4663-05-03-SC-223

SDN# 25472-130-J5-0000-P0063  
 UEL# 2012016-1EF-CLD-000-0063-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL	
REV No	DATE	PROJECT CODE	DRAFTER
00	2014-02-28	2197104	SEM

PROFESSIONAL ENGINEER/RPT		PERMIT/ ENG. APPROVAL	
DATE	DATE	DATE	DATE

**TransCanada**  
 In business to deliver

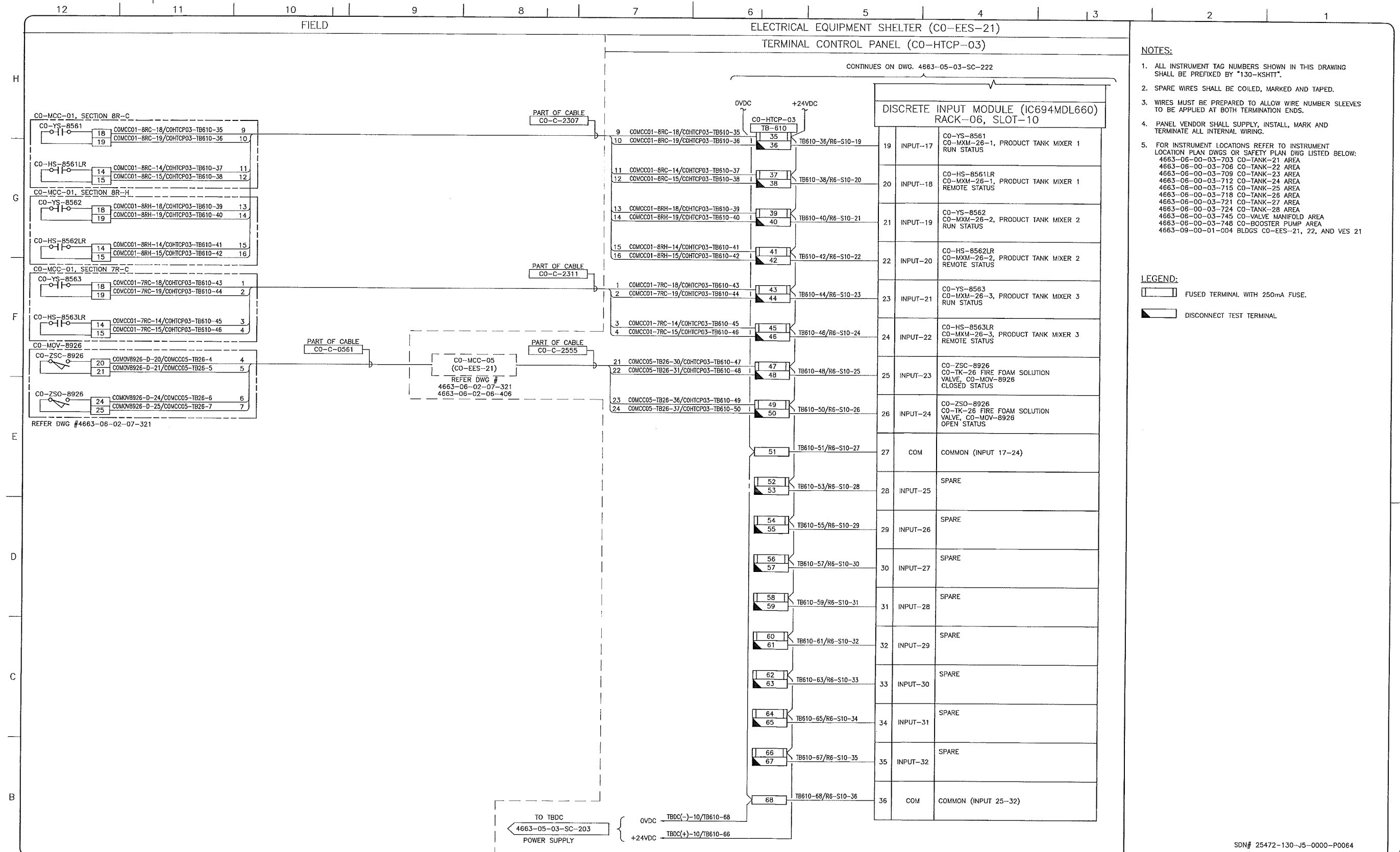
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508

The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SCALE N.T.S. DRAWING No 4663-05-03-SC-222 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

REV. No. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0064  
 UEL# 2012016-1EF-CLD-000-0064-01

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*In business to deliver*

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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

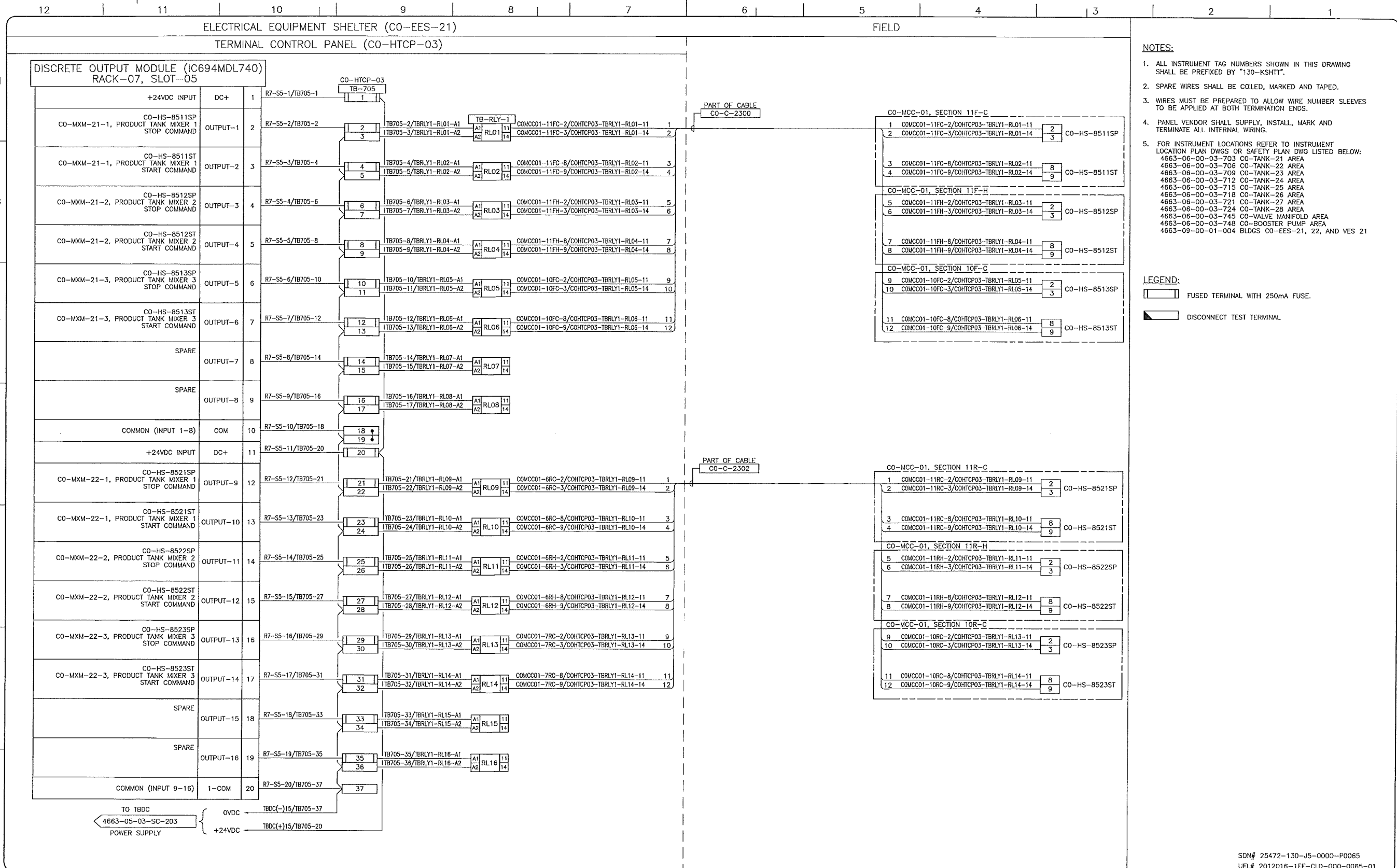
FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/06 SLOT 10  
 DISCRETE INPUT  
 I/O WIRING DIAGRAM (SHEET 2 OF 2)

SCALE N.T.S. DRAWING No 4663-05-03-SC-223 REV 00

TC\_A1\_BR.DWG 594XB41

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	PROJECT CODE
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104

DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
BEM	DVC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0065  
UEL# 2012016-1EF-CLD-000-0065-01

**TransCanada**  
In business to deliver

**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

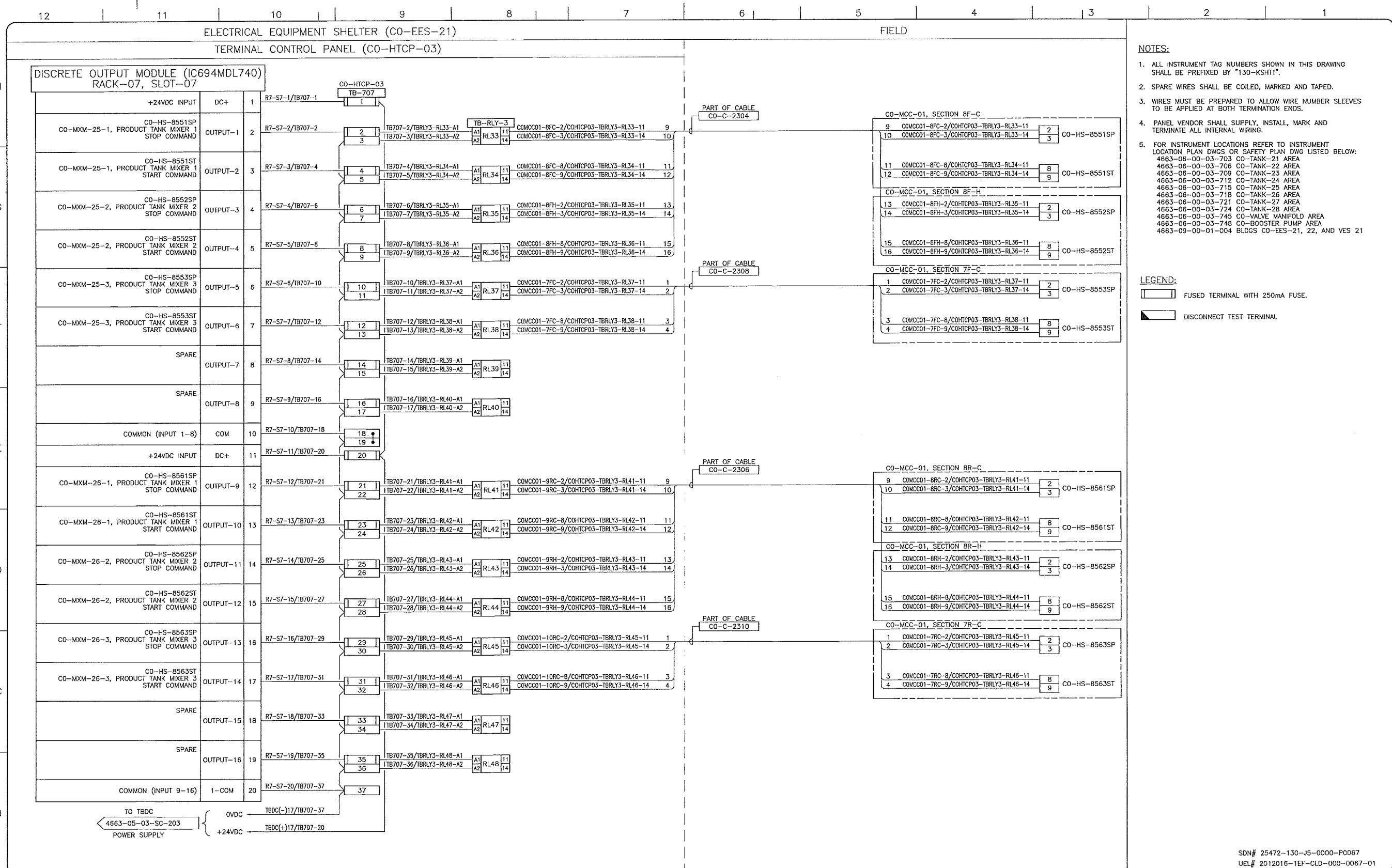
FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 05  
DISCRETE OUTPUT - STATIC  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No 4663-05-03-SC-232 REV 00







- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

APPROVAL						
PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0067  
 UEL# 2012016-1EF-CLD-000-0067-01

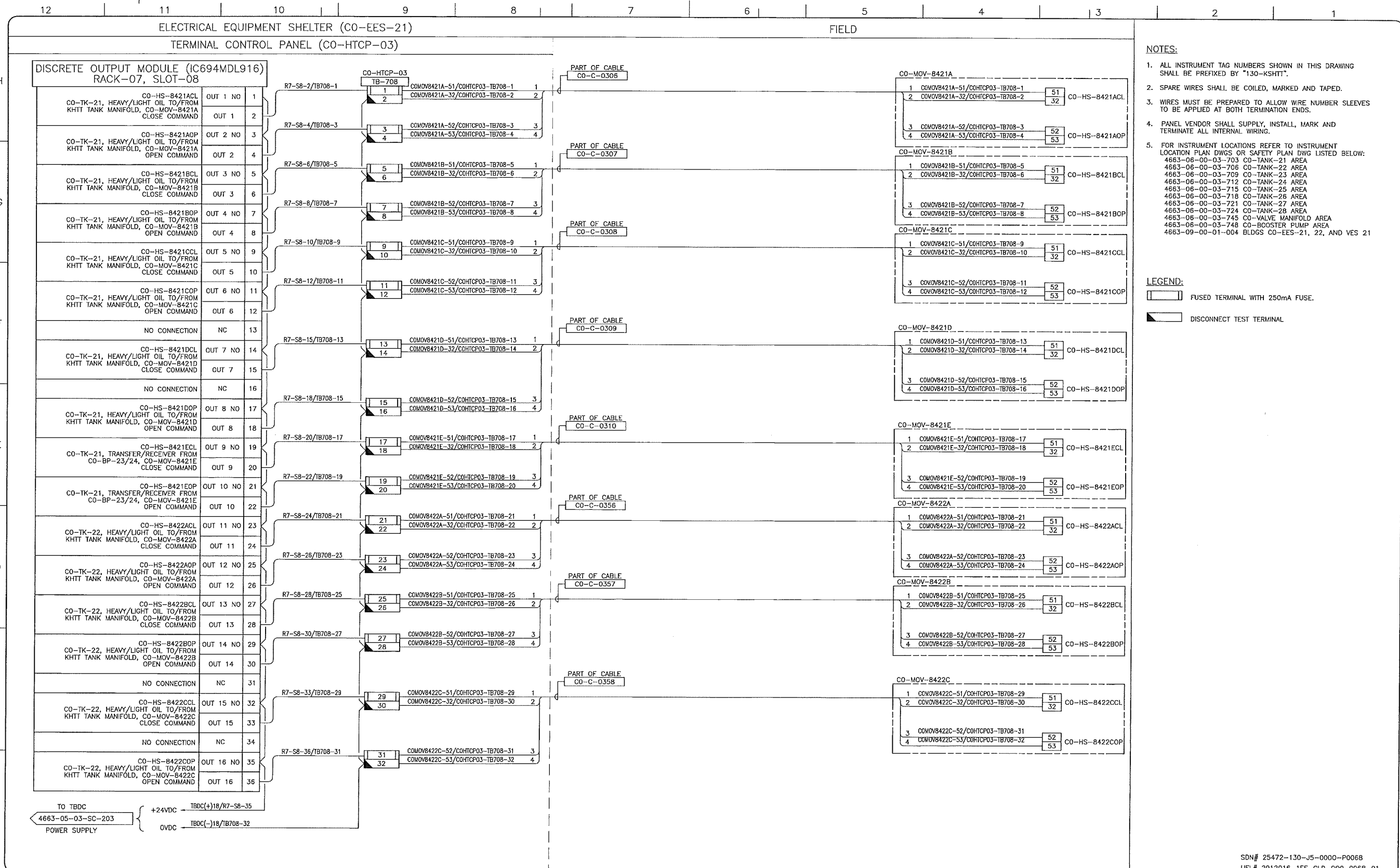
**TransCanada**  
 In business to deliver

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 CHANGAGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 07  
 DISCRETE OUTPUT - STATIC  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-234 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- [Symbol] FUSED TERMINAL WITH 250mA FUSE.
  - [Symbol] DISCONNECT TEST TERMINAL

TO TBDC  
4663-05-03-SC-203  
POWER SUPPLY

+24VDC TBDC(+)/R7-SB-35  
OVDC TBDC(-)/R708-32

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
	DATE
PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5608 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	
REV. NO.	DATE
	PERMIT NUMBER:

SDN# 25472-130-J5-0000-P0068  
UEL# 2012016-1EF-CLD-000-0068-01

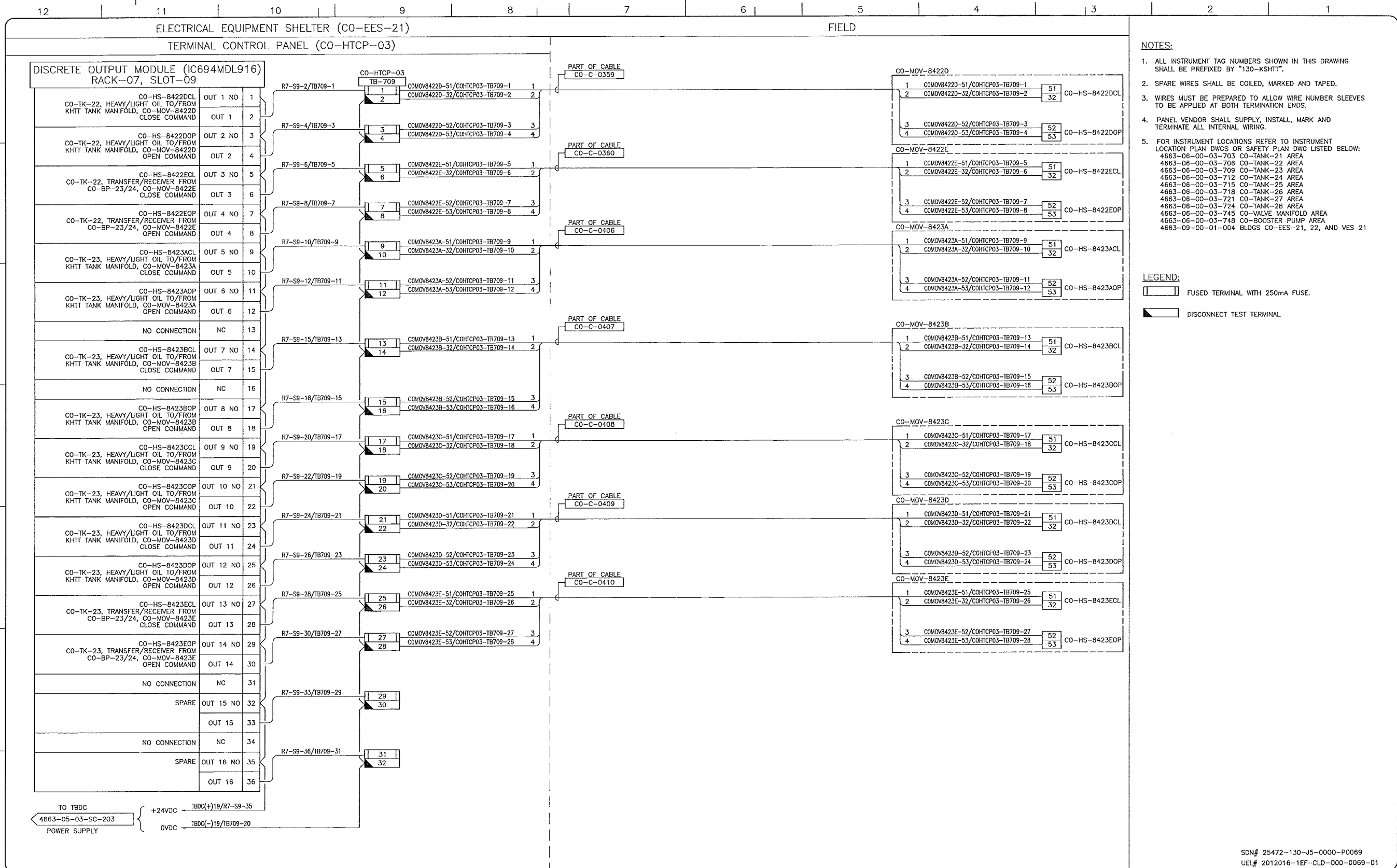
**TransCanada**  
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**upside Engineering Ltd.**

