UNIVERSITY OF COLORADO AT BOULDER

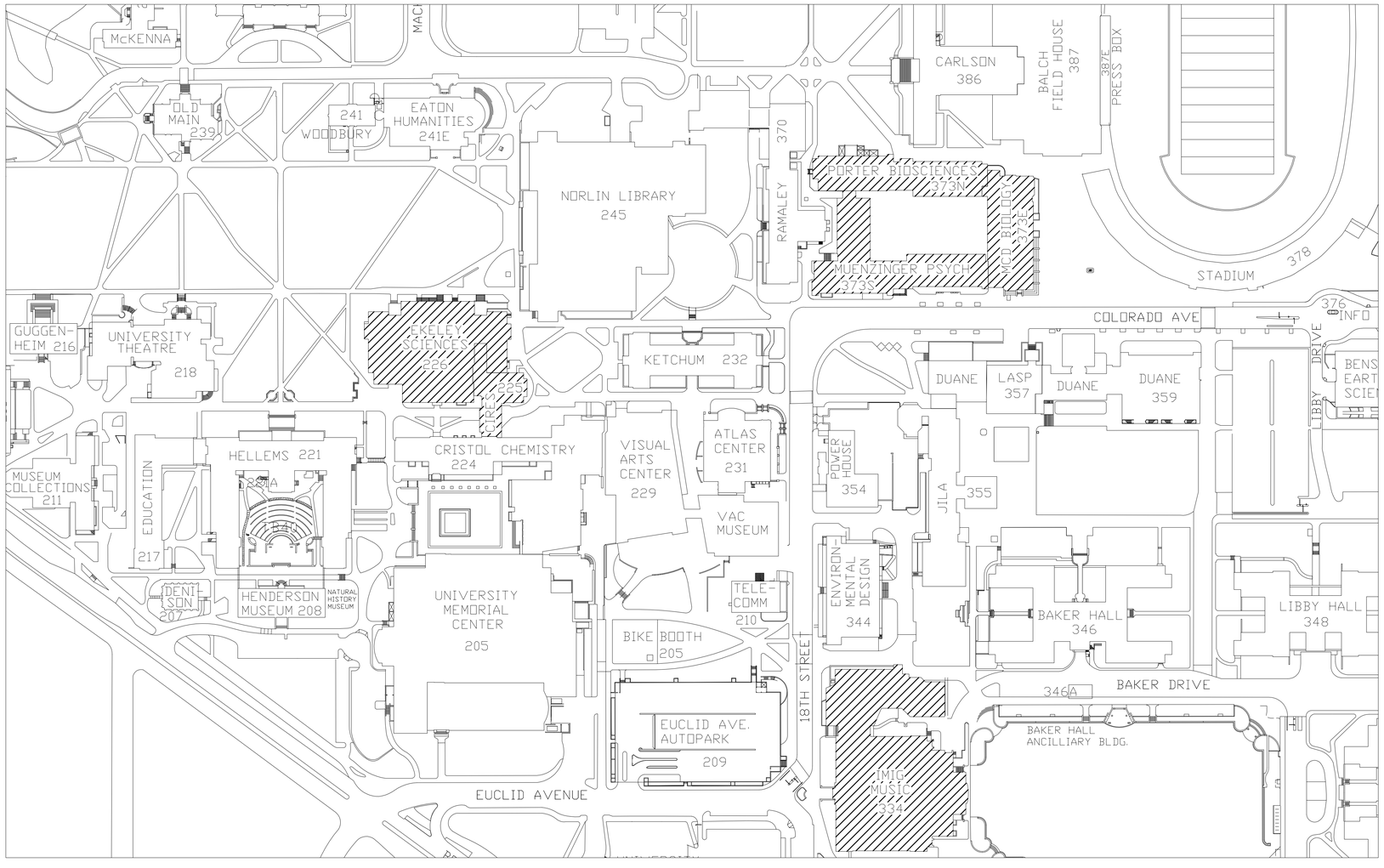
MAIN CAMPUS SMART METERING
CAMP CP 142558

SMART GRID
METERING 2011
University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

1. NEW PIPING AND EQUIPMENT IS DRAWN WITH A HEAVY LINE AND EXISTING ITEMS ARE DRAWN WITH A LIGHT LINE.
2. ALL WORK AND MATERIALS SHALL COMPLY WITH INTERNATIONAL CODES AND UCB CONSTRUCTION STANDARDS.
3. CONTRACTOR SHALL VERIFY EXISTING CONDITIONS PRIOR TO BID. AND SHALL VERIFY PIPE SIZES, DIMENSIONS, VOLTAGES, ETC, PRIOR TO CONSTRUCTION.
4. INSTALL NEW PIPING AND EQUIPMENT TO BE ACCESSIBLE FOR SERVICE AND MAINTENANCE WITHOUT OBSTRUCTING EXISTING DEVICES NEEDING SERVICE AND MAINTENANCE.
5. CONTRACTOR SHALL ENSURE THAT NEW PIPING AND EQUIPMENT WILL NOT OBSTRUCT THE SPRAY PATTERN OF ANY FIRE SPRINKLERS.
6. CONTRACTOR SHALL PROTECT FIRE SPRINKLERS IN THE CONSTRUCTION AREA AGAINST MECHANICAL DAMAGE.
7. CONTRACTOR SHALL OBTAIN A HOT WORK PERMIT FOR ANY WORK INVOLVING HEAT GUNS, SOLDERING, BRAZING, WELDING, GRINDING, POWDER DRIVEN STUD, METAL CUTTING USING POWER TOOLS OR OTHER ACTIVITIES INVOLVING FLAMES OR SPARKS. HOT WORK PERMIT FORMS ARE AVAILABLE FROM CU PROJECT MANAGERS, FM OFFICE OF PLANNING, DESIGN AND CONSTRUCTION AND UNDER "HOT WORK PERMIT" AT THE FLS WEB SITE: (HTTP://WWW.COLORADO.EDU/FACILITIESMANAGEMENT/PDC/SAFETY/INDEX.HTML).
8. AT ALL TIMES, CONTRACTOR SHALL ENSURE THAT THE PROJECT AND STAGING AREA AND CONSTRUCTION ACTIVITIES DO NO CAUSE OBSTRUCTION OF EGRESS PATHS INSIDE THE BUILDING, BLOCK EXIT DISCHARGE FROM THE BUILDING OR IMPEDE EMERGENCY VEHICLE ACCESS TO THE AREA.
9. IF THE CONSTRUCTION ACTIVITIES GENERATE DUST OF FUMES INSIDE THE BUILDING, CONTRACTOR SHALL TAKE NECESSARY MEASURES TO PREVENT NUISANCE ACTUATION OF ANY NEARBY SMOKE OR DUCT DETECTORS. CONTACT THE FIRE SYSTEMS GROUP FOR ASSISTANCE IN ADVANCE OF THESE ACTIVITIES.
10. OUTAGE PROCEDURES: CONTRACTOR SHALL FOLLOW CAMPUS PROCEDURES FOR ANY OUTAGE OF FIRE SYSTEMS. THE CAMPUS PROCEDURES ARE AVAILABLE FROM THE FLS WEB SITE: (HPPT://WWW.COLORADO.EDU/FACILITESMANAGEMENT/PDC/SAFETY/DOCUMENTS/FIRE_SUPPRESSION_SYSTEMS.PDF) AND (HTTP://WWW.COLORADO.EDU/FACILITESMANAGEMENT/PDC/SAFETY/DOCUMENTS/FIREALARM_DETECTION.PDF)
11. CONTRACTOR SHALL MAKE SURE THAT NEW WORK SHALL NOT BLOCK ACCESS TO ANY OF THE EXISTING INFORMATION TECHNOLOGY OUTLETS OR PATHWAYS INCLUDING BUT NOT LIMITED TO CABLE TRAYS, PULL BOXES, BUTTERS, WIRE MOLD, ETC.



KEY PLAN

BID SET

SHEET INDEX:

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

TITLE SHEET

Project Number: 10.01461
Date: 07/08/2011
Sheets: 1 of 19

T1

ELECTRICAL SYMBOLS LEGEND

THIS IS A COMPREHENSIVE SYMBOL SCHEDULE, NOT ALL SYMBOLS ARE APPLICABLE TO THESE DRAWINGS

SYMBOLS	DESCRIPTION	MOUNTING HEIGHT TO CENTER OF DEVICE UNLESS OTHERWISE INDICATED
$^{A}O_{B}$	CEILING SURFACE MOUNTED LIGHT FIXTURE, CAPITAL LETTER INDICATES FIXTURE TYPE, SMALL LETTER INDICATES SWITCHING.	
⊘	RECESSED CEILING MOUNTED LIGHT FIXTURE	
●	CONNECTED TO EMERGENCY POWER	
O	WALL MOUNTED INCAND. OR H.I.D. LIGHT FIXTURE, SURFACE OR, RECESSED MOUNTED	
Ⓔ	CEILING-MOUNTED JUNCTION BOX ("C" INDICATES EMERGENCY CRITICAL BRANCH POWER; "L" INDICATES EMERGENCY LIFE SAFETY POWER; "E" INDICATES EMERGENCY EQUIPMENT POWER)	
J	WALL JUNCTION BOX	18 INCHES
E	CEILING EXIT SIGN, SHADED SIDE INDICATES LIGHTED FACE,ARROWS INSTALLED AS SHOWN	
E	WALL EXIT SIGN	6 INCHES ABOVE DOOR FRAME TO BOTTOM
	SUSPENDED FIXTURE	
	SURFACE FLUORESCENT	
	RECESSED FLUORESCENT	
	FIXTURE CONNECTED TO EMERGENCY POWER	
	DASHED LINES INDICATE EXISTING FIXTURES, DEVICES, OR EQUIPMENT	
	EMERGENCY BATTERY LIGHT	7 FOOT 6 INCHES
	EMERGENCY REMOTE LAMP	7 FOOT 6 INCHES
$	SWITCH: SINGLE POLE (HORSEPOWER RATED WHEN USED AS MOTOR DISCONNECT)	48 INCHES
$2	DOUBLE POLE	48 INCHES
$3	3-WAY	48 INCHES
$4	4-WAY	48 INCHES
$K	KEY OPERATED	48 INCHES
$P	WITH PILOT LIGHT (CAN BE USED WITH OTHER SWITCH TYPES)	48 INCHES
$D	FLUORESCENT DIMMER	48 INCHES
$MC	MOMENTARY CONTACT	48 INCHES
	DIMMER (600 WATT UNLESS OTHERWISE NOTED)	48 INCHES
$T	LIGHTING INTENSITY SELECTOR	48 INCHES
$LV	LOW VOLTAGE SWITCH	48 INCHES
	DUPLEX RECEPTACLE	18 INCHES
	DOUBLE DUPLEX RECEPTACLE	18 INCHES
^{A}	SPECIAL PURPOSE RECEPTACLE LETTER INDICATES TYPE, SEE SPECIFICATION	18 INCHES
	MULTI-OUTLET ASSEMBLY - M.O.A., PROVIDE DEVICES AS SHOWN ON PLANS	18 INCHES
	DUPLEX RECEPTACLE, HALF SWITCHED	18 INCHES
^{A}	FLOOR OUTLET, ADDITIONAL SYMBOL INDICATES TYPE	
	TIME SWITCH	
	PHOTO CELL	
	TRANSFORMER	
F	FIRE ALARM: MANUAL STATION	48 INCHES
FR	RATE OF RISE DETECTOR	
F	FIXED TEMPERATURE DETECTOR	
F DPD	DUCT PHOTOELECTRIC DETECTOR	
F P,(S,G,E)	PHOTOELECTRIC DETECTOR ("S" INDICATES SLEEPING ROOM WITH AUX. CONTACT,"G" INDICATES WITH GUARD, "E" INDICATES FOR ELEVATOR RECALL)	
F H,S,SB	COMBINATION HEAT/SMOKE WITH STROBE SOUNDER BASE DETECTOR	
C	COMBINATION FIRE/SMOKE DAMPER OR SMOKE DAMPER BY DIVISION 23	
FHS	HORN ("S" INDICATES WITH STROBE LIGHT)	BOTTOM OF LENS 80 INCHES
FS	SPEAKER HORN ("S" INDICATES WITH STROBE LIGHT)	BOTTOM OF LENS 80 INCHES
FCHS	CHIME ("S" INDICATES WITH STROBE LIGHT)	BOTTOM OF LENS 80 INCHES
FM	FIRE ALARM MODULE/RELAY	
F	FAN RELAY	
FS	STROBE LIGHT	BOTTOM OF LENS 80 INCHES
	MAGNETIC DOOR HOLD OPEN	
I	INTEGRAL MAGNETIC DOOR CLOSER (PROVIDED BY DIVISION 08)	
F 2	TAMPER SWITCH (NUMBER INDICATES NUMBER OF DEVICES AT THIS LOCATION)	
FP	FIRE PUMP	
F	FLOW SWITCH	
FACP	FIRE ALARM CONTROL PANEL	
FANN	FIRE ALARM ANNUNCIATOR	
	LIGHTING AND APPLIANCE PANELBOARD	
	SWITCHBOARD OR MOTOR CONTROL CENTER AS NOTED	
	CONTROL CABINET BY DIVISION 23	
	SPECIAL EQUIPMENT CABINET AS NOTED	
	POWER POLE	
M	MOTOR (NUMBER REFERS TO MOTOR AND EQUIPMENT SCHEDULE SEE SCHEDULE FOR WIRING AND CONTROL REQUIREMENTS)	
	DISCONNECT ("F" INDICATES FUSED WHEN SHOWN)	
	MAGNETIC STARTER	
	COMBINATION STARTER-DISCONNECT	
E	UL 924 RELAY	
(T)	NOTE IDENTIFICATION	

SYMBOLS	DESCRIPTION	MOUNTING HEIGHT TO CENTER OF DEVICE UNLESS OTHERWISE INDICATED
	ENCLOSED MOLDED CASE CIRCUIT BREAKER 30A/3P UON (WALL RECESSED)	
VFD	VARIABLE FREQUENCY CONTROLLER	
TH	THERMAL SWITCH (MOTOR OVERLOAD TYPE)	48 INCHES
TE	THERMOSTAT - PROVIDE BY DIVISION 26	48 INCHES
T	THERMOSTAT - FURNISHED BY DIVISION 23, INSTALLED BY DIVISION 26	48 INCHES
	HASH MARKS INDICATE ITEM NOTED TO BE REMOVED	
S	SPEAKER	
MS	WALL MOUNTED SPEAKER	90 INCHES TO BOTTOM
C	CLOCK	94 INCHES TO BOTTOM
M	MICROPHONE OUTLET	18 INCHES
V	VOLUME CONTROL	48 INCHES
	SECURITY DEVICES: REQUEST TO EXIT	3 INCHES ABOVE DOOR FRAME
R	DOOR POSITION SWITCH, RECESSED	
S	DOOR POSITION SWITCH, SURFACE MOUNT	
	DOOR POSITION SWITCH	
	CARD READER	48 INCHES
M	CEILING MOUNTED MOTION SENSOR SWITCH	
MA	CEILING MOUNTED MOTION SENSOR SWITCH, 90° COVERAGE	
MA	CEILING MOUNTED MOTION SENSOR SWITCH, 180° COVERAGE	
MA	CEILING MOUNTED MOTION SENSOR SWITCH, 360° COVERAGE	
MA	CEILING MOUNTED MOTION SENSOR SWITCH, HALLWAY COVERAGE	
MA	WALL MOUNTED MOTION SENSOR, 90° COVERAGE	
MA	WALL MOUNTED MOTION SENSOR, 180° COVERAGE	48 INCHES
MPP	MOTION SENSOR SWITCH POWER PACK	
	AUXILIARY INPUT OUTLET	18 INCHES
2	COMPUTER OUTLET (NUMBER INDICATES QUANTITY OF CABLES AND JACKS, NO NUMBER INDICATES ONE)	18 INCHES
2	COMBINATION COMPUTER/TELEPHONE OUTLET IN SINGLE GANG OPENING (NUMBER INDICATES QUANTITY OF CABLES AND JACKS,NO NUMBER INDICATES ONE)	18 INCHES
WH	TELEPHONE OUTLET ("W" INDICATES WALL MOUNTED AT 48 INCHES)	18 INCHES
D	DATA PATCH PANEL	
	COMPUTER/TELEPHONE OUTLET, PROVIDE ROUGH-IN AND CONDUIT ONLY	18 INCHES
	TELEVISION OUTLET	18 INCHES
	INTERCOM OUTLET	18 INCHES
M	INTERCOM MASTER	
S	INTERCOM STAFF STATION	
V	BUZZER	
	PUSH BUTTON	
	POWER DOOR HANDICAP PUSH PAD	42 INCHES
	BELL	
2	CONTACTOR (NUMBER INDICATES NUMBER OF POLES)	
WP	WEATHERPROOF	
AC	ABOVE COUNTER	
EWC	ELECTRIC WATER COOLER	
Z	NURSE CALL : CORRIDOR CALL OR ZONE LIGHT	
M	MASTER STATION	
E	PATIENT EMERGENCY STATION	48 INCHES
	SINGLE BED PATIENT STATION	
S	STAFF STATION	48 INCHES
D	DUTY STATION	48 INCHES
2	DOUBLE BED PATIENT STATION	
CB	EMERGENCY (CODE BLUE)	
L	NURSE LOCATOR	
SA	STAFF ASSIST	48 INCHES
SR	STAFF REGISTER	
P	EMERGENCY PUSH BUTTON	48 INCHES
U	UNIT INTERFACE	
	TELEMETRY ANTENNA	
	CONDUIT CONCEALED IN WALL OR CEILING, QUANTITY OF CONDUCTORS NOT SHOWN, PROVIDE AS REQUIRED FOR DEVICE/CIRCUIT NUMBERS SHOWN.	
	CONDUIT UP	
	CONDUIT DOWN	
	CONDUIT CONCEALED IN FLOOR	
L1-2,4,6 #10	HOME RUN TO PANELBOARD, QUANTITY OF CONDUCTORS REQUIRED NOT INDICATED, PROVIDE QUANTITY AS REQUIRED FOR CIRCUIT NUMBERS SHOWN, SWITCHING ARRANGEMENT, OR NUMBER OF HOME RUNS SHOWN. "#10" INDICATES WIRE SIZE, NO NUMBERS INDICATES #12, 3/4 INCH CONDUIT MINIMUM.	
	SURFACE CONDUIT OR SURFACE RACEWAY	
	WIRE BASKET TYPE CABLE TRAY	
	COMMUNICATIONS CABLE SUPPORT HANGER	
PANEL CIRC 1	LIGHTING CIRCUIT DESIGNATION AND PLAN NOTE REFERENCE NUMBER	
	LIGHTING CIRCUIT DESIGNATION	

NOTES:
1. FOR DEVICES SHOWN AS 48 INCHES MOUNTING HEIGHT, WHEN INSTALLED IN MASONRY BLOCK WALLS, MOUNTING AT 48 INCHES TO THE TOP OF THE OUTLET BOX IS ACCEPTABLE.

