MINUTES OF THE MEETING
LONG RANGE PLANNING SUBCOMMITTEE
50TH LEGISLATIVE SESSION

The meeting of the Long Range Planning Subcommittee was called to order by Chairman Rep. Robert Thoft on February 4, 1987 at 8:00 a.m., in Room 202B of the State Capitol.

ROLL CALL: All members of the Long Range Planning Subcommittee were present except Rep. Donaldson who was excused.

Tape 55:A:000

CAPITAL CONSTRUCTION PROGRAM

Madalyn Quinlan, Office of the Legislative Fiscal Analyst, presented the Long Range Planning Subcommittee with two worksheets (Exhibit #1 and #2).

Montana State University

Experiment Station

Jim Welsh, stated the MSU experiment station needs repairs and renovations. Mr. Welsh said the Huntley Research Center and the Fort Assiniboine facility are MSU's primary concerns. Mr. Welsh said MSU spends approximately $50,000 a year for maintenance on these facilities.

Dr. Tietz, President, MSU, said the experiment station needs to be made handicapped accessible.

Craig Roloff, presented a packet of handouts for the Subcommittee concerning different aspects of MSU (Exhibit #3). Mr. Roloff said the major maintenance plan covers over 100 buildings that are over 100 years in age. Mr Roloff said the replacement cost of these buildings would be over $200 million.

Mr. Roloff said MSU's alarm systems are inadequate.

Roofs:

Mr Roloff stated the roof needs replacement at a cost of $395,000 estimated by the Governor's executive budget.

Electrical Distribution:

Mr. Roloff said the electrical distribution system is overloaded and MSU has had many major electrical failures, some of which last for days. Mr. Roloff said $623,900 would come from student fees to cover the dormitories. Mr. Roloff said the Greenhouse project is not on the campus' electrical system they have their own separate line meter.

Mr. Roloff said they would like to invest the gas contract savings into another construction project. He said the budget is $1,890,000 and the annual savings from the gas would be $168,000. Mr. Roloff said if those monies that are saved were to be financed through a conventional lending institution at an interest rate of 7% with the annual payments of $269,000, the annual savings would be $290,000.

Rep. Bardanouve asked how MSU proposes to get the initial funds for the project. (225) Mr. Roloff said MSU would solicite financing from local lending institutions as they have already on their gas contract, which was a four year note for $250,000.

Mr. Roloff said $125,000 was over and above debt service on the gas contract and $168,000 was the savings on the electrical contract which is a total of $293,000 in savings. Mr. Roloff said the bid on the natural gas contract came in lower than the wood pellets contract. Mr. Roloff said the natural gas contract service is interruptible. He said MSU has a six year contract with Montana Power Company. Mr. Roloff said MSU has a 24 hour backup supply of propane if needed (a 40,000 gallon tank of propane). He said MPC according to a contract has to pay for all the propane MSU uses when the natural gas service is interrupted.

Rep. Bardanouve asked if there is an unlimited amount of propane gas on hand. Dr. Tietz said MSU has at least five days assured by MPC according to their contract.

Engineering and Physical Science Lab: (414)

Rep. John Vincent said he is drafting a bill to build the new Engineering and Physical Science Lab. Rep. Vincent said Pennsylvania even during down swings of their economy did many projects of this sort and they were used as a catalyst to build their economy. He said this was one main reason Montana should consider this project.

Rep. Dorthy Bradley, said she was in support of the project. Rep. Bradley said student fees have been increase 130% since 1981, and that students have paid for 1/4 of the instructional facilities at MSU.

55:B:000

Dave Gibson, Dean, Engineering, presented the Subcommittee with a fact sheet (Exhibit #4). Dr. Gibson said in reading an article in Fortune magazine about the economy in the 1990's, there were three areas of focus. The first one was schools, the second was the availability of quality employees (scientists, engineers, etc.) and the third was brain trusts.

Bill Shirackeles said the Engineering Research Center from the National Science Foundation is a possibility of where MSU might be able to receive $1-2 million a year in funds.

Bob Swenson, Physics Department,went over the physics portion of Exhibit #3.

Bill Raul, Mountain Bell, said as a graduate of the Engineering department is in favor of the addition, and said the universities need to change as the need for more knowledgeable employees increases.

John Morrison read his testimony for the Subcommittee (Exhibt #5). (125)

Doug Ellis who is a student at MSU said he was in favor of the project. (347)

Dr. Tietz read Exhibit #6.

Bob Frazer, Priorities for People, said he was in favor of the project.

Owen Letcher who is a student at MSU said he was not in favor of the project because if MSU is cutting programs then why should they build a new building.

Dr. Tietz the $12 million dollar figure is a new estimate of the project; last spring the projected cost of the project was $18 million. (56:A:000)

ADJOURNMENT: There being no further business the Long Range Planning Subcommittee adjourned at 9:45 a.m.

Bob Thoft

Chairman Rep. Bob Thoft

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DAILY ROLL CALL

LONG RANGE PLANNING SUBCOMMITTEE

DATE February 4 , 1987

NAME	PRESENT	ABSENT	EXCUSED
Rep., Thoft, Chairman	✓		
Sen., Van Valkenburg, Vice-Chairman	✓		
Rep., Bardanouve	✓		
Rep., Donaldson			
Sen., Aklestad	✓		
Sen., McLane	✓		
Sen., Walker	✓		

Form CS-30A
Rev. 1985

EXHIBIT ____
DATE 2/4/87
HB ____

STATE OF MONTANA
ZERO COUPON BONDS
FEBRUARY 3, 1987

I. General Obligation Bonds - Currently Outstanding

a) Debt Service (Per November 21, 1986 Report)

Annual Principal & Interest Payments:

1987 to 1996	- Highest Payment	$15,951,054
	- Lowest Payment	$13,405,361
1997		$ 4,035,698
1998		$ 734,995

II. Zero Coupon Bonds - $30,500,000 New Issue

a) First Payment - 1997

Principal & Interest per year $ 4,570,000

b) 25 Year Maturity

c) General Obligation Bonds

d) "AA" Rated

EXHIBIT 2
DATE 2/4/87

STATE OF MONTANA
GENERAL OBLIGATION BONDS
EXAMPLE: ZERO COUPON BONDS ASSUMING "AA" G.O. RATING
Price Report
$ 30,553,923.20
Dated Date 1/ 1/1989
Delivery Date 1/ 1/1989

Year Ending 1/ 1	Debt Service Payment	Coupon	Yield	Price	Principal Payment	Bond Years	Cumulative Bond Years
1997	$4,570,000		5.8000%	63.292000%	$2,892,444.40	36560.0000	36560.0000
1998	$4,570,000		6.0000%	58.739000%	$2,684,372.30	41130.0000	77690.0000
1999	$4,570,000		6.1000%	54.832000%	$2,505,822.40	45700.0000	123390.0000
2000	$4,570,000		6.2000%	51.086000%	$2,334,630.20	50270.0000	173660.0000
2001	$4,570,000		6.3000%	47.504000%	$2,170,932.80	54840.0000	228500.0000
2002	$4,570,000		6.4000%	44.088000%	$2,014,821.60	59410.0000	287910.0000
2003	$4,570,000		6.5000%	40.839000%	$1,866,342.30	63980.0000	351890.0000
2004	$4,570,000		6.5000%	38.308000%	$1,750,675.60	68550.0000	420440.0000
2005	$4,570,000		6.5000%	35.935000%	$1,642,229.50	73120.0000	493560.0000
2006	$4,570,000		6.5000%	33.708000%	$1,540,455.60	77690.0000	571250.0000
2007	$4,570,000		6.6000%	31.073000%	$1,420,036.10	82260.0000	653510.0000
2008	$4,570,000		6.6000%	29.119000%	$1,330,738.30	86830.0000	740340.0000
2009	$4,570,000		6.6000%	27.288000%	$1,247,061.60	91400.0000	831740.0000
2010	$4,570,000		6.6000%	25.573000%	$1,168,686.10	95970.0000	927710.0000
2011	$4,570,000		6.6000%	23.965000%	$1,095,200.50	100540.0000	1028250.0000
2012	$4,570,000		6.6000%	22.458000%	$1,026,330.60	105110.0000	1133360.0000
2013	$4,570,000		6.6000%	21.046000%	$961,802.20	109680.0000	1243040.0000
2014	$4,570,000		6.6000%	19.723000%	$901,341.10	114250.0000	1357290.0000
Totals	$82,260,000				$30,553,923.20		