KEYSTONE HARDISTY TANK TERMINAL  
 CHANAGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 08  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-235 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
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 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

**REFERENCE DRAWINGS**

DRAWING No	TITLE
-	-

**REVISION**

REV No	DATE	DESCRIPTION
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

**APPROVAL**

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0069  
 UEL# 2012016-1EF-CLD-000-0069-01

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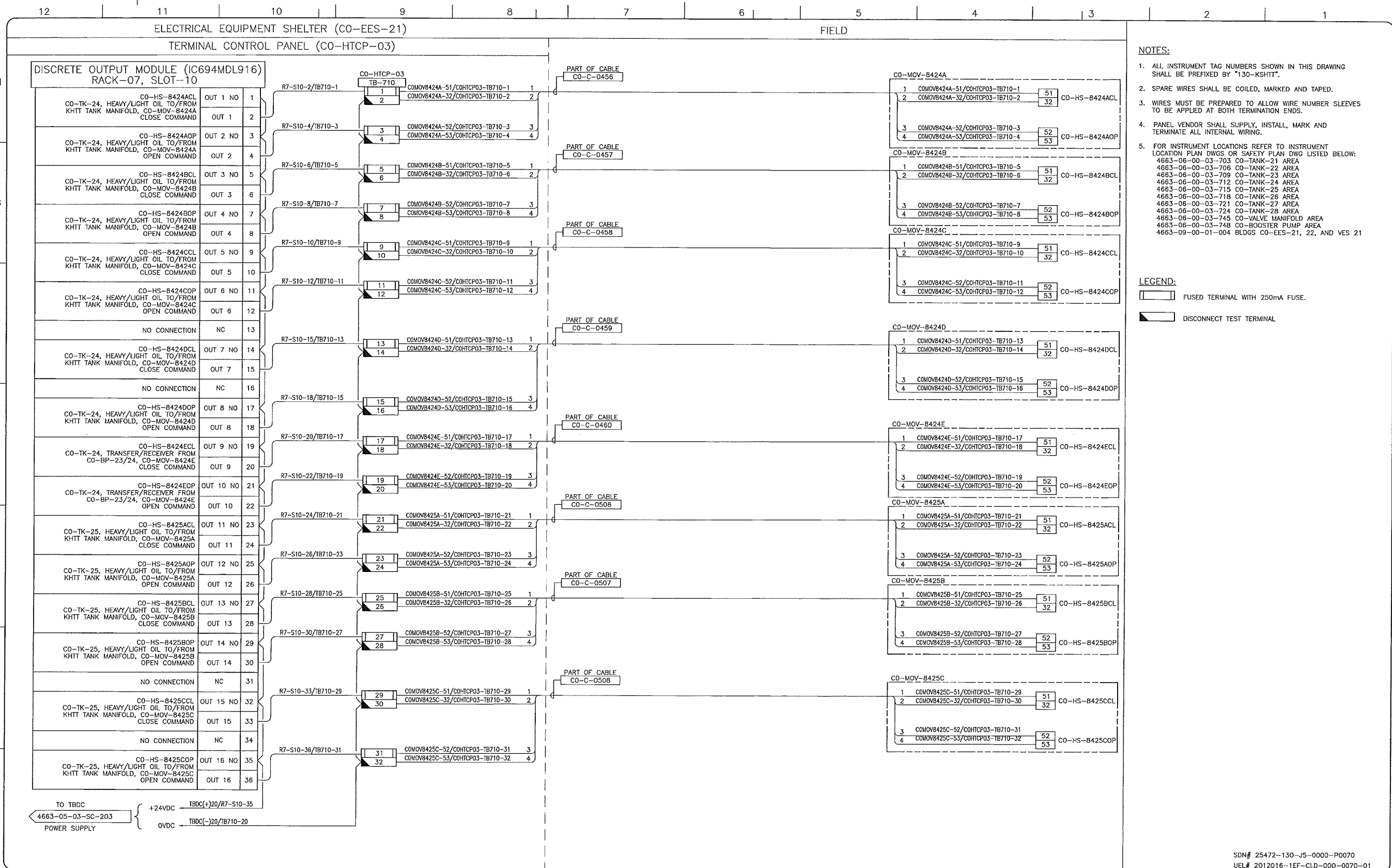
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA / 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 09  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-236 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	PROJECT CODE
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104

PROFESSIONAL ENGINEER/RPT		PERMIT/ ENG. APPROVAL	
DATE	COMPANY	DATE	COMPANY
2014-MAR-5	UPSIDE		

SDN# 25472-130-J5-0000-P0070  
 UEL# 2012016-1EF-CLD-000-0070-01

**TransCanada**  
 In business to deliver

**Upside Engineering Ltd.**

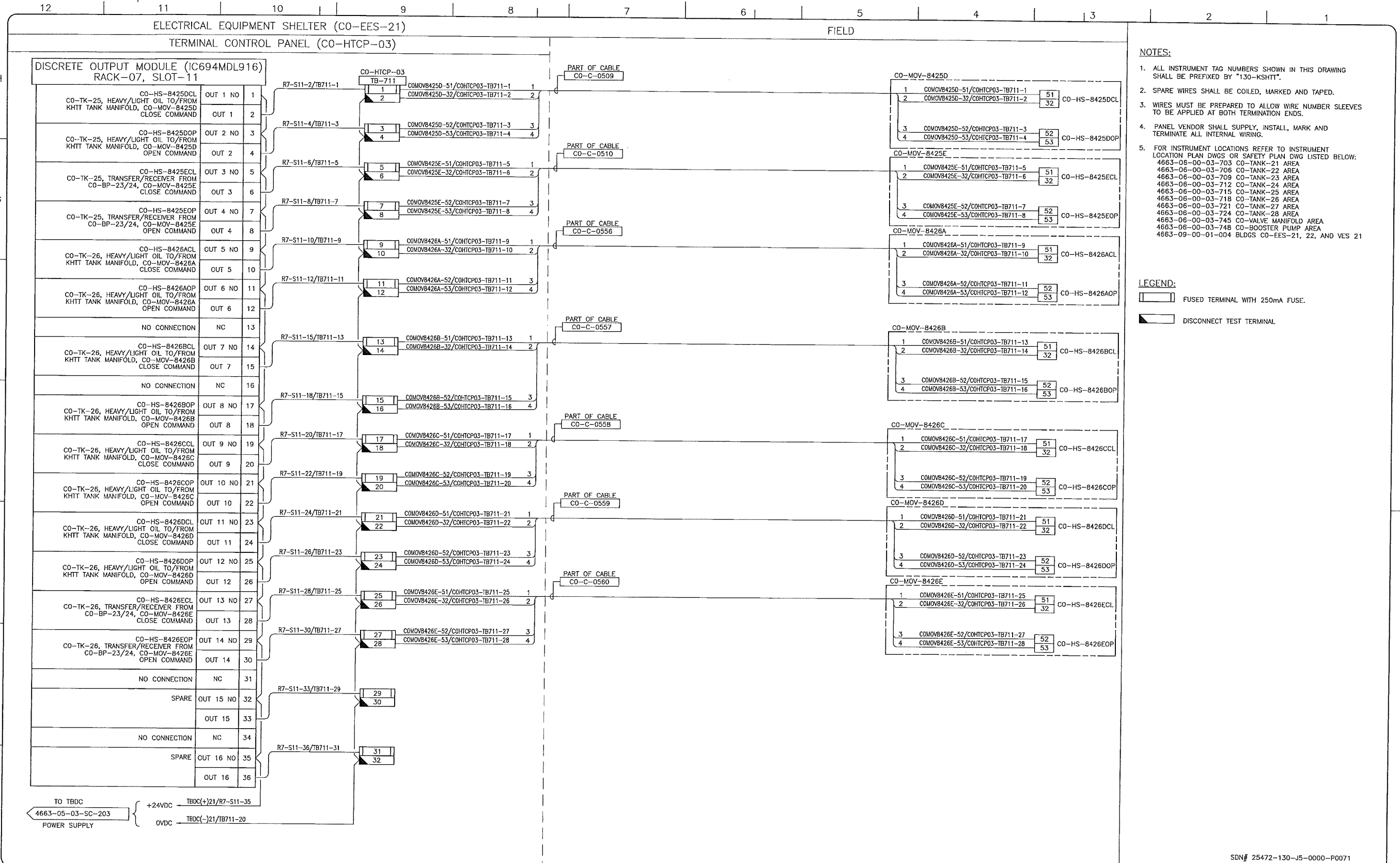
KEYSTONE HARDISTY TANK TERMINAL  
 RIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 10  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-237 REV 00

TC\_A1\_BR.DWG 594x841

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

SDN# 25472-130-J5-0000-P0071  
 UEL# 2012016-1EF-CLD-000-0071-01

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL							
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

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 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FX # 4663 CHANGE# DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 11  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No 4663-05-03-SC-238 REV 00

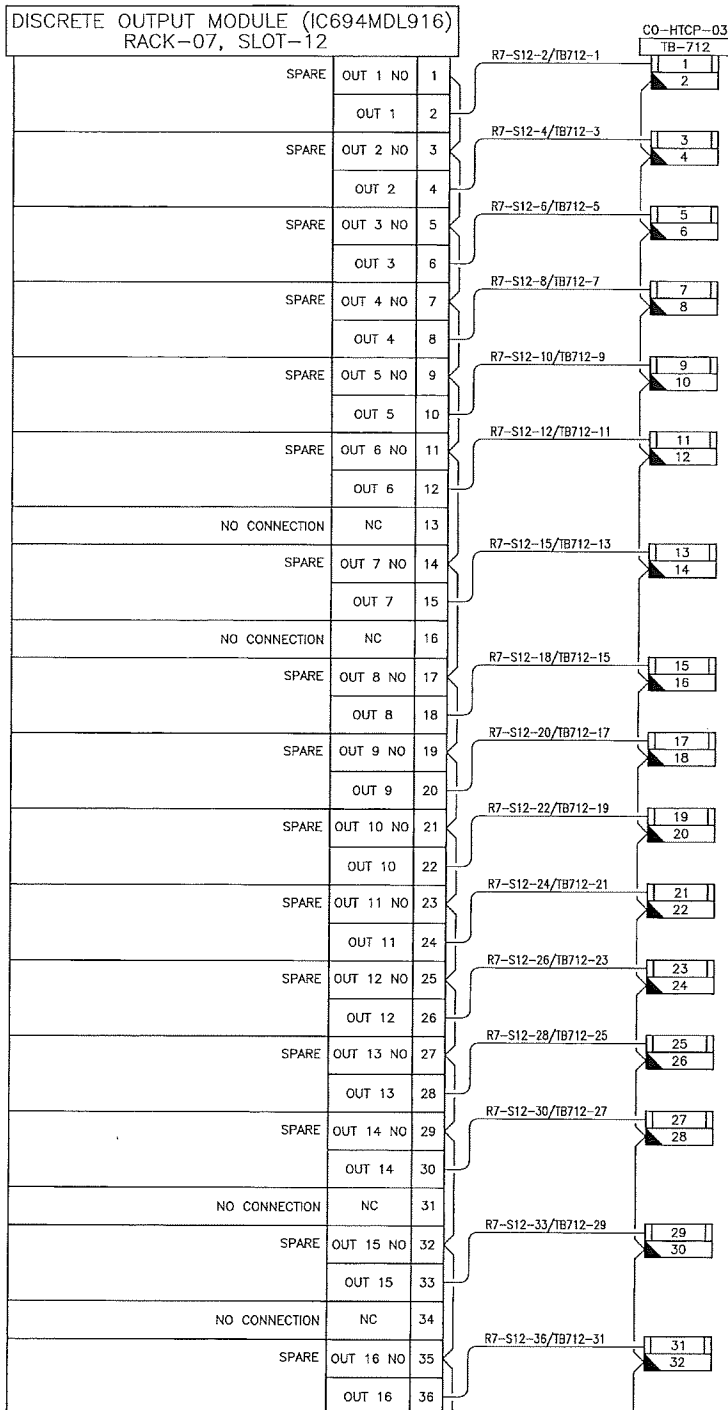
TC\_A1\_BR.DWG 594XB41

CADD DRAWING: DO NOT MAKE MANUAL REVISIONS

ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)

FIELD

TERMINAL CONTROL PANEL (CO-HTCP-03)

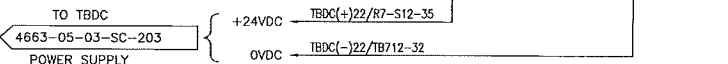


NOTES:

- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
- SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
- WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
- PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
- FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

LEGEND:

- FUSED TERMINAL WITH 250mA FUSE.
- DISCONNECT TEST TERMINAL



SDN# 25472-130-J5-0000-P0072  
 UEL# 2012016-1EF-CLD-000-0072-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geologists and Geophysicists of Alberta

2014-MAR-5

REV. NO. DATE PERMIT NUMBER:

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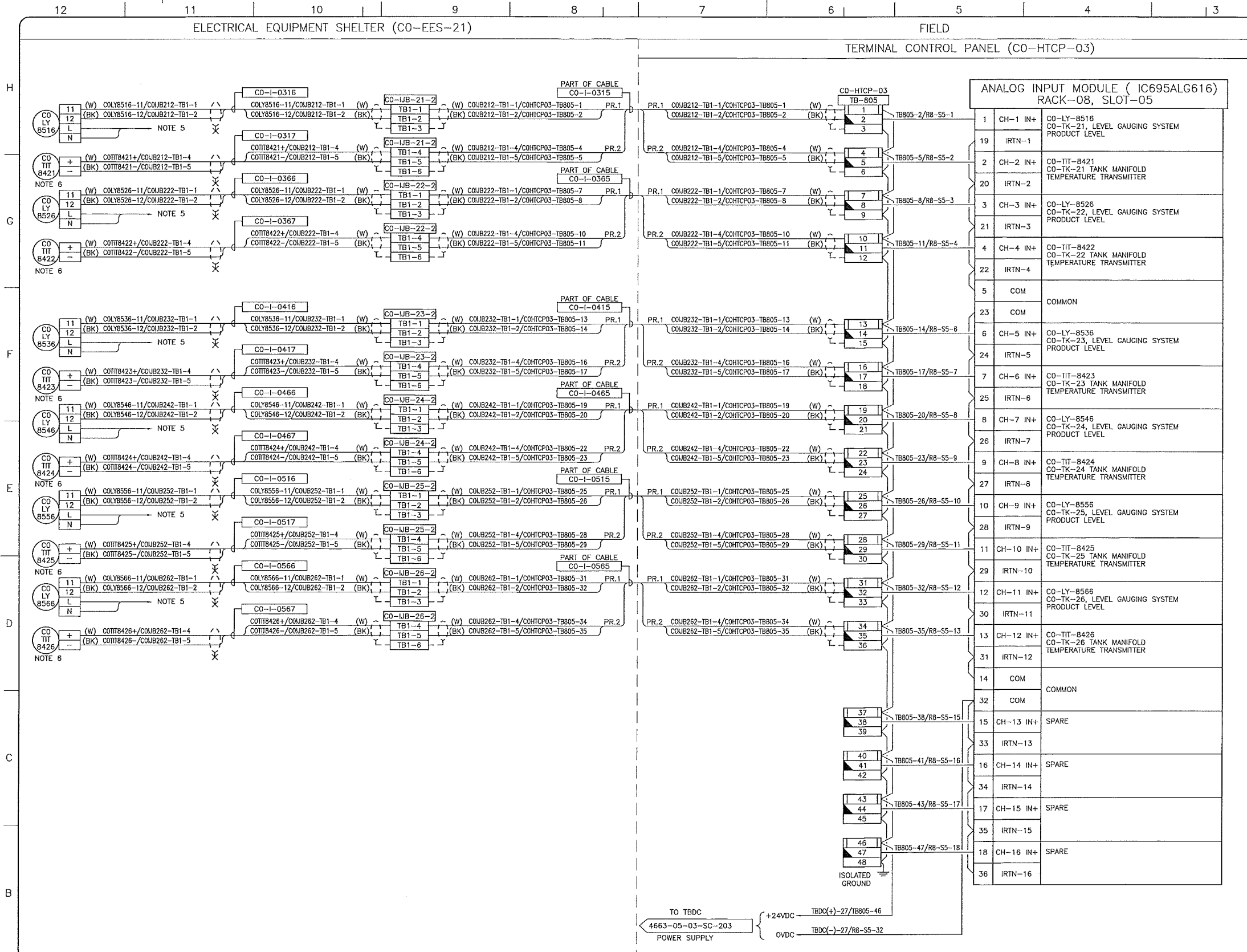
upside Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/07 SLOT 12  
 DISCRETE OUTPUT - RELAY  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-239 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER. SEE DRAWINGS:  
4663-06-02-07-114 CO-LY-8516  
4663-06-02-07-124 CO-LY-8526  
4663-06-02-07-134 CO-LY-8536  
4663-06-02-07-144 CO-LY-8546  
4663-06-02-07-154 CO-LY-8556  
4663-06-02-07-164 CO-LY-8566
  - JUNCTION BOX WIRING DIAGRAMS. SEE DRAWINGS:  
4663-06-02-07-113 CO-LY-8516  
4663-06-02-07-123 CO-LY-8526  
4663-06-02-07-133 CO-LY-8536  
4663-06-02-07-143 CO-LY-8546  
4663-06-02-07-153 CO-LY-8556  
4663-06-02-07-163 CO-LY-8566
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
4663-06-00-03-703 CO-TANK-21 AREA  
4663-06-00-03-706 CO-TANK-22 AREA  
4663-06-00-03-709 CO-TANK-23 AREA  
4663-06-00-03-712 CO-TANK-24 AREA  
4663-06-00-03-715 CO-TANK-25 AREA  
4663-06-00-03-718 CO-TANK-26 AREA  
4663-06-00-03-721 CO-TANK-27 AREA  
4663-06-00-03-724 CO-TANK-28 AREA  
4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
4663-06-00-03-748 CO-BOOSTER PUMP AREA  
4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J5-0000-PO073  
UEL# 2012016-1EF-CLD-000-0073-01