MECHANICAL SYMBOLS & ABBREVIATIONS LEGEND

THIS IS A COMPREHENSIVE SYMBOL SCHEDULE, NOT ALL SYMBOLS ARE APPLICABLE TO THESE DRAWINGS

SYMBOL	DESCRIPTION
	PIPING SYSTEMS:
HWS	HOT WATER SUPPLY
HWR	HOT WATER RETURN
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
LPS	LOW PRESSURE STEAM
LPC	LOW PRESSURE CONDENSATE
MPSTM	MEDIUM PRESSURE STEAM
MPC	MEDIUM PRESSURE CONDENSATE
HPS	HIGH PRESSURE STEAM
HPC	HIGH PRESSURE CONDENSATE
LFS	LOOP FIELD SUPPLY
LFR	LOOP FIELD RETURN
PC	PUMPED CONDENSATE
	MISCELLANEOUS ABBREVIATIONS:
EC	ELECTRICAL CONTRACTOR
GC	GENERAL CONTRACTOR
LBS/HR	POUNDS PER HOUR
MC	MECHANICAL CONTRACTOR
PG	PROPYLENE GLYCOL MIXTURE
VFD	VARIABLE FREQUENCY DRIVE
	PIPING SYMBOLS:
	PIPE DOWN
	PIPE UP
	BOTTOM PIPE TAKE-OFF
	TOP PIPE TAKE-OFF
	CAPPED PIPE
	TYPICAL SHUTOFF VALVE. VALVE MAY BE BALL, BUTTERFLY, OR GATE. TYPE OF VALVE VARIES BY PIPE SIZE AND SYSTEM. REFER TO SPECIFICATIONS FOR VALVE REQUIREMENTS
	BALL VALVE
	BUTTERFLY VALVE
	GLOBE VALVE
	GATE VALVE
	WATER FLOW MEASURING DEVICE
	AUTOMATIC FLOW CONTROL VALVE

SYMBOL	DESCRIPTION
	BALL VALVE INDICATOR
	CHECK VALVE, ARROW IN DIRECTION OF FLOW
	2-WAY TEMPERATURE CONTROL VALVE
	3-WAY TEMPERATURE CONTROL VALVE
	STRAINER
	BALANCING VALVE
	BACKFLOW PREVENTER
FS	FLOW SWITCH
	PRESSURE REDUCING VALVE
P	PRESSURE GAUGE
	SOLENOID VALVE
	THERMOMETER
	UNION
	FLEXIBLE PIPE CONNECTION
	AIR VENT
	REDUCER, CONCENTRIC
	REDUCER, ECCENTRIC
	STEAM TRAP
	CONNECT NEW TO EXISTING.
	DEMOLITION NOTE
1	KEY NOTE

UNIVERSITY OF COLORADO
Preconstruction / Post Construction Commissioning Check out for Andover Controls

Due to the rapid growth and complexity of the University's Andover DDC Control System, this procedure must be followed and adhered by in order to ensure all additions and alterations are documented and accounted for.

Failure to complete the following forms will result in denial of connectivity to the campus Andover network and in violation of UCB Standards 15950 Section 3.04, Detail A.02 and Detail A.03.

Andover Controls Commissioning Documentation
Preconstruction / Post Construction Commissioning
Rev. 1.1
17-Oct-07

UNIVERSITY OF COLORADO
Post Commissioning Check Out For Andover Controls Commissioning

Project Manager: _____

Work Order #:_____

Building Location: _____

Contractor: _____

Commissioning: Complete Incomplete

If complete-
Signature of Commissioning Agent:

_____ **Date:** _____

Panel layouts in enclosure: Yes No

If Yes-
Signature of Verifying UCB Staff :

_____ **Date:** _____

Submittals: Handed Over to UCB Staff or Still in Possession

If Submittals Are Handed Over to UCB Staff-
Signature of Recipient of Submittals:

_____ **Date:** _____

Alarms Created and Implemented: Yes No

Final Approval of Completed Job

Andover Technician 1:_____ **Date:** _____

Andover Technician 2:_____ **Date:** _____

Shop Supervisor:_____ **Date:** _____

Facilities Management
HVAC / Control Shop
Shop Phone: 303-492-0056
Fax Number: 303-492-8656

Andover Controls Commissioning Documentation
Preconstruction / Post Construction Commissioning
Rev. 1.1
17-Oct-07

UNIVERSITY OF COLORADO
Preconstruction Checklist for Andover Controls Commissioning

Date of Request_____

Project Manager: _____

Work Order #:_____

Building Location: _____

Contractor: _____

Are new controllers being added? Yes No

If Yes, how many? _____

Will an Infilink / Repeater be required? Yes No

If Yes, Where and or how many? _____

Is there an existing controller being modified? Yes No

If Yes, Existing controller Name: _____

Controller Serial Number: _____

Points to be added or removed: _____

Programs Modified: _____

Other: _____
Example: Addition of expansion module, point rearrangement, etc.

Reviewed and Approved By:

Andover Technician 1:_____ **Date:** _____

Andover Technician 2:_____ **Date:** _____

Shop Supervisor:_____ **Date:** _____

Facilities Management
HVAC / Control Shop
Shop Phone: 303-492-0056
Fax Number: 303-492-8656

SMART GRID
METERING 2011
University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

KEY PLAN

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com
Drawn By: JJB
Checked By: NHM
Approved By: NHM

MECHANICAL AND ELECTRICAL LEGEND AND ABBREVIATIONS

Project Number: 10.01461
Date: 07/08/2011
Sheets: 2 of 19

ME1.0

MECHANICAL/PLUMBING METERING INFORMATION MATRIX

METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER	ONICON	F-3100		2	2	1.0-345				1B A-1	1, 2, 3
HIGH PRESSURE STEAM	VERIS	ACCELBAR		2	2	0.071-1,000				TUNNEL T3-G	1, 2, 3
CHILLED WATER	ONICON	F-3500		3	3	2.4-460				1B A-1	1, 2, 3

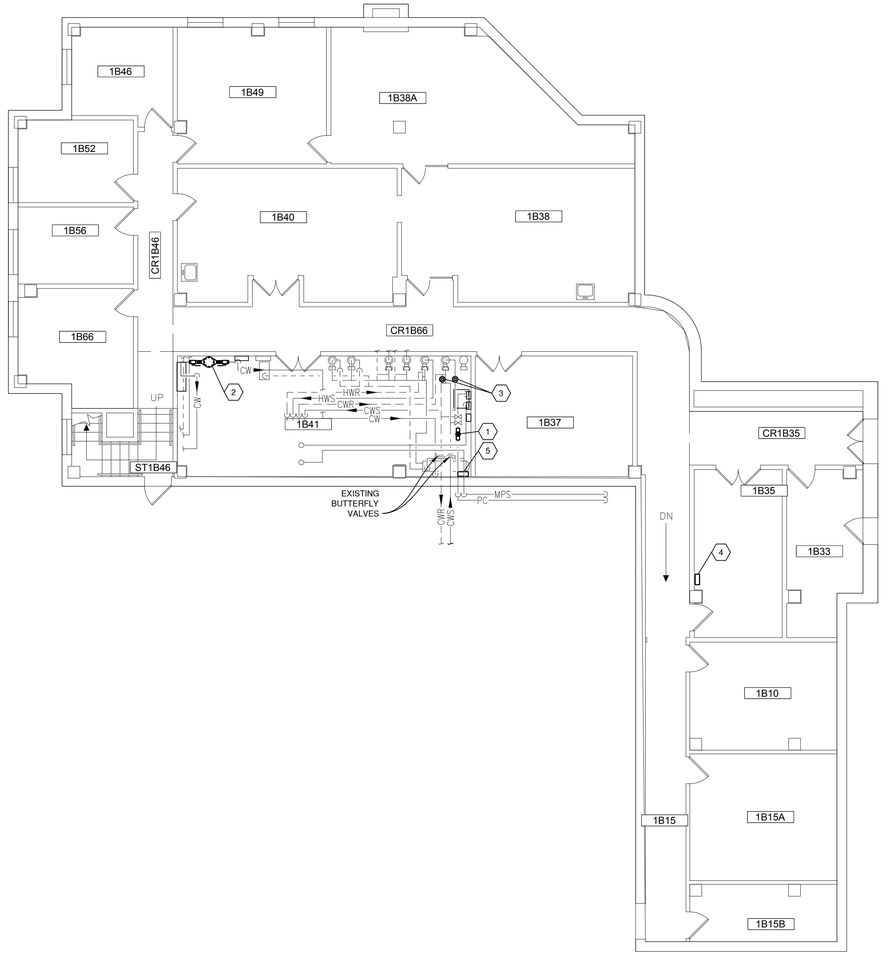
GENERAL NOTES:

1. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. MOUNT METER HORIZONTALLY.
4. MOUNT METER VERTICALLY.
5. REMOTE SENSOR HEAD LOCATION.

2

3

5



CIRES FIRST BASEMENT LEVEL NEW

1 M1.0

0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

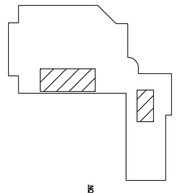
Revision	Date	Description	By

SHEET NOTES:

1. NEW CONDENSATE METER. WIRE TO NEW KEP PANEL.
2. NEW 2" DOMESTIC WATER METER. WIRE TO NEW KEP PANEL.
3. REPLACE CHILLED WATER METER AND CONTROLLER. WIRE TO NEW KEP PANEL.
4. NEW KEP PANEL
5. REMOVE EXISTING CHILLED WATER METER PANEL, AND ASSOCIATED WIRING

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

CIRES BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 3 of 19

M1.0

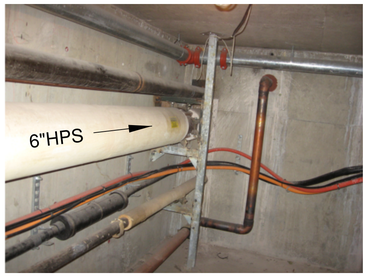
MECHANICAL/PLUMBING METERING INFORMATION MATRIX

METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER	ONICON	F-3100		4	4	4-1,311				M2B51D	1, 2, 3
HIGH PRESSURE STEAM	VERIS	ACCELABAR		6	6	0.68-29,200				M2B10	1, 2, 3
CHILLED WATER	ONICON	F-3500		8	8	39-3,100				M2B51D	1, 2, 3

GENERAL NOTES:

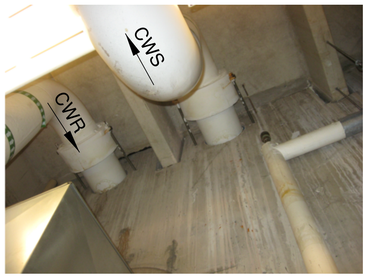
1. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. MOUNT METER HORIZONTALLY
4. MOUNT METER VERTICALLY
5. REMOTE SENSOR HEAD LOCATION.

1

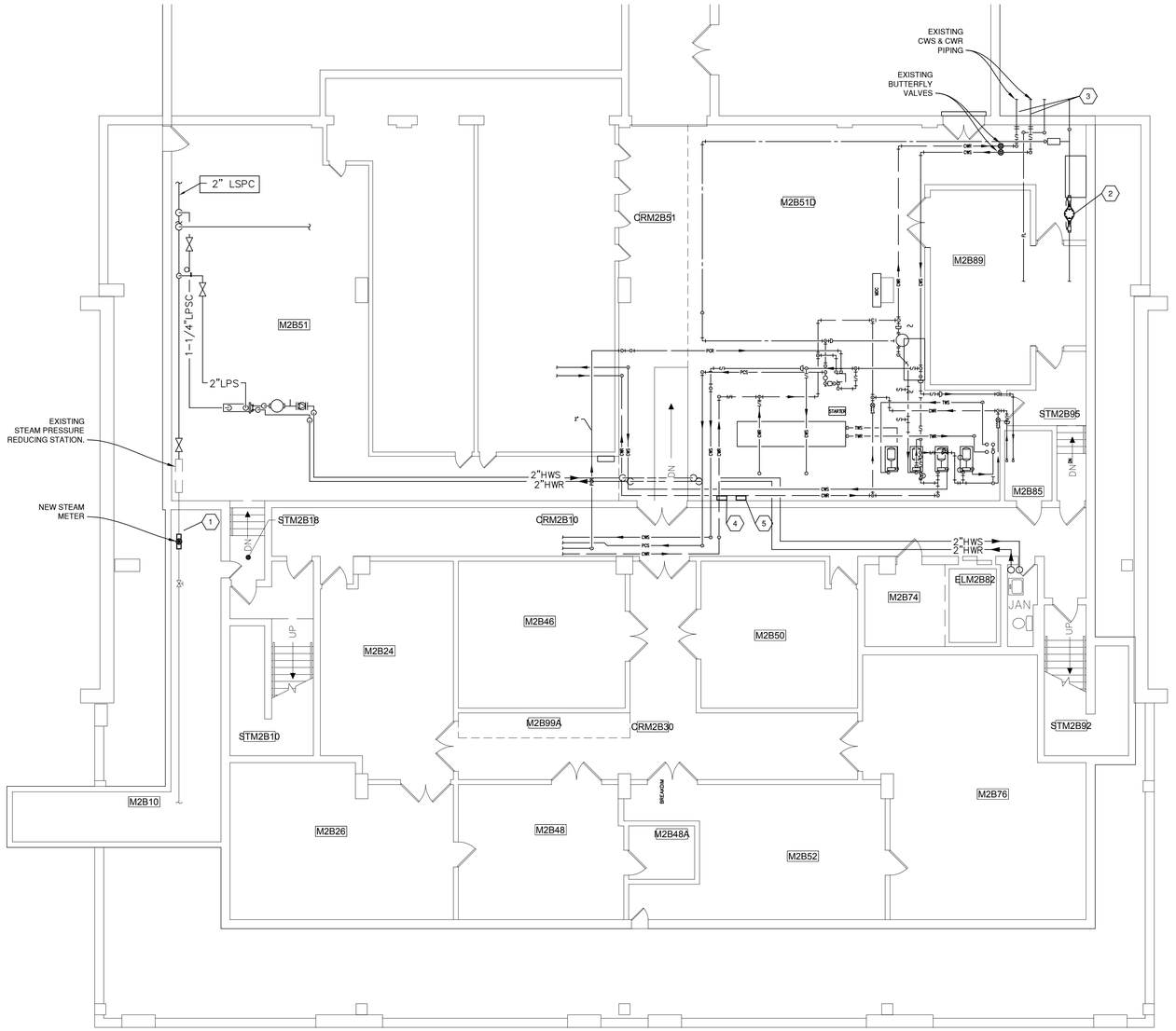


2

3



5



NORTH

1 / M2.0 EKELEY SECOND BASEMENT LEVEL NEW

0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

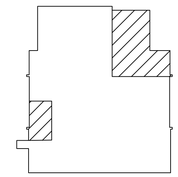
Revision	Date	Description	By

SHEET NOTES:

1. NEW HIGH PRESSURE STEAM METER. WIRE TO NEW KEP PANEL.
2. REPLACE DOMESTIC WATER METER. WIRE TO NEW KEP PANEL.
3. NEW CHILLED WATER METER AND CONTROLLER. WIRE TO NEW KEP PANEL.
4. NEW KEP PANEL.
5. EXISTING ANDOVER CONTROL PANELS.

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

EKELEY BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 4 of 19

M2.0

N:\Projects\2010\10.01461\Drawing\MECH\10.01461 M2.0.dwg-M2.0-7/7/2011 11:36 AM

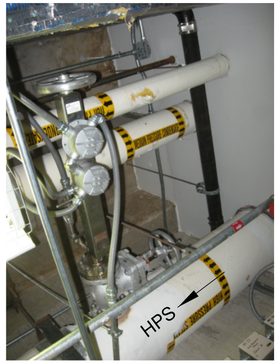
MECHANICAL/PLUMBING METERING INFORMATION MATRIX

METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER	ONICON	F-3100		6	6	9.0-2,975				A4 B10	1, 2, 3
HIGH PRESSURE STEAM	VERIS	ACCELBAR		6	6	0.58-20,400				CR A4 B01	1, 2, 3
CHILLED WATER	ONICON	F-3500		12	12	35-7,050				A4 B40	1, 2, 3

GENERAL NOTES:

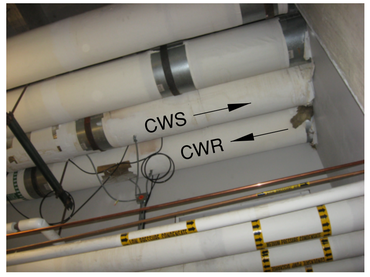
1. NEW GATE VALVE NOT REQUIRED FOR NEW STEAM METER.
2. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
3. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
4. MOUNT METER HORIZONTALLY
5. MOUNT METER VERTICALLY.
6. REMOTE SENSOR HEAD LOCATION.

