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Proposed Metering and Instrumentation Monitoring and Analysis Plan and Budget

Alamo Community College District

San Antonio College
St. Phillip's College
Palo Alto College
Southwest College
W. Houston Administration Building
W. Sheridan Administration Building

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Overview

The purpose of this overview is to outline the metering points that will be monitored by the Energy Systems Laboratory (ESL). At three of the campuses, Alamo Community College District (ACCD) has a central energy management system (EMS) installed that has the capability to record energy data. It is ESL's intent to utilize this system to collect data for energy monitoring and commissioning purposes. Since ACCD does not monitor gas consumption, ESL would like to incorporate gas metering into the current EMS. ESL may recommend upgrading some or all of the existing Energy Management System's software and client PC workstations (these hardware/software upgrades are not included in this budget). In order for ESL to link into the existing EMS, it will be necessary to install additional software (PCAnywhere) or equipment (mainly another PC workstation) near the existing EMS computer terminals. ESL would also like Ethernet lines connected to the PC workstation so the system could be accessed via Internet. Software development will be needed to extract and format the existing EMS data sequence, push the data to ESL's network and load it into ESL's databases.

There are three sites, West Houston Administration Building, the West Sheridan Administration Building and St. Phillip's College Southwest campus in which stand alone data loggers will need to be installed because the EMS does not exist. At these sites, it will be necessary for ESL to monitor the whole building electric and the data logger will be accessed via telephone and modem.

The following table is a summary of the metering and instrumentation costs.

Summary	Labor Cost	Equip. Cost	Total Costs
San Antonio College	$ 7,600	$ 4,365	$ 11,965
Palo Alto College	$ 5,600	$ 2,910	$ 8,510
St. Phillip's College	$ 5,600	$ 2,910	$ 8,510
St. Phillip's College Southwest Campus	$ 4,600	$ 6,710	$ 11,310
W. Sheridan Administration Bldg.	$ 1,400	$ 2,280	$ 3,680
W. Houston Administration Bldg.	$ 1,400	$ 2,280	$ 3,680
Site Notebooks/Project Management	$ 11,100	--	$ 11,100
Other expenses (Travel, supplies, etc)	--	$6,200	$ 6,200
EMCS Communication Software development			$25,000
TOTAL:			**$89,955.00**

Monitoring and Analysis Plan

San Antonio College

San Antonio College will be monitored using the existing EMS control system. The CSI InetMax and Johnson Control MetaSystem will be programmed to collect and store data. The points to be metered at San Antonio College are whole campus electric, whole campus gas, thermal plant electric and whole building electric for approximately 15 campus buildings. In order to use the existing control systems, client workstations may have to be upgraded with

newer PC hardware/software and/or EMS software. ESL has to develop software that will interface with the existing system and format the data to integrate into the ESL database. ESL will also need Internet access on the EMS client workstations.

Since gas is not metered by ACCD, ESL will supervise the installation of digital pulse initiators on the gas utility meters. ACCD will be responsible for connecting the signal from the gas pulse initiator to the EMS control box and ESL will add gas channels to the EMS system via software. ESL will verify all EMS meters that are specified as ESL metering points and any problems discovered will be documented and reported to ACCD. ACCD is responsible for the repair, maintenance and replacement of any EMS metering identified by ESL personnel as non-functioning or out of calibration.

The following table is a break down of the labor and equipment costs for San Antonio College.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Campus Electric	Trend two points in the EMS	4	$50	$200	-----	--	$200	
Building's Electri	Trend approximately 15 points in the EMS	30	$50	$1,500	------	--	$1,500	
Plant Electric	Trend two points in the EMS	4	$50	$200	------	--	$200	
Campus Gas	Install gas pulse initiators on three gas meters	32	$50	$1,600	3 gas initiators	$4,365	$5,965	
	Run wire from gas meter and terminate in EMS control bo	--	--	--	signal wire	--	--	YES
	Add three gas points to the EMS	6	$50	$300	------	--	$300	
Verify Existing	Verify 19 ACCD meters and report problems to ACCD	76	$50	$3,800	------	--	$3,800	
ACCD Meters	Repair or replace malfunctioning ACCD meters	--	--	--	as needed	-	--	YES
					TOTAL COST	**$11,965.00**		

Palo Alto College

Palo Alto College will be monitored using the existing EMS control system. The InetMax CSI and Honeywell DeltaNet systems will be programmed to collect and store data. The points to be metered at Palo Alto College are whole campus electric, whole campus gas, thermal plant electric and whole building electric for approximately 10 campus buildings. In order to use the existing control systems, client workstations may have to be upgraded with newer PC hardware/software and/or EMS software. ESL has to develop software that will interface with the existing system and format the data to integrate into the ESL database. ESL will also need Internet access on the EMS client workstations.