<u>Sources of Funds:</u>

Bond Proceeds	$30,553,923.20
Total	$30,553,923.20

<u>Uses of Funds:</u>

Projects	$30,003,923.20
Costs of Issuance	150,000.00
Discount (1.3%)	400,000.00
Total	$30,553,923.20

EXHIBIT 3
DATE 2/4/87
HB

MONTANA STATE UNIVERSITY
Bozeman, Montana

REGENTS RECOMMENDATIONS
CAPITAL CONSTRUCTION PROJECTS
1987 - 1989 Biennium
Exhibit B

MSU REQUEST			REGENTS APPROVED	
Rank	Project Description	Amount	Rank	Amount
1.	Engr. Physical Sciences	18,000,000	New- 1	18,000,000
2.	Roof Repair, Major Maint.	395,000	7	395,000
3.	Electrical Distribution	1,853,200	15	1,853,200
4.	Gaines Hall Ventil/Retrofit	361,500	DNRC FUNDED	361,500
5.	Alarm System	38,000	5	38,000
6.	Irrigation Reservoir	225,000		
7.	Energy Mgmt Control System	1,890,000		
8.	Handicapped Access Modif.	631,000	24	107,000
9.	Natural Gas Main - Phase 1	60,000		
10.	Planning Funds Agr/Life Sci	550,000		
11.	Reid Hall Basement Remodel	47,000		
12.	Library Basement Remodel	372,500		
13.	Planning Funds Nursing Build	150,000		
14.	Remodel Herrick Hall	370,000		
15.	Central Rec/Shop & Storage	2,022,400		
16.	Remodel/Repair Traphagen	1,634,600		
17.	Replace Hamilton Hall	1,726,000		
18.	Expand CAC Facilities	400,000		
19.	CES Facility Planning	360,000		
20.	Major Maint. - Asbestos	20,000		
TOTAL PROJECTS		31,106,200		20,754,700

MONTANA STATE UNIVERSITY
Bozeman, Montana

GOVERNOR'S RECOMMENDATION
CAPITAL CONSTRUCTION PROJECTS
1987 - 1989 Biennium
Exhibit B

REGENTS APPROVED			GOVERNOR'S RECOMMEND.	
Rank	Project Description	Amount	Rank	Amount
1	Engr. Physical Sciences	18,000,000	NOT RECOMMENDED	
5	Alarm System	38,000	6	38,000
7	Roof Repair, Major Maint.	395,000	10	395,000
12	Major Maint. - AES	160,000	27	160,000
15	Electrical Distribution	1,853,200	20	1,853,200
24	Handicapped Access Modif.	107,000	NOT RECOMMENDED	
	TOTAL PROJECTS	20,553,200		2,446,200

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title: Renovate Fire Alarm Systems
Project Priority: 6
Biennium: 1987 - 1989

Department: MONTANA UNIVERSITY SYSTEM
Agency/Program: MSU & WMC

A. THIS PROJECT: (Check one)

- ____ Is an Original Facility
- ____ Is an Add. to Exist. Fac.
- _x_ Other: Improves Life Safety of Existing Facilities
- ____ Reno. an Existing Fac.
- ____ Replaces Existing Fac.

B. LOCATION: Gaines Hall, MSU and Campus wide at WMC

(Check where appropriate)

- _x_ Site on Owned Property
- ____ Site to be Selected
- ____ Site Already Selected
- ____ Util. Already Available
- ____ Access Already Available

C. DESCRIPTION OF FACILITY:
General Description:

Repair existing fire alarm systems and install new alarm systems as necessary to provide adequate fire protection for Gaines Hall at MSU and Main Hall, the Office Classroom Building, Arts and Crafts Shop and Metal Shop at WMC.

Impact on Existing Facilities:

The project will improve the fire safety of the various buildings.

Number to be served by Facility: NA

Functional Space Requirements: (In Sq.Ft.) NA

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED

MSU
The Gaines Hall alarm system is in poor condition, and should be replaced with a reliable system because of the hazards inherent with an undergraduate chemistry facility.

WMC
The alarm systems in Main Hall, and the Office Classroom Building are obsolete and compatible
(Continued on General Narrative)

E. ALTERNATIVES CONSIDERED:

1. Upgrade alarm systems for all buildings.
2. Upgrade alarm systems for only academic buildings.
3. Do nothing.

Rationale for Selection of a Particular Alternative:

Alternative #1 is preferred to maintain the safety of students and faculty.

F. ESTIMATED COST OF PROJECT:

Source of Estimate: Physical Plant Personnel

1.	Land Acquisition:	$
2.	Preliminary Expenses	$
	Site Survey:	$
	Soil Testing:	$
	Other:	$
3.	Construction Cost:	$ 60,300
4.	Architectural/Engineering Fees:	$ 7,500
5.	Utilities:	$
6.	Landscaping & Site Develop.:	$
7.	Equipment:	$
8.	Contingencies:	$ 5,200
9.	Other	$
		$
	TOTAL COST	$ 73,000
	Less Other Funds Available Source	$ -0-
		$
	STATE FUNDS REQUIRED	$ 73,000

ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: 1988

Number of Additional Personnel Required: None

Additional Funds Required when Project is in Full Operation: None

1st BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
2nd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
3rd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED (Continued)

replacement parts are difficult to find. New alarms are needed in Arts and Craft Shop Building and the I.A. Metal/Welding Shop (College Motors) because without alarms they are potentially hazardous.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title: Replace/Repair Roofs
Project Priority: 10
Biennium: 1987 - 1989

Department: MONTANA UNIVERSITY SYSTEM
Agency/Program: All six campuses

A. THIS PROJECT: (Check one)

___ Is an Original Facility
___ Is an Add. to Exist. Fac.
_x_ Other Repairs and Maintains facilities
___ Reno. an Existing Fac.
___ Replaces Existing Fac.

B. LOCATION: EMC, Tech, MSU, NMC, U of M, WMC

(Check where appropriate)

_x_ Site on Owned Property
___ Site to be Selected
___ Site Already Selected
_x_ Util. Already Available
_x_ Access Already Available

C. DESCRIPTION OF FACILITY:

General Description:

The project will rebuild or provide major maintenance to roofs on all campuses to ensure the future service of the buildings. The project funds can be summarized as follows:

EMC	$ 119,000
Tech	227,000
MSU	395,500
NMC	56,000
U of M	167,500
WMC	25,000
	$ 990,000

Impact on Existing Facilities:

New roofs will extend the life of the buildings and improve the environments for the programs located in them.

Number to be served by Facility: All buildings occupants

Functional Space Requirements: (In Sq.Ft.) NA

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED

The project addresses the problem of unserviceable roofs which are all leaking to one degree or another.

E. ALTERNATIVES CONSIDERED:

1. Replace roofs.
2. Continue present maintenance of patching and repairing which will temporarily delay further deterioration and damage but require increased replacement costs at a late date.

Rationale for Selection of a Particular Alternative:

The roofs have been maintained over the years but have been deteriorated to the point where they can no longer be effectively repaired. The only solution that eliminates the problem is replacement of the roofs.