1

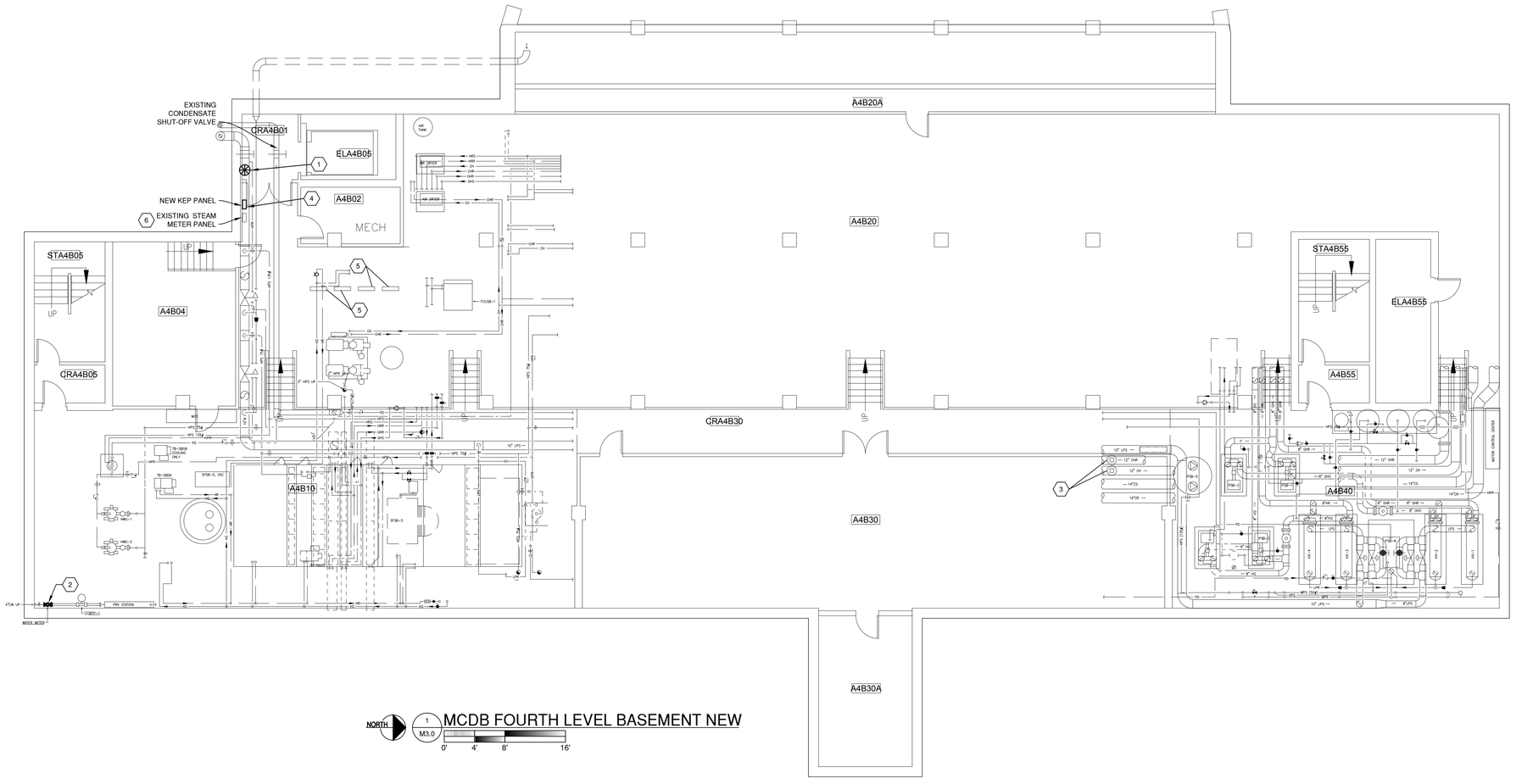


2

3



3



NORTH

1 M3.0 MCDB FOURTH LEVEL BASEMENT NEW

0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

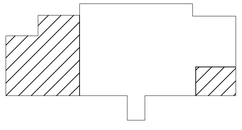
Revision	Date	Description	By

SHEET NOTES:

1. REPLACE HIGH PRESSURE STEAM METER. WIRE TO NEW KEP PANEL. REMOVE EXISTING STEAM METER PANEL.
2. REPLACE DOMESTIC WATER METER. WIRE TO NEW KEP PANEL.
3. REPLACE EXISTING CHILLED WATER METER AND REMOVE CONTROLLER. EXTEND CONTROL OUTPUT TO NEW KEP PANEL.
4. NEW KEP PANEL.
5. EXISTING ANDOVER CONTROL PANELS.
6. REMOVE EXISTING STEAM METER PANEL AND ASSOCIATED WIRING.

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN NORTH

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com
Drawn By: JJB
Checked By: NHM
Approved By: NHM

MCDB BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 5 of 19

M3.0

1

2

3

5

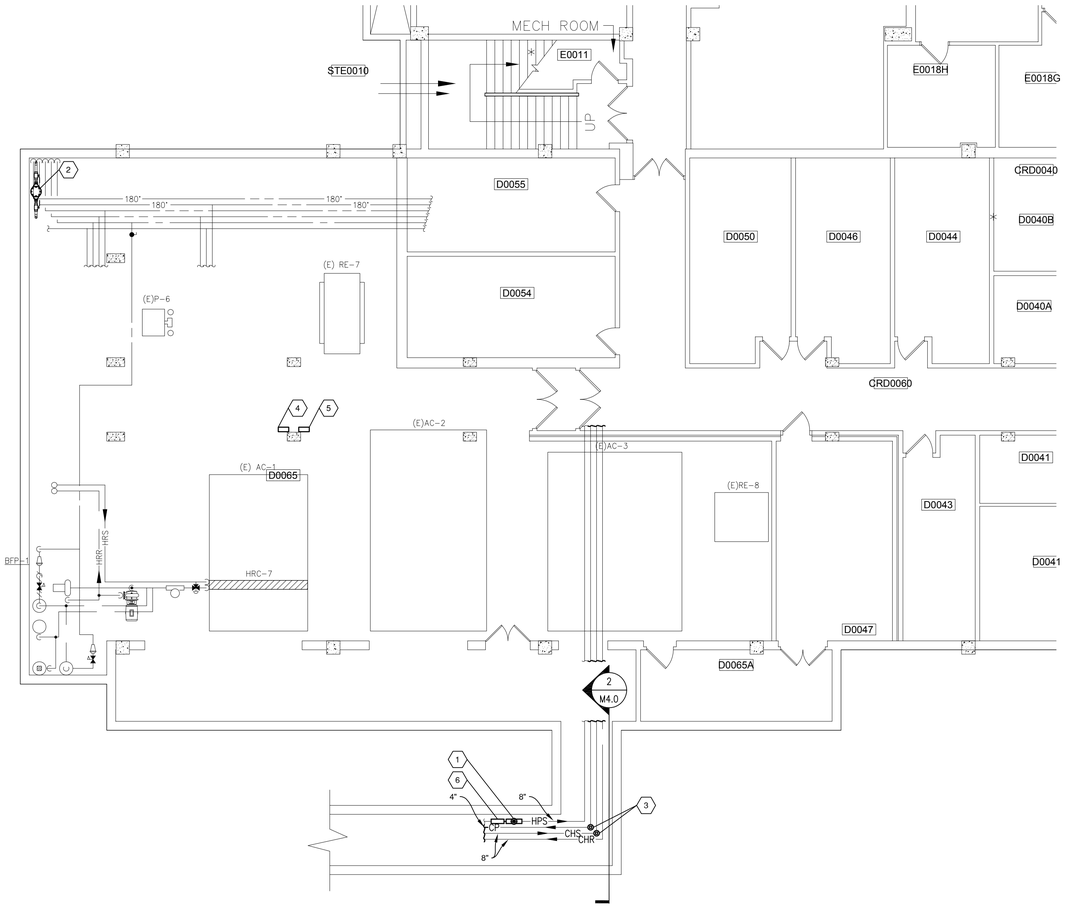
6

MECHANICAL/PLUMBING METERING INFORMATION MATRIX

METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER	ONICON	F-3100		4	4	4.0-1,311				D0065	1, 2, 3
HIGH PRESSURE STEAM	VERIS	ACCELABAR		8	6	0.68-29,200				TUNNEL T	1, 2, 3, 5
CHILLED WATER	ONICON	F-3500		8	8	16-3,100				TUNNEL T	1, 2, 4

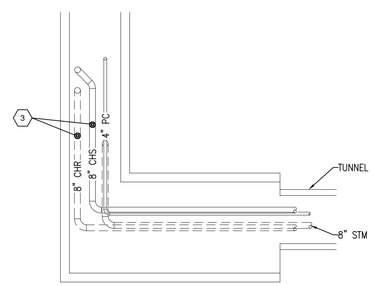
GENERAL NOTES:

1. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. MOUNT METER HORIZONTALLY.
4. MOUNT METER VERTICALLY.
5. REMOTE SENSOR HEAD LOCATION.



2 M4.0 MUENZINGER SECOND BASEMENT LEVEL NEW

NORTH 0' 4' 8' 16'



2 M4.0 MUENZINGER SECOND BASEMENT TUNNEL SECTION

NORTH 0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

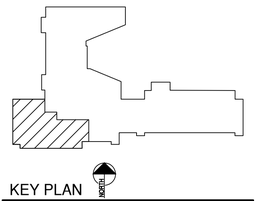
Revision	Date	Description	By

SHEET NOTES:

1. NEW HIGH PRESSURE STEAM METER IN TUNNEL. WIRE TO NEW KEP PANEL.
2. REPLACE 4" DOMESTIC WATER METER TO REMAIN. WIRE TO NEW KEP PANEL.
3. NEW CHILLED WATER METER AND SENSORS IN TUNNEL. WIRE TO NEW KEP PANEL.
4. NEW KEP PANEL WIRED TO ANDOVER SYSTEM.
5. EXISTING ANDOVER CONTROL PANELS.
6. REMOTE STEAM METER HEAD LOCATION. MOUNT 36" ABOVE TUNNEL FLOOR.
7. RE-INSULATE 10FT 8" HPS AT TUNNEL STREET ENTRY.

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN NORTH

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

MUENZINGER BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 6 of 19

M4.0

N:\Projects\2010\10.01461\Drawing\MECH\10.01461 M4.0.dwg-M4.0-7/7/2011 11:37 AM

MECHANICAL/PLUMBING METERING INFORMATION MATRIX

METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER AREA "A"	ONICON	F-3100		2	2	1.0-345				N1 B45	1, 2, 3
STEAM CONDENSATE AREA "A"	CADILLAC	CG-F		1 1/2	1	0-6,500				N1 B45	1, 2, 3
STEAM CONDENSATE AREA "B"	CADILLAC	CG-F		1 1/2	1	0-6,500				TUNNEL TI-Y	1, 2, 3
CHILLED WATER AREA "B"	ONICON	F-3500		3	2	13.8-295				TUNNEL TI-Y	1, 2, 3

GENERAL NOTES:

1. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. MOUNT METER HORIZONTALLY.
4. MOUNT METER VERTICALLY.
5. REMOTE SENSOR HEAD LOCATION.

1 AREA 'A'

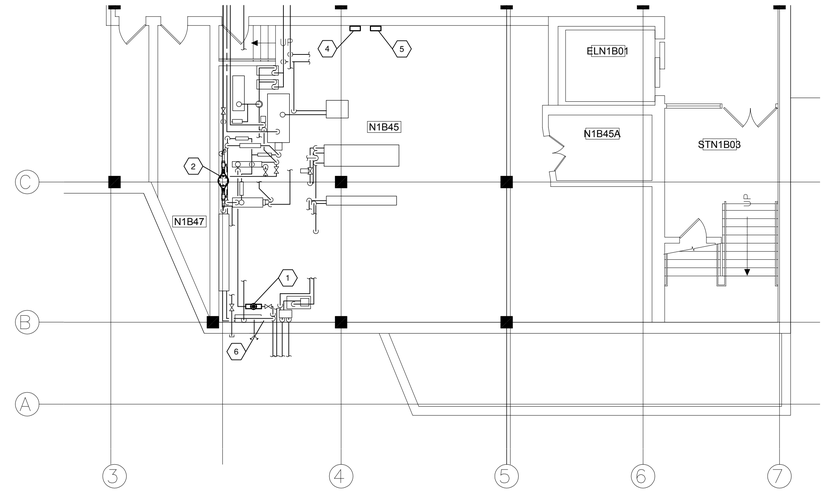
1 AREA 'A'

1 AREA 'B'

2

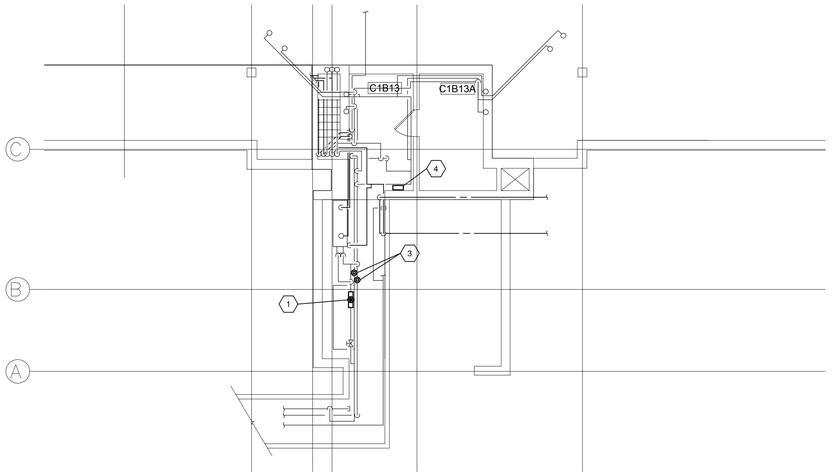
3

5



NORTH 1 M5.0 0' 4' 8' 16'

IMIG MUSIC BASEMENT - AREA 'A'



NORTH 1 M5.0 0' 4' 8' 16'

IMIG MUSIC BASEMENT - AREA 'B'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

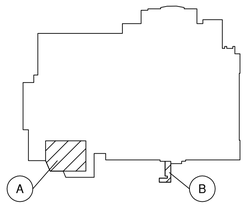
Revision	Date	Description	By

SHEET NOTES:

1. NEW GRAVITY CONDENSATE METER. WIRE TO NEW KEP PANEL.
2. NEW DOMESTIC WATER METER . WIRE TO NEW KEP PANEL.
3. REPLACE AND RE-INSTALL CHILLED WATER METER. WIRE TO NEW KEP PANEL.
4. NEW KEP PANEL.
5. EXISTING ANDOVER CONTROL PANELS.
6. INSULATE 10FT HPS

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN NORTH

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

IMIG MUSIC BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 7 of 19

M5.0

MECHANICAL/PLUMBING METERING INFORMATION MATRIX

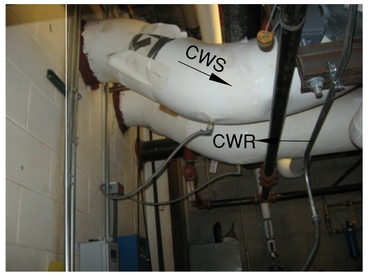
METER SYSTEM	MANUFACTURER	MODEL NO.	SERIAL NO.	PIPE/LINE SIZE (INCHES)	METER SIZE (INCHES)	CAPACITY (FLOW RANGE)	INSTALLATION DATE	OLD METER READING	NEW METER READING	METER LOCATION	REMARKS
DOMESTIC COLD WATER	ONICON	F-3100		3	3	2.3-761					1, 2, 3
HIGH PRESSURE STEAM	VERIS	ACCELABAR		6	6	0.58-2,500					1, 2, 3
CHILLED WATER	F-3500	F-3500		12	12	35-7,050					1, 2, 3

GENERAL NOTES:

1. SERIAL NUMBER AND INSTALLATION DATE COLUMN FOR EACH METER SHALL BE COMPLETED BY CONTRACTOR FOLLOWING METER INSTALLATION AND PRIOR TO TURN OVER TO UNIVERSITY.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. MOUNT METER HORIZONTALLY.
4. MOUNT METER VERTICALLY.
5. REMOTE SENSOR HEAD LOCATION.

1

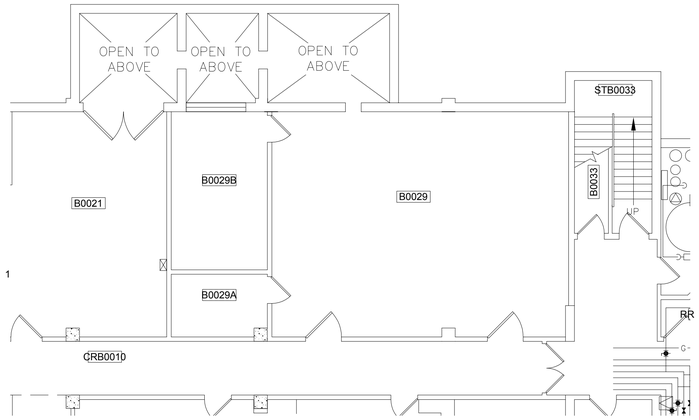
2



3

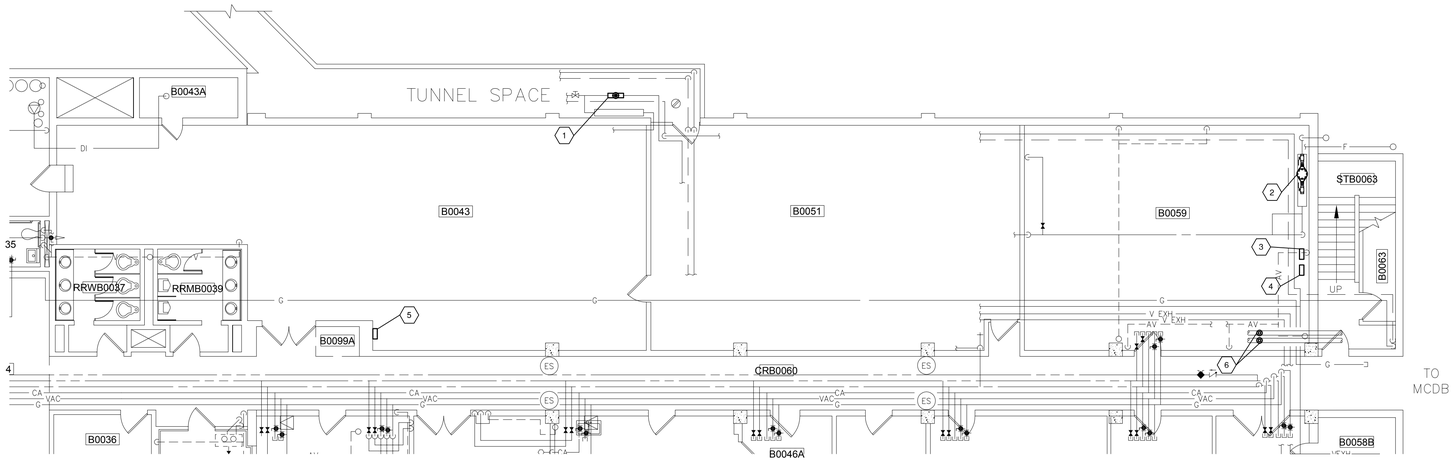
5

6



1 M6.0 PORTER SECOND BASEMENT LEVEL - AREA 'A'

NORTH 0' 4' 8' 16'



2 M6.0 PORTER SECOND BASEMENT LEVEL - AREA 'B'

NORTH 0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

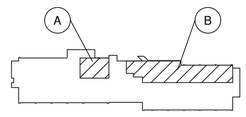
Revision	Date	Description	By

SHEET NOTES:

1. REPLACE STEAM METER. WIRE TO NEW KEP PANEL.
2. REPLACE DOMESTIC WATER METER. WIRE TO NEW KEP PANEL. PROVIDE PLUG WITH CHAIN FOR EXISTING BALL VALVE
3. REMOVE AND PLUG CHILLED WATER SENSOR AND CONTROLLER.
4. NEW KEP PANEL.
5. EXISTING ANDOVER CONTROL PANELS.
6. NEW CHILLED WATER METER SENSOR AT LOCATION SHOWN.