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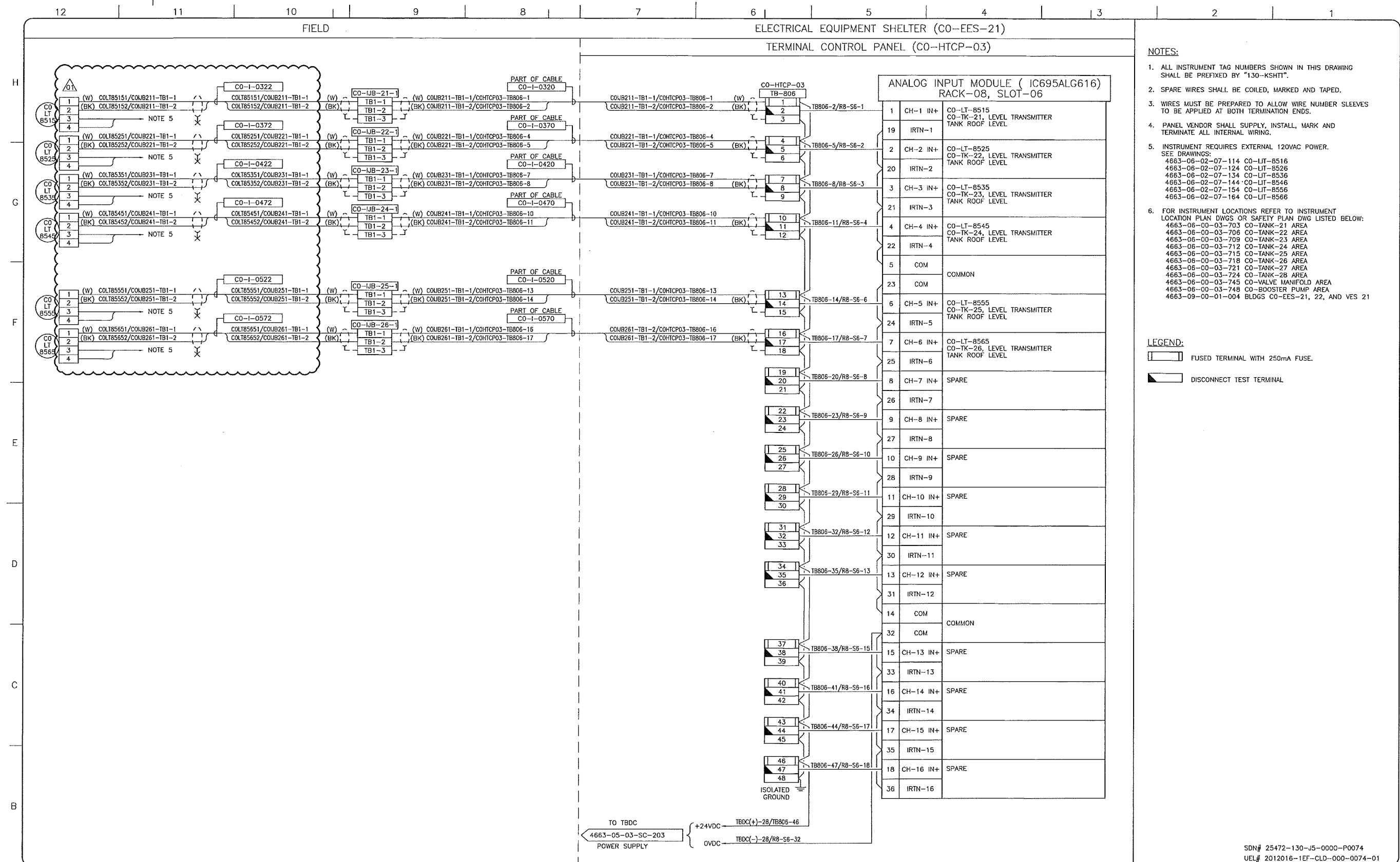
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 05  
ANALOG INPUT - SINGLE ENDED  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-244 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT REQUIRES EXTERNAL 120VAC POWER.  
SEE DRAWINGS:  
4663-06-02-07-114 CO-LIT-8516  
4663-06-02-07-124 CO-LIT-8528  
4663-06-02-07-134 CO-LIT-8536  
4663-06-02-07-144 CO-LIT-8546  
4663-06-02-07-154 CO-LIT-8556  
4663-06-02-07-164 CO-LIT-8566
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
4663-06-00-03-703 CO-TANK-21 AREA  
4663-06-00-03-706 CO-TANK-22 AREA  
4663-06-00-03-709 CO-TANK-23 AREA  
4663-06-00-03-712 CO-TANK-24 AREA  
4663-06-00-03-715 CO-TANK-25 AREA  
4663-06-00-03-718 CO-TANK-26 AREA  
4663-06-00-03-721 CO-TANK-27 AREA  
4663-06-00-03-724 CO-TANK-28 AREA  
4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
4663-06-00-03-748 CO-BOOSTER PUMP AREA  
4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	

REVISION		APPROVAL	
REV No	DATE	DESCRIPTION	
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	
01	2014-03-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	

PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE
2197104	JIM	PLR	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT:

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0074  
UEL# 2012016-1EF-CLD-000-0074-01

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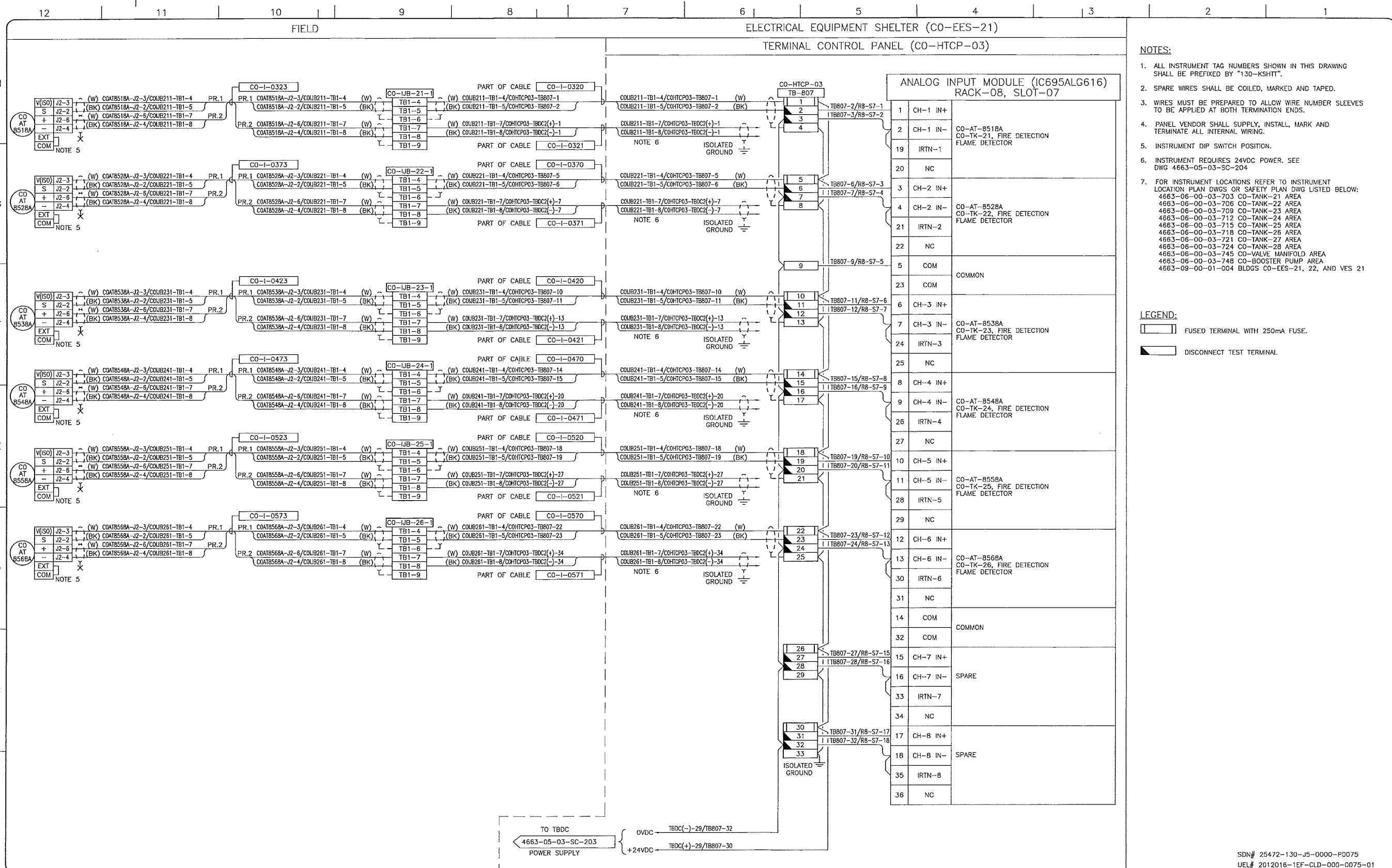
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
FIA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 06  
ANALOG INPUT - SINGLE ENDED  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-245 REV 01





- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHIT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES 24VDC POWER. SEE DWG 4663-05-03-SC-204
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0075  
 UEL# 2012016-1EF-CLD-000-0075-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

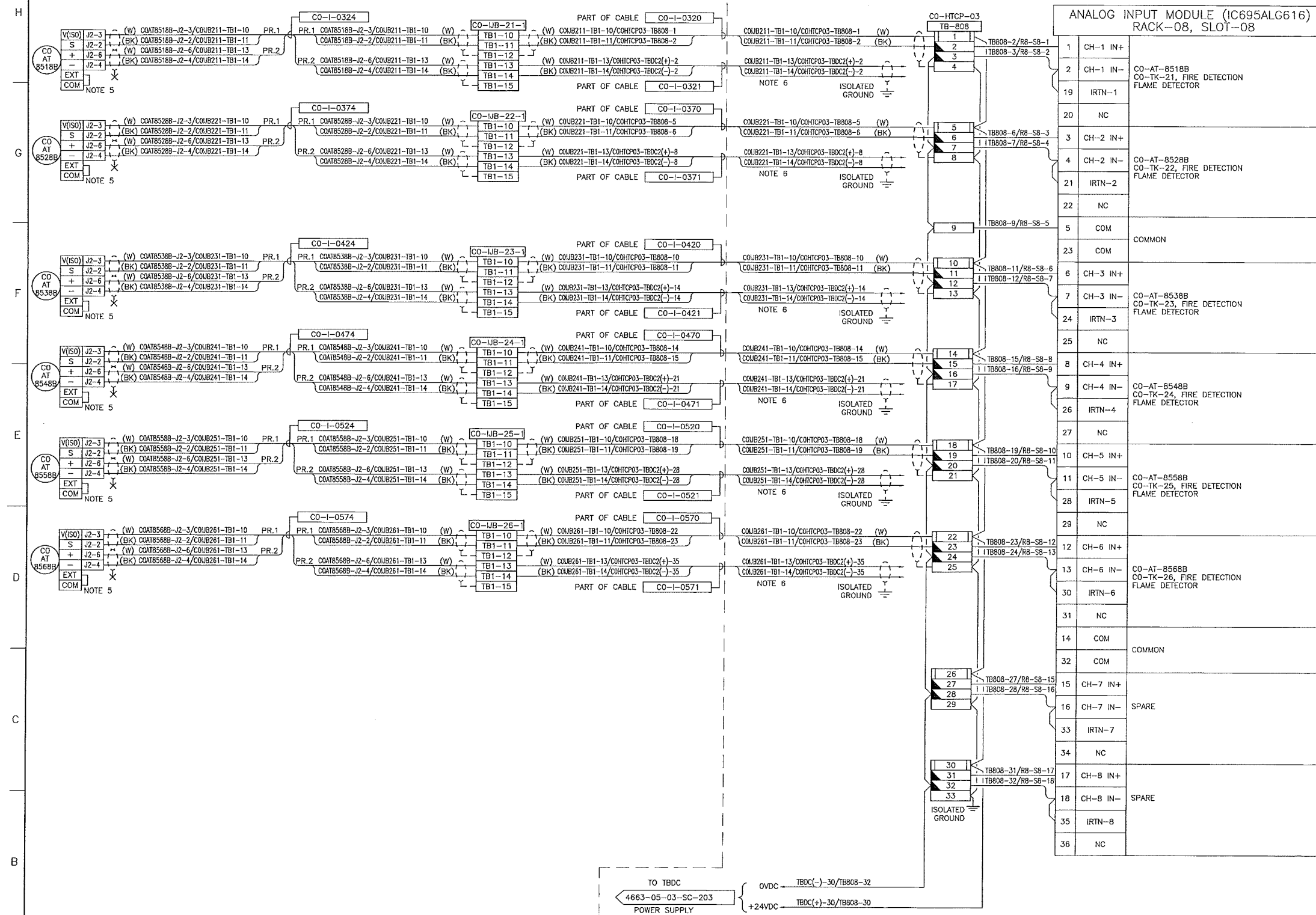
REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BDM	DMC	SRL	JED	DCB	UPSIDE

 PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	PERMIT/ ENG. APPROVAL DATE 2014-MAR-5
--	---

 In business to deliver	 upsidedesignline
KEYSTONE HARDISTY TANK TERMINAL	
FIA # 4663	CHNAGE: DISCIPLINE # 05
CO-HTCP-03, PLC-11/08 SLOT 07 ANALOG INPUT - DIFFERENTIAL I/O WIRING DIAGRAM	
SCALE N.T.S.	DRAWING No 4663-05-03-SC-246
	REV 00

ELECTRICAL EQUIPMENT SHELTER (CO-EES-21)

TERMINAL CONTROL PANEL (CO-HTCP-03)



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES 24VDC POWER, SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
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 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

ANALOG INPUT MODULE (IC695ALG616)  
RACK-08, SLOT-08

1	CH-1 IN+	
2	CH-1 IN-	CO-AT-8518B CO-TK-21, FIRE DETECTION FLAME DETECTOR
19	IRTN-1	
20	NC	
3	CH-2 IN+	
4	CH-2 IN-	CO-AT-8528B CO-TK-22, FIRE DETECTION FLAME DETECTOR
21	IRTN-2	
22	NC	
5	COM	COMMON
23	COM	COMMON
6	CH-3 IN+	
7	CH-3 IN-	CO-AT-8538B CO-TK-23, FIRE DETECTION FLAME DETECTOR
24	IRTN-3	
25	NC	
8	CH-4 IN+	
9	CH-4 IN-	CO-AT-8548B CO-TK-24, FIRE DETECTION FLAME DETECTOR
26	IRTN-4	
27	NC	
10	CH-5 IN+	
11	CH-5 IN-	CO-AT-8558B CO-TK-25, FIRE DETECTION FLAME DETECTOR
28	IRTN-5	
29	NC	
12	CH-6 IN+	
13	CH-6 IN-	CO-AT-8568B CO-TK-26, FIRE DETECTION FLAME DETECTOR
30	IRTN-6	
31	NC	
14	COM	COMMON
32	COM	COMMON
15	CH-7 IN+	
16	CH-7 IN-	SPARE
33	IRTN-7	
34	NC	
17	CH-8 IN+	
18	CH-8 IN-	SPARE
35	IRTN-8	
36	NC	

SDN# 25472-130-J5-0000-P0076  
UEL# 2012016-1EF-CLD-000-0076-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

APPROVAL					
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER
2197104	REM	DWC	SRL	JED	DCB

PROFESSIONAL ENGINEER/RPT:

PERMIT/ENG. APPROVAL: \_\_\_\_\_ DATE: \_\_\_\_\_

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

**TransCanada**  
In business to deliver

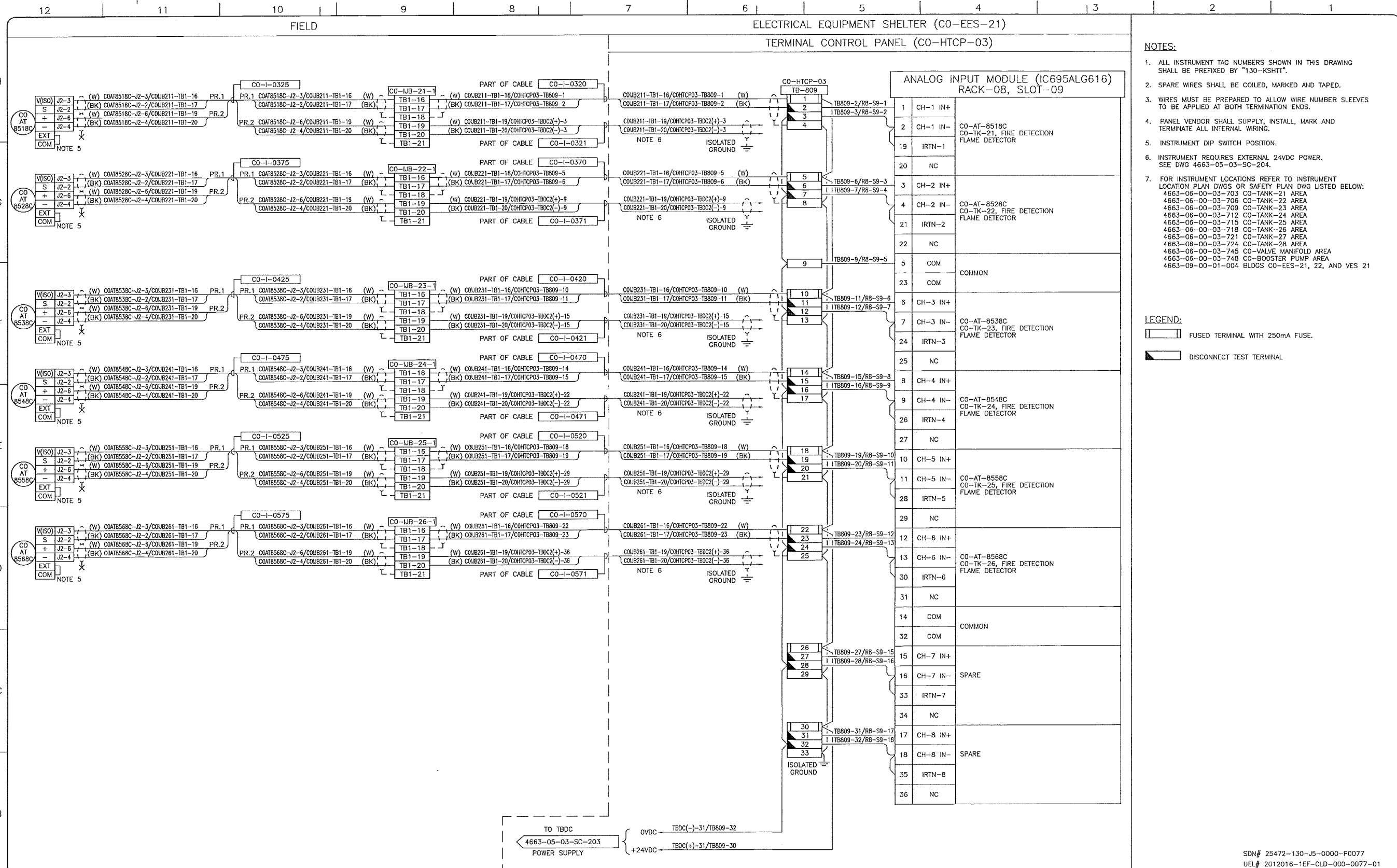
**upside**  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: \_\_\_\_\_ DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 08  
ANALOG INPUT - DIFFERENTIAL  
I/O WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-05-03-SC-247 REV: 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTI".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION		
REV No	DATE	DESCRIPTION
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)

APPROVAL						
PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

**PROFESSIONAL ENGINEER**  
 JAMES DOODY  
 2014-MAR-5

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0077  
 UEL# 2012016-1EF-CLD-000-0077-01

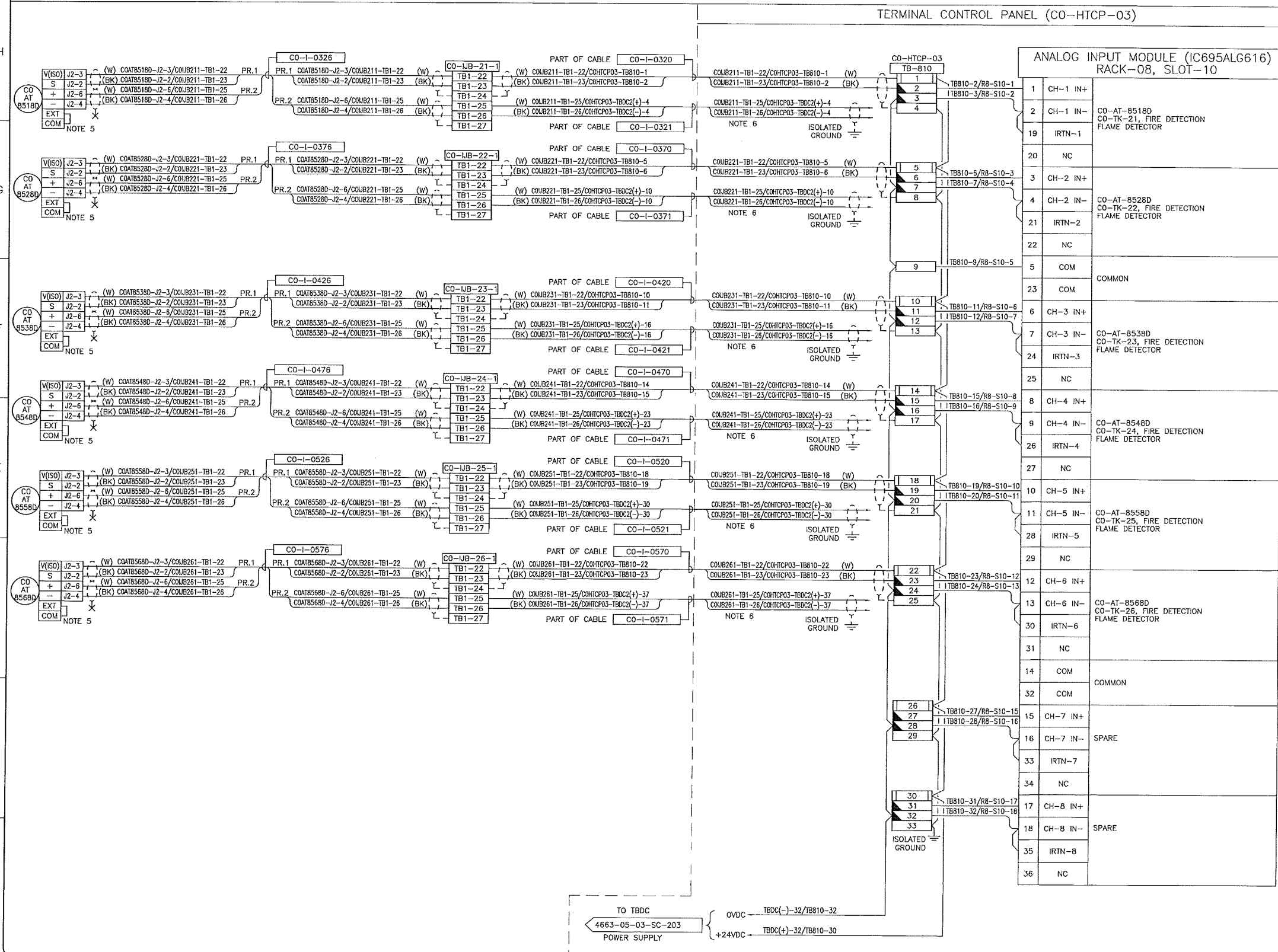
**TransCanada**  
 In business to deliver