Since gas is not metered by ACCD, ESL will supervise the installation of digital pulse initiators on the gas utility meters and ACCD will connect the signal from the gas pulse initiator to the EMS control box. ESL will add gas channels to the EMS system via software. ESL will verify all EMS meters that are specified as ESL metering points and any problems discovered will be documented and reported to ACCD. ACCD is responsible for the repair, maintenance and replacement of any EMS metering identified by ESL personnel as non-functioning or out of calibration.

The following table is a break down of the labor and equipment costs for Palo Alto College.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Campus Electric	Trend two points in the EMS	4	$50	$200	—	–	$200	
Building's Electric	Trend approximately 10 points in the EMS	20	$50	$1,000	—	–	$1,000	
Plant Electric	Trend two points in the EMS	4	$50	$200	—	–	$200	
Campus Gas	Install gas pulse initiators on two gas meters	24	$50	$1,200	2 gas initiators	$2,910	$4,110	
	Run wire from gas meter and terminate in EMS Control Box	–	–	–	signal wire	–	–	YES
	Add two gas points to the EMS program	4	$50	$200	—	–	$200	
Verify Existing ACCD Meters	Verify 14 ACCD meters and report problems to ACCD	56	$50	$2,800	—	–	$2,800	
	Repair or replace malfunctioning ACCD meters	–	–	–	as needed	-	–	YES
					TOTAL COST	**$8,510.00**		

St. Phillip's College

St. Phillip's College will be monitored using the existing EMS control system. The CSI InetMax and Johnson Control MetaSystem will be programmed to collect and store data. The points to be metered at St. Phillip's College are whole campus electric, whole campus gas, thermal plant electric and whole building electric for approximately 10 campus buildings. In order to use the existing control systems, client workstations may have to be upgraded with newer PC hardware/software and/or EMS software. ESL has to develop software that will interface with the existing system and format the data to integrate into the ESL database. ESL will also need Internet access on the EMS client workstations.

Since gas is not metered by ACCD, ESL will supervise the installation of digital pulse initiators on the gas utility meters and ACCD will connect the signal from the gas pulse initiator to the EMS control box. ESL will add gas channels to the EMS system via software. ESL will verify all EMS meters that are specified as ESL metering points and any problems discovered will be documented and reported to ACCD. ACCD is responsible for the repair, maintenance and replacement of any EMS metering identified by ESL personnel as non-functioning or out of calibration.

The following table is a break down of the labor and equipment costs for St. Phillip's College.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Campus Electric	Trend two points in the EMS	4	$50	$200	—	–	$200	
Building's Electric	Trend approximately 10 points in the EMS	20	$50	$1,000	—	–	$1,000	
Plant Electric	Trend two points in the EMS	4	$50	$200	—	–	$200	
Campus Gas	Install gas pulse initiators on two gas meters	24	$50	$1,200	2 gas initiators	$2,910	$4,110	
	Run wire from gas meter and terminate in EMS Control Box	–	–	–	signal wire	–	–	YES
	Add two gas points to the EMS program	4	$50	$200	—	–	$200	
Verify Existing ACCD Meters	Verify 14 ACCD meters and report problems to ACCD	56	$50	$2,800	—	–	$2,800	
	Repair or replace malfunctioning ACCD meters	–	–	–	as needed	-	–	YES
					TOTAL COST	**$8,510.00**		

St. Phillip's College Southwest Campus

ESL will install a data acquisition system (DAS) to monitor the St. Phillip's Southwest Campus. The points to be metered at the Southwest Campus are whole campus electric, buildings 3004, 3008 and 3020. Whole building electric will be monitored with the installation of CTs, PTs and watt-hour transducers. A pulse initiator will be installed on the utility electric meter to monitor the whole campus electric. The DAS will be remotely accessed via modem. ACCD will provide a telephone line to the DAS and will be responsible to maintain the telephone line. Natural gas consumption will be monitored through utility bill analysis.