F. ESTIMATED COST OF PROJECT:

Source of Estimate: Physical Plant Personnel

1. Land Acquisition:	$
2. Preliminary Expenses	$
Site Survey:	$
Soil Testing:	$
Other:	$
3. Construction Cost:	$ 786,150
4. Architectural/Engineering Fees:	$ 81,400
5. Utilities:	$
6. Landscaping & Site Develop.:	$
7. Equipment:	$
8. Contingencies:	$ 58,450
9. Other Code & Misc.	$ 4,000
	$
TOTAL COST	$ 930,000
Less Other Funds Available Source	$ -0-
	$
STATE FUNDS REQUIRED	$ 930,000 *

ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: 1988

Number of Additional Personnel Required: None

Additional Funds Required when Project is in Full Operation: None

1st BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
2nd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
3rd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$

*Project recommended for funding at an increased level ($990,000). See General Narrative for cost breakdown.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

GENERAL NARRATIVE MATERIAL

UNIVERSITY SYSTEM ROOF REPLACEMENT

EASTERN MONTANA COLLEGE		
Special Education Building	65,000	119,000 recommended
MONTANA COLLEGE OF MINERAL SCIENCE & TECHNOLOGY	227,000	
Mining Geology Building		
Library/Auditorium		
Engineering Building		
MONTANA STATE UNIVERSITY		
Wilson Hall	150,000	
Leon Johnson Hall	55,000	
AJM Johnson Addition	10,000	
Huffman Building	5,500	
Ryan Laboratory	175,000	
NORTHERN MONTANA COLLEGE		
Math Science Building	50,000	56,000 recommended
UNIVERSITY OF MONTANA		
Law Building (Partial)	32,000	
Building # 32 (Partial)	59,000	
Health Science (Partial)	33,000	
Fine Arts (Partial)	6,500	
McGill Hall (Partial)	26,000	
Heating Plant (Partial)	11,000	

WESTERN MONTANA COLLEGE	25,000	
(Coating and Repairs)		
Library/Administration Old Main Auditorium Swimming Pool Office Classroom Building College Motors P.E. Complex Presidents Resident		
UNIVERSITY SYSTEM ROOF REPLACEMENT TOTAL REQUEST	$930,000	
TOTAL RECOMMENDED		990,000 *

* All projects were recommended for funding at amount requested unless indicated otherwise.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title Improve Electrical Distribution, Phase I

Project Priority 20

Biennium 1987 - 1989

Department MONTANA UNIVERSITY SYSTEM

Agency/Program Montana State University

A. THIS PROJECT: (Check one)

___ Is an Original Facility
___ Is an Add. to Exist. Fac.
___ Other ___
x Reno. an Existing Fac.
___ Replaces Existing Fac.

B. LOCATION: Montana State University, Bozeman

(Check where appropriate)

x Site on Owned Property
x Site to be Selected
___ Site Already Selected
x Util. Already Available
___ Access Already Available

C. DESCRIPTION OF FACILITY:
General Description:

Increase primary distribution capacity from current substation to southeast corner of campus. This would be a 15KV-rated service and would be the initial step in replacing and converting the distribution system to 15 KV.

Impact on Existing Facilities:

Project would improve/increase electrical service to meet increasing demand.

Number to be served by Facility: Main Campus

Functional Space Requirements: (In Sq.Ft.) NA

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED

A recently completed study of the MSU primary distribution system by Schmit, Smith and Rush states that "Failure to provide increased capacity could result in a severe and extensive outage..." Further, the report states that the work herein requested which is about one-half of the total project, "... should be completed immediately to avoid catastrophic system failure."

E. ALTERNATIVES CONSIDERED:

1. Do nothing.
2. Begin phased expansion of primary distribution capacity.

Rationale for Selection of a Particular Alternative:

By completing the first phase of the work, the possibility of a catastrophic failure can be avoided. The balance of the work can be delayed to subsequent biennia as pressing needs arises, and funding can be made available.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

F. ESTIMATED COST OF PROJECT:

Source of Estimate: Schmit, Smith and Rush

1. Land Acquisition:	$
2. Preliminary Expenses	$
Site Survey:	$
Soil Testing:	$
Other:	$
3. Construction Cost:	$ 1,631,000
4. Architectural/Engineering Fees:	$ 130,000
5. Utilities:	$
6. Landscaping & Site Develop.:	$
7. Equipment:	$
8. Contingencies:	$ 92,200
9. Other	$
	$
TOTAL COST - Phase I	$ 1,853,200
Less Other Funds Available Source 07037	$ 623,900
	$
STATE FUNDS REQUIRED	$ 1,229,300

ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: 1988

Number of Additional Personnel Required: None

Additional Funds Required when Project is in Full Operation: None

1st BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
2nd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
3rd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$

GENERAL NARRATIVE MATERIAL

As was set down in a 1983 study, and confirmed by the February 1986 study by Schmit, Smith, and Rush, the Primary Electrical Distribution System on the Montana State University Campus is woefully inadequate. The real potential for a breakdown of this system exists. Should such a failure occur, MSU would be totally shut down as of the moment of the failure. A failure of greatest impact would likely involve tee-tap failure of one of the trunk lines in a manhole close to the sub-station. Failure could easily damage other cables or circuits. An outage of several days at least, could be expected for temporary repairs. This is most likely to happen during the Winter, since that is our peak demand period. building freeze-ups are almost certain to take place in this case.

The required changes, as described in the February 1986 report, would construct two new 15 KV circuits, including step-down transformers and switches, and additions to Montana Power Co. South Side Sub Station. It would also install switches at 7 manholes, to provide for loop feed, sectionalizing, and circuit balancing.

The present voltage serving MSU is inadequate to provide the increased needs, and peak use protection. It is therefore determined that the System requires upgrading to higher voltage to meet the increased loads. No other solution would provide any more than another "patchwork", which would still leave the operation of the MSU Campus in jeopardy.

Phase II, will remove and replace obsolete lead sheathed cable, and replace cable and switchgear, to a single standard. Presently there are many different materials in the system, and this needs to be standardized.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title Major Maintenance
Project Priority 27
Biennium 1987 - 1989

Department MONTANA UNIVERSITY SYSTEM
Agency/Program Montana State University, AES

A. THIS PROJECT: (Check one)

- ___ Is an Original Facility
- ___ Is an Add. to Exist. Fac.
- ___ Other ______
- x Reno. an Existing Fac.
- ___ Replaces Existing Fac.

B. LOCATION: Southern Agricultural Experiment Station at Huntley and Northwestern Ag. Experiment Station at Havre

(Check where appropriate)

- x Site on Owned Property
- ___ Site to be Selected
- ___ Site Already Selected
- ___ Util. Already Available
- ___ Access Already Available

C. DESCRIPTION OF FACILITY:
General Description:

The buildings at the referenced locations have been allowed to deteriorate for a number of years and are in need of substantial repairs to the roofs, windows, floors, ceilings and electrical systems. Their exteriors require painting.

Impact on Existing Facilities:

The project will maintain facilities in reasonable condition.

Number to be served by Facility: NA

Functional Space Requirements: (In Sq.Ft.) NA

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED

At Southern Agricultural Experiment Station and Northwestern Agricultural Experiment Station, repairs are required to many elements of the buildings.

E. ALTERNATIVES CONSIDERED:

Do nothing, which will allow these facilities to continue to deteriorate.

Rationale for Selection of a Particular Alternative:

No other alternative will preserve the status quo.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

F. ESTIMATED COST OF PROJECT:

Source of Estimate: Dept. of Facil. Dev. & Mgt.

1.	Land Acquisition:	$
2.	Preliminary Expenses	$
	Site Survey:	$
	Soil Testing:	$
	Other:	$
3.	Construction Cost:	$ 142,000
4.	Architectural/Engineering Fees:	$ 11,000
5.	Utilities:	$
6.	Landscaping & Site Develop.:	$
7.	Equipment:	$
8.	Contingencies:	$ 7,000
9.	Other	$
		$
	TOTAL COST	$ 160,000
	Less Other Funds Available Source	$ -0-
		$
	STATE FUNDS REQUIRED	$ 160,000

ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: 1988

Number of Additional Personnel Required: None

Additional Funds Required when Project is in Full Operation: None

1st BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
2nd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$
3rd BIENNIUM (NA)	
Personal Services	$
Operating Expenses	$
Maintenance Expenses	$

PROPOSED HOUSE JOINT RESOLUTION or LRBP BILL AMENDMENT

A JOINT RESOLUTION OF THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA CONSENTING TO CONSTRUCTION (THE MODIFICATION OF FACILITIES) AT MONTANA STATE UNIVERSITY THAT WILL RESULT IN THE INSTALLATION OF A COMPUTERIZED ENERGY MANAGEMENT CONTROL SYSTEM (EMCS).

WHEREAS, Section 18-2-102, MCA, requires legislative consent for construction projects by a state agency in excess of $25,000; and

WHEREAS, Montana State University has signed a heating fuel contract which will result in annual cost savings of up to $123,285 (FY'87 dollars); and

WHEREAS, Montana State University wishes to carry out a construction project to install a computerized Energy Management Control System throughout its major campus buildings to enable it to reduce plant costs through computer-assisted 1) control of HVAC temperatures/operations and 2) management of equipment maintenance needs.

