

SNS 108050000-DC0002-R01

# Spallation Neutron Source

## Conventional Facilities Controls Site Communications Backbone Design Criteria

November 2002



A U.S. Department of Energy Multilaboratory Project

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Thomas Jefferson National Accelerator Facility • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

**SPALLATION NEUTRON SOURCE  
SITE COMMUNICATIONS BACKBONE  
DESIGN CRITERIA**

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**SPALLATION NEUTRON SOURCE  
SITE COMMUNICATIONS BACKBONE  
DESIGN CRITERIA**

**November 2002**

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## 1.0 Scope

This document provides requirements and criteria for Title II design documents needed to install and terminate the Site Communications Backbone cabling. The Site Communications Backbone consists of fiber and copper cabling that carries controls and communications (not power) signals that in nearly all cases, are external to buildings and use cabling which is installed in duct bank and/or conduit provided by the Site Utilities contractor.

The scope of this work will be to install and terminate cabling as described in Appendix 1 and listed in Appendix 2.

It is intended that the installation and termination of this cabling will be performed by the I&C Installation contractor. Thus, these design documents will be used to generate a Task Order design package.

Generating this task order package will include:

- a) Completing drawing "Site Communications Backbone" which has been started by SNS. This drawing shows all cable runs and end points and will serve as the package "P&ID".
- b) Change existing duct cross section details as needed.
- c) Generating and overall specification 170xx for the package and other specifications needed to support installation and termination and testing of the cabling.
- d) Generating routing drawings as needed to show routing of cabling inside the buildings to communication and/or control rooms.
- e) Generating patch panel installation and cable termination detail drawings
- f) Generating duct bank conduit assignments
- g) Generating a design for inner duct using fiber cabling or multi-cable tubing used with blown fiber technology

Generating pull lists will be left to the installation contractor. Specific cable pulls shall be installed such that:

- a) Cabling that is completely internal to buildings shall be installed and terminated prior to the building Ready for Equipment (RFE) status.
- b) Cabling with portions external to buildings shall be installed and terminated prior to RFE status of the later of the cabling source or destination.

## 2.0 Requirements

- a) Use Knight specifications (16000 series) and drawings showing building and site layouts as appropriate. Drawing and SNS specification numbers shall be assigned per SNS 109000000-DC0001-R00.
- b) The site communications duct bank is shown on Knight CFC drawings for the site & utilities construction package and DCN T1-SU1-01. The design of this duct bank should not be changed.
- c) Dedicated ducts or conduit shall be provided for GC/MPS (Type A and B cables), PPS (Type C cables) and NFSS (Type H cables), TPS channel 1 (Type F cables), TPS channel 2 (Type F cables), FPS (Type L cables), and CF controls and Telephone (Type M and P cables). Further, FPS cables shall use the FA section of cable tray where they are installed in tray.
- d) In conduit, each fiber cable shall be installed in a dedicated inner duct or multi-cable tube section. All inner ducts or multi-cable tubing shall be installed before any cabling (copper or fiber) is pulled. Copper cabling need not be installed in inner duct. Fiber cabling in cable tray need not be installed in inner duct or multi-cable tubing. However, they may be installed in inner duct or multi-cable tubing if this makes installation more efficient.
- e) Do not remove any Fire Protection System (FPS) conduits where they are needed for cables L14 through L19.. These conduits will be used for copper cabling installed by the fire alarm design-build contractor.
- f) Install and terminate Power Monitoring Blue Hose cables in accordance with sketches PM1 through PM5.
- g) Target Protection System (TPS) and Nuclear Facility Safety Significant (NFSS) cabling will be subject to additional installation requirements that will be applicable to safety systems.

## **Appendix 1, Scope of Work**

## Appendix 1: Scope of Work

1. Conduit – In general, duct bank and all conduit external to buildings is provided (procured and installed) by others. Cable tray in the Klystron and CIO buildings may be used where applicable. Fiber and communications (300V rated) cable should be in the COM section. Signal (600V rated) should be in the S-NLL section. All conduit routed inside buildings (including any required pull boxes) is to be procured and installed by the contractor.
2. Global Controls Cables (A) – These are fiber optic cables that terminate in patch panels in cabinets in communications rooms. Patch panels and racks are procured and installed by others. The contractor should procure and install the cable and conduit as needed to the racks and terminate the fibers using fusion splicing per specification 16129.

Note: Cables A11 through A16 have been installed by others and are no longer part of the backbone package.

Cable A18 (12mm/12sm) runs from a patch panel Ring\_ICS:PL0201/02 in the Ring Service Building rack Ring\_ICS:CR\_Cab02 that is procured and installed by others to a 48 connector (spares are needed at this location) dedicated, locked, wall mounted patch panel mounted adjacent to the Tgt\_IDMP:Cab8840 Target Controls System rack in the injection dump building. The contractor should procure and install the patch panel in the injection dump building, the cable, and conduit as needed and terminate the fibers using fusion splicing per specification 16129.

3. Machine Protection System (MPS) Cables (B) – Except for one shielded twisted pair cable, these are fiber optic cables that terminate in patch panels in racks in communications rooms. Patch panels and racks are procured and installed by others. The contractor should procure and install the cable and conduit as needed to the racks and terminate the fibers using fusion splicing per specification 16129.

The shielded copper cable (B09), should be terminated on terminal strips procured and installed by others in cabinets Ring\_MPS:Cab01 and cabinet TGT\_CTL: Cab8840 in the injection dump building. Termination should be per the cabling design criteria.

Note: There are additional cables in the Klystron building (formerly cables B22 through B33 that have been installed by others and are no longer part of the backbone package).

4. Personnel Protection System (PPS), C, Cables – Except for two Copper ControlNet cables, these are fiber optic cables that terminate in dedicated, locked, wall mounted patch panels or PPS cabinets procured and installed by others. The contractor should procure the cable, conduit, and patch panels, install conduit as needed and terminate the fibers using fusion splicing per specification 16129.

RG-6, ControlNet cables C01 and C02 terminate in PPS racks procured and installed by others. The contractor should procure and install the cable and conduit as needed to run the cabling to a junction box overhead of rack that is closest to the stub ups and leave enough

cable coiled to reach the ground plus six feet. Terminate in a coax connector. Routing the cable to the racks and connecting the cables will be by others.