GENERAL NOTES:

1. FOR DRAWING CLARITY NOT ALL PIPING AND EQUIPMENT HAS NOT BEEN SHOWN.
2. FIELD VERIFY EXISTING CONDITIONS BEFORE COMMENCEMENT OF WORK OR ORDERING MATERIALS.



KEY PLAN NORTH

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

PORTER BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 8 of 19

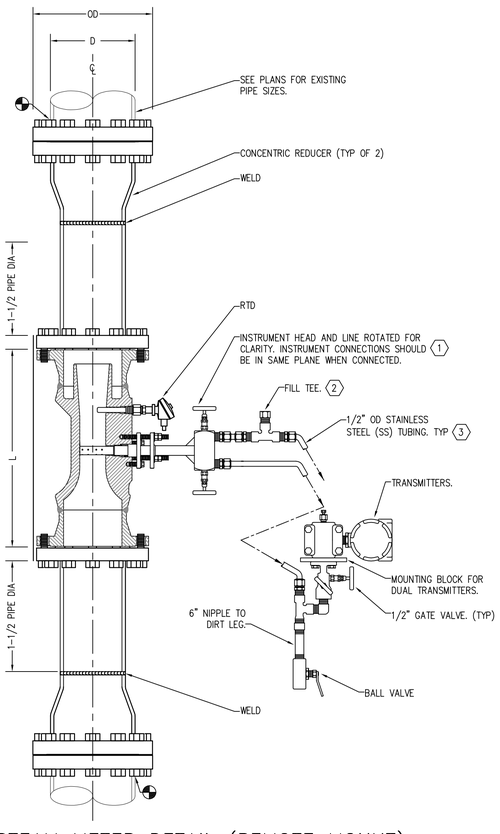
M6.0

HIGH PRESSURE STEAM METER DATA SCHEDULE

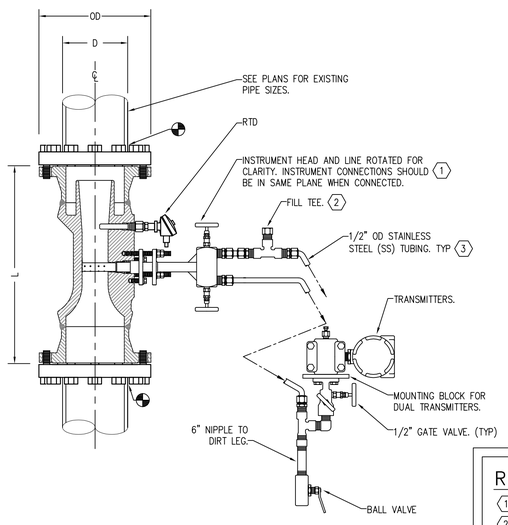
METER SIZE (DIA) (IN)	MANUFACTURER	MODEL NO.	SYSTEM SERVED	VERABAR SENSOR	FLOW RATE RANGE @150 PSI (PPH x 1000)	CONNECTION FLANGE (LBS)	BOLTS (PER FLANGE) TOTAL QTY	GRADE	SIZE (DIAxPITCHxLENGTH)	NUTS (PER FLANGE) TOTAL QTY	GRADE	SIZE (DIAxPITCH)	RING GASKET DIA (IN)	THICKNESS (MM)	QTY	INNER RING	OUTER RING	ELECTRICAL UNITS MEASURED	VOLTAGE (VDC)	OUTPUT (MA)	COMMUNICATION	DIMENSIONAL DATA FACE TO FACE "L" (IN)	FLG DIA "D" (IN)	OVERALL HEIGHT "H" (IN)	OVERALL HEIGHT "H1" (IN)	WEIGHT (LBS)	REMARKS
2	VERIS	ACCELABAR	STEAM	–05 1/2"	0.071–1.0	300	8	8	5/8"x11 UNCx3"	8	8	5/8"x11 UNC	4 3/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	8.875	6.5	12.0	7.5	30	1,2,3,4
3	VERIS	ACCELABAR	STEAM	–05 1/2"	0.17–7.1	300	8	8	3/4"x10 UNCx3 1/2"	8	8	3/4"x10 UNC	5 7/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	14.5	8.25	14.0	8.5	53	1,2,3,4
4	VERIS	ACCELABAR	STEAM	–10 1"	0.32–15.9	300	8	8	7/8"x9 UNCx3 3/4"	8	8	7/8"x9 UNC	7 1/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	16.0	10	14.0	8.5	79	1,2,3,4
6	VERIS	ACCELABAR	STEAM	–10 1"	0.68–29.2	300	12	8	7/8"x9 UNCx4 1/4"	12	8	7/8"x9 UNC	9 7/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	20.0	12.5	15.0	9.5	153	1,2,3,4
8	VERIS	ACCELABAR	STEAM	–10 1"	1.26–56.8	300	12	8	7/8"x9 UNCx4 3/4"	12	8	7/8"x9 UNC	12 1/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	22.0	15.0	16.0	10.5	247	1,2,3,4
10	VERIS	ACCELABAR	STEAM	–10 1"	2.10–94.8	300	16	8	1 "x8 UNCx5 1/4"	16	8	1 "x8 UNC	14 1/4	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	24.5	17.5	17.0	11.5	417	1,2,3,4
12	VERIS	ACCELABAR	STEAM	–10 1"	2.93–126.4	300	16	8	1 1/8"x7 UNCx5 3/4"	16	8	1 1/8"x7 UNC	16 5/8	4.5	2	SERIES WOUND 304 SS	CARBON STEEL	LBS/HR	24	4 – 20	MODBUS RS485 RTU	28.0	20.5	18.0	12.5	538	1,2,3,4

REMARKS:

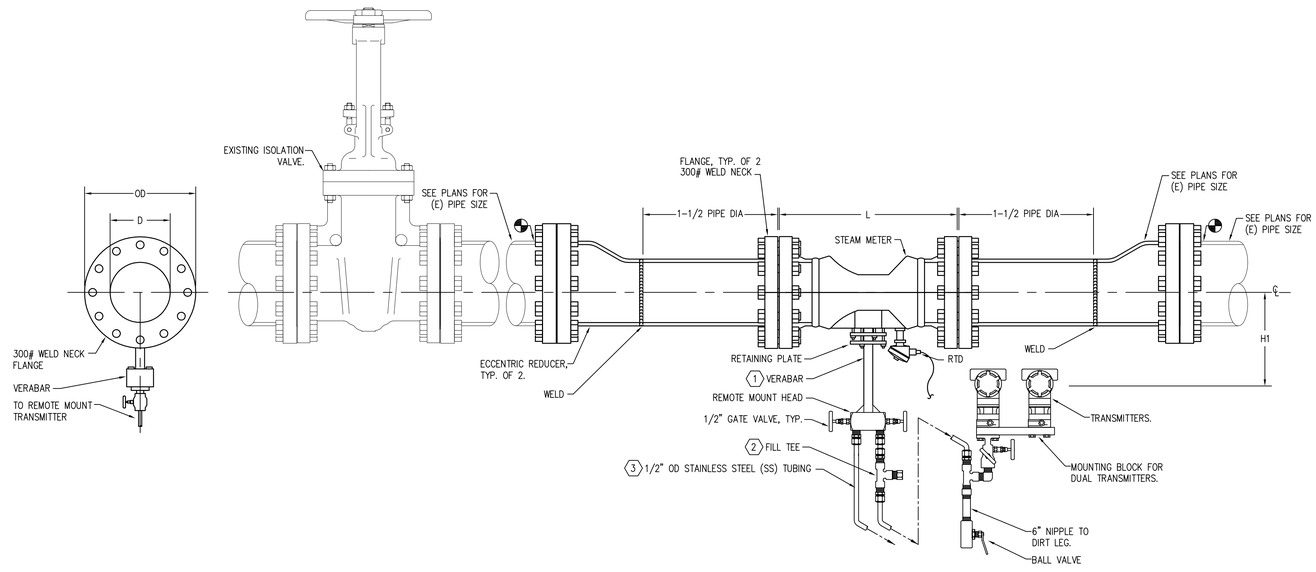
1. FLOW RATE RANGES ARE BASED ON STEAM PRESSURES OF 100 PSI.
2. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
3. CONTRACTOR RESPONSIBLE FOR INSURING THAT EXISTING STEAM LINE IS PROPERLY ANCHORED TO PREVENT EXCESSIVE PIPE MOVEMENT DURING INSTALLATION OF NEW METER.
2. COORDINATE ELECTRICAL REQUIREMENTS FOR NEW METER INSTALLATION WITH UNIVERSITY APPROVED ELECTRICAL CONTRACTOR.



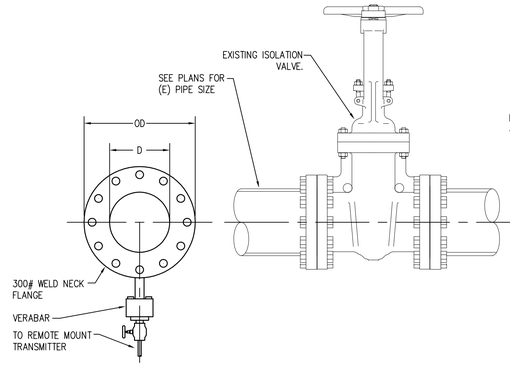
1 M7.0 STEAM METER DETAIL (REMOTE MOUNT)
SCALE: NONE

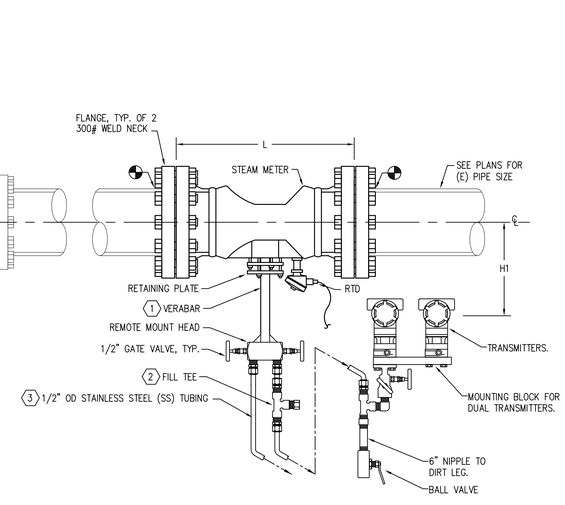


2 M7.0 STEAM METER DETAIL (REMOTE MOUNT)
SCALE: NONE



3 M7.0 STEAM METER DETAIL (REMOTE MOUNT)
SCALE: NONE





4 M7.0 STEAM METER DETAIL (REMOTE MOUNT)
SCALE: NONE

REMOTE MOUNT DETAIL NOTES:

1. THE PRESSURE TRANSMITTERS SHALL BE LOCATED BELOW THE STEAM PIPE.
2. FILL TEES SHALL BE AT THE SAME HEIGHT.
3. SS TUBING SHALL SLOPE DOWNWARD TO THE PRESSURE TRANSMITTER AT LEAST 4" PER FOOT. SS TUBING SHALL BE FREE OF PEAKS, DIPS OR SHARP BENDS THAT WILL ALLOW ENTRAPPED AIR TO ACCUMULATE. SS TUBING BENDS SHALL BE MADE WITH A TUBE BENDER AND SHALL HAVE A MINIMUM RADIUS OF THREE TIMES THE SS TUBING OD.

SMART GRID METERING 2011
University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

KEY PLAN

BID SET

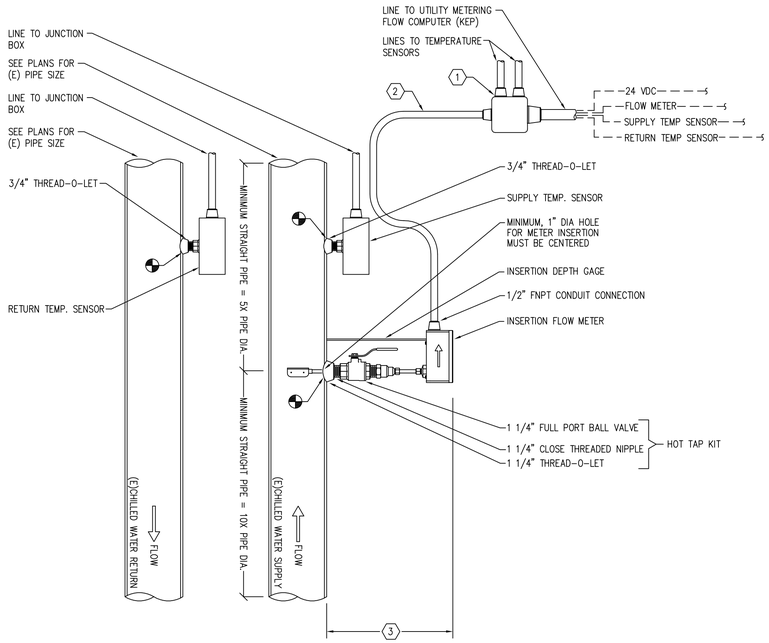
Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

MECHANICAL DETAILS

Project Number: 10.01461
Date: 07/08/2011
Sheets: 9 of 19

M7.0



CHILLED WATER – INSERTION BTU METER DETAIL

1 / M7.1 SCALE: NONE

DETAIL NOTES:

1. CONNECT FACTORY WIRES TO FIELD WIRES IN APPROPRIATE JUNCTION BOX.
2. ALLOW ENOUGH SLACK IN THE FLEXIBLE CONDUIT TO PERMIT THE METER TO BE REMOVED FROM THE VALVE.

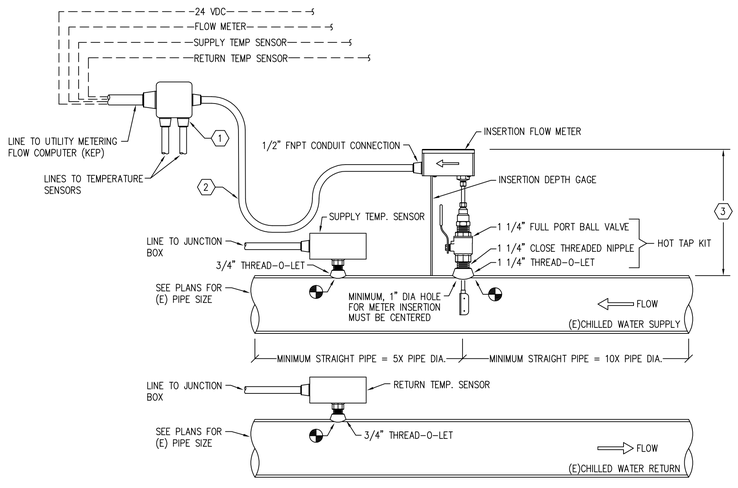
   CLEARANCE REQUIRED FOR INSTALLATION. TYPICALLY 30" – 36" DEPENDING ON PIPE SIZE AND HEIGHT OF THE VALVE ASSEMBLY.

CHILLED WATER METER DATA SCHEDULE

SERVICE SIZE (INCHES)	MANUFACTURER	MODEL NO.	SYSTEM SERVED	TYPE	MATERIAL: WETTED METAL COMPONENTS	MATERIAL: SENSOR HEAD	ELECTRICAL: UNITS MEASURED	ELECTRICAL: VOLTAGE (VDC)	ELECTRICAL: OUTPUT (MA)	FLOW RATE RANGE (GPM)	REMARKS
2–2.5	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	2.5–230	1,2
3	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	6–460	1,2
4	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	10–800	1,2
6	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	15–1,800	1,2
8	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	39–3,100	1,2
10	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	61–4,900	1,2
12	ONICON	F–3500	CHILLED WATER	INSERTION ELECTROMAGNETIC	316 STAINLESS SYEEL	POLYPROPOLYNE	BTUH	24	4 – 20	87–7,050	1,2

REMARKS:

1. PER UCB STANDARDS; CONTRACTOR SHALL CONTACT THE REQUIRED UNIVERSITY DEPARTMENTS FOR INSPECTION OF WORK PRIOR TO COMPLETION OF PROJECT.
2. COORDINATE ELECTRICAL REQUIREMENTS FOR NEW METER INSTALLATION WITH UNIVERSITY APPROVED ELECTRICAL CONTRACTOR.