NOW, THEREFORE, BE IT RESOLVED BY THE SENATE AND THE HOUSE OF REPRESENTATIVES OF THE STATE OF MONTANA:

That the Senate and the House of Representatives of the State of Montana consent to a construction project at Montana State University to install a computerized Energy Management Control System throughout its major campus buildings.

BE IT FURTHER RESOLVED, that MSU will be allowed to retain its heating fuel contract savings of $123,285 per year so that these funds, in addition to those savings generated through use of the EMCS, may be utilized to retire the debt, of conventional lending, that MSU will obtain to finance the cost of this construction.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title: Energy Management Control System
Project Priority 7
Biennium 1987-89

Department: Commissioner of Higher Education
Agency/Program: Montana State University

A. THIS PROJECT: (Check one)

_____ Is an Original Facility
_____ Is An Addition to an Existing Facility
__X__ Renovates an Existing Facility
_____ Replaces an Existing Facility
_____ Other

B. LOCATION: Main Campus

(CHECK WHERE APPROPRIATE)
__X__ Site on Currently Owned Property
_____ Site to be Selected
__X__ Site Already Selected (For CPU)
__X__ Utilities Already Available
__X__ Access Already Available

C. DESCRIPTION OF FACILITY:
General Description:

Computer based energy management system to control HVAC, provide an Optimal Start system and to include a fire and safety security system.

IMPACT ON EXISTING FACILITIES:

1. Will improve energy management in existing facilities.
2. Will provide life safety through improved fire/security supervision.
3. Will provide precise metering, maintenance efficiency and report generating.

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED:

1. Energy costs are a large and steadily-growing expense for MSU. Methods to improve energy utilization and thus control costs must be identified and implemented.
2. MSU needs to improve campus fire/security detection and signaling, metering, maintenance efficiency improvement & report generating.

E. ALTERNATIVES CONSIDERED:

1. Do nothing.
2. Install system.

RATIONALE FOR SELECTION OF A PARTICULAR ALTERNATIVE:

1. Of various energy-saving strategies, the Energy Management System was identified as one of the best investments (re: 1983 Energy Conservation Consultants Study) available and one worth implementing.
2. MSU desires to improve the life safety of its' facilities through improved fire/safety protection.

Number to be served by Facility: Main Campus

Functional Space Requirement: (In Square Feet) 300 (for CPU), other equipment would be installed in existing space.

LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

F. ESTIMATED COST OF PROJECT:

Source of Estimate: Energy Conservation Consultants

1.	Land Acquisition	$
2.	Preliminary Expenses:	$
	Site Survey:	$
	Soil Testing:	$
	Other:	$
3.	Construction Cost:	$ 1,500,000
4.	Architectural/Eng. Fees:	$ 245,000
5.	Utilities:	$
6.	Landscaping & Site Devel.	$
7.	Equipment:	$
8.	Art:	$
9.	Contingencies	$ 145,000
10.	Other	$
	TOTAL COST	$ 1,890,000
	Less Other Funds Available	
	Source	$ 1,890,000
STATE FUNDS REQUIRED		$ 0

G. ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: June 30, 1989

Number of Additional Personnel Required: N.A.

Additional Funds Required when Project is in full Operation:*

1st BIENNIUM (89-91)	
Personal Services	$ N.A.
Operating Expenses	$ 2,000
Maintenance Expenses	$ N.A.
2nd BIENNIUM (91-93)	
Personal Services	$ N.A.
Operating Expenses	$ 2,000
Maintenance Expenses	$ N.A.
3rd BIENNIUM (93-95)	
Personal Services	$ N.A.
Operating Expenses	$ 2,000
Maintenance Expenses	$ N.A.

In 1983, Mr. H. S. Hanson of Energy Conservation Consultants did a preliminary energy study of four major areas at Montana State University. One of the areas was Feasibility Energy Management Control System. His report stated: "There is clearly feasibility for EMCS at MSU. There are important justifications beyond the significant energy savings: energy metering, maintenance efficiency improvement, report generating, and fire and security management. Installation of an EMCS can therefore be justified with or without further energy savings calculations".
With a full EMCS and monitoring system it is conservatively estimated that electrical savings will be 1.68 million kwh, and steam savings will be 23.6 million pounds, for a combined BTU savings of 27.9 billion BTU with a dollar value of approximately $168,000 based on F.Y. 1986 costs, which is sligltly over 10% of the net utility cost.

It has been well demonstrated throughout the United States that substantial savings in utility costs can be realized through the installation of a computerized energy management system. Heating, Ventilating and Airconditioning units can and be operated to coincide with building use. Where adequate HVAC zones exist, start-stop schedules can be set from the main terminal, and unused zones can be shut down producing savings of considerable magnitude. A second feature of these systems is the ability to cycle electrical loads to avoid demand peaks in electrical energy, which are very costly. Many of these systems have been installed for this feature alone. "Peak shaving" as this process is referred to, does not result in significnt drops in KWH consumption, but dollar savings are considerable. Another feature which produces great savings is a function called Optimal Start. By this function, building temperature and outside temperature are fed into the computer every 30 seconds, and the computer calculates the last instant when HVAC systems need to be started to bring the space up to occupancy standards. This avoids "guessing", and can save as many as three hours of operation each day. Experience with these systems at other Universities indicates that savings can be in the area of 25% per year, without affecting the necessary building environment.

Even more important is the safety function and the infinite value of human life. The EMCS can be used as a central monitor and control for fire, security and environmental alarms. Existing alarm systems can also be connected into the EMCS to detect maintenance problems and display a diagnostic message as well as detect alarm situations for all connected buildings at a central monitor. This display can be remoted to any desired location. Building system alarms can alert Maintenance forces; security alarms can be displayed at security headquarters, and fire alarms can be remoted to Fire Stations. The Security and Fire alarm add-ons are relatively low cost, since they are transmitted over the network used for the control system.

Three alternatives to financing methods for an Energy Monitoring and Control System at MSU are Lease, Purchase, and Energy Service Agreement.In a true lease, the lessor (investor) retains full benefits, risks, and responsibilities of ownership of the system. The lessor may not take an Investment Tax Credit, but may depreciate the equipment.

A lease purchase combines aspects of a true lease with those of a purchase agreement. The principal advantage of this arrangement is that it allows the purchase of equipment without a large initial appropriation. In this case, the lessee (MSU) carries the equipment on his balance sheet from the beginning of the lease. State law does not currently allow lease purchases of equipment. An energy service agreement ("shared savings") is one where the third party contracts to provide the service of EMCS operation to MSU. The energy service company owns and maintains the equipment and receives a monthly payment which is some portion of the savings generated. Tax credits for this type of contract rely on the "service exception" to the IRS regulations against tax credits being taken for equipment leased to a non-profit entity. The idea is that the equipment is not being leased to MSU as the user. Instead, the energy service company is the user, and MSU would be the "service recipient". There is a bill pending in a House-Senate conference committee which may curtail such agreements. Two of the many companies offering energy service contracts are Time Energy Systems of Houston, Texas and Energard Corporation of Seattle, Washington. Johnson Service Company also offers energy service agreements. There are also Montana companies which are beginning to offer this type of service.

OPTIMUM START/STOP

GENERAL

During unoccupied periods, DELTA 21 System Outside Air Selection maintains the temperature inside a building at levels that would be uncomfortable for occupants.

Before the building is ready to be occupied, the temperature inside must be brought within the desired comfort conditions. The amount of time it will take the heating/cooling equipment to prepare the building for occupancy depends on the outside and inside air temperatures.

The Optimum Start/Stop program monitors the inside and outside air temperatures and calculates how long it will take the heating/cooling equipment to prepare the building and issues commands to mechanical equipment at the appropriate time. Optimum Start/Stop shortens occupancy preparation time on mild days (reducing energy costs) and lengthens it on extremely hot or cold days, ensuring that the occupants will be comfortable upon arrival.