**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 FA # 4663 CHANGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 09  
 ANALOG INPUT - DIFFERENTIAL I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-248 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHHT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES 24VDC POWER, SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-00-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION		APPROVAL						
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	2197104	BEM	DWC	SRL	JED	DCB	UPSIDE
DESCRIPTION		ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)						

PROFESSIONAL ENGINEER/RPT	PERMIT/ ENG. APPROVAL
 PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	DATE

SDN# 25472-130-J5-0000-P0078  
UEL# 2012016-1EF-CLD-000-0078-01

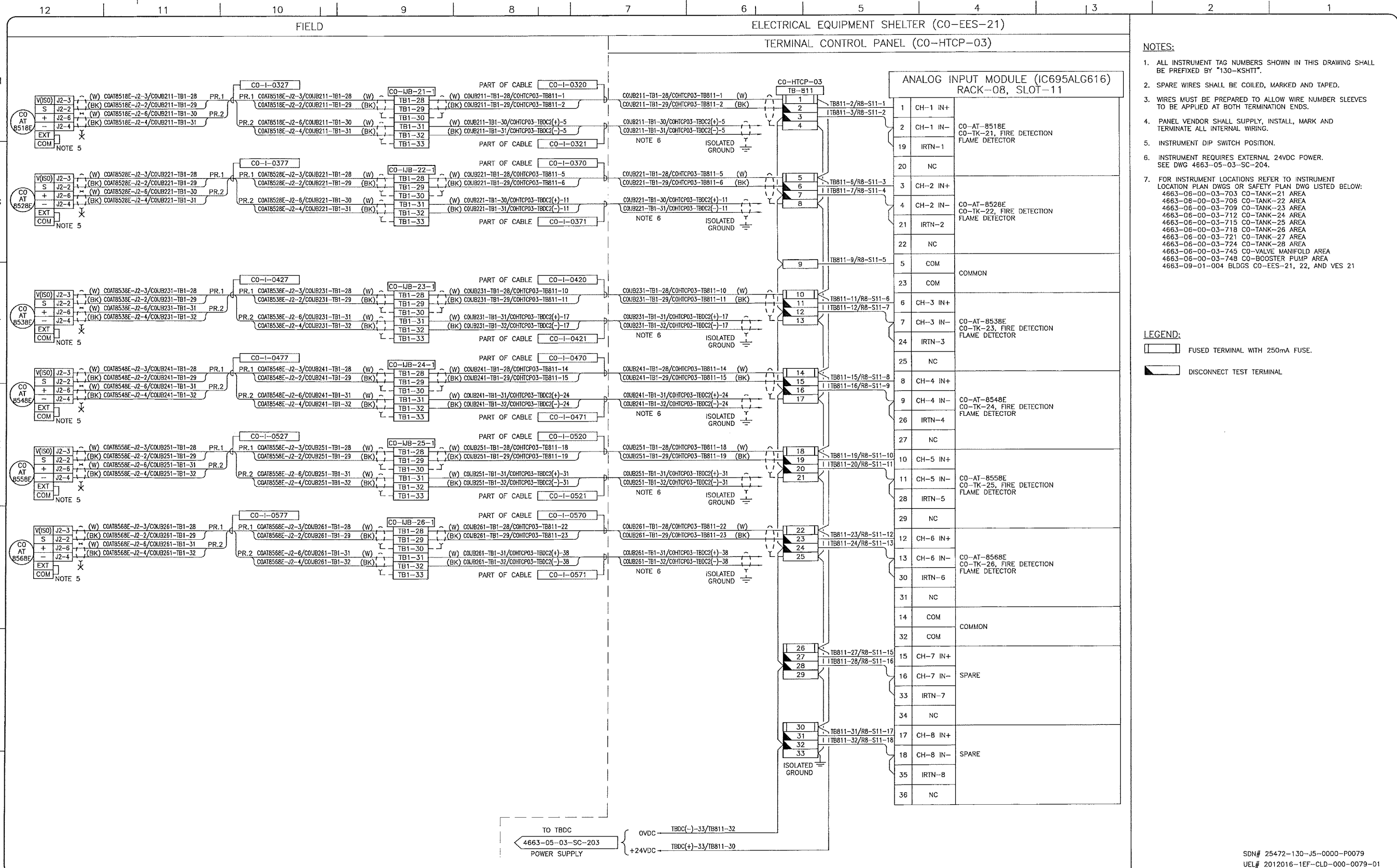
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL  
 RA # 4663      CHANGE:      DISCIPLINE # 05

**CO-HTCP-03, PLC-11/08 SLOT 10**  
**ANALOG INPUT - DIFFERENTIAL**  
**I/O WIRING DIAGRAM**

SCALE N.T.S.      DRAWING No 4663-05-03-SC-249      REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHTT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-01-004 BLDGS CO-EES-21, 22, AND YES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL			
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAWING CHECKER	DESIGNER	DESIGN CHECKER
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DVC	SRL	JED

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

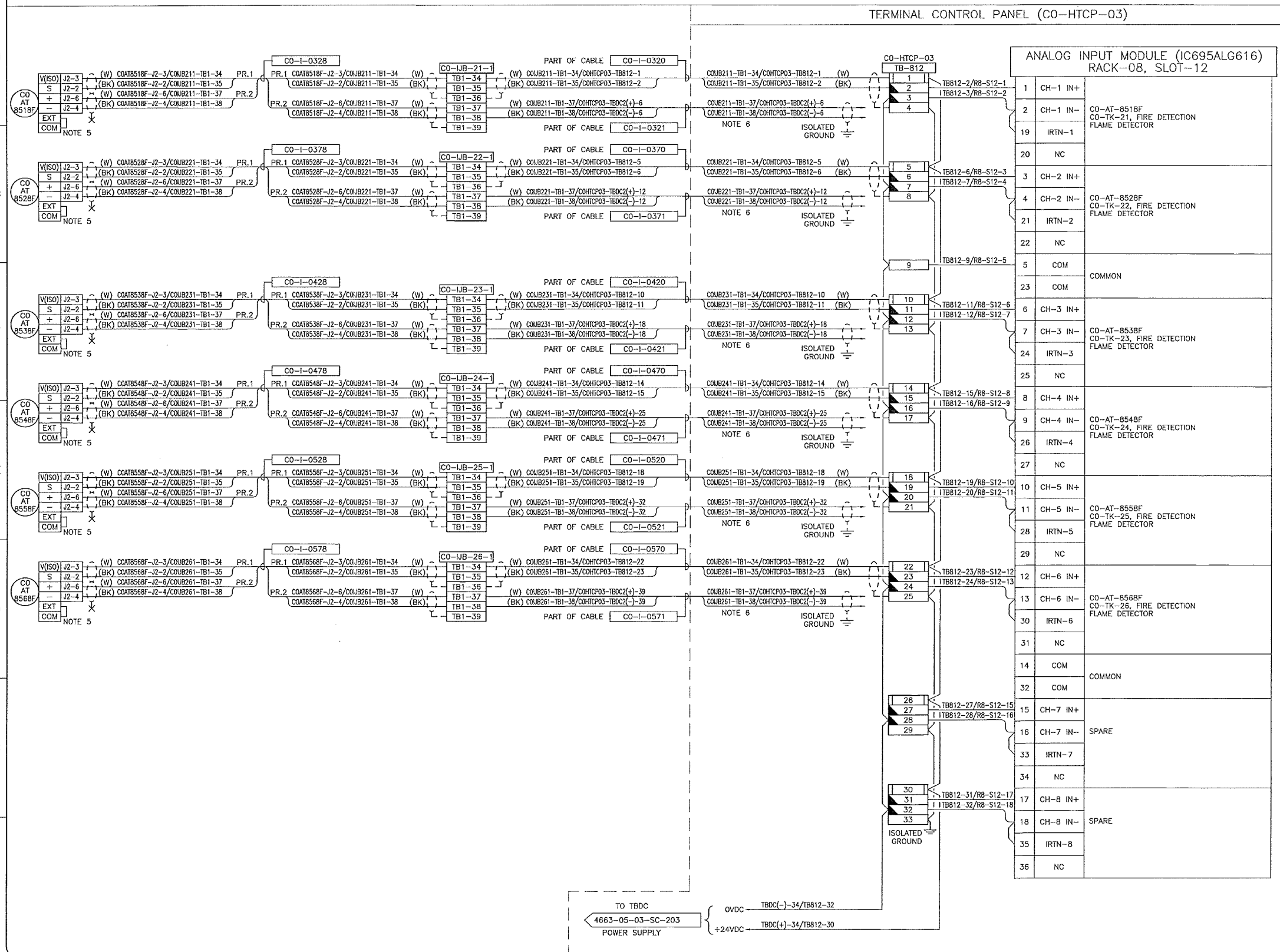
PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-J5-0000-P0079  
 UEL# 2012016-1EF-CLD-000-0079-01

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 05  
 CO-HTCP-03, PLC-11/08 SLOT 11  
 ANALOG INPUT - DIFFERENTIAL  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-250 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-708 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
 4663-06-00-03-721 CO-TANK-27 AREA  
 4663-06-00-03-724 CO-TANK-28 AREA  
 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-01-004 BLDGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT PERMIT/ ENG. APPROVAL

DATE

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 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-MAR-5

SDN# 25472-130-J5-0000-P0080  
 UEL# 2012016-1EF-CLD-000-0080-01

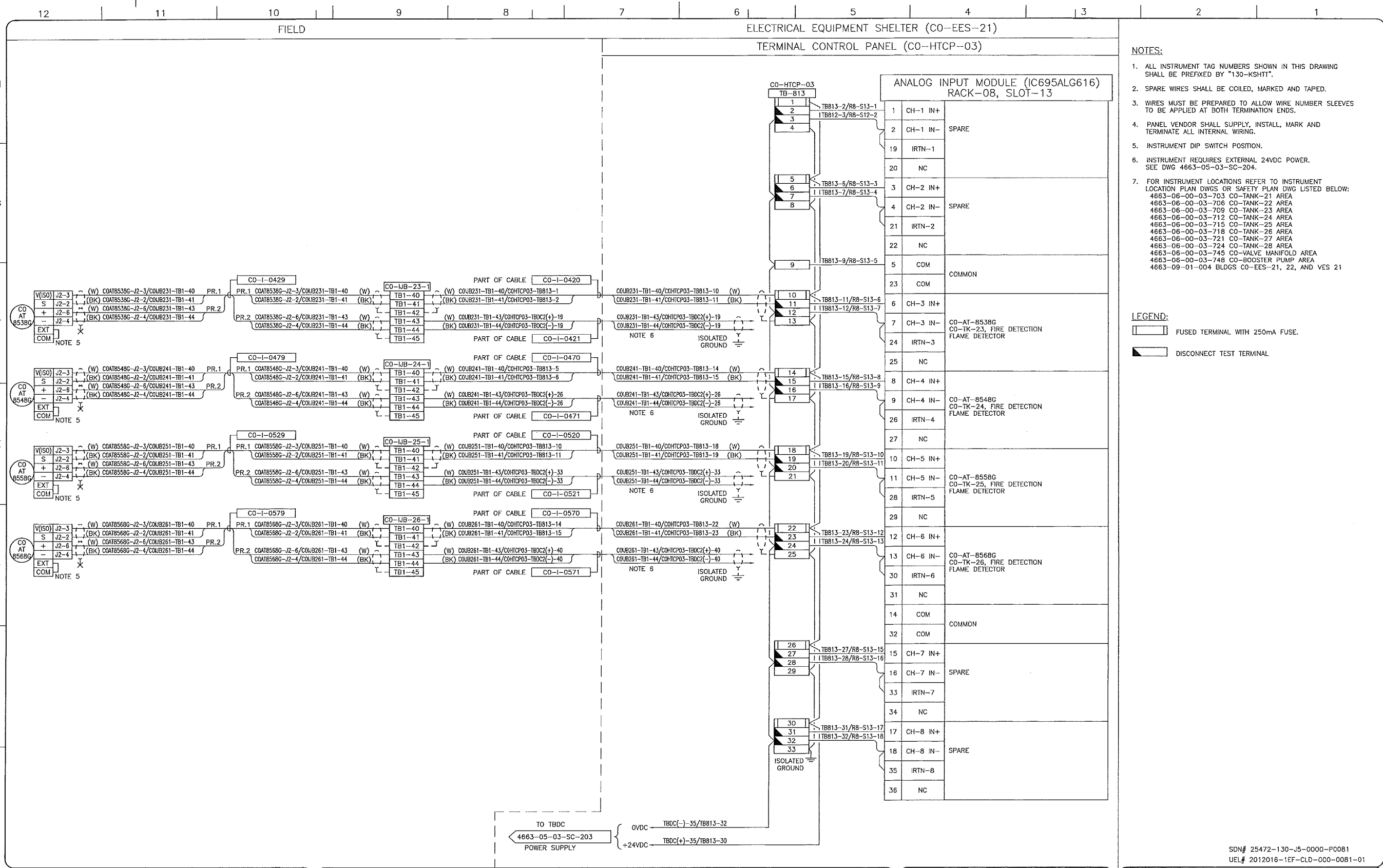
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KEYSTONE HARDISTY TANK TERMINAL  
 CHANNAGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 12  
 ANALOG INPUT - DIFFERENTIAL  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-251 REV 00



- NOTES:**
- ALL INSTRUMENT TAG NUMBERS SHOWN IN THIS DRAWING SHALL BE PREFIXED BY "130-KSHITT".
  - SPARE WIRES SHALL BE COILED, MARKED AND TAPED.
  - WIRES MUST BE PREPARED TO ALLOW WIRE NUMBER SLEEVES TO BE APPLIED AT BOTH TERMINATION ENDS.
  - PANEL VENDOR SHALL SUPPLY, INSTALL, MARK AND TERMINATE ALL INTERNAL WIRING.
  - INSTRUMENT DIP SWITCH POSITION.
  - INSTRUMENT REQUIRES EXTERNAL 24VDC POWER. SEE DWG 4663-05-03-SC-204.
  - FOR INSTRUMENT LOCATIONS REFER TO INSTRUMENT LOCATION PLAN DWGS OR SAFETY PLAN DWG LISTED BELOW:  
 4663-06-00-03-703 CO-TANK-21 AREA  
 4663-06-00-03-706 CO-TANK-22 AREA  
 4663-06-00-03-709 CO-TANK-23 AREA  
 4663-06-00-03-712 CO-TANK-24 AREA  
 4663-06-00-03-715 CO-TANK-25 AREA  
 4663-06-00-03-718 CO-TANK-26 AREA  
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 4663-06-00-03-745 CO-VALVE MANIFOLD AREA  
 4663-06-00-03-748 CO-BOOSTER PUMP AREA  
 4663-09-01-004 BLOGS CO-EES-21, 22, AND VES 21

- LEGEND:**
- FUSED TERMINAL WITH 250mA FUSE.
  - DISCONNECT TEST TERMINAL.

SDN# 25472-130-J5-0000-P0081  
 UEL# 2012016-1EF-CLD-000-0081-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
-	-

REVISION				APPROVAL								
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY			
00	2014-02-28	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DWC	SRL	JED	DCB	UPSIDE			

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-MAR-5

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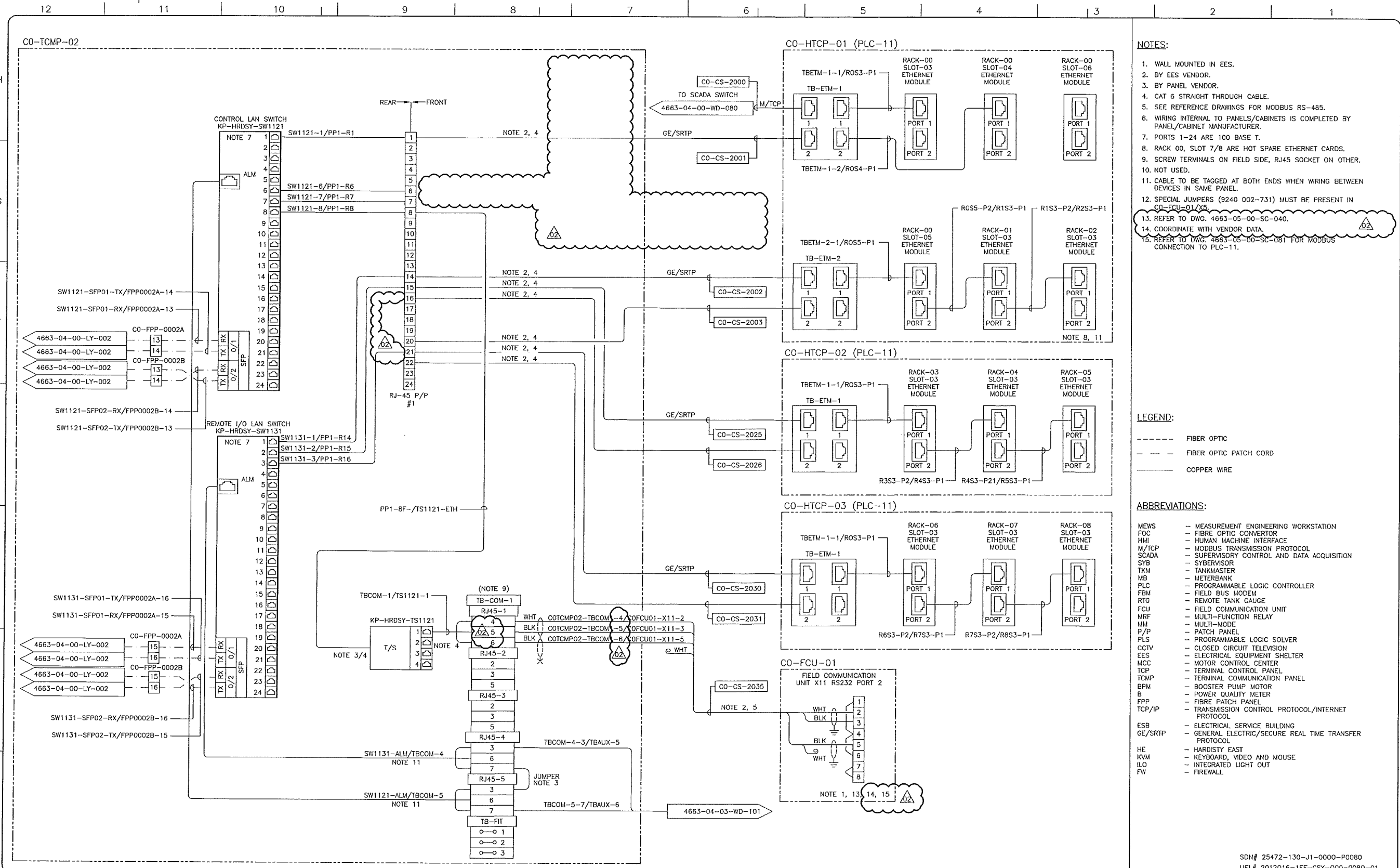
**upside**  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHARGE: DISCIPLINE # 05

CO-HTCP-03, PLC-11/08 SLOT 13  
 ANALOG INPUT - DIFFERENTIAL  
 I/O WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-03-SC-252 REV. 00



- NOTES:**
1. WALL MOUNTED IN EES.
  2. BY EES VENDOR.
  3. BY PANEL VENDOR.
  4. CAT 6 STRAIGHT THROUGH CABLE.
  5. SEE REFERENCE DRAWINGS FOR MODBUS RS-485.
  6. WIRING INTERNAL TO PANELS/CABINETS IS COMPLETED BY PANEL/CABINET MANUFACTURER.
  7. PORTS 1-24 ARE 100 BASE T.
  8. RACK 00, SLOT 7/8 ARE HOT SPARE ETHERNET CARDS.
  9. SCREW TERMINALS ON FIELD SIDE, RJ45 SOCKET ON OTHER.
  10. NOT USED.
  11. CABLE TO BE TAGGED AT BOTH ENDS WHEN WIRING BETWEEN DEVICES IN SAME PANEL.
  12. SPECIAL JUMPERS (9240 002-731) MUST BE PRESENT IN CO-FCU-01/XS.
  13. REFER TO DWG. 4663-05-00-SC-040.
  14. COORDINATE WITH VENDOR DATA.
  15. REFER TO DWG. 4663-05-00-SC-081 FOR MODBUS CONNECTION TO PLC-11.

