NOvA Project Description: **02-10-2012**

Provide parallel control system for the Minos Experimental Hall.

The new system needs to be completed & operational no later than March Thirty One to allow approximately three weeks run time of the existing and new system together before the May shutdown.

Duplicating the existing system requires support fabrication & installation, conduit installation, fiber optic cable installation & terminations, phone cable installation & terminations and the coax cable installation & terminations.

Coax and phone terminations will be done by in-house personnel.

Fiber optic cable terminations will be done by a contractor under the direction of Computer Division personnel.

This project **requires 1 ea. 3" rigid steel conduit** (~ 85 lbs per length) at approximately four hundred feet to be installed. The single conduit will be utilized to install the confirmed cable pull list. Installing additional cable into an existing near-full conduit is difficult at best and can be near impossible depending on the twist of the cable, length of conduit and percentage of fill. Risk of damaging existing cable with an additional pull is very likely and would be devastating to the timing/control cable. **No spare conduit in this project scope.**

The conduit installation will begin @ the control cable pull box @ the base of the elevator shaft and positioned on the West side. Conduit will be installed up to the crown and across to the East side. Crossing West-East will require trapeze type support similar to the existing supports @ the power pull box from West-East.

The control conduit installation will proceed downstream above the life safety walkway and will require fabrication and installation of approximately thirty supports along the corridor. There is no typical related to these supports. Each support will be a custom support related to the variations in obstacles and elevation required. NOvA's construction project will include power distribution conduits to be layered over the top of the control conduit resulting in no change related to the support fabrication & installation of the racks. The control conduit requires multiple bends to accomplish the installation.

The downstream end (Minos Detector Hall) requires installing the conduit to elevation of the crown, cross the Hall East-West and down to the tray elevation on the West side to allow the cable to reach their intended destination(s) resulting in additional custom supports related to the walls & ceiling area(s).

Top of the Life Safety Passageway (conduit route) is very congested and requires fall protection, staging and installation of supports and conduit.

Method of access to the Minos Detector Hall crown has not been approved at this point. Expectation is to be able to utilize the Minos Detector Hall crane as a work platform. If this does not prove to be the case - - - support and conduit installation will be done from an articulating arm lift - - - requires a bit more time. A walk through this area to make the determination with the PPD-SSO is scheduled Wednesday (02-01-2012). Any interested parties are welcome to accompany this exercise.

Single mode fiber is estimated @ ~ 1.00/ft. Multi mode fiber is estimated @ ~ $ 2.25/ft.

Fiber pull(s) originating in the Minos Service Building Relay racks with the Minos Detector Hall Relay Rack destination requires support in the j-box mounted in the crane shaft to prevent cable falling to the bottom - - - working in the shaft requires Fermi crane operator working with the installation crew.

Regards,

Dwight

Project Time Sequence:

Week # 1	**2_man crew**	**Supports**
Week # 2	**2_man crew**	**Supports**
	2_man crew	**Conduit**
Week # 3	**2_man crew**	**Supports**
	2_man crew	**Conduit**
Week # 4	**2_man crew**	**Supports**
	2_man crew	**Conduit**
Week # 5	**2_man crew**	**Cable & demobilization**
	2_man crew	**Cable & demobilization**

Fiber Pull List at this point:

Karen Kephart / Mike Lindgren:

Singlemode Fiber Optic (~ 1100 feet) (Spare- Future)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Mulitmode Fiber Optic (~ 1100 feet) (Spare- Future)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Phil Adamson / Rob Plunkett:

Single Mode Fiber Optic (1 @ ~ 1100 feet) (GPS & TOF)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks

Greg Vogel / Dan Stenman:

Singlemode Fiber Optic (1 @ ~ 1100 feet) (Timing)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks

Mulitmode Fiber Optic (1 @ ~ 1100 feet) (Timing)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks

Singlemode Fiber Optic (1 @ ~ 1325 feet) (Timing)
Origin: Minos Detector Hall Relay Racks
Destination: Absorber Hall Relay Racks

Mulitmode Fiber Optic (1 @ ~ 1325 feet) (Timing)
Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks

Andrew Norman / NOvA

Singlemode Fiber Optic (1 @ ~ 1500 feet) (NOvA Requirements)
Origin: Minos Service Building Relay Racks
Destination: NOvA Near Detector Hall Relay Racks

Singlemode Fiber Optic (1 @ ~ 1100 feet) (NOvA Requirements)
Origin: Minos Service Building Relay Racks
Destination: Future NOvA Cavern

Measurements & Lengths:

Minos Service Building Relay Racks to Crane Shaft J-Box:	500 feet
Minos Detector Hall Relay Racks to Crane Shaft J-Box	600 feet
Minos Detector Hall Relay Racks to Absorber Hall Relay Racks	725 feet

Additional Pull List at this point:

Nan Larson / Telecom:

1_ea 25-pair phone trunk line
Origin: Crane Shaft Terminal Board
Destination: Minos Detector Hall Terminal Board

Tim Cunneen / PPD Electrical Dept:

6_ea RG-59
Origin: Crane Shaft Control Pull Box
Destination: Minos Detector Hall Relay Rack

Note of Caution:
Pull List may not be complete at this point ! !