5. Target Protection System (TPS) Cables (F) – These cables are all copper cables. Conduit in the FE and Klystron buildings will be provided by others. The contractor should procure and install all cable and conduit as needed in other buildings to the TPS cabinets. Termination will be by others.
6. Nuclear Facility Safety Significant (NFSS) Cables (H) – These two cables are copper, RG-6, ControlNet cables. The contractor should procure and install the cable and conduit as needed, route the cable to NFSS racks procured and installed by others and terminate them on a ControlNet device procured and installed by others.
7. Fire Protection System (FPS) Cables (L) - These are fiber optic cables that terminate in dedicated, locked, wall mounted patch panels. The contractor should procure and install the cable, patch panels, and conduit as needed and terminate the fibers using fusion splicing per specification 16129. Cables L14 through L19 need conduit assignments only. Procurement and installation of these cables is by others. Cable L20 will be not use backbone duct banks and thus is no longer included in the backbone task.
8. CF Controls Cables (M) – These consist of:
  - a) One 6mm/6sm fiber cable. Terminate one end in the patch panel HEBT\_ICS:PL0201/02 in rack HEBT\_ICS:CR\_Cab02. Terminate the other end in a ControlNet driver and a Ethernet driver in PLC enclosure CF\_ST:ENCL01 which are procured and installed by others. The contractor should procure and install the cable and conduit as needed and terminate the fibers using fusion splicing per specification 16129.

Note: For this fiber and fibers in the A cables that carry ControlNet signals for CF Controls, SvT will prepare kits with din rail mounted ControlNet and/or Ethernet drivers for installation in communication room cabinets by others.

- b) RG-6 Coax Cables for ControlNet – These cables are run between racks and/or cabinets procured and installed by others. The contractor should procure and install the cable and conduit as needed and connect the cable to ControlNet devices procured and installed by others.
- c) Twinaxial Cable for DeviceNet - These cables are run between racks and/or cabinets procured and installed by others. The contractor should procure and install the cable and conduit as needed and connect the cable to ControlNet devices procured and installed by others.
- d) Blue Hose Cable for Power Monitoring – These cables exist in several configurations as follows:

- 1) Cables that are arranged in a daisy chained fashion from substations to communication rooms. Conduit imbedded in concrete to carry cabling from the substations to a point inside the building is existing. The contractor should procure and install the cable and any other conduit as needed. The contractor should terminate the cabling at each substation and at EMINTS procured and installed by others in racks in communication rooms.

Cables M09 through M14 have been installed by others and are not a part of the backbone package.

- 2) Cables that are run from the Cutler Hammer switch gear cabinets on Klystron Power supplies to communication rooms. The contractor should procure the cable and any other conduit as needed and install cable and conduit. This cable should be brought to the same racks as those with EMINTS in the communication rooms and should be coiled up at the Cutler Hammer switch gear for future use.
- 3) Cat 5e – These two cables run from the Primary Substation to the communication room in the CUB. Conduit imbedded in concrete to carry cabling from the substations to a point inside the building is existing. The contractor should procure and install the cable and any other conduit as needed. The contractor should terminate the cabling at primary substation and in cabinet CF\_ICS:CUCR\_Cab01 in the CUB communication room using the TIA-568A method. Connection to Ethernet devices will be by others.

e) Copper Signal Cable

- 1) Cable M06 from the FE Communications room to the Grinder Pump has already been installed and is thus not part of this package. If the cable stops at the communication room and does not go all the way to the FE PLC rack, the remaining cable will be provided as part of the building work – not in the backbone package.
- 2) Cables M29 through M51 should be terminated at sensors and in cabinets per details shown on the CF controls drawings. The contractor should procure and install the cable and any conduit as needed

9. Telephone Cables (P) – These are copper cables as follows:

The contractor should procure and install the cable, any conduit needed, punch down blocks, and termination equipment in manholes. Terminate all cabling. Mount the punch down blocks on plywood backing in communication rooms. Punch down blocks and termination equipment in manholes will be field located per direction from the CM.

## **Appendix 2 Cable Number and Routing Listing**

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800A01	A01	FE comm rm FE-105, GC FE_ICS:PL0301/02	HEBT SB comm rm HS-104, HEBT_ICS:PL0201/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A02	A02	FE comm rm FE-105, GC FE_ICS:PL0303/04	CHL/RF comm rm CY-125, CHL_ICS:PL0201/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A03	A03	FE comm rm FE-105, GC FE_ICS:PL0305/06	RING SB comm rm RN-307, GC RING_ICS:PL0201/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A04	A04	FE comm rm FE-105, GC FE_ICS:PL0307/08	RING SB comm rm RN-307, GC RING_ICS:PL0203/04	48mm/48sm	Global Controls
8800A05	A05	FE comm rm FE-105, GC FE_ICS:PL0401/02	RTBT SB comm rm RS-302, GC RTBT_ICS:PL0201/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A06	A06	FE comm rm FE-105, GC FE_ICS:PL0403/04	Tgt Bldg comm rm TA103, GC TGT_ICS:PL103_021/022	48mm/48sm	Global Controls CF Controls - Cnet
8800A07	A07	FE comm rm FE-105, GC FE_ICS:PL0405/06	Tgt Bldg comm rm TA-B110, GC TGT_ICS:PL0201/02	48mm/48sm	Global Controls
8800A08	A08	FE comm rm FE-105, GC FE_ICS:PL0407/08	CUB comm rm CU 102, GC CF_ICS:PL_CU0101/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A09	A09	FE comm rm FE-105, GC FE_ICS:PL0501/02	CER in CLO, GC CER_ICS:PL1301/02	48mm/48sm	Global Controls CF Controls - Cnet
8800A10	A10	FE comm rm FE-105, GC FE_ICS:PL0503/04	CER in CLO, GC CER_ICS:PL1401/02	48mm/48sm	Global Controls
8800A11	A11*	FE comm rm FE-105, GC FE_ICS:PL0505/06	Kly comm rm 1, GC LIN_ICS:PL1401/02	48mm/48sm	Global Controls
8800A12	A12*	FE comm rm FE-105, GC FE_ICS:PL0507/08	Kly comm rm 2, GC LIN_ICS:PL2201/02	48mm/48sm	Global Controls
8800A13	A13*	FE comm rm FE-105, GC FE_ICS:PL0601/02	Kly comm rm 3, GC LIN_ICS:PL3201/02	48mm/48sm	Global Controls
8800A14	A14*	FE comm rm FE-105, GC FE_ICS:PL0603/04	Kly comm rm 4, GC LIN_ICS:PL4201/02	48mm/48sm	Global Controls
8800A15	A15*	FE comm rm FE-105, GC FE_ICS:PL0605/06	Kly comm rm 5, GC LIN_ICS:PL5201/02	48mm/48sm	Global Controls
8800A16	A16*	FE comm rm FE-105, GC FE_ICS:PL0607/08	Kly comm rm 6, GC LIN_ICS:PL06201/02	48mm/48sm	Global Controls
8800A17	A17	CHL/RF Comm Rm CY-125, GC CHL_ICS:PL0204/05	CHL Control Room, GC CHL_ICS:PL0801/02	24mm/24sm	Global Controls
8800A18	A18**	RING SB comm rm RN-307, RING_ICS:PL0201/02	Ring Injection Dump Bldg Patch Panel IDMP_ICS:PL01A	12mm/12sm	Global Controls
8800A19	A19	Target Building comm rm TA- 103, TGT_ICS:PL103_0103/04	CER in CLO, CER_ICS:PL2301/02	48mm/48sm	Scattering Instr
8800A20	A20	Target Building comm rm TA- 103, TGT_ICS:PL103_0105/06	CER in CLO, CER_ICS:PL2401/02	48mm/48sm	Scattering Instr
8800B01	B01	FE comm rm FE-105, MPS FE_ICS:PL1001/02	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	12mm/12sm	MPS
8800B02	B02	FE comm rm FE-105, MPS FE_ICS:PL1003/04	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	12mm/12sm	MPS
8800B03	B03	Kly comm rm 6, MPS LIN_ICS:PL6101/02	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	12mm/12sm	MPS
8800B04	B04	Kly comm rm 6, MPS LIN_ICS:PL6101/02	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	12mm/12sm	MPS