- LEGEND:**
- FIBER OPTIC
  - - - FIBER OPTIC PATCH CORD
  - COPPER WIRE

- ABBREVIATIONS:**
- MEWS — MEASUREMENT ENGINEERING WORKSTATION
  - FOC — FIBRE OPTIC CONVERTOR
  - HMI — HUMAN MACHINE INTERFACE
  - M/TCP — MODBUS TRANSMISSION PROTOCOL
  - SCADA — SUPERVISORY CONTROL AND DATA ACQUISITION
  - SVB — SYBEBVISOR
  - TKM — TANKMASTER
  - MB — METERBANK
  - PLC — PROGRAMMABLE LOGIC CONTROLLER
  - FBM — FIELD BUS MODEM
  - RTG — REMOTE TANK GAUGE
  - FCU — FIELD COMMUNICATION UNIT
  - MRF — MULTI-FUNCTION RELAY
  - MM — MULTI-MODE
  - P/P — PATCH PANEL
  - PLS — PROGRAMMABLE LOGIC SOLVER
  - CCTV — CLOSED CIRCUIT TELEVISION
  - EES — ELECTRICAL EQUIPMENT SHELTER
  - MCC — MOTOR CONTROL CENTER
  - TCP — TERMINAL CONTROL PANEL
  - TCMP — TERMINAL COMMUNICATION PANEL
  - BPM — BOOSTER PUMP MOTOR
  - B — POWER QUALITY METER
  - FPP — FIBRE PATCH PANEL
  - TCP/IP — TRANSMISSION CONTROL PROTOCOL/INTERNET PROTOCOL
  - ESB — ELECTRICAL SERVICE BUILDING
  - GE/SRTIP — GENERAL ELECTRIC/SECURE REAL TIME TRANSFER PROTOCOL
  - HE — HARDISTY EAST
  - KVM — KEYBOARD, VIDEO AND MOUSE
  - ILO — INTEGRATED LIGHT OUT
  - FW — FIREWALL

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-00-LY-002	HARDISTY KHT TERMINAL FIBER OPTIC WIRING DIAGRAM
4663-05-03-SC-012	KHTT CO-HTCP-01, PLC-11/00 SLOT 09 DISCRETE INPUT I/O WIRING DIAGRAM
4663-05-00-SC-040	KEYSTONE HARDISTY TANK TERMINAL TANK GAUGING SYSTEM TOPOLOGY
4663-05-00-SC-081	CO-EES-21 MODBUS RS485 NETWORK (CO-EES-21) INTERCONNECTING WIRING DIAGRAM

REVISION		APPROVAL						
REV No	DATE	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
01	2013-11-20	2197104	ROC	DMC	SRL	JED	DCB	UPSIDE
02	2014-02-12	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

2014-FEB-13

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-J1-0000-P0080  
UEL# 2012016-1EF-CSY-000-0080-01

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KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 05

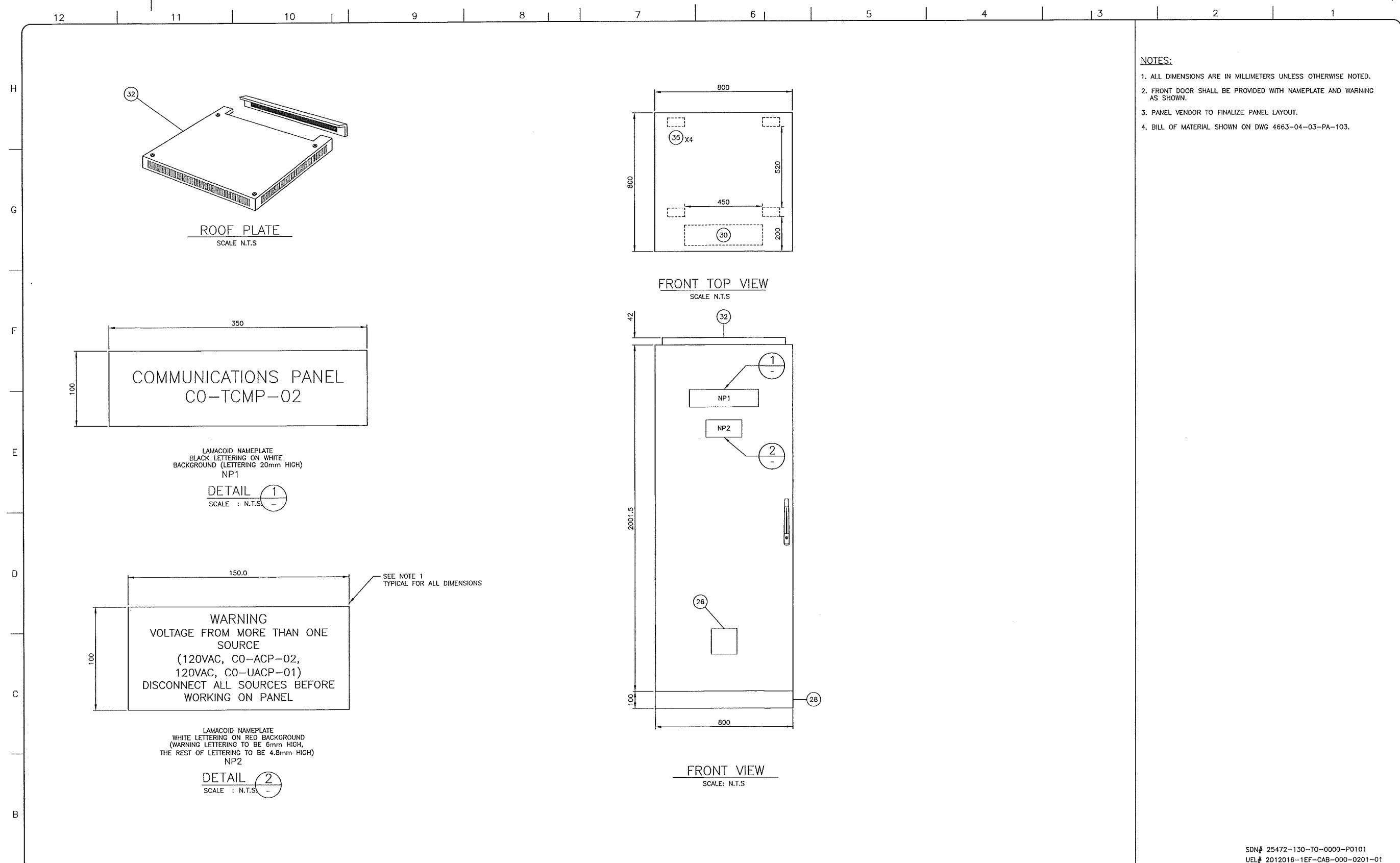
HARDISTY KHTT TERMINAL  
CO-EES-21  
CONTROL SYSTEM WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-05-00-SC-080 REV 02

TC\_A1\_BR.DWG 594XB41

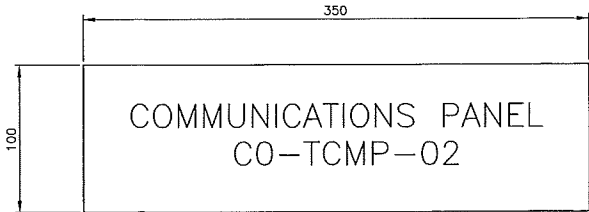
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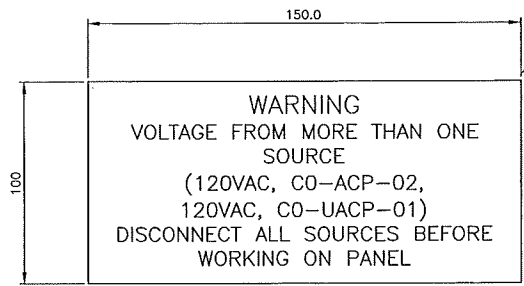
ROOF PLATE  
SCALE N.T.S

FRONT TOP VIEW  
SCALE N.T.S



LAMACOID NAMEPLATE  
BLACK LETTERING ON WHITE  
BACKGROUND (LETTERING 20mm HIGH)  
NP1

DETAIL 1  
SCALE : N.T.S



SEE NOTE 1  
TYPICAL FOR ALL DIMENSIONS

LAMACOID NAMEPLATE  
WHITE LETTERING ON RED BACKGROUND  
(WARNING LETTERING TO BE 6mm HIGH,  
THE REST OF LETTERING TO BE 4.8mm HIGH)  
NP2

DETAIL 2  
SCALE : N.T.S

FRONT VIEW  
SCALE: N.T.S

- NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  2. FRONT DOOR SHALL BE PROVIDED WITH NAMEPLATE AND WARNING AS SHOWN.
  3. PANEL VENDOR TO FINALIZE PANEL LAYOUT.
  4. BILL OF MATERIAL SHOWN ON DWG 4663-04-03-PA-103.

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-03-PA-102	KHIT COMMUNICATION PANEL CO-TCMP-02 LAYOUT SHT 2 OF 2
4663-04-03-PA-103	KHIT COMMUNICATION PANEL CO-TCMP-02 BILL OF MATERIAL

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2013-OCT-03

PERMIT TO PRACTICE  
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PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-TO-0000-P0101  
UEL# 2012016-1EF-CAB-000-0201-01

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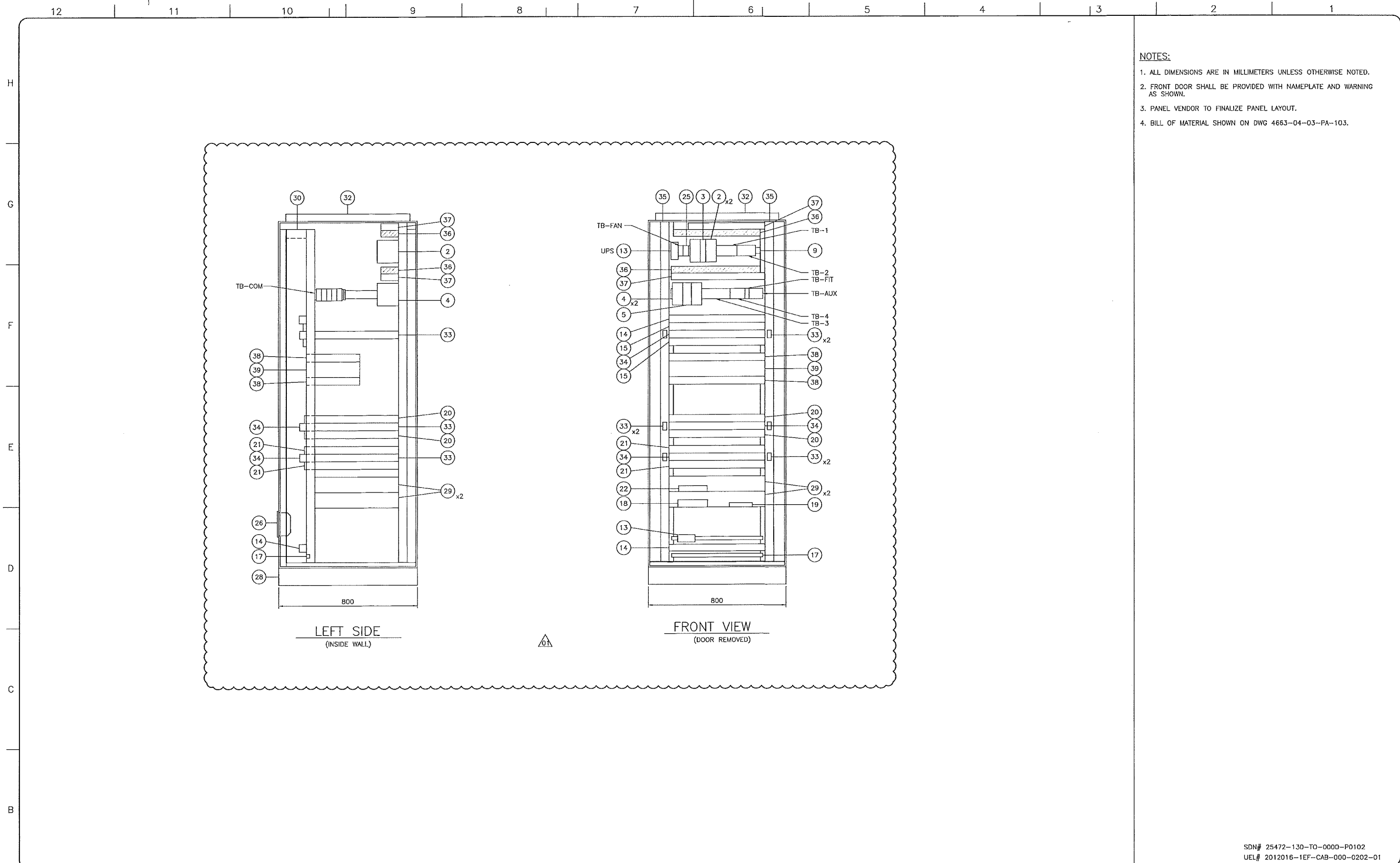
upside  
Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE #04

KHIT COMMUNICATION PANEL  
CO-TCMP-02 (CO-EES-21)  
PANEL LAYOUT SHEET 1 OF 2

SCALE N.T.S. DRAWING No 4663-04-03-PA-101 REV 00



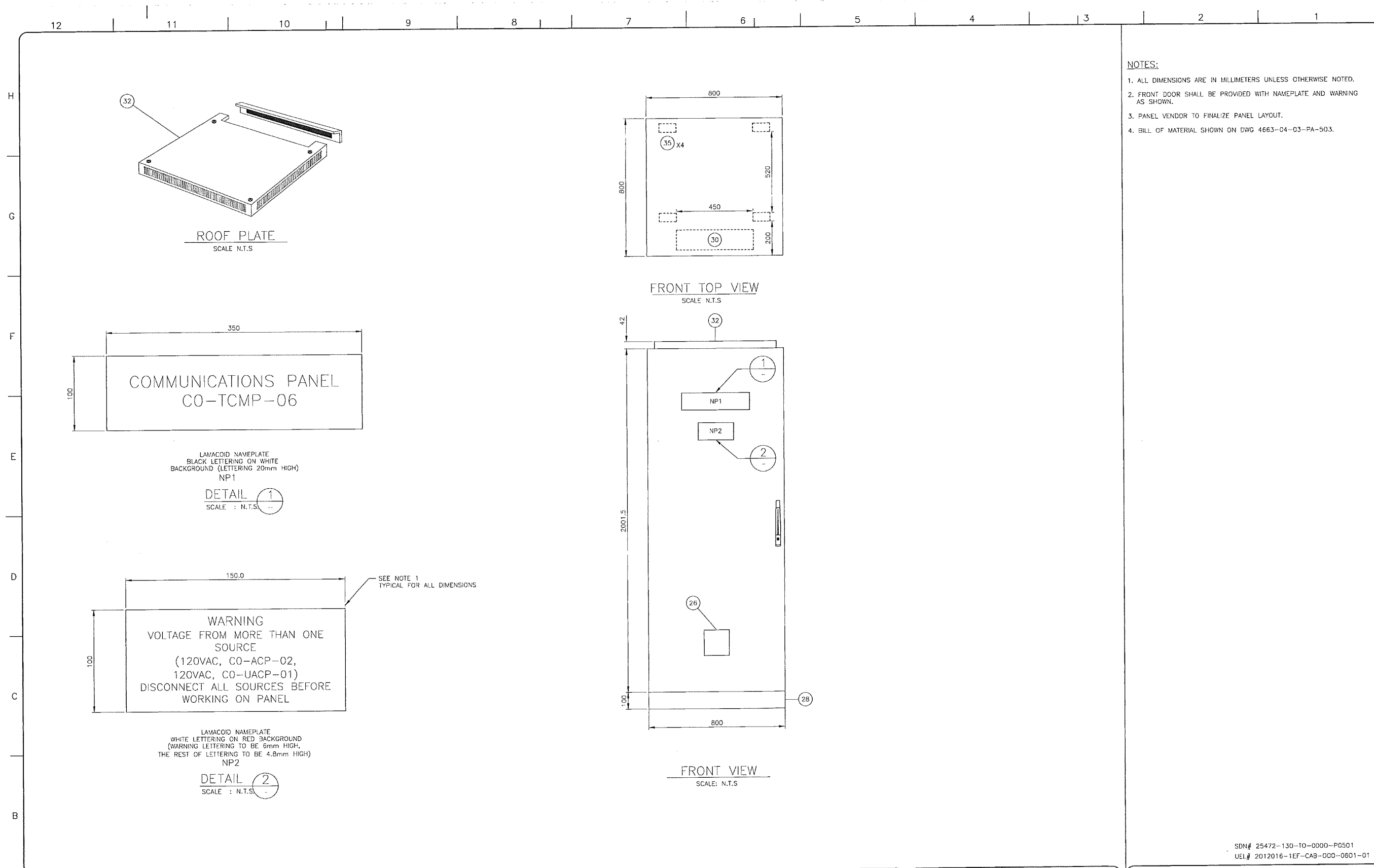
- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  2. FRONT DOOR SHALL BE PROVIDED WITH NAMEPLATE AND WARNING AS SHOWN.
  3. PANEL VENDOR TO FINALIZE PANEL LAYOUT.
  4. BILL OF MATERIAL SHOWN ON DWG 4663-04-03-PA-103.

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-03-PA-101	KHTT COMMUNICATION PANEL CO-TCMP-02 LAYOUT SH1 1 OF 2
4663-04-03-PA-103	KHTT COMMUNICATION PANEL CO-TCMP-02 BILL OF MATERIAL

REVISION				APPROVAL						
REV No	DATE	DESCRIPTION		PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)		2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
01	2013-11-20	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)		2197104	MAF	DMC	SRL	JED	DCB	UPSIDE

	PERMIT/ ENG. APPROVAL DATE PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 <small>The Association of Professional Engineers, Geologists and Geophysicists of Florida</small>
REV. NO.	DATE

KEYSTONE HARDISTY TANK TERMINAL			
PA # 4663	CHANGAGE:	DISCIPLINE #04	
KHTT COMMUNICATION PANEL CO-TCMP-02 (CO-EES-21) PANEL LAYOUT SHEET 2 OF 2			
SCALE N.T.S.	DRAWING No 4663-04-03-PA-102	REV 01	



- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  2. FRONT DOOR SHALL BE PROVIDED WITH NAMEPLATE AND WARNING AS SHOWN.
  3. PANEL VENDOR TO FINALIZE PANEL LAYOUT.
  4. BILL OF MATERIAL SHOWN ON DWG 4663-04-03-PA-503.