NOvA Cost Estimate: 02-10-2012

Conduit & Cable Installation:

3" Rigid Conduit(purchase): (~ 400 feet @ ~ $ 10.00/foot / conduit quotes vary daily/weekly)		~ $ 4.0 K
Galvanized Strut(purchase): (~ 1,000 feet @ ~ $ 5.50/foot / strut quotes vary daily)	(Same as original)	~ $ 6.0 K
Strut Hardware(purchase): (Hilti anchors / 1/2 " rod / bolts / washers / strut fittings)		~ $ 4.9 K
Lift Rental(work @ elevation)):	(Same as original)	~ $ 6.0 K
Conduit Equipment Rental: (one shot bender / pipe threading machine / oiler / band saw)	(Same as original)	~ $ 5.0 K
Porta-Potty Rental:	(Same as original)	~ $ 0.2 K
Labor:		~ $ 82.0 K
	T&M Contractor Total:	~ $ 108.1 K
	Cable & Terms:	~ $ 24.3 K
	Project Total:	~ $ 132.4 K

Week # 1	2_man crew	Supports	~ $ 10.0 K
Week # 2	2_man crew	Supports	~ $ 10.0 K
	2_man crew	Conduit	~ $ 10.0 K
Week # 3	2_man crew	Supports	~ $ 10.0 K
	2_man crew	Conduit	~ $ 10.0 K
Week # 4	2_man crew	Supports	~ $ 10.0 K
	2_man crew	Conduit	~ $ 10.0 K
Week # 5	2_man crew	Cable & demobilization	~ $ 6.0 K
	2_man crew	Cable & demobilization	~ $ 6.0 K

Cable Purchase & Terms:

Fiber Optic Cable(purchase): (~ 7300 ' singlemode @ ~ $ 1.00/ft) (~ 5000 ' mulitmode @ ~ $ 2.25/ft)	~ $	18.6 K
Fiber Optic Terminations: (Contractor Personnel)	~ $	4.0 K
Phone Cable: (~ 1,000 feet @ ~ $ 0.70/foot)	~ $	.7 K
RG-59 Cable: (~ 3,000 feet @ ~ $ 0.34/foot)	~ $	1.0 K
Cable Purchase & Contractor Related Terminations Total:	~ $	24.3 K

NOvA Near Detector Hall Site Prep: **02-10-2012**

Karen Kephart / Mike Lindgren:

Singlemode Fiber Optic (~ 1100 feet)
(Spare- Future)

Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Mulitmode Fiber Optic (~ 1100 feet)
(Spare- Future)

Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Phil Adamson / Rob Plunkett:

Single Mode Fiber Optic (~ 1100 feet)
(GPS & TOF)

Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Greg Vogel / Dan Stenman

Singlemode Fiber Optic (~ 1100 feet)
(Timing)

Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Mulitmode Fiber Optic (~ 1100 feet)
(Timing)

Origin: Minos Service Building Relay Racks
Destination: Minos Detector Hall Relay Racks
(1 cable)

Singlemode Fiber Optic (~ 1325 feet)
(Timing)

Origin: Minos Detector Hall Relay Racks
Destination: Absorber Hall Relay Racks
(1 cable)

Mulitmode Fiber Optic (~ 1325 feet)
(Timing)

Origin: Minos Detector Hall Relay Racks
Destination: Absorber Hall Relay Racks
(1 cable)

Andrew Norman / NOvA

Singlemode Fiber Optic (~ 1500 feet)
(NOvA Requirements)

Origin: Minos Service Building Relay Racks
Destination: NOvA Near Detector Hall Relay Racks
(1 cable)

Singlemode Fiber Optic (~ 1100 feet)
(NOvA Requirements)

Origin: Minos Service Building Relay Racks
Destination: Future US NOvA Cavern
(1 cable)

Tim Cunneen (PPD Electrical Dept):

RG-59 (~ 600 feet)
(TV)

Origin: Crane Shaft Control Pull-Box
Destination: Minos Detector Hall Relay Racks
(5 cables)

Nan Larson (Telecom):

25_pr trunkline (~ 600 feet)
(Communication - phones)

Origin: Crane Shaft Control Pull-Box
Destination: Minos Detector Hall Relay Racks
(1 cable)

Measurements & Lengths:

Minos Service Building Relay Racks to Crane Shaft J-Box:	500 feet
Minos Detector Hall Relay Racks to Crane Shaft J-Box	600 feet
Minos Detector Hall Relay Racks to Absorber Hall Relay Racks	725 feet

Singlemode Cable:	Multimode Cable:
7225 feet (2ea - 5000' reels)	3525 feet (1ea - 5000' reel)

Notes & Points of Interest:

Chuck Andrews / Orlando Colon needs will be tagged onto the AD control cable. No additional cable required for CD.

RG-8(2) High Voltage Cable were never utilized(or terminated on either end) - - passes through the crane shaft control pull box - - will be eliminated on the replacement pull. The RG-8 will be pulled back and terminated on a patch panel to be fabricated & installed in the crane shaft control pull box by Mike Matulik staff.

RG-8(1) Signal Cable was never utilized(or terminated on either end). Cable is cut at the crane shaft control pull box. This cable will be eliminated on the replacement pull. The RG-8 will be pulled back and terminated on a patch panel to be fabricated & installed in the crane shaft control pull box by Mike Matulik staff.

RG-58 High Voltage Cable(bundle of 10) was never (or terminated on either end) - - passes through the crane shaft control pull box - - will be eliminated on the replacement pull. The RG-8 will be pulled back and terminated on a patch panel to be fabricated & installed in the crane shaft control pull box by Mike Matulik staff.

Existing fiber optic cable terminating in the Minos Detector Hall Relay Racks will not be cut. They will be pulled back to the crane shaft junction box - - - coiled and bagged and saved for future utilization of the need arises.