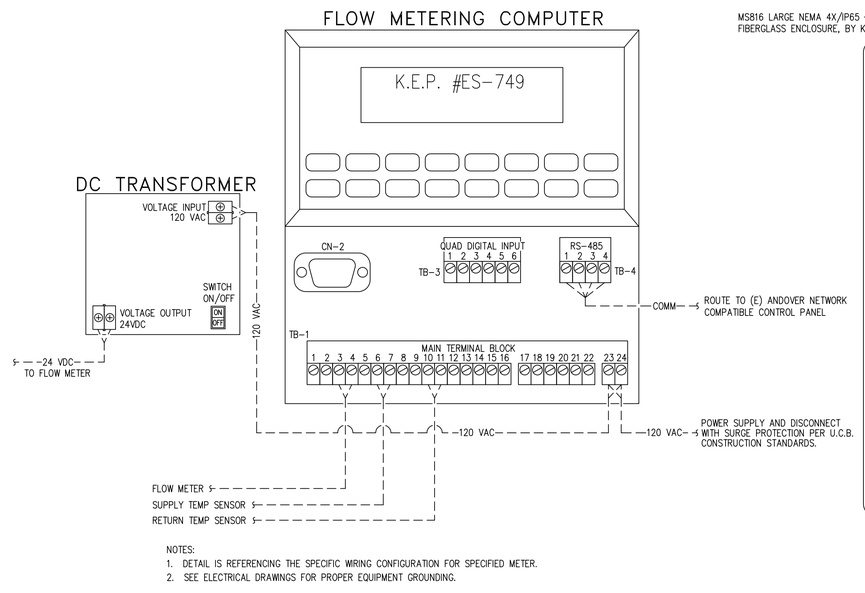
CHILLED WATER – INSERTION BTU METER DETAIL

2 / M7.1 SCALE: NONE

DETAIL NOTES:

1. CONNECT FACTORY WIRES TO FIELD WIRES IN APPROPRIATE JUNCTION BOX.
2. ALLOW ENOUGH SLACK IN THE FLEXIBLE CONDUIT TO PERMIT THE METER TO BE REMOVED FROM THE VALVE.

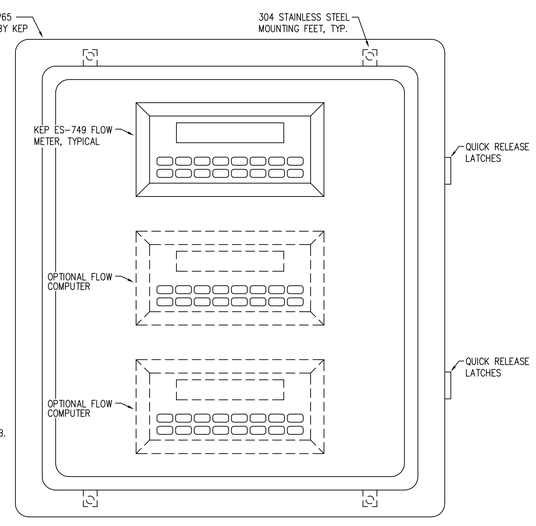
   CLEARANCE REQUIRED FOR INSTALLATION. TYPICALLY 30" – 36" DEPENDING ON PIPE SIZE AND HEIGHT OF THE VALVE ASSEMBLY.



NOTES:

1. DETAIL IS REFERENCING THE SPECIFIC WIRING CONFIGURATION FOR SPECIFIED METER.
2. SEE ELECTRICAL DRAWINGS FOR PROPER EQUIPMENT GROUNDING.

FLOW COMPUTER DETAIL



NOTES:

1. FLOW COMPUTERS SHALL BE MOUNTED TOGETHER WITHIN A 16"(H)x14"(W)x8"(D) FIBERGLASS REINFORCED POLYESTER NEMA4X ENCLOSURE AS NOTED ON FLOOR PLANS
2. ENCLOSURE SHALL BE PROVIDED WITH 1, 2, 3 OR 4 CUTOUTS AS REQUIRED.

FLOW COMPUTER ENCLOSURE DETAIL

METERING FLOW COMPUTER DETAIL/TERMINATIONS

3 / M7.1 SCALE: NONE

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

KEY PLAN

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JJB
Checked By: NHM
Approved By: NHM

MECHANICAL DETAILS

Project Number: 10.01461
Date: 07/08/2011
Sheets: 10 of 19

M7.1

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

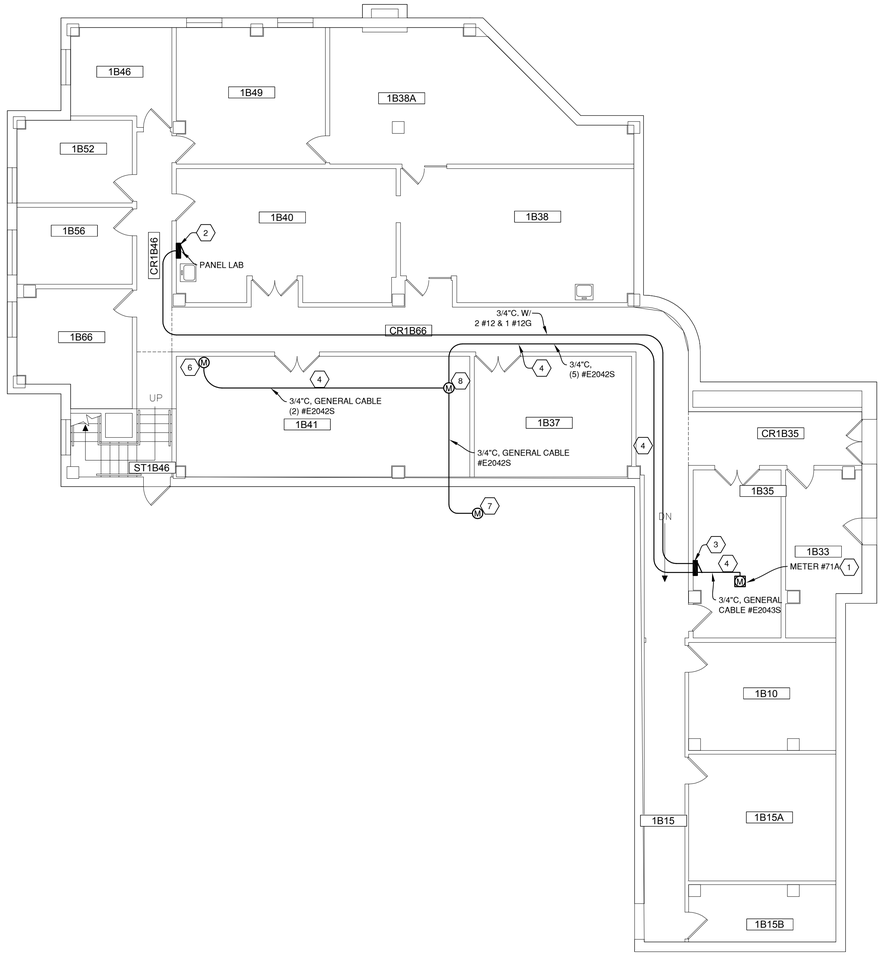
A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

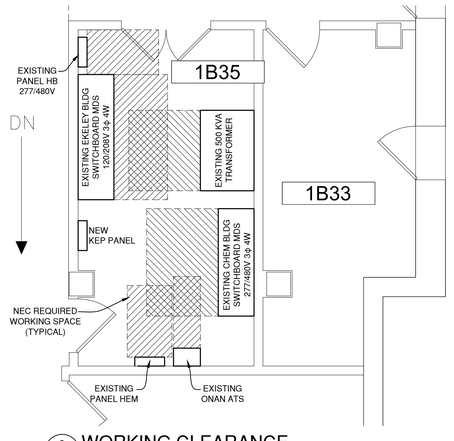
1. EXISTING METER #71A - LANDIS & GYR. REMOVE EXISTING METER AND REPLACE WITH NEW POWERLOGIC ION 8600 METER WITH MODBUS COMMUNICATION CAPABILITY AND PROGRAM METER.
2. EXISTING PANELBOARD LAB. USE THE EXISTING SPARE NEW 20 A BREAKER IN SPACE 2 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
5. EXISTING ANDOVER CONTROL PANEL.
6. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
7. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
8. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



1 E1.0 CIRES FIRST BASEMENT LEVEL

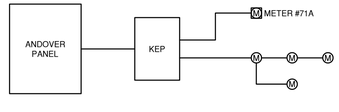
NORTH

0' 4' 8' 16'



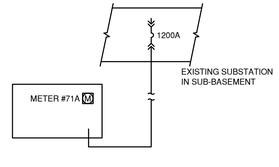
3 E1.0 WORKING CLEARANCE

0' 2' 4' 8'



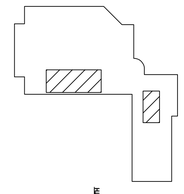
2 E1.0 SMART GRID SCHEMATIC

NO SCALE



3 E1.0 PARTIAL ONE LINE

NO SCALE



KEY PLAN

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

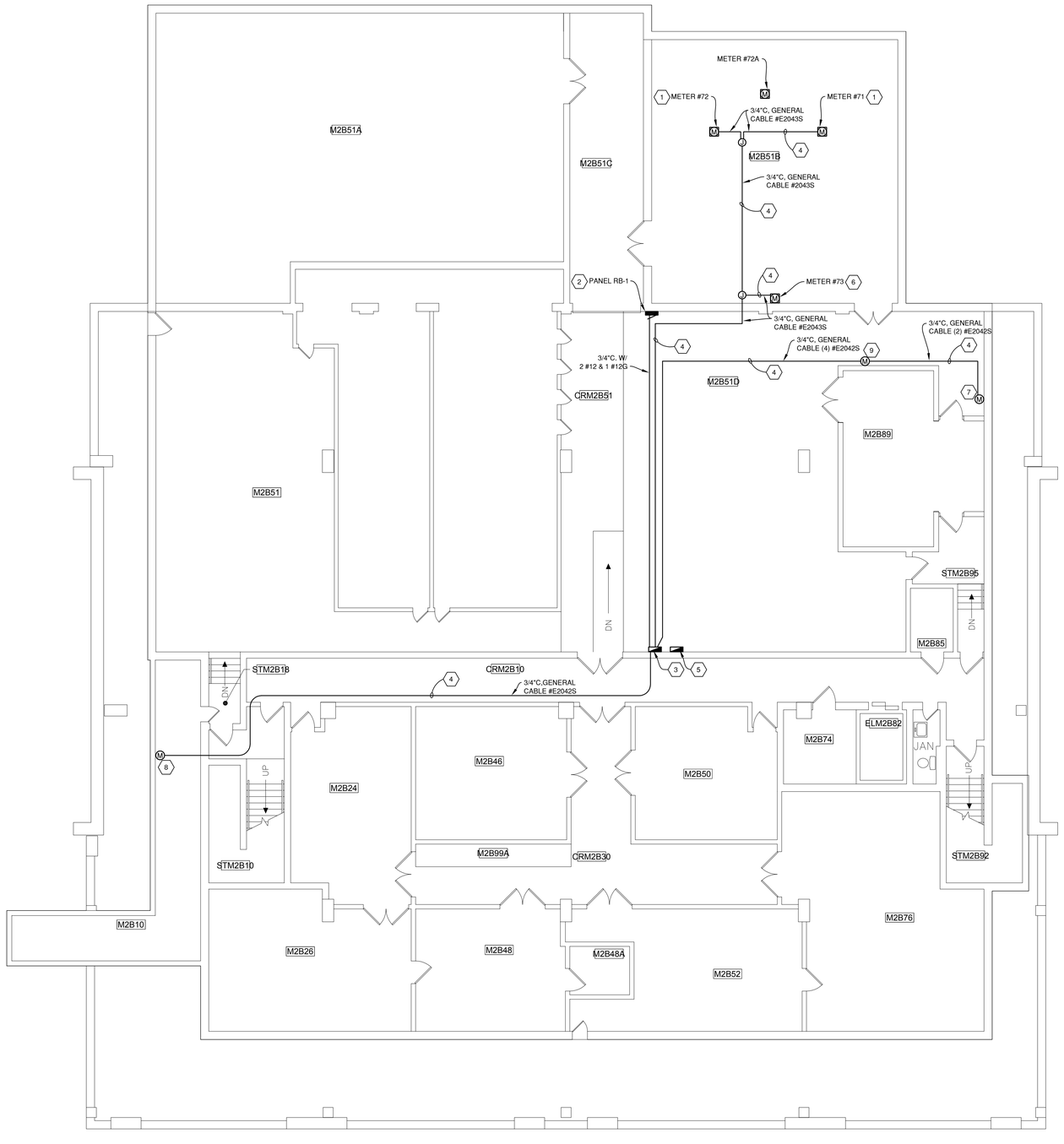
Drawn By: JPS
Checked By: RNH
Approved By: RNH

CIRES BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 11 of 19

E1.0

N:\Projects\2010\10.01461\Drawing\ELEC\10.01461 E1.0.dwg-E1.0-7/7/2011 12:05 PM



NORTH 1 E2.0 EKELEY SECOND BASEMENT LEVEL

0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

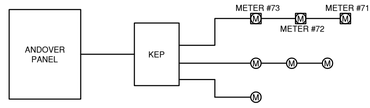
A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

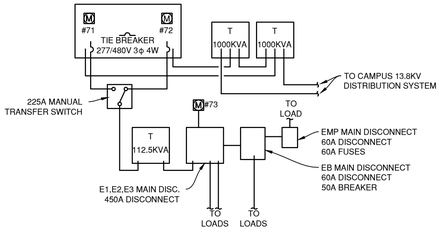
C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

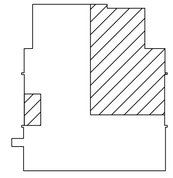
1. EXISTING METER #71 - POWER MEASUREMENT 8400, AND METER #72 - POWER MEASUREMENT 8400. EXISTING METERS HAVE A MODBUS. PROVIDE SOFTWARE AND PROGRAMMING FOR THE METERS TO ALLOW MODBUS COMMUNICATION CAPABILITY.
2. EXISTING PANELBOARD RB-1. UTILIZE SPARE 20 A BREAKER IN SPACE 6 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
5. EXISTING ANDOVER CONTROL PANEL.
6. EXISTING METER #73 - LANDIS & GYR. REMOVE EXISTING METER AND REPLACE WITH NEW POWERLOGIC ION 8600 METER WITH MODBUS COMMUNICATION CAPABILITY AND PROGRAM METER.
7. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
8. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
9. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



2 E2.0 SMART GRID SCHEMATIC
NO SCALE



3 E2.0 PARTIAL ONE LINE
NO SCALE



KEY PLAN

BID SET

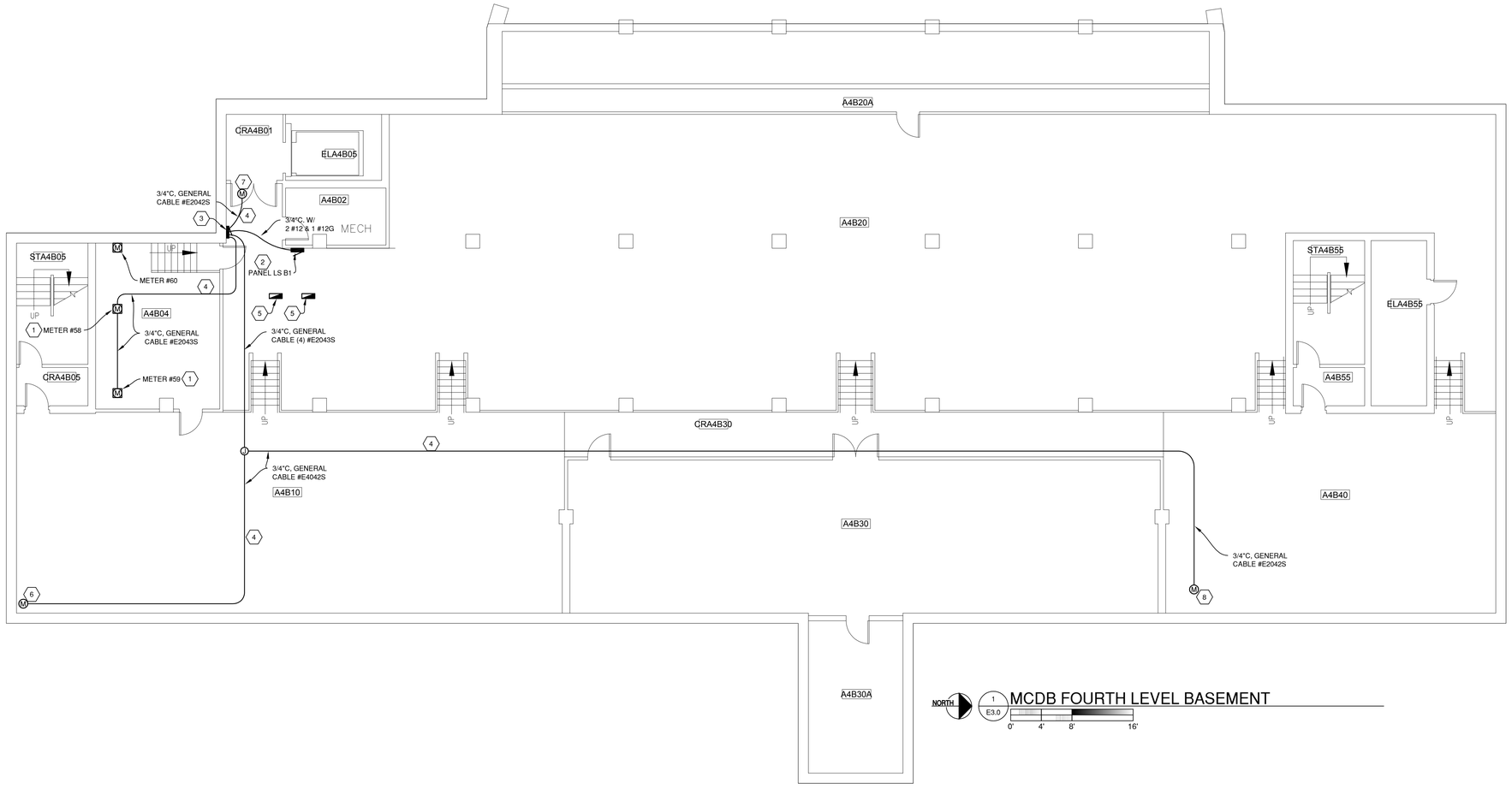
Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

