Scope of Work:

The University of Colorado at Boulder needs to upgrade the 4160 volts loop to 13.8KV volts; the upgrade requires removing and replacing transformers and switches. The scope of work will be executed in five phases:

1) Remove transformer 56 and switch 56B  
2) Replace Reed hall transformer number 55  
3) Replace Bracket Hall transformer number 42  
4) Replace Baker Hall transformer number 40  
5) Remove transformer number 26

Schedule

The contractor shall coordinate the above work with the Project Manager and CU Utility Services.

Submittal requirements:

Prior to purchase, provide submittal for review and approval of transformer, cables, supports, elbows, fault indicators, and any other material that is required for the execution of this work. The transformer submittal will include but not limited to transformer dimensions, auxiliary enclosure accessory layout, oil sample and oil drain location.

Detailed work scope:

Phase 1:

Transformer 56 and inline Joslyn fuse 56B - removed by others under other project.

Replace cable 106 and cable 105 approximate total per phase length 100’ Feet, install new wiring from switch 56 to be spliced to cable 83. Install heavy duty non metallic cable rack to support cable and splice in the tunnel. Install new ID cable tags at switch 56, tunnel cable entrance and exit. New cable ID tags 83. Cable and splice testing per CU standard 16366.

Phase 2:

Reed Hall Transformer number 55  
3 single phase pots Rated 75KVA 120/240 no secondary breaker

Contractor to verify the feasibility of replacing 3 RTE single phase transformer with 3 single phase pad mounted transformers, 200 Amps bushing wells, Envirotemp FR3,
automatic pressure relief, no load tap changer, primary over current protection. If this option is chosen the contractor will remove and dispose the Joslyn fuse number 55.

If the first option is not feasible, contract shall supply 3 RTE transformers or equal with Envirotex FR3, rated at 13.8KV, integral over current protection. If over current protection is not an option for the RTE transformers, the contractor shall also supply 3 new fuses and 3 spare fuses to replace the existing Joslyn fuses rated at 4160 volts and 65 Amps.

**Phase 3:**

Brackett Hall transformer number 42  
Rated 500 KVA 120/208 no secondary breaker

Replace transformer 42 with 13.8 KV primary voltage, 225 KVA, 120/208 secondary voltage

Removal and proper disposal of existing transformer.

Installation of new transformer in accordance with Campus Standard 16320 attached, with the following modified specifications in section 2.02 subsection f 1 through 9:

- ANSI Tank ground pad
- Liquid level gauge, with alarm contacts
- Thermometer, dial-type, with alarm contacts
- Pressure/vacuum gauge with alarm contacts
- Schrader valve
- Pressure relief device
- Drain valve with sampler in HV Compartment (1")
- Locate drain valve outside cabinet & tank

Full height side enclosure for accessories with gauges, alarm contacts, drain valve with sampler and pressure relief device. Full side enclosure assembly is tempered proof with lockable Penta-head.

Provide and install new transformer concrete pad to fit the new transformer in accordance with Campus Standard 03300 where applicable.

**Transformer minimum criteria:**

500kVA 3 Phase pad mounted transformer.

Primary voltage 13800 Delta.

Primary configuration Dead front  
Primary configuration Loop Feed

Primary current limiting over current protection.
Two (2) 600amps internal oil immersed two position load break switches, and one (1) 400 amps two position load break switch.

Six primary bushings 600 amp (QTY: 6) for loop feed application.

Secondary voltage 120/208

Secondary bushings 1" copper stud with 4-hole screw-on spade bushing(s) (Qty: 4)

2-2 1/2 % above and 2-2 1/2 % below normal primary taps with externally operated no load tap changer.

For additional specifications refer to section 16320 medium voltage transformers liquid filled.

**Transformer ID tag marking:**

Contractor is responsible to install transformer identification tag and cable ID on the new installed transformer. Install 2”x2” new non reflective weather resistant identification tags as per original transformer ID tag.

**Transformer primary wire termination:**

Contractor shell re-terminate the primary wiring maintaining the same cable phasing termination as per original transformer installation.

Contractor will verify bushing bolt torque per manufacture specification after the transformer is in place.

Contractor shell inspect the transformer during pre-bid walk through to verify re-termination of the primary cable with new 600 amps deadbreak elbow, per Campus Standard 16366. In cases where the conductor length do not allow new deadbreak elbows, the contractor shell furnish a 600 to 200 amp adapter and new 200 amps deadbreak connector pin.

Contractor need to specify what option is chosen for primary cable re-termination.

Contract will furnish six (6) new cables mount Directional Load Tracker FCI fault indicator manufacture by Power Delivery Products or equivalent fault indicators.

Contractor is responsible to install existing cable identification tags and phasing identification tags such as Almetek PM1 or equivalent, tags are installed using two ty-rap per tag.