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800B05	B05	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	12mm/12sm	MPS
8800B06	B06	HEBT SB comm rm HS-104, MPS HEBT_ICS:PL0101/02	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	12mm/12sm	MPS
8800B07	B07	FE comm rm FE-105, MPS FE_ICS:PL1001/02	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	12mm/12sm	MPS
8800B08	B08	FE comm rm FE-105, MPS FE_ICS:PL1003/04	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	12mm/12sm	MPS
8800B09	B09	RING SB RN-301, RING_MPS:CAB301	INJ DUMP CABINET TGT_CTL:CAB8840	6-2/C-SH#18	MPS
8800B10	B10	Tgt Bldg Comm Rm TA-B110, MPS TGT_ICS:PL0101/02	CER in CLO, MPS CER_ICS:PL2701/02	12mm/12sm	MPS
8800B11	B11	Tgt Bldg Comm Rm TA-B110, MPS TGT_ICS:PL0101/02	CER in CLO, MPS CER_ICS:PL2701/02	12mm/12sm	MPS
8800B14	B14	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	12mm/12sm	MPS
8800B15	B15	RING SB comm rm RN-307, MPS RING_ICS:PL0101/02	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	12mm/12sm	MPS
8800B16	B16	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	Tgt Bldg comm rm TA-B110, MPS TGT_ICS:PL0101/02	12mm/12sm	MPS
8800B17	B17	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	Tgt Bldg comm rm TA-B110, MPS TGT_ICS:PL0101/02	12mm/12sm	MPS
8800B18	B18	FE comm rm FE-105, MPS FE_ICS:PL1001/02	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	12mm/12sm	MPS
8800B19	B19	FE comm rm FE-105, MPS FE_ICS:PL1003/04	RTBT SB comm rm RS-302, MPS RTBT_ICS:PL0101/02	12mm/12sm	MPS
8800B20	B20	FE comm rm FE-105, MPS FE_ICS:PL1001/02	CER in CLO, MPS CER_ICS:PL2701/02	12mm/12sm	MPS
8800B21	B21	FE comm rm FE-105, MPS FE_ICS:PL1003/04	CER in CLO, MPS CER_ICS:PL2701/02	12mm/12sm	MPS
8800B22	B22	FE comm rm FE-105, MPS FE_ICS:PL1001/02	Kly comm rm 1, MPS LIN_ICS:PL1501/02	12mm/12sm	MPS
8800B23	B23	FE comm rm FE-105, MPS FE_ICS:PL1003/04	Kly comm rm 1, MPS LIN_ICS:PL1501/02	12mm/12sm	MPS
8800B24	B24	Kly comm rm 1, MPS LIN_ICS:PL1501/02	Kly comm rm 2, MPS LIN_ICS:PL2101/02	12mm/12sm	MPS
8800B25	B25	Kly comm rm 1, MPS LIN_ICS:PL1501/02	Kly comm rm 2, MPS LIN_ICS:PL2101/02	12mm/12sm	MPS
8800B26	B26	FE comm rm FE-105, MPS FE_ICS:PL1001/02	Kly comm rm 3, MPS LIN_ICS:PL3101/02	12mm/12sm	MPS
8800B27	B27	FE comm rm FE-105, MPS FE_ICS:PL1003/04	Kly comm rm 3, MPS LIN_ICS:PL3101/02	12mm/12sm	MPS
8800B28	B28	Kly comm rm 3, MPS LIN_ICS:PL3101/02	Kly comm rm 4, MPS LIN_ICS:PL4101/02	12mm/12sm	MPS
8800B29	B29	Kly comm rm 3, MPS LIN_ICS:PL3101/02	Kly comm rm 4, MPS LIN_ICS:PL4101/02	12mm/12sm	MPS
8800B30	B30	Kly comm rm 4, MPS LIN_ICS:PL4101	Kly comm rm 5, MPS LIN_ICS:PL5101/02	12mm/12sm	MPS
8800B31	B31	Kly comm rm 4, MPS LIN_ICS:PL4101	Kly comm rm 5, MPS LIN_ICS:PL5101/02	12mm/12sm	MPS

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800B32	B32	Kly comm rm 5, MPS LIN_ICS:PL5101	Kly comm rm 6, MPS LIN_ICS:PL6101/02	12mm/12sm	MPS
8800B33	B33	Kly comm rm 5, MPS LIN_ICS:PL5101	Kly comm rm 6, MPS LIN_ICS:PL6101/02	12mm/12sm	MPS
8800C01	C01	RING SB comm rm RN-307	PPS cab in INJ DUMP Bldg	RG6 Coax	PPS - Cnet
8800C02	C02	RING SB comm rm RN-307	PPS cab in INJ DUMP Bldg	RG6 Coax	PPS - Cnet
8800C03	C03	FE Control Rm FE-101, PPS_Lin:FE_Cab02	HEBT SB comm rm HS-104, Patch Panel PPS_HS:PL104A	06mm/06sm	PPS
8800C04	C04	FE Control Rm FE-101, PPS_Lin:FE_Cab02	HEBT SB comm rm HS-104, Patch Panel PPS_HS:PL104A	06mm/06sm	PPS
8800C05	C05	CER in CLO, PPS Patch Panel PPS_CL:PLCERA	RTBT SB comm rm RS-302, PPS Patch Panel PPS_RS:PL302A	06mm/06sm	PPS
8800C06	C06	CER in CLO, PPS Patch Panel PPS_CL:PLCERA	RTBT SB comm rm RS-302, PPS Patch Panel PPS_RS:PL302A	06mm/06sm	PPS
8800C07	C07	CER in CLO, PPS Patch Panel PPS_CL:PLCERA	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307A	06mm/06sm	PPS
8800C08	C08	CER in CLO, PPS Patch Panel PPS_CL:PLCERA	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307A	06mm/06sm	PPS
8800C09	C09	CER in CLO, PPS Patch Panel PPS_CL:PLCERB	Tgt bldg control rm TA-B112, PPS Patch Panel PPS_TA:PL112A	06mm/06sm	PPS
8800C10	C10	CER in CLO, PPS Patch Panel PPS_CL:PLCERB	Tgt bldg control rm TA-B112, PPS Patch Panel PPS_TA:PL112A	06mm/06sm	PPS
8800C11	C11	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	CER in CLO, PPS Patch Panel PPS_CL:PLCERB	06mm/06sm	PPS
8800C12	C12	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	CER in CLO, PPS Patch Panel PPS_CL:PLCERB	06mm/06sm	PPS
8800C13	C13	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307A	PPS cab in INJ DUMP Bldg, PPS Patch Panel PPS_DU:PL223A	06mm/06sm	PPS
8800C14	C14	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307A	PPS cab in INJ DUMP Bldg, PPS Patch Panel PPS_DU:PL223A	06mm/06sm	PPS
8800C15	C15	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	Tgt bldg control rm TA-B112, PPS Patch Panel PPS_TA:PL112A	06mm/06sm	PPS
8800C16	C16	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	Tgt Bldg comm rm TA-B110, PPS Patch Panel PPS_TA:PL110A	06mm/06sm	PPS
8800C17	C17	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	RTBT SB comm rm RS-302, PPS Patch Panel PPS_RS:PL302A	06mm/06sm	PPS
8800C18	C18	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	RTBT SB comm rm RS-302, PPS Patch Panel PPS_RS:PL302A	06mm/06sm	PPS