Toward the end of the day, Optimum Start/Stop determines how soon the heating/cooling equipment and other software programs can operate at unoccupied levels. The inside air temperature coasts within comfort conditions for the remainder of occupancy. On mild days, this early shut down of equipment can be as much as an hour.

FEATURES

- Sixty Programs
- Eight-Day Schedule
- Self Correcting
- Automatically Sets Night Temperature Alarm Limits

SIXTY PROGRAMS

A maximum of 60 separate Optimum Start/Stop programs can be run from one ECU. Each program has its own comfort limits and temperature inputs, providing specific, user defined Optimum Start/Stop programming for all areas in a building.

▲ Specific Optimum Start/Stop programs can be provided to all areas in a building.

EIGHT-DAY SCHEDULE

Each of the 60 possible programs has its own eight-day schedule, Sunday through Saturday, plus one holiday. The schedule defines when the building is occupied and unoccupied for each day. Using this schedule, Optimum Start/Stop can be programmed (via the video display terminal) to operate at different times on different days including holidays.

▲ An Eight-Day Schedule allows an operator to define occupancy periods on a day of the week basis and account for holidays.

SELF-CORRECTING

Each program remembers and learns from history. If the temperature does not reach the comfort limit by occupancy time, it starts the heating/cooling equipment earlier the next day. Conversely, if the comfort limit is reached too soon, the heating/cooling equipment will be started later the next day. The energy used for building preparation is the minimum needed to reach the comfort range.

In addition, different formulas are used to calculate the Optimum Start/Stop times according to the season, giving heat response in the winter and cooling response in the summer. Optimum Start/Stop also takes into account if the building was unoccupied the previous day and allows for more preparation time to bring the space into comfort limits.

▲ Optimum Start/Stop adapts to seasonal changes and corrects its own performance.

AUTOMATICALLY SETS NIGHT TEMPERATURE ALARM LIMITS

Using Outside Air Selection, unoccupied building can be maintained at temperature levels outside the comfort limits. Each of the 60 possible Optimum Start/Stop programs can be programmed to automatically reset the high and low temperature alarm limits when the building is unoccupied. The building is monitored at the new temperature limits until occupancy preparation begins the next day.

▲ Temperature alarm limits are automatically reset every night.

REQUIREMENTS

— DELTA 21 System.
— One RCM point per temperature input.
— One RCM point per output.
— Honeywell Building Control Language (HBCL), if temperature sensors are to be averaged.

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[illegible]e Centralized Building Control System

WHAT IS IT AND WHAT CAN IT DO FOR YOU?

It's a system, not just a machine. A two-way communication and command center giving you fingertip, push-button remote control of thousands of points on your campus.

What kind of points? Almost anything you want data on or need to start or stop or adjust and control or keep track of. Fans . . . pumps . . . heating or cooling coils . . . boilers . . . chillers . . . motors . . . fire alarm stations . . . smoke sensors . . . lights . . . door lock mechanisms . . . security detectors . . . patrol tour stations . . . valves . . . freezers . . . holdup alarms . . . almost anything. It gathers information from these points electronically, all by itself, day and night, 365 days a year.

WHEN THE ABNORMAL HAPPENS, THE ACTION STARTS

With routine monotony, the central control system constantly scans all the points connected to it, making sure each is within a pre-set limit. If a monitored machine goes off, or temperature strays, the alarm comes in — instantly. Lights flash, the console "beeps", and a slide is displayed, graphically showing the disabled system. Immediately the operator can pinpoint and analyze the problem. And send the proper tradesman to the job. Equipment damage is avoided — energy is saved — and manpower conserved. A problem detected and solved before it becomes serious.

MONITORING IS ONLY A SMALL PART — ADD CONTROL TOO

Monitoring lets you profit from early detection. But the actual control is where you save money — a lot of money!! Centralized control is the tool to turn things on when they're needed and off when they're not . . . shave expensive electric peaks . . . reduce temperature settings when outdoor temperatures change . . . control the intake of outside air.

Central control saves money in other areas, too. Through less wasted manpower. Increased protection against losses from fire, theft or vandalism.

CONTROL CAN EXTEND FOR MILES

A centralized control system can monitor and control a main city campus, off-campus data processing center, freshwater biological laboratory on a nearby lake or stream and a branch campus in a city 90 miles away. Remote building monitoring and control is accomplished by leased, voice grade lines from the telephone company. If your campus doesn't have wires strung to these locations. These leased lines can be microwave circuits. Benefits of centralized control can be extended throughout the city or throughout the state.

CONTROL "COMMAND POST" CAN BE DELEGATED

Honeywell centralized control systems are [illegible] and are built for any size campus. Depending on your control needs, one master operator's console may [illegible]. Or you may need one or more smaller [illegible] consoles. For example, a console located in the [illegible] department dedicated to monitoring and controlling [illegible] alarms. Or a similar one in the security office. [illegible] of these could be programmed to "throw back" control to the master console at night.

Whatever your needs, Honeywell has a system to help you run a fine tuned campus.

TIMED START/STOP

GENERAL

Timed Start/Stop is a controlled method of automatically turning on and off regularly used lighting and mechanical equipment. These programs are suitable for buildings of all sizes, are easily implemented, and allow flexibility in scheduling.

DELTA 21 Energy Management Programs are designed to maintain comfort conditions on the hottest and coldest days of the year and save large amounts of energy. On the nonextreme days, which comprise 75 percent of the days in most climates, equipment can be started later and shut down earlier to save even more energy. Timed Start/Stop accomplishes this task.

FEATURES

- Timed Start/Stop Adapts to Building Timetable
- Comprehensive Eight-Day Week
- Levels of Operator Accessibility

TIMED START/STOP ADAPTS TO BUILDING TIMETABLE

The DELTA 21 controls up to 450 points. While not exceeding this maximum, Timed Start/Stop allows up to 60 programs.

A program's schedule is user defined according to the regular on/off times of electrical loads. An established program's schedule may be temporarily changed. Unforeseen alterations in business or occupancy routines are easily accommodated by the software's capacity for up to 10 temporary schedules. Upon executing a temporary schedule the program immediately reverts back to its original schedule.

▲ Timed Start/Stop offers adaptability in permanent and temporary scheduling.

COMPREHENSIVE EIGHT-DAY WEEK

A timed start/stop schedule covers eight days; Sunday through Saturday and holiday. The eighth day saves the operator from having to enter a holiday schedule less than a week in advance. Each schedule allows four start and four stop times per day.

▲ Lighting and equipment use may be scheduled well in advance.

LEVELS OF OPERATOR ACCESSIBILITY

Three levels of accessibility ensure timed start/stop programming by designated operators only. Operator identification code distinguishes levels of access. All operators can display or print a schedule and make temporary time changes. A second level operator can enable or disable a program or point. A third level operator can add or delete programs, change schedules and point numbers, and add or delete points.

▲ Three levels of operator access prevent unauthorized personnel from making changes to Timed Start/Stop.

REQUIREMENTS

— DELTA 21 System.
— Two RCM points per status input.
— Two RCM points per output.

HVAC MONITORING

GENERAL

All equipment connected to the DELTA 21 System is supervised by the Heating, Ventilating, and Air Conditioning (HVAC) Monitoring software. HVAC Monitoring constantly scans the equipment, such as temperature sensors, humidity sensors, fan switches, air-flow sensors, and pressure sensors, and records the current condition or status. All the DELTA 21 software programs use this information in making calculations and executing commands. Alarm conditions are quickly relayed to the operator via the Video Display Terminal (VDT).

Through the VDT, the operator can use HVAC Monitoring software to turn equipment on or off, read temperatures at any location, adjust thermostat settings, design control zones, and check on the present condition of any piece of equipment connected to the DELTA 21 System. HVAC Monitoring provides the user complete control over the DELTA 21 System.

FEATURES

- Building Constantly Monitored
- User Definable Alarms
- Holiday Scheduling

BUILDING CONSTANTLY MONITORED

Equipment and space conditions are constantly monitored. Any changes, such as a fan going off or a space temperature rising, is recorded and checked to see if the change has created an alarm condition. If an alarm condition exists, the operator and any pertinent software programs, such as Honeywell Building Control Language (HBCL), are immediately notified. If the software or an operator issues a command (e.g., turn Fan 1 off), HVAC Monitoring will verify that the command was executed and issue an alarm if it was not. The operator can check on the current conditions anywhere in the system and get a hard-copy printout of the data for documentation purposes.

