MINUTES

JOINT COMMITTEE ON STATE BUILDING CONSTRUCTION

May 28, 2010
Room 144-S—Statehouse

Members Present

Senator Dwayne Umbarger, Chairperson
Senator Pat Apple
Senator Jay Emler
Senator Marci Francisco
Senator Laura Kelly
Representative Steve Brunk
Representative Bill Feuerborn
Representative Bob Grant
Representative Mitch Holmes

Member Absent

Representative Jo Ann Pottorff, Vice-chairperson

Staff

Audrey Dunkel, Kansas Legislative Research Department
Cody Gorges, Kansas Legislative Research Department
Matt Sterling, Office of the Revisor of Statutes
Gary Deeter, Committee Secretary

Conferees

Richard Gaito, Deputy Director, Division of Facilities Management, Kansas Department of Administration
Eric King, Director of Facilities, Kansas Board of Regents
Jim Modig, Campus Director, Design and Construction Management, University of Kansas
Marilyn Jacobson, Director, Division of Facilities Management, Kansas Department of Administration
Debra Billingsley, Executive Secretary, Kansas Board of Pharmacy

Others Attending

See attached sheet.

The Chairperson called the meeting to order at 10:27 a.m. and welcomed Richard Gaito, Deputy Director, Division of Facilities Management, Kansas Department of Administration, who reviewed proposed agency leases (Attachment 1). He stated that the Kansas Board of Cosmetology, at the same location since 2000, was downsizing, reduced the leased area from 4,000 square feet to 3,469 square feet, saving $17,000. Of the three bidders, Mr. Gaito said the current landlord offered the lowest total cost, a five-year lease with two one-year renewal options at $10.99 per square foot (psf), a figure within market range for the capitol complex. The energy-star rating of 70 is below the recommended 75; the landlord will address energy savings to increase efficiency, and the Department of Administration will request a new energy audit in CY 2011. Responding to a question, Mr. Gaito replied that the energy audit, free to state agencies, is provided by the federal Department of Energy as an online service.

The lease was approved unanimously. (Motion by Representative Grant and seconded by Representative Feuerborn)

Reviewing the proposed lease for the Kansas Board of Pharmacy, Mr. Gaito said that the agency has been at its current location (Landon State Office Building) for seven years, but a recent grant to monitor prescription drugs requires three more Full-time Equivalent (FTE) positions, necessitating a move to a location with additional space. Of the nine proposals (six bidders), the proposed lease has the lowest total cost, a full-service five-year lease with two one-year renewal options for $12.50 psf, an amount within market range for the capitol complex. Noting the energy-star rating of 61, Mr. Gaito stated that the landlord is addressing energy savings by upgrading the heating/ventilation/air-conditioning (HVAC) systems and that the Department of Administration will request an energy audit in CY 2011.

Members questioned why an agency would leave a state-owned building. Marilyn Jacobson, Director, Division of Facilities Management, Kansas Department of Administration, explained that present policy allows an agency to seek private locations. Answering a question, Ms. Jacobson replied that space costs at Landon are $16.78 psf, an amount which includes such things as parking, supplies, maintenance, repairs, insurance, and utilities. Debra Billingsley, Executive Secretary, Kansas Board of Pharmacy, further explained that the Board evaluated other state-owned locations, but could not find turn-key space available. Members commented that they preferred agencies to locate in state buildings and suggested assessing the policy which allows agencies to seek private locations if they wish. A member requested follow-up after next year's energy audit is completed.

The lease was approved. (Motion by Representative Feuerborn; second, Representative Grant).

Audrey Dunkel, Kansas Legislative Research Department, noted information-only material regarding change orders and monthly reports required by statute (Attachment 2).

Eric King, Director of Facilities, Kansas Board of Regents, presented the priority listing of rehabilitation and repairs for the Regents universities, a total of $15 million (Attachment 3), reviewed the quarterly report on the State Educational Institution Long-Term Infrastructure Maintenance Program (Attachment 4), and outlined the funding for Regents universities' Five-year Maintenance Plan allocations (Attachment 5). Regarding the quarterly report, he noted that the report includes

narrative and spread-sheet information, the bond program was suspended by the Legislature for 2010, and no changes are indicated regarding the tax-credit program. Regarding the five-year plan, he said the plan includes only projects that members have considered previously.

Jim Modig, Campus Director, Design and Construction Management, University of Kansas, presented four projects which have moved forward since the FY 2011 Capital Improvements budget request, three of which resulted from grant applications for American Recovery and Reinvestment Act (ARRA) funding (Attachments 6 and 7). The first project is construction of a new building, the Measurement, Materials, and Sustainable Environment Center for the School of Engineering. He explained that currently graduate engineering students, who conduct extensive research activities, are housed in various locations that cannot support modern testing equipment. The 34,690 square-foot building will provide research for 100 students and faculty with $3 million in equipment provided by federal agency funding. The $21.6 million project will receive $12.275 million of stimulus money through the National Institute of Standards and Technology, with the balance funded through private sources. Answering a question, he said testing includes bio-fuels production and engine emission analysis, bio-engineering, composites, fracture and fatigue materials testing, and evaluation of sustainability practices. In reply to another question, Mr. Modig stated that, following the Board of Regents policy, funding is allocated for building maintenance.

Mr. Modig outlined another project, the renovation of Nichols Hall to create a Bioinformatics Computing Facility Core, the $4.65-million project to be funded by the National Institute of Health (Attachment 8). He explained that the project will provide a multidisciplinary integration for research projects in the life sciences and will be able to accommodate the ballooning requirements for data processing and storage in the bio-medical fields. Mr. Modig explained that the Regents' policy providing for future maintenance does not apply to renovation projects. A member expressed concern for installing sophisticated equipment with no provision for future maintenance.

Mr. Modig presented a third project: renovation of Dyche Hall to provide better facilities for the Biodiversity Institute; the $1.525-million project will be funded by the National Science Foundation (Attachment 9). He said that the grant project will modernize a suite of laboratories to provide research for such things as genomics and ecosystems forecasting. Mr. Modig noted that the upgrading of the HVAC and electrical systems will be separately funded through the deferred maintenance program. Members again expressed concern that no plan was provided for maintenance of the building. Members requested a follow-up report to address this issue and suggested the need to consider revising the maintenance policy to include renovation projects.

Mr. Modig reviewed a planned addition to the Lied Center, the University's facility for the performing arts (Attachment 10). He said the addition will include a visitor's center and an education pavilion where students and adults can learn more about the performing arts. The 8,000-square-foot addition, budgeted at $2.5 million, will be funded with private monies. He noted that funding has been identified for future maintenance.

Members considered proposed dates for future meetings and agreed on the following dates, all on Wednesdays:

- July 14
- August 18
- September 15-16
- October 13
- November 10
- December 15

The meeting was adjourned at 11:35 a.m.

Prepared by Gary Deeter
Edited by Audrey Dunkel

Approved by Committee on:

July 14, 2010
(Date)

JOINT COMMITTEE ON STATE BUILDING CONSTRUCTION

GUEST LIST

DATE: MAY 28 2010

NAME	REPRESENTING
Richard Gaito	DoA
[illegible]	DofA
Jim Modig	KU-Dos. & Constr. Mgmt
[illegible]	KBOC
~~ERIC KING~~	~~KBOR~~
Marilyn Jacobs	DOA
Debra Billingsley	KBOP
Jean Michel	Capitol Strategies

Lease Comparison Sheet
COSMETOLOGY

May 28, 2010

	A	B	C	D	E
	GENERAL INFORMATION	CURRENT LEASE	PROPOSED LEASE	Other State Leases	
1	State Agency	Cosmetology	Cosmetology	Credit Union	Animal Health
2	Address	714 SW Jackson	714 SW Jackson	109 SW 9th St.	708 SW Jackson
3	City Location (market)	Topeka	Topeka	Topeka	Topeka
4	Building Name or Location (Landlord)	Jayhawk Walk	Jayhawk Walk	Mills Building LLC	Jayhawk Tower Partners. LLC
5	Lease Space (sq. ft.) Office Sq. Ft.	4,000	3,469	2,350	4,251
6	Storage Sq. Ft.	0	0	0	0
7	Total Sq. Ft.	4,000	3,469	2,350	4,251
8	Full Time Equivalency (FTE) employees/workstations	13	13	9	17
9	Lease Begin Date	10/1/2005	10/1/2010	7/1/2010	81/2010
10	Lease End Date	9/30/2010	9/30/2015	6/30/2015	7/31/2015
11	Years of Lease	5	5	5	5
12	Space Standards Check (sq. ft. per FTE/workstation)	308	267	261	250
	LEASE COSTS - provided by 1st Party Landlord within the lease				
13	Base Lease Cost (annual per sq. ft.)	$12.00	$10.99	$9.50	$9.99
14	Storage				
15	Real Estate Taxes	in base w/stop	in base w/stop	inc. in base	in base w/stop
16	Insurance	in base w/stop	in base w/stop	inc. in base	in base w/stop
17	Major Maintenance	in base w/stop	in base w/stop	inc. in base	in base w/stop
18	Utilities - total				
19	Electricity	in base w/stop	in base w/stop	Inc. in base	in base w/stop
20	Gas	in base w/stop	in base w/stop	inc.in base	in base w/stop
21	Water/Sewer/etc.	in base w/stop	in base w/stop	Inc. in base	in base w/stop
22	Trash Pickup/Removal	in base w/stop	in base w/stop	inc. in base	in base w/stop
23	Custodial/Janitorial	in base w/stop	in base w/stop	Inc. in base	in base w/stop
24	Pest Control	inc. in base	inc. in base	Inc. in base	inc. in base
25	Grounds Maintenance (inc. snow removal)	inc. in base	inc. in base	inc. in base	inc. in base
26	Common Area	inc. in base	inc. in base	Inc. in base	in base w/stop
27	Other Services - Bldg Operating Expense Stops	n/a	n/a	n/a	n/a
28	Parking	in base w/stop	in base w/stop	Inc. in base	in base w/stop
29	No. of Parking Spaces included	11	10	7	18
30	**SUBTOTAL - Lease Costs w/o Additional Services**	**$12.00**	**$10.99**	**$9.50**	**$9.99**
31	**Additional Services**				
32	**SUBTOTAL - Additional Services**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
	OTHER BUILDING OCCUPANCY COSTS - funded by State Agency separate from the lease				
33	Building Operating Cost (not included in base rent)	$0.91			
34	Utilities - total (estimated)	$0.70			
35	Electricity				
36	Gas				
37	Water/Sewer/etc.				
38	Trash Pickup/Removal				
39	Custodial/Janitorial				
40	Pest Control				
41	Grounds Maintenance (inc. snow removal)				
42	Parking	$0.27			
43	No. of Parking Spaces included				
44	Other Services				
45	**Total Other Bldg Optg Costs (not included in lease)**	**$1.88**	**$0.00**	**$0.00**	**$0.00**
	IMPROVEMENTS				
46	Improvements				
47	Subtotal - Improvements	$0.00	$0.00	$0.00	$0.00
48	Annual Cost per Sq. Ft. (estimated)	$13.88	$10.99	$9.50	$9.99
49	Annual Cost (estimated)	$55,532	$38,124	$22,325	$42,467
50	**Total Cost of Lease (estimated)**	**$277,661**	**$190,622**	**$111,625**	**$212,337**

Joint Committee on State Building Construction
May 28, 2010
Attachment 1

Exhibit C

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
Jayhawk Tower Complex

Building ID: 1998002
For 12-month Period Ending: January 31, 2010[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: March 22, 2010

Facility
Jayhawk Tower Complex
700-720 SW Jackson
Topeka, KS 66603

Facility Owner
Jayhawk Tower Partners, LLC
700 SW Jackson, Ste 200
Topeka, KS 66603

Primary Contact for this Facility
N/A

Year Built: 1926
Gross Floor Area (ft²): 150,359

Energy Performance Rating[2] (1-100) 70

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	9,187,667
Natural Gas (kBtu)[4]	3,431,822
Total Energy (kBtu)	12,619,489
Energy Intensity[5]	
Site (kBtu/ft²/yr)	84
Source (kBtu/ft²/yr)	228
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	2,590
Electric Distribution Utility	
Westar Energy Inc	
National Average Comparison	
National Average Site EUI	106
National Average Source EUI	288
% Difference from National Average Source EUI	-21%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Certifying Professional
N/A

Meets Industry Standards[6] for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

EPA Form 5900-16

Exhibit C

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Building Name	Jayhawk Tower Complex	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☐
Type	Office	Is this an accurate description of the space in question?		☐
Location	700-720 SW Jackson, Topeka, KS 66603	Is this address accurate and complete? Correct weather normalization requires an accurate zip code.		☐
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☐

JAYHAWK TOWER COMPLEX (Continued)

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	☑
Gross Floor Area	150,358 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☐
Weekly operating hours	76 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☐
Workers on Main Shift	340	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☐
Number of PCs	438	Is this the number of personal computers in the Office?		☐
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?		☐
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?		☐

Exhibit C

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Westar Energy Inc

Electric - Electricity

Meter: 714 Jackson - A (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/15/2009	01/19/2010	24,000.00
11/12/2009	12/15/2009	24,000.00
10/13/2009	11/12/2009	20,000.00
09/14/2009	10/13/2009	20,000.00
08/12/2009	09/14/2009	26,800.00
07/15/2009	08/12/2009	25,200.00
06/16/2009	07/15/2009	24,400.00
05/14/2009	06/16/2009	23,600.00
04/15/2009	05/14/2009	22,800.00
03/18/2009	04/15/2009	24,400.00
02/17/2009	03/18/2009	25,600.00
714 Jackson - A Consumption (kWh (thousand Watt-hours))		260,800.00
714 Jackson - A Consumption (kBtu (thousand Btu))		889,849.60

Meter: 720 Jackson - A (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/15/2009	01/19/2010	14,934.00
11/12/2009	12/15/2009	9,563.00
10/13/2009	11/12/2009	5,220.00
09/14/2009	10/13/2009	2,025.00
08/12/2009	09/14/2009	2,916.00
07/15/2009	08/12/2009	2,823.00
06/16/2009	07/15/2009	3,155.00
05/14/2009	06/16/2009	2,954.00
04/15/2009	05/14/2009	5,605.00
03/18/2009	04/15/2009	8,273.00
02/17/2009	03/18/2009	10,380.00
720 Jackson - A Consumption (kWh (thousand Watt-hours))		67,951.00
720 Jackson - A Consumption (kBtu (thousand Btu))		231,843.91

Exhibit C

Meter: 720 Jackson - B (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/15/2009	01/19/2010	55,400.00
11/12/2009	12/15/2009	48,320.00
10/13/2009	11/12/2009	39,600.00
09/14/2009	10/13/2009	38,320.00
08/12/2009	09/14/2009	47,040.00
07/15/2009	08/12/2009	42,160.00
06/16/2009	07/15/2009	45,680.00
05/14/2009	06/16/2009	42,720.00
04/15/2009	05/14/2009	42,800.00
03/16/2009	04/15/2009	43,440.00
02/17/2009	03/16/2009	48,320.00
720 Jackson - B Consumption (kWh (thousand Watt-hours))		494,866.00
720 Jackson - B Consumption (kBtu (thousand Btu))		1,688,257.60
Meter: 700 Jackson - 9822105116 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/15/2009	01/19/2010	138,000.00
11/12/2009	12/15/2009	115,000.00
10/13/2009	11/12/2009	118,000.00
09/14/2009	10/13/2009	139,000.00
08/12/2009	09/14/2009	184,000.00
07/15/2009	08/12/2009	172,000.00
06/16/2009	07/15/2009	197,000.00
05/14/2009	06/16/2009	166,000.00
04/15/2009	05/14/2009	136,000.00
03/16/2009	04/15/2009	108,000.00
02/17/2009	03/16/2009	115,000.00
700 Jackson - 9822105116 Consumption (kWh (thousand Watt-hours))		1,578,000.00
700 Jackson - 9822105116 Consumption (kBtu (thousand Btu))		5,384,136.00
Meter: 714 Jackson - 0643662421 (kWh (thousand Watt-hours)) Space(s): Entire Facility Generation Method: Grid Purchase		
Start Date	**End Date**	**Energy Use (kWh (thousand Watt-hours))**
12/15/2009	01/19/2010	7,200.00
11/12/2009	12/15/2009	6,720.00
10/13/2009	11/12/2009	5,920.00
09/14/2009	10/13/2009	7,200.00
08/12/2009	09/14/2009	10,080.00
07/15/2009	08/12/2009	10,560.00
06/16/2009	07/15/2009	11,840.00

Exhibit C

05/14/2009	06/16/2009	9,920.00
04/15/2009	05/14/2009	7,600.00
03/18/2009	04/15/2009	6,000.00
02/17/2009	03/18/2009	6,000.00
714 Jackson - 0643552421 Consumption (kWh (thousand Watt-hours))		**89,040.00**
714 Jackson - 0643552421 Consumption (kBtu (thousand Btu))		**303,884.48**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**8,497,886.49**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☐

Meter: Kansas Gas Service (ccf (hundred cubic feet))
Space(s): Entire Facility

Start Date	End Date	Energy Use (ccf (hundred cubic feet))
01/01/2010	01/31/2010	11,068.00
12/01/2009	12/31/2009	7,481.00
11/01/2009	11/30/2009	1,264.00
10/01/2009	10/31/2009	2,354.00
09/01/2009	09/30/2009	69.00
08/01/2009	08/31/2009	39.00
07/01/2009	07/31/2009	54.00
06/01/2009	06/30/2009	80.00
05/01/2009	05/31/2009	372.00
04/01/2009	04/30/2009	2,084.00
03/01/2009	03/31/2009	4,036.00
02/01/2009	02/28/2009	5,517.00
Kansas Gas Service Consumption (ccf (hundred cubic feet))		**34,418.00**
Kansas Gas Service Consumption (kBtu (thousand Btu))		**3,541,612.20**
Total Natural Gas Consumption (kBtu (thousand Btu))		**3,541,612.20**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☐

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☐

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	☐

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: _____ Date: _____

Signature: _____

Signature is required when applying for the ENERGY STAR.

Exhibit C

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
Jayhawk Tower Complex
700-720 SW Jackson
Topeka, KS 66603

Facility Owner
Jayhawk Tower Partners, LLC
700 SW Jackson, Ste 200
Topeka, KS 66603

Primary Contact for this Facility
N/A

General Information

Jayhawk Tower Complex	
Gross Floor Area Excluding Parking: (ft²)	150,359
Year Built	1926
For 12-month Evaluation Period Ending Date:	January 31, 2010

Facility Space Use Summary

Jayhawk Tower Complex	
Space Type	Office
Gross Floor Area(ft²)	150,359
Weekly operating hours	75
Workers on Main Shift	340
Number of PCs	435
Percent Cooled	50% or more
Percent Heated	50% or more

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	Current (Ending Date 01/31/2010)	Baseline (Ending Date 01/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	70	69	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	84	87	79	N/A	106
Source (kBtu/ft²)	226	231	213	N/A	285
Energy Cost					
$/year	N/A	N/A	N/A	N/A	N/A
$/ft²/year	N/A	N/A	N/A	N/A	N/A
Greenhouse Gas Emissions					
MtCO2e/year	2,580	2,619	2,423	N/A	3,277
kgCO2e/ft²/year	17	17	16	N/A	22

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

Exhibit C

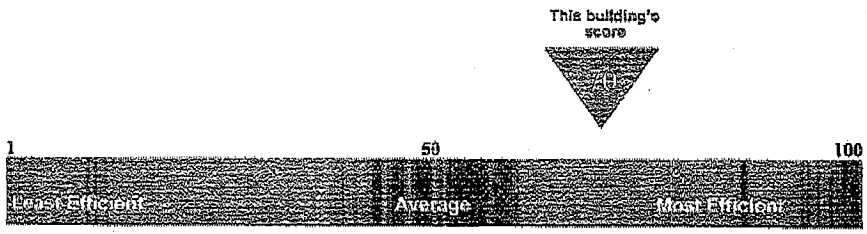
Statement of Energy Performance

2010

Jayhawk Tower Complex
700-720 SW Jackson
Topeka, KS 66603

Portfolio Manager Building ID: 1998002

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 228 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending January 2010

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

Date Generated: 03/22/2010

Lease Comparison Sheet
Pharmacy
May 28, 2010

	A	B	C	D
	GENERAL INFORMATION	**PROPOSED LEASE**	**Other State Leases**	
1	State Agency	Pharmacy	Kansas Arts Commission	Office of the Attorney General
2	Address	800 SW Jackson	700 SW Jackson	720 SW Jackson
3	City Location (market)	Topeka	Topeka	Topeka
4	Building Name or Location (Landlord)	US Bank Building	Jayhawk Tower Partners. LLC	Little Property Service, Inc.
5	Lease Space (sq. ft.) Office Sq. Ft.	2,000	2,213	1,816
6	Storage Sq. Ft.			0
7	Total Sq. Ft.	2,000	2,213	1,816
8	Full Time Equivalency (FTE) employees/workstations	8	8	8
9	Lease Begin Date	10/1/2010	11/1/2010	9/1/2009
10	Lease End Date	9/30/2015	10/31/2013	8/31/2011
11	Years of Lease	5	3	2
12	Space Standards Check (sq. ft. per FTE/workstation)	250	277	227
	LEASE COSTS - provided by 1st Party Landlord within the lease			
13	Base Lease Cost (annual per sq. ft.)	$12.50	$9.99	$11.99
14	Storage			
15	Real Estate Taxes	inc. in base	in base w/stop	in base w/stop
16	Insurance	inc. in base	in base w/stop	in base w/stop
17	Major Maintenance	inc. in base	in base w/stop	in base w/stop
18	Utilities - total			
19	Electricity	inc. in base	in base w/stop	in base w/stop
20	Gas	inc. in base	in base w/stop	in base w/stop
21	Water/Sewer/etc.	inc. in base	in base w/stop	in base w/stop
22	Trash Pickup/Removal	inc. in base	in base w/stop	in base w/stop
23	Custodial/Janitorial	inc. in base	in base w/stop	in base w/stop
24	Pest Control	inc. in base	inc. in base	inc. in base
25	Grounds Maintenance (inc. snow removal)	inc. in base	inc. in base	inc. in base
26	Common Area	inc. in base	inc. in base	inc. in base
27	Other Services - Bldg Operating Expense Stops	n/a	n/a	n/a
28	Parking	inc. in base	in base w/stop	in base w/stop
29	No. of Parking Spaces included	8	8	7
30	**SUBTOTAL - Lease Costs w/o Additional Services**	**$12.50**	**$9.99**	**$11.99**
31	**Additional Services - Security**			
32	**SUBTOTAL - Additional Services**	**$0.00**	**$0.00**	**$0.00**
	OTHER BUILDING OCCUPANCY COSTS - funded by State Agency separate from the lease			
33	Building Operating Cost (not included in base rent)			
34	Utilities - total (estimated)			
35	Electricity			
36	Gas			
37	Water/Sewer/etc.			
38	Trash Pickup/Removal			
39	Custodial/Janitorial			
40	Pest Control			
41	Grounds Maintenance (inc. snow removal)			
42	Parking			
43	No. of Parking Spaces included			
44	Other Services			
45	**Total Other Bldg Optg Costs (not included in lease)**	**$0.00**	**$0.00**	**$0.00**
	IMPROVEMENTS			
46	Improvements - lump sum payment			
47	**Subtotal - Improvements**	**$0.00**	**$0.00**	**$0.00**
48	**Annual Cost per Sq. Ft. (estimated)**	**$12.50**	**$9.99**	**$11.99**
49	**Annual Cost (estimated)**	**$25,000**	**$22,108**	**$21,774**
50	**Total Cost of Lease (estimated)**	**$125,000**	**$66,324**	**$43,548**

OMB No. 2060-0347

STATEMENT OF ENERGY PERFORMANCE
800 SW Jackson

Building ID: 1994946
For 12-month Period Ending: December 31, 2009[1]
Date SEP becomes ineligible: N/A

Date SEP Generated: February 16, 2010

Facility	Facility Owner	Primary Contact for this Facility
800 SW Jackson 800 SW Jackson Topeka, KS 66612	8th & Jackson Investment Group, L.L.C. 201 S Kansas Ave Topeka, KS 66603	Ann Adams 201 S Kansas Ave Topeka, KS 66603

Year Built: 1969
Gross Floor Area (ft²): 141,653

Energy Performance Rating[2] (1-100) 61

Site Energy Use Summary[3]	
Electricity - Grid Purchase(kBtu)	10,393,634
Natural Gas (kBtu)[4]	6,449
Total Energy (kBtu)	10,400,083
Energy Intensity[5]	
Site (kBtu/ft²/yr)	73
Source (kBtu/ft²/yr)	245
Emissions (based on site energy use)	
Greenhouse Gas Emissions ($MtCO_2e$/year)	2,724
Electric Distribution Utility	
Westar Energy Inc	
National Average Comparison	
National Average Site EUI	83
National Average Source EUI	276
% Difference from National Average Source EUI	-11%
Building Type	Office

Stamp of Certifying Professional

Based on the conditions observed at the time of my visit to this building, I certify that the information contained within this statement is accurate.

Meets Industry Standards[6] for Indoor Environmental Conditions:

Ventilation for Acceptable Indoor Air Quality	N/A
Acceptable Thermal Environmental Conditions	N/A
Adequate Illumination	N/A

Certifying Professional
Ann Adams
201 S Kansas Ave
Topeka, KS 66603

Notes:
1. Application for the ENERGY STAR must be submitted to EPA within 4 months of the Period Ending date. Award of the ENERGY STAR is not final until approval is received from EPA.
2. The EPA Energy Performance Rating is based on total source energy. A rating of 75 is the minimum to be eligible for the ENERGY STAR.
3. Values represent energy consumption, annualized to a 12-month period.
4. Natural Gas values in units of volume (e.g. cubic feet) are converted to kBtu with adjustments made for elevation based on Facility zip code.
5. Values represent energy intensity, annualized to a 12-month period.
6. Based on Meeting ASHRAE Standard 62 for ventilation for acceptable indoor air quality, ASHRAE Standard 55 for thermal comfort, and IESNA Lighting Handbook for lighting quality.

1-10

ENERGY STAR® Data Checklist for Commercial Buildings

In order for a building to qualify for the ENERGY STAR, a Professional Engineer (PE) must validate the accuracy of the data underlying the building's energy performance rating. This checklist is designed to provide an at-a-glance summary of a property's physical and operating characteristics, as well as its total energy consumption, to assist the PE in double-checking the information that the building owner or operator has entered into Portfolio Manager.

Please complete and sign this checklist and include it with the stamped, signed Statement of Energy Performance.
NOTE: You must check each box to indicate that each value is correct, OR include a note.

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Building Name	800 SW Jackson	Is this the official building name to be displayed in the ENERGY STAR Registry of Labeled Buildings?		☑
Type	Office	Is this an accurate description of the space in question?		☑
Location	800 SW Jackson, Topeka, KS 66612	Is this address accurate and complete? Correct, weather normalization requires an accurate zip code.		☑
Single Structure	Single Facility	Does this SEP represent a single structure? SEPs cannot be submitted for multiple-building campuses (with the exception of acute care or children's hospitals) nor can they be submitted as representing only a portion of a building		☑

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Gross Floor Area	141,653 Sq. Ft.	Does this square footage include all supporting functions such as kitchens and break rooms used by staff, storage areas, administrative areas, elevators, stairwells, atria, vent shafts, etc. Also note that existing atriums should only include the base floor area that it occupies. Interstitial (plenum) space between floors should not be included in the total. Finally gross floor area is not the same as leasable space. Leasable space is a subset of gross floor area.		☑
Weekly operating hours	60 Hours	Is this the total number of hours per week that the Office space is 75% occupied? This number should exclude hours when the facility is occupied only by maintenance, security, or other support personnel. For facilities with a schedule that varies during the year, "operating hours/week" refers to the total weekly hours for the schedule most often followed.		☑
Workers on Main Shift	189	Is this the number of employees present during the main shift? Note this is not the total number of employees or visitors who are in a building during an entire 24 hour period. For example, if there are two daily 8 hour shifts of 100 workers each, the Workers on Main Shift value is 100. The normal worker density ranges between 0.3 and 10 workers per 1000 square feet (92.8 square meters)		☑
Number of PCs	280	Is this the number of personal computers in the Office?	Includes servers	☑
Percent Cooled	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical cooling equipment?	95% of the Bldg is cooled	☑
Percent Heated	50% or more	Is this the percentage of the total floor space within the facility that is served by mechanical heating equipment?	95% of the Bldg is heated	☑

CRITERION	VALUE AS ENTERED IN PORTFOLIO MANAGER	VERIFICATION QUESTIONS	NOTES	
Gross Floor Area	116,988 Sq. Ft.	Is this the total square footage of the entire parking area (enclosed + nonenclosed + open floor area)?		☑

1-11

Enclosed Floor Area	0 Sq. Ft.	Is this the total square footage of the enclosed garage space? An enclosed garage is defined as having both sides and a roof.		☑
Non-Enclosed Floor Area (w/roof)	93,574 Sq. Ft.	Is this the total square footage of the nonenclosed garage space? This is typically defined as the portion of the garage above ground (contains no sides but is under a roof).		☑
Open Floor Area (w/o roof)	23,394 Sq. Ft.	Is this the total square footage of the nonenclosed parking area without a roof? This is typically defined as open parking lots or the very top level of an above ground parking garage.		☑
Weekly Hours of Access	168 Hours	Is this the total number of hours per week when it is possible for a vehicle to enter or exit?		☑

ENERGY STAR® Data Checklist for Commercial Buildings

Energy Consumption

Power Generation Plant or Distribution Utility: Westar Energy Inc

Fuel Type: Electricity

Meter: Westar (kWh (thousand Watt-hours))
Space(s): Entire Facility
Generation Method: Grid Purchase

Start Date	End Date	Energy Use (kWh (thousand Watt-hours))
12/01/2009	12/31/2009	256,000.00
11/01/2009	11/30/2009	225,000.00
10/01/2009	10/31/2009	217,200.00
09/01/2009	09/30/2009	253,800.00
08/01/2009	08/31/2009	309,600.00
07/01/2009	07/31/2009	301,800.00
06/01/2009	06/30/2009	258,600.00
05/01/2009	05/31/2009	254,400.00
04/01/2009	04/30/2009	231,600.00
03/01/2009	03/31/2009	238,800.00
02/01/2009	02/28/2009	237,000.00
01/01/2009	01/31/2009	263,400.00
Westar Consumption (kWh (thousand Watt-hours))		**3,046,200.00**
Westar Consumption (kBtu (thousand Btu))		**10,393,634.40**
Total Electricity (Grid Purchase) Consumption (kBtu (thousand Btu))		**10,393,634.40**
Is this the total Electricity (Grid Purchase) consumption at this building including all Electricity meters?		☒

Fuel Type: Natural Gas

Meter: KS Gas ONEOK (cf (cubic feet))
Space(s): Entire Facility

Start Date	End Date	Energy Use (cf (cubic feet))
12/01/2009	12/31/2009	575.00
11/01/2009	11/30/2009	531.00
10/01/2009	10/31/2009	31.00
09/01/2009	09/30/2009	0.00
08/01/2009	08/31/2009	0.00
07/01/2009	07/31/2009	0.00
06/01/2009	06/30/2009	72.00
05/01/2009	05/31/2009	438.00
04/01/2009	04/30/2009	795.00
03/01/2009	03/31/2009	917.00

02/01/2009	02/28/2009	1,520.00
01/01/2009	01/31/2009	1,589.00
KS Gas ONEOK Consumption (cf (cubic feet))		**6,468.00**
KS Gas ONEOK Consumption (kBtu (thousand Btu))		**6,655.57**
Total Natural Gas Consumption (kBtu (thousand Btu))		**6,655.57**
Is this the total Natural Gas consumption at this building including all Natural Gas meters?		☑

Additional Fuels	
Do the fuel consumption totals shown above represent the total energy use of this building? Please confirm there are no additional fuels (district energy, generator fuel oil) used in this facility.	☑

On-Site Solar and Wind Energy	
Do the fuel consumption totals shown above include all on-site solar and/or wind power located at your facility? Please confirm that no on-site solar or wind installations have been omitted from this list. All on-site systems must be reported.	There are no on-site solar or wind installations ☑

Certifying Professional

(When applying for the ENERGY STAR, the Certifying Professional must be the same as the PE that signed and stamped the SEP.)