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800C19	C19	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307B	06mm/06sm	PPS
8800C20	C20	FE ctrl rm FE-101, PPS_Lin:FE_Cab02	RING SB comm rm RN-307, PPS Patch Panel PPS_RN:PL307B	06mm/06sm	PPS
8800C21	C21	CER in CLO, PPS Patch Panel PPS_CL:PLCERC	HEBT SB comm rm HS-104, PPS Patch Panel PPS_HS:PL104A	06mm/06sm	PPS
8800C22	C22	CER in CLO, PPS Patch Panel PPS_CL:PLCERC	HEBT SB comm rm HS-104, PPS Patch Panel PPS_HS:PL104A	06mm/06sm	PPS
8800C23	C23	HEBT SB comm rm HS-104, PPS Patch Panel PPS_HS:PL104B	Central Exhaust Facility, PPS Patch Panel PPS_CE:PL01A	06mm/06sm	PPS
8800C24	C24	HEBT SB comm rm HS-104, PPS Patch Panel PPS_HS:PL104B	Central Exhaust Facility, PPS Patch Panel PPS_CE:PL01A	06mm/06sm	PPS
8800F01	F01	Tgt Bldg Cnt Rm TA-B112, TPS1 CAB5500A	Target Control Rm in CLO, TGT_TPS:CAB5501A	19 COND # 12	TPS - Channel 1
8800F02	F02	Tgt Bldg Ser Gal TA-112, TPS2 CAB5500B	Target Control Rm in CLO, TGT_TPS:CAB5501B	19 COND # 12	TPS - Channel 2
8800F03	F03	Tgt Bldg Cnt Rm TA-B112, TPS1 CAB5500A	RTBT SB TGT_TPS:CAB5503A	19 COND # 12	TPS - Channel 1
8800F04	F04	Tgt Bldg Ser Gal TA-112, TPS2 CAB5500B	RTBT SB TGT_TPS:CAB5503B	19 COND # 12	TPS - Channel 2
8800F05	F05	Tgt Bldg Cnt Rm TA-B112, TPS1 CAB5500A	FE TPS CABINET TGT_TPS:CAB5502A	19 COND # 12	TPS - Channel 1
8800F06	F06	Tgt Bldg Ser Gal TA-112, TPS2 CAB5500B	Klystron Gallery TPS CABINET TGT_TPS:CAB5502B	19 COND # 12	TPS - Channel 2
8800F07	F07	Tgt Bldg Cnt Rm TA-B112, TPS1 CAB5500A	Target Control Rm in CLO, TGT_TPS:CAB5501A	8 pr # 16	TPS - Channel 1
8800F08	F08	Tgt Bldg Ser Gal TA-112, TPS2 CAB5500B	Target Control Rm in CLO, TGT_TPS:CAB5501B	8 pr # 16	TPS - Channel 2
8800F09	F09	Target Control Rm in CLO, TGT_TPS:CAB5501A	RTBT SB TGT_TPS:CAB5503A	19 COND # 12	TPS - Channel 1
8800F10	F10	Target Control Rm in CLO, TGT_TPS:CAB5501B	RTBT SB TGT_TPS:CAB5503B	19 COND # 12	TPS - Channel 2
8800F11	F11	Target Control Rm in CLO, TGT_TPS:CAB5501A	FE TPS CABINET TGT_TPS:CAB5502A	19 COND # 12	TPS - Channel 1
8800F12	F12	Target Control Rm in CLO, TGT_TPS:CAB5501B	Klystron Gallery TPS CABINET TGT_TPS:CAB5502B	19 COND # 12	TPS - Channel 2
8800H01	H01	Tgt Bldg Cnt Rm TA-B112, TGT_CTL:CAB8920A	Target Control Rm in CLO, TGT_CTL:CAB8921A	RG6 Coax	NFSS - Cnet
8800H02	H02	Tgt Bldg Cnt Rm TA-B112, TGT_CTL:CAB8920B	Target Control Rm in CLO, TGT_CTL:CAB8921B	RG6 Coax	NFSS - Cnet
8800L01	L01	FE fire riser rm FE-103, FPS Patch Panel FA_FE:PL103A	CHL/RF comm rm CY-125, FPS Patch Panel FA_CY:PL125A	6mm,6sm	FPS