SDN# 25472-130-10-0000-P0501  
UEL# 2012016-1EF-CAB-000-0601-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-03-PA-502	KHIT COMMUNICATION PANEL CO-TCMP-06 LAYOUT SH. 2 OF 2
4663-04-03-PA-503	KHIT COMMUNICATION PANEL CO-TCMP-06 BILL OF MATERIAL

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-11-20	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAF	DWC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers,  
 Geoscientists and Geophysicists of Alberta

REV. NO. DATE PERMIT NUMBER:

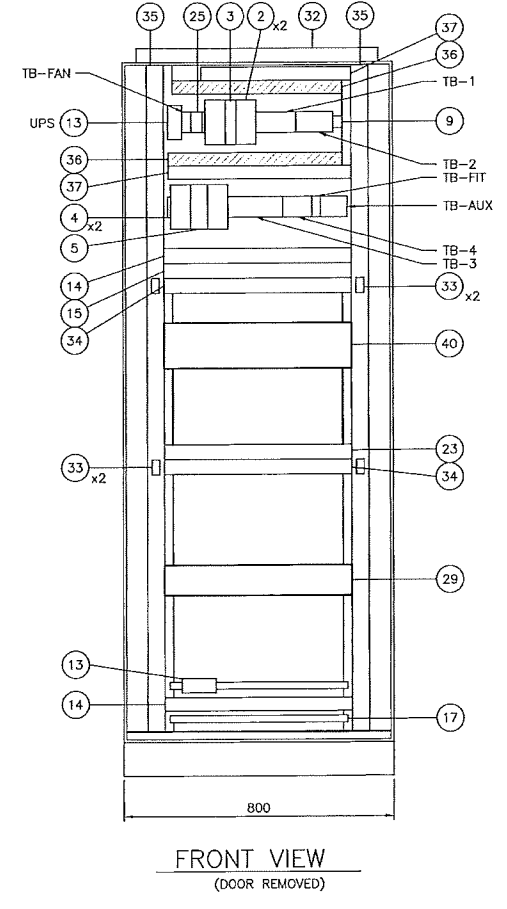
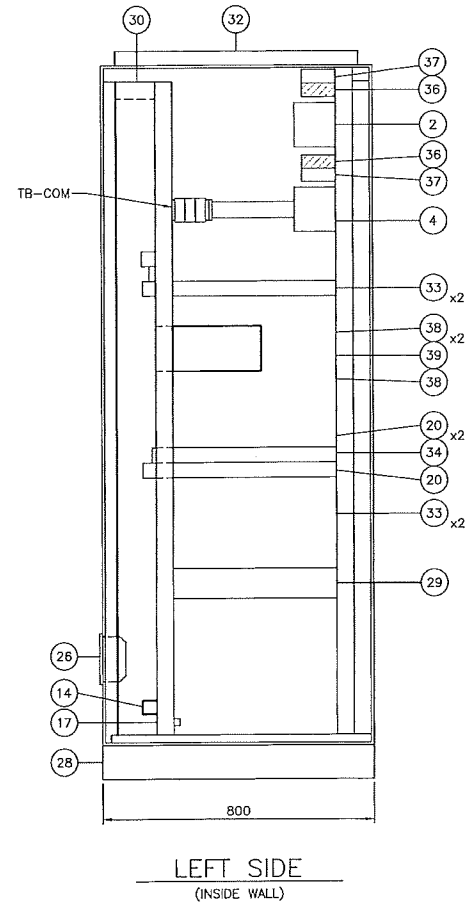
KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 04

KHIT COMMUNICATION PANEL  
CO-TCMP-06 (CO-EES-21)  
PANEL LAYOUT SHEET 1 OF 2

SCALE: N.T.S. DRAWING No: 4663-04-03-PA-501 REV: 00

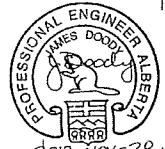
H  
G  
F  
E  
D  
C  
B  
A



- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
  2. FRONT DOOR SHALL BE PROVIDED WITH NAMEPLATE AND WARNING AS SHOWN.
  3. PANEL VENDOR TO FINALIZE PANEL LAYOUT.
  4. BILL OF MATERIAL SHOWN ON DWG 4663-04-03-PA-503.

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-03-PA-501	KHHT COMMUNICATION PANEL CO-TCMP-06 LAYOUT SH1 1 OF 2
4663-04-03-PA-503	KHHT COMMUNICATION PANEL CO-TCMP-06 BILL OF MATERIAL

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-11-20	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAF	DMC	SRL	JED	DCB	UPSIDE

 <p>PROFESSIONAL ENGINEER ALBERTA JAMES DODD 2013-NOV-20</p>	<p>PERMIT TO PRACTICE UPSIDE ENGINEERING LTD. PERMIT NUMBER: P 5508 The Association of Professional Engineers, Geologists and Geophysicists of Alberta</p>
<p>PROFESSIONAL ENGINEER/RPT</p>	<p>PERMIT/ ENG. APPROVAL</p>
<p>REV. NO.</p>	<p>DATE</p>
<p>DATE</p>	<p>PERMIT NUMBER:</p>

SDN# 25472-130-TO-0000-P0502  
UEL# 2012016-1EF-CAB-000-0602-01

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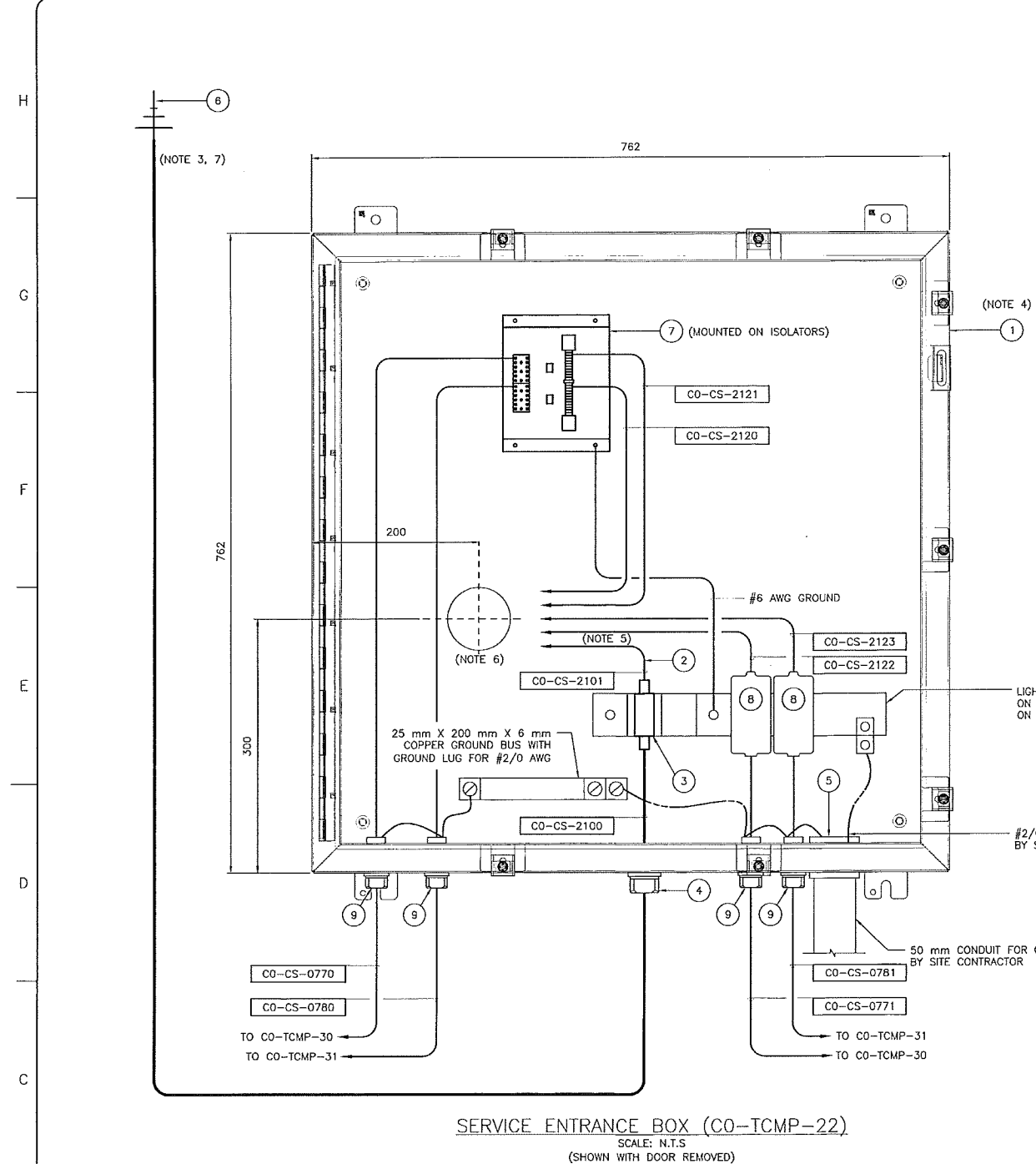
KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHAINAGE: DISCIPLINE #04

KHHT COMMUNICATION PANEL  
CO-TCMP-06 (CO-EES-21)  
PANEL LAYOUT SHEET 2 OF 2

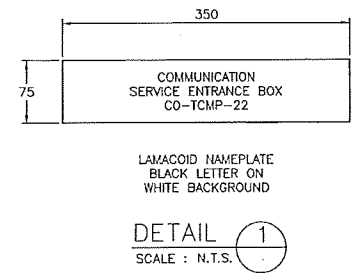
SCALE N.T.S. DRAWING No 4663-04-03-PA-502 REV 00

TIME DESIGN FILE



BILL OF MATERIAL					
ITEM	QTY	DESCRIPTION	MANUFACTURER	PART NO.	REMARKS
1	1	NEMA 4 762H x 760W x 200D PANEL ANSI 61 GRAY	HOFFMAN	A30H30BLP	NOTE 8
	1	PLATE	HOFFMAN	A30P30	
2	1	RG142 COAXIAL CABLE 2m LONG, TNC-MALE TO N-MALE	-	-	NOTE 9
3	1	LIGHTNING PROTECTORS (CELL)	POLYPHASE	IS-B850LN-C2	NOTE 8
4	1	LIQUID TIGHT NON-METALLIC STRAIN RELIEF CONNECTION	SKINTOP	S2112	NOTE 8
5	1	50 mm CONDUIT GROUNDING BUSHING	THOMAS & BETTS	BG200-14-20	SUPPLIED AND INSTALLED BY SITE CONTRACTOR
6	1	ANTENNA: COMES WITH LMR400 ULTRAFLEX CABLE AND N-MALE CONNECTORS	WAVELINK	PRO806-14-4030 NICG-KG	NOTE 3
7	1	6 PAIR BIX CONNECTOR LIGHTENING ARRESTOR	CIRCA	2100BN-6	NOTE 8
8	2	LIGHTNING PROTECTORS	POLYPHASE	1X-2H1M	NOTE 8
9	4	CABLE GLAND C/W GROUND BUSHING	OPEN		NOTE 8

- NOTES:**
1. LEAVE AND CABLE SLACK AROUND THE INSIDE PERIMETER.
  2. LEAVE 75 mm AROUND SIDES/TOP/BOTTOM FOR CABLE MANAGEMENT.
  3. YAGI WILL BE SUPPLIED BY TCPL, MAST BY VENDOR, EES VENDOR WILL HAVE ANTENNA AND CABLE REMOVED FOR SHIPMENT AND REINSTALLATION WILL BE BY SITE CONTRACTOR.
  4. PANEL MUST BE NEMA 4 CERTIFIED PANEL.
  5. THE CABLE SHALL PENETRATE IN TO CO-EES-21 THRU THE 75 mm SLEEVE AND SHALL RUN IN TO COMMUNICATION CABINET CO-TCMP-02 THE FINAL DESTINATION OF THE CABLE SHALL BE AT A LEVEL BETWEEN 150 mm (3RU) AND 225 mm (5RU) HEIGHT FROM BOTTOM OF THE CABINET.
  6. 75 mm SLEEVE TO BE INSTALLED BY EES VENDOR, LOCATION TO BE FIELD VERIFIED.
  7. YAGI ANTENNA IS MOUNTED ON MAST FIXED TO EES EXTERIOR WALL. REFER TO 4663-06-00-20-300 DETAIL 4.
  8. SUPPLIED BY PANEL VENDOR.
  9. SUPPLIED BY TCPL AND INSTALLED BY VENDOR.



**SERVICE ENTRANCE BOX (CO-TCMP-22)**  
SCALE: N.T.S.  
(SHOWN WITH DOOR REMOVED)

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-03-WD-080	KHIT COMMUNICATION PANELS CO-TCMP-02 (CO-EES-21)

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-12	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT: **JAMES DOODS**  
 PERMIT/ ENG. APPROVAL: **DCB**  
 DATE: 2014-FEB-12  
 PERMIT TO PRACTICE  
 UPSIDE ENGINEERING LTD.  
 PERMIT NUMBER: P 5508  
 The Association of Professional Engineers, Geologists and Geophysicists of Alberta

SDN# 25472-130-T70-0000-P0025  
 UEL# 2012016-1EF-EWD-000-0711-01

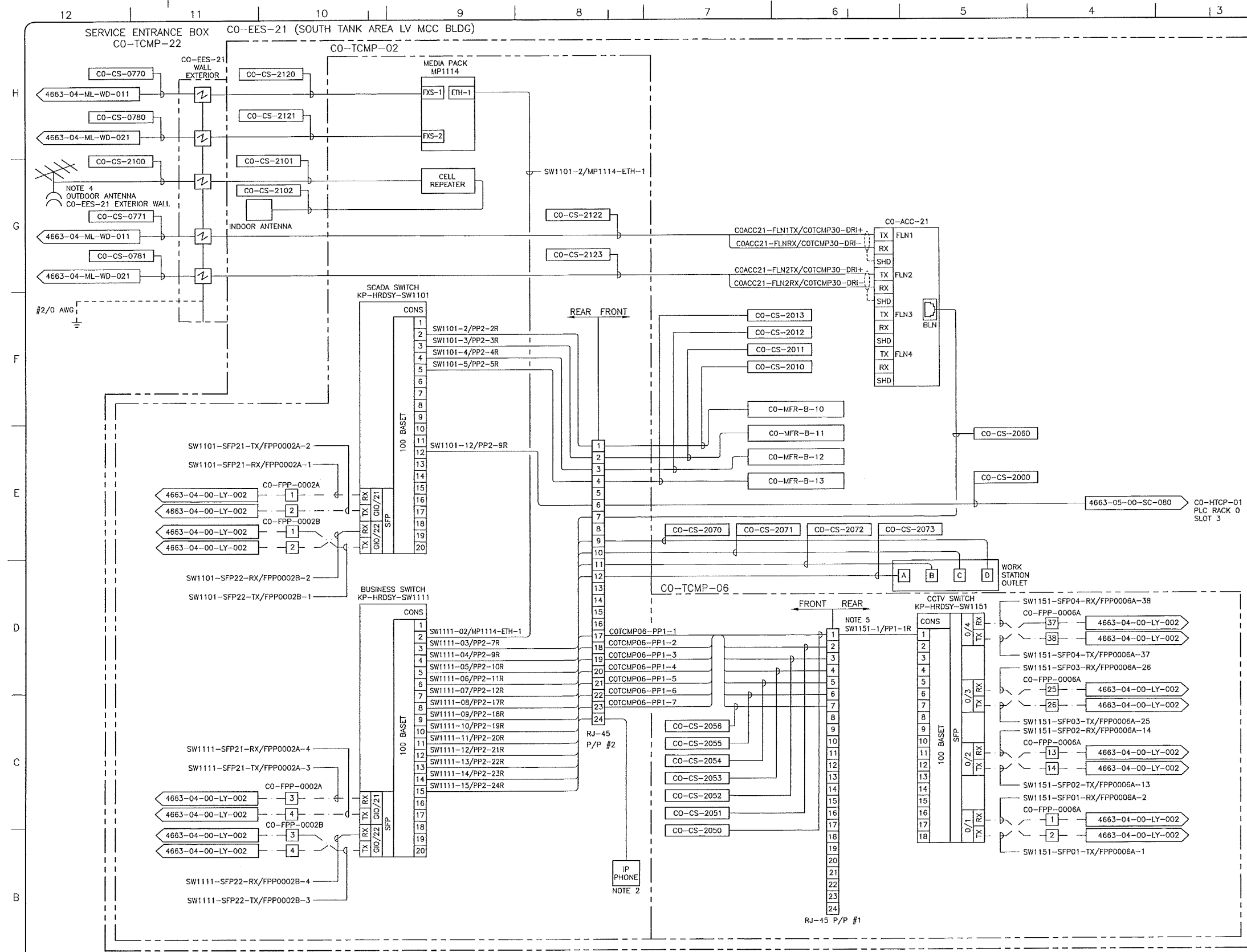
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KEYSTONE HARDISTY TANK TERMINAL  
 CHANAGE: 4663 DISCIPLINE # 04

**KHIT COMMUNICATION PANELS**  
 CO-TCMP-22 (CO-EES-21)  
 COMMUNICATIONS SERVICE ENTRANCE BOX LAYOUT

SCALE: N.T.S. DRAWING No: 4663-04-03-WD-022 REV: 00



- NOTES:**
- RESERVED FOR FUTURE WIRELESS.
  - RESERVED FOR IP PHONE CONNECTION, PROVIDED BY TCPL, MOUNTED ON INSIDE OF PANEL.
  - RESERVED FOR OCCASIONAL WORKSTATION USE.
  - YAGI IS MOUNTED ON MAST FIXED TO EXTERIOR WALL.
  - PATCH CORD CONNECTION TO BE MADE CROSS-OVER.