Name: Ann Adams / Ann Adams Date: 2/16/2010

Signature: Ann Adams

Signature is required when applying for the ENERGY STAR.

1-14

FOR YOUR RECORDS ONLY. DO NOT SUBMIT TO EPA.

Please keep this Facility Summary for your own records; do not submit it to EPA. Only the Statement of Energy Performance (SEP), Data Checklist and Letter of Agreement need to be submitted to EPA when applying for the ENERGY STAR.

Facility
800 SW Jackson
800 SW Jackson
Topeka, KS 66612

Facility Owner
8th & Jackson Investment Group, L.L.C.
201 S Kansas Ave
Topeka, KS 66603

Primary Contact for this Facility
Ann Adams
201 S Kansas Ave
Topeka, KS 66603

General Information

800 SW Jackson	
Gross Floor Area Excluding Parking: (ft²)	141,653
Year Built	1969
For 12-month Evaluation Period Ending Date:	December 31, 2009

Facility Space Use Summary

800 SW Jackson		800 SW Parking Lot	
Space Type	Office	Space Type	Parking
Gross Floor Area(ft2)	141,653	Gross Floor Area(ft2)	116,968
Weekly operating hours	60	Enclosed Floor Area	0
Workers on Main Shift	189	Non-Enclosed Floor Area (w/roof)	93,574
Number of PCs	280	Open Floor Area (w/o roof)	23,394
Percent Cooled	50% or more	Weekly Hours of Access	168
Percent Heated	50% or more		

Energy Performance Comparison

	Evaluation Periods		Comparisons		
Performance Metrics	Current (Ending Date 12/31/2009)	Baseline (Ending Date 12/31/2009)	Rating of 75	Target	National Average
Energy Performance Rating	61	61	75	N/A	50
Energy Intensity					
Site (kBtu/ft²)	73	73	63	N/A	83
Source (kBtu/ft²)	245	245	210	N/A	276
Energy Cost					
$/year	$ 282,544.13	$ 282,544.13	$ 242,387.60	N/A	$ 318,333.57
$/ft²/year	$ 1.99	$ 1.99	$ 1.71	N/A	$ 2.24
Greenhouse Gas Emissions					
MtCO2e/year	2,724	2,724	2,337	N/A	3,069
kgCO2e/ft²/year	19	19	16	N/A	21

More than 50% of your building is defined as Office. Please note that your rating accounts for all of the spaces listed. The National Average column presents energy performance data your building would have if your building had an average rating of 50.

Notes:
o - This attribute is optional.
d - A default value has been supplied by Portfolio Manager.

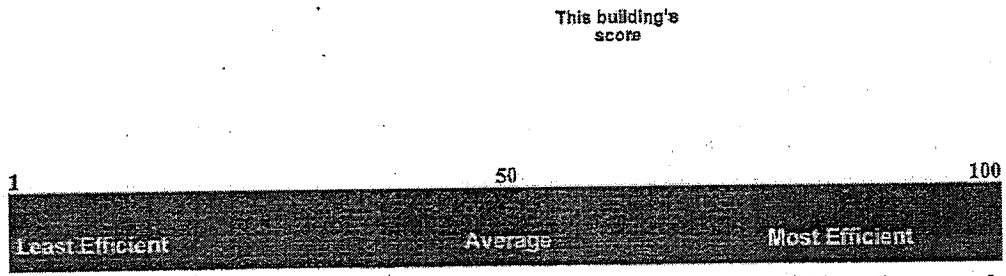
Statement of Energy Performance

2009

800 SW Jackson
800 SW Jackson
Topeka, KS 66612

Portfolio Manager Building ID: 1994946

The energy use of this building has been measured and compared to other similar buildings using the Environmental Protection Agency's (EPA's) Energy Performance Scale of 1–100, with 1 being the least energy efficient and 100 the most energy efficient. For more information, visit energystar.gov/benchmark.



This building uses 245 kBtu per square foot per year.*

*Based on source energy intensity for the 12 month period ending December 2009

Buildings with a score of 75 or higher may qualify for EPA's ENERGY STAR.

I certify that the information contained within this statement is accurate and in accordance with U.S. Environmental Protection Agency's measurement standards, found at energystar.gov

Date of certification

Date Generated: 02/16/2010

1-16

Improvements to Eighth & Jackson to Improve Energy Efficiency.
The Owner's maintenance staff is continually looking for energy saving equipment and only consider highly rated energy saving equipment when making any and all repairs or replacements to the Building or the Building equipment. The owner has spent approximately $150,000 in the last five years on various repairs and replacement for energy saving Building repairs and/or equipment replacement including but not limited to the following:

Windows and the Building seams are caulked on a routine base with one side per year scheduled, and over the last three years the east, north and south side have been caulked. The west side is scheduled for 2010.

Mechanical/HVAC Systems. Heating was originally provided by 24 Hydropulse boilers each generating 150,000 Btu's. These boilers were installed in 1983 and two of these boilers are replaced at a time as needed with Weil-McLain Ultra gas-fired water boilers. Owner has replaced six of the Hydorpulse boilers with three of the new smaller more energy efficient boilers and the remainder will be replaced as needed. Historically two to four boilers are replaced in one year.

The chillers are being refurbished in 2010 to make them more energy efficient.

The Building has an energy management system that was replaced in 2007. This is a computer controlled Honeywell web based energy management system that controls the schedules and temperatures for all HVAC equipment as well as exterior lighting.

The Owner has installed freight drives on motors to reduce electrical usage on the lower level air handler, two water pumps, and the two cooling tower fans.

KANSAS
DEPARTMENT OF ADMINISTRATION

Mark Parkinson, Governor
Marilyn Jacobson, Director
http://da.ks.gov/fm

April 1, 2010

The Honorable Dwayne Umbarger, Chairperson
Joint Committee on State Building Construction
c/o Audrey A. Dunkel, Senior Fiscal Analyst
Legislative Research Department
68-W, State Capitol Building
Topeka, Kansas 66612

RE: Report of change orders for and status of State construction projects

Dear Chairperson Umbarger:

Pursuant to K.S.A. 75-1264 as amended, I am reporting to the Joint Committee on State Building Construction as to change orders of less than $125,000 which have been approved by this office. The enclosed documents reflect change orders which occurred during the month of March 2010, and the current status of major projects under construction.

Should any questions arise concerning this matter, please feel free to contact me at 368-6484.

Sincerely yours,

Gary L. Hibbs, Manager
Facilities Planning, Design & Construction

GLH:sk
Encl.

pc: Senator Pat Apple
Senator Jay Emler
Senator Marci Francisco
Senator Laura Kelly
Representative Steve Brunk
Representative Bill Feuerborn
Representative Robert Grant
Representative Mitch Holmes
Representative Jo Ann Pottorff
Secretary of Administration Duane A. Goossen
James Wilson, Office of Revisor of Statutes
Matt Sterling, Office of Revisor of Statutes
Vicki Helsel, Division of the Budget
Audrey A. Dunkel, Legislative Research Dept.

DIVISION OF FINANCE AND FACILITIES
900 SW Jackson, Room 600-N, Topeka, KS 66612-1220 • (785
e-mail: marilyn.jacobson@da.ks.

FPDC Form 460
Revised August ~~8, 2007~~

STATE AGENCY MUST FILL IN
FUND: 682-8880-10-8094
P.O. No.: A0041344

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
Web Site http://da.ks.gov/fp

Project Title:	Kansas Law Enforcement Training Center – Phase 2, Pkg 1	Project No.:	A-010407
Agency:	University of Kansas, Design and Construction Management	Date:	January 27, 2010
Institution & Location:	University of Kansas, Continuing Education Kansas Law Enforcement Training Center, Hutchinson, KS	Change Order No.:	08
Building No.	NA	Net Amount of Change:	$ 30,388.00
A/E Firm:	Treanor Architects, P.A.		show deduct amts in ( )

DFM Approval Planner
RSS
3-9-10

A Brief Description of Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
Item No. 1 (PR No. 14 / PCO No. 30R1): Provide 20' x 36" dia. RCP stormwater culvert extensions and KDOT Type IV End Sections at Sta. 11 + 70, Alignment 'A' and at Sta. 100 + 46, Alignment 'C', with additional embankment material and revised grading, as described in PR No. 14.	Initiated by:	1	$23,441.00
	Result of:	B	
Item No. 2 (PCO No. 33): Remove existing deteriorated concrete shoulder pavement and replace with compacted fill and topsoil, as requested by the Owner during the 01/19/10 Progress Meeting. Extend Contract Time 5 Calendar Days.	Initiated by:	2	$6,947.00
	Result of:	C	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from Continuation Sheet(s)			0

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	2,469,800.00
Net change by previous Change Orders	$	465,907.00
The Contract Sum prior to this Change Order was	$	2,935,707.00
The Contract Sum will be ☒ increased ☐ decreased ☐ unchanged by this Change Order (Double click on check boxes)	$	30,388.00
The New Contract Sum including this Change Order will be	$	2,966,095.00
The Contract time will be ☒ increased ☐ decreased ☐ unchanged by (Double click on check boxes)		Five (5) Days
The Date of Completion as of the date of this Change Order therefore is		March 26, 2010 (Date)

APPROVALS

Contractor Name and Address
The Law Company, Inc.
345 Riverview
Wichita, KS 67203-4297

Theresa Goodyear 2/17/10
Head of State Agency Signature **Date**

2/1/2010
Contractor's Signature Richard M. Kerschen President **Date**

3-9-10
Director of Facilities Management Signature **Date**

Richard K. Tilghman 01/27/2010
Project Architect/Engineer Signature **Date**

MAR 10 2010
Director of Accounts and Reports Signature **Date**

3/10/10

FPDC Form 460
Revised August 8, 2007

STATE AGENCY MUST FILL IN
FUND: 682-8880-10-8094
P.O. No.: A0041344

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-3899 FAX 785-296-8898
Web Site http://da.ks.gov/fp

Project Title:	Kansas Law Enforcement Training Center – Phase 2, Pkg 1	Project No.:	A-010407
Agency:	University of Kansas, Design and Construction Management	Date:	February 25, 2010
Institution & Location:	University of Kansas, Continuing Education Kansas Law Enforcement Training Center, Hutchinson, KS	Change Order No.:	09
Building No.	NA	Net Amount of Change:	$ 27,900.00
A/E Firm:	Treanor Architects, P.A.	show deduct amts in ( )	

DFM Approval Planner
RSS
3-26-10

A Brief Description of Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. **Use continuation sheet if necessary** & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Item No. 1 (PR No. 16 / PCO No. 35R1): Provide foundation insulation, hatch cover insulation, additional backfill, and electrical work at the Skid Pad Valve Vault and Backflow Preventer Vault, as described in PR No. 16, PCO NO. 35R1 and subsequent revisions. (Electrical work shall include thermostatically-controlled heat trace for the backflow preventer, and a weatherproof convenience outlet in the backflow preventer vault.)	Initiated by: Result of:	1 B	$6,644.00
Item No. 2 (PR No. 17 / PCO No. 36): Provide fertilizer, seed and mulch for the 17.9 acres of clearing and grubbing area that are not included in the 62.9 acres required to be fertilized, seeded and mulched in the Summary of Seeding Quantities on Sheet C183.	Initiated by: Result of:	1 B	$15,828.00
Item No. 3 (PCO No. 37): Remove and replace existing deteriorated pavement and subgrade at two locations on the Skills Pad, with AB-3 subgrade and 8" thick concrete pavement, as described in PCO No. 37.	Initiated by: Result of:	2 C	$5,428.00
	Initiated by: Result of:		
	Initiated by: Result of:		
	Initiated by: Result of:		
	Subtotal from Continuation Sheet(s)		0

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	2,469,800.00
Net change by previous Change Orders	$	496,295.00
The Contract Sum prior to this Change Order was	$	2,966,095.00
The Contract Sum will be ☒ increased ☐ decreased ☐ unchanged by this Change Order (Double click on check boxes)	$	27,900.00
The New Contract Sum including this Change Order will be	$	2,993,995.00
The Contract time will be ☒ increased ☐ decreased ☐ unchanged by (Double click on check boxes)		Six (6) Days
The Date of Completion as of the date of this Change Order therefore is		April 1, 2010 (Date)

APPROVALS

Contractor Name and Address
The Law Company, Inc.
345 Riverview
Wichita, KS 67203-4297

Contractor's Signature Richard M. Kerschen President — Date 3-1-10

Project Architect/Engineer Signature — Date 02/25/2010

Head of State Agency Signature — Date 3/8/10

for Director of Facilities Management Signature — Date 3-26-10

Director of Accounts and Reports Signature — Date MAR 26 2010

3/29/10

2-3

FPDC Form 460
Revised January 1, 2009

STATE AGENCY MUST FILL IN	
Fund	682-8001-10-F328
PO No	A0041361

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-3899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

				DFM Approval Planner
Project Title:	Blake Hall, replace chiller	Project A#010617	KU#017/5463	
Agency:	Design and Construction Management	Date:	1/14/2010	
Institution & Location:	University of Kansas, Lawrence KS	Change Order No.	3	
Building Number:	17	Net Amount of Change:	$885.00 show deduct in ( )	
A / E Firm:				

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
modifications to exhaust duct	Initiated by:	1	$885.00
	Result of:	d	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Subtotal from continuations sheets		

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	218,800.00
Net change by previous Change Orders	$	11,840.00
The Contract Sum prior to this Change Order was	$	230,640.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	885.00
The New Contract Sum including this Change Order will be	$	231,525.00
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged	0	Days
The Date of Completion as of the date of this Change Order therefore is		

APPROVALS

Contractor Name and Address
BCI Mechanical Inc.
PO Box 441
Gardner KS 66030

[signature] 2/12/10
Head of State Agency Signature Date

[signature] 1/21/10
Contractor's Signature Date

[signature] 3-9-10
for Director of Facilities Management Signature Date

NW 3/2/10
2.3.10 Kent E. Olson 2-4
MAR 1 0 2010

FPDC form 4...
Revised January 1, 2009

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

DFM Approval Planner
TRS
3-2-10

Project Title:	K-State Center for Child Development	Project No.:	A-010662 Rev
Agency:	Kansas State University	Date:	January 21, 2010
Institution & Location:	Manhattan, Kansas	Change Order No.	2
Building Number:		Net Amount of Change:	$9,499.60
A / E Firm:	Gould Evans Associates		show deduct in ( )

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
PR #6: Excavation Remobilization	Initiated by:	1	$4,510.00
	Result of:	D	
PR #7: Revised Water Line	Initiated by:	2	$4,989.60
	Result of:	C	
Weather Days: Snowstorms November (5 days) through December (4 days) 9 days total	Initiated by:	4	
	Result of:	C	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
		Subtotal from continuations sheets	

APPROVED: 2/4/10
DIRECTOR OF FACILITIES PLANNING
KANSAS STATE UNIVERSITY

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	3,539,997.00
Net change by previous Change Orders	$	17,827.03
The Contract Sum prior to this Change Order was	$	3,557,824.03
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	9,499.60
The New Contract Sum including this Change Order will be	$	3,567,323.63
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged	9	Days
The Date of Completion as of the date of this Change Order therefore is	September 8, 2010	

APPROVALS EH&E DR REE 2-8-10 DCM 2-4-10

Contractor Name and Address
FIRST MANAGEMENT, INC
P.O. 1797 601 N. IOWA
LAWRENCE, KS 66044

Contractor's Signature — Date 1/22/10

Project Architect/Engineer Signature — Date 1/21/10

2-8-10

Head of State Agency Signature — Date 2-11-10

Director of Facilities Management Signature — Date 3-2-10

Director of Accounts and Reports Signature — Date MAR 09 2010

3/9/10

FEB 08 2010

2-5

460

ed January 1, 2009

STATE OF KANSAS

DEPARTMENT OF ADMINISTRATION

DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 S'W JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

Project Title:	Crisis City	Project No.:	A-010676; DOFE T180
Agency:	Adjutant General's Department	Date:	December 21, 2009
Institution & Location:	Smoky Hill Weapons Range, Salina, Kansas	Change Order No.	THREE (03)
Building Number:	03400-06100	Net Amount of Change:	$3,556.00
A / E Firm:	Tevis Architectural Group		show deduct in ( )

DFM Approval Planner
PSS
3-2-10

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
Provide six each Category 6 Patch Panels in place of 12 each 110 Blocks in Communication Room. Reference attached Change Order Request No. 07, Rev. 1.	Initiated by:	2	$1,693.00
	Result of:	C	
Replace broken bottom pivot at north aluminum storefront entrance door.	Initiated by:	4	$1,863.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	5,043,761.00
Net change by previous Change Orders	$	(3,263.16)
The Contract Sum prior to this Change Order was	$	5,040,497.84
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	3,556.00
The New Contract Sum including this Change Order will be	$	5,044,053.84
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged		0 Days
The Date of Substantial Completion as of the date of this Change Order therefore is		September 13, 2009

APPROVALS

Contractor Name and Address
Gracon Corporation
7221 East US Highway 34
P.O. Box 869
Loveland, Colorado 80537-8956

Todd M Bunting 12 Feb 10
Head of State Agency Signature Date

Richard Veronemann 1/4/10
Contractor's Signature Date

for Gary S Hulbs 3-2-10
Director of Facilities Management Signature Date

12-28-09

MAR 09 2010

2-6

FP n 460 · ·

RECEIVED
JAN 0 8 2010
COMPTROLLER AGKS

STATE OF K
DEPARTMENT OF ADMINISTR
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
Web Site http://da.ks.gov/fp

STATE AGENCY MUST FILL IN
FUND:
P.O. No.:

CONTRACT CHANGE ORDER

Project Title:	Office Refurbishment – State Defense Building Phase III	Project No.:	A-010681
Agency:	Adjutant General's Department (DOFE #A-339)	Date:	11–23
Institution & Location:	131 SW 27th St., Topeka, KS 66611	Change Order No.:	2
Building No.	100	Net Amount of Change:	$ 7166 ~~6,918~~ show deduct amts in ( )
A/E Firm:	HTK Architects, P.A.		

DFM Approval Planner
BSS
3-2-10

A Brief Description of Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. **Use continuation sheet if necessary** & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Change Order Request #03: Fire Sprinkler Drops-Suite 15	Initiated by:	4	$569
	Result of:	D	
Change Order Request #04: Room 120 Flooring. Materials only.	Initiated by:	2	$430
	Result of:	C	
Proposal Request #05R2: Duplex Receptacle in Room 105	Initiated by:	2	$746
	Result of:	C	
Proposal Request #06: Door Hardware	Initiated by:	1	$3,707
	Result of:	B	
Proposal Request #07: Room 120 Electrical Work	Initiated by:	2	$1,466
	Result of:	C	
Proposal Request #08: Room 108 Thermostat Relocation	Initiated by:	1	$248
	Result of:	D	
	Initiated by:		
	Result of:		
Subtotal from Continuation Sheet(s)			n/a

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	267,900
Net change by previous Change Orders	$	56,191
The Contract Sum prior to this Change Order was	$	324,091
The Contract Sum will be ☒ increased ☐ decreased ☐ unchanged by this Change Order	$	7,166
The New Contract Sum including this Change Order will be	$	331,257
The Contract time will be ☐ increased ☐ decreased ☒ unchanged by		0 weeks
The Date of Completion as of the date of this Change Order therefore is		Per delivery of door hardware

APPROVALS

Contractor Name and Address
B.A. GREEN CONST. CO. INC.
P.O. BOX 8
LAWRENCE, KS. 66044

Contractor's Signature — Date: 11/25/09

Project Architect/Engineer Signature — Date: 11-29-09

3/9/10

Head of State Agency Signature — Date: 12-2-10

Director of Facilities Management Signature — Date: 3-2-10

Director of Accounts and Reports Signature — Date: MAR 09 2010

2-7

DC Form 460

STATE AGENCY MUST FILL IN
FUND:
P.O. No.:

CONTRACT CHANGE ORDER

RECEIVED FEB 25 2010 COMPTROLLER AGKS

KANSAS DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
Web Site http://da.ks.gov/fp

Project Title:	Office Refurbishment – State Defense Building Phase III	Project No.:	A-010681	DFM Approval Planner
Agency:	Adjutant General's Department (DOFE #A-339)	Date:	11-25	RGS
Institution & Location:	131 SW 27th St., Topeka, KS 66611	Change Order No.:	3	3-16-10
Building No.	100	Net Amount of Change:	$ 2,157 (show deduct amts in ( ))	
A/E Firm:	HTK Architects, P.A.			

A Brief Description of Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Proposal Request #03: Door Hardware & Hardware Revisions	Initiated by:	4	$2,157
	Result of:	D	
	Initiated by:	2	
	Result of:	C	
	Initiated by:	2	
	Result of:	C	
	Initiated by:	1	
	Result of:	B	
	Initiated by:	2	
	Result of:	C	
	Initiated by:	1	
	Result of:	D	
	Initiated by:		
	Result of:		
	Subtotal from Continuation Sheet(s)		n/a

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$ 267,900
Net change by previous Change Orders	$ 63,357
The Contract Sum prior to this Change Order was	$ 331,257
The Contract Sum will be ☒ increased ☐ decreased ☐ unchanged by this Change Order	$ 2,157
The New Contract Sum including this Change Order will be	$ 333,414
The Contract time will be ☐ increased ☐ decreased ☒ unchanged by	0 weeks
The Date of Completion as of the date of this Change Order therefore is	Per delivery of door hardware

APPROVALS

Contractor Name and Address
D.A. Green Construction Co., Inc.
P.O. Box 8
Lawrence, Kansas 66044

		[signature] Head of State Agency Signature	Date
[signature] Contractor's Signature	12/16/09 Date	[signature] Director of Facilities Management Signature	3-16-10 Date
[signature] Project/Architect/Engineer Signature	11-25-09 Date	[signature] Director of Accounts and Reports Signature	MAR 17 2010 Date

2-8

FPDC form 460

~~Revised~~ January 1, 2009

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8199 FAX 785-296-8896
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN	
Fund	6287-2545-10-0700
PO No	A0041394

Project Title:	Kansas Memorial Union - Relocate KJHK Radio	Project No.:	~~A-010669~~ A-010695
Agency:	University of Kansas	Date:	February 23, 2010
Institution & Location:	University of Kansas, Lawrence, Kansas	Change Order No.	One
Building Number:	68200-00002	Net Amount of Change:	$ 10,014.00 (show deduct in ( ))
A / E Firm:	SLEMMONS ASSOCIATES architects, p.a.		

DFM Approval Planner: 3-22-10

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
CO 1-1: Provide added 10 mil vapor barrier on exterior walls on room side of new Type H partitions in Rooms 370, 370A, 370B1, 370B2, 370B3, and 370B4. See RFP e-mail from Architect, dated 02.01.10 (1 page), and proposal from the Contractor, dated 02.01.10 (1 page). **Add to the Contract Amount.....**	Initiated by:	4	$ 963.00
	Result of:	D	
CO 1-2: Provide added wood blocking in between studs in Rooms 370B4 and 370C as discussed on-site with KJHK representatives. See proposal from the Contractor, dated 01.18.10 (1 page). **Add to the Contract Amount.....**	Initiated by:	2	$ 306.00
	Result of:	C	
CO 1-3: Relocate a portion of the existing fire sprinkler line to allow new HVAC ductwork to be installed. See RFP from the Architect, dated 12.31.09 (1 page), and proposal from the Contractor, dated 01.04.10 (2 pages). **Add to the Contract Amount.....** **Add to the Contract Time.....10 days**	Initiated by:	4	$ 1,882.00
	Result of:	B	
CO 1-4: Revise door hardware for Doors 307B adn 370C-1 to delete electric strikes and provide electric locksets. See RFP from the Architect, dated 12.23.09 (4 pages), and proposal from the Contractor, dated 01.05.10 (3 pages). **Add to the Contract Amount.....** **Add to the Contract Time.....14 days**	Initiated by:	4	$ 1,947.00
	Result of:	C	
CO 1-5: Modify partition Type "A" between Rooms 370B4 and 370C as shown on Revision Drawing RA1.0, dated 12.23.09. See RFP from the Architect, dated 12.23.09 (2 pages), and proposal from the Contractor, dated 12.29.09 (1 page). **Add to the Contract Amount.....**	Initiated by:	1	$ 525.00
	Result of:	A	
CO 1-6: Add speaker conduit and additional J-box in Studio 370B4 and Production 1 370B3 per request from KJHK representatives and modify speaker conduit size from 1 1/2" to 2" . See RFP e-mail from the Architect, dated 01.21.10 (1 page), and proposal from the Contractor, dated 01.22.10 (3 pages). **Add to the Contract Amount.....**	Initiated by:	2	$ 732.00
	Result of:	C	
CO 1-7: Add rough-in for 3 future fire alarm visual display lights in Rooms 370B2, 370B3, and 370B4. See proposal from the Contractor, dated 02.10.10 (4 pages). **Add to the Contract Amount.....** **Add to the Contract Time.....5 days**	Initiated by:	2	$ 3,659.00
	Result of:	C	
	Subtotal from continuations sheets		

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	241,000.00
Net change by previous Change Orders	$	-
The Contract Sum prior to this Change Order was	$	241,000.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	10,014.00
The New Contract Sum including this Change Order will be	$	251,014.00
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged **Twenty-Nine**	29	Days
The Date of Completion as of the date of this Change Order therefore is **March 30, 2010**		

APPROVALS

Contractor Name and Address

RMT
P.O. Box 2225
Olathe, KS 66051

Contractor's Signature — Date: 02/26/10

Head of State Agency Signature — Date: 3/4/10

Director of Facilities Management Signature — Date: 3-25-10

2-9

FPDC form 460
Revised January 1, 2009

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http://da.ks.gov/fp

Project Title:	12.5kV Distribution System Modifications	Project No.:	A-010700
Agency:	Board of Regents	Date:	February 11, 2010
Institution & Location:	Kansas State University, Manhattan, Kansas	Change Order No.	6
Building Number:	N/A	Net Amount of Change:	$27,001.00
A / E Firm:	Morrow Engineering, Inc.		show deduct in ( )

DFM Approval Planner
MW
3/10/10

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
1) (PCO #26) Removal of Wind Erosion Switch from M52-C	Initiated by:	2	$8,713.00
	Result of:	D	
2) (PCO #24) Replace Vista 624 by Throckmorton Hall to increase electrical capacity	Initiated by:	1	$5,085.00
	Result of:	D	
3) (PCO #44) Replace Vista 422 by Derby to increase electrical capacity	Initiated by:	1	$5,133.00
	Result of:	D	
4) (PCO #29) Alternate Chiller Plant temporary generator use	Initiated by:	1	($6,267.00)
	Result of:	C	
5) (PCO #35) M58-W top upgrade for cable backfeed and switch removal, south of Coles Hall	Initiated by:	4	$5,983.00
	Result of:	D	
6) (PCO #41) M06-E conduit modifications; Between Petticoat Ln. and Campus Creek Rd.	Initiated by:	1	$3,343.00
	Result of:	D	
7) (PCO #42) Locate then modify undocumented manhole northeast of Derby	Initiated by:	4	$5,011.00
	Result of:	D	
	Subtotal from continuations sheets		

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	1,135,000.00
Net change by previous Change Orders	$	906,571.00
The Contract Sum prior to this Change Order was	$	2,041,571.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	27,001.00
The New Contract Sum including this Change Order will be	$	2,068,572.00
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged		43 Days
The Date of Completion as of the date of this Change Order therefore is		September 23, 2010

APPROVALS

Contractor Name and Address
Torgeson Electric Co
711 W 1st Street
Topeka, KS 66603

Contractor's Signature 02/11/10 **Date**

Project Architect/Engineer Signature 02/18/10 **Date**

APPROVED: 2/25/10
DIRECTOR OF FACILITIES PLANNING
KANSAS STATE UNIVERSITY

2/25/10

Head of State Agency Signature 3/4/10 **Date**

Director of Facilities Management Signature 3-16-10 **Date**

Director of Accounts and Reports Signature MAR 10 2010 **Date**

3/11/10

2-10

FPDC form 400
Revised January 1, 2009

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

Project Title:	Eastman Building Renovation	Project No.:	A-010837	DFM Approval Planner
Agency:	Kansas Department of Labor	Date:	March 4, 2010	RSS
Institution & Location:	Kansas Department of Labor, Topeka, KS	Change Order No.	TEN	3-16-10
Building Number:	29600-00031	Net Amount of Change:	$29,434.40	
A / E Firm:	Emig and Associates, Architects		show deduct in ( )	

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
RFP #48 and RMT Proposal dated February 3, 2010; fire caulking at existing penetrations through concrete floor	Initiated by:	3	$4,998.40
	Result of:	D	
RFP #52 and RMT Proposal dated February 9, 2010; additional 1/2" blocking at top of wall, increase thickness of foam insulation to 1.5", additional caulking at bottom of wall.	Initiated by:	1	$1,210.00
	Result of:	D	
RFP #53 and RMT Proposal dated February 15, 2010; Additional wire basket raceway and misc. electrical work, new HVAC system, and room ugrades for new ground floor DISC room	Initiated by:	2	$22,629.00
	Result of:	C	
RFP #54 and RMT Proposal dated February 15, 2010; remove existing drinking fountain and repair wall finishes in Cooridor	Initiated by:	2	$597.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Subtotal from continuations sheets		$0.00

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	530,500.00
Net change by previous Change Orders	$	398,339.25
The Contract Sum prior to this Change Order was	$	928,839.25
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	$29,434.40
The New Contract Sum including this Change Order will be	$	958,273.65
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged		14 Days
The Date of Completion as of the date of this Change Order therefore is July 06, 2010		

APPROVALS

Contractor Name and Address

RMT Construction Co., Inc.
P.O. Box 2225
Olathe, KS 66051

[signature] 10 Mar 2010
Head of State Agency Signature — Date

[signature] 3/4/10
Contractor's Signature — Date

for [signature] 3-16-10
Director of Facilities Management Signature — Date

[signature] 3.4.2010 [signature]

MAR 17 2010
2-11

A-C.C 8??