**Appendix 2, Cable Number and Routing Listing**

CableNo	Drawing Symbol	From Loc	To Loc	Cable Type	Service
8800L02	L02	FE fire riser rm FE-103, FPS Patch Panel FA_FE:PL03A	CUB riser rm, FPS Patch Panel FA_CU:PL104A	6mm,6sm	FPS
8800L03	L03	CHL/RF comm rm CY-125, FPS Patch Panel FA_CY:PL125A	Kly comm rm 6, FPS Patch Panel FA_KL:PL139A	6mm,6sm	FPS
8800L04	L04	Kly comm rm 6, FPS Patch Panel FA_KL:PL139A	HEBT SB comm rm HS-104, FPS Patch Panel FA_HS:PL104A	6mm,6sm	FPS
8800L05	L05	HEBT SB comm rm HS-104, FPS Patch Panel FA_HS:PL104A	RING SB comm rm RN-307, FPS Patch Panel FA_RN:PL307A	6mm,6sm	FPS
8800L06	L06	RING SB comm, FPS Patch Panel FA_RN:PL307A	RTBT SB comm rm RS-302, FPS Patch Panel FA_RS:PL302A	6mm,6sm	FPS
8800L07	L07	RTBT SB comm rm RS-302, FPS Patch Panel FA_RS:PL302A	Tgt Bldg comm rm TA103, FPS Patch Panel FA_TA:PL103A	6mm,6sm	FPS
8800L08	L08	Tgt Bldg comm rm TA-103, FPS Patch Panel FA_TA:PL103A	CER in CLO, FPS Patch Panel FA_CL:PLCERA	6mm,6sm	FPS
8800L09	L09	CER in CLO, FPS Patch Panel FA_CL:PLCERA	CUB riser rm, FPS Patch Panel FA_CU:PL104A	6mm,6sm	FPS
8800L10	L10	CER in CLO, FPS Patch Panel FA_CL:PLCERA	CLO - Qwest Demark, FPS Patch Panel FA_CL:PL223A	6mm,6sm	FPS
8800L11	L11	CLO - Qwest Demark, FPS Patch Panel FA_CL:PL223A	CER in CLO, FPS Patch Panel FA_CL:PLCERA	6mm,6sm	FPS
8800L14	L14	TVA Switchgear	CUB comm rm.	Copper	TVA SH F/A Devices
8800L15	L15	Central Exhaust	Ring SB comm rm.	Copper	CE H/A Devices
8800L16	L16	Water Tower	Ring SB comm rm.	Copper	WT F/A Devices
8800L17	L17	Injection Dump	Ring SB comm rm.	Copper	ID F/A Devices
8800L18	L18	West MAU	Ring SB comm rm.	Copper	Ring West MAU F/A Devices
8800L19	L19	East MAU	Ring SB comm rm.	Copper	Ring East MAU F/A Devices
8800L20	L20****	Compressor Building	TA-218 in Tgt Building	Copper	Compressor Bldg. F/A Devices
8800M01	M01	CUB comm rm CU 102	CF_CU:ENCL02 at cooling tower	RG6 Coax	CF Controls - Cnet
8800M02	M02	TVA Switch House, Bldg 8912	CUB comm rm CU 102, CF_ICS:CUCR_CAB01	cat5e	CF Controls
8800M03	M03	TVA Switch House, Bldg 8912	CUB comm rm CU 102, CF_ICS:CUCR_CAB01	cat5e	Global Controls - Office Network
8800M04	M04	Deleted			
8800M05	M05	CF_RN:ENCL01 in Ring SB	CF_RG:ENCL01 in West MUA Bldg 8413	RG6 Coax	CF Controls - Cnet
8800M06	M06	FE comm rm FE-105	Grinder Pump Sta	5 pr #16	CF Controls
8800M07	M07	CF_RG:ENCL02 in East MUA Bldg 8423	H2O Booster Sta Cabinet CF_ST:ENCL02	RG6 Coax	CF Controls - Cnet
8800M08	M08	HEBT SB comm rm HS-104, CF HEBT_ICS:PL0201/02	CF_ST:ENCL01 in Central Exhaust Building	6mm,6sm	CF Controls - Cnet
8800M09	M09	FE Unit Substation SS1	KL Unit Substation SS1	Blue Hose	Power Monitoring

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800M10	M10	CH Unit Substation SS4	KL #6 Comm Room EMINT	Blue Hose	Power Monitoring
8800M11	M11	KL Unit Substation SS1	KL Unit Substation SS2	Blue Hose	Power Monitoring
8800M12	M12	KL Unit Substation SS2	KL Unit Substation SS3	Blue Hose	Power Monitoring
8800M13	M13	KL Unit Substation SS3	KL Unit Substation SS4	Blue Hose	Power Monitoring
8800M14	M14	KL Unit Substation SS4	KL #6 Comm Room EMINT	Blue Hose	Power Monitoring
8800M15	M15	HE Unit Substation SS1	KL #6 Comm Room EMINT	Blue Hose	Power Monitoring
8800M16	M16	RT Unit Substation SS1	TA Unit Substation SS4	Blue Hose	Power Monitoring
8800M17	M17	RN Unit Substation SS3	RN Unit Substation SS2	Blue Hose	Power Monitoring
8800M18	M18	RN Unit Substation SS2	RN Unit Substation SS1	Blue Hose	Power Monitoring
8800M19	M19	RN Unit Substation SS1	RN Unit Substation SS4	Blue Hose	Power Monitoring
8800M20	M20	RN Unit Substation SS4	Ring Service Comm Room EMINT	Blue Hose	Power Monitoring
8800M21	M21	CH Unit Substation SS2	CH Unit Substation SS1	Blue Hose	Power Monitoring
8800M22	M22	CH Unit Substation SS1	CH Unit Substation SS4	Blue Hose	Power Monitoring
8800M23	M23	CH Unit Substation SS3	KL #6 Comm Room EMINT	Blue Hose	Power Monitoring
8800M24	M24	TA Unit Substation SS1	Target Comm Room EMINT	Blue Hose	Power Monitoring
8800M25	M25	TA Unit Substation SS3	Target Comm Room EMINT	Blue Hose	Power Monitoring
8800M26	M26	TA Unit Substation SS4	TA Unit Substation SS1	Blue Hose	Power Monitoring
8800M27	M27	CF_ID:ENCL01 in Injection Dump bldg	CF_RG:ENCL01 in West MUA Bldg 8413	RG6 Coax	CF Controls - Cnet
8800M28	M28	CF_RN:ENCL01 in Ring SB	CF_RG:ENCL02 in East MUA Bldg 8423	RG6 Coax	CF Controls - Cnet
8800M29	M29	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Flow Transmitter in Grid H5	3 twpr #18SH	CF Controls
8800M30	M30	Ring West Makeup Air Bldg 8413 CF_RG:ENCL01	Pressure Xmitter @ Base of Water Tank	3 twpr #18SH	CF Controls
8800M31	M31	CF_RN:ENCL01 in Ring SB	CF_RN:TAP07 in West MUA Bldg 8413	Dnet Thick	CF Controls - Dnet
8800M32	M32	CF_RN:TAP07 in West MUA Bldg 8413	CF_RN:TAP08 in Ring Injection Dump Bldg	Dnet Thick	CF Controls - Dnet
8800M33	M33	CF_RN:TAP05 in Ring SB	CF_RN:TAP06 in East MUA Bldg 8423	Dnet Thick	CF Controls - Dnet
8800M34	M34	CU Unit Substation SS4	CU Unit Substation SS1	Blue Hose	Power Monitoring
8800M35	M35	CU Unit Substation SS1	CU Unit Substation SS2	Blue Hose	Power Monitoring
8800M36	M36	CU Unit Substation SS2	CU Unit Substation SS3	Blue Hose	Power Monitoring
8800M37	M37	CU Unit Substation SS3	CUB Comm Room EMINT	Blue Hose	Power Monitoring
8800M38	M38	TVA Main Substation	CU Unit Substation SS3	Blue Hose	Power Monitoring
8800M39	M39	CL Unit Substation SS3	CL Unit Substation SS2	Blue Hose	Power Monitoring
8800M40	M40	CL Unit Substation SS2	CL Unit Substation SS1	Blue Hose	Power Monitoring
8800M41	M41	CL Unit Substation SS1	CLO Main Equip Room EMINT	Blue Hose	Power Monitoring
8800M42	M42	CF_CU:ENCL01 in CUB	CF_CU:TAP11 IN COOLING TOWER ELECTRICAL EQUIP SHED	Dnet Thick	CF Controls - Dnet
8800M43	M43	CF_CU:CHILLER	CF_ST:ENCL03 (Bldg 8917)	RG6 Coax	CF Controls - Cnet
8800M44	M44	CF_CU:TAP10 in CUB	PW-MS-01 (Bldg 8917)	Dnet Thick	CF Controls - Dnet
8800M45	M45	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M46	M46	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls

**Appendix 2, Cable Number and Routing Listing**

<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800M47	M47	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M48	M48	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M49	M49	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M50	M50	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M51	M51	CF_CU:ENCL01 in CUB	Site Sanitary Sewer Pump Station Panel in Grid H5	1 pr # 16	CF Controls
8800M52	M52	KL ASD TECHNICAL EQUIPMENT HEBT-ME9	HE UNIT SUBSTATION SS1	Blue Hose	Power Monitoring
8800M53	M53	KL ASD TECHNICAL EQUIPMENT DTL-ME1	KL ASD TECHNICAL EQUIPMENT DTL-ME2	Blue Hose	Power Monitoring
8800M54	M54	KL ASD TECHNICAL EQUIPMENT DTL-ME2	KL #1 COMM RM, EMINT	Blue Hose	Power Monitoring
8800M55	M55	KL #1 COMM RM, EMINT	KL ASD TECHNICAL EQUIPMENT DTL-ME3	Blue Hose	Power Monitoring
8800M56	M56	KL ASD TECHNICAL EQUIPMENT CCL-ME1	KL ASD TECHNICAL EQUIPMENT CCL-ME2	Blue Hose	Power Monitoring
8800M57	M57	KL ASD TECHNICAL EQUIPMENT CCL-ME2	KL ASD TECHNICAL EQUIPMENT CCL-ME3	Blue Hose	Power Monitoring
8800M58	M58	KL ASD TECHNICAL EQUIPMENT CCL-ME3	KL ASD TECHNICAL EQUIPMENT CCL-ME4	Blue Hose	Power Monitoring
8800M59	M59	KL ASD TECHNICAL EQUIPMENT CCL-ME4	KL ASD TECHNICAL EQUIPMENT SCL-ME1	Blue Hose	Power Monitoring
8800M60	M60	KL ASD TECHNICAL EQUIPMENT SCL-ME1	KL #3 COMM RM, EMINT	Blue Hose	Power Monitoring
8800M61	M61	KL #3 COMM RM, EMINT	KL ASD TECHNICAL EQUIPMENT SCL-ME2	Blue Hose	Power Monitoring
8800M62	M62	KL ASD TECHNICAL EQUIPMENT SCL-ME2	KL ASD TECHNICAL EQUIPMENT SCL-ME3	Blue Hose	Power Monitoring
8800M63	M63	KL ASD TECHNICAL EQUIPMENT SCL-ME4	KL ASD TECHNICAL EQUIPMENT SCL-ME5	Blue Hose	Power Monitoring
8800M64	M64	KL ASD TECHNICAL EQUIPMENT SCL-ME5	KL ASD TECHNICAL EQUIPMENT SCL-ME6	Blue Hose	Power Monitoring
8800M65	M65	KL ASD TECHNICAL EQUIPMENT SCL-ME6	KL ASD TECHNICAL EQUIPMENT SCL-ME7	Blue Hose	Power Monitoring
8800M66	M66	KL ASD TECHNICAL EQUIPMENT SCL-ME7	KL #5 COMM RM, EMINT	Blue Hose	Power Monitoring
8800M67	M67	KL #5 COMM RM, EMINT	KL ASD TECHNICAL EQUIPMENT SCL-ME8	Blue Hose	Power Monitoring
8800M68	M68	RN UNIT SUBSTATION SS6	Ring Service Comm Room, EMINT	Blue Hose	Power Monitoring
8800M69	M69	CH UNIT SUBSTATION SS3	KL TEST PATCH PANEL	Blue Hose	Power Monitoring
8800P01	P01	Kly comm rm 6	HEBT SB comm rm HS-104	Cu,50pr	Telephone
8800P02	P02	RING SB comm rm RN-307	INJ DUMP	Cu,25pr	Telephone
8800P03	P03	RING SB comm rm RN-307	Central Exhaust Facility	Cu,25pr	Telephone
8800P04	P04	RING SB comm rm RN-307	RTBT SB comm rm RS-302	Cu,25pr	Telephone
8800P05	P05	RING SB comm rm RN-307	H2O Tower	Cu,25pr	Telephone
8800P06	P06	CUB comm rm CU 102	Primary Substation	Cu,25pr	Telephone
8800P07	P07	KL Comm room 6	CHL/RF comm rm CY-125	Cu,50pr	Telephone