The following table is a break down of the labor and equipment costs for St. Phillip's Southwest College.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Campus Electric	Install Electric Pulse Initiator on utility mete	8	$50	$400	pulse initiator	$690	$1,090	
	Install Signal Wire from Pulse Initiator to DAS	16	$50	$800	signal wire	$145	$945	
Building's Electric	Install CTs and PTs in Building 3020	8	$50	$400	CTs and PTs	$600	$1,000	
	Install CTs and PTs in Transformer for Buildings	16	$50	$800	CTs and PTs	$1,200	$2,000	
	Install Veris Watt Hour Transducer	16	$50	$800	2 Veris meters	$2,330	$3,130	
	Run wire from meters and terminate in DAS	24	$50	$1,200	signal wire	$300	$1,500	
Communication System	Install Data Logger	4	$50	$200	DAS	$1,445	$1,645	
	Install phone line to data logger	--	--	--	-	-	-	YES
	Monthly phone line fees	--	--	--	-	-	-	YES
					TOTAL COST	$11,310.00		

West Sheridan Administration Building

ESL will install a data acquisition system (DAS) to monitor the West Sheridan Administration Building. A pulse initiator will be installed on the utility electric meter, which will monitor the whole building electric. The DAS will be remotely accessed via modem. ACCD will provide a telephone line to the DAS and will be responsible to maintain the telephone line. Natural gas consumption will be monitored through utility bill analysis.

The following table is a break down of the labor and equipment costs for West Sheridan Administration Building.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Building Electric	Install Electric Pulse Initiator on utility meter	8	$50	$400	pulse initiator	$690	$1,090	
	Install Signal Wire from Pulse Initiator to DAS	16	$50	$800	signal wire	$145	$945	
Communication System	Install Data Logger	4	$50	$200	DAS	$1,445	$1,645	
	Install phone line to data logger	–	–	–	-	-	-	YES
	Monthly phone line fees	–	–	–	-	-	-	YES
					TOTAL COST	$3,680.00		

West Houston Administration Building

ESL will install a data acquisition system (DAS) to monitor the West Houston Administration Building. A pulse initiator will be installed on the utility electric meter, which will monitor the whole building electric. The DAS will be remotely accessed via modem. ACCD will provide a telephone line to the DAS and will be responsible to maintain the telephone line.

The following table is a break down of the labor and equipment costs for West Houston Administration Building.

Metering Point	Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Building Electric	Install Electric Pulse Initiator on utility meter	8	$50	$400	pulse initiator	$690	$1,090	
	Install Signal Wire from Pulse Initiator to DAS	16	$50	$800	signal wire	$145	$945	
Communication System	Install Data Logger	4	$50	$200	DAS	$1,445	$1,645	
	Install phone line to data logger	–	–	–	-	-	-	YES
	Monthly phone line fees	–	–	–	-	-	-	YES
					TOTAL COST	**$3,680.00**		

Other Labor Expenses:

Task	Quantity	Rate	Total
Developing Metering Notebooks for each Site	126 hours	$50 /hr	$6,300
Project Management	60 hours	$80 /hr	$4,800
	TOTAL:		**$11,100.00**

Other Expenses:

Task	Quantity	Rate	Total
Travel expense: automobile	35 days	$52 /day	$1,820
Travel expense: hotel	35 days	$80 /night	$2,800
Travel expense: meals	35 days	$30 /day	$1,050
Supplies: copy machine, fax, telephone calls			$530
	TOTAL:		**$6,200**

EMS Communications Software Development

At three of the campuses, ACCD has a central energy management system installed that has the capability to record energy data. It is ESL's intent to utilize this system to collect data for energy monitoring and commissioning purposes. ESL may recommend upgrading some or all of the existing Energy Management System's software and client PC workstations (these hardware/software upgrades are not included in this budget). In order for ESL to link into the existing EMS, it will be necessary to install additional software (PCAnywhere) or equipment

(mainly another PC workstation) near the existing EMS computer terminals. ESL would also like Ethernet lines connected to the PC workstation so the system could be accessed via Internet. Software development will be needed to extract and format the existing EMS data sequence, push the data to ESL's network and load it into ESL's databases. The budget includes labor for a computer programmer to develop the software necessary to push the data to ESL's network in an automated fashion. Once the data is at ESL, it will need to be formatted to fit into the ESL database. The formatting process requires the development of a 'subroutine' that will take the EMS data and format it into data that is compatible with ESL's database.

The following table is a break down of the labor and equipment costs for EMS Communications Software Development

Labor Required	Labor Hours	Cost/ Hour	Labor Cost	Equipment Required	Equip. Cost	Total Costs	ACCD Responsibility
Analysis of System and Recommendations	36	$50	$1,800			$1,800	
Setup Software and Hardware	36	$50	$1,800	LanTAP	$3,000	$4,800	Drop Ethernet
Setup ESL's DBMs for added channel load	14	$50	$700	and terminals		$700	
Programmer to develop software	224	$50	$11,200			$11,200	
Project Management	130	$50	$6,500			$6,500	
				TOTAL COST	**$25,000.00**		