▲ HVAC Monitoring constantly watches all building conditions, providing quick response to any HVAC needs.

USER DEFINABLE ALARMS

Every piece of equipment connected to the DELTA 21 System can be programmed to generate an alarm. HVAC Monitoring allows the user to define the alarm conditions for each piece of equipment, whether it be comfort high/low limits for a space temperature sensor, humidity limits for a humidity sensor, or a contact position for a fan switch.

Each alarm is programmed to display a user entered message, up to 72 characters long. This message can be used to give specific instructions for each alarm condition.

The user can also use conditions at one piece of equipment to lockout alarm messages at another. For example, a fan, when it is turned off, could be used to lockout a message from a temperature sensor, thus avoiding a false alarm. When the fan is turned back on, the temperature sensor alarm message is again active.

Another feature of lockout is a user selectable delay time. When the equipment turns back on, the alarm message lockout can be extended (up to 255 minutes) allowing some time before the alarm message function of the other point becomes active.

▲ User defines alarms conditions, each with a specific message.

HOLIDAY SCHEDULING

▲ Up to 32 holidays can be programmed in advance. The DELTA 21 software uses this information to automatically operate the building equipment at unoccupied conditions on those days.

Equipment can be programmed for holiday operation up to two years in advance.

REQUIREMENTS

— DELTA 21 System.
— One RCM point per input.
— One RCM point per controlled device.

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DEMAND CONTROL

GENERAL

Reducing electric demand peaks can save thousands of dollars every year in power demand charges. Unfortunately, the first indication that a peak has been exceeded is on the monthly power bill. The DELTA 21 System Demand Control program continuously monitors the demand meters, receiving the same signals the power company uses to determine the power bill. The Demand Control program measures the total power usage in a building and compares it to a user defined (via the video display terminal) demand limit. If the Demand Control program predicts that energy usage will exceed the demand limit, it shuts off (sheds) designated equipment to cut down power usage even if the equipment is being used in other programs (e.g., Duty Cycle). The user selects the order in which loads are shed and in what order they are turned back on. Less important loads are usually shed first and returned last.

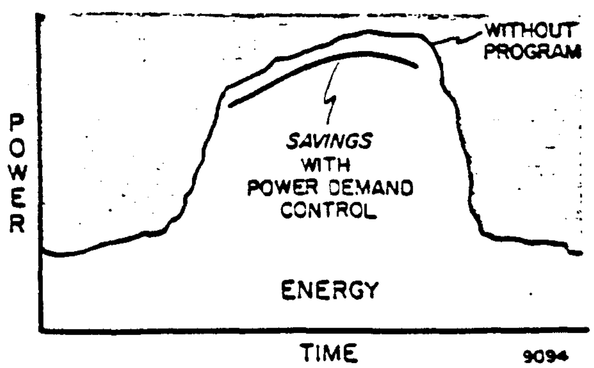
FEATURES

- Can Monitor Up to Six Electric Demand Meters Divided into Four Programs
- Seasonal Programs
- Three Demand Limits per Day
- Predictive or Instantaneous Demand Control
- Sliding or Fixed Window Interval
- Selectable Load Shed Programming
- Floating Limit

CAN MONITOR UP TO SIX ELECTRIC DEMAND METERS DIVIDED INTO FOUR PROGRAMS

Demand Control can monitor up to six power demand meters divided into a maximum of four programs, reflecting the power company's billing procedure. The user selects the number of programs and meters in each program, providing specific Demand Control throughout a building.

▲ Monitoring six meters allows flexibility in Demand Control programming.



SEASONAL PROGRAMS

Depending on the number of electric demand meters, Demand Control programs may be customized on a seasonal basis, one program covering the summer season and a second program handling the winter season. Each with a specific schedule of equipment to be shed and demand limit. The programs may be enabled and/or disabled manually or by using Honeywell Building Control Language (HBCL).

▲ Seasonal programs allow a lower demand limit during the winter season as well as a different load shed schedule.

THREE DEMAND LIMITS PER DAY

In the course of a day, a building's energy needs vary greatly. When the building is unoccupied, little energy is needed, as opposed to a building running at full occupancy. Demand Control allows up to three different demand limits to be set per program per day of the week (including one holiday). For example, three different demand limits can be set for various time periods on Monday and one demand limit for Saturday.

▲ Multiple demand limits allow lower limits at night and on holidays to match various power company demand billing procedures.

PREDICTIVE OR INSTANTANEOUS DEMAND CONTROL

Whether the local power company bills using an instantaneous peak demand rate or an average power use method, Demand Control can adapt to it. By using Predictive Demand Control the average power use is always kept to a minimum. By using Instantaneous Demand Control the instantaneous peak power use is always kept to a minimum.

▲ Predictive or Instantaneous Demand Control matches the power company billing methods and operates the building in the most cost effective manner.

SLIDING OR FIXED WINDOW INTERVAL

Whether the local power company uses a sliding window interval or a fixed window interval, Demand Control can be programmed to operate in the same mode. Demand Control always operates on the same information the power company uses.

▲ The interval method can be matched to the one used by the utility company.

SELECTABLE LOAD SHED PROGRAMMING

Up to 22 load groups can be assigned to each of the four possible Demand Control programs. Each load shed order can have as many as 255 loads (pieces of equipment) assigned to it as needed. Demand Control turns off Load Group 1 first and works its way down to Load Group 22 and returns loads in reverse (22 is returned first). The equipment within each load group is turned off and returned by four possible methods:

— Rotational shed/add orders—First load turned off is the first one returned.

— Sequential shed/add orders—Last load turned off is the first one returned.

— Comfort fairness shed/add orders—Similar to Sequential except the loads are automatically ranked from most comfortable to least comfortable and turned off or returned on that basis. The load that is causing the greatest discomfort is turned off last and returned first, while the load causing the least discomfort is turned off first and returned last. A temperature input is required for each load in the comfort fairness mode.

— Manual shed/add orders—These are individually selected by the operator from a list of loads and kW ratings displayed on the video display terminal. The demand program restores the loads when conditions permit.

▲ The four types of shed orders allow maximum flexibility in how the loads are turned off and returned.

FLOATING DEMAND LIMIT

Floating demand limit adjusts the limit upward during the day as needed. The floating demand limit operates on only the first nine load groups. If all nine load groups have been shed (shut off) and the program predicts the limit will be exceeded, the limit is raised until it reaches a user designated maximum. Once the maximum has been reached the remaining load groups (10-22) are shed. This keeps the critical loads on longer and allows other DELTA 21 System software programs to utilize the equipment.

▲ If no ratchet clause is employed in power billing, floating demand limit can be used to reset the demand limit during periods of high energy use.

REQUIREMENTS

— DELTA 21 System.
— Power Demand meter(s) with pulse output and sync pulse if fixed window interval.
— One Totalizer Remote Communications Module (RCM) for each power demand meter (maximum of six).
— One RCM output for each load.

SECURE/ACCESS

GENERAL

The DELTA 21 System Secure/Access monitors building entrances in conjunction with existing access control devices. This program provides the building owner/manager with a complete report of valid and invalid entries.

A loading dock, main entrance, side entrance, or a wing with limited access typically require their own accessibility schedule. Secure/Access can individually regulate up to 30 such entrances. While in the secure mode, invalid entries are counted and depending on the local access device can trigger an alarm at the operator's terminal. In the access mode, the local access control device is disabled and entry is permitted without alarm.

FEATURES

- Each Door is Scheduled Individually
- Eight-Day Week Accommodates Holiday Scheduling
- Passcard Entry Monitoring
- Invalid Entry Logging
- Three Levels of Operator Access for Added Security

EACH DOOR IS SCHEDULED INDIVIDUALLY

Openings and closings are scheduled on a per door basis. For each door, the DELTA 21 operator assigns an access (opening) time and a secure (closing) time. Assigned times are in ten-minute increments (6:10, 5:20, 10:30, etc) and are stored in memory. A zero time entry indicates that no access or secure command should be issued. When an assigned time matches the current time of day, a door is switched to the appropriate secure/access mode.