EKELEY BUILDING

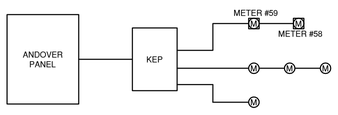
Project Number: 10.01461
Date: 07/08/2011
Sheets: 12 of 19

E2.0



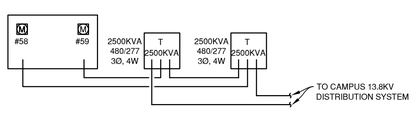
1 E3.0 MCDB FOURTH LEVEL BASEMENT

NORTH 0' 4' 8' 16'



2 E3.0 SMART GRID SCHEMATIC

NO SCALE



3 E3.0 PARTIAL ONE LINE

NO SCALE

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

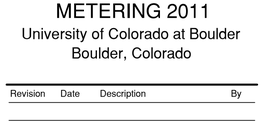
A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

1. EXISTING METER #58 - LANDIS & GYR, AND METER #59 LANDIS & GYR. REMOVE EXISTING METERS AND REPLACE WITH NEW POWERLOGIC ION 8600 METERS WITH MODBUS COMMUNICATION CAPABILITY AND PROGRAM METERS.
2. EXISTING PANELBOARD LSB1. PROVIDE A NEW 20 A BREAKER IN SPACE 20 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
5. EXISTING ANDOVER CONTROL PANEL.
6. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
7. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
8. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



KEY PLAN NORTH

BID SET

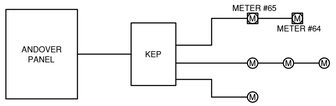
Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

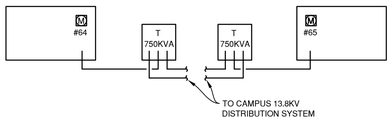
MCDB BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 13 of 19

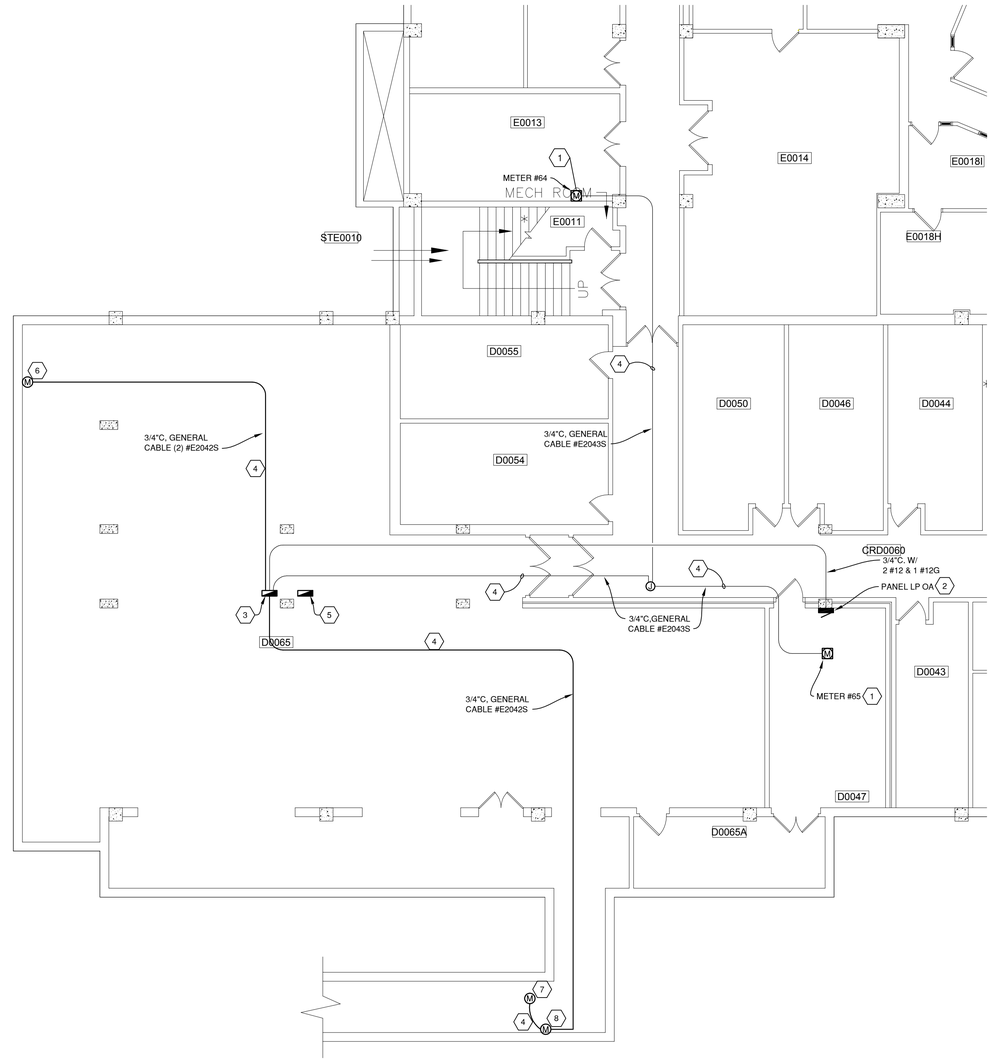
E3.0



2 / E4.0 SMART GRID SCHEMATIC
NO SCALE



3 / E4.0 PARTIAL ONE LINE
NO SCALE



1 / E4.0 MUENZINGER SECOND BASEMENT LEVEL
0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

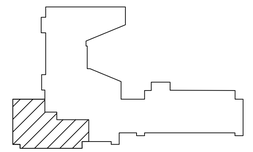
A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

1. EXISTING METER #64 - LANDIS & GYR, AND METER #65 - LANDIS & GYR. REMOVE EXISTING METER AND REPLACE WITH NEW POWERLOGIC ION 8600 METER WITH MODBUS COMMUNICATION CAPABILITY AND PROGRAM METER.
2. EXISTING PANELBOARD LPOA. PROVIDE A NEW 20 A BREAKER IN SPACE 18 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S
5. EXISTING ANDOVER CONTROL PANEL.
6. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
7. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
8. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



KEY PLAN

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

MUENZINGER BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 14 of 19

E4.0

PANELBOARD SCHEDULE PANEL - B

MOUNTING - Flush

120/208 VOLT 3 PHASE 4 WIRE
225 AMP BUS
100 AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE - Square D Type NQOB

LOCATION - MUSIC BUILDING

CIRCUIT	CIRCUIT LOAD IN WATTS				CCT	BRKR			BRKR		CCT	CIRCUIT LOAD IN WATTS				CIRCUIT
DESCRIPTION	RECPT	LTG	MTR	MISC	NUM	AMPS	P		AMPS	P	NUM	MISC	MTR	LTG	RECPT	DESCRIPTION
Lights Rm 146	256				1	20	1	A	20	1	2				1080	Receptacles
Lights Rm 143 144	384				3	20	1	B	20	1	4				1080	Receptacles
Lights Rm 140 141	384				5	20	1	C	20	1	6				1080	Receptacles
Entry Track Lights	1000				7	20	1	A	20	1	8				1080	Receptacles
Entry Lights	384				9	20	1	B	20	1	10				1080	Receptacles
Lights Rm 103	256				11	20	1	C	20	1	12				1080	Receptacles
Lights Rm 104 104A 103A	256				13	20	1	A	20	1	14			256		Bath Lts
Lights Rm 102	256				15	20	1	B	20	1	16	750				Fire Alarm
Lights Rm 102A vault Tele Rm	256				17	20	1	C	20	1	18			256		Tunnel Lts
Tunnel Receipt & KEP Panel	360			20	19	20	1	A	20	1	20		696			Hot Water Pump
Poles W Entry	500				21	20	1	B	20	1	22			512		Lights Rm 102C 108C
Exhaust Fans Bath Rms			300		23	20	1	C	20	1	24				1080	Receptacles
Receptacle	1080				25	20	1	A	20	1	26				1080	Receptacles
Unknown				1000	27	20	1	B	20	1	28	1000				Unknown
Track Lts	1000				29	20	1	C	20	1	30			1000		Track Light
Lighting 125	256				31	20	1	A	20	1	32				180	Podium Receptacle
Receptacle	1080				33	20	1	B	20	1	34				1080	Receptacles
Receptacle	1080				35	20	1	C	20	1	36				1080	Receptacles
Andover Control				750	37	20	1	A	20	1	38				1080	Receptacles
Evap Pump			696		39	20	1	B	20	1	40		696			Evap Pump
Evap Pump			696		41	20	1	C	20	1	42		696			Evap Pump

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	7708	5844	7296	20848
LIGHTING	256	512	1256	2024
MOTOR	696	1392	1692	3780
MISC	770	2750	0	3520
TOTALS	9430	10498	10244	

PHASE BALANCING	LOAD	%	BTWN	%
A	9430	31.25	A - B	10.17
B	10498	34.79	A - C	7.95
C	10244	33.95	B - C	2.48
TOTALS	30172	100.00		

	LOAD		PF CORR LOAD		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	10000	100%	10,000.00	X 1.00	10,000.00
(REMAINDER @ 50%)	10848	100%	10,848.00	X 0.50	5,424.00
LIGHTING (LOAD @ 125%)	2024	95%	2,130.53	X 1.25	2,663.16
MOTOR (LARGEST @ 125%)	696	90%	773.33	X 1.25	966.67
(REMAINDER @ 100%)	3084	90%	3,426.67	X 1.00	3,426.67
MISC (LOAD @ 100%)	3520	100%	3,520.00	X 1.00	3,520.00

TOTALS		
CONNECTED LOAD	30.17	KVA
DEMAND LOAD	26.00	KVA
REQUIRED AMPERAGE	72.17	AMPS

PANELBOARD SCHEDULE PANEL - RA

MOUNTING - Surface

120/208 VOLT 3 PHASE 4 WIRE
225 A AMP BUS
AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE - GTE Sylvania

LOCATION - MUSIC BUILDING

CIRCUIT	CIRCUIT LOAD IN WATTS				CCT	BRKR			BRKR		CCT	CIRCUIT LOAD IN WATTS				CIRCUIT
DESCRIPTION	RECPT	LTG	MTR	MISC	NUM	AMPS	P		AMPS	P	NUM	MISC	MTR	LTG	RECPT	DESCRIPTION
Receptacle	1080				1	20	1	A	20	1	2		1176			Med Evap Cooler
Receptacle	1260				3	20	1	B	20	1	4				1080	Receptacle
Receptacle	1080				5	20	1	C	20	1	6				1260	Receptacle
Receptacle	1080				7	20	1	A	20	1	8				1080	Receptacle
Receptacle	1260				9	20	1	B	20	1	10		1176			Unit Heater
Receptacle	1260				11	20	1	C	20	1	12		1176			Hot Water Circ Pump
Plugmold	1200				13	20	1	A	20	1	14				1260	Plugmold
Plugmold	1260				15	20	1	B	20	1	16				1260	Plugmold
Outlets Stage	720				17	20	1	C	20	1	18	100			360	Elevator Pit and Control
Plugmold	1260				19	20	1	A	20	1	20				720	TV Panel
Plugmold	1260				21	20	1	B	20	1	22		1176			Med 2 Evap Cooler
Drink Cooler	500				23	20	1	C	20	1	24	1000				Fire Alarm NAC Panel
Receptacles	1080				25	20	1	A	20	1	26	1000				Time Clock
Receptacles	1260				27	20	1	B	20	1	28	1000				Johnson Control Panel
Unit Heater Fan			1176		29	20	1	C	20	1	30	1800				Heat Tape
Plugmold	1260				31	20	1	A	20	1	32	1800				Heat Tape
Plugmold	1260				33	20	1	B	20	1	34			750		NW Sign (breaker off)
Printer Receptacle	500				35	20	1	C	20	1	36				1620	Unknown
Plugmold	1260				37	20	1	A	20	1	38	20				KEP Panel
Plugmold	1260				39	20	1	B	20	1	40				1260	Plugmold
Unit Heater			1176		41	20	1	C	20	1	42				500	Printer Receptacle

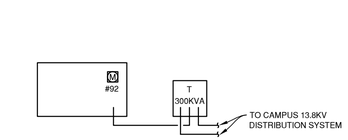
DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	11280	12420	7800	31500
LIGHTING	0	750	0	750
MOTOR	1176	2352	3528	7056
MISC	2820	1000	2900	6720
TOTALS	15276	16522	14228	

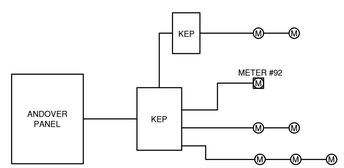
PHASE BALANCING	LOAD	%	BTWN	%
A	15276	33.19	A - B	7.54
B	16522	35.90	A - C	7.37
C	14228	30.91	B - C	16.12
TOTALS	46026	100.00		

	LOAD		PF CORR LOAD		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	10000	100%	10,000.00	X 1.00	10,000.00
(REMAINDER @ 50%)	21500	100%	21,500.00	X 0.50	10,750.00
LIGHTING (LOAD @ 125%)	750	95%	789.47	X 1.25	986.84
MOTOR (LARGEST @ 125%)	1176	90%	1,306.67	X 1.25	1,633.33
(REMAINDER @ 100%)	5880	90%	6,533.33	X 1.00	6,533.33
MISC (LOAD @ 100%)	6720	100%	6,720.00	X 1.00	6,720.00

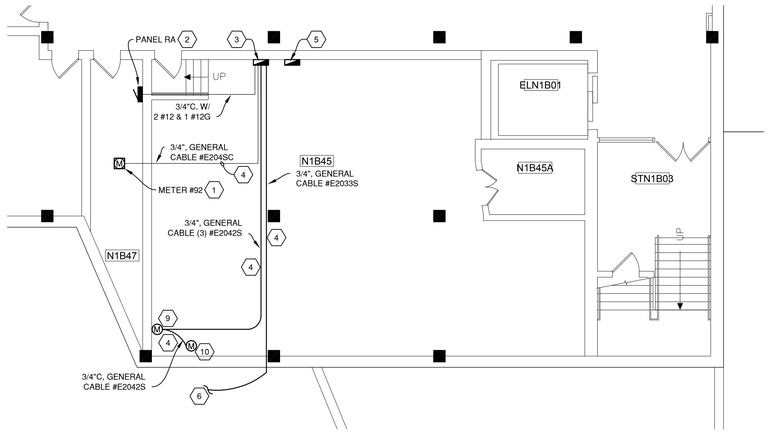
TOTALS		
CONNECTED LOAD	46.03	KVA
DEMAND LOAD	36.62	KVA
REQUIRED AMPERAGE	101.66	AMPS



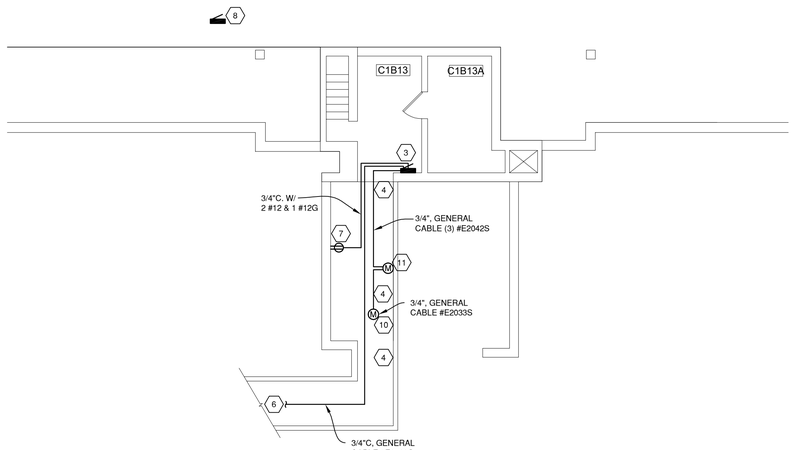
4 E5.0 PARTIAL ONE LINE
NO SCALE



3 E5.0 SMART GRID SCHEMATIC
NO SCALE



NORTH 1 E5.0 IMIG MUSIC BASEMENT - AREA 'A'
0' 4' 8' 16'



NORTH 2 E5.0 IMIG MUSIC BASEMENT - AREA 'B'
0' 4' 8' 16'

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

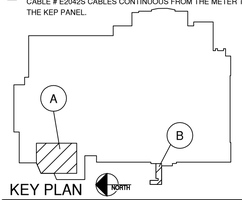
A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

1. EXISTING METER #92 - POWER MEASUREMENTS 8600. EXISTING METER HAS A MODBUS. PROVIDE SOFTWARE AND PROGRAMMING FOR THE METER TO ALLOW MODBUS COMMUNICATION CAPABILITY.
2. EXISTING PANELBOARD RA. PROVIDE A NEW 20 A BREAKER IN SPACE 38 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
5. EXISTING ANDOVER CONTROL PANEL.
6. ROUTE MODBUS CONDUIT AND CABLE IN EXISTING STEAM TUNNEL. SEE AREA "A" AND AREA "B" PARTIAL PLANS FOR CONTINUATION OF CONDUIT RUN.
7. EXISTING TUNNEL RECEPTACLE (VERIFY EXACT LOCATION) FED FROM PANELBOARD "B" CIRCUIT 19. EXTEND EXISTING CIRCUIT TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
8. APPROXIMATE LOCATION OF EXISTING PANELBOARD B LOCATED ON THE FIRST FLOOR. EXISTING CIRCUIT 19 WHICH FEEDS TUNNEL RECEPTACLES TO BE EXTENDED TO FEED NEW KEP PANEL.
10. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
11. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
12. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