Color tag designation for the primary side:

1) A Phase (Red)
2) B Phase (White)
3) C Phase (Blue)

**Transformer secondary wire termination:**
Contractor shell test and inspect the secondary main breaker and main breaker lugs per manufacture specifications.

Contractor shell re-terminate the secondary wiring maintaining the same cable phasing termination as per original transformer installation.

Contractor is responsible to install cable phasing identification with model 35 electrical tape or equivalent:

Color phasing designation for the secondary side:

1) A Phase (Black)
2) B Phase (red)
3) C Phase (Blue)

In cases where the secondary wiring needed to be extended do to breaker removal or different secondary spade bushing height the contractor will use the following specification:

1) Splices are to carry full conductor ampacity.
2) Secondary cable splice methods will use a high pressure crimper,
3) Clean cable with SpliceMaster or equivalent product.
4) Cold or hot shrink tube installed per manufacture published reference distance from the cable splice.

Phase 4

Baker Hall transformer number 40
Rated 500 KVA 120/208, no secondary breaker

Replace transformer 40 with 13.8 KV primary voltage, 500 KVA, 120/208 secondary voltage

Removal and proper disposal of existing transformer.

Installation of new transformer in accordance with Campus Standard 16320 attached, with the following modified specifications in section 2.02 subsection f1 through 9:

- ANSI Tank ground pad
- Liquid level gauge, with alarm contacts
- Thermometer, dial-type, with alarm contacts
- Pressure/vacuum gauge with alarm contacts
- Schrader valve
- Pressure relief device
- Drain valve with sampler in HV Compartment (1”)
- Locate drain valve outside cabinet & tank

Full height side enclosure for accessories with gauges, alarm contacts, drain valve with sampler and pressure relief device. Full side enclosure assembly is tempered proof with lockable Penta-head.
Provide and install new transformer concrete pad to fit the new transformer in accordance with Campus Standard 03300 where applicable.

**Transformer minimum criteria:**

500kVA 3 Phase pad mounted transformer.

Primary voltage 13800 Delta.

Primary configuration Dead front
Primary configuration Loop Feed

Primary current limiting over current protection.

Two (2) 600amps internal oil immersed two position load break switches, and one (1) 400 amps two position load break switch.

Six primary bushings 600 amp (QTY: 6) for loop feed application.

Secondary voltage 120/208

Secondary bushings 1" copper stud with 4-hole screw-on spade bushing(s) (Qty: 4)

2-2 1/2 % above and 2-2 1/2 % below normal primary taps with externally operated no load tap changer.

For additional specifications refer to section 16320 medium voltage transformers liquid filled.

**Transformer ID tag marking:**

Contractor is responsible to install transformer identification tag and cable ID on the new installed transformer. Install 2”x2” new non reflective weather resistant identification tags as per original transformer ID tag.

**Transformer primary wire termination:**

Contractor shell re-terminate the primary wiring maintaining the same cable phasing termination as per original transformer installation.

Contractor will verify bushing bolt torque per manufacture specification after the transformer is in place.

Contractor shell inspect the transformer during pre-bid walk through to verify re-termination of the primary cable with new 600 amps deadbreak elbow, per Campus Standard 16366. In cases where the conductor length do not allow new deadbreak elbows, the contractor shell furnish a 600 to 200 amp adapter and new 200 amps deadbreak connector pin.
Contractor need to specify what option is chosen for primary cable re-termination.

Contract will furnish six (6) new cables mount Directional Load Tracker FCI fault indicator manufacture by Power Delivery Products or equivalent fault indicators.

Contractor is responsible to install existing cable identification tags and phasing identification tags such as Almetek PM1 or equivalent, tags are installed using two ty-rap per tag.

Color tag designation for the primary side:

4) A Phase (Red)
5) B Phase (White)
6) C Phase (Blue)

Transformer secondary wire termination:

Contractor shell test and inspect the secondary main breaker and main breaker lugs per manufacture specifications.

Contractor shell re-terminate the secondary wiring maintaining the same cable phasing termination as per original transformer installation.

Contractor is responsible to install cable phasing identification with model 35 electrical tape or equivalent:

Color phasing designation for the secondary side:

4) A Phase (Black)
5) B Phase (red)
6) C Phase (Blue)

In cases where the secondary wiring needed to be extended do to breaker removal or different secondary spade bushing height the contractor will use the following specification:

5) Splices are to carry full conductor ampacity.
6) Secondary cable splice methods will use a high pressure crimper,
7) Clean cable with SpliceMaster or equivalent product.
8) Cold or hot shrink tube installed per manufacture published reference distance from the cable splice.

Phase 5:

Remove and dispose transformer 26 and install cable 79 to switch 25.