▲ Each entrance is assigned its own secure and access times.

EIGHT-DAY WEEK ACCOMMODATES HOLIDAY SCHEDULING

Secure and access times are scheduled for eight days; Sunday through Saturday, and an eighth day for holiday scheduling. Building access may be scheduled well in advance for holidays as well as for all other days. The eight-day feature eliminates the need to enter a holiday schedule less than a week in advance.

▲ The eight-day schedule means less operator time spent entering secure or access times.

PASSCARD ENTRY MONITORING

Secure/Access can monitor alarms on local access control devices. A local access control device such as a passcard reader, that is equipped with an alarm for invalid entry, can be monitored so that invalid entry is annunciated at the operator's terminal. Similarly, a passcard reader's tamper contacts can be monitored and annunciated.

▲ Secure/Access monitors invalid entry alarms and tamper alarms for local access control devices.

INVALID ENTRY LOGGING

While in the secure mode, each invalid entry for each door is logged. An operator can print or display this count at any time. When a door is switched from secure to access (from night to day, typically), the invalid entry log is automatically printed for each door.

▲ Invalid entry log gives the building owner a view of after-hour traffic.

THREE LEVELS OF OPERATOR ACCESS FOR ADDED SECURITY

Secure/Access has three levels of operator access to ensure valid scheduling and system integrity. A first-level operator can display each door's schedule and check for correct program operation. A second-level operator can modify secure and access times and check the invalid entry log in addition to all functions of the first-level operator. A third-level operator can do all the functions of a first- or second-level operator and also add or delete assigned secure and access times.

▲ Three levels of operator access ensures valid secure/access operation.

REQUIREMENTS

— DELTA 21 System.
— One RCM point per status input.
— Two RCM points per output.

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LONG RANGE BUILDING PROGRAM
CAPITAL PROJECT REQUEST

Project Title: New Construction Engineering/Physical Sciences Complex
Project Priority 1
Biennium 87-89

Department: Higher Education
Agency/Program: Montana State University

A. THIS PROJECT: (Check one)
- __X__ Is an Original Facility
- _____ Is An Addition to an Existing Facility
- __X__ Renovates an Existing Facility
- __X__ Replaces an Existing Facility
- _____ Other

B. LOCATION: Main Campus

(CHECK WHERE APPROPRIATE)
- _____ Site on Currently Owned Property
- _____ Site to be Selected
- __X__ Site Already Selected
- _____ Utilities Already Available
- _____ Access Already Available

C. DESCRIPTION OF FACILITY:
General Description:

A program to build new/refurbish existing facilities to house portions of engineering & related physical sciences (math, physics, chemistry).

D. EXPLANATION OF THE PROBLEM BEING ADDRESSED:

The facilities housing portions of engineering, physics, computer science are both obsolete and over-crowded. Those housing chemistry and mathematics are over-crowded and adequate classroom laboratory space doesn't exist.

E. ALTERNATIVES CONSIDERED:

1. Remodel and add to Ryon Lab, expand the physics & chemistry buildings and build new lecture halls, either as one project or separate.
2. Remodel & add to Ryon Lab only.
3. Replace Ryon Lab.
4. A combination of the above.

IMPACT ON EXISTING FACILITIES:

Elimination of those that are uneconomically fit to remodel, update those that are, eliminate over-crowding of others.

RATIONALE FOR SELECTION OF A PARTICULAR ALTERNATIVE:

After exploring many alternatives, the firm of CTA Architects Engineers has produced a Schematic Design and budget estimate for this project. It is upon this design that the request is based.

Number to be served by Facility: Approximately 2500 students & 150 staff

Functional Space Requirement: (In Square Feet) 67,000 ADDITIONAL

F. ESTIMATED COST OF PROJECT:

Source of Estimate: CTA Architects Engineers

1.	Land Acquisition	$
2.	Preliminary Expenses:	$
	Site Survey:	$ 3,000
	Soil Testing:	$ 5,000
	Other: Code Review, advertising, testing	$ 50,000
3.	Construction Cost:	$15,000,000
4.	Architectural/Eng. Fees:	$ 1,057,000
5.	Utilities:	$ 125,000
6.	Landscaping & Site Devel.	$ 100,000
7.	Equipment:	$ 1,000,000
8.	Art:	$ 50,000
9.	Contingencies	$ 610,000
10.	Other ______	$
	______	$
	TOTAL COST	$ 18,000,000
	Less Other Funds Available	
	Source ______	$
STATE FUNDS REQUIRED		$ 18,000,000

G. ESTIMATED OPERATIONAL COST AT COMPLETION:

Expected Completion Date: Sept. 1, 1988

Number of Additional Personnel Required: 2

Additional Funds Required when Project is in full Operation: *

1st BIENNIUM (87-89)	
Personal Services	$ 41,800
Operating Expenses	$ 164,600
Maintenance Expenses	$ 20,550
2nd BIENNIUM (89-91)	
Personal Services	$ 83,600
Operating Expenses	$ 329,200
Maintenance Expenses	$ 41,100
3rd BIENNIUM (91-93)	
Personal Services	$ 83,600
Operating Expenses	$ 329,200
Maintenance Expenses	$ 41,100

*Additional costs are expressed in 1986 dollars.

GENERAL NARRATIVE MATERIAL

During the years since World War II knowledge in the Physical Science disciplines has expanded at a phenomenal rate. The catalyst for this expansion of knowledge has been, in a large part, the de-stratification of academic disciplines. Prior to that time, the Physical Sciences, and Engineering were largely separate, with ongoing research done primarily within the separate disciplines.

During the persent era, the Physical Scientists and Engineers have been working closely together to develop such now common entities as lasers, computers, satellite communications, and other "high tech" operational equipment and ideas. This facility is dedicated to support such inter-disciplinary basic and applied research.

While it is possible to create undergraduate space in existing facilities by remodeling, new thrusts in research require unique facilities, which cannot effectively be created through the remodeling process. As a major academic and research institution Montana State University must fulfill its obligation to society by contributing its share of the research knowledge which cannot economically be undertaken in any other segment of society.

The basic industries of Montana presently have a limited job potential for graduates, however the fields created through this type of basic and applied technical research, hold great potential for MSU graduates. The opportunity for learning and contributing in these fields must not be withheld from these young people. To a large extent the traditional undergraduate courses must continue to be offered, but facilities must be remodeled to meet present day standards. New classroom and laboratory space must be created which is specific to the newer technical knowledge, due to the special characteristics required.

GENERAL NARRATIVE MATERIAL

The objectives of this project request are as follows:

A. Improve research/outreach facilities to provide highly technical human and physical resources for Montana industries and citizens.

B. Provide additional facilities to offer students adequate access to computer use.

C. Build additional and/or remodel existing class laboratory space to eliminate over-crowding and provide safer conditions in areas of specialized equipment.

D. One specific aspect of this would be the relocate and improve highly specialized laboratories such as those in the basement of A.J.M. Johnson Hall (Physics).

E. Provide new, specially designed space for the Department of Computer Science.

F. Provide additional classroom space which will support the use of state-of-the-art methodologies for teaching.

G. Combine all service areas such as the Machine Shop, Electrical Shop, etc. This will provide for a more efficient and effective use of space and resources.

Specifically, the new structure will contain about 67,000 assignable square feet, which has been determined by careful analysis as that amount to meet the needs. Of this, approximately 6,000 is for new classroom space. The existing complex of buildings, Roberts Hall, Cobleigh Hall, Ryon Lab, A.J.M. Johnson Hall (Physics) and Gaines Hall (Chemistry) will be subject to some remodeling which will range from very minor to quite major depending on the specific area's intended use.

Benefits of the Project

- Provides regional focal point for science and technology:
  - To assist Montanans with use of competitive technologies
  - To provide foundation for economic growth
  - To insure quality education opportunities
- Promotes interdisciplinary [illegible] resource sharing:
  - To efficiently use educational [illegible]
  - To increase research opportunities
  - To enhance exchange of scientific knowledge
- Provides increased educational and job opportunities for Montanans.
- Relieves overcrowding in engineering and physical sciences disciplines and upgrades technically obsolete space.
- Advances Montana's technical capabilities to the "state-of-the-art" and provides for future developments.
- Demonstrates Montana's interest and commitment to developing its economy and [illegible]
- [illegible] technology to Montanans [illegible] Advanced Technology Park [illegible] to create new economic opportunities for Montana.