KEY PLAN

BID SET

Ulteig

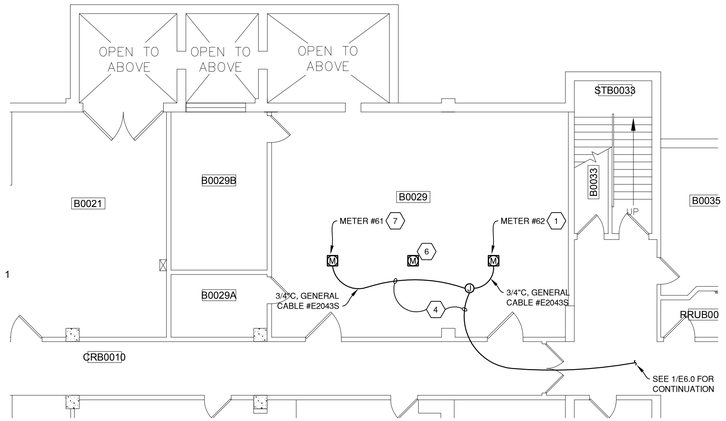
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com
Drawn By: JPS
Checked By: RNH
Approved By: RNH

IMIG MUSIC BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 15 of 19

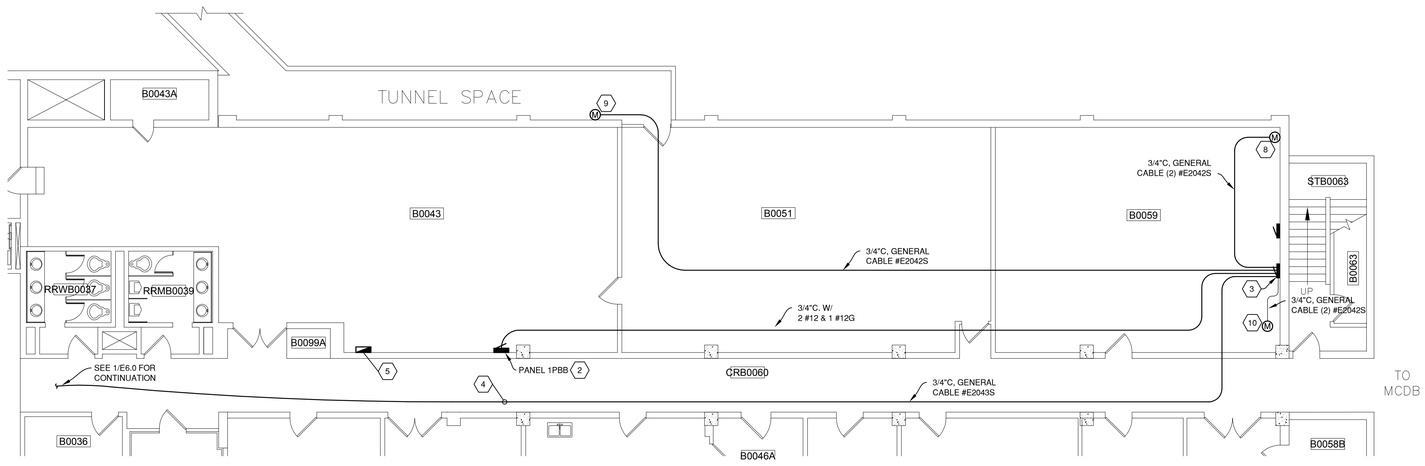
E5.0

N:\Projects\2010\10.01461\Drawing\ELEC\10.01461 E5.0.dwg-E5.0-7/7/2011 12:05 PM



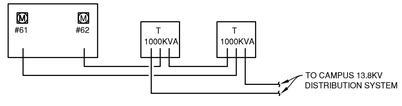
1 E6.0 PORTER SECOND BASEMENT LEVEL - AREA 'A'

NORTH 0' 4' 8' 16'



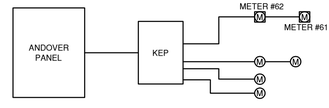
2 E6.0 PORTER SECOND BASEMENT LEVEL - AREA 'B'

NORTH 0' 4' 8' 16'



4 E6.0 PARTIAL ONE LINE

NO SCALE



3 E6.0 SMART GRID SCHEMATIC

NO SCALE

SMART GRID METERING 2011

University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

GENERAL NOTES:

A. PRIOR TO REPLACING THE EXISTING METER(S), PROVIDE THE UNIVERSITY WITH A FINAL METER READING AND DATE OF READING. ALSO PROVIDE THE UNIVERSITY AN INITIAL METER READING AND DATE OF READING FOR ALL NEW METER(S).

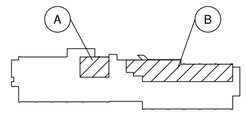
B. VERIFY THE LOCATION OF THE EXISTING IT LINES AND WORK AROUND THESE LINES SO AS NOT TO DISTURB, IMPACT OR BLOCK ACCESS TO THESE IT LINES OR DEVICES.

C. COORDINATE ALL WORK AND THE ROUTING OF ALL CONDUIT SO AS NOT TO BLOCK ACCESS TO ANY ACCESS DOORS/PANELS.

SHEET NOTES:

1. EXISTING METER #62 - POWER MEASUREMENTS 8600. EXISTING METER HAS A MODBUS. PROVIDE SOFTWARE AND PROGRAMMING FOR THE METER TO ALLOW MODBUS COMMUNICATION CAPABILITY.
2. EXISTING PANELBOARD 1PBB. PROVIDE A NEW 20 A BREAKER IN SPACE 18 TO FEED NEW KEP PANEL. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.
3. NEW KEP PANEL. PROVIDE POWER CONNECTION AND MODBUS COMMUNICATION CONNECTIONS TO THE PANEL.
4. MODBUS COMMUNICATIONS. ROUTE CONDUIT APPROXIMATELY AS SHOWN TO MINIMIZE ASBESTOS CONCERNS. COORDINATE EXACT CONDUIT ROUTING WITH EH&S.

   EXISTING ANDOVER CONTROL PANEL.
5. EXISTING SIEMENS METER TO REMAIN AS IS.
6. EXISTING METER #61 - LANDIS & GYR. REMOVE EXISTING METER AND REPLACE WITH NEW POWERLOGIC ION 8600 METER WITH MODBUS COMMUNICATION CAPABILITY AND PROGRAM METERS.
7. NEW WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.
8. NEW STEAM METER. PROVIDE A GENERAL CABLE # E2042S CABLE CONTINUOUS FROM THE METER TO THE KEP PANEL.
9. NEW CHILLED WATER METER. PROVIDE TWO GENERAL CABLE # E2042S CABLES CONTINUOUS FROM THE METER TO THE KEP PANEL.



KEY PLAN

BID SET

Ulteig

Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

PORTER BIOSCIENCES BUILDING

Project Number: 10.01461
Date: 07/08/2011
Sheets: 16 of 19

E6.0

PANELBOARD SCHEDULE PANEL – LAB

MOUNTING – Flush

120/208 VOLT 3 PHASE 4 WIRE
150 AMP BUS
150 AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE – Square D Type NQOB

LOCATION – CIRES

CIRCUIT DESCRIPTION	CIRCUIT RECPT	LOAD IN LTG	MTR	WATTS MISC	CCT NUM	BRKR AMPS	P		BRKR AMPS	P	CCT NUM	CIRCUIT LOAD IN MISC	MTR	LTG	WATTS RECPT	CIRCUIT DESCRIPTION
Receptacles	1080				1	20	1	A	20	1	2	20				KEP Panel
Receptacles	1260				3	20	1	B	20	1	4				1080	Receptacles
Receptacles	1260				5	20	1	C	20	1	6				1260	Receptacles
HWD Controls				1000	7	20	1	A	20	1	8				1080	Receptacles
Spare					9	20	1	B	20	1	10		1176			Evap Cooler
Temp Control				1000	11	20	1	C	20	1	12				1260	Receptacles
Receptacles	1080				13	20	1	A	20	1	14				1080	Receptacles
Air Dryer Receptacle	360				15	20	1	B	20	1	16				1260	Receptacles
Spare					17	20	1	C	20	1	18					Spare
Spare					19	20	1	A	20	1	20					Spare
Sump Pumps			1176		21	20	1	B	20	1	22					Spare
Spare					23	20	1	C	20	1	24					Spare
Spare					25	20	1	A	20	1	26					Spare
Spare					27	20	1	B	20	1	28					Spare
Spare					29	20	1	C	20	1	30					Spare
Space					31			A	30		32		1321			1B15 West Wall
Space					33			B			34		1321			" " "
Space					35			C		3	36		1321			" " "
Space					37			A			38					Space
Space					39			B			40					Space
Space					41			C			42					Space

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	4320	3960	3780	12060
LIGHTING	0	0	0	0
MOTOR	1321	3673	1321	6315
MISC	1000	0	1000	2000
TOTALS	6641	7633	6101	

PHASE BALANCING	LOAD	%	BTWN	%
A	6641	32.59	A – B	13.00
B	7633	37.46	A – C	8.85
C	6101	29.94	B – C	25.11
TOTALS	20375	100.00		

	LOAD		PF CORR		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	10000	100%	10,000.00 X 1.00		10,000.00
(REMAINDER @ 50%)	2060	100%	2,060.00 X 0.50		1,030.00
LIGHTING (LOAD @ 125%)	0	95%	0.00 X 1.25		0.00
MOTOR (LARGEST @ 125%)	3963	90%	4,403.33 X 1.25		5,504.17
(REMAINDER @ 100%)	2352	90%	2,613.33 X 1.00		2,613.33
MISC (LOAD @ 100%)	2000	100%	2,000.00 X 1.00		2,000.00
TOTALS	CONNECTED LOAD		20.38 KVA		
	DEMAND LOAD		21.15 KVA		
	REQUIRED AMPERAGE		58.70 AMPS		

PANELBOARD SCHEDULE PANEL – LSB1

MOUNTING – Surface

120/208 VOLT 3 PHASE 4 WIRE
100 A AMP BUS
100 A AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE – GE A Series (?)

LOCATION – MCDB

CIRCUIT DESCRIPTION	CIRCUIT RECPT	LOAD IN LTG	MTR	WATTS MISC	CCT NUM	BRKR AMPS	P		BRKR AMPS	P	CCT NUM	CIRCUIT LOAD IN MISC	MTR	LTG	WATTS RECPT	CIRCUIT DESCRIPTION
Receptacles	900				1	20	1	A	20	1	2					Spare
Receptacles	1080				3	20	1	B	20	1	4	500				Compressor Drains
PSB 26				500	5	20	1	C	20	1	6			500		Lights Mechanical
Flow Processor				500	7	20	1	A	20	1	8			500		Lights Mechanical
???				1000	9	20	1	B	20	1	10			500		Lights Mechanical
Steam Condensate Station				500	11	20	1	C	20	1	12			500		Lights Mechanical
???				1000	13	20	1	A	20	1	14			500		Lights Mechanical
???				1000	15	20	1	B	20	1	16	1000				???
???				1000	17	20	1	C	20	1	18	1000				???
???				1000	19	20	1	A	20	1	20	20				KEP Panel
???				1000	21	20	1	B			22					Space
???				1000	23	20	1	C			24					Space
???			3866		25	60		A	20	1	26					Space
"			3866		27			B	20	1	28					Space
"			3866		29		3	C	20	1	30					Space

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	900	1080	0	1980
LIGHTING	1000	500	1000	2500
MOTOR	3866	3866	3866	11598
MISC	3020	4500	4000	11520
TOTALS	8786	9946	8866	

PHASE BALANCING	LOAD	%	BTWN	%
A	8786	31.84	A – B	11.66
B	9946	36.04	A – C	0.90
C	8866	32.13	B – C	12.18
TOTALS	27598	100.00		

	LOAD		PF CORR		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	1980	100%	1,980.00 X 1.00		1,980.00
(REMAINDER @ 50%)	0	100%	0.00 X 0.50		0.00
LIGHTING (LOAD @ 125%)	2500	95%	2,631.58 X 1.25		3,289.47
MOTOR (LARGEST @ 125%)	11598	90%	12,886.67 X 1.25		16,108.33
(REMAINDER @ 100%)	0	90%	0.00 X 1.00		0.00
MISC (LOAD @ 100%)	11520	100%	11,520.00 X 1.00		11,520.00
TOTALS	CONNECTED LOAD		27.60 KVA		
	DEMAND LOAD		32.90 KVA		
	REQUIRED AMPERAGE		91.32 AMPS		

PANELBOARD SCHEDULE PANEL – LPOA

MOUNTING – Surface

120/208 VOLT 3 PHASE 4 WIRE
100 AMP BUS
AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE – GE A Series

LOCATION – MUENZINGER

CIRCUIT DESCRIPTION	CIRCUIT RECPT	LOAD IN LTG	MTR	WATTS MISC	CCT NUM	BRKR AMPS	P		BRKR AMPS	P	CCT NUM	CIRCUIT LOAD IN MISC	MTR	LTG	WATTS RECPT	CIRCUIT DESCRIPTION
HRP – 1			1320		1	20		A	20		2		1320			CU – RM 0041
" "			1320		3			B			4		1320			" " "
" "			1320		5		3	C		3	6		1320			" " "
Space					7			A	20	1	8			720		Tunnel Receptacles
Space					9			B	20	1	10		500			Tunnel Fan
Glycol Feeder			1000		11	20	1	C	20	1	12			500		Tunnel Lights
Time Clock		500			13	20	1	A	20	1	14	1000				Control Circuit
Space					15			B	20	1	16					Breaker off
Space					17			C	20	1	18	20				KEP Panel

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	720	0	0	720
LIGHTING	0	0	500	500
MOTOR	2640	3140	3640	9420
MISC	1500	0	20	1520
TOTALS	4860	3140	4160	

PHASE BALANCING	LOAD	%	BTWN	%
A	4860	39.97	A – B	54.78
B	3140	25.82	A – C	16.83
C	4160	34.21	B – C	24.52
TOTALS	12160	100.00		

	LOAD		PF CORR		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	720	100%	720.00 X 1.00		720.00
(REMAINDER @ 50%)	0	100%	0.00 X 0.50		0.00
LIGHTING (LOAD @ 125%)	500	95%	526.32 X 1.25		657.89
MOTOR (LARGEST @ 125%)	3960	90%	4,400.00 X 1.25		5,500.00
(REMAINDER @ 100%)	5460	90%	6,066.67 X 1.00		6,066.67
MISC (LOAD @ 100%)	1520	100%	1,520.00 X 1.00		1,520.00
TOTALS	CONNECTED LOAD		12.16 KVA		
	DEMAND LOAD		14.46 KVA		
	REQUIRED AMPERAGE		40.15 AMPS		

PANELBOARD SCHEDULE PANEL – 1PBB

MOUNTING – Surface

120/208 VOLT 3 PHASE 4 WIRE
225 A AMP BUS
AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE – GE NLAB

LOCATION – PORTER

CIRCUIT DESCRIPTION	CIRCUIT RECPT	LOAD IN LTG	MTR	WATTS MISC	CCT NUM	BRKR AMPS	P		BRKR AMPS	P	CCT NUM	CIRCUIT LOAD IN MISC	MTR	LTG	WATTS RECPT	CIRCUIT DESCRIPTION
Spare					1	20	1	A	20	1	2					Spare
Condensate Panel				1000	3	20	1	B	20	1	4					Spare
Receptacle Mech Room	720				5	20	1	C	20	1	6					Spare
Spare					7	20	1	A	20	1	8					Spare
Spare to Cond Panel (brkr off)					9	20	1	B	20	1	10	1000				Andover Panel
Pole Lights		1500			11	20	1	C	20	1	12					Spare
Receptacle	900				13	20	1	A	20	1	14					Spare
Tunnel Lights		1200			15	20	1	B	20	1	16					Spare
???				1000	17	20	1	C	20	1	18	20				KEP
Space					19			A	20		20		1320			Air Compressor 20 A 3ø
Space					21			B			22		1320			" "
Space					23			C		3	24		1320			" "
Space					25			A			26					Space
Space					27			B			28					Space
Space					29			C			30					Space
Space					31			A			32					Space
Space					33			B			34					Space
Space					35			C			36					Space
Space					37			A			38					Space
Space					39			B			40					Space
Space					41			C			42					Space

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	900	0	720	1620
LIGHTING	0	1200	1500	2700
MOTOR	1320	1320	1320	3960
MISC	0	2000	1020	3020
TOTALS	2220	4520	4560	

PHASE BALANCING	LOAD	%	BTWN	%
A	2220	19.65	A – B	50.88
B	4520	40.00	A – C	51.32
C	4560	40.35	B – C	0.88
TOTALS	11300	100.00		

	LOAD		PF CORR		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	1620	100%	1,620.00 X 1.00		1,620.00
(REMAINDER @ 50%)	0	100%	0.00 X 0.50		0.00
LIGHTING (LOAD @ 125%)	2700	95%	2,842.11 X 1.25		3,552.63
MOTOR (LARGEST @ 125%)	3960	90%	4,400.00 X 1.25		5,500.00
(REMAINDER @ 100%)	0	90%	0.00 X 1.00		0.00
MISC (LOAD @ 100%)	3020	100%	3,020.00 X 1.00		3,020.00
TOTALS	CONNECTED LOAD		11.30 KVA		
	DEMAND LOAD		13.69 KVA		
	REQUIRED AMPERAGE		38.01 AMPS		

PANELBOARD SCHEDULE PANEL – RB–1

MOUNTING – Surface

120/208 VOLT 3 PHASE 4 WIRE
100 A AMP BUS
50 A AMP MAIN BREAKER
SHORT CIRCUIT RATING

TYPE – Square D NQOD

LOCATION – EKELEY

CIRCUIT DESCRIPTION	CIRCUIT RECPT	LOAD IN LTG	MTR	WATTS MISC	CCT NUM	BRKR AMPS	P		BRKR AMPS	P	CCT NUM	CIRCUIT LOAD IN MISC	MTR	LTG	WATTS RECPT	CIRCUIT DESCRIPTION
Receptacles	1080				1	20	1	A	20	1	2	500				Receiver Tank Dump Valve
Glycol Pump			1000		3	20	1	B	20	1	4	500				Magnetic Starter Control
Andover Panel				1000	5	20	1	C	20	1	6	20				KEP Panel
Spare					7	20	1	A	20	1	8					Spare
Spare					9	20	1	B	20	1	10					Spare
Spare					11	20	1	C	20	1	12					Spare
Space					13			A			14					Space
Space					15			B			16					Space
Space					17			C			18					Space
Space					19			A			20					Space
Space "					21			B			22					Space
Space "					23			C			24					Space