- LEGEND:**
- FIBER OPTIC (FOR THIS DWG)
  - - - FIBER OPTIC PATCH CORD (FOR THIS DWG)
  - COPPER WIRE (FOR THIS DWG)
  - [Symbol] SURGE ARRESTOR
  - SM SINGLE-MODE
  - MM MULTI-MODE
  - CO-CS-XXXX CABLE TAG
  - XXXX-XX-XX-XXX FROM/TO ARROW

- ABBREVIATIONS:**
- CCTV - CLOSED CIRCUIT TELEVISION
  - EES - ELECTRICAL EQUIPMENT SHELTER
  - FPP - FIBER PATCH PANEL
  - HMI - HUMAN MACHINE INTERFACE
  - HTCP - HARDISTY TERMINAL CONTROL PANEL
  - P/P - PATCH PANEL
  - PLC - PROGRAMMABLE LOGIC CONTROLLER
  - SCADA - SUPERVISORY CONTROL AND DATA ACQUISITION
  - TCMP - TERMINAL COMMUNICATION PANEL

SDN# 25472-130-T70-0000-P0080  
 UEL# 2012016-1EF-EWD-000-0080-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-04-00-LY-002	HARDISTY KHIT TERMINAL FIBER OPTIC WIRING DIAGRAM

REVISION		APPROVAL	
REV No	DATE	PROJECT CODE	DRAFTER
00	2014-02-12	2197104	BEM
DESCRIPTION		DESIGNER	DESIGN CHECKER
ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)		SRL	JED
		PROJECT MANAGER	COMPANY
		DCB	UPSIDE

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PERMIT/ ENG. APPROVAL

DATE

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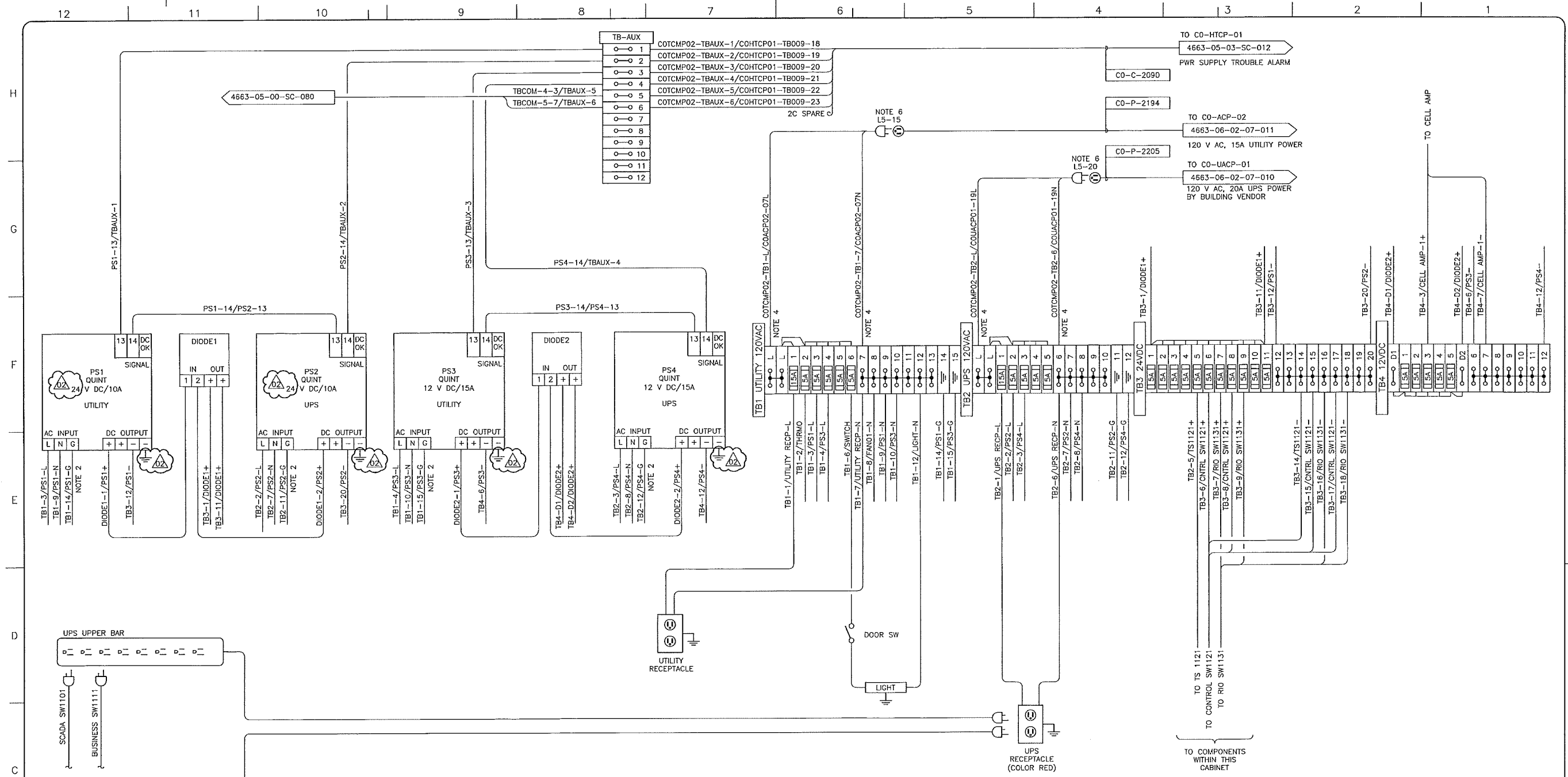
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KEYSTONE HARDISTY TANK TERMINAL

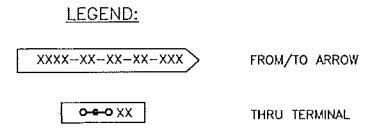
CHAUNAGE: DISCIPLINE # 04

KHIT COMMUNICATION PANELS  
 CO-TCMP-02 (CO-EES-21)  
 COMMUNICATIONS WIRING DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-04-00-WD-080 REV: 00



- NOTES:**
1. ALL WIRING TO BE #14 AWG TEW UNLESS NOTED OTHERWISE.
  2. #10 AWG TEW GREEN/YELLOW STRIPE.
  3. 24 V DC WIRING TO POWER SUPPLY MODULES IS #10AWG TEW.
  4. TERMINALS MUST BE SUITABLE FOR INCOMING #12 AWG.
  5. USE HEAT-SHRINK WIRE MARKERS TO IDENTIFY ALL WIRE ENDS.
  6. PANEL VENDOR TO PROVIDE FLEXIBLE CORD CONNECTION, 5M, 12 AWG, SOW CABLE C/W L5-15 CORD END (UTILITY) L5-20 CORD END (UPS)



REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-10-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	SKC	DMC	SRL	JED	DCB	UPSIDE
01	2013-11-20	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAF	DMC	SRL	JED	DCB	UPSIDE
02	2014-02-12	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	BEM	DMC	SRL	JED	DCB	UPSIDE

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SDN# 25472-130-170-0000-P0101  
UEL# 2012016-1EF-EWD-000-0201-01

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KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHANGE: DISCIPLINE # 04

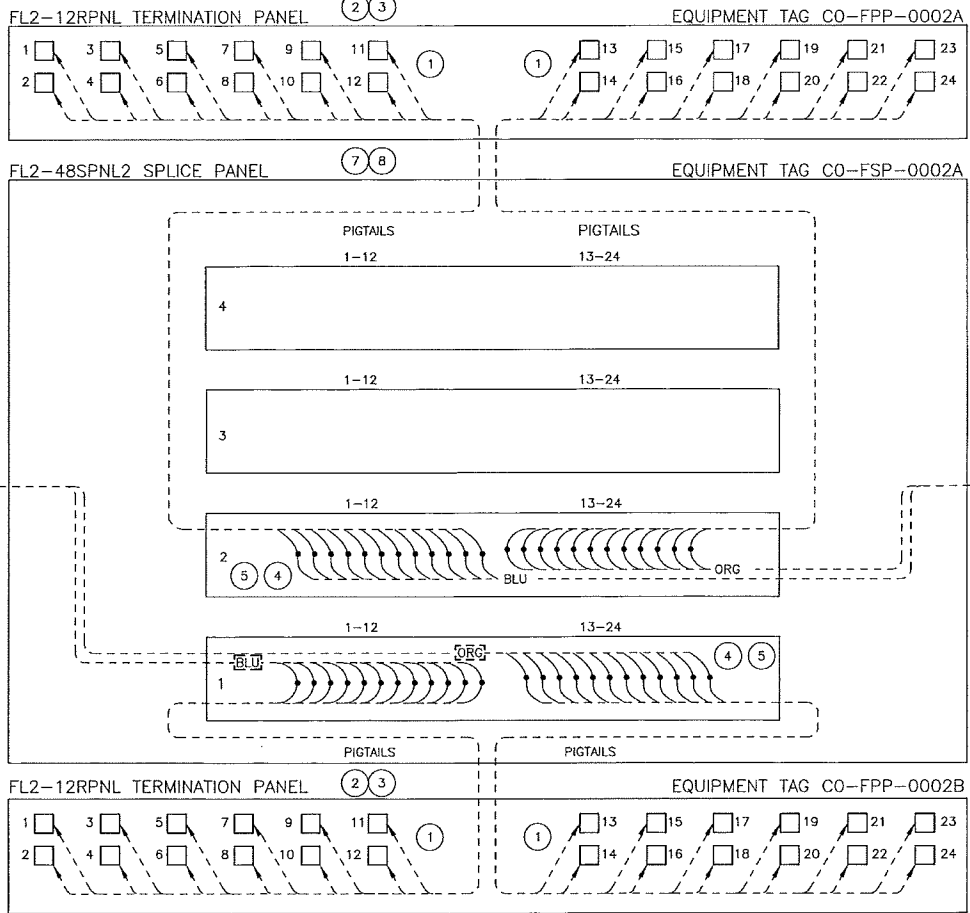
**KHTT COMMUNICATION PANEL**  
CO-TCMP-02 (CO-EES-21)  
POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-04-03-WD-101 REV 02

12 11 10 9 8 7 6 5 4 3 2 1

CO-TCMP-02 REFER TO DWG. 4663-04-03-PA-101

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EQUIPMENT IDENTIFICATION LIST			
ITEM	MFR	PART #	DESCRIPTION
1	TE	FL2-6PBSC605R	6-PAK PLUG-IN WITH LC CONNECTORS
2	TE	FL2-12RPNL	12 PORT PATCH PANEL
3	TE	FL2-FLMT175	1RU FLUSH MOUNT KIT
4	TE	FST-DRS24-HS	SPLICE WHEEL 24 FIBER
5	TE	FST-ACC001	SPLICE PROTECTORS
6	TE	FL2-ACC007	CABLE CLAMP KIT
7	TE	FL2-48SPNL2	48 PORTS SPLICE PANEL
8	TE	FL2-FLMT0350	2RU FLUSHMOUNT KIT

- NOTES:
1. MANUFACTURER TYCO ELECTRONICS ABBREVIATED TO "TE".
  2. PANEL VENDOR TO SUPPLY ALL MATERIALS, SHIP LOOSE PANEL MATERIALS WHICH REQUIRE SITE INSTALLATION.

- LEGEND:
- 11 FIBER OPTIC LC TYPE BULKHEAD CONNECTION
  - 12 FIBER OPTIC FUSION SPLICE (MULTIMODE)
  - FIBER OPTIC FUSION SPLICE (SINGLEMODE)
  - SINGLEMODE FIBER OR CABLE
  - MULTIMODE FIBER OR CABLE

FIBER OPTIC CABLE COLOUR CODE		
ACR	STRAND/TUBE COLOR	TUBE/STRAND #
BLU	BLUE	1
ORG	ORANGE	2
GRN	GREEN	3
BRN	BROWN	4
SLT	SLATE	5
WHT	WHITE	6
RED	RED	7
BLK	BLACK	8
YLW	YELLOW	9
VLT	VIOLET	10
PNK	PINK (ROSE)	11
AQU	AQUA	12

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL									
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY				
00	2014-02-12	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	DMC	SRL	JED	DCB	UPSIDE				

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SDN# 25472-130-T70-0000-P0110  
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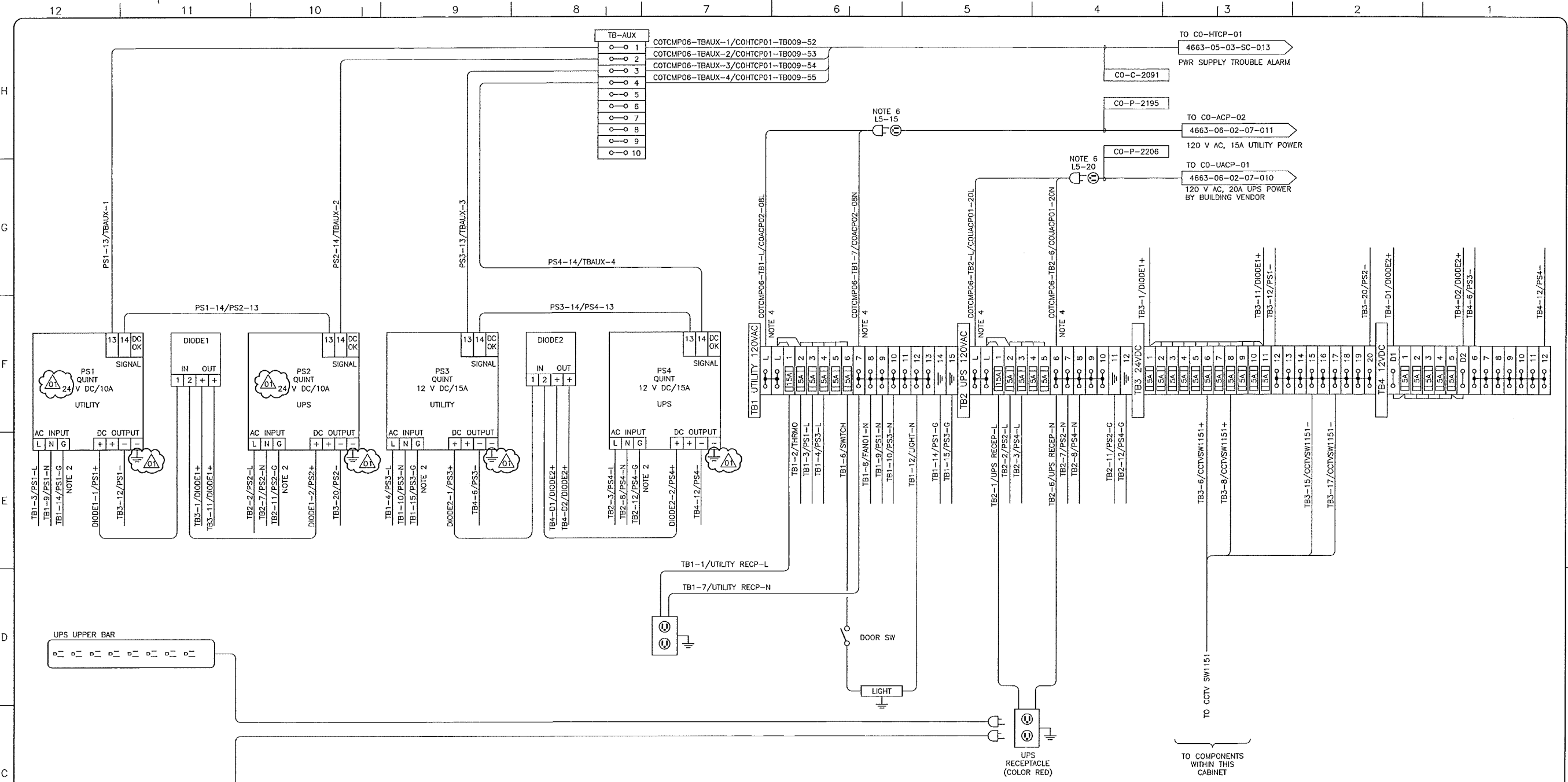
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KEYSTONE HARDISTY TANK TERMINAL

CHAINAGE: 4663 DISCIPLINE # 04  
 HARDISTY KHTT TERMINAL  
 CO-FPP-0002A/B/C (CO-EES-21)  
 FIBER OPTIC CONNECTION DIAGRAM

SCALE: N.T.S. DRAWING No: 4663-04-03-WD-110 REV: 00





- NOTES:**
1. ALL WIRING TO BE #14 AWG TEW FLEXIBLE UNLESS NOTED OTHERWISE.
  2. #10 AWG TEW GREEN/YELLOW STRIPE.
  3. 24 V DC WIRING TO POWER SUPPLY MODULES IS #10AWG TEW.
  4. TERMINALS MUST BE SUITABLE FOR IDENTIFYING #12 AWG.
  5. USE HEAT-SHRINK WIRE MARKERS TO IDENTIFY ALL WIRE ENDS.
  6. PANEL VENDOR TO PROVIDE FLEXIBLE CORD CONNECTION, 5M, 12 AWG, SOW CABLE C/W L5-15 CORD END (UTILITY) L5-20 CORD END (UPS)

**LEGEND:**

XXXX-XX-XX-XXX FROM/TO ARROW

○-○-XX THRU TERMINAL

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION				APPROVAL					
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2013-11-20	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAF	DMC	SRL	JED	DCB	UPSIDE
01	2014-02-12	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	MAF	DMC	SRL	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014 FEB 12

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-T70-0000-P0501  
UEL# 2012016-1EF-EWD-000-0601-01

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KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHANGE: DISCIPLINE # 04

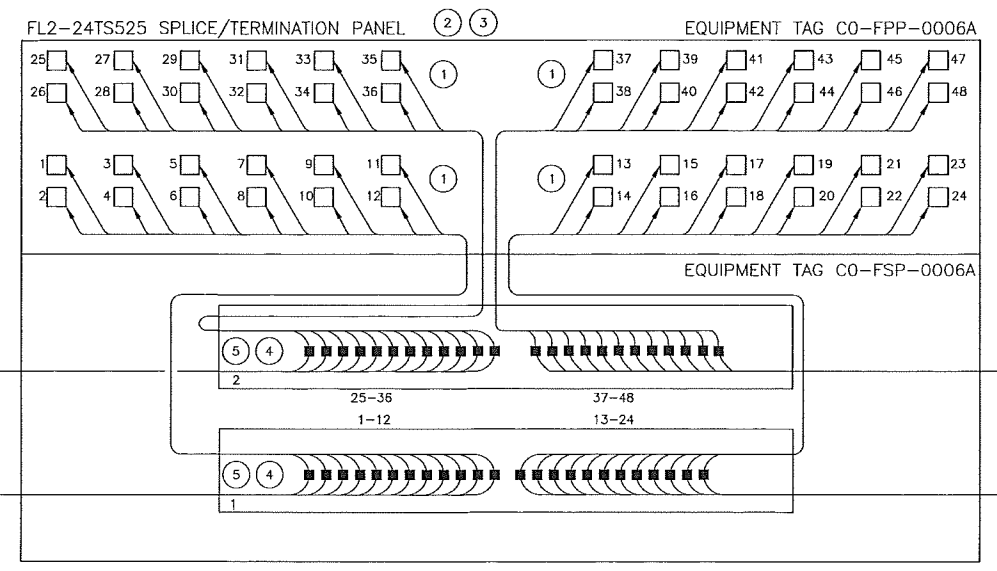
KHHT COMMUNICATION PANEL  
CO-TCMP-06 (CO-EES-21)  
POWER DISTRIBUTION WIRING DIAGRAM

SCALE N.T.S. DRAWING No 4663-04-03-WD-501 REV 01

12 11 10 9 8 7 6 5 4 3 2 1

CO-TCMP-06 REFER TO DWG. 4663-04-03-PA-501

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EQUIPMENT IDENTIFICATION LIST			
ITEM	MFR	PART #	DESCRIPTION
1	TE	FL2-6P6CC605R	6-PAK PLUG-IN WITH LC CONNECTORS MM
2	TE	FL2-24TS525	SPLICE/TERMINATION PANEL
3	TE	FL2-FLMT0525	3RU FLUSHMOUNT KIT
4	TE	FST-DRS24-HS	SPLICE WHEEL 24 FIBER
5	TE	FST-ACC001	SPLICE PROTECTORS
6	TE	FL2-ACC007	CABLE CLAMP KIT

- NOTES:
1. MANUFACTURER TYCO ELECTRONICS ABBREVIATED TO "TE".
  2. PANEL VENDOR TO SUPPLY ALL MATERIALS, SHIP LOOSE PANEL MATERIALS WHICH REQUIRE SITE INSTALLATION.