For additional information contact:

Dr. David F. Gibson, Dean
College of Engineering
Montana State University
406-994-2272

MSU

Creating tomorrow's opportunities today for

Montana Center for High Technology

Engineering/Physical Sciences Complex

Montana State University
Bozeman, Montana

EXHIBIT #5
2/4/87

TESTIMONY OF JOHN H. MORRISON
IN SUPPORT OF
MONTANA STATE UNIVERSITY
AT LEGISLATIVE LONG-RANGE PLANNING COMMITTEE HEARING
HELD FEBRUARY 4, 1987

Mr. Chairman, Members of the Committee, my name is John Morrison of Helena, Montana. My profession is Civil Engineering.

Since 1923, when I entered Montana State College as a undergraduate student, I have been interested in the development of Montana State. I have been very closely associated with the activities of the college, as instructor, special lecturer, Alumni President, Director of Endowment and Research and member of the President's Council. I have the privilege, honor and responsibility of receiving three degrees from Montana State College. Bachelor of Science Degree in 1927, Professional Degree as a Civil Engineer in 1931, and the first Honorary Doctor of Engineering given by the University in 1968. The three years following my graduation in 1927 were spent as an instructor in the Civil Engineering Department of Montana State College. Between 1930 and 1945, I was employed by the State Highway Department as a Bridge Designer, Bridge Project Engineer, Chief Bridge Engineer, and finally Bridge Engineer until September of 1945. At that time, I entered private engineering practice and founded the firm of Morrison-Maierle Consulting Engineers.

Our firm has had a successful engineering practice which I believe can be attributed to the professional quality of our staff. The majority of our key people are graduates of the

Montana State University. The attached list names twenty professionals on our staff who are graduates of Montana State University.

The training and experience which our professionals received at MSU have enabled our firm to compete with some of the top engineering firms in not only the United States, but internationally. To keep our staff busy, we have, of necessity, worked outside Montana in most of the western states and in the international arena.

Internationally, we have ongoing projects in Zaire and Lesotho, and have completed work in eight other foreign countries including:

South Viet Nam

Syria

Saudi Arabia

Zaire

Lesotho

Sudan

Tanzania

Egypt

Mauritania

Caribbean Islands:
- Antigua
- St Vincent
- St. Lucia

For the past several years, about 1/2 of our company income has been the result of the work done in these foreign assignments.

Our firm has consistently been listed among the "Top 500" Engineering Firms in the United States. This is a testimonial to the excellent training which our key personnel received at Montana State University. MSU is well regarded for its quality of research in many areas. From my perspective it receives even greater credit for its ability to make the transition in its graduates from basic fundamentals of Engineering and research to the applied sciences. Our engineers, and the engineering graduates as a whole, are recognized for their practical application of state-of-the-art principles and their ability to solve real-world problems. That's a reputation of which we can be proud.

Our concern is that our ability to compete and survive with MSU graduates depends on the quality of education they receive. We won't be able to compete with Montana educated staff unless MSU provides quality instruction, training, and research. This requires qualified Engineering Faculty and an adequate and up-to-date physical plant. The current and projected cuts are disasterous. MSU Engineering faculty salaries are low by any standard, and professionals will sacrifice only so much for the quality of life we enjoy in Montana. MSU competes in the market place for students also, and if a quality education isn't funded, then the top students along with top faculty will be leaving the state. Can we afford the brain drain?

As a business person, I am well aware of the financial bind with which we are faced in the State of Montana. Our firm, for example, is about 1/2 as large as it was a few years ago. primarily due to a slow down in Montana work. However, those of us who are still in the state would like to carry on and see the quality of education preserved that we have established. We are willing to foot the bill. We realize this means new taxes. I am sure that the majority of the citizens of the State of Montana are proud of the record our school has made and will support funding the quality of education and training which we have built up during last 50 or 60 years.

Respectfully submitted.

John F. [illegible]

MORRISON-MAIERLE, INC. EMPLOYEES
MONTANA STATE UNIVERSITY GRADUATES

NAME	GRADUATION DATE	TITLE
BARNETT, DAVID L.	1976	STRUCTURAL ENGINEER
BELL, SCOTT	1984	ENGINEER
BERRY, TIMOTHY R.	1973	CHIEF ENVIRONMENTAL ENGINEER
CARLSON, DAVID R.	1964	CHIEF CIVIL/TRANSPORTATION ENGR.
EAGLE, HAROLD L.	1943	CHAIRMAN OF THE BOARD
ENRIGHT, WILLIAM G.	1971	ENGINEER
FOSTER, RODGER C.	1972	VICE PRESIDENT, BUSINESS DEVELOPMENT
GREEN, PHILLIP C.	1962	VICE PRESIDENT AND BRANCH MANAGER, BILLINGS
HARRINGTON, JAMES G.	1975	DIRECTOR OF DATA PROCESSING
HEINECKE, JOHN H.	1979	ENGINEER
KEITH, C. WILLIAM	1956	SENIOR VICE PRESIDENT AND CHIEF STRUCTURAL ENGINEER
KRAFT, ALBERT N.	1950	SENIOR VICE PRESIDENT, INTERNATIONAL
MAIERLE, JAMES A.	1970	SENIOR VICE PRESIDENT, FINANCE
MORRISON, JR., JOHN H.	1955	PRESIDENT
MORRISON, SR., JOHN H.	1927	CONSULTANT TO THE BOARD
RICHMOND, TERENCE W.	1972	BRANCH MANAGER, KALISPELL
SCHUNKE, JOHN R.	1975	BRANCH MANAGER, BOZEMAN
STELLING, DAVID S.	1979	AIRPORT ENGINEER
WATSON, T. MICHAEL	1971	ENGINEER
WETSTEIN, WILLIS J.	1957	SENIOR VICE PRESIDENT

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1. From a personal viewpoint, I now have five great-grandchildren. The oldest, in about six years, will be making a decision as to where he would like to carry on with his education. As he doing well with math and science, it is possible that he may choose Engineering. I hope his Dad, Grandfather and I (all graduates of MSU Civil Engineering Department) will be able to recommend Montana State University. We won't, unless quality education is preserved.

2. When I graduated from college, there were no Consulting Engineering firms in practice in Montana. Communities relied on the Charles T. Main's, Black and Veatch's, Burns and McDonald's from the East and Mid-West to do their engineering work. We now have probably 50 in-state firms of various disciplines providing these services. This couldn't have been accomplished without MSU, and if MSU dries up, so will this profession as far as Montana is concerned.

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EXHIBIT 6
DATE 2|4|87
HB

ZERO-COUPON BONDS - 12,000,000 NET ISSUE

- INTEREST Accumulating until 1997
- MATURE in 2014

Debt Service per Year $1,828,000
TOTAL Debt Service ≈ 32,900,000
INTEREST = ≈ 20,900,000

Traditional Loan - 12,000,000 loan
6% interest rate

- MATURE in 2004

Debt Service per Year $1,126,234
Total Debt Service ≈ 19,700,000
Interest = ≈ 7,700,000

Coal-tax Fund - 12,000,000

VISITOR'S REGISTER

LONG RANGE PLANNING SUBCOMMITTEE

AGENCY(S) ______________________ DATE FEBRUARY 4, 1987

DEPARTMENT ______________________

NAME	REPRESENTING	SUP-PORT	OP-POSE
David T. Gresson	MSU	X	
Robert Swenson	MSU	X	
W. G. Chamberlis	MSU	X	
Tom Cornell	State of Montana	✓	
[illegible]	M.S.U.	✓	
Craig Roloff	MSU	X	
Owen Letcher	Student MSU		X
Bob Frazier	Pyramids for People		
Jim Whalen	Administration	X	
Douglas Hall	M.S.U.	X	

IF YOU CARE TO WRITE COMMENTS, ASK SECRETARY FOR WITNESS STATEMENT.
IF YOU HAVE WRITTEN COMMENTS, PLEASE GIVE A COPY TO THE SECRETARY.

FORM CS-33A
Rev. 1985