AIA® Document G701™ – 2001

Change Order

PROJECT *(Name and address)*:	**CHANGE ORDER NUMBER:** 001	OWNER: ☐
Kansas Bioscience Venture Accelerator	**DATE:** 02/28/2010	ARCHITECT: ☐
10900 South Roundtree		CONTRACTOR: ☐
Olathe, KS 66061		
TO CONTRACTOR *(Name and address)*:	**ARCHITECT'S PROJECT NUMBER:** A-10889	FIELD: ☐
Excel Constructors, Inc.	**CONTRACT DATE:** November 13, 2009	OTHER: ☐
8041 W 47th St	**CONTRACT FOR:** General Construction	
Overland Park KS 66203		

THE CONTRACT IS CHANGED AS FOLLOWS:
(Include, where applicable, any undisputed amount attributable to previously executed Construction Change Directives)

Add all work associated with Architet's Proposal Request #1 (ECI COR 1-2R); Architect's Propsal Request #2 (ECI COR 1-1); Architect's Supplemental Instruction #3R (ECI COR-3R); Additional Concrete Costs due to Rock (ECI COR-4). – See attached.

The original Contract Sum was	$	10,631,200.00
The net change by previously authorized Change Orders	$	0.00
The Contract Sum prior to this Change Order was	$	10,631,200.00
The Contract Sum will be increased by this Change Order in the amount of	$	46,145
The new Contract Sum including this Change Order will be	$	10,677,345.00

The Contract Time will be increased by Zero (0) days.
The date of Substantial Completion as of the date of this Change Order therefore is February 25, 2011.

NOTE: This Change Order does not include changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.

Peckham, Guyton, Athers, Viets	Excel Constructors, Inc.	Kansas Bioscience Authority
ARCHITECT *(Firm name)*	**CONTRACTOR** *(Firm name)*	**OWNER** *(Firm name)*
1900 West 47th Place, Ste. 100, Westwood, KS 66205	8041 W 47th St, Overland Park KS 66203	25501 West Valley Parkway, Ste. 100, Olathe, KS 66061
ADDRESS	**ADDRESS**	**ADDRESS**
BY *(Signature)*	**BY** *(Signature)*	**BY** *(Signature)*
GALEN LIF	Michael E. Johnson	Thomas V Thornton
(Typed name)	*(Typed name)*	*(Typed name)*
3.9.10	3.8.10	3-10-10
DATE	**DATE**	**DATE**

3/17/10

2-12

Change Order Request 1-1

Excel Constructors, Inc.
8041 W. 47th Street, Suite 200
Overland Park, KS 66203-5390
913-261-1000 913-261-1001

Distribution List			Control No
Kansas Bioscience Authority-Gary Micheel Kansas Dept of Facilities Mgmt-Mark Seman Kansas Dept of Facilities Mgmt-Ray Smith Peckham, Guyton, Albers, & Viets-Galen Lif Excel Constructors, Inc.-Kerry D. Winter	Date Project No Project CO/PR No A/E Control No	1/22/2010 EC-09-028 KS Bioscience Park Venture Accelerator #A-10889 KBP #08 7080 Base Bid 1 PR-2	34

This proposal is valid for 10 calendar days

This proposal requires the addition of 0 calendar days for completion of this contract

Description

Per Architect Proposal Request No. 2: Furnish and Install a compressed air clean out at the lake water intake screen.

Work Type	Cost	MU Rate	Cost + MU
Self-Performed Work	162	20.00%	$194
Work by Others	20,586	10.00%	$22,645
(See Attached Breakdown)			
		Sub Total	$22,839
			0
		Total	$22,839

Approval	Signature
Owner [signature] Date Feb. 8, 2010 Architect [signature] Date 2.8.10	[signature] Kerry D. Winter 1/22/2010 Project Manager

Change Order Request 1-2R

Excel Constructors, Inc.
8041 W. 47th Street, Suite 200
Overland Park, KS 66203-5390
913-261-1000 913-261-1001

Distribution List
Kansas Bioscience Authority-Gary Micheel
Kansas Dept of Facilities Mgmt-Mark Seman
Kansas Dept of Facilities Mgmt-Ray Smith
Peckham, Guyton, Albers, & Viets-Galen Lif
Excel Constructors, Inc.-Kerry D. Winter

Date	1/26/2010
Project No	EC-09-028
Project	KS Bioscience Park Venture Accelerator #A-10889 KBP #08 7080 Base Bid
CO/PR No	2R
A/E Control No	PR-1

Control No
25

This proposal is valid for 10 calendar days

This proposal requires the addition of 0 calendar days for completion of this contract

Description

Per Proposal Request No. 1: Provide under slab conduit and power revisions.

Work Type	Cost	MU Rate	Cost + MU
Self-Performed Work	0	20.00%	$0
Work by Others	14,681	10.00%	$16,149
(See Attached Breakdown)			
		Sub Total	$16,149
			0
		Total	$16,149

Approval	Signature
Owner [signature] Date Feb 8 2010	[signature] Kerry D. Winter, Project Manager 1/26/2010
Architect [signature] Date 2.8.10	

Change Order Request 1-3R

Excel Constructors, Inc.
8041 W. 47th Street, Suite 200
Overland Park, KS 66203-5390
913-261-1000 913-261-1001

Distribution List
Kansas Bioscience Authority-Gary Micheel
Kansas Dept of Facilities Mgmt-Mark Seman
Kansas Dept of Facilities Mgmt-Ray Smith
Peckham, Guyton, Albers, & Viets-Galen Lif
Excel Constructors, Inc.-Kerry D. Winter

Date	3/2/2010
Project No	EC-09-028
Project	KS Bioscience Park Venture Accelerator #A-10889 KBP #08 7080 Base Bid
CO/PR No	3
A/E Control No	ASI-3

Control No

17

This proposal is valid for **10** calendar days

This proposal requires the addition of **0** calendar days for completion of this contract

Description

Per ASI-3R: Modify the depth of the elevator (EL-2) hoist way and modify the Control Closet configurations and doors. In order to meet CODE, install a sheet metal cover with 75 degree beveled edges at the bottom floor of each elevator shaft to restrict access to the elevator pit curb.

Work Type	Cost	MU Rate	Cost + MU
Self-Performed Work	0	20.00%	$0
Work by Others	2,591	10.00%	$2,850
(See Attached Breakdown)			
		Sub Total	$2,850
			0
		Total	$2,850

Approval	Signature
Owner _____	Kerry D. Winter 3/2/2010
Date 3/10/10	Project Manager
Architect _____	
Date 3.3.10	

Change Order Request 1-4

Excel Constructors, Inc.
8041 W. 47th Street, Suite 200
Overland Park, KS 66203-5390
913-261-1000 913-261-1001

Distribution List			Control No
Kansas Bioscience Authority-Gary Micheel Kansas Dept of Facilities Mgmt-Mark Seman Kansas Dept of Facilities Mgmt-Ray Smith Peckham, Guyton, Albers, & Viets-Galen Llf Excel Constructors, Inc.-Kerry D. Winter	Date Project No Project CO/PR No A/E Control No	2/26/2010 **EC-09-028** **KS Bioscience Park** **Venture Accelerator #A-10889** **KBP #08 7080 Base Bid** 4 Memo-1.151	**41**

This proposal is valid for **10** calendar days

This proposal requires the addition of **0** calendar days for completion of this contract

Description
Additional concrete costs associated with rock excavation.

Work Type	Cost	MU Rate	Cost + MU
Self-Performed Work	0	20.00%	$0
Work by Others	3,915	10.00%	$4,307
(See Attached Breakdown)			
		Sub Total	$4,307
			0
		Total	$4,307

Approval	Signature
Owner [signature] Date 3/10/10 Architect [signature] Date 3.1.10	[signature] Kerry D. Winter 2/26/2010 Project Manager

2-16

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Revised January 1, 2009

STATE AGENCY MUST FILL IN
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CONTRACT CHANGE ORDER

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DEPARTMENT OF A[illegible]RATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

				DFM Approval Planner
Project Title:	Coles Hall - Ceiling & Lighting Improvements	Project No.:	A-011023(A)	w 3/10/10
Agency:	Kansas State University	Date:	2/12/10	
Institution & Location:	Kansas State University, Manhattan, Kansas	Change Order No.	3	
Building Number:	36700-00147	Net Amount of Change:	$1,281.00 show deduct in ( )	
A / E Firm:	Bartlett & West, Inc			

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Provide caulking around perimeter of all surface mounted lighting fixtures.	Initiated by:	4	$1,281.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
APPROVED: 2/25/10 [signature] DIRECTOR OF FACILITIES PLANNING KANSAS STATE UNIVERSITY	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	46,397.00
Net change by previous Change Orders	$	4,477.00
The Contract Sum prior to this Change Order was	$	50,874.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	1,281.00
The New Contract Sum including this Change Order will be	$	52,155.00
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged	2	Days
The Date of Completion as of the date of this Change Order therefore is February 5, 2010		

APPROVALS

Contractor Name and Address
Cheney Construction, Inc.
1125 Hayes Drive
Manhattan, Kansas 66502
785-776-3200

[signature] 2-22-2010
Contractor's Signature **Date**

[signature] 2/12/10
Project Architect/Engineer Signature **Date**

[signature: Bruce Shubert] 3/4/10
Head of State Agency Signature **Date**

[signature] 3-10-10
Director of Facilities Management Signature **Date**

[signature: Kent E. Olson] MAR 10 2010
Director of Accounts and Reports Signature **Date**

FEB 25 2010 PM03:45

2-17

FPL 460

Revised January 1, 2009

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

Project Title:	Coles Hall - Ceiling & Lighting Improvements	Project No.:	A-011023(A)
Agency:	Kansas State University	Date:	2/12/10
Institution & Location:	Kansas State University, Manhattan, Kansas	Change Order No.	4
Building Number:	36700-00147	Net Amount of Change:	$454.00
A / E Firm:	Bartlett & West, Inc		show deduct in ( )

DFM Approval Planner

MW 3/22/10

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
Provide stainless steen angle at joint between cabinet and wall in Room 346.	Initiated by:	2	$454.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Subtotal from continuations sheets		

APPROVED: 3/8/10 PE
A. [illegible]
DIRECTOR OF FACILITIES PLANNING
KANSAS STATE UNIVERSITY

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	46,397.00	
Net change by previous Change Orders	$	5,758.00	
The Contract Sum prior to this Change Order was	$	52,155.00	
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	454.00	
The New Contract Sum including this Change Order will be	$	52,609.00	
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged		1	Days
The Date of Completion as of the date of this Change Order therefore is	February 8, 2010		

APPROVALS

Contractor Name and Address
Cheney Construction, Inc.
1125 Hayes Drive
Manhattan, Kansas 66502
785-776-3200

[signature] 3-12-10
Head of State Agency Signature **Date**

[signature] 3-3-2010
Contractor's Signature **Date**

for [signature] 3-22-10
Director of Facilities Management Signature **Date**

[signature] 3/1/10

MAR 23 2010

2-18

MAR 10 2010 PM04

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Revised January 1, 2009

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

S KANSAS

DEPARTMENT OF ADMINISTRATION

DIVISION OF FACILITIES MANAGEMENT

FACILITIES PLANNING, DESIGN & CONSTRUCTION

900 SW JACKSON, SUITE 600

TOPEKA, KANSAS 66612-1220

PHONE 785-296-8899 FAX 785-296-8898

WEBSITE: http://da.ks.gov/fp

Project Title:	Marlatt Hall Window Replacement	Project No.:	A-011033
Agency:	Department of Housing and Dining Services	Date:	January 22, 2010
Institution & Location:	Kansas State University, Manhattan, KS	Change Order No.	2
Building Number:	36700-00076	Net Amount of Change:	$9,319.20
A / E Firm:	The Ebert Mayo Design Group, Architects		show deduct in ( )

DFM Approval Planner

fast 3/9/10

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
COP# 002: Install 1,412LF aluminum trim at locations requiring same at "Unit Cost" of $6.60/LF	Initiated by:	4	$9,319.20
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
APPROVED: 2/10/10 DIRECTOR OF FACILITIES PLANNING KANSAS STATE UNIVERSITY	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4

Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	475,000.00
Net change by previous Change Orders	$	21,547.16
The Contract Sum prior to this Change Order was	$	496,547.16
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	9,319.20
The New Contract Sum including this Change Order will be	$	505,866.36
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged	0	Days
The Date of Completion as of the date of this Change Order therefore is		July 30,2010

APPROVALS

EH for DR RICE 2/12/10

Contractor Name and Address

J & M Contracting, Inc.
1712 E 123rd Street
Olathe, KS 66061

Head of State Agency Signature — 2-23-10 Date

Contractor's Signature — 1/27/2010 Date

Director of Facilities Management Signature — 3-9-10 Date

Project Architect/Engineer Signature — 1/29/10 Date

Director of Accounts and Reports Signature — MAR 09 2010 Date

FEB 15 2010 #09:35

2-19

FPD Form 460
Revised January 1, 2009

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
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PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN	
Fund	682-8001-10-8328
PO No	A0041362

CONTRACT CHANGE ORDER

FEB 12 2010

A#011035

Project Title:	Art & Design Building, building envelope improvements	Project No.:	151 / 5413
Agency:	Design and Construction Management	Date:	1/27/10
Institution & Location:	University of Kansas, Lawrence KS	Change Order No.	4
Building Number:	151	Net Amount of Change:	$4,260.00 show deduct in ( )
A / E Firm:			

DFM Approval
Planner
3/9/10

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Misc. T&M for wall patching, A/C installations and shade installation	Initiated by:	1	$4,260.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	306,500.00
Net change by previous Change Orders	$	64,815.00
The Contract Sum prior to this Change Order was	$	371,315.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	4,260.00
The New Contract Sum including this Change Order will be	$	375,575.00
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged	0	Days
The Date of Completion as of the date of this Change Order therefore is		

APPROVALS

Contractor Name and Address
RMT Construction Co.
PO Box 2225
Olathe KS 66051

Head of State Agency Signature — Date 2/17/10

Contractor's Signature — Date 2/11/10; 11 Feb 10

Director of Facilities Management Signature — Date 3-9-10

MAR 10 2010
2-20

FPDC form
Revised Ja 2009

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

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FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

A-011102

DFM Approval Planner
18
3.9.10

Project Title:	Goodnow House Interior Restoration	Project No.:	A-0111102
Agency:	Kansas State Historical Society	Date:	March 1, 2010
Institution & Location:	Goodnow House State Historic Site, Manhattan KS	Change Order No.	1
Building Number:	28800-13001	Net Amount of Change:	$42,081.00 show deduct in ( )
A / E Firm:	Historic Sites Division, Kansas State Historical Society		

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Remove existing damanged interior plaster and replace with traditional three-coat plaster system as called for in the specifications: 1014 square feet at $41.50 per square foot (Unit Price 1 as provided by contractor in bid document) This increase in the work was based on field conditions uncovered during demolition. It was assumed during project planning that these problems would be encountered and was budgeted for by the Historical Society.	Initiated by:	2	$42,081.00
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	19,995.00
Net change by previous Change Orders	$	
The Contract Sum prior to this Change Order was	$	19,995.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	42,081.00
The New Contract Sum including this Change Order will be	$	62,076.00
The Contract time will be ☑ Increased ☐ Decreased ☐ Unchanged	30	Days
The Date of Completion as of the date of this Change Order therefore is April 30, 2010		

APPROVALS

Contractor Name and Address
J. A. Lyden Construction Company, Inc.
3825 NW Button Road
Topeka KS 66618

Head of State Agency Signature — 3-3-10 Date

Contractor's Signature — 3-2-10 Date

Director of Facilities Management Signature — 3-9-10 Date

Project Architect/Engineer Signature — 3-3-10 Date

MAR 16 2010

Director of Accounts and Reports Signature — Date

3/16/10

2-21

FPL 460
Rev. January 1, 2009

E OF KANSAS
DEPARTMEN ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN
Fund 4100.10.8005.99400.2440
PO No A0041383 01

CONTRACT CHANGE ORDER

Project Title:	Hutchinson Freight Elevator Replacement	Project No.:	A-011139
Agency:	Kansas Department of Transportation	Date:	March 1, 2010
Institution & Location:	Hutchinson, Kansas	Change Order No.	1
Building Number:	27600-5-0020	Net Amount of Change:	$4,676.10
A / E Firm:	Facilities Planning, Design & Construction		show deduct in ( )

DFM Approval Planner
3.17.10

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
Furnish and install new 400amp electrical panel for freight elevator. Work will be performed on a Saturday. ADD	Initiated by:	1	$4,676.10
	Result of:	D	
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	93,590.00
Net change by previous Change Orders	$	-
The Contract Sum prior to this Change Order was	$	93,590.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	4,676.10
The New Contract Sum including this Change Order will be	$	98,266.10
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged		0 Days
The Date of Completion as of the date of this Change Order therefore is May 27, 2010		

APPROVALS

Contractor Name and Address
A & A Builders Inc.
506 North Whiteside
Hutchinson, Kansas 67504-0146

Head of State Agency Signature — 3/4/2010 Date

Larry Arnsdorf — 3/3/10 Date
Contractor's Signature

Director of Facilities Management Signature — 3-17-10 Date

Project Architect/Engineer Signature — 1 MARCH 10 Date

MAR 17 2010
Director of Accounts and Reports Signature — Date

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2-22

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Revised January 1, 2009

STATE OF KANSAS
DEPARTMENT OF ADMINISTRATION
DIVISION OF FACILITIES MANAGEMENT
FACILITIES PLANNING, DESIGN & CONSTRUCTION
900 SW JACKSON, SUITE 600
TOPEKA, KANSAS 66612-1220
PHONE 785-296-8899 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

STATE AGENCY MUST FILL IN
Fund
PO No

CONTRACT CHANGE ORDER

Project Title:	Headquarters Building Attic Renovation	Project No.:	A-011179
Agency:	Kansas Bureau of Investigation	Date:	March 16, 2010
Institution & Location:	1620 SW Tyler	Change Order No.	ONE
Building Number:	08300-00001	Net Amount of Change:	$3,213.00
A / E Firm:	Emig and Associates, Architects		show deduct in ( )

DFM Approval Planner
RSS
3-22-10

A Brief Description of the Work	Request Info Use Legend Below (Required for Approval)		Amount
The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.			
Credit to Owner for substitution of Hacker Industries products for cementitous topping.	Initiated by:	4	-$3,500.00
	Result of:	E	
Construct new communications closet (eliminate storage room 418). Add foam sealant at joint between roof sheathing and wood plate, add sheet metal rain deflector at vertical attic vent in gable wall, add three access panels	Initiated by:	2	$2,655.00
	Result of:	C	
Furnish and install replacement valve for condenser and recharge system to replace freon that was lost due to existing faulty valve	Initiated by:	4	$946.00
	Result of:	D	
Furnish and install three additional data outlets	Initiated by:	2	$394.00
	Result of:	C	
Furnish and install new circuit breakers in Panel AP	Initiated by:	4	$902.00
	Result of:	D	
Furnish and install three additional electrical and data outlets at two columns (add $633.00). Furnish and install receptacle and cable box on west wall for flat screen television monitor (add $315.00).	Initiated by:	2	$948.00
	Result of:	C	
Additional labor cost to transport materials that were originally intended to be brought up elevator, which became unusable after bids were received (add $950.00). Credit for unused signage allowance (deduct $82.00)	Initiated by:	4	$868.00
	Result of:	D	
	Subtotal from continuations sheets		

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	152,796.00
Net change by previous Change Orders	$	-
The Contract Sum prior to this Change Order was	$	152,796.00
The Contract Sum will be ☑ Increased ☐ Decreased ☐ Unchanged by ths Change Order	$	3,213.00
The New Contract Sum including this Change Order will be	$	156,009.00
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged		0 Days
The Date of Completion as of the date of this Change Order therefore is March 26, 2010		

APPROVALS

Contractor Name and Address

Robert E. Sevka, Director — 18 Mar 2010
Head of State Agency Signature — **Date**

[signature] — 3/17/10
Contractor's Signature — **Date**

for [signature] — 3-22-10
Director of Facilities Management Signature — **Date**

David G. Emig — 3.16.10
Project Architect/Engineer Signature — **Date**

Kent E. Olson — MAR 23 2010
Director of Accounts and Reports Signature — **Date**

2-23

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Revised January 1, 2009

STATE OF KANSAS

DEPARTMENT OF ADMINISTRATION
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TOPEKA, KANSAS 66612-1220
PHONE 785-296-8399 FAX 785-296-8898
WEBSITE: http//:da.ks.gov/fp

CONTRACT CHANGE ORDER

STATE AGENCY MUST FILL IN	
Fund	8001-8318
PO No	A0041398

Project Title:	Replace Roof Gaddis Physical Plant Bldg. B	Project No.:	A-011234
Agency:	Wichita State University	Date:	January 28, 2010
Institution & Location:	Wichita State University	Change Order No.	1
Building Number:	71500-0074	Net Amount of Change:	$0.00 (show deduct in ( ))
A / E Firm:	Wichita State University		

DFM Approval Planner: RSS 3-2-10

A Brief Description of the Work The following shall be provided subject to the requirements of the Contract and Bond already executed the same as if herein repeated. Furnish all labor, materials, tools and equipment & transportation required to complete the following item(s) of work. Use continuation sheet if necessary & attach all back-up documentation.	Request Info Use Legend Below (Required for Approval)		Amount
Change the beginning date for the Notice to Proceed to March 8, 2010.	Initiated by:	1	$0.00
	Result of:	D	
	Initiated by:		
	Result of:		
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	Result of:		
	Initiated by:		
	Result of:		
Subtotal from continuations sheets			

Legend: Initiated by: Architect/Engineer = 1 Agency = 2 DFM = 3 Contractor = 4
Result of: Design Error = A Design Omission = B Change in Scope/Program = C Result of Field Conditions = D Other (explain) = E

The Original Contract Sum was	$	147,822.00
Net change by previous Change Orders	$	-
The Contract Sum prior to this Change Order was	$	147,822.00
The Contract Sum will be ☐ Increased ☐ Decreased ☑ Unchanged by ths Change Order	$	-
The New Contract Sum including this Change Order will be	$	147,822.00
The Contract time will be ☐ Increased ☐ Decreased ☑ Unchanged	0	Days
The Date of Completion as of the date of this Change Order therefore is May 7, 2010		

APPROVALS

Contractor Name and Address

Schefers Roofing Co.
PO Box 326
Grain Valley, Missouri 64029.

Mary L. Herren 2/8/10
Head of State Agency Signature Date

Douglas J. Makesty 2-1-2010
Contractor's Signature Date

[signature] 3-2-10
Director of Facilities Management Signature Date

[signature] 2-5-10

MAR 09 2010
2-24

S MARY OF CONSTRUCTION PROJECTS
M n 1, 2010 – March 31, 2010

ADJUTANT GENERAL'S DEPARTMENT

Olathe Armory Rehabilitation, A-9613 MW/MS
Single Contract - $664,522.00; Dalrymple Construction, Overland Park, Kansas - Contractor
Inspection and construction administration by Slemmons Associates, Architects, P.A.
Notice to Proceed September 27, 2007; original completion date May 27, 2008.

Dalrymple Construction filed a Petition in Johnson County for recovery of withheld funds and damages.

Lawrence Armory Renovation, A-010054 Revised RS/MW/MS
Single Contract - $454,538.00; Q.T., Inc., Topeka, Kansas - Contractor
Inspection and construction administration by Peterson Architectural Group.
Notice to Proceed February 9, 2009; completion date August 8, 2009.

The project has been completed; waiting on final closeout documents.

Salina Crisis City, Smoky Hill Weapons Range, A-010676 RS/MW/RH
Design Build Contract - $5,043,761.00; Gracon Corporation, Loveland, Colorado - Contractor
Inspection and construction administration by Tevis Architects.
Notice to Proceed July 15, 2008; completion date extended to September 15, 2009.

The Contractor is progressing with the code required modifications at the Incident Command Center. The Contractor continues to recondition, modify and paint the shipping containers for placement at Training Venues 1 and 4.

CORRECTIONS, DEPT. OF

Lansing Correctional Facility, Clinic/Infirmary Building - Interior Finish, A-010502(a) RS/MW/MS
Single Contract - Lansing Correctional Facility In-house Forces.
Inspection and construction administration by Wilson Johnson Embers.
Completion date August 18, 2008.

Painting and flooring work is in progress at the 2nd floor. Continuing with drywall partitions and M.E.P. rough-in work at the 1st floor.

El Dorado Correctional Facility, D & E Cellhouses, Metal Roof Retrofit, A-011096(a) PF/JS
Single Contract - $390,110.00; Centurion Industries dba A-Lert Roof Systems Div., Kansas - Contractor
Inspection and construction administration by Kevin Morgan, Kansas Department of Corrections.
Notice to Proceed May 26, 2009; completion date October 17, 2010.

Cellhouses D & E roof replacements are currently underway and should be completed prior to their completion date.

KA[illegible] BIOSCIENCE AUTHORITY

Kansas Bioscience Park Venture Accelerator, Olathe, Kansas, A-010889 RS/MW/MS
Single Contract - $10,631,200.00; Excel Constructors, Overland Park, Kansas - Contractor
Inspection and construction administration by PGAV Architects.
Notice to Proceed December 1, 2009; completion date February 25, 2011.

At the Lower Level, the building pad is being prepared for placement of slab on grade. Forming and placement of foundation walls continue at the Upper Level. Adverse weather continues to delay the progress of work.

LABOR, KANSAS DEPARTMENT OF

Eastman Renovation, A-010837 RS/MW/JS
Single Contract - $530,500.00; RMT Construction Company, Inc., Olathe, Kansas - Contractor
Inspection and construction administration by Emig and Associates Architects.
Notice to Proceed June 6, 2009; completion date is December 1, 2009.

Lay-in ceiling and painting continue at the offices. Installation of new carpeting and vinyl tile will following painting. The installation of the exterior insulated finish system and windows has been completed.

REGENTS, BOARD OF

EMPORIA STATE UNIVERSITY

William Allen White Library HVAC & Electrical Repair/Replacement, A-010565 MW/JS
Single Contract - $1,739,384.00; Modern Air Conditioning, Inc., Emporia, Kansas - Contractor
Inspection and construction administration by Brack & Associates Engineering.
Notice to Proceed written December 10, 2008; completion date extended to April 2010.

Equipment has been delivered, installation is being scheduled dependent on weather. All interior work is completed.

FORT HAYS STATE UNIVERSITY

Picken Hall Renovation, A-010583 RS/MW/JM
Single Contract - $4,105,000.00; Paul-Wertenberger Construction, Inc., Hays, Kansas - Contractor
Inspection and construction administration by Howard and Helmer Architecture.
Notice to Proceed written January 29, 2009; completion date May 25, 2010.

The interior renovation work is near completion. Inspections are scheduled for the first week of April. At the addition, painting followed by ceiling installation is in progress. Door hardware and casework have been completed.

KANSAS STATE UNIVERSITY

KSU-Salina Student Life Center - Phase 1, A-010331 Rebid RS/MW/RH
Single Contract - $4,388,780.00; Cheney Construction, Inc., Manhattan, Kansas - Contractor
Inspection and construction administration by The Ebert Mayo Design Group.
Notice to Proceed February 26, 2008; completion date May 2, 2009.

The Contractor still has landscape work to complete.

F. g Structure, A-010333 RS/ RH
Single Contract - $12,816,300.00; Murray & Sons Construction Co., Inc., Topeka, Kansas - Contractor
Inspection and construction administration by The Ebert Mayo Design Group.
Notice to Proceed July 25, 2007; completion date extended to June 15, 2009.

The Contractor has sitework and punch list items to complete.

Throckmorton Greenhouse Electrical Renovation, A-010335 MW/JS
Project Budget $1,800,000.00; work is being done by KSU labor forces.
Project started in June 2007; final completion is approximately April 2010.

Project is complete, waiting on final completion documents.

Jardine Apartments, Building 5 Tenant Improvements, A-010425 BS/RH
Single Contract - $1,457,000.00; First Management, Inc., Lawrence, Kansas - Contractor
Inspection and construction administration by The Ebert Mayo Design Group.
Notice to Proceed June 15, 2009; completion date April 10, 2010.

Work continues.

Student Union Fire Protection, A-010563 MW/JS
Single Contract - $891,880.00; American Fire Sprinkler, Mission, Kansas - Contractor
Inspection and construction administration by Fire Sprinkler Solutions, Inc.
Notice to Proceed June 20, 2008; completion date June 21, 2010.

Project is complete. Waiting on final completion documents.

Power Plant Boiler #6 Replacement, A-010652 MW/JS
Single Contract - $2,093,400.00; Knopke Company LLC, Kansas City, Missouri - Contractor
Inspection and construction administration by BWR Corporation.
Notice to Proceed August 19, 2008; completion date April 12, 2010.

Project is complete; boilers have been turned over to KSU for operation; waiting on final completion documents.

Center for Child Development, A-010662 Revised
Single Contract - $3,539,997; First Management, Lawrence, Kansas - Contractor RS/MW/RH
Inspection and construction administration by Gould Evans Associates.
Notice to Proceed June 22, 2009; completion date July 26, 2010.

Structural steel erection has been completed. Metal roof decking, exterior masonry, and interior partition framing are in progress. M.E.P. rough-in is also in progress.