DEMAND LOAD CALCULATION

PHASE LOADING	A	B	C	TOTAL
RECEPTACLE	1080	0	0	1080
LIGHTING	0	0	0	0
MOTOR	0	1000	0	1000
MISC	500	500	1020	2020
TOTALS	1580	1500	1020	

PHASE BALANCING	LOAD	%	BTWN	%
A	1580	38.54	A – B	5.33
B	1500	36.59	A – C	54.90
C	1020	24.88	B – C	47.06
TOTALS	4100	100.00		

	LOAD		PF CORR		DEMAND LOAD
RECEPTACLE (FIRST 10 KW @ 100%)	1080	100%	1,080.00 X 1.00		1,080.00
(REMAINDER @ 50%)	0	100%	0.00 X 0.50		0.00
LIGHTING (LOAD @ 125%)	0	95%	0.00 X 1.25		0.00
MOTOR (LARGEST @ 125%)	1000	90%	1,111.11 X 1.25		1,388.89
(REMAINDER @ 100%)	0	90%	0.00 X 1.00		0.00
MISC (LOAD @ 100%)	2020	100%	2,020.00 X 1.00		2,020.00
TOTALS	CONNECTED LOAD		4.10 KVA		
	DEMAND LOAD		4.49 KVA		
	REQUIRED AMPERAGE		12.46 AMPS		

CURRENT TRANSFORMER SIZE TABLE

Size the current transformers according to the follow power transformer sizes:

Transformer Size	Transformer Secondary Voltage	CT Ratio	Transformer Size	Transformer Secondary Voltage	CT Ratio
1000 KVA	277/480	500:5	1000 KVA	120/208	1200:5
750 KVA	277/480	400:5	750 KVA	120/208	1000:5
500 KVA	277/480	300:5	500 KVA	120/208	600:5
300 KVA	277/480	200:5	300 KVA	120/208	400:5
225 KVA	277/480	100:5	225 KVA	120/208	300:5
150 KVA	277/480	75:5	150 KVA	120/208	200:5

SMART GRID
METERING 2011
University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

KEY PLAN

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

PANELBOARD SCHEDULES

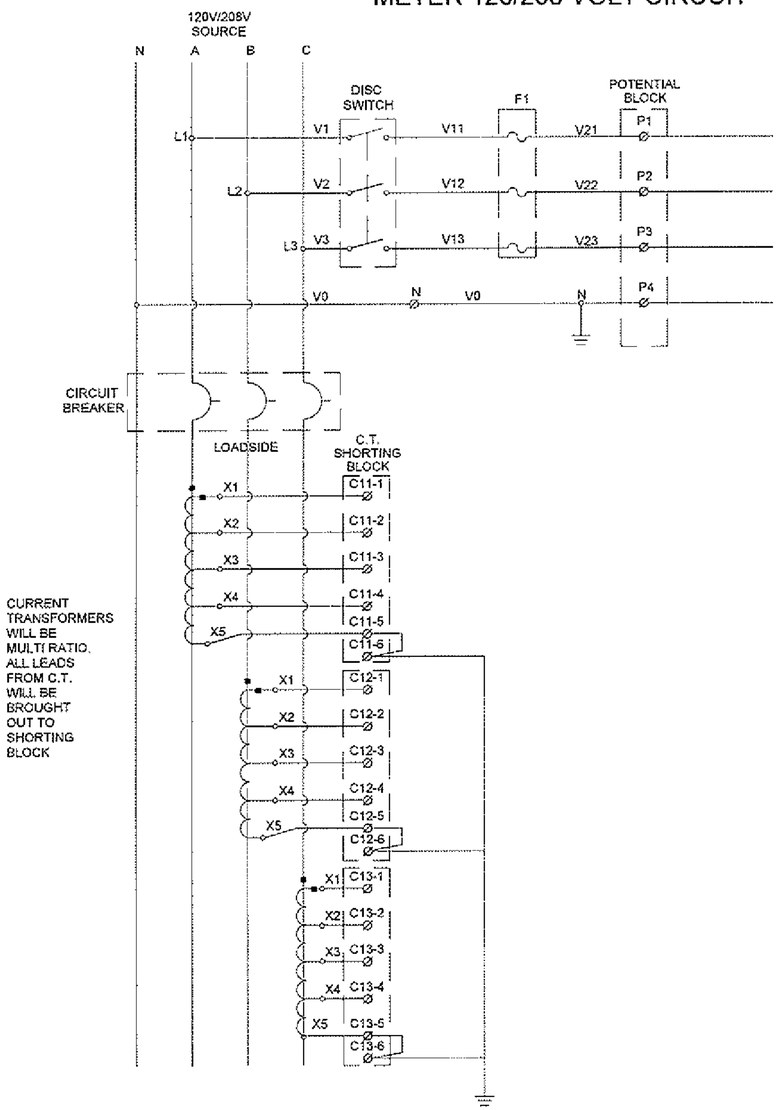
Project Number: 10.01461
Date: 07/08/2011
Sheets: 17 of 19

E7.0

SMART GRID
METERING 2011
University of Colorado at Boulder
Boulder, Colorado

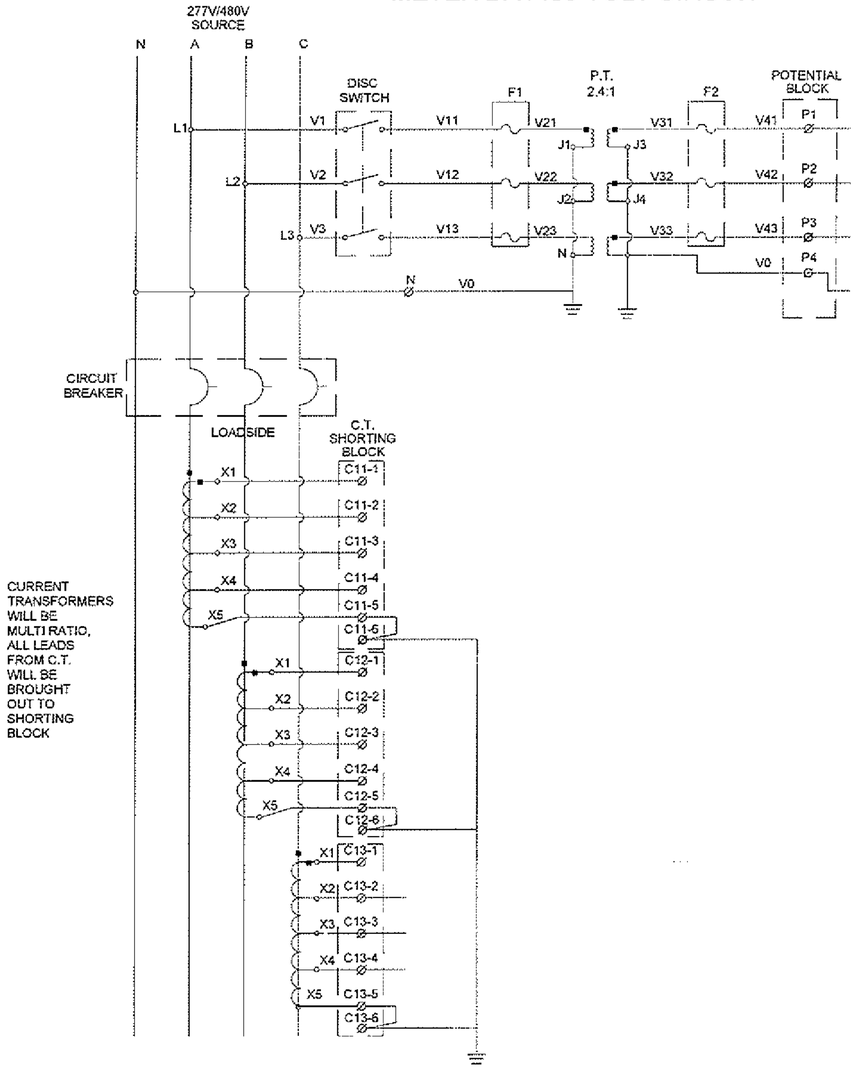
Revision	Date	Description	By

METER 120/208 VOLT CIRCUIT



CURRENT TRANSFORMERS WILL BE MULTI RATIO, ALL LEADS FROM C.T. WILL BE BROUGHT OUT TO SHORTING BLOCK

METER 277/480 VOLT CIRCUIT



CURRENT TRANSFORMERS WILL BE MULTI RATIO, ALL LEADS FROM C.T. WILL BE BROUGHT OUT TO SHORTING BLOCK

KEY PLAN

BID SET

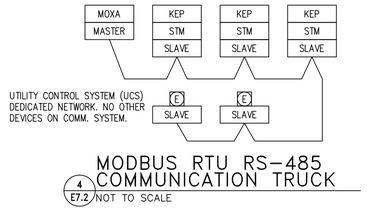
Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

DETAILS

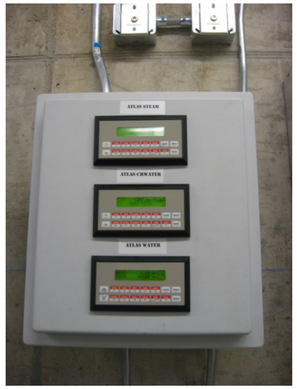
Project Number: 10.01461
Date: 07/08/2011
Sheets: 18 of 19

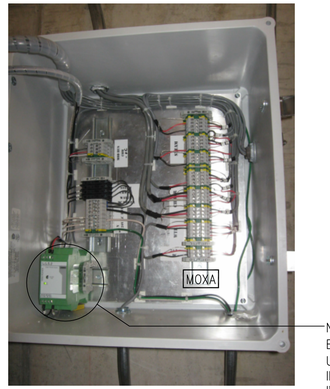
E7.1



MODBUS RTU RS-485 COMMUNICATION TRUCK

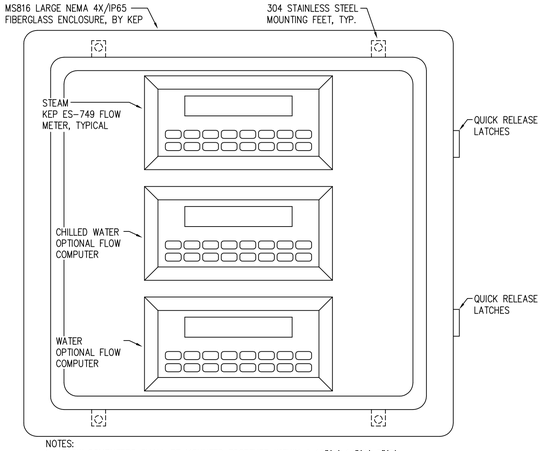
4 / E7.2 NOT TO SCALE





NOTE: POWER SUPPLY CAN BE REMOVED (WITH WRITTEN UNIVERSITY P.M. APPROVAL) IF MAG. METERS NOT INCLUDED IN UMP. KEP CAN POWER 24VDC LOOP.

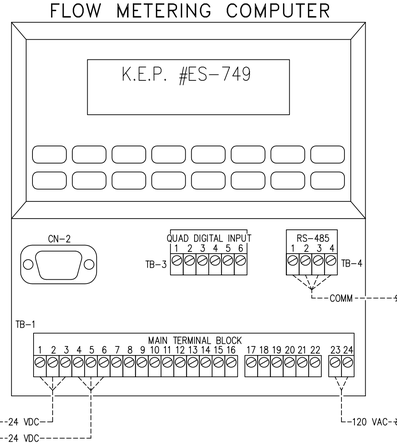
3 / E7.2 PICTORIAL UTILITY METERING PANEL (UMP) NOT TO SCALE



NOTES:
1. FLOW COMPUTERS SHALL BE MOUNTED TOGETHER WITHIN A 16"(H)x14"(W)x8"(D) FIBERGLASS REINFORCED POLYESTER NEMA4X ENCLOSURE AS NOTED ON FLOOR PLANS
2. ENCLOSURE SHALL BE PROVIDED WITH 1, 2, 3 OR 4 CUTOUTS AS REQUIRED.

FLOW COMPUTER ENCLOSURE DETAIL

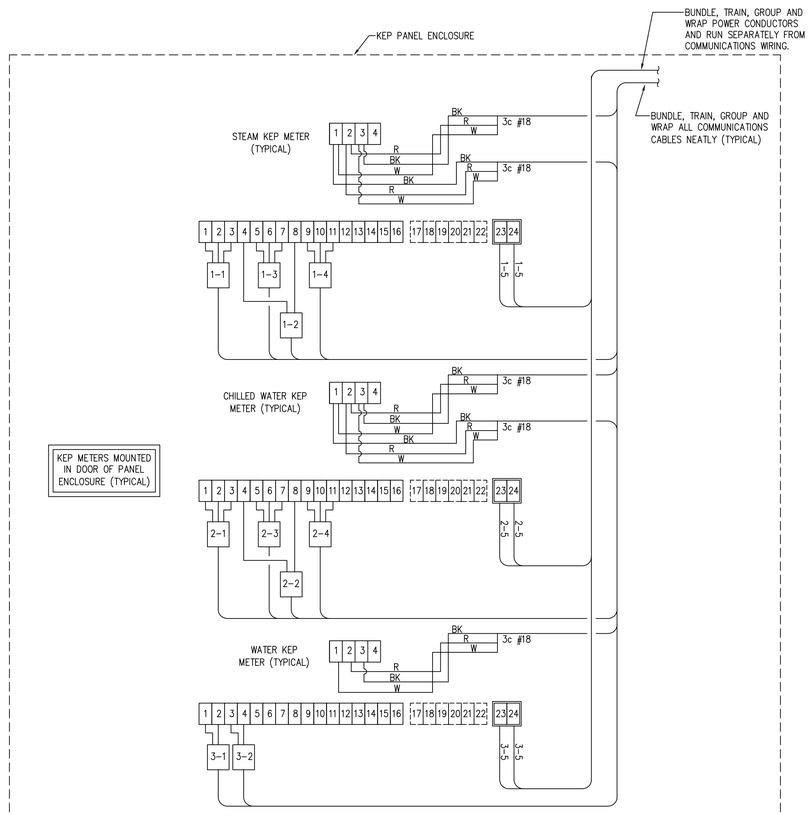
FLOW METERING COMPUTER



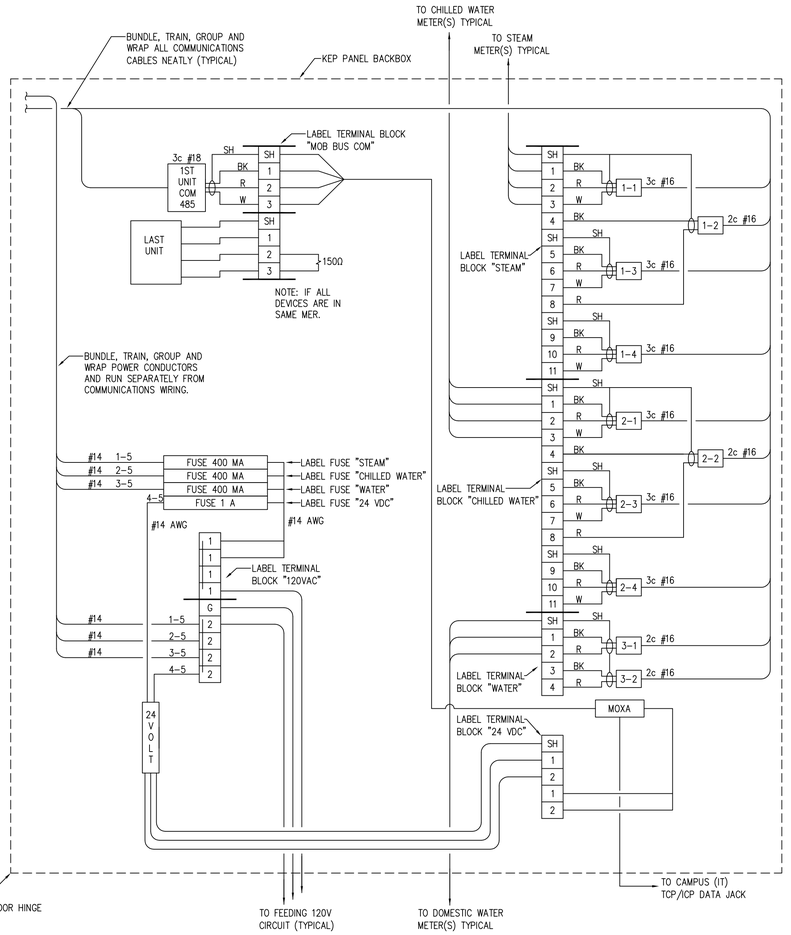
NOTES:
1. DETAIL REFERENCING SPECIFIC WIRING CONFIGURATION FOR SPECIFIED METER.

FLOW COMPUTER DETAIL

1 / E7.2 METERING FLOW COMPUTER DETAIL/TERMINATIONS NOT TO SCALE



2 / E7.2 WIRING DIAGRAM UTILITY METERING PANEL (UMP) NOT TO SCALE



SMART GRID
METERING 2011
University of Colorado at Boulder
Boulder, Colorado

Revision	Date	Description	By

KEY PLAN

BID SET

Ulteig
Bismarck - Denver - Detroit Lakes - Fargo - Minneapolis - Sioux Falls
9777 Pyramid Court #200
Englewood, Colorado 80112
Phone: 720.873.5700 Fax: 720.873.5701
Web: www.ulteig.com

Drawn By: JPS
Checked By: RNH
Approved By: RNH

ELECTRICAL DETAILS

Project Number: 10.01461
Date: 07/08/2011
Sheets: 19 of 19

E7.2

N:\Projects\2010\10.01461\Drawing\ELEC\10.01461 E7.2.dwg-E7.2-7/7/2011 12:07 PM