**Appendix 2, Cable Number and Routing Listing**

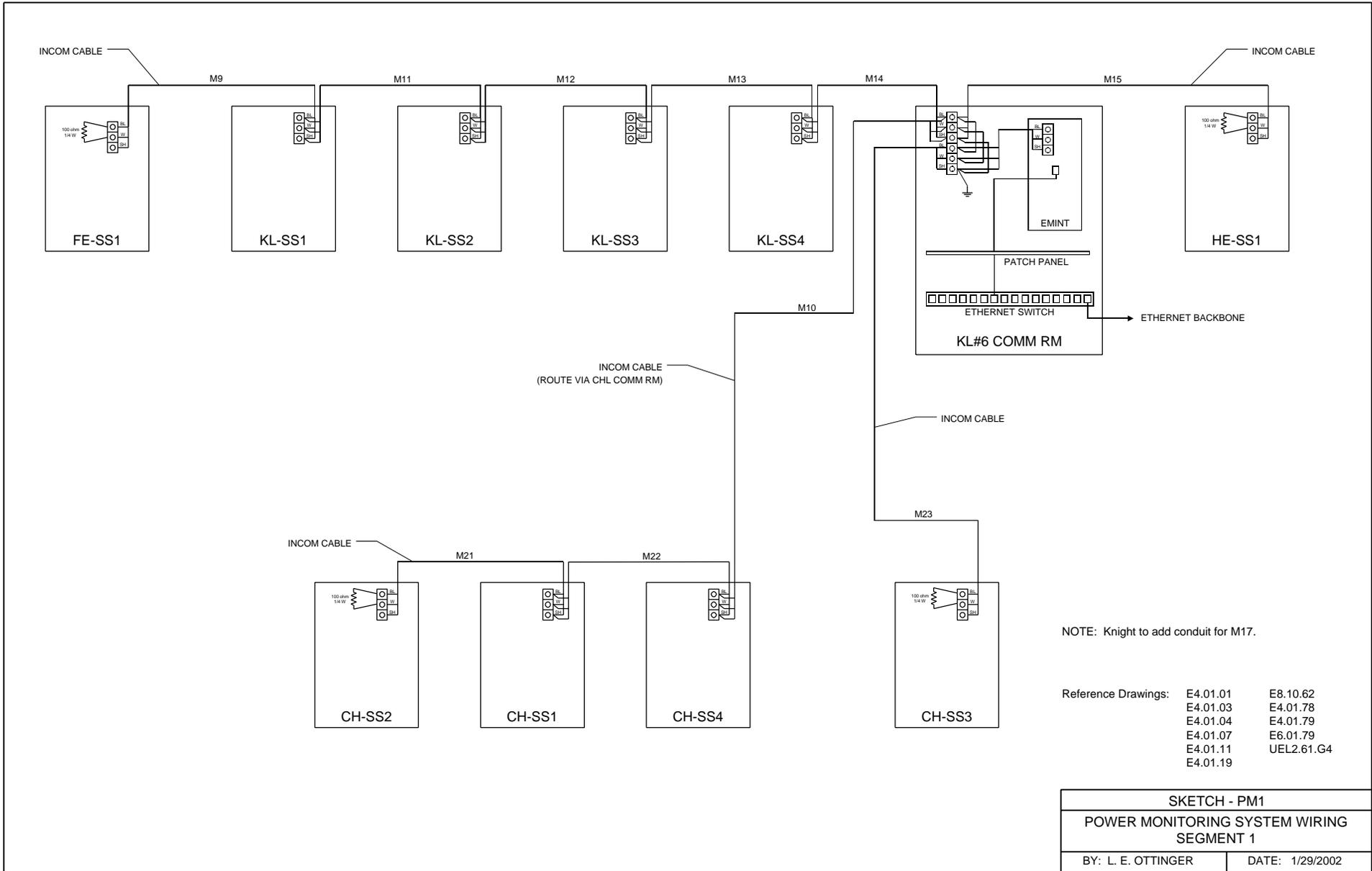
<b>CableNo</b>	<b>Drawing Symbol</b>	<b>From Loc</b>	<b>To Loc</b>	<b>Cable Type</b>	<b>Service</b>
8800P08	P08	KL Comm room 6	CUB comm rm CU 102	Cu,50pr	Telephone
8800P09	P09	Man Hole #15***	Tgt Bldg comm rm TA103	Cu, 300 pr	Telephone
8800P10	P10	KL Comm room 6	Man Hole #15***	Cu, 300 pr	Telephone
8800P11	P11	Tgt Bldg comm rm TA103	Target TA-B110	Cu, 100 pr	Telephone
8800P12	P12	Man Hole #15***	RING SB comm. Rm RN-307	Cu, 300 pr	Telephone
8800P13	P13	RING SB comm rm RN-307	H2O Booster Sta	Cu,6pr	Telephone
8800P14	P14	FE-105 COMM. ROOM	Kly comm rm 1	Cu,100 pr	Telephone
8800P15	P15	Kly comm rm 1	Kly comm rm 2	Cu,100 pr	Telephone
8800P16	P16	Kly comm rm 2	Kly comm rm 3	Cu, 200 pr	Telephone
8800P17	P17	Kly comm rm 3	Kly comm rm 4	Cu, 200 pr	Telephone
8800P18	P18	Kly comm rm 4	Kly comm rm 5	Cu, 300 pr	Telephone
8800P19	P19	Kly comm rm 5	Kly comm rm 6	Cu, 300 pr	Telephone
8800P20	P20	Man Hole #15***	CLO/Demark	Cu, 300 pr	Telephone
8800P21	P21	Man Hole #15***	CLO/Demark	Cu, 300 pr	Telephone
8800P22	P22	Man Hole #15***	CLO/Demark	Cu, 300 pr	Telephone

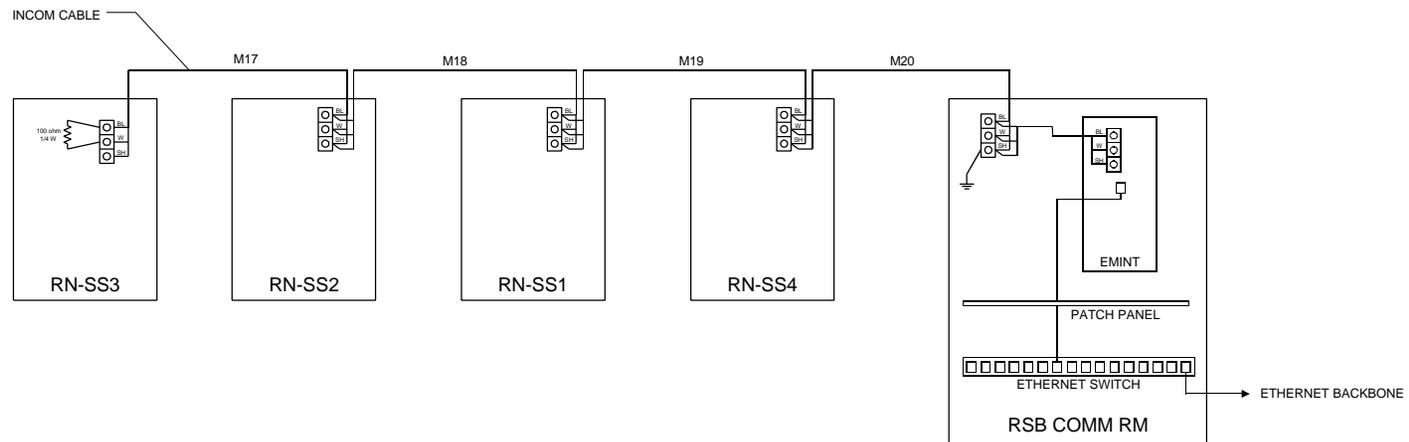
\* These cables were installed by others and are no longer a part of the backbone package.

\*\* Patch panel should have 48 connectors, not 24.

\*\*\* Termination equipment is required in the man hole.

\*\*\*\* L20 does not use duct banks and is thus deleted from the backbone package