12.5 KV Distribution System Modifications, A-010700 MW/JS
Single Contract - $1,135,000.00; Torgeson Electric Topeka, Kansas - Contractor
Inspection and construction administration by Morrow Engineering, Inc.
Notice to Proceed April 22, 2009; completion date extended to August 11, 2010.

Construction continues on the East Loop with work scheduled for Calvin Hall, Beach Museum, Justin Hall, Thompson Hall and McCain Auditorium. Switches and materials for the rerouting of feeds around the NBAF site have arrived.

Kansas Army National Guard Readiness Center/PSU Classroom Recreation Center, A-9396 RS/MW
Single Contract - $14,671,450.00; Crossland Construction, Columbus - Contractor
Inspection and construction administration by Horst, Terrill & Karst Architects, P.A.
Notice to Proceed October 20, 2006; completion date July 10, 2008.

The project is complete and waiting to receive project closeout documents.

Student Health Center, A-010243 BS/MW/JS
Single Contract - $2,271,743.00; Crossland Construction, Columbus - Contractor
Inspection and construction administration by Anderson-MacAdam Architects, Inc.
Notice to Proceed October 27, 2008; completion date July 1, 2009.

Waiting on as-built drawings.

Parking Lot Improvements, A-010806 BS/JS
Single Contract - $901,400.00; General Service Corporation, Oswego, Kansas - Contractor
Inspection and construction administration by Bartlett & West Engineers, Inc.
Notice to Proceed June 1, 2009; completion date August 7, 2009.

As-built drawings received.

Parking Lot Improvements, Lindburg Plaza, A-010806(a) BS/JS
Single Contract - $343,000.00; Crossland Construction Company, Inc., Columbus, Kansas - Contractor
Inspection and construction administration by Bartlett & West Engineers, Inc.
Notice to Proceed June 1, 2009; completion date September 25, 2009.

As-built drawings received.

New Student Housing, A-010807 BS/JS
Single Contract - $8,290,689.00; R. E. Smith Construction Company, Inc., Joplin, Missouri - Contractor
Inspection and construction administration by Horst, Terrill & Karst Architects.
Notice to Proceed July 13, 2009; completion date July 16, 2010.

Structure is being erected.

Bowen Hall Renovation, A-010808 BS/MW/JS
Single Contract - $879,800.00; Crossland Construction Company, Inc., Columbus, Kansas - Contractor
Inspection and construction administration by Anderson MacAdam Architects, Inc.
Notice to Proceed May 4, 2009; completion date August 7, 2009.

Work is complete. Waiting on as-built drawings.

Porter Hall Renovation – Deferred Maintenance – Phase 1, A-010925 RS/JS
Single Contract - $924,000.00; Crossland Construction Co., Inc., Columbus, Kansas - Contractor
Inspection and construction administration by Helix Architecture.
Notice to Proceed May 18, 2009; completion date August 7, 2009.

Waiting on closeout documents.

Kansas Law Enforcement Training Center, Phase II, A-010407 RS/RH
Single Contract - $2,459,800.00; The Law Company, Wichita, Kansas - Contractor
Inspection and construction administration by Treanor Architects, P.A.
Notice to Proceed July 9, 2009; completion date January 25, 2010.

The Contractor continues to work on the road course in areas as the weather permits.

Kansas Law Enforcement Training Center, Phase II, A-010407(a) RS/RH
Single Contract - $1,084,800.00; Regier Construction, Newton, Kansas - Contractor
Inspection and construction administration by Treanor Architects, P.A.
Notice to Proceed July 13, 2009; completion date January 29, 2010.

M.E.P. rough-in, ceilings and drywall installation is continuing.

KUMC Applegate Energy Center Renovation, A-010677 MW/MS
Single Contract - $4,650,977.00; Turner Construction, K.C., Missouri - Constr. Mgmt. At-Risk (CMAR)
Notice to Proceed December 8, 2008; completion dates pending funding approvals.
Contract + Amendment #1, $2,327,243.00
Amendment #2, Purchase equipment $634,255.00
Amendment #3, Installation of generators, chiller pumps, switches & chiller $1,689,479.00

Task 10-2: 13.8 KV Emergency Distribution System – Equipment delivered; installation started.
Task 10-3: Demo of existing Generators and Accessories – Complete.
Task 10-4: Fire Pump – Construction underway, fire line pressure tested.
Task 10-5: Existing Chiller Electrical Replacements – Most equipment delivered, installation started.

School of Pharmacy, A-010933 RS/MS
Multiple Contracts - $4,951,633.00 (to date); J.E. Dunn Construction, Topeka, Ks. - Constr. Mgmt. At-Risk (CMAR)
Inspection and construction administration by Treanor Architects, P.A.
Notice to Proceed March 10, 2009; completion date August 2, 2010.

Interior M.E.P. rough-in and partition framing are ongoing. Exterior masonry veneer and roofing are in progress. Mechanical work is continuing at the MRB and in the tunnel to the new building.

Wichita Campus – Pharmacy and Standardized Patient Training Addition, A-010970 RS/RH
Single Contract - $2,554,200.00; Walz, Harmon, Huffman Construction, Kechi, Kansas - Contractor
Inspection and construction administration by McCluggage, Van Sickle, Perry Corporation.
Notice to Proceed October 6, 2009; completion August 10, 2010.

Demolition of the existing roofing has been completed. The new floor topping has been placed and partition framing and M.E.P. rough-ins are in progress.

Utility Tunnel Deferred Maintenance, Phase III, A-011059 MW/MS
Single Contract - $826,100.00; Taylor Kelly, LLC, Kansas City, Kansas - Contractor
Inspection and construction administration by PEC, Lawrence, Kansas.
Notice to Proceed March 29, 2010; completion date August 13, 2010.

Pre-construction conference was held; project submittals underway.

Engineering Building HVAC Renovation, A-010846 MW/RH
Single Contract - $951,056.00; Caro Construction, Wichita, Kansas - Contractor
Inspection and construction administration by Welch & Mitchell Consulting Engineers.
Notice to Proceed December 9, 2009; completion June 7, 2010.

Majority of ductwork and boxes is installed. Soffit and ceiling installation is beginning.

SOCIAL & REHABILITATION SERVICES, DEPARTMENT OF

Kansas Neurological Institute HVAC Replacement Meadowlark & Cottonwood Lodges, A-010775 MW/JS
Single Contract - $2,337,000.00; SAMCO, Inc., Kansas City, Missouri - Contractor
Inspection and construction administration by Professional Engineering Consultants, P.A. (Lawrence).
Notice to Proceed April 9, 2009; completion date June 14, 2010.

Phase 5 is scheduled to be complete mid-April. Owner move April 19-27. Phase 6 to start end of April.

TRANSPORTATION, KANSAS DEPARTMENT OF

Topeka Westgate Subarea Shop, A-010538 RS/MW/JS
Single Contract - $1,566,065.00; Shirley Construction, Inc., Topeka, Kansas - Contractor
Inspection and construction administration by Bruce McMillan, AIA, Architects.
Notice to Proceed July 13, 2009; completion date May 6, 2010.

The roof water shield has been installed. Installation of roof panels and trim is in progress. Due to continued moisture, the Contractor continues to work on the interior subgrade in preparation for placement of the slab on grade.

WILDLIFE AND PARKS, DEPARTMENT OF

Great Bend Wetlands Education Center, Cheyenne Bottoms, A-010101 RS/MW/JM
Single Contract - $2,458,000.00; National Builders, Wichita, Kansas - Contractor
Inspection and construction administration by Bowman Bowman Novick, Inc.
Notice to Proceed May 2, 2007; completion date February 1, 2008.

Waiting on final completion documents.

FACILITIES – DECEMBER 17, 2009 AGENDA – DISCUSSION

1. APPROVE ALLOCATION OF FY 2011 REHABILITATION AND REPAIR APPROPRIATION - SYSTEMWIDE

Allocation of Funds for Rehabilitation and Repair Projects for Institutions of Higher Education as Appropriated to the Kansas Board of Regents

FY 2011 - $15,000,000 (EBF)

Adjusted gross square feet (mission-critical buildings only):

	GSF	% of Total
The University of Kansas	5,488,301	26.87
The University of Kansas Medical Center	2,297,176	11.25
Kansas State University	6,105,374	29.90
Wichita State University	2,243,148	10.98
Emporia State University	1,232,601	6.04
Pittsburg State University	1,507,841	7.38
Fort Hays State University	1,548,171	7.58
	20,422,612	100.00

Priority Listing of Projects	Allocation
The University of Kansas	
1. Campus Fire Code Improvements	$ 375,000
2. Campus Tuckpointing	343,000
3. Campus Roof Repair/Replacement	402,000
4. Campus Window Replacement	392,000
5. Campus Elevator Improvements	150,000
6. Campus Electrical Service Improvements	300,000
7. Research Laboratory Improvements	350,000
8. ADA Improvements	50,000
9. Watson Hall/Bailey Hall HVAC Improvements	1,669,000
	$4,031,000
The University of Kansas Medical Center	
1. Campus Energy Conservation Improvements	$ 100,000
2. Campus Exterior Maintenance	100,000
3. Campus Building Infrastructure Replacements	445,500
4. Campus Fire Alarm/Sprinkler System/Heat	100,000
5. Campus Interior Maintenance	345,000
6. Campus Utility Infrastructure Improvements	375,000
7. Campus BAS Infrastructure	40,000

9.	Campus Elevator Repairs	66,000
10.	Campus Infrastructure Improvements (Wichita)	115,500
		$1,687,000

Kansas State University

1.	Campus Roof Repair & Replacement	1,000,000
2.	Campus Infrastructure Improvements	797,000
3.	Campus Utility Maintenance	800,000
4.	Campus Fire Code Improvements	782,000
5.	Campus Classroom Improvements	600,000
6.	Campus Hazardous Material Abatement	105,000
7.	Campus Cyclic Painting	150,000
8.	Campus Cyclic Floor Covering Replacement	250,000
		$ 4,484,000

Wichita State University

1.	Campus Floor Covering Replacement	$ 100,000
2.	Campus Sidewalk Repairs	50,000
3.	Campus Street Repair	50,000
4.	Campus Interior & Exterior Door/Hardware Replacements	50,000
5.	Campus Installation Automatic Door Operations	25,000
6.	Henrion Hall Roof Replacement	180,000
7.	Hubbard Lecture Hall Asbestos Abatement & Seating Replacement	175,000
8.	McNight Annex HVAC Replacement	130,000
9.	Ulrich Museum HVAC Replacement & Fire Protection System in Vault	450,000
10.	Campus Exterior Lighting Upgrades	125,000
11.	Jardine Hall Tuckpointing & Waterproofing	165,000
12.	Jardine Hall Copper-lined Masonry Gutter Repairs	55,000
13.	Neff Hall & Geology Building Repainting	93,000
		$1,648,000

Emporia State University

1.	Visser Hall HVAC Repairs/Replacement	$ 300,000
2.	Power House Chiller Addition	500,000
3.	Campus Laboratory Improvements	106,000
		$ 906,000

Pittsburg State University

1.	Hughes Hall Window Replacement & Masonry Repairs	300,000
2.	Hartman Hall Window Replacement & Roof Repairs	500,000
3.	KTC Sprinkler Extension into Wood Technology Area	75,000
4.	Kelce Center Masonry Repairs	207,000
5.	Campus Fire Code Improvements	25,000
		$ 1,107,000

Fort Hays State University

1.	Campus Sidewalk Replacements	$ 15,000

2.	Campus HVAC Repair/Replacement	30,000
3.	Campus Elevator Repairs	5,000
4.	Campus Asbestos Abatement	10,000
5.	Campus Steam Generation and Distribution Upgrades	10,000
6.	Campus Exterior Utility Repair/Replacement	10,000
7.	Campus Miscellaneous Roof Repairs	5,000
8.	Campus Floor Covering Replacement	100,000
9.	Campus Fire Code Improvements	7,000
10.	Akers Energy Center Boiler Upgrade/Tune-up	40,000
11.	Rarick Hall Telecommunications Improvements	165,000
12.	Davis Hall/Sheridan Hall Roof Repairs	40,000
13.	Cunningham Hall/Gross Coliseum Sanitary Sewer Improvements	150,000
14.	Beach Hall Roof Repairs	550,000
		$1,137,000

SUMMARY

	Allocation
The University of Kansas	**$4,031,000**
The University of Kansas Medical Center	**1,687,000**
Kansas State University	**4,484,000**
Wichita State University	**1,648,000**
Emporia State University	**906,000**
Pittsburg State University	**1,107,000**
Fort Hays State University	**1,137,000**
TOTAL	**$15,000,000**

KANSAS BOARD OF REGENTS

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Joint Committee on State Building Construction

Eric King, Director of Facilities
May 28, 2010

Good afternoon, Chairman Umbarger and members of the Committee. Thank you for this opportunity to appear before your committee to provide you with a quarterly report on the State Educational Institution Long-Term Infrastructure Maintenance Program, per requirements mandated by K.S.A. 76-7,103 *et seq.*

As you know, in 2007, the Legislature enacted legislation creating the Postsecondary Educational Institution (PEI) Long-Term Infrastructure Maintenance Program (IMP), as well as several important financing components that will be implemented over the five-year period that began in 2008. These components included:

I. Direct state funds of $90 million and approximately $44 million in interest earnings from university funds to begin to address the then-documented $663 million backlog of deferred maintenance projects at the state universities;
II. Interest-free bonding authority up to $100 million available to Washburn University, the 19 community colleges, and the five technical colleges to be used for infrastructure improvement projects; and
III. Allowance of state-funded tax credits intended to generate up to $158 million in private contributions to the state's six universities, Washburn University, the 19 community colleges, and the five technical colleges.

This report covers the third quarter of fiscal year (FY) 2010, ended March 31, 2010. At the end of this period, the state universities had total, actual, project-to-date expenditures of $54,726,718, which includes direct state funds of $44,353,469, university interest earnings of $9,647,981, and tax credit donation expenditures of $725,268. The expenditures include those made in FY 2008 and FY 2009, as well as the monies spent in the first three quarters of fiscal year 2010.

I. Direct State Funds, University Interest Earnings, and Tax Credit Donations

The following is an abbreviated narrative update on the progress the state universities have made on their authorized, deferred maintenance projects. Information about each university's current quarter and project-to-date expenditures can be found in the spreadsheets attached for your review. If additional detail about these expenditures is needed, please let me know.

Emporia State University

1. Physical Education Building Roof Replacement – This project is complete, and allocated funds were expended.

2. William Allen White (WAW) Library HVAC Repairs/Replacement - The base contract has been completed, and the certificate of occupancy has been issued. The final change order for the replacement of an existing rooftop air conditioning and condensing unit was approved ($76,720.00) and has been installed. Final payment will be made in the next few weeks. This will complete the project, expending the remaining FY 2008 and FY 2009 Funds. The remaining funds will be transferred to start other deferred maintenance projects indicated in FY 2011 and FY 2012.

3. WAW Library Electrical Repairs/Replacement - The base contract has been completed, and the certificate of occupancy has been issued. The final change order for the replacement of an existing rooftop air conditioning, condensing unit has been approved ($76,720.00) and has been installed. Final payment will be made in the next few weeks. This will complete the project, expending the remaining FY 2008 and FY 2009 Funds. The remaining funds will be transferred to start other deferred maintenance projects indicated in FY 2011 and FY 2012.

4. WAW Partition Repairs/Replacement – The HVAC & Electrical Repairs/Replacement project bids were considerably under the estimates for this project and repairs/replacement of partitions related to these projects were included in those budgets. The remaining funds will be transferred to start other deferred maintenance projects indicated in FY 2011 and FY 2012.

5. Utility Tunnels Repairs - Work has been completed with this phase of the project, with valve replacements, asbestos abatement, and re-insulation. Additional tunnel work will be started upon the completion of the asbestos and re-insulation work. A study has been completed to verify the location, condition and types of valves for the campus main water supply lines in the tunnel system. The final phase of construction and funding will start in FY 2012. Remaining funds, if any, from other projects will be reallocated to this project to allow the start of the replacement of the campus main water supply lines at an earlier date.

6. Roosevelt Hall Foundation Stabilization - Construction has been completed for the underground work. The above ground work (installing expansion joints in the masonry walls and lining the crawl spaces) will be completed with on-call construction services during FY 2010.

7. Roosevelt Hall HVAC Replacement – Replacement of existing roof top units has been completed. The final phase of construction to replace the supply and return air systems began this fiscal year. Preliminary and final planning has been completed. The bids were received April 20, 2010, and the apparent low bidder is Modern Air Conditioning of Emporia, Kansas, at $157,200. Work will start in May 2010, to minimize classroom disruption, and will be completed by August 2010.

8. Roosevelt Hall Plumbing Replacement – Specifications are being prepared for the repairs and/or replacement of the hot/cold water main supply lines. The repairs to the main sewer line from the building to the City sewer main have been completed. Planning work has been completed. The final phase of construction and funding begins this fiscal year during appropriate academic down times (Christmas Break, Spring Break and Summer Break).

9. Elevator repair projects for White Library, Cremer Hall, and King Hall have been completed. The remaining funds will be transferred to start other deferred maintenance projects indicated in FY 2011 and FY 2012.

Fort Hays State University

1. Picken Hall Improvements – This project bid on December 23, 2008, and a contract was executed with Paul-Wertenberger Construction. Work commenced on February 2, 2009, and continues to progress slightly ahead of schedule. Project completion is still planned for June 1, 2010.

2. Utility Tunnel Replacement from Center of Quad to Rarick Hall – This project is complete.

3. Service Buildings Masonry Cleaning and Sealing – This project is complete.

4. Sheridan Hall Re-Roofing – This project is complete.

5. Felten-Start Theatre Seating Replacement – This project is complete.

6. Repaint Cunningham Hall Gyms 100,101,120 & 121 – This project is complete.

7. Campus Exterior Graphics – Phase II – Material bids are now complete. Installation is 95% complete.

8. Campus Electrical Improvements – Phase I design work is 90% complete. Project is anticipated to bid in June and to be under construction by August 2010.

9. Street Improvements – This project will replace one block of street pavement along Park Street/South Campus Drive. This project has been bid and awarded, with construction to commence in late May 2010.

Kansas State University

1. Utilities Infrastructure and Power Plant Improvements:

   a. Replacement of campus steam line – Federal Stimulus Funds will now pay for the work. The project engineer is Smith and Boucher. The project is under construction.

   b. Boiler replacement in the Power Plant – The work is complete. The project engineer is Bucher Willis Ratliff, and the contractor is Knopke Co., LLC of Kansas City.

   c. Repair and replace antiquated 4160 volt electrical system - Project construction is 90% complete. The construction of the National Bio-Ag Facility (NBAF) has added to the project's overall size and cost. The revised completion date is June 30, 2010. The engineer is Morrow Engineering, and the university has ordered materials. The contractor is Torguson Electrical Co.

2. Renovate Academic and Academic Support Space in Old Memorial Stadium – The master plan for West Memorial Stadium is finalized. Costs are identified. A schedule of design and construction is developed. Bid documents are on hold pending availability of budget. The project's on-call architect is Ken Ebert Design Group. The on-call engineer is Orazem & Scalora Engineering of Manhattan, Kansas.

3. Leasure Hall Renovation - The elevator was completed in January 2009. A general use classroom (Room 010) is being renovated. A maintenance shop is being converted into a technology general use classroom. The design and construction are being done in house.

The exterior doors and stairs are being replaced with elements that conform to ADA and life safety standards. The design is being done in house, and it is 25% complete.

4. Willard Hall:

   a. Repair and replacement of exterior stone walls is complete. The stones were cleaned and tuck-pointed where possible, and waterproofing of the entrances is complete. The contractor was Restoration and Waterproofing, Inc., and the architect for the project was Bruce McMillian Architects.

   b. Construction is complete for the below-grade waterproofing. The contractor was Ron Fowles Construction, and the engineering was done in-house.

   c. The medium-voltage electrical project is complete. Brack & Associates was the engineer, and the contractor was Coal Creek Construction.

   d. The broken coolers have been removed. The basement walls have been demolished to begin the repair and replacement project, and asbestos abatement is complete.

   e. Life safety and ADA improvements construction is 95% complete, and the punch list items and partial occupancy permit are pending. The firm of Treanor Architects is the on-call project architect, and the contractor is The Wilson Group.

   f. Basement improvements project construction is complete, pending punch list items to be addressed. Treanor Architects is the on-call architect, and the contractor is Cheney Construction Company.

   g. Willard north basement improvement is 90% complete. Treanor Architects is the on-call architect, and the contractor is Cheney Construction Company.

   h. The facilities shops are converting eight labs into art studios in the basement, and the work is 60% complete.

   i. The fire alarm system for the building was bid and work awarded to Cheney Construction. The start date is August 15, 2010.

   j. The windows are on order for the window replacement. The front basement windows will be complete by June 30, 2010.

   k. The reroofing project is in the planning stage. Ebert Mayo Design Group is the architect of record. The lower roof is being replaced by Danker Roofing. Willard's upper roof is in design by Ebert/Mayo design groups. The roofing projects will start in 2011. The building will be scaffolded for the work.

5. Seaton Court:

   a. The Seaton Court roof project construction is 100% complete, but the project still has an outstanding punch list and warranty items to be addressed. The on-call architect is Anderson Knight of Manhattan, Kansas, and the contractor is Ron Fowles.

b. The flat roof of the connecting structure between Seaton Court and Seaton Hall was evaluated. The project has been divided, due to the fact that two different roofing systems are involved, each with its own problems and solutions.
   i. Flat roof - The on-call consultants BG Engineering completed the plans, and the project was bid. Ron Fowles Construction was the successful low bidder, and the project is scheduled to begin April 26, 2010, and be completed by the summer of 2010.
   ii. Gable roof - The cracked and broken rafters cannot be repaired, and there is a large amount of asbestos-containing materials surrounding them. In-house plans and specifications for an umbrella roof to be built over the existing roof are 40% complete. BG Engineering has been retained to do the structural plans. Architectural plans are being done in house. Construction is scheduled to be completed in Fall 2010.

6. Roofs and Other Projects:

   a. The Calvin Hall re-roofing project was completed in Winter 2008.

   b. The Justin Hall 109 general use classroom renovation was completed in Fall 2008.

   c. The Kedzie Hall 017 classroom laboratory renovation was completed in Fall 2008.

Pittsburg State University

1. McCray Hall Renovation - The project is complete. Final payment was issued May 1, 2009.

2. Electrical Switchgear Replacements - The project is complete. Final payment was issued February 24, 2009.

3. Axe Library Masonry Restoration – The project is complete. Final payment was issued December 16, 2008.

4. Russ Hall Facade Restoration – The project is complete. Final payment was issued on January 8, 2009.

5. Steamline Replacement – The project is complete. Final payment was issued October 6, 2009.

6. Porter Hall Renovation – The project was divided into two phases. Phase I is complete. Final payment was issued January 25, 2010. Phase II includes all interior work, including new HVAC system, electrical service upgrades and new lights in studios. Phase II bid on January 28, 2010. Construction will begin May 17, 2010, with completion expected by Fall 2010.

7. Yates Hall Renovation – This project was split into three separate projects. The new windows project bid April 2, 2010, and the HVAC project bid April 18, 2010. The roofing project was moved to be funded from the R&R allocation. All three projects will be completed during the summer of 2010. The new windows and HVAC system will start construction May 17, 2010. These projects were originally scheduled to begin in FY 2011 but were moved to FY 2010.

8. Grubbs Hall Renovation – This project will provide for the repair of the first floor slab settlement, replace windows, replace louvered corridor interior doors, provide a new HVAC control system, and replace the main electrical switch gear. Bids were received April 8, 2010. Construction will begin May 17, 2010, and is scheduled to be completed in August 2010. This project was originally scheduled to begin in FY 2011 but has been moved to FY 2010.

9. Heckert-Wells Hall – This project will provide for the repair/replacement of HVAC equipment, new domestic water piping, and gas valve replacement in the labs. This project was originally scheduled to begin in FY 2010 but has been moved to FY 2011.

10. Weede Facility – This project will provide foundation and settlement repairs, new roof, new exterior metal wall panels, and partial new HVAC system. This project was originally scheduled to begin in FY 2010 but has been moved to FY 2012.

The University of Kansas

1. Utility Tunnel Improvements - Phase 2 Tunnel construction – The project was awarded to Kissick Construction. The University received a tax credit donation towards the tunnel improvements. The project is complete.

2. Wescoe Hall Improvements:

   a. Phase One is the replacement of the failed first-floor concrete slab and reconstruction of that area. Included in Phase One is deferred maintenance work, which includes the replacement of the HVAC system on the first floor. Construction started January 15, 2008, and completed in August 2008.
   b. Phase Two is the replacement of outdated and failing HVAC equipment and ductwork on the 2nd and 3rd floors. The construction management firm of Ferrell Construction of Topeka was selected, and sub-contract bids were taken for all phases of work. Phase Two construction began on the 3rd floor in June 2008, and was completed in December 2008. Construction work began on the 2nd floor in January 2009, and was completed on May 29, 2009. The fire sprinkler and fire alarm replacement work on the 4th floor classrooms, offices, and lecture halls started May 18, 2009, and completed July 31, 2009. The project is complete.

3. Haworth Hall Improvements - Purchase and design of the fume hoods is complete. Installation of the fume hoods started March 2008, and has been completed. The ESCO investment grade audit was completed on January 12, 2009. The proposed ESCO work has been thoroughly reviewed for necessary adjustments of the scope for the HVAC project, to better coordinate energy efficiency improvements with the deferred maintenance replacement of HVAC systems. The University finalized the contracts with Energy Solutions Professionals (ESP) to include this work within the energy performance contract. ESP has submitted shop drawings and ordered materials. Construction is scheduled to start in May 2010.

4. Energy Conservation Improvements – Energy Solutions Professionals (ESP), the selected consultant, completed an investment grade audit of Haworth Hall, Malott Hall, other buildings identified in the Five-Year Deferred Maintenance Program, and of other campus facilities. ESP completed mechanical systems test and balance data gathering in Malott in late November 2008. Additionally, ESP completed data logging of laboratory space

occupancies for use in its final audit reporting. The initial investment grade audit for FYs 2008 and 2009 deferred maintenance projects was completed on January 12, 2009, and the University has completed its review of the audit. The University finalized the contracts with ESP to include this work within the energy performance contract. ESP has submitted shop drawings and ordered materials. Construction is scheduled to start in April 2010.

5. Malott Hall Improvements – Purchase and design of the fume hoods is complete. Installations of the fume hoods started in September 2008, and all hoods have been installed. The ESCO investment grade audit was completed on January 12, 2009. The proposed ESCO work has been thoroughly reviewed for necessary adjustments of the scope for the HVAC project, to better coordinate energy efficiency improvements with the deferred maintenance replacement of HVAC systems. The University finalized the contracts with Energy Solutions Professionals (ESP) to include this work within the energy performance contract. ESP has submitted shop drawings and ordered materials. Construction is scheduled to start in May 2010.

6. Murphy Hall Electrical Improvements – Advertisements for design services were released, and Professional Engineering Consultants was selected to design the project. The scope of work will be coordinated with the FY 2010 Federal Stimulus funded HVAC improvements. Design started in February 2010, bids will be taken in July 2010, and construction should begin in late August 2010. Construction is scheduled to complete by May 2011.

The University of Kansas Medical Center

1. Electrical Infrastructure, Wichita campus – Electrical engineering documents for the replacement of the main electrical service for Building 90 of the KU School of Medicine at Wichita are complete, and the project was bid in August 2009. The installation of the replacement switchgear was successfully completed during the 2009 Thanksgiving holiday break.

2. Emergency Repairs to Building 37 Vivarium – KUMC has completed the installation of new lighting and major renovation of the walls and floors in animal housing rooms required by a USDA inspection.

3. Applegate Energy Center & Utility Distribution Systems - This project will replace and renovate major utility equipment and systems in phases over a five-year period, in accordance with annual funding allocations. The scope of work outlined in the Black & Veatch infrastructure study will include replacement of emergency generators, motor control centers and electrical distribution; replacement of chillers and associated equipment; boiler modifications and replacement; domestic and fire water distribution; and other associated systems and controls. Turner Construction is executing the FY 2010 projects, which include replacing and renovating the water pumping system, demolition of the old emergency generators, and renovation of the emergency and normal electrical distribution systems. Accomplishments this quarter include: 1) Turner Construction completed removal of the old generators; 2) the installation of the new fire pump and separation from the domestic water service is ongoing; and 3) replacement of electrical switchgear serving chiller number one is ongoing. Completion of all FY 2010 projects is scheduled for June 2010.

Wichita State University

Wichita State University has now completed deferred maintenance projects involving campus infrastructure, and many items that needed to be addressed in the Visual Communications Building, Wallace Hall, Ahlberg Hall, McKnight Art Center, Central Energy Plant, Lindquist Hall, Jardine Hall, Heskett Center and the National Institute for Aviation Research. Three (3) major projects remain to be completed that involve the replacement of the HVAC systems in Duerksen Fine Arts Center, the Engineering Building, and Grace Wilkie Hall. The status of these major projects is as follows:

1. Duerksen Fine Arts Center – The engineering consultants have completed the preparation of construction documents for replacement of the building's HVAC systems. The project will be implemented in three separate phases as sufficient funds accrue for each phase, and as the building occupants can be temporarily relocated to other facilities. Federal Stimulus dollars from the American Recovery and Reinvestment Act / State Fiscal Stabilization Funds for FY 2009 and FY 2010 are being used to implement Phase I. Bids for Phase I were received on February 25, 2010, and a construction contract has been awarded for the project. It is estimated that Phase I will take approximately one year to complete. Replacement of the building's store-front and entrances is complete, upgrades to the building's electrical services, and demolition of obsolete boilers and the associated asbestos abatement have all been completed.

2. Engineering Building – Engineering consultants completed the preparation of construction documents for replacement of the building's HVAC system, and bids were received on October 15, 2009. A construction contract was awarded on October 28, 2009, and the project is targeted for completion in August 2010.

3. Grace Wilkie Hall – Engineering consultants selected to do engineering, plans, specifications, and construction administration for replacement of the building's HVAC system are nearing of construction documents. Bidding the project will be postponed until funds accrue to a sufficient amount to be able to award a construction contract.

4. Visual Communications Building – The project for upgrade of the building's electrical services is complete.

5. Wallace Hall – The project for upgrade of the building's electrical service is complete. The project for modernization of the elevator is complete.

6. Ahlberg Hall – The project for upgrade to the building's electrical service is complete. The project for modernization of the elevator is complete.

7. McKnight Art Center – The project for upgrading building controls is complete. The project for modernization of the elevator is complete.