- LEGEND:
- 11 FIBER OPTIC LC TYPE BULKHEAD CONNECTION
  - 12 FIBER OPTIC FUSION SPLICE (MULTIMODE)
  - FIBER OPTIC FUSION SPLICE (SINGLEMODE)
  - SINGLEMODE FIBER OR CABLE
  - MULTIMODE FIBER OR CABLE

FIBER OPTIC CABLE COLOUR CODE		
ACR	STRAND/TUBE COLOR	TUBE/STRAND #
BLU	BLUE	1
ORG	ORANGE	2
GRN	GREEN	3
BRN	BROWN	4
SLT	SLATE	5
WHT	WHITE	6
RED	RED	7
BLK	BLACK	8
YLW	YELLOW	9
VLT	VIOLET	10
PNK	PINK (ROSE)	11
AQU	AQUA	12

REFERENCE DRAWINGS	
DRAWING No	TITLE

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-02-12	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	JIM	DMC	SRL	JED	DCB	UPSIDE

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PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5508  
The Association of Professional Engineers,  
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2014-FEB-12

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-T70-0000-P0510  
UEL# 2012016-1EF-EWD-000-0610-01

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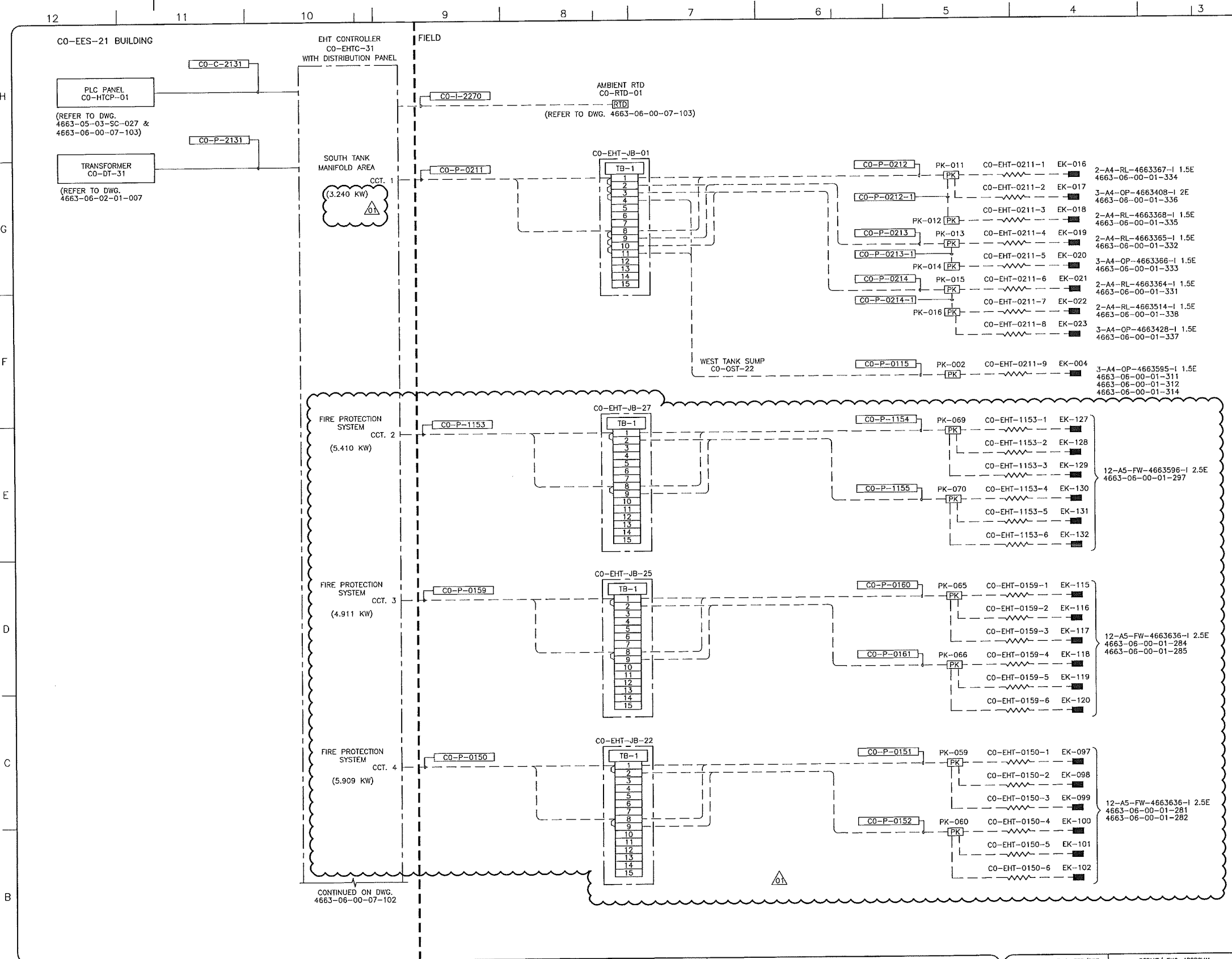
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

CHAUNAGE: 4663 DISCIPLINE # 04

HARDISTY KHTT TERMINAL  
CO-FPP-0006A (CO-EES-21)  
FIBER OPTIC CONNECTION DIAGRAM

SCALE N.T.S. DRAWING No 4663-04-03-WD-510 REV 00



**NOTES:**

- ELECTRICAL INSTALLATIONS TO CONFORM TO LATEST CEC CODE. ALL EQUIPMENT TAGS TO BE PREFIXED WITH '130-KSHHT'
- ALL CABLES SHALL ENTER AT THE BOTTOM OF THE JUNCTION BOX.

**LEGEND:**

- [PK] - POWER CONNECTION KIT (PK)
- [EK] - END TERMINATION KIT (EK)
- - TRACER
- [RTD] - RTD
- CO P XXXX - CABLE TAG IDENTIFIER
- P=POWER, I=INSTRUMENT AND C=CONTROL CABLE
- UNIT #

CONTINUED ON DWG. 4663-06-00-07-102

SDN# 25472-130-EH-0000-F0101  
UEL# 2012016-1EF-EWD-000-0801-01

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-07-104	ELECTRICAL HEAT TRACING CONTROL (CO-EHTC-31) INTERCONNEC. WIRING DIAG. SHT. 2
4663-06-00-07-105	ELECTRICAL HEAT TRACING CONTROL (CO-EHTC-31) INTERCONNEC. WIRING DIAG. SHT. 3

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-01-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HMM	JED	DCB	UPSIDE
01	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HMM	JED	DCB	UPSIDE

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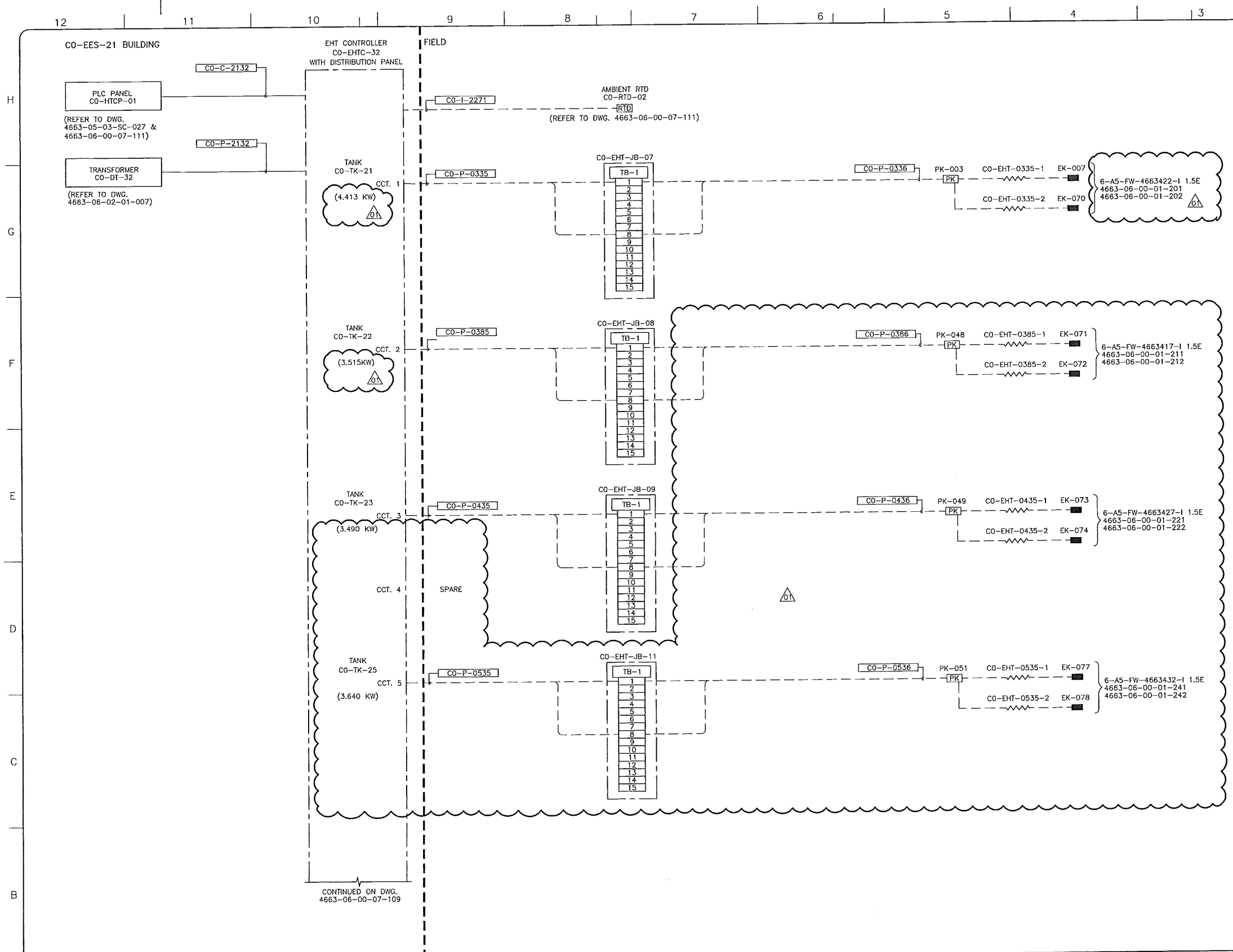
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KEYSTONE HARDISTY TANK TERMINAL

CHAIRMAN: 4663 DISCIPLINE # 06

ELECTRICAL HEAT TRACING CONTROLLER  
CO-EHTC-31  
BLOCK WIRING DIAGRAM SHEET 1

SCALE: N.T.S. DRAWING No: 4663-06-00-07-101 REV 01



**NOTES:**

- ELECTRICAL INSTALLATIONS TO CONFORM TO LATEST CEC CODE. ALL EQUIPMENT TAGS TO BE PREFIXED WITH '130-KSHTT-'
- ALL CABLES SHALL ENTER AT THE BOTTOM OF THE JUNCTION BOX.

**LEGEND:**

- [PK] - POWER CONNECTION KIT (PK)
- [EK] - END TERMINATION KIT (EK)
- - TRACER
- [RTD] - RTD
- CO P XXXX - CABLE TAG IDENTIFIER
- P=POWER, I=INSTRUMENT AND C=CONTROL CABLE
- UNIT #

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-07-112	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNECT, WIRING DIAG, SHT. 2
4663-06-00-07-113	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNECT, WIRING DIAG, SHT. 3

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-01-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HHM	JED	DCB	UPSIDE
01	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-APR-15

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SDN# 25472-130-EH-0000-P0108  
UEL# 2012016-1EF-EWD-000-0808-01

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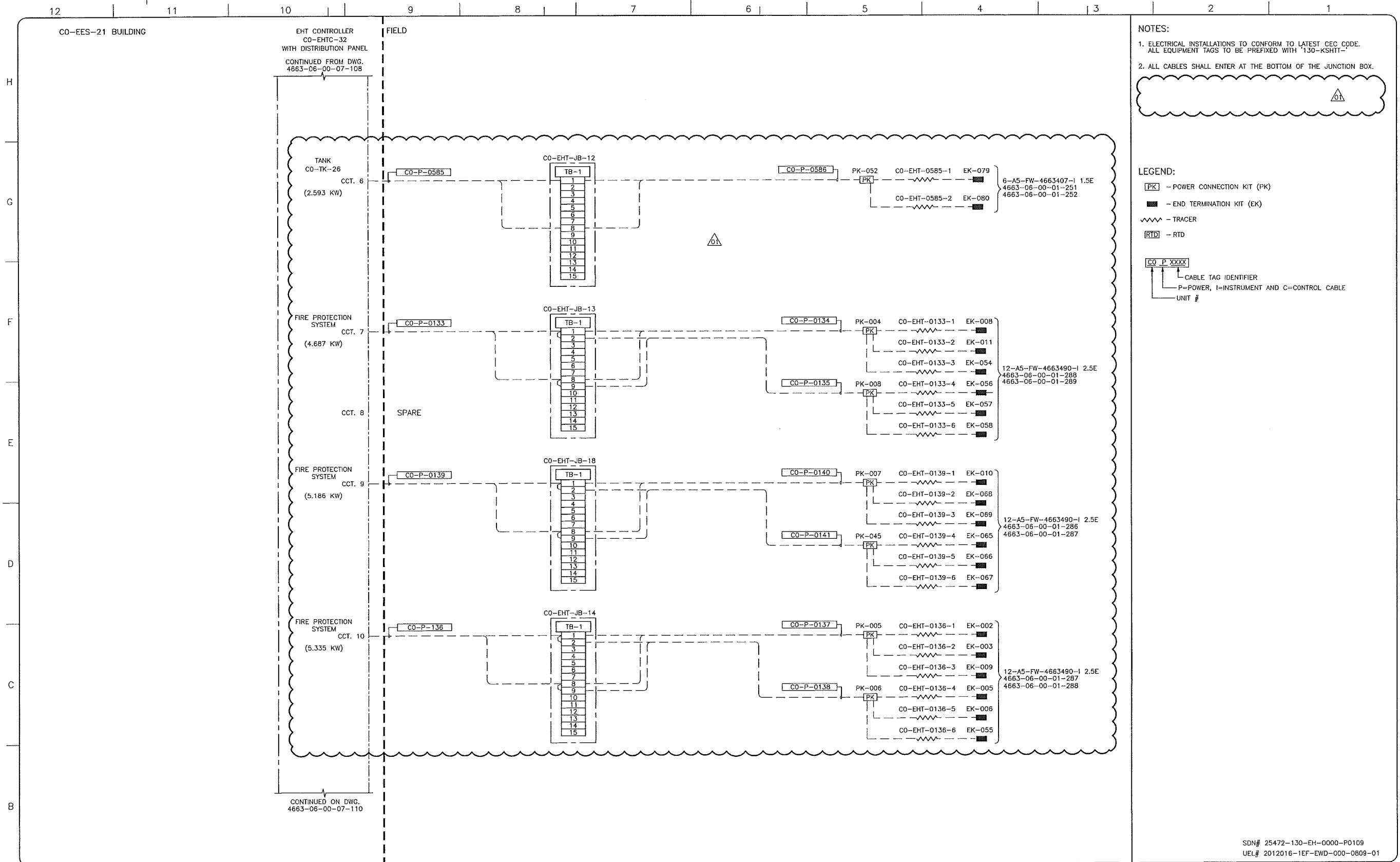
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FW # 4663 CHARGE: DISCIPLINE # 06

ELECTRICAL HEAT TRACING CONTROLLER  
CO-EHTC-32  
BLOCK WIRING DIAGRAM SHEET 1

SCALE N.T.S. DRAWING No 4663-06-00-07-108 REV 01



NOTES:

- ELECTRICAL INSTALLATIONS TO CONFORM TO LATEST CEC CODE. ALL EQUIPMENT TAGS TO BE PREFIXED WITH "130-KSHTT"
- ALL CABLES SHALL ENTER AT THE BOTTOM OF THE JUNCTION BOX.

LEGEND:

- [PK] - POWER CONNECTION KIT (PK)
- [EK] - END TERMINATION KIT (EK)
- ~ - TRACER
- [RTD] - RTD

CABLE TAG IDENTIFIER  
 P=POWER, I=INSTRUMENT AND C=CONTROL CABLE  
 UNIT #

REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-07-112	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNEC. WIRING DIAG. SHEET 2
4663-06-00-07-113	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNEC. WIRING DIAG. SHEET 3

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-01-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HRM	JED	DCB	UPSIDE
01	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HRM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

2014-APR-15

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SDN# 25472-130-EH-0000-P0109  
 UEL# 2012016-1EF-EWD-000-0809-01

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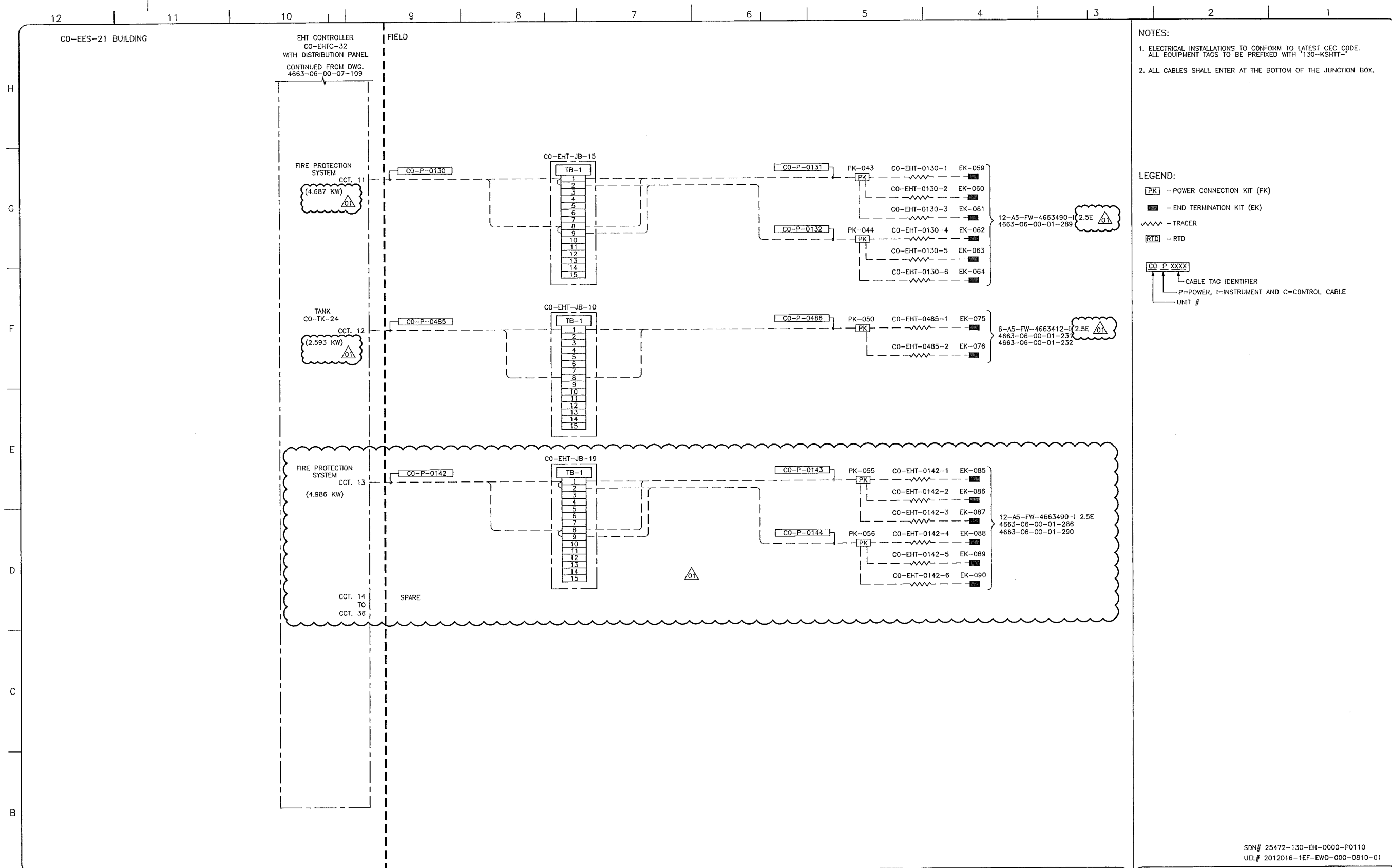
upside  
 Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FIA # 4663 CHAINAGE: DISCIPLINE # 06

ELECTRICAL HEAT TRACING CONTROLLER  
 CO-EHTC-32  
 BLOCK WIRING DIAGRAM SHEET 2

SCALE N.T.S. DRAWING No 4663-06-00-07-109 REV 01



REFERENCE DRAWINGS	
DRAWING No	TITLE
4663-06-00-07-108	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNEC. WIRING DIAG. SHT. 1
4663-06-00-07-109	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNEC. WIRING DIAG. SHT. 2
4663-06-00-07-110	ELECTRICAL HEAT TRACING CONTROL\CO-EHTC-32\INTERCONNEC. WIRING DIAG. SHT. 3

REVISION			APPROVAL						
REV No	DATE	DESCRIPTION	PROJECT CODE	DRAFTER	DRAFTING CHECKER	DESIGNER	DESIGN CHECKER	PROJECT MANAGER	COMPANY
00	2014-01-03	ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HHM	JED	DCB	UPSIDE
01	2014-04-11	RE-ISSUED FOR CONSTRUCTION (UEL PROJ. #2012016)	2197104	PRG	PLR	HHM	JED	DCB	UPSIDE

PROFESSIONAL ENGINEER/RPT

PERMIT/ ENG. APPROVAL

DATE

PERMIT TO PRACTICE  
UPSIDE ENGINEERING LTD.  
PERMIT NUMBER: P 5608  
The Association of Professional Engineers,  
Geologists and Geophysicists of Alberta

2014-Afk-1-E

REV. NO. DATE PERMIT NUMBER:

SDN# 25472-130-EH-0000-P0110  
UEL# 2012016-1EF-EWD-000-0810-01

**TransCanada**  
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Engineering Ltd.

KEYSTONE HARDISTY TANK TERMINAL

FA # 4663 CHARGE: DISCIPLINE # 06

**ELECTRICAL HEAT TRACING CONTROLLER**  
**CO-EHTC-32**  
**BLOCK WIRING DIAGRAM SHEET 3**

SCALE H.T.S. DRAWING No 4663-06-00-07-110 REV 01

TIME - DESIGNFILE