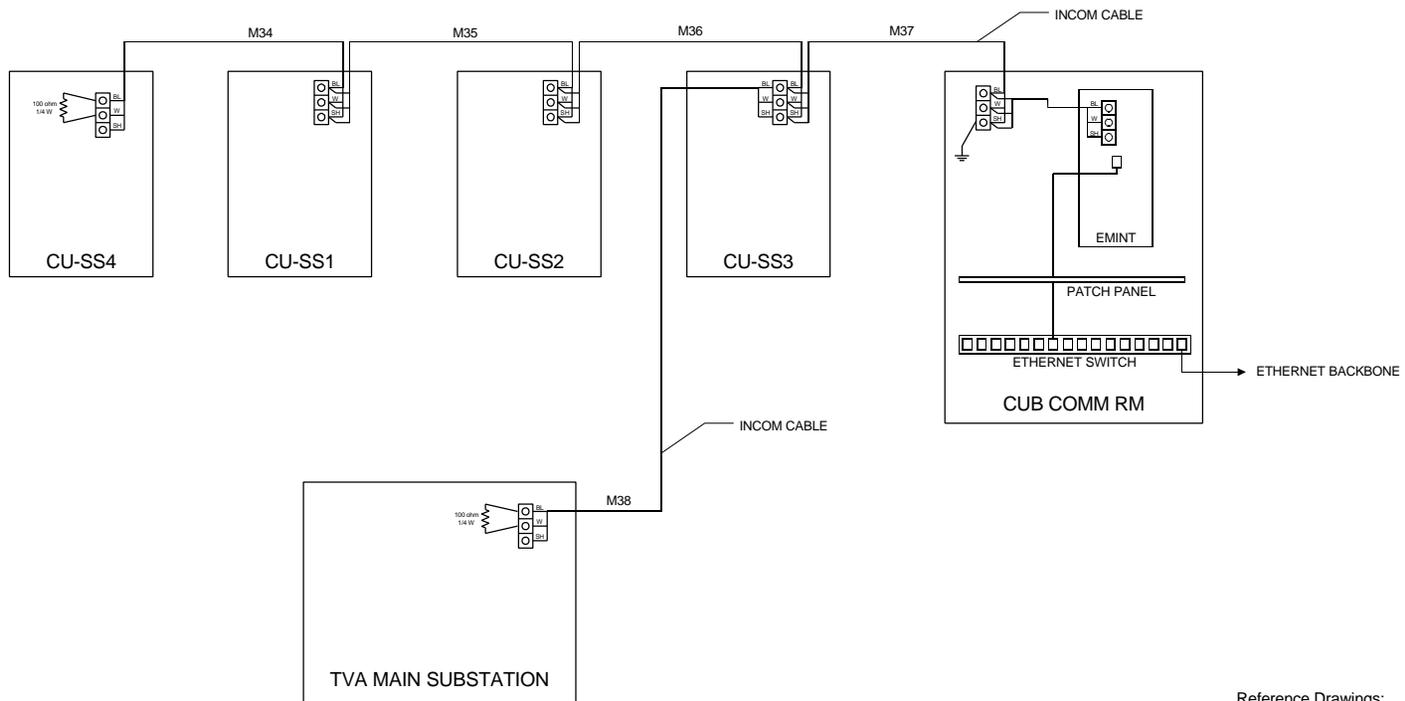




NOTE: Knight to add conduits for M19 - M22.

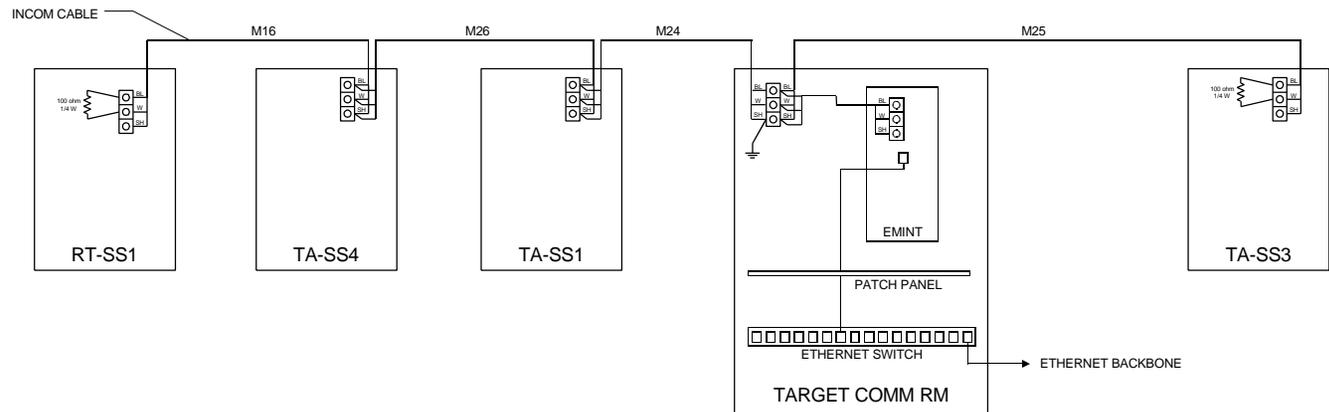
Reference Drawings: E4.03.31

SKETCH - PM2	
POWER MONITORING SYSTEM WIRING SEGMENT 2	
BY: L. E. OTTINGER	DATE: 1/29/2002



Reference Drawings: E4.01.75  
UEL2.61.G4

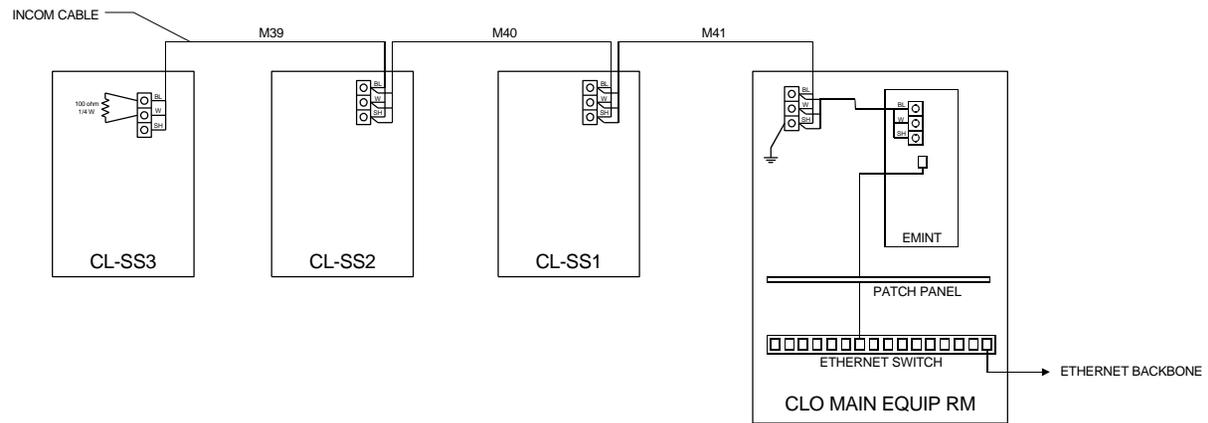
SKETCH - PM3	
POWER MONITORING SYSTEM WIRING SEGMENT 3	
BY: L. E. OTTINGER	DATE: 1/29/2002



NOTE: Knight to add conduit for M28.

Reference Drawings: E4.03.36  
 E4.02.51  
 E4.02.41  
 E4.01.49

SKETCH - PM4	
POWER MONITORING SYSTEM WIRING SEGMENT 4	
BY: L. E. OTTINGER	DATE: 1/29/2002



Reference Drawings: E4.01.64  
E4.B2.62

SKETCH - PM5	
POWER MONITORING SYSTEM WIRING SEGMENT 5	
BY: L. E. OTTINGER	DATE: 1/29/2002