8. Central Energy Plant – The motor control center replacement project is complete.

9. Lindquist Hall – The project for modernization of the elevator is complete.

10. Jardine Hall – The project for modernization of the elevator is complete.

11. Campus Infrastructure –The project for water line improvements and expanded fire hydrant coverage is complete. The project for waterproofing a portion of a utility tunnel is complete.

12. Heskett Center – The project for building controls is complete.

13. National Institute for Aviation Research (NIAR) –The project for building controls is complete.

II. PEI Infrastructure Bonds

In addition to direct state funds and university interest earnings, another important funding component of the State Educational Institution Long-Term Infrastructure Maintenance Program (IMP) is the subsidized loan program made possible through the issuance of Post-Educational Institution (PEI) Infrastructure Maintenance Program Bonds.

As you will recall, the 2007 Legislature authorized $100 million in bonds, $20.0 million to be issued each fiscal year, beginning in FY 2008, to be requested by the Board of Regents from the Kansas Development Finance Authority (KDFA) for deferred maintenance projects at Washburn University, the 19 community colleges, and the five technical colleges. The principal and interest for the bonds will be paid from the State General Fund, and the participating institutions will reimburse the State General Fund for the principal portion of the payments each year. Each series of bonds will be issued with an 8-year amortization period. There is a cap of $15.0 million of bond proceeds per institution over the five-year period of the program. Debt service payments on the bonds were authorized to begin after July 1, 2008, and the first debt service payment on the initial series of bonds issued for the program was paid on March 1, 2009.

The Board is authorized to enter into loan agreements with the eligible institutions to provide for payment of principal on the bonds. When approving applications for financing under the program, the Board must take into consideration both the need for the project and the financial ability of the institution to meet its obligation if the application is approved. The capacity to repay the bonds is also required to be further reviewed by KDFA. The Board is mandated to provide an annual report to the Legislature disclosing the aggregate amount of bonds issued, the amount of bonds issued for each postsecondary educational institution (PEI), and an overview of the projects financed by such bonds.

Projects eligible for financing are defined in the legislation: "Project" or "infrastructure project" means the maintenance, repair, reconstruction, remodeling or rehabilitation of a building located at a postsecondary educational institution, any additions to a building, any utility system and other infrastructure relating to such building, any life-safety upgrades to such building, any improvements necessary to be made to such building in order to comply with the requirements of the Americans with Disabilities Act or other federal or state law. The law excludes from the definition of an eligible project all new construction; the maintenance, repair, reconstruction or rehabilitation of any building used as an athletic facility that does not directly support the delivery of academic pursuits; and the maintenance, repair, reconstruction or rehabilitation of the residence of the president or chief executive officer of a postsecondary educational institution.

The Series 2008A Bonds

As previously reported to you, the first PEI Infrastructure Maintenance bonds were issued by the Kansas Development Finance Authority (KDFA) in the principal amount of $20,000,000 on March 26, 2008, and bond proceeds were deposited in the State Treasury. The following table lists the names of 13 participating institutions, the number of projects authorized by the Board and KDFA for each participant, the total amounts of loans from bond proceeds that were

authorized for each institution, and the total amount of bond proceeds spent by and loaned to each institution at March 31, 2009. These expenditures of $17,725,297.45 represent 89% of total 2008A Bond proceeds. Bond covenants mandate expenditures equal to at least 30% at March 15, 2009, and equal to at least 95% by March 15, 2011.

The 13 participating institutions are required to pay loan payments to the Board on or before December 1 of each year, so that the principal payments on the bonds will be deposited in the State Treasury prior to the subsequent year's March 1 principal payment date. The first principal payment of $2.5 million on the 2008A Bonds was paid on March 1, 2009, using the loan payments received from the participants, as mandated. The $2.5 million of principal paid on March 1, 2010, was also collected from the participants.

2008A Bond Proceeds - Distribution and Expenditures through March 31, 2009

Name of Participating Institution	# of Authorized Projects	Total Authorized Loan Amount	Total Expended at Sept. 30, 2009
Barton County Community College	1	$1,300,000.00	$ 1,300,000.00
Butler County Community College	9	2,222,707.00	2,080,328.42
Coffeyville Community College	4	899,460.00	891,749.78
Dodge City Community College	2	850,000.00	839,814.35
Highland Community College	4	970,000.00	577,172.45
Hutchinson Community College	2	3,979,270.00	3,979,270.00
Kansas City Kansas Community College	3	2,525,000.00	2,349,369.96
Labette County Community College	3	1,213,900.00	1,207,935.14
Manhattan Area Technical College	3	412,500.00	298,786.67
Northwest Kansas Technical College	4	338,280.00	338,280.00
Pratt Community College	5	623,883.00	189,172.00
Seward County Community College	6	1,260,000.00	1,029,793.56
Washburn University	2	3,405,000.00	2,643,625.12
TOTALS	**48**	$20,000,000.00	$17,725,297.45

The Series 2009C Bonds

With regard to the second year of the program (FY 2009), applications from 12 of the 25 eligible institutions were approved by the Board on February 12, 2009. The Series 2009C Bonds, in the amount of $20 million, were issued by KDFA on March 31, 2009. The following table lists the twelve participating institutions, the number of authorized projects and loan amounts for each institution, and the amount of bond proceeds disbursed to each participant by March 31, 2009. At that date, $8,191,140.21, or 41% of the Series 2009C bond proceeds had been disbursed. Bond covenants mandate expenditures equal to at least 30% at March 15, 2010, and equal to at least 95% by March 15, 2012.

2009C Bond Proceeds - Distribution and Expenditures through March 31, 2009

Name of Participating Institution	# of Authorized Projects	Total Authorized Loan Amount	Total Expended at Sept. 30, 2009
Butler County Community College	16	$ 1,451,923.00	$ 723,824.97
Cloud County Community College	6	981,104.00	697,180.26
Dodge City Community College	6	276,841.00	225,770.05
Garden City Community College	1	2,216,645.00	906,269.19
Highland Community College	5	241,100.00	121,677.22
Hutchinson Community College	2	4,178,520.00	2,984,225.88
Independence Community College	1	1,500,000.00	1,293,541.74
Johnson County Community College	3	5,293,382.00	79,710.27
Kansas City Kansas Community College	3	2,058,224.00	958,224.00
Northwest Kansas Technical College	5	98,261.00	77,241.93
Pratt Community College	4	460,000.00	-0-
Seward County Community College	8	1,244,000.00	123,474.70
TOTALS	**60**	$ 20,000,000.00	$8,191,140.21

The first payment of principal on the 2009C Bonds was paid on March 1, 2010. The $2.5 million of principal due on the 2009C Bonds on March 1, 2010, was collected from the participants.

The interest payment portion of the FY 2009 debt service payment for the Series 2008A Bonds was $680,468.75, paid from the State General Fund (SGF). In FY 2010, the SGF's interest payment portion of the debt service payments for both the 2008A bonds and the 2009C bonds was $1,318,135.07.

The Legislature did not authorize the issuance of bonds in fiscal year 2010 for the third year of the program.

III. The Tax Credits Program

In addition to combined direct state funds and university interest earnings and the subsidized loan program made possible with the issuance of the PEI bonds, the final funding component of the State Educational Institution Long-Term Infrastructure Maintenance Program (IMP) is the Tax Credits Program.

In 2007, tax credit provisions authorized by the Legislature established a new tax credit based on a percentage of a taxpayer's contribution made on or after July 1, 2008, to a community college for capital improvements (60% of the contribution), to a technical college for deferred maintenance or purchases of technology or equipment (60% of the contribution), or to a university for deferred maintenance (50% of the contribution). The credit, effective for tax years 2008 through 2012, is applicable to corporate and individual income tax, insurance premiums tax, and financial institutions privilege tax. The credits are scheduled to sunset after tax year 2012. The credit on a contribution to a community or technical college is refundable, if it is in excess of income tax liability. The university credits are non-refundable, but can be carried forward for up to three years. All credits originally claimed by not-for-profit entities are transferable to other taxpayers. The Kansas Department of Revenue (KDOR) has developed and implemented for all institutions a tax credits process designed to assure that qualifying contributions qualify for Federal as well as State income tax deductions.

As part of the fiscal year 2010 State budget approved by the Kansas Legislature on May 9, 2009, these tax credits were reduced by 10% in both the 2009 and the 2010 tax years. For a

taxpayer donating $1,000 to an eligible community college, prior to the cuts, that taxpayer would have received a 60% credit of $600. Now, the taxpayer will receive 90% of the 60% credit, or $540. The contribution of $1,000 generates 10% less tax credit to the taxpayer. This reduced credit is reflected only on the taxpayer's income tax return.

The table below shows the 2007 projected amounts of contributions for each sector of postsecondary education by fiscal year, assuming contributions were received to fully use the available tax credits. Also shown are the previously projected, related impacts on the State General Fund.

Note: All amounts are expressed in millions of dollars

Fiscal Year	Total Projected Contributions	Projected Contributions to State Universities and to Washburn University	Impact to the State General Fund from Projected Contributions to State Universities and Washburn	Projected Contributions to Community & Technical Colleges	Impact to the State General Fund from Projected Contributions to Community & Technical Colleges
2009	$ 14.375	$ 11.250	$ (7.500)	$ 3.125	$ (5.625)
2010	27.750	22.500	(15.000)	6.250	(11.250)
2011	38.333	30.000	(20.000)	8.333	(15.000)
2012	38.333	30.000	(20.000)	8.333	(15.000)
2013	38.333	30.000	(20.000)	8.333	(15.000)
Totals	$158.125	$123.750	$(82.500)	$34.375	$(61.875)

The allotment of the tax credits in the legislation is handled differently for Washburn and the state universities than for the community and technical colleges. The legislation specifies that for tax year 2008, each community and technical college is allotted $78,125 in tax credits. For tax year 2009, this amount increased to $156,250, and for each of tax years 2010 through 2012, further increases to $208,233. Assuming that all tax credits are used, each of the 24 institutions will generate private contributions for projects of $130,308 in tax year 2008, $260,416 in tax year 2009, and $347,208 for each of tax years 2010 through 2012.

For the state universities and Washburn University, a total of $5,625,000 in tax credits was divided among the seven institutions for tax year 2008. This total amount increased to $11,250,000 for tax year 2009, and further increases to $15,000,000 for each of tax years 2010 through 2012. The legislation stipulates that the Board of Regents, in consultation with the Secretary of Revenue and university foundation or endowment associations for each institution, will make the allotment of tax credits in advance of any credit issuance each year, with not more than 40% of the total credits being allotted to any one institution, unless all institutions are in agreement to waive that cap.

As previously reported to you, to prepare for the effective date of the program, the Department of Revenue has implemented regulations, and the universities have agreed to focus tax credit efforts on projects identified in the $200 million list approved in February 2007.

The Board of Regents approved the tax credit allocations listed in the following table for calendar years 2008 and 2009:

University Name	2008 Allocation Amount	2009 Allocation Amount
University of Kansas	$1,540,566	$ 3,081,133
University of Kansas – Medical Center	588,471	1,176,941
Kansas State University	1,624,381	3,248,761
Wichita State University	553,879	1,107,758
Emporia State University	324,481	648,961
Pittsburg State University	370,910	741,820
Fort Hays State University	371,220	742,441
Washburn University	251,092	502,185
TOTALS	**$5,625,000**	**$11,250,000**

The table below summarizes the actual, total contributions and corresponding tax credits issued for calendar years 2008 and 2009, as reported to KBOR by the universities and confirmed with the Kansas Department of Revenue's reports to KBOR as of January 19, 2010:

University Name	Calendar Year 2008		Calendar Year 2009	
	Total Donations Received	Total Tax Credits Issued	Total Donations Received	Total Tax Credits Issued
University of Kansas	$ 55,550	$ 27,775	$153,700	$ 76,850
University of Kansas – Medical Center	15,400	7,700	25,895	12,948
Kansas State University	2,000	1,000	3,000	1,500
Wichita State University	85,000	42,500	70,000	35,000
Emporia State University	-0-	-0-	-0-	-0-
Pittsburg State University	15,000	7,500	18,598	9,299
Fort Hays State University	689,270	344,635	136,017	68,009
Washburn University	-0-	-0-	-0-	-0-
TOTALS	$ 862,220	$ 431,110	$ 407,210	$ 203,606

Obviously, the actual donations and allocated tax credits were substantially less than anticipated for both calendar year 2008 (about $4.7 million less) and calendar year 2009 (about $10.8 million less).

According to reports from the Kansas Department of Revenue, for the calendar year ended December 31, 2009, the technical colleges received $89,900 in total contributions and awarded $53,940 in tax credits. The State's community colleges reported receiving contributions totaling $1,510,766, resulting in the award of $906,459 of tax credits in the 2009 calendar year.

Thank you for your attention. I would be pleased to respond to questions at this time.

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

.ie University of Kansas	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$25,803,000	$10,769,000	$ 36,572,000	$25,430,290	$10,223,345	$ -	$ 35,653,635	$ 8,601,000	$2,626,306	$ 5,734,000	$1,747,039		$ 3,927,790	$1,950,000		$ 4,300,500	$1,950,000		$ 2,867,000	$1,950,000		$25,430,290	$10,223,345	$ -	$ 35,653,635
Project Description and Estimated Cost																									
Utility Tunnel Improvements	$ 8,800,000	$ -	$ 8,800,000	$10,369,000	$ 2,811,000		$ 13,180,000	$ 6,000,000	$1,326,000	$ 1,200,000	$1,485,000		$ 1,600,000									$ 8,800,000	2,811,000	$ -	$ 11,611,000
Wescoe Hall	3,560,000	1,350,000	4,910,000	3,560,000	1,300,306		4,860,306	1,961,000	1,300,306	1,599,000												3,560,000	1,300,306	-	4,860,306
Haworth Hall	2,600,000		2,600,000	1,600,000	1,000,000		2,600,000	640,000		1,960,000	262,039			1,000,000								2,600,000	1,262,039	-	3,862,039
Malott Hall Improvements	1,239,000	1,391,000	2,630,000	2,367,961	262,039		2,630,000			975,000	-		1,961,961									2,936,961	-	-	2,936,961
Murphy Hall	2,637,000	1,823,000	4,460,000	2,587,000	1,823,000		4,410,000						365,829	950,000		2,221,171	873,000					2,587,000	1,823,000	-	4,410,000
Spencer Art Museum	-	970,000	970,000	908,000	62,000		970,000										62,000		908,000			908,000	62,000	-	970,000
Lippincott Hall	895,000	300,000	1,195,000	1,045,000	107,000		1,152,000						-	-		1,045,000	107,000					1,045,000	107,000	-	1,152,000
Bailey Hall	1,617,000	208,000	1,825,000	509,000	977,000		1,486,000						-	-		509,000	908,000			69,000		509,000	977,000	-	1,486,000
Strong Hall	-	2,013,000	2,013,000	1,063,000	1,677,000		2,740,000										-		1,063,000	1,677,000		1,063,000	1,677,000	-	2,740,000
Art and Design	896,000	204,000	1,100,000	896,000	204,000		1,100,000										-		896,000	204,000		896,000	204,000	-	1,100,000
Lindley Hall	2,080,000		2,080,000	525,329			525,329									525,329			-			525,329	-	-	525,329
Watson Library	530,000	1,105,000	1,635,000	-	-		0									-	-					-	-	-	-
Learned Hall	949,000	1,405,000	2,354,000	-	-		0												-	-		-	-	-	-
TOTALS	$25,803,000	$10,769,000	$ 36,572,000	$25,430,290	$10,223,345	$ -	$ 35,653,635	$ 8,601,000	$2,626,306	$ 5,734,000	$1,747,039		$ 3,927,790	$1,950,000		$ 4,300,500	$1,950,000		$ 2,867,000	$1,950,000		$25,430,290	$10,223,345	$ -	$ 35,653,635

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

The University of Kansas Medical Center	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$ 9,855,000	$ 2,000,000	$ 11,855,000	$ 9,712,650	$ 1,504,000		$ 11,216,650	$ 3,285,000	$ 400,000	$ 2,190,000	$ 276,000		$ 1,500,150	$ 276,000		$ 1,642,500	$ 276,000		$ 1,095,000	$ 276,000		$ 9,712,650	$ 1,504,000	$ -	$ 11,216,650
Project Description and Estimated Cost																									
Campus Exterior Maintenance		$ 100,000	$ 100,000		$ 100,000		$ 100,000		$ 100,000													$ -	$ 100,000	$ -	$ 100,000
Campus Infrastructure Improvements		45,000	45,000		45,000		45,000		45,000													-	45,000	-	45,000
Wahl Hall East Basement AHU Replacement		80,000	80,000		80,000		80,000		80,000													-	80,000	-	80,000
Mechanical Infrastructure - Wichita		24,500	24,500		24,500		24,500		24,500													-	24,500	-	24,500
Emergency Repairs to Building 37 Vivarium			-		350,000		350,000		124,000		226,000											-	350,000	-	350,000
Replace Building 90 Electrical Switchgear			-		50,000		50,000				50,000											-	50,000	-	50,000
Campus Roof Replacements			-		276,000		276,000							276,000								-	276,000	-	276,000
Campus Electrical Infrastructure			-		276,000		276,000										276,000					-	276,000	-	276,000
Campus Steam Infrastructure Replacements			-		276,000		276,000													276,000		-	276,000	-	276,000
Applegate Energy Center & Utility Distribution Systems:																									
1. Renovate & Upgrade Boiler	1,038,471		1,038,471	1,038,471	-		1,038,471	574,149								50,322			414,000			1,038,471	-	-	1,038,471
2. Replace Emergency Generator System	2,609,022	455,000	3,064,022	2,609,022	-		2,609,022	1,841,367	-	513,655	-			-		254,000						2,609,022	-	-	2,609,022
3. Replace & Renovate Chilled Water System	4,302,747	1,295,500	5,598,247	4,160,397	26,500		4,186,897	591,084	26,500	1,229,610	-		464,525	-		1,194,178	-		681,000	-		4,160,397	26,500	-	4,186,897
4. Renovate Electrical Distribution System	1,621,985		1,621,985	1,621,985	-		1,621,985	278,400		428,835			770,750			144,000						1,621,985	-	-	1,621,985
5. Replace & Renovate Water Pumping System	282,775		282,775	282,775	-		282,775			17,900			264,875									-	-	-	282,775
TOTALS	$ 9,855,000	$ 2,000,000	$ 11,855,000	$ 9,712,650	$ 1,504,000	$ -	$ 11,216,650	$ 3,285,000	$ 400,000	$ 2,190,000	$ 276,000		$ 1,500,150	$ 276,000		$ 1,642,500	$ 276,000		$ 1,095,000	$ 276,000		$ 9,712,650	$ 1,504,000	$ -	$ 11,216,650

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

Kansas State University	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$27,198,000	$15,200,000	$ 42,398,000	$26,805,140	$10,400,000		$ 37,205,140	$ 9,066,000	$3,200,000	$ 6,044,000	$1,800,000		$ 4,140,140	$1,800,000		$ 4,533,000	$1,800,000		$ 3,022,000	$1,800,000		$26,805,140	$10,400,000	$ -	$ 37,205,140
Project Description and Estimated Cost																									
Utility Infrastructure and Power Plant Improvements	$14,378,000	$ 4,045,000	$ 18,423,000	$14,378,000	$ 3,265,500		$ 17,643,500	$ 2,970,000		$ 1,610,000			$ 2,500,000			$ 4,423,000	$1,800,000		$ 2,875,000	$1,465,500		$14,378,000	$ 3,265,500	$ -	$ 17,643,500
Renovate Academic & Academic Support Spaces in Old Memorial Stadium	2,600,000	7,400,000	10,000,000	2,600,000	3,239,500		5,839,500	600,000	1,439,500	2,000,000	1,800,000			-			-					2,600,000	3,239,500	-	5,839,500
Leasure Hall	2,863,000	737,000	3,600,000	2,470,140	877,000		3,347,140	216,000		614,000			1,640,140	877,000								2,470,140	877,000	-	3,347,140
Willard Hall ($10,000,000 total project. Balance to be paid from University investment earnings spent in 2013)	5,357,000	1,257,500	6,614,500	5,357,000	1,257,500		6,614,500	5,100,000						923,000		110,000			147,000	334,500		5,357,000	1,257,500	-	6,614,500
Seaton Court	2,000,000		2,000,000	2,000,000			2,000,000	180,000		1,820,000												2,000,000	-	-	2,000,000
Roofs and Other Projects		1,760,500	1,760,500		1,760,500		1,760,500		1,760,500													-	1,760,500	-	1,760,500
TOTALS	$27,198,000	$15,200,000	$ 42,398,000	$26,805,140	$10,400,000	$ -	$ 37,205,140	$ 9,066,000	$3,200,000	$ 6,044,000	$1,800,000		$ 4,140,140	$1,800,000		$ 4,533,000	$1,800,000		$ 3,022,000	$1,800,000		$26,805,140	$10,400,000	$ -	$ 37,205,140

4-15

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

Wichita State University	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$ 9,279,000	$ 6,422,766	$ 15,701,766	$ 9,144,970	$ 4,939,244	$ 85,000	$ 14,169,214	$ 3,093,000	$1,244,952	$ 2,062,000	$ 886,999	$85,000	$ 1,412,470	$ 910,948		$ 1,546,500	$ 935,544		$ 1,031,000	$ 960,801		$ 9,144,970	$ 4,939,244	$ 85,000	$ 14,169,214
Project Description and Estimated Cost																									
Duerksen Fine Arts Center	$ 3,106,000	$ 4,393,766	$ 7,499,766	$ 4,146,360	$ 3,978,443	$ 40,000	$ 8,164,803	$ 374,000	$1,244,952	$ 1,775,000	$ 886,999	$40,000	$ 914,470	$ 910,948		$ 952,500	$ 935,544					$ 4,015,970	$ 3,978,443	$ 40,000	$ 8,034,413
Henrion Hall	240,000	53,000	293,000	-	-		-												-	-		-	-		-
Engineering Building	214,000	-	214,000	756,000	-	45,000	801,000	145,000		113,000		45,000	498,000									756,000	-	45,000	801,000
Grace Wilkie Hall	334,000		334,000	1,969,000	960,801		2,929,801	170,000		174,000						594,000			1,031,000	960,801		1,969,000	960,801	-	2,929,801
Fiske Hall	294,000	42,000	336,000	-	-		-													-		-	-	-	-
Wilner Auditorium	498,000		498,000	-	-		-						-							-		-	-	-	-
Clinton Hall	504,000	240,000	744,000	-	-		-									-				-		-	-	-	-
Visual Communications Building	156,000	36,000	192,000	54,702	-		54,702	54,702											-	-		54,702	-	-	54,702
Hubbard Hall		622,000	622,000		-		-						-									-	-	-	-
Wallace Hall	562,000	100,000	662,000	148,120	-		148,120	148,120									-		-			148,120	-	-	148,120
Ahlberg Hall	348,000		348,000	163,954			163,954	163,954											-			163,954	-	-	163,954
McKnight Art Center	474,000	30,000	504,000	214,060	-		214,060	214,060											-	-		214,060	-	-	214,060
Geology Building	418,000	30,000	448,000	-	-		-						-						-	-		-	-	-	-
Ablah Library	161,000		161,000	-			-												-			-	-	-	-
Jabara Hall	42,000		42,000				-												-			-	-	-	-
Central Energy Plant	384,000	24,000	408,000	235,243	-		235,243	235,243											-	-		235,243	-	-	235,243
Lindquist Hall	252,000	42,000	294,000	190,347	-		190,347	190,347												-		190,347	-	-	190,347
Jardine Hall	36,000	24,000	60,000	59,438	-		59,438	59,438												-		59,438	-	-	59,438
Elliott Hall		114,000	114,000		-		-													-		-	-	-	-
Infrastructure	680,000		680,000	1,004,270			1,004,270	1,134,660												-		1,134,660	-	-	1,134,660
Brennan Hall 1		210,000	210,000		-		-													-		-	-	-	-
Blake Hall		120,000	120,000		-		-						-							-		-	-	-	-
Heskett Center	300,000		300,000	116,696			116,696	116,696														116,696	-	-	116,696
Metropolitan Complex		342,000	342,000		-		-													-		-	-	-	-
Police Building	36,000		36,000	-			-												-			-	-	-	-
National Institute for Aviation Research	240,000		240,000	86,780			86,780	86,780														86,780	-	-	86,780
TOTALS	$ 9,279,000	$ 6,422,766	$ 15,701,766	$ 9,144,970	$ 4,939,244	$ 85,000	$ 14,169,214	$ 3,093,000	$1,244,952	$ 2,062,000	$ 886,999	$85,000	$ 1,412,470	$ 910,948	$ -	$ 1,546,500	$ 935,544	$ -	$ 1,031,000	$ 960,801	$ -	$ 9,144,970	$ 4,939,244	$ 85,000	$ 14,169,214
				ERR	ERR										ERR									ERR	ERR

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

Emporia State University	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$ 5,436,000	$ 2,430,000	$ 7,866,000	$ 5,357,480	$ 1,964,700		$ 7,322,180	$ 1,812,000	$ 459,700	$ 1,208,000	$ 395,000		$ 827,480	$ 370,000		$ 906,000	$ 370,000		$ 604,000	$ 370,000		$ 5,357,480	$ 1,964,700	$ -	$ 7,322,180
Project Description and Estimated Cost																									
Physical Education Building Roof Replacement	$ 351,000	$ 486,000	$ 837,000	$ 351,000	$ 459,700		$ 810,700	$ 351,000	$ 459,700													$ 351,000	$ 459,700	$ -	$ 810,700
P.E. Building HVAC Repairs / Replacement		363,000	363,000		270,000		270,000													270,000		-	270,000	-	270,000
P.E. Building Plumbing Repairs / Replacement		123,000	123,000		100,000		100,000													100,000		-	100,000	-	100,000
White Library HVAC Repairs / Replacement	1,438,000	300,000	1,738,000	1,438,000	209,000		1,647,000	230,000		1,208,000	209,000											1,438,000	209,000	-	1,647,000
White Library Electrical Repairs / Replacement	519,000	186,000	705,000	519,000	186,000		705,000	410,000			186,000		109,000									519,000	186,000	-	705,000
White Library Elevator Repairs / Replacement	50,000		50,000	50,000			50,000						50,000									50,000	-	-	50,000
White Library Partition Repairs / Replacement	200,000		200,000	200,000			200,000						200,000									200,000	-	-	200,000
Utility Tunnels Repairs / Replacement	936,000		936,000	936,000			936,000	339,000											597,000			936,000	-	-	936,000
Roosevelt Hall Foundation Stabilization / Repairs	819,000	100,000	919,000	740,480			740,480	272,000					468,480	-								740,480	-	-	740,480
Roosevelt Hall HVAC Repairs / Replacement	175,000	275,000	450,000	175,000	259,000		434,000	175,000						259,000								175,000	259,000	-	434,000
Roosevelt Hall Plumbing Repairs / Replacement	35,000	63,000	98,000	35,000	63,000		98,000	35,000						63,000								35,000	63,000	-	98,000
Cremer Hall Elevator Repairs / Replacement	36,000	24,000	60,000	36,000	24,000		60,000							24,000		36,000						36,000	24,000	-	60,000
King Hall Elevator Repairs / Replacement	36,000	24,000	60,000	36,000	24,000		60,000							24,000		36,000						36,000	24,000	-	60,000
Visser Hall HVAC Repair / Replacement	291,000	486,000	777,000	291,000	370,000		661,000									284,000	370,000		7,000			291,000	370,000	-	661,000
Stormont Maint.Building HVAC Repair / Replacement	300,000		300,000	300,000			300,000									300,000						300,000	-	-	300,000
Power House Roof Replacement	250,000		250,000	250,000			250,000									250,000						250,000	-	-	250,000
TOTALS	$ 5,436,000	$ 2,430,000	$ 7,866,000	$ 5,357,480	$ 1,964,700	$ -	$ 7,322,180	$ 1,812,000	$ 459,700	$ 1,208,000	$ 395,000	$ -	$ 827,480	$ 370,000	$ -	$ 906,000	$ 370,000	$ -	$ 604,000	$ 370,000	$ -	$ 5,357,480	$ 1,964,700	$ -	$ 7,322,180

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

...tsburg State University

	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$ 6,210,000	$ 3,842,000	$ 10,052,000	$ 6,120,300	$ 2,228,639	$ -	$ 8,348,939	$ 2,070,000	$ 728,639	$ 1,380,000	$ 375,000		$ 945,300	$ 375,000		$ 1,035,000	$ 375,000		$ 690,000	$ 375,000		$ 6,120,300	$ 2,228,639	$ -	$ 8,348,939
Project Description and Estimated Cost																									
McCray Hall	$ 2,300,000	$ -	$ 2,300,000	$ 2,093,357	$ 174,187		$ 2,267,544	$ 2,070,000	$ 200,000	$ 23,357												$ 2,093,357	$ 200,000	$ -	$ 2,293,357
Russ Hall	-	150,000	150,000		138,321		138,321		138,321													-	138,321	-	138,321
Axe Library	-	250,000	250,000		282,596		282,596		284,118													-	284,118	-	284,118
Heckert-Wells Hall and Weede Facility - Replace Electrical Switch Gear	-	150,000	150,000		103,910		103,910		106,200													-	106,200	-	106,200
Steam Line Replacement	-	200,000	200,000	125,000			125,000			125,000												125,000	-	-	125,000
Utility Distribution System Improvements	-	1,359,000	1,359,000		375,000		375,000				-			-						375,000		-	375,000	-	375,000
Porter Hall	2,185,000	115,000	2,300,000	2,176,943	779,625		2,956,568			1,231,643	375,000		945,300	375,000								2,176,943	750,000	-	2,926,943
Heckert - Wells Hall	630,000	418,000	1,048,000	630,000	-		630,000							-		630,000	-					630,000	-	-	630,000
Grubbs Hall	345,000	438,000	783,000	345,000	-		345,000												345,000	-		345,000	-	-	345,000
Yates Hall	345,000	387,000	732,000	345,000	125,000		470,000										125,000		345,000	-		345,000	125,000	-	470,000
Weede Facility	405,000	375,000	780,000	405,000	250,000		655,000							-		405,000	250,000					405,000	250,000	-	655,000
TOTALS	6,210,000	3,842,000	10,052,000	6,120,300	2,228,639	-	8,348,939	2,070,000	728,639	1,380,000	375,000	-	945,300	375,000	-	1,035,000	375,000	-	690,000	375,000	-	6,120,300	2,228,639	-	8,348,939

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

Fort Hays State University

	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$ 6,219,000	$ 3,767,500	$ 9,986,500	$ 6,129,170	$ 3,470,025	$ 672,423	$ 10,271,618	$ 2,073,000	$ 826,225	$ 1,382,000	$ 738,500		$ 946,670	$ 635,100		$ 1,036,500	$ 635,100		$ 691,000	$ 635,100		$ 6,129,170	$ 3,470,025	$ -	$ 9,599,195
Project Description and Estimated Cost																									
Picken Hall Improvements ($3,845,000)	$ 3,455,000	$ 390,000	$ 3,845,000	$ 2,782,577	$ 390,000	$ 672,423	$ 3,845,000	$ 2,073,000		$ 1,382,000	$ 390,000											$ 3,455,000	$ 390,000	$ -	$ 3,845,000
Campus Electrical Improvements ($3,696,000)	2,073,000	1,623,000	3,696,000	2,655,593	1,325,525		3,981,118						946,670	690,425		1,036,500	635,100					1,983,170	1,325,525	-	3,308,695
Akers Energy Center - Boiler Replacements ($1,123,500)	691,000	432,500	1,123,500	691,000	432,500		1,123,500												691,000	432,500		691,000	432,500	-	1,123,500
Street Improvements ($661,000)	-	661,000	661,000		661,000		661,000				223,000						117,000			321,000		-	661,000	-	661,000
Utility Tunnel Replacement-Center of Quadrangle to Rarc	-	336,000	336,000		336,000		336,000		336,000													-	336,000	-	336,000
Sheridan Hall Roof Repairs ($70,000)	-	70,000	70,000		70,000		70,000		70,000													-	70,000	-	70,000
Service Buildings Masonry Cleaning and Sealing ($60,000	-	60,000	60,000		60,000		60,000		60,000													-	60,000	-	60,000
Repaint Cunningham Hall Gyms 100, 101, 102 and 121 (	-	35,000	35,000		35,000		35,000		35,000													-	35,000	-	35,000
Felten-Start Theatre Seating Replacement ($100,000)	-	100,000	100,000		100,000		100,000		100,000													-	100,000	-	100,000
Campus Exterior Graphics - Phase II ($60,000)	-	60,000	60,000		60,000		60,000		60,000													-	60,000	-	60,000
TOTALS	$ 6,219,000	$ 3,767,500	$ 9,986,500	$ 6,129,170	$ 3,470,025	$ 672,423	$ 10,271,618	$ 2,073,000	$ 661,000	$ 1,382,000	$ 613,000	$ -	$ 946,670	$ 690,425	$ -	$ 1,036,500	$ 752,100	$ -	$ 691,000	$ 753,500	$ -	$ 6,129,170	$ 3,470,025	$ -	$ 9,599,195

5-YEAR BUDGET PLAN - FISCAL YEARS 2008 THROUGH 2012

System Totals

	ORIGINAL PROJECT BUDGETS			REVISED PROJECT BUDGETS				5-YEAR ANNUAL BUDGETED ALLOCATION AMOUNTS BY FISCAL YEAR AND CATEGORY													5-YEAR REVISED PROJECT TOTALS			
								FY 2008		FY 2009			FY 2010			FY 2011			FY 2012						
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	TAX CREDITS	IMP	UI	4-YEAR TAX CREDITS TOTALS	GRAND TOTALS
Estimated, Approved Budget Amounts	$90,000,000	$44,431,266	$134,431,266	$88,700,000	$34,729,953	$ 757,423	$124,187,376	$30,000,000	$9,320,597	$20,000,000	$6,093,038	$85,000	$13,700,000	$6,372,373	$ -	$15,000,000	$6,458,644	$ -	$10,000,000	$6,485,301	$ -	$88,700,000	$34,729,953	$ 85,000	$123,514,953
			ERR			ERR																			ERR

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

The University of Kansas

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	2008 Allocation Budget UI	2008 Allocation Budget TOTAL	Revised 2008 Allocation Budget IMP	Revised 2008 Allocation Budget UI	Revised 2008 Allocation Budget TAX CREDITS	Revised 2008 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	FY 2008 TOTALS UI	FY 2008 TOTALS TAX CREDITS	FY 2008 TOTALS TOTAL	Project Status at 6/30/08: Projected Completion Date	Project Status at 6/30/08: To Date % of Project Completion
Utility Tunnel Improvements	$ 6,000,000		$ 6,000,000	$ 6,000,000	$ 1,326,000	n/a	$ 7,326,000	6/30/08		$ 964,120		n/a	$ 964,120	12/2009	8.30%
Wescoe Hall	1,961,000	1,350,000	3,311,000	1,961,000	1,300,306	n/a	3,261,306	6/25/09		566,144	$ 881,479	n/a	1,447,623	08/2009	29.78%
Haworth Hall	640,000		640,000	640,000		n/a	640,000	n/a		212,581		n/a	212,581	11/2009	5.50%
TOTALS	$ 8,601,000	$ 1,350,000	$ 9,951,000	$ 8,601,000	$ 2,626,306		$11,227,306			$ 1,742,845	$ 881,479		$ 2,624,324		7.36%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	2009 Allocation Budget UI	2009 Allocation Budget TOTAL	Revised 2009 Allocation Budget IMP	Revised 2009 Allocation Budget UI	Revised 2009 Allocation Budget TAX CREDITS	Revised 2009 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Utility Tunnel Improvements	$ 1,200,000		$ 1,200,000	$ 2,769,000	$ 1,485,000		$ 4,254,000	6/30/08		$ 8,765,500	$ 1,200,793	$ 12,751	$ 9,979,044	12/2009	85.94%
Wescoe Hall	1,599,000		1,599,000	1,599,000			1,599,000	n/a		3,258,805	1,295,192	-	4,553,997	07/2009	93.70%
Haworth Hall	1,960,000		1,960,000	960,000			960,000	n/a		441,759	-	-	441,759	01/2010	11.44%
Malott Hall	975,000	$ 1,391,000	2,366,000	406,000	262,039		668,039	n/a		259,189	-	-	259,189	11/2010	8.83%
TOTALS	$ 5,734,000	$ 1,391,000	$ 7,125,000	$ 5,734,000	$ 1,747,039	$ -	$ 7,481,039			$12,725,253	$ 2,495,985	$ 12,751	$16,233,989		42.73%

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2010 Allocation Budget IMP	2010 Allocation Budget UI	2010 Allocation Budget TOTAL	Revised 2010 Allocation Budget IMP	Revised 2010 Allocation Budget UI	Revised 2010 Allocation Budget TAX CREDITS	Revised 2010 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Utility Tunnel Improvements	$ 1,600,000		$ 1,600,000	$ 1,600,000			$ 1,600,000	n/a	$ 123,311		$ 1,354	$ 124,665	$ 8,990,641	$ 2,289,764	$ 52,845	$11,333,250	11/2009	97.61%
Wescoe Hall			-				-	n/a				-	3,282,383	1,295,192	-	4,577,575	07/2009	94.18%
Haworth Hall			-		1,000,000		1,000,000	n/a	23,915	76		23,991	628,881	76	-	628,957	05/2011	16.29%
Malott Hall	264,000		264,000	1,961,961			1,961,961	n/a				-	261,223	-	-	261,223	05/2011	8.89%
Murphy Hall	832,500	$ 1,364,000	2,196,500	365,829	950,000		1,315,829	n/a				-	-	-	-	-	05/2011	0.00%
Spencer Art Museum		970,000	970,000	-	-		-	n/a				-	-	-	-	-	N/A	0.00%
Lippincott Hall	895,000	300,000	1,195,000	-	-		-	n/a				-	-	-	-	-	N/A	0.00%
Bailey Hall	709,000	42,000	751,000	-	-		-	n/a				-	-	-	-	-	N/A	0.00%
TOTALS	$ 4,300,500	$ 2,676,000	$ 6,976,500	$ 3,927,790	$ 1,950,000	$ -	$ 5,877,790		$ 147,226	$ 76	$ 1,354	$ 148,656	$13,163,128	$ 3,585,032	$ 52,845	$16,801,005		47.12%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

The University of Kansas

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2011 Allocation Budget IMP	2011 Allocation Budget UI	2011 Allocation Budget TOTAL	Revised 2011 Allocation Budget IMP	Revised 2011 Allocation Budget UI	Revised 2011 Allocation Budget TAX CREDITS	Revised 2011 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Utility Tunnel Improvements			$ -				$ -					$ -	$ 8,990,641	$ 2,289,764	$ 52,845	$11,333,250		97.61%
Wescoe Hall			-				-					-	3,282,383	1,295,192	-	4,577,575		94.18%
Haworth Hall			-				-					-	628,881	76	-	628,957		16.29%
Malott Hall			-				-					-	261,223	-	-	261,223		8.89%
Murphy Hall	$ 1,804,500	$ 459,000	2,263,500	$ 2,221,171	$ 873,000		3,094,171	n/a				-	-	-	-	-		0.00%
Spencer Art Museum			-		62,000		62,000					-	-	-	-	-		0.00%
Lippincott Hall			-	1,045,000	107,000		1,152,000					-	-	-	-	-		0.00%
Bailey Hall	908,000	166,000	1,074,000	509,000	908,000		1,417,000	n/a				-	-	-	-	-		0.00%
Strong Hall		742,000	742,000		-		-	n/a				-	-	-	-	-		0.00%
Art and Design		204,000	204,000		-		-	n/a				-	-	-	-	-		0.00%
Lindley Hall	1,058,000		1,058,000	525,329			525,329	n/a				-	-	-	-	-		0.00%
Watson Library	530,000	1,105,000	1,635,000	-	-		-	n/a				-	-	-	-	-		N/A
TOTALS	$ 4,300,500	$ 2,676,000	$ 6,976,500	$ 4,300,500	$ 1,950,000	$ -	$ 6,250,500		$ -	$ -	$ -	$ -	$13,163,128	$ 3,585,032	$ 52,845	$16,801,005		47.12%

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2012 Allocation Budget IMP	2012 Allocation Budget UI	2012 Allocation Budget TOTAL	Revised 2012 Allocation Budget IMP	Revised 2012 Allocation Budget UI	Revised 2012 Allocation Budget TAX CREDITS	Revised 2012 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Utility Tunnel Improvements			$ -				$ -					$ -	$ 8,990,641	$ 2,289,764	$ 52,845	$11,333,250		97.61%
Wescoe Hall			-				-					-	3,282,383	1,295,192	-	4,577,575		94.18%
Haworth Hall			-				-					-	628,881	76	-	628,957		16.29%
Malott Hall			-				-					-	261,223	-	-	261,223		8.89%
Murphy Hall			-				-					-	-	-	-	-		0.00%
Spencer Art Museum			-	908,000			908,000					-	-	-	-	-		0.00%
Lippincott Hall			-				-					-	-	-	-	-		0.00%
Bailey Hall			-		69,000		69,000					-	-	-	-	-		0.00%
Strong Hall		$ 1,271,000	1,271,000	1,063,000	1,677,000		2,740,000	n/a				-	-	-	-	-		0.00%
Art and Design	$ 896,000		896,000	896,000	204,000		1,100,000	n/a				-	-	-	-	-		0.00%
Lindley Hall	1,022,000		1,022,000	-			-	n/a				-	-	-	-	-		0.00%
Watson Library			-				-					-	-	-	-	-		N/A
Learned Hall	949,000	1,405,000	2,354,000	-	-		-	n/a				-	-	-	-	-		0.00%
TOTALS	$ 2,867,000	$ 2,676,000	$ 5,543,000	$ 2,867,000	$ 1,950,000	$ -	$ 4,817,000		$ -	$ -	$ -	$ -	$13,163,128	$ 3,585,032	$ 52,845	$16,801,005		47.12%

FIVE-YEAR TOTALS TO DATE	$25,803,000	$10,769,000	$36,572,000	$25,430,290	$10,223,345	$ -	$35,653,635	>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<					$13,163,128	$ 3,585,032	$ 52,845	$16,801,005	N/A	47.12%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

The University of Kansas Medical Center

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	2008 Allocation Budget UI	2008 Allocation Budget TOTAL	Revised 2008 Allocation Budget IMP	Revised 2008 Allocation Budget UI	Revised 2008 Allocation Budget TAX CREDITS	Revised 2008 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES — CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	FY 2008 TOTALS UI	FY 2008 TOTALS TAX CREDITS	FY 2008 TOTALS TOTAL	Project Status at 6/30/08 Projected Completion Date	Project Status at 6/30/08 To Date % of Project Completion
Campus Exterior Maintenance		$ 100,000	$ 100,000		$ 100,000	n/a	$ 100,000	n/a			$ 47,492	n/a	$ 47,492	09/2008	47.49%
Campus Infrastructure Improvements		45,000	45,000		45,000	n/a	45,000	n/a			14,019	n/a	14,019	09/2008	31.15%
Wahl Hall East Basement AHU Replacement		80,000	80,000		80,000	n/a	80,000	n/a			73,752	n/a	73,752	05/2008	92.19%
Mechanical Infrastructure - Wichita		24,500	24,500		24,500	n/a	24,500	n/a				n/a	-	12/2008	0.00%
Emergency Repairs to Building 37 Vivarium			-		124,000	n/a	124,000	6/25/09				n/a	-		0.00%
Replace Building 90 Electrical Switchgear			-			n/a	-	6/25/09				n/a	-		0.00%
Campus Roof Replacements			-			n/a	-	6/25/09				n/a	-		0.00%
Campus Electrical Infrastructure			-			n/a	-	6/25/09				n/a	-		0.00%
Campus Steam Infrastructure Replacements			-			n/a	-	6/25/09				n/a	-		0.00%
Applegate Energy Center and Utility Systems:															
1. Renovate & Upgrade Boiler	$ 574,149		574,149	574,149		n/a	574,149	n/a		$ 31,374		n/a	31,374	06/2012	3.02%
2. Replace Emergency Generator System	1,841,367	100,000	1,941,367	1,841,367		n/a	1,841,367	6/25/09		61,506	42,708	n/a	104,214	06/2011	3.99%
3. Replace & Renovate Chilled Water System	591,084	50,500	641,584	591,084	26,500	n/a	617,584	6/25/09		18,726		n/a	18,726	06/2012	0.45%
4. Renovate Electrical Distribution System	278,400		278,400	278,400		n/a	278,400	n/a		8,820		n/a	8,820	06/2012	0.54%
5. Replace & Renovate Water Pumping System			-			n/a	-	n/a				n/a	-	06/2010	0.00%
TOTALS	$ 3,285,000	$ 400,000	$ 3,685,000	$ 3,285,000	$ 400,000		$ 3,685,000			$ 120,426	$ 177,971		$ 298,397		2.66%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	2009 Allocation Budget UI	2009 Allocation Budget TOTAL	Revised 2009 Allocation Budget IMP	Revised 2009 Allocation Budget UI	Revised 2009 Allocation Budget TAX CREDITS	Revised 2009 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES — CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status Projected Completion Date	Project Status To Date % of Project Completion
Campus Exterior Maintenance			$ -				$ -			$ -	$ 91,391	$ -	$ 91,391	03/2009	91.39%
Campus Infrastructure Improvements			-				-			-	40,652	-	40,652	03/2009	90.34%
Wahl Hall East Basement AHU Replacement			-				-			-	73,752	-	73,752	05/2008	92.19%
Mechanical Infrastructure - Wichita			-				-				11,829		11,829	12/2009	48.28%
Emergency Repairs to Building 37 Vivarium			-		226,000		226,000	6/25/09			72,916		72,916		20.83%
Replace Building 90 Electrical Switchgear			-		50,000		50,000	6/25/09			-		-		0.00%
Campus Roof Replacements			-				-				-		-		0.00%
Campus Electrical Infrastructure			-				-				-		-		0.00%
Campus Steam Infrastructure Replacements			-				-			-	-	-	-		0.00%
Applegate Energy Center and Utility Systems:															
1. Renovate & Upgrade Boiler			-				-			116,816	-	-	116,816	06/2012	11.25%
2. Replace Emergency Generator System	$ 513,655	$ 180,000	693,655	513,655	-		513,655	6/25/09		1,184,045	42,708	-	1,226,753	06/2011	47.02%
3. Replace & Renovate Chilled Water System	1,229,610	220,000	1,449,610	1,229,610	-		1,229,610	6/25/09		493,488	6,365	-	499,853	06/2012	11.94%
4. Renovate Electrical Distribution System	428,835		428,835	428,835			428,835	6/25/09		304,208	-	-	304,208	06/2010	18.76%
5. Replace & Renovate Water Pumping System	17,900		17,900	17,900			17,900	6/25/09		86,636	-	-	86,636	06/2010	30.64%
TOTALS	$ 2,190,000	$ 400,000	$ 2,590,000	$ 2,190,000	$ 276,000	$ -	$ 2,466,000			$ 2,185,193	$ 339,613	$ -	$ 2,524,806		22.51%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

4-20

The University of Kansas Medical Center

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2010 Allocation Budget			Revised 2010 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Campus Exterior Maintenance			$ -				$ -					$ -	$ -	$ 91,391	$ -	$ 91,391		91.39%
Campus Infrastructure Improvements			-				-					-	-	40,652	-	40,652		90.34%
Wahl Hall East Basement AHU Replacement			-				-					-	-	73,752	-	73,752		92.19%
Mechanical Infrastructure - Wichita			-				-					-	-	11,829	-	11,829		48.28%
Emergency Repairs to Building 37 Vivarium			-				-			28,560		28,560	-	361,857	-	361,857	7/31/09	103.39%
Replace Building 90 Electrical Switchgear			-				-			2,035		2,035	-	12,669	-	12,669	12/01/09	25.34%
Campus Roof Replacements			-		276,000		276,000					-	-	-	-	-		0.00%
Campus Electrical Infrastructure			-				-					-	-	-	-	-		0.00%
Campus Steam Infrastructure Replacements			-				-					-	-	-	-	-		0.00%
Applegate Energy Center and Utility Systems:																		
1. Renovate & Upgrade Boiler			-				-		2,108			2,108	136,106	-	-	136,106	6/30/10	13.11%
2. Replace Emergency Generator System		$ 175,000	175,000				-		229,808			229,808	2,059,155	88,120	-	2,147,275	6/30/10	82.30%
3. Replace & Renovate Chilled Water System	$ 606,875	225,000	831,875	464,525			464,525		202,478			202,478	1,880,467	14,718	-	1,895,185	6/30/10	45.26%
4. Renovate Electrical Distribution System	770,750		770,750	770,750			770,750		185,922			185,922	1,012,960	2,722	-	1,015,682	6/30/10	62.62%
5. Replace & Renovate Water Pumping System	264,875		264,875	264,875			264,875		83,275			83,275	464,405	2,575	-	466,980	6/30/10	165.14%
TOTALS	$ 1,642,500	$ 400,000	$ 2,042,500	$ 1,500,150	$ 276,000	$ -	$ 1,776,150		$ 703,591	$ 30,595	$ -	$ 734,186	$ 5,553,093	$ 700,285	$ -	$ 6,253,378		55.75%

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2011 Allocation Budget			Revised 2011 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Campus Exterior Maintenance			$ -				$ -					$ -	$ -	$ 91,391	$ -	$ 91,391		91.39%
Campus Infrastructure Improvements			-				-					-	-	40,652	-	40,652		90.34%
Wahl Hall East Basement AHU Replacement			-				-					-	-	73,752	-	73,752		92.19%
Mechanical Infrastructure - Wichita			-				-					-	-	11,829	-	11,829		48.28%
Emergency Repairs to Building 37 Vivarium			-				-					-	-	361,857	-	361,857		103.39%
Replace Building 90 Electrical Switchgear			-				-					-	-	12,669	-	12,669		25.34%
Campus Roof Replacements			-				-					-	-	-	-	-		0.00%
Campus Electrical Infrastructure			-		276,000		276,000					-	-	-	-	-		0.00%
Campus Steam Infrastructure Replacements			-				-					-	-	-	-	-		0.00%
Applegate Energy Center and Utility Systems:																		
1. Renovate & Upgrade Boiler	$ 50,322		50,322	50,322			50,322					-	136,106	-	-	136,106		13.11%
2. Replace Emergency Generator System	254,000		254,000	254,000			254,000					-	2,059,155	88,120	-	2,147,275		82.30%
3. Replace & Renovate Chilled Water System	1,194,178	$ 400,000	1,594,178	1,194,178			1,194,178					-	1,880,467	14,718	-	1,895,185		45.26%
4. Renovate Electrical Distribution System	144,000		144,000	144,000			144,000					-	1,012,960	2,722	-	1,015,682		62.62%
5. Replace & Renovate Water Pumping System			-				-					-	464,405	2,575	-	466,980		165.14%
TOTALS	$ 1,642,500	$ 400,000	$ 2,042,500	$ 1,642,500	$ 276,000	$ -	$ 1,918,500		$ -	$ -	$ -	$ -	$ 5,553,093	$ 700,285	$ -	$ 6,253,378		55.75%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

12-4

The University of Kansas Medical Center

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2012 Allocation Budget			Revised 2012 Allocation Budget				Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE				Projected Completion Date	To Date % of Project Completion
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL		IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL		
Campus Exterior Maintenance			$ -				$ -					$ -	$ -	$ 91,391	$ -	$ 91,391		91.39%
Campus Infrastructure Improvements			-				-					-	-	40,652	-	40,652		90.34%
Wahl Hall East Basement AHU Replacement			-				-					-	-	73,752	-	73,752		92.19%
Mechanical Infrastructure - Wichita			-				-					-	-	11,829	-	11,829		48.28%
Emergency Repairs to Building 37 Vivarium			-				-					-	-	361,857	-	361,857		103.39%
Replace Building 90 Electrical Switchgear			-				-					-	-	12,669	-	12,669		25.34%
Campus Roof Replacements			-				-					-	-	-	-	-		0.00%
Campus Electrical Infrastructure			-				-					-	-	-	-	-		0.00%
Campus Steam Infrastructure Replacements			-		276,000		276,000					-	-	-	-	-		0.00%
Applegate Energy Center and Utility Systems:																		
1. Renovate & Upgrade Boiler	$ 414,000		414,000	414,000			414,000					-	136,106	-	-	136,106		13.11%
2. Replace Emergency Generator System			-				-					-	2,059,155	88,120	-	2,147,275		82.30%
3. Replace & Renovate Chilled Water System	681,000	$ 400,000	1,081,000	681,000			681,000					-	1,880,467	14,718	-	1,895,185		45.26%
4. Renovate Electrical Distribution System			-				-					-	1,012,960	2,722	-	1,015,682		62.62%
5. Replace & Renovate Water Pumping System			-				-					-	464,405	2,575	-	466,980		165.14%
TOTALS	$ 1,095,000	$ 400,000	$ 1,495,000	$ 1,095,000	$ 276,000	$ -	$ 1,371,000		$ -	$ -	$ -	$ -	$ 5,553,093	$ 700,285	$ -	$ 6,253,378		55.75%
FIVE-YEAR TOTALS TO DATE	$ 9,855,000	$ 2,000,000	$11,855,000	$ 9,712,650	$ 1,504,000	$ -	$11,216,650	>>>>>>>>>>>>>>>>*Not Relevant*<<<<<<<<<<<<<<<<					$ 5,553,093	$ 700,285	$ -	$ 6,253,378	*N/A*	55.75%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

4-22

Kansas State University

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	UI	TOTAL	Revised 2008 Allocation Budget IMP	UI	TAX CREDITS	TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES — CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	UI	TAX CREDITS	TOTAL	Project Status at 6/30/08 Projected Completion Date	To Date % of Project Completion
Utility infrastructure & power plant improvements	$ 2,970,000		$ 2,970,000	$ 2,970,000		n/a	$ 2,970,000	n/a		$ 228,681		n/a	$ 228,681	12/2012	1.30%
Renovate academic & academic support spaces in old Memorial Stadium	600,000	$ 1,439,500	2,039,500	600,000	1,439,500	n/a	2,039,500	n/a		63,762	$ 551	n/a	64,313	11/2010	1.10%
Leasure Hall	216,000		216,000	216,000		n/a	216,000	n/a		32,031		n/a	32,031	12/2010	0.96%
Willard Hall	5,100,000		5,100,000	5,100,000		n/a	5,100,000	n/a		302,829		n/a	302,829	12/2012	4.58%
Seaton Court	180,000		180,000	180,000		n/a	180,000	n/a		63,033		n/a	63,033	12/2009	3.15%
Roofs and Other Projects		1,760,500	1,760,500	-	1,760,500	n/a	1,760,500	n/a			782,513	n/a	782,513	07/2008	44.45%
TOTALS	$ 9,066,000	$ 3,200,000	$12,266,000	$ 9,066,000	$ 3,200,000		$12,266,000			$ 690,336	$ 783,064		$ 1,473,400		3.96%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	UI	TOTAL	Revised 2009 Allocation Budget IMP	UI	TAX CREDITS	TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES — CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	UI	TAX CREDITS	TOTAL	Project Status Projected Completion Date	To Date % of Project Completion
Utility infrastructure & power plant improvements	$ 1,610,000		$ 1,610,000	$ 1,610,000			$ 1,610,000	n/a		$ 3,988,133	$ 10,249	$ -	$ 3,998,382	12/2012	22.66%
Renovate academic & academic support spaces in old Memorial Stadium	2,000,000	$ 3,000,000	5,000,000	2,000,000	1,800,000		3,800,000	n/a		118,339	551	-	118,890	11/2010	2.04%
Leasure Hall	614,000		614,000	614,000			614,000	n/a		277,978	-	-	277,978	12/2010	8.30%
Willard Hall			-				-	n/a		2,510,349	-	-	2,510,349	12/2012	37.95%
Seaton Court	1,820,000		1,820,000	1,820,000			1,820,000	n/a		621,259	-	-	621,259	12/2009	31.06%
Roofs and Other Projects			-				-	n/a		-	1,334,327	-	1,334,327	12/2009	75.79%
TOTALS	$ 6,044,000	$ 3,000,000	$ 9,044,000	$ 6,044,000	$ 1,800,000	$ -	$ 7,844,000			$ 7,516,058	$ 1,345,127	$ -	$ 8,861,185		23.82%

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2010 Allocation Budget IMP	UI	TOTAL	Revised 2010 Allocation Budget IMP	UI	TAX CREDITS	TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES — CURRENT QUARTER IMP	UI	TAX CREDITS	TOTAL	TOTAL PROJECT-TO-DATE IMP	UI	TAX CREDITS	TOTAL	Project Status Projected Completion Date	To Date % of Project Completion
Utility infrastructure & power plant improvements	$ 2,500,000		$ 2,500,000	$ 2,500,000			$ 2,500,000		$ 615,360	$ 386,101		$ 901,461	$ 7,332,418	$ 1,149,380	$ -	$ 8,481,798	12/2012	48.07%
Renovate academic & academic support spaces in old Memorial Stadium		1,340,000	1,340,000				-		-	-		-	121,839	551	-	122,390	11/2010	2.10%
Leasure Hall	2,033,000	737,000	2,770,000	1,640,140	877,000		2,517,140		55,896	-		55,896	440,342	-	-	440,342	12/2010	13.16%
Willard Hall		923,000	923,000		923,000		923,000		254,690	-		254,690	3,880,652	-	-	3,880,652	12/2012	58.67%
Seaton Court			-				-		13,500			13,500	834,986	-	-	834,986	12/2009	41.75%
Roofs and Other Projects			-				-			1,671		1,671	-	1,373,478	-	1,373,478	12/2009	78.02%
TOTALS	$ 4,533,000	$ 3,000,000	$ 7,533,000	$ 4,140,140	$ 1,800,000	$ -	$ 5,940,140		$ 839,446	$ 387,772	$ -	$ 1,227,218	$12,610,237	$ 2,523,409	$ -	$15,133,646		40.68%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

4-23

Kansas State University

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2011 Allocation Budget			Revised 2011 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Utility infrastructure & power plant improvements	$ 4,423,000	$ 1,379,500	$ 5,802,500	$ 4,423,000	$ 1,800,000		$ 6,223,000					$ -	$ 7,332,418	$ 1,149,380	$ -	$ 8,481,798		48.07%
Renovate academic & academic support spaces in old Memorial Stadium		1,620,500	1,620,500				-					-	121,839	551	-	122,390		2.10%
Leasure Hall			-				-					-	440,342	-	-	440,342		13.16%
Willard Hall	110,000		110,000	110,000			110,000					-	3,880,652	-	-	3,880,652		58.67%
Seaton Court			-				-					-	834,986	-	-	834,986		41.75%
Roofs and Other Projects			-				-					-	-	1,373,478	-	1,373,478		78.02%
TOTALS	$ 4,533,000	$ 3,000,000	$ 7,533,000	$ 4,533,000	$ 1,800,000	$ -	$ 6,333,000		$ -	$ -	$ -	$ -	$12,610,237	$ 2,523,409	$ -	$15,133,646		40.68%

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2012 Allocation Budget			Revised 2012 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Utility infrastructure & power plant improvements	$ 2,875,000	$ 2,665,500	$ 5,540,500	$ 2,875,000	$ 1,465,500		$ 4,340,500					$ -	$ 7,332,418	$ 1,149,380	$ -	$ 8,481,798		48.07%
Renovate academic & academic support spaces in old Memorial Stadium			-				-					-	121,839	551	-	122,390		2.10%
Leasure Hall			-				-					-	440,342	-	-	440,342		13.16%
Willard Hall	147,000	334,500	481,500	147,000	334,500		481,500					-	3,880,652	-	-	3,880,652		58.67%
Seaton Court			-				-					-	834,986	-	-	834,986		41.75%
Roofs and Other Projects			-				-					-	-	1,373,478	-	1,373,478		78.02%
TOTALS	$ 3,022,000	$ 3,000,000	$ 6,022,000	$ 3,022,000	$ 1,800,000	$ -	$ 4,822,000		$ -	$ -	$ -	$ -	$12,610,237	$ 2,523,409	$ -	$15,133,646		40.68%

FIVE-YEAR TOTALS TO DATE	$27,198,000	$15,200,000	$42,398,000	$26,805,140	$10,400,000	$ -	$37,205,140		>>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<<<				$12,610,237	$ 2,523,409	$ -	$15,133,646	N/A	40.68%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Wichita State University

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2008 Allocation Budget			Revised 2008 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES					Project Status at 6/30/08	
									CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved		IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Duerksen Fine Arts Center	$ 24,000	$ 1,307,383	$ 1,331,383	$ 500,375	$ 1,244,952	n/a	$ 1,745,327	12/31/09		$ -	$ 45,124	n/a	$ 45,124	09/2008	0.56%
Engineering Building	101,000		101,000	145,000		n/a	145,000	3/30/08		-	-	n/a	-	10/2008	0.00%
Grace Wilkie Hall	70,000		70,000	170,000		n/a	170,000	3/30/08		-	-	n/a	-	10/2008	0.00%
Visual Communications Building	120,000		120,000	54,702		n/a	54,702	6/30/09		760	-	n/a	760	06/2008	1.39%
Wallace Hall	220,000		220,000	148,120		n/a	148,120	6/30/09		5,394	-	n/a	5,394	06/2008	3.64%
Ahlberg Hall	300,000		300,000	167,954		n/a	167,954	6/30/09		-	-	n/a	-	09/2008	0.00%
McKnight Art Center	450,000		450,000	214,060		n/a	214,060	6/30/09		-	-	n/a	-	06/2008	0.00%
Central Energy Plant	300,000		300,000	235,258		n/a	235,258	6/30/09		9,638	-	n/a	9,638	06/2008	4.10%
Lindquist Hall	252,000		252,000	190,347		n/a	190,347	6/30/09		-	-	n/a	-	06/2008	0.00%
Jardine Hall	36,000		36,000	59,438		n/a	59,438	6/30/09		-	-	n/a	-	06/2008	0.00%
Infrastructure	680,000		680,000	1,004,270		n/a	1,004,270	12/31/09		32,100	-	n/a	32,100	09/2008	2.83%
Heskett Center	300,000		300,000	116,696		n/a	116,696	6/30/09		27,383	-	n/a	27,383	06/2008	23.47%
National Institute for Aviation Research	240,000		240,000	86,780		n/a	86,780	6/30/09		70,902	-	n/a	70,902	06/2008	81.70%
TOTALS	$ 3,093,000	$ 1,307,383	$ 4,400,383	$ 3,093,000	$ 1,244,952		$ 4,337,952			$ 146,177	$ 45,124		$ 191,301		1.35%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2009 Allocation Budget			Revised 2009 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES					Project Status	
									CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved		IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Duerksen Fine Arts Center	$ 1,775,000	$ 1,307,383	$ 3,082,383	$ 1,775,000	$ 886,999	$ 40,000	$ 2,701,999	6/30/09		$ 968,976	$ 173,282	$ -	$ 1,142,258	03/2012	14.22%
Engineering Building	113,000		113,000	113,000		45,000	158,000	12/31/08		101,150	-	-	101,150	06/2010	12.63%
Grace Wilkie Hall	174,000		174,000	174,000			174,000	n/a		92,675	-	-	92,675	06/2011	3.16%
Visual Communications Building			-				-	n/a		54,702	-	-	54,702	12/2008	100.00%
Wallace Hall			-				-	n/a		147,520	-	-	147,520	07/2009	99.59%
Ahlberg Hall			-				-	n/a		167,954	-	-	167,954	06/2009	102.44%
McKnight Art Center			-				-	n/a		214,060	-	-	214,060	05/2009	100.00%
Central Energy Plant			-				-	n/a		235,258	-	-	235,258	04/2009	100.01%
Lindquist Hall			-				-	n/a		190,347	-	-	190,347	04/2009	100.00%
Jardine Hall			-				-	n/a		59,438	-	-	59,438	01/2009	100.00%
Infrastructure			-				-	n/a		746,698	-	-	746,698	07/2009	65.81%
Heskett Center			-				-	n/a		116,696	-	-	116,696	04/2009	100.00%
National Institute for Aviation Research			-				-	n/a		86,780	-	-	86,780	04/2009	100.00%
TOTALS	$ 2,062,000	$ 1,307,383	$ 3,369,383	$ 2,062,000	$ 886,999	$ 85,000	$ 3,033,999			$ 3,182,254	$ 173,282	$ -	$ 3,355,536		23.68%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Wichita State University

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2010 Allocation Budget			Revised 2010 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Duerksen Fine Arts Center	$ 648,500	$ 1,172,000	$ 1,820,500		$ 910,948	$ 70,200	$ 981,148	12/31/09				$ -	$ 1,021,248	$ 173,282	$ -	$ 1,194,530	03/2012	14.63%
Henrion Hall	210,000		210,000	-			-	9/30/09				-	-	-	-	-	N/A	0.00%
Engineering Building			-	1,412,470			1,412,470	9/30/09	383,528			383,528	514,216	-	-	514,216	09/2010	64.20%
Grace Wilkie Hall			-				-	n/a				-	92,675	-	-	92,675	12/2011	3.16%
Wilner Auditorium	498,000		498,000	-			-	9/30/09				-	-	-	-	-	N/A	0.00%
Visual Communications Building			-				-	n/a				-	54,702	-	-	54,702	12/2008	100.00%
Hubbard Hall		60,000	60,000		-		-	9/30/09				-	-	-	-	-	N/A	0.00%
Wallace Hall			-				-	n/a	599			599	148,119	-	-	148,119	07/2009	100.00%
Ahlberg Hall			-				-	n/a				-	167,954	-	-	167,954	06/2009	102.44%
McKnight Art Center			-				-	n/a				-	214,060	-	-	214,060	05/2009	100.00%
Geology Building	190,000		190,000	-			-	9/30/09				-	-	-	-	-	N/A	0.00%
Central Energy Plant			-				-	n/a				-	235,258	-	-	235,258	04/2009	100.01%
Lindquist Hall			-				-	n/a				-	190,347	-	-	190,347	04/2009	100.00%
Jardine Hall			-				-	n/a				-	59,438	-	-	59,438	01/2009	100.00%
Infrastructure			-				-	n/a	32,100			32,100	1,036,370	-	-	1,036,370	10/2009	103.20%
Heskett Center			-				-	n/a				-	116,696	-	-	116,696	04/2009	100.00%
National Institute for Aviation Research			-				-	n/a				-	86,780	-	-	86,780	04/2009	100.00%
TOTALS	$ 1,546,500	$ 1,232,000	$ 2,778,500	$ 1,412,470	$ 910,948	$ 70,200	$ 2,393,618		$ 416,227	$ -	$ -	$ 416,227	$ 3,937,863	$ 173,282	$ -	$ 4,111,145		29.01%

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2011 Allocation Budget			Revised 2011 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
Duerksen Fine Arts Center	$ 658,500	$ 607,000	$ 1,265,500	$ 952,500	$ 935,544		$ 1,888,044	n/a				$ -	$ 1,021,248	$ 173,282	$ -	$ 1,194,530		14.63%
Henrion Hall			-				-					-	-	-	-	-		0.00%
Engineering Building			-				-					-	514,216	-	-	514,216		64.20%
Grace Wilkie Hall	90,000		90,000	594,000			594,000	n/a				-	92,675	-	-	92,675		3.16%
Fiske Hall	294,000		294,000	-			-	n/a				-	-	-	-	-		0.00%
Wilner Auditorium			-				-					-	-	-	-	-		0.00%
Clinton Hall	504,000		504,000	-			-	n/a				-	-	-	-	-		0.00%
Visual Communications Building			-				-					-	54,702	-	-	54,702		100.00%
Hubbard Hall		562,000	562,000		-		-	n/a				-	-	-	-	-		0.00%
Wallace Hall		100,000	100,000		-		-	n/a				-	148,119	-	-	148,119		100.00%
Ahlberg Hall			-				-					-	167,954	-	-	167,954		102.44%
McKnight Art Center			-				-					-	214,060	-	-	214,060		100.00%
Geology Building			-				-					-	-	-	-	-		0.00%
Central Energy Plant			-				-					-	235,258	-	-	235,258		100.01%
Lindquist Hall			-				-					-	190,347	-	-	190,347		100.00%
Jardine Hall			-				-					-	59,438	-	-	59,438		100.00%
Infrastructure			-				-					-	1,036,370	-	-	1,036,370		103.20%
Heskett Center			-				-					-	116,696	-	-	116,696		100.00%
National Institute for Aviation Research			-				-					-	86,780	-	-	86,780		100.00%
TOTALS	$ 1,546,500	$ 1,269,000	$ 2,815,500	$ 1,546,500	$ 935,544	$ -	$ 2,482,044		$ -	$ -	$ -	$ -	$ 3,937,863	$ 173,282	$ -	$ 4,111,145		26.18%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Wichita State University

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2012 Allocation Budget			Revised 2012 Allocation Budget				Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE				Projected Completion Date	To Date % of Project Completion
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL		IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL		
Duerksen Fine Arts Center			$ -				$ -	n/a				$ -	$ 1,021,248	$ 173,282	$ -	$ 1,194,530		14.63%
Henrion Hall	$ 30,000	$ 53,000	83,000	$ -	$ -		-	n/a				-	-	-	-	-		0.00%
Engineering Building			-				-	n/a				-	514,216	-	-	514,216		64.20%
Grace Wilkie Hall			-	1,031,000	960,801		1,991,801	n/a				-	92,675	-	-	92,675		3.16%
Fiske Hall		42,000	42,000		-		-	n/a				-	-	-	-	-		0.00%
Wilner Auditorium			-				-	n/a				-	-	-	-	-		0.00%
Clinton Hall		240,000	240,000		-		-	n/a				-	-	-	-	-		0.00%
Visual Communications Building	36,000	36,000	72,000	-	-		-	n/a				-	54,702	-	-	54,702		100.00%
Hubbard Hall			-				-	n/a				-	-	-	-	-		0.00%
Wallace Hall	342,000		342,000	-			-	n/a				-	148,119	-	-	148,119		100.00%
Ahlberg Hall	48,000		48,000	-			-	n/a				-	167,954	-	-	167,954		102.44%
McKnight Art Center	24,000	30,000	54,000	-	-		-	n/a				-	214,060	-	-	214,060		100.00%
Geology Building	228,000	30,000	258,000	-	-		-	n/a				-	-	-	-	-		0.00%
Ablah Library	161,000		161,000	-	-		-	n/a				-	-	-	-	-		0.00%
Jabara Hall	42,000		42,000	-			-	n/a				-	-	-	-	-		0.00%
Central Energy Plant	84,000	24,000	108,000	-	-		-	n/a				-	235,258	-	-	235,258		100.01%
Lindquist Hall		42,000	42,000		-		-	n/a				-	190,347	-	-	190,347		100.00%
Jardine Hall		24,000	24,000		-		-	n/a				-	59,438	-	-	59,438		100.00%
Elliott Hall		114,000	114,000		-		-	n/a				-	-	-	-	-		0.00%
Infrastructure			-				-	n/a				-	1,036,370	-	-	1,036,370		103.20%
Brennan Hall 1		210,000	210,000		-		-	n/a				-	-	-	-	-		0.00%
Blake Hall		120,000	120,000		-		-	n/a				-	-	-	-	-		0.00%
Heskett Center			-				-	n/a				-	116,696	-	-	116,696		100.00%
Metropolitan Complex		342,000	342,000		-		-	n/a				-	-	-	-	-		0.00%
Police Building	36,000		36,000	-			-	n/a				-	-	-	-	-		0.00%
National Institute for Aviation Research			-				-	n/a				-	86,780	-	-	86,780		100.00%
TOTALS	$ 1,031,000	$ 1,307,000	$ 2,338,000	$ 1,031,000	$ 960,801	$ -	$ 1,991,801		$ -	$ -	$ -	$ -	$ 3,937,863	$ 173,282	$ -	$ 4,111,145		29.01%
FIVE-YEAR TOTALS TO DATE	$ 9,279,000	$ 6,422,766	$15,701,766	$ 9,144,970	$ 4,939,244	$ 155,200	$14,239,414		>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<				$ 3,937,863	$ 173,282	$ -	$ 4,111,145	N/A	26.18%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Emporia State University

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	2008 Allocation Budget UI	2008 Allocation Budget TOTAL	Revised 2008 Allocation Budget IMP	Revised 2008 Allocation Budget UI	Revised 2008 Allocation Budget TAX CREDITS	Revised 2008 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	FY 2008 TOTALS UI	FY 2008 TOTALS TAX CREDITS	FY 2008 TOTALS TOTAL	Project Status at 6/30/08: Projected Completion Date	To Date % of Project Completion
Physical Education Building Roof Replacement	$ 351,000	$ 486,000	$ 837,000	$ 351,000	$ 459,700	n/a	$ 810,700			$ 348,485	$ 390,619	n/a	$ 739,104	08/2008	91.17%
White Library HVAC Repairs / Replacement	230,000		230,000	230,000		n/a	230,000			63,052		n/a	63,052	08/2008	3.83%
White Library Electrical Repairs / Replacement	410,000		410,000	410,000		n/a	410,000			32,250		n/a	32,250	08/2008	4.57%
Utility Tunnels Repairs / Replacement	339,000		339,000	339,000		n/a	339,000			162,214		n/a	162,214	09/2008	17.33%
Roosevelt Hall Foundation Stabilization / Repairs	272,000		272,000	272,000		n/a	272,000			65,156		n/a	65,156	10/2008	8.80%
Roosevelt Hall HVAC Repairs / Replacement	175,000		175,000	175,000		n/a	175,000			137,425		n/a	137,425	05/2008	31.66%
Roosevelt Hall Plumbing Repairs / Replacement	35,000		35,000	35,000		n/a	35,000			13,600		n/a	13,600	10/2008	13.88%
TOTALS	$ 1,812,000	$ 486,000	$ 2,298,000	$ 1,812,000	$ 459,700		$ 2,271,700			$ 822,182	$ 390,619		$ 1,212,801		16.56%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	2009 Allocation Budget UI	2009 Allocation Budget TOTAL	Revised 2009 Allocation Budget IMP	Revised 2009 Allocation Budget UI	Revised 2009 Allocation Budget TAX CREDITS	Revised 2009 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
Physical Education Building Roof Replacement			$ -				$ -			$ 351,000	$ 486,000	$ -	$ 837,000	10/2008	103.24%
White Library HVAC Repairs / Replacement	$ 1,208,000	$ 300,000	1,508,000	1,208,000	209,000		1,417,000			1,385,680	65,285	-	1,450,965	10/2009	88.10%
White Library Electrical Repairs / Replacement		186,000	186,000		186,000		186,000			136,258	-	-	136,258	10/2009	19.33%
Utility Tunnels Repairs / Replacement			-				-			330,507	-	-	330,507	06/2012	35.31%
Roosevelt Hall Foundation Stabilization / Repairs			-				-			175,017	-	-	175,017	06/2010	23.64%
Roosevelt Hall HVAC Repairs / Replacement			-				-			149,137	-	-	149,137	06/2010	34.36%
Roosevelt Hall Plumbing Repairs / Replacement			-				-			13,600	-	-	13,600	06/2010	13.88%
TOTALS	$ 1,208,000	$ 486,000	$ 1,694,000	$ 1,208,000	$ 395,000	$ -	$ 1,603,000			$ 2,541,199	$ 551,285	$ -	$ 3,092,484		42.23%

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2010 Allocation Budget IMP	2010 Allocation Budget UI	2010 Allocation Budget TOTAL	Revised 2010 Allocation Budget IMP	Revised 2010 Allocation Budget UI	Revised 2010 Allocation Budget TAX CREDITS	Revised 2010 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
Physical Education Building Roof Replacement			$ -				$ -					$ -	$ 351,000	$ 486,000	$ -	$ 837,000	10/2008	103.24%
White Library HVAC Repairs / Replacement			-				-					-	1,438,000	110,834	-	1,548,834	10/2009	94.04%
White Library Electrical Repairs / Replacement	$ 109,000		109,000	109,000			109,000		2,343			2,343	412,858	157,496	-	570,354	10/2009	80.90%
White Library Elevator Repairs / Replacement	50,000		50,000	50,000			50,000		13,655			13,655	22,856	-	-	22,856	06/2010	45.71%
White Library Partition Repairs / Replacement	200,000		200,000	200,000			200,000					-	-	-	-	-	06/2010	0.00%
Utility Tunnels Repairs / Replacement			-				-		1,792			1,792	339,000	-	-	339,000	06/2012	36.22%
Roosevelt Hall Foundation Stabilization / Repairs	547,000	$ 100,000	647,000	468,480			468,480					-	192,332	-	-	192,332	06/2010	25.97%
Roosevelt Hall HVAC Repairs / Replacement		275,000	275,000		259,000		259,000		5,250			5,250	174,329	-	-	174,329	06/2010	40.17%
Roosevelt Hall Plumbing Repairs / Replacement		63,000	63,000		63,000		63,000		1,411			1,411	18,131	-	-	18,131	06/2010	18.50%
Cremer Hall Elevator Repairs / Replacement		24,000	24,000		24,000		24,000			8,588		8,588	-	13,538	-	13,538	06/2010	22.56%
King Hall Elevator Repairs / Replacement		24,000	24,000		24,000		24,000			8,916		8,916	-	17,832	-	17,832	06/2010	29.72%
TOTALS	$ 906,000	$ 486,000	$ 1,392,000	$ 827,480	$ 370,000	$ -	$ 1,197,480		$ 24,451	$ 17,504	$ -	$ 41,955	$ 2,948,506	$ 785,700	$ -	$ 3,734,206		51.00%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Emporia State University

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2011 Allocation Budget IMP	2011 Allocation Budget UI	2011 Allocation Budget TOTAL	Revised 2011 Allocation Budget IMP	Revised 2011 Allocation Budget UI	Revised 2011 Allocation Budget TAX CREDITS	Revised 2011 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Physical Education Building Roof Replacement			$ -				$ -					$ -	$ 351,000	$ 486,000	$ -	$ 837,000		103.24%
White Library HVAC Repairs / Replacement			-				-					-	1,438,000	110,834	-	1,548,834		94.04%
White Library Electrical Repairs / Replacement			-				-					-	412,858	157,496	-	570,354		80.90%
White Library Elevator Repairs / Replacement			-				-					-	22,856	-	-	22,856		45.71%
White Library Partition Repairs / Replacement			-				-					-	-	-	-	-		0.00%
Utility Tunnels Repairs / Replacement			-				-					-	339,000	-	-	339,000		36.22%
Roosevelt Hall Foundation Stabilization / Repairs			-				-					-	192,332	-	-	192,332		25.97%
Roosevelt Hall HVAC Repairs / Replacement			-				-					-	174,329	-	-	174,329		40.17%
Roosevelt Hall Plumbing Repairs / Replacement			-				-					-	18,131	-	-	18,131		18.50%
Cremer Hall Elevator Repairs / Replacement	$ 36,000		36,000	36,000			36,000					-	-	13,538	-	13,538		22.56%
King Hall Elevator Repairs / Replacement	36,000		36,000	36,000	-		36,000					-	-	17,832	-	17,832		29.72%
Visser Hall HVAC Repair / Replacement	284,000	$ 486,000	770,000	284,000	370,000		654,000					-	-	-	-	-		0.00%
Stormont Maintenance Building HVAC R&R	300,000		300,000	300,000			300,000					-	-	-	-	-		0.00%
Power House Roof Replacement	250,000		250,000	250,000			250,000					-	-	-	-	-		0.00%
TOTALS	$ 906,000	$ 486,000	$ 1,392,000	$ 906,000	$ 370,000	$ -	$ 1,276,000		$ -	$ -	$ -	$ -	$ 2,948,506	$ 785,700	$ -	$ 3,734,206		51.00%

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2012 Allocation Budget IMP	2012 Allocation Budget UI	2012 Allocation Budget TOTAL	Revised 2012 Allocation Budget IMP	Revised 2012 Allocation Budget UI	Revised 2012 Allocation Budget TAX CREDITS	Revised 2012 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	Project Status: To Date % of Project Completion
Physical Education Building Roof Replacement			$ -				$ -					$ -	$ 351,000	$ 486,000	$ -	$ 837,000		103.24%
P.E. Building HVAC Repairs / Replacement		$ 363,000	363,000		270,000		270,000					-	-	-	-	-		0.00%
P.E. Building Plumbing Repairs / Replacement		123,000	123,000		100,000		100,000					-	-	-	-	-		0.00%
White Library HVAC Repairs / Replacement			-				-					-	1,438,000	110,834	-	1,548,834		94.04%
White Library Electrical Repairs / Replacement			-				-					-	412,858	157,496	-	570,354		80.90%
White Library Elevator Repairs / Replacement			-				-					-	22,856	-	-	22,856		45.71%
White Library Partition Repairs / Replacement			-				-					-	-	-	-	-		0.00%
Utility Tunnels Repairs / Replacement	$ 597,000		597,000	597,000			597,000					-	339,000	-	-	339,000		36.22%
Roosevelt Hall Foundation Stabilization / Repairs			-				-					-	192,332	-	-	192,332		25.97%
Roosevelt Hall HVAC Repairs / Replacement			-				-					-	174,329	-	-	174,329		40.17%
Roosevelt Hall Plumbing Repairs / Replacement			-				-					-	18,131	-	-	18,131		18.50%
Cremer Hall Elevator Repairs / Replacement			-				-					-	-	13,538	-	13,538		22.56%
King Hall Elevator Repairs / Replacement			-				-					-	-	17,832	-	17,832		29.72%
Visser Hall HVAC Repair / Replacement	7,000		7,000	7,000			7,000					-	-	-	-	-		0.00%
Stormont Maintenance Building HVAC R&R			-				-					-	-	-	-	-		0.00%
Power House Roof Replacement			-				-					-	-	-	-	-		0.00%
TOTALS	$ 604,000	$ 486,000	$ 1,090,000	$ 604,000	$ 370,000	$ -	$ 974,000		$ -	$ -	$ -	$ -	$ 2,948,506	$ 785,700	$ -	$ 3,734,206		51.00%

FIVE-YEAR TOTALS TO DATE	$ 5,436,000	$ 2,430,000	$ 7,866,000	$ 5,357,480	$ 1,964,700	$ -	$ 7,322,180	>>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<<<					$ 2,948,506	$ 785,700	$ -	$ 3,734,206	N/A	51.00%

4-28

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Pittsburg State University

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	2008 Allocation Budget UI	2008 Allocation Budget TOTAL	Revised 2008 Allocation Budget IMP	Revised 2008 Allocation Budget UI	Revised 2008 Allocation Budget TAX CREDITS	Revised 2008 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	FY 2008 TOTALS UI	FY 2008 TOTALS TAX CREDITS	FY 2008 TOTALS TOTAL	Project Status at 6/30/08: Projected Completion Date	To Date % of Project Completion
McCray Hall	$ 2,070,000		$ 2,070,000	$ 2,070,000	$ 174,187	n/a	$ 2,244,187	6/25/09		$ 154,237	$ 12,014	n/a	$ 166,251	11/2008	7.25%
Russ Hall		150,000	150,000		138,321	n/a	138,321	6/25/09			38,263	n/a	38,263	07/2008	27.66%
Axe Library		250,000	250,000		282,596	n/a	282,596	6/25/09			11,488	n/a	11,488	09/2008	4.04%
Replace Electrical Switch Gears		150,000	150,000		103,910	n/a	103,910	6/25/09			2,268	n/a	2,268	08/2008	2.14%
Steam Line Replacement		200,000	200,000		-	n/a	-	6/25/09			-	n/a	-		0.00%
Porter Hall	-	-	-		29,625	n/a	29,625	6/25/09				n/a	-		0.00%
TOTALS	$ 2,070,000	$ 750,000	$ 2,820,000	$ 2,070,000	$ 728,639		$ 2,798,639			$ 154,237	$ 64,033		$ 218,270		2.61%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	2009 Allocation Budget UI	2009 Allocation Budget TOTAL	Revised 2009 Allocation Budget IMP	Revised 2009 Allocation Budget UI	Revised 2009 Allocation Budget TAX CREDITS	Revised 2009 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
McCray Hall	$ 230,000		$ 230,000	$ 23,357			$ 23,357	6/25/09		$ 2,093,357	$ 174,187	$ -	$ 2,267,544	4/2009	98.87%
Russ Hall			-				-	6/25/09		-	138,321	-	138,321	12/2008	100.00%
Axe Library			-				-	6/25/09		-	282,596	-	282,596	12/2008	99.46%
Replace Electrical Switch Gears			-				-	6/25/09		-	103,911	-	103,911	12/2008	97.84%
Steam Line Replacement			-	125,000			125,000	6/25/09		15,023	-	-	15,023	08/2009	12.02%
Utility Distribution System Improvements		$ 773,000	773,000				-	6/25/09		-	-	-	-	12/2010	0.00%
Porter Hall	1,150,000		1,150,000	1,231,643	375,000		1,606,643	6/25/09		234,165	6,274	-	240,439	09/2010	8.21%
TOTALS	$ 1,380,000	$ 773,000	$ 2,153,000	$ 1,380,000	$ 375,000	$ -	$ 1,755,000			$ 2,342,545	$ 705,289	$ -	$ 3,047,834		36.51%

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2010 Allocation Budget IMP	2010 Allocation Budget UI	2010 Allocation Budget TOTAL	Revised 2010 Allocation Budget IMP	Revised 2010 Allocation Budget UI	Revised 2010 Allocation Budget TAX CREDITS	Revised 2010 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
McCray Hall			$ -				$ -					$ -	$ 2,093,357	$ 174,187	$ -	$ 2,267,544	4/2009	98.87%
Russ Hall			-				-					-	-	138,321	-	138,321	12/2008	100.00%
Axe Library			-				-					-	-	282,596	-	282,596	12/2008	99.46%
Replace Electrical Switch Gears			-				-					-	-	103,911	-	103,911	12/2008	97.84%
Steam Line Replacement			-				-					-	106,417	-	-	106,417	8/2009	85.13%
Utility Distribution System Improvements		$ 200,000	200,000		-		-	n/a				-	-	-	-	-	N/A	0.00%
Porter Hall	$ 1,035,000	115,000	1,150,000	$ 945,300	375,000		1,320,300	n/a	26,933	935		27,868	1,180,255	149,737	-	1,329,992	9/2010	45.44%
Heckert - Wells Hall		228,000	228,000		-		-	n/a				-	-	-	-	-	10/2011	0.00%
Grubbs Hall			-				-	n/a		52,875		52,875	-	52,875	-	52,875	10/2010	15.33%
Yates Hall			-				-	n/a		41,597		41,597	-	47,606	-	47,606	10/2010	10.13%
Weede Facility		230,000	230,000		-		-	n/a				-	-	-	-	-	10/2012	0.00%
TOTALS	$ 1,035,000	$ 773,000	$ 1,808,000	$ 945,300	$ 375,000	$ -	$ 1,320,300		$ 26,933	$ 95,407	$ -	$ 122,340	$ 3,380,029	$ 949,233	$ -	$ 4,329,262		51.85%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

4-30

Pittsburg State University

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2011 Allocation Budget			Revised 2011 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
McCray Hall			$ -				$ -					$ -	$ 2,093,357	$ 174,187	$ -	$ 2,267,544		98.87%
Russ Hall			-				-					-	-	138,321	-	138,321		100.00%
Axe Library			-				-					-	-	282,596	-	282,596		99.46%
Replace Electrical Switch Gears			-				-					-	-	103,911	-	103,911		97.84%
Steam Line Replacement			-				-					-	106,417	-	-	106,417		85.13%
Utility Distribution System Improvements			-				-					-	-	-	-	-		0.00%
Porter Hall			-				-					-	1,180,255	149,737	-	1,329,992		45.44%
Heckert-Wells Hall	$ 630,000	$ 190,000	820,000	$ 630,000	-		630,000	n/a				-	-	-	-	-		0.00%
Grubbs Hall		228,000	228,000				-	n/a				-	-	-	-	-		0.00%
Yates Hall		210,000	210,000		125,000		125,000	n/a				-	-	-	-	-		0.00%
Weede Facility	405,000	145,000	550,000	405,000	250,000		655,000	n/a				-	-	-	-	-		0.00%
TOTALS	$ 1,035,000	$ 773,000	$ 1,808,000	$ 1,035,000	$ 375,000	$ -	$ 1,410,000		$ -	$ -	$ -	$ -	$ 3,380,029	$ 848,752	$ -	$ 4,228,781		50.65%

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

	2012 Allocation Budget			Revised 2012 Allocation Budget					ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE					
Project/Building Name*	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Date Approved	IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL	Projected Completion Date	To Date % of Project Completion
McCray Hall			$ -				$ -					$ -	$ 2,093,357	$ 174,187	$ -	$ 2,267,544		98.87%
Russ Hall			-				-					-	-	138,321	-	138,321		100.00%
Axe Library			-				-					-	-	282,596	-	282,596		99.46%
Replace Electrical Switch Gears			-				-					-	-	103,911	-	103,911		97.84%
Steam Line Replacement			-				-					-	106,417	-	-	106,417		85.13%
Utility Distribution System Improvements		386,000	386,000		375,000		375,000	n/a				-	-	-	-	-		0.00%
Porter Hall			-				-					-	1,180,255	149,737	-	1,329,992		45.44%
Heckert - Wells Hall			-				-					-	-	-	-	-		0.00%
Grubbs Hall	345,000	210,000	555,000	345,000	-		345,000	n/a				-	-	-	-	-		0.00%
Yates Hall	345,000	177,000	522,000	345,000	-		345,000	n/a				-	-	-	-	-		0.00%
Weede Facility			-				-					-	-	-	-	-		0.00%
TOTALS	$ 690,000	$ 773,000	$ 1,463,000	$ 690,000	$ 375,000	$ -	$ 1,065,000		$ -	$ -	$ -	$ -	$ 3,380,029	$ 848,752	$ -	$ 4,228,781		50.65%

FIVE-YEAR TOTALS TO DATE	$ 6,210,000	$ 3,842,000	$10,052,000	$ 6,120,300	$ 2,228,639	$ -	$ 8,348,939	>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<<					$ 3,380,029	$ 848,752	$ -	$ 4,228,781	N/A	50.65%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Fort Hays State University

FY 2008 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2008 Allocation Budget IMP	2008 Allocation Budget UI	2008 Allocation Budget TOTAL	Revised 2008 Allocation Budget IMP	Revised 2008 Allocation Budget UI	Revised 2008 Allocation Budget TAX CREDITS	Revised 2008 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	FY 2008 TOTALS IMP	FY 2008 TOTALS UI	FY 2008 TOTALS TAX CREDITS	FY 2008 TOTALS TOTAL	Project Status at 6/30/08: Projected Completion Date	To Date % of Project Completion
Picken Hall Improvements	$ 2,073,000		$ 2,073,000	$ 2,073,000		n/a	$ 2,073,000	n/a		$ 184,776	$ -	n/a	$ 184,776	05/2010	4.81%
Utility Tunnel Replacement		336,000	336,000		336,000	n/a	336,000	n/a			25,964	n/a	25,964	09/2008	7.73%
Sheridan Hall Roof Repairs		70,000	70,000		70,000	n/a	70,000	06/25/09			59,256	n/a	59,256	05/2008	84.65%
Service Buildings Masonry Cleaning and Sealing		60,000	60,000		60,000	n/a	60,000	n/a			8,072	n/a	8,072	08/2008	13.45%
Repaint Cunningham Hall Gym Rooms		35,000	35,000		35,000	n/a	35,000	n/a			-	n/a	-		0.00%
Felten-Start Theatre Seating Replacement		100,000	100,000		100,000	n/a	100,000	n/a			-	n/a	-		0.00%
Campus Exterior Graphics - Phase II		60,000	60,000		60,000	n/a	60,000	n/a			-	n/a	-		0.00%
TOTALS	$ 2,073,000	$ 661,000	$ 2,734,000	$ 2,073,000	$ 661,000		$ 2,734,000			$ 184,776	$ 93,292		$ 278,068		2.71%

FY 2009 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2009 Allocation Budget IMP	2009 Allocation Budget UI	2009 Allocation Budget TOTAL	Revised 2009 Allocation Budget IMP	Revised 2009 Allocation Budget UI	Revised 2009 Allocation Budget TAX CREDITS	Revised 2009 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER NOT APPLICABLE	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
Picken Hall Improvements	$ 1,382,000	$ 390,000	$ 1,772,000	$ 709,577	$ 390,000	$ 672,423	$ 1,772,000	1/13/10		$ 1,437,958		$ -	$ 1,437,958	05/2010	37.40%
Street Improvements		223,000	223,000		223,000		223,000			-	-	-	-	08/2010	0.00%
Utility Tunnel Replacement			-				-			-	332,837	-	332,837	10/2008	99.06%
Sheridan Hall Roof Repairs			-				-			-	92,631	-	92,631	05/2008	132.33%
Service Buildings Masonry Cleaning and Sealing			-				-			-	51,984	-	51,984	03/2009	86.64%
Repaint Cunningham Hall Gym Rooms			-				-			-	39,629	-	39,629	01/2009	113.23%
Felten-Start Theatre Seating Replacement			-				-			-	93,760	-	93,760	03/2009	93.76%
Campus Exterior Graphics - Phase II			-				-			-	-	-	-	09/2009	0.00%
TOTALS	$ 1,382,000	$ 613,000	$ 1,995,000	$ 709,577	$ 613,000	$ 672,423	$ 1,995,000			$ 1,437,958	$ 610,841	$ -	$ 2,048,799		19.95%

FY 2010 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2010 Allocation Budget IMP	2010 Allocation Budget UI	2010 Allocation Budget TOTAL	Revised 2010 Allocation Budget IMP	Revised 2010 Allocation Budget UI	Revised 2010 Allocation Budget TAX CREDITS	Revised 2010 Allocation Budget TOTAL	Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES: CURRENT QUARTER IMP	CURRENT QUARTER UI	CURRENT QUARTER TAX CREDITS	CURRENT QUARTER TOTAL	TOTAL PROJECT-TO-DATE IMP	TOTAL PROJECT-TO-DATE UI	TOTAL PROJECT-TO-DATE TAX CREDITS	TOTAL PROJECT-TO-DATE TOTAL	Project Status: Projected Completion Date	To Date % of Project Completion
Picken Hall Improvements			$ -				$ -		$ 11,288	$ 55,292	$ -	$ 66,580	$ 2,760,613	$ 257,803	$ 672,423	$ 3,690,839	05/2010	95.99%
Campus Electrical Improvements	$ 1,036,500	$ 986,500	2,023,000	1,619,093	690,425		2,309,518	01/13/10					-	-	-	-	12/2011	0.00%
Street Improvements			-				-			5,468		5,468	-	21,094	-	21,094	08/2010	3.19%
Utility Tunnel Replacement			-				-					-	-	332,837	-	332,837	10/2008	99.06%
Sheridan Hall Roof Repairs			-				-					-	-	92,631	-	92,631	05/2008	132.33%
Service Buildings Masonry Cleaning and Sealing			-				-					-	-	51,984	-	51,984	03/2009	86.64%
Repaint Cunningham Hall Gym Rooms			-				-					-	-	39,629	-	39,629	01/2009	113.23%
Felten-Start Theatre Seating Replacement			-				-					-	-	93,760	-	93,760	03/2009	93.76%
Campus Exterior Graphics - Phase II			-				-			33,146		33,146	-	41,302	-	41,302	07/2010	68.84%
TOTALS	$ 1,036,500	$ 986,500	$ 2,023,000	$ 1,619,093	$ 690,425	$ -	$ 2,309,518		$ 11,288	$ 93,906	$ -	$ 105,194	$ 2,760,613	$ 931,040	$ 672,423	$ 4,364,076		42.49%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

Fort Hays State University

FY 2011 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2011 Allocation Budget			Revised 2011 Allocation Budget				Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE				Projected Completion Date	To Date % of Project Completion
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL		IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL		
Picken Hall Improvements			$ -				$ -					$ -	$ 2,760,613	$ 257,803	$ 672,423	$ 3,690,839		95.99%
Campus Electrical Improvements	$ 1,036,500	$ 636,500	1,673,000	$ 1,036,500	$ 635,100		1,671,600					-	-	-	-	-		0.00%
Street Improvements		117,000	117,000		117,000		117,000					-	-	21,094	-	21,094		3.19%
Utility Tunnel Replacement			-				-					-	-	332,837	-	332,837		99.06%
Sheridan Hall Roof Repairs			-				-					-	-	92,631	-	92,631		132.33%
Service Buildings Masonry Cleaning and Sealing			-				-					-	-	51,984	-	51,984		86.64%
Repaint Cunningham Hall Gym Rooms			-				-					-	-	-	-	-		0.00%
Felten-Start Theatre Seating Replacement			-				-					-	-	-	-	-		0.00%
Campus Exterior Graphics - Phase II			-				-					-	-	41,302	-	41,302		68.84%
TOTALS	$ 1,036,500	$ 753,500	$ 1,790,000	$ 1,036,500	$ 752,100	$ -	$ 1,788,600		$ -	$ -	$ -	$ -	$ 2,760,613	$ 797,651	$ 672,423	$ 4,230,687		41.19%

FY 2012 BUDGET ALLOCATIONS AND ACTUAL EXPENDITURES

Project/Building Name*	2012 Allocation Budget			Revised 2012 Allocation Budget				Date Approved	ACTUAL QUARTERLY AND PROJECT-TO-DATE EXPENDITURES								Project Status	
									CURRENT QUARTER				TOTAL PROJECT-TO-DATE				Projected Completion Date	To Date % of Project Completion
	IMP	UI	TOTAL	IMP	UI	TAX CREDITS	TOTAL		IMP	UI	TAX CREDITS	TOTAL	IMP	UI	TAX CREDITS	TOTAL		
Picken Hall Improvements			$ -				$ -					$ -	$ 2,760,613	$ 257,803	$ 672,423	$ 3,690,839		95.99%
Campus Electrical Improvements			-				-					-	-	-	-	-		0.00%
Akers Energy Center Boiler Replacements	$ 691,000	$ 432,500	1,123,500	$ 691,000	$ 432,500		1,123,500					-	-	-	-	-		0.00%
Street Improvements		321,000	321,000		321,000		321,000					-	-	21,094	-	21,094		3.19%
Utility Tunnel Replacement			-				-					-	-	332,837	-	332,837		99.06%
Sheridan Hall Roof Repairs			-				-					-	-	92,631	-	92,631		132.33%
Service Buildings Masonry Cleaning and Sealing			-				-					-	-	51,984	-	51,984		86.64%
Repaint Cunningham Hall Gym Rooms			-				-					-	-	-	-	-		0.00%
Felten-Start Theatre Seating Replacement			-				-					-	-	-	-	-		0.00%
Campus Exterior Graphics - Phase II			-				-					-	-	41,302	-	41,302		68.84%
TOTALS	$ 691,000	$ 753,500	$ 1,444,500	$ 691,000	$ 753,500	$ -	$ 1,444,500		$ -	$ -	$ -	$ -	$ 2,760,613	$ 797,651	$ 672,423	$ 4,230,687		41.19%

FIVE-YEAR TOTALS TO DATE	$ 6,219,000	$ 3,767,500	$ 9,986,500	$ 6,129,170	$ 3,470,025	$ 672,423	$10,271,618	>>>>>>>>>>>>>>>Not Relevant<<<<<<<<<<<<<<<					$ 2,760,613	$ 797,651	$ 672,423	$ 4,230,687	N/A	41.19%

Kansas Board of Regents
State University Deferred Maintenance 5-Year Plan
Report for the Quarter Ended
March 31, 2010

ALL UNIVERSITIES	TOTAL PROJECT-TO-DATE			
	IMP	UI	TAX CREDITS	TOTAL
Project-to-date total expenditures by category	$44,353,469	$ 9,647,981	$ 725,268	$54,726,718

State University 5-Year Maintenance Plan Allocations

Originally Created May 1, 2007, as Revised May 2010

Infrastructure Maintenance Program (IMP) Funds

Institution	FY 08	FY 09	FY 10*	FY 11	FY 12	5-Yr. Total
University of Kansas	8,601,000	5,734,000	3,927,790	0	2,867,000	21,129,790
University of Kansas Medical Ctr.	3,285,000	2,190,000	1,500,150	0	1,095,000	8,070,150
Kansas State University	9,066,000	6,044,000	4,140,140	0	3,022,000	22,272,140
Wichita State University	3,093,000	2,062,000	1,412,470	0	1,031,000	7,598,470
Emporia State University	1,812,000	1,208,000	827,480	0	604,000	4,451,480
Pittsburg State University	2,070,000	1,380,000	945,300	0	690,000	5,085,300
Fort Hays State University	2,073,000	1,382,000	946,670	0	691,000	5,092,670
Total	30,000,000	20,000,000	13,700,000	0	10,000,000	73,700,000

University Interest (UI) Earnings

Institution	FY 08	FY 09	FY 10	FY 11	FY 12	5-Yr. Total
University of Kansas	2,626,306	1,747,039	960,000	960,000	960,000	7,253,345
University of Kansas Medical Ctr.	400,000	276,000	276,000	204,000	204,000	1,360,000
Kansas State University (incl. KSU-S)	3,200,000	1,800,000	900,000	900,000	900,000	7,700,000
Wichita State University	1,244,952	869,472	473,525	358,845	358,845	3,305,639
Emporia State University	459,700	372,414	169,300	170,000	170,000	1,341,414
Pittsburg State University	702,271	439,569	200,000	200,000	200,000	1,741,840
Fort Hays State University	826,225	738,500	375,000	375,000	375,000	3,470,025
Total	9,459,454	6,242,994	3,353,825	3,167,845	3,167,845	25,391,963

Note: Updated as directed by Universities

Total Funds

Institution	FY 08	FY 09	FY 10	FY 11	FY 12	5-Yr. Total
University of Kansas	11,227,306	7,481,039	4,887,790	960,000	3,827,000	28,383,135
University of Kansas Medical Ctr.	3,685,000	2,466,000	1,776,150	204,000	1,299,000	9,430,150
Kansas State University (incl. KSU-S)	12,266,000	7,844,000	5,040,140	900,000	3,922,000	29,972,140
Wichita State University	4,337,952	2,931,472	1,885,995	358,845	1,389,845	10,904,109
Emporia State University	2,271,700	1,580,414	996,780	170,000	774,000	5,792,894
Pittsburg State University	2,772,271	1,819,569	1,145,300	200,000	890,000	6,827,140
Fort Hays State University	2,899,225	2,120,500	1,321,670	375,000	1,066,000	8,562,695
Total	39,459,454	26,242,994	17,053,825	3,167,845	13,167,845	99,091,963

*EBF Funds

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

The University of Kansas	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 8,601,000	$ 2,626,306	$ 5,734,000	$ 1,747,039	$ 3,927,790	$ 960,000	$ -	$ 960,000	$ 2,867,000	$ 960,000	$ 21,129,790	$ 7,253,345
Project Description and Estimated Cost												
Utility Tunnel Improvements ($11,411,000) Originally $8,800,000	6,000,000	1,326,000	2,769,000	1,485,000	484,847						9,253,847	$ 2,811,000
Various State-owned utility systems are routed through over 16,000 feet of tunnel systems, to deliver steam and condensate piping from the central plant, portions of the campus electrical system, communications cabling, and other vital utilities to about 50 buildings on the main campus. A 2000 evaluation of the visibly deteriorated parts of the total campus utility tunnel system (about 40%) identified repairs that must be made in order to slow deterioration and minimize the possibility of major failures of tunnel segments with existing structural deficiencies, including wall and ceiling movements, cracks, offsets and spalling, water infiltration, and deficient utility support components. To facilitate this on-going maintenance, improvements addressing access and safety for individuals working on the various systems distributed through the tunnels are also included in the project.													
Wescoe Hall ($4,910,000)	1,961,000	1,300,306	1,599,000								3,560,000	1,300,306
This includes the $1,350,000 in tuition interest funding previously submitted to the Board of Regents for approval for FY 2008. This project will replace air-handling units on the 1st, 2nd and 3rd levels which, are original 1973 equipment, deficient and at or beyond serviceable life. Outside air intake will be reconfigured, and distribution ductwork and volume control devices will be replaced to meet current code. Vertical shafts for ductwork and fire protection systems will be reworked to meet current code requirements; the project includes ceiling repair/replacement.												
Haworth Hall ($2,600,000)	640,000		960,000			960,000		40,000			1,600,000	1,000,000
This project replaces up to ten air handling units, controls, and chilled water piping in the original building, the 1971 and 1985 additions including Stewart Wing and replaces the cooling tower fill, piping and pumps in the original building; replaces deficient exhaust fume hoods; upgrades fire alarm to meet current code.												
Malott Hall Improvements ($2,630,000)			406,000	262,039	1,961,961						2,367,961	262,039
This project will replace at least four 30 year-old air-handling units, controls, and up to 50 laboratory fume exhaust hoods; the replacements will incorporate heat recovery where possible.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

The University of Kansas	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 8,601,000	$ 2,626,306	$ 5,734,000	$ 1,747,039	$ 3,927,790	$ 960,000	$ -	$ 960,000	$ 2,867,000	$ 960,000	$ 21,129,790	$ 7,253,345
Project Description and Estimated Cost												
Murphy Hall ($4,460,000) *Note: Balance funded by ARRA $$*					365,829			920,000		30,000	365,829	950,000
This project replaces HVAC components, including the air-handling units, cooling tower and chilled water piping; replaces deficient electrical distribution system to branch panel boards; includes an emergency generator for life safety systems; and repairs or replaces deficient elevator equipment.												
Spencer Art Museum ($970,000) *Note: Funded by ARRA $$*											0	0
Chiller replacement and HVAC improvements. Funding of this project may coordinate with the potential ESCO project.												
Lippincott Hall ($1,195,000)											0	0
This project replaces HVAC and electrical systems components, the fire alarm and smoke detection system, an existing open gate elevator, and includes abatement of hazardous materials. A generator will replace the central battery inverter system for the emergency lighting system. *(Note: Funded by R&R reallocation)*												
Dyche Hall Improvements ($1,150,000) *Note: Funded by ARRA $$*												
The project replaces HVAC and electrical system components and includes abatement of hazardous materials.												
Bailey Hall Improvements ($1,825,000) *Note: Balance funded by R&R $$*										930000	0	930,000
The project will repair and replace HVAC/mechanical, electrical and plumbing components; replace the existing elevator and fire alarm system.												
Strong Hall ($2,867,000) Originally $2,740,000									2,867,000		2,867,000	0
The project replaces several dozen deficient package HVAC units with central air handling units and associated controls and piping. Funding of this project may coordinate with the potential ESCO project.												
Art and Design ($1,100,000)											0	0
Design fees/project development costs/contingency and construction cost to replace HVAC equipment including chilled water coils, controls, and variable frequency drives; replace original foundry furnace with an induction furnace; abate and replace existing single glazed windows.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

The University of Kansas	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 8,601,000	$ 2,626,306	$ 5,734,000	$ 1,747,039	$ 3,927,790	$ 960,000	$ -	$ 960,000	$ 2,867,000	$ 960,000	$ 21,129,790	$ 7,253,345
Project Description and Estimated Cost												
Lindley Hall ($2,080,000) *Note: Reallocate Deferred Maintenance*					1,115,153						1,115,153	
This project replaces HVAC equipment including air handling units, condensing units and terminal boxes, electrical panel boards and distribution, and includes plumbing improvements. Non-compliant transite and wood fume hoods will be abated and replaced. Repairs to the foundation and the below grade area way and replacing single glazed metal frame windows and exterior doors will also be completed.												
Watson Library ($1,635,000)												
This project will repair or replace electrical, lighting and HVAC systems that are beyond their serviceable life. Includes replacing the building chiller, the fire building alarm updates and life/safety code required projects.												
Learned Hall (Proposed $2,900,000; thru FY 2012, $2,354,000)												
This project replaces HVAC air handling units, fan coils, chiller, chilled water piping, and controls; also replaces all the electrical panel boards and improves the fire alarm system. Additional funds added to potentially coordinate with proposed ESCO project. To balance FY 2012 funds, the project scope is reduced to include complete design and partial installation of the replacement HVAC components, electrical/lighting systems and the total project cost for the fire alarm/emergency lighting.												
TOTALS	$ 8,601,000	$ 2,626,306	$ 5,734,000	$ 1,747,039	$ 3,927,790	$ 960,000	$ -	$ 960,000	$ 2,867,000	$ 960,000	$ 21,129,790	$ 7,253,345

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

The University of Kansas Medical Center	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 3,285,000	$ 400,000	$ 2,190,000	$ 276,000	$ 1,500,150	$ 276,000	$ 1,642,500	$ 204,000	$ 1,095,000	$ 204,000	$ 9,712,650	$ 1,360,000
Project Description and Estimated Cost												
Campus Exterior Maintenance ($100,000)		100,000									0	100,000
Repair exterior masonry walls, roofs, and sidewalks.												
Campus Infrastructure Improvements ($45,000)		45,000									0	45,000
Replace the remaining campus condensate return pipe.												
Wahl Hall East Basement AHU Replacement ($80,000)		80,000									0	80,000
Replace the AHU serving the Wahl Hall East Auditorium.												
Mechanical Infrastructure - Wichita ($24,500)		24,500									0	24,500
Replace a 20-year old cooling tower.												
Applegate Energy Center & Utility Distribution Systems												
1. Renovate & Upgrade Boiler ($1,038,471)	574,149						50,322		414,000		1,038,471	0
Inspection of all boilers, and renovation of two boilers with economizer, burner replacement, and controls.												
2. Replace Emergency Generator System ($2,609,022)	1,841,367		513,655				254,000				2,609,022	0
Install new replacement emergency generators, remove existing generators and install automatic transfer switchboard and emergency power distribution equipment.												
3. Replace & Renovate Chilled Water System ($4,186,897)	591,084	26,500	1,229,610		464,525		1,194,178		681,000		4,160,397	26,500
Replace two chillers, replace four chilled water pumps, renovate power source equipment for two existing chillers, and renovate three cooling tower cells with new media, fans, VFDs and condenser piping												
4. Renovate Electrical Distribution System ($1,621,985)	278,400		428,835		770,750		144,000				1,621,985	0
Renovate the 13.8kv electrical distribution system with new switches and transformers.												
5. Replace & Renovate Water Pumping System ($282,775)			17,900		264,875						282,775	0
Provide new fire pump on emergency power source to meet code requirements and replace existing domestic water pump.												
Emergency Repairs to Building 37 Vivarium ($350,000)		124,000		226,000							0	350,000
Repair deteriorated walls, floors, ceilings, plumbing and HVAC systems to maintain certifications per USDA citation.												
Replace Building 90 Electrical Switchgear ($50,000)				50,000							0	50,000
Provide supplemental funding to replace the unsafe and obsolete electrical switchgear at the School of Medicine in Wichita. The overall project budget is $315,000 from various funding sources.												
Campus Roof Replacements ($276,000)											0	0
Replace deterioriated roofing systems on various campus buildings.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

The University of Kansas Medical Center	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 3,285,000	$ 400,000	$ 2,190,000	$ 276,000	$ 1,500,150	$ 276,000	$ 1,642,500	$ 204,000	$ 1,095,000	$ 204,000	$ 9,712,650	$ 1,360,000
Project Description and Estimated Cost												
Campus Electrical Infrastructure ($276,000)						276,000					0	276,000
Replace high voltage distribution system components, transformers, switches, etc.												
Campus Steam Infrastructure Replacements ($204,000)										204,000	0	204,000
Replace deteriorated steam distribution system components, piping, insulation, traps, pumps, etc.												
Campus Chilled Water Infrastructure Replacements ($204,000)								204,000			0	204,000
Replace deteriorated chilled water system components, piping, insulation, etc.												
TOTALS	$ 3,285,000	$ 400,000	$ 2,190,000	$ 276,000	$ 1,500,150	$ 276,000	$ 1,642,500	$ 204,000	$ 1,095,000	$ 204,000	$ 9,712,650	$ 1,360,000

New projects are italicized

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Kansas State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
Estimated Budget Amounts	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
	$ 9,066,000	$ 3,200,000	$ 6,044,000	$ 1,800,000	$ 4,140,140	$ 900,000		$ 900,000	$ 3,022,000	$ 900,000	$ 22,272,140	$ 7,700,000
Project Description and Estimated Cost												
Utility Infrastructure and Power Plant Improvements	2,970,000		1,610,000	1,800,000	2,500,140	620,000		900,000	3,022,000	900,000	**10,102,140**	**4,220,000**
This project addresses serious deficiencies in the electrical and steam distribution system, significantly improving safety, efficiency, and reliability. The antiquated 4,160 volt electrical system that serves the core of the central campus is unstable and inefficient and must be replaced. Additionally, seriously deteriorated and leaking sections of the 80-year old steam distribution lines and an inefficient 56-year old boiler in the central power plant also are in urgent need of replacement.												
Renovate Academic & Academic Support Spaces in Old Memorial Stadium ($10,000,000)	170,000										**170,000**	**-**
This space is located beneath the east and west grandstands of the facility. It was used by athletics prior to 1965 but has been used for academic and academic support functions for the past 40 years. The project will stabilize exterior limestone walls, repair deteriorated interior walls, remove asbestos, repair the roof support structures, replace roof material, replace the original electrical and plumbing systems, bring the HVAC system up to code compliance and install fire and life safety system components.												
Leasure Hall ($3,600,000)	216,000		534,000								**750,000**	**-**
Leasure Hall is a centrally located academic building, built in 1908. The project will replace original plaster walls, electrical wiring, plumbing, and HVAC systems, which are failing due to age and use. The aging elevator, which does not meet ADA requirements and only services two of the three floors, will be replaced with a code-compliant one. The project will also abate the original asbestos insulation, asbestos floor tiles, and lead-based paints, replacing them with code-compliant materials.												
Willard Hall ($10,000,000--an additional $3,385,500 in University interest earnings will be spent in FY 2013 to complete the project)	5,530,000	1,439,500	1,680,000								**7,210,000**	**1,439,500**
This academic and research building was constructed in 1939 and is centrally located on the main campus. Like many other aging structures at K-State, it has many basic problems. These include deteriorated interior and exterior walls; a roof and roof structure in need of replacement; aging electrical, plumbing, and HVAC systems that require replacement; windows, floors and ceiling that need repair; asbestos and other material that require abatement; and life safety and fire code compliance issues.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Kansas State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 9,066,000	$ 3,200,000	$ 6,044,000	$ 1,800,000	$ 4,140,140	$ 900,000		$ 900,000	$ 3,022,000	$ 900,000	$ 22,272,140	$ 7,700,000
Project Description and Estimated Cost												
Willard Hall ($10,000,000--an additional $3,385,500 in University interest earnings will be spent in FY 2013 to complete the project) - Description continued from previous page												
The exterior walls need to be stabilized, the roof structure must be repaired and the roof material replaced. Many of the original plaster walls are cracked, the floor tiles and ceilings contain asbestos and require abatement. The deteriorated plumbing systems need to be repaired. The water pipes, sewer pipes and storm sewer pumps need to be replaced. The antiquated electrical wires and associated equipment must be replaced. The building's original windows have deteriorated and need to be replaced with insulated, energy saving units. The building fire alarm system needs to be upgraded and expanded and all three stair towers need to be made fire code compliant.												
Seaton Court ($2,000,000)	180,000		2,220,000		1,640,000	280,000					4,040,000	280,000
This 133 year old academic building is still in its original configuration. Seaton Court needs major repair to meet current safety and code compliance standards. The roof, plumbing systems, original windows, and original ceilings must be replaced and the HVAC system requires repair. The deteriorated roof structure requires immediate attention - rainwater leaks down the interior walls. The antiquated plumbing system needs to be replaced. The crushed and deteriorated drain, HVAC and plumbing pipes will be replaced to meet current code standards. The original windows do not maintain integrity and need to be replaced with insulated, energy saving units. The ceiling contains asbestos that must be removed. The deteriorated chilled and hot water piping for heating and cooling systems need to be replaced.												
Roofs and Other Projects ($1,760,500)		1,760,500									-	1,760,500
The remainder of the 5 year maintenance budget will be used for critical roof repairs to the academic portion of McCain and Calvin Hall. These repairs will prevent serious structural damage to these heavily used facilities. Additionally, heavily utilized classrooms and academic space in Justin, Call Hall and Kedzie Hall are in dire need of repair.												
TOTALS	$ 9,066,000	$ 3,200,000	$ 6,044,000	$ 1,800,000	$ 4,140,140	$ 900,000	$ -	$ 900,000	$ 3,022,000	$ 900,000	$ 22,272,140	$ 7,700,000

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Wichita State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 3,093,000	$ 1,244,952	$ 2,062,000	$ 869,472	$ 1,412,470	$ 473,525		$ 358,845	$ 1,031,000	$ 358,845	$ 7,598,470	$ 3,305,639
Project Description and Estimated Cost												
Duerksen Fine Arts Center ($7,994,413)	374,000	1,244,952	1,775,000	869,472		473,525		358,845			2,149,000	2,946,794
The project includes replacement of the HVAC systems, interior doors, and windows; removal of old boilers and abatement of related asbestos; re-piping of domestic water; replacement of exterior storefront and glass; painting Miller Concert Hall; replacement of the electrical distribution; abatement of asbestos throughout the building; and replacement of sprinkler heads.												
Henrion Hall											0	0
The project includes upgrades to the HVAC system; provides a code required wall separation of the kiln area; replaces exterior lighting; refurbishes existing restrooms; and repairs exterior cornice work.												
Engineering Building ($756,000)	145,000		113,000		1,412,470						1,670,470	0
The project includes replacement of the HVAC system and the abatement of asbestos.												
Grace Wilkie Hall ($2,929,801)	170,000		174,000						1,031,000	358,845	1,375,000	358,845
The project includes replacement of HVAC system; and replaces roof system.												
Fiske Hall											0	0
The project includes repair of termite damage; replacement of the heating system; masonry waterproofing; insulating the attic; and rebuilding the entrance steps.												
Wilner Auditorium											0	0
The project includes abatement of lead and asbestos; replaces HVAC system to auditorium area; replace auditorium seating; repairs and repainting interior auditorium walls; and repair termite damaged walls.												
Clinton Hall											0	0
This project rebuilds the north and south entrances/steps; replaces exterior and interior doors and hardware; replaces main water service; and replaces direct buried hot and cold water lines.												
Visual Communications Building ($54,702)	54,702										54,702	0
The project upgrades the main electrical service; replaces the HVAC system; and replaces exterior metal siding.												
Hubbard Hall											0	0
The project includes abatement of asbestos; lecture hall seating replacement; and replaces domestic water booster pump.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Wichita State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 3,093,000	$ 1,244,952	$ 2,062,000	$ 869,472	$ 1,412,470	$ 473,525		$ 358,845	$ 1,031,000	$ 358,845	$ 7,598,470	$ 3,305,639
Project Description and Estimated Cost												
Wallace Hall ($148,120)	148,120										148,120	0
The project includes replacement of the roof; upgrades of building elevators; asbestos abatement; accessibility to front of lecture hall; masonry repair and restoration; upgrade electrical service; and upgrade HVAC system.												
Ahlberg Hall ($163,954)	163,954										163,954	0
This project upgrades electrical service; upgrades building elevators; and replaces domestic hot water system.												
McKnight Art Center ($214,060)	214,060										214,060	0
The project includes upgrade of building elevators; asbestos abatement; repairs to elevated pedestrian walkway; and replacement of HVAC building controls.												
Geology Building											0	0
The project includes replacement of the roof; rebuilding a brick screen wall; replacing lighting in the lecture hall; conducting a structural evaluation of masonry failures; replacing air handling units; and improving acoustics in general classrooms.												
Ablah Library											0	0
This project replaces exterior hot water piping; provides downspout connections to roof scuppers; replaces sewage ejection pumps; and abates asbestos.												
Jabara Hall											0	0
The project replaces domestic water booster pump.												
Central Energy Plant ($235,243)	235,243										235,243	0
This project installs lighting protection; upgrades electrical distribution and replaces the roof.												
Lindquist Hall ($190,347)	190,347										190,347	0
The project includes upgrade of building elevators; and replacement of domestic water booster pumps.												
Jardine Hall ($59,438)	59,438										59,438	0
The project includes elevator upgrades and asbestos abatement.												
Elliott Hall												0
The project replaces the roof system.												
Infrastructure ($1,134,660)	1,134,660										1,134,660	0
The project includes fire hydrant coverage improvements and waterproofing of the utility tunnel in the vicinity of the Engineering Building and Ahlberg Hall.												
Brennan Hall 1											0	0
This project replaces interior doors and hardware and replaces water and sewer lines in the building tunnel.												
Blake Hall											0	0
This project replaces the HVAC system and provides emergency lighting.												
Heskett Center ($116,696)	116,696										116,696	0
The project replaces HVAC building controls.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Wichita State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 3,093,000	$ 1,244,952	$ 2,062,000	$ 869,472	$ 1,412,470	$ 473,525		$ 358,845	$ 1,031,000	$ 358,845	$ 7,598,470	$ 3,305,639
Project Description and Estimated Cost												
Metropolitan Complex												
The project includes upgrading emergency lighting; providing emergency generator; and caulking, painting, and waterproofing of the building exterior.											0	0
Police Building												
The project includes replacement of the HVAC system.											0	0
National Institute for Aviation Research ($86,780)	86,780											
The project replaces HVAC building controls.											86,780	0
TOTALS	$ 3,093,000	$ 1,244,952	$ 2,062,000	$ 869,472	$ 1,412,470	$ 473,525	$ -	$ 358,845	$ 1,031,000	$ 358,845	$ 7,598,470	$ 3,305,639

5-11

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Emporia State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 1,812,000	$ 459,700	$ 1,208,000	$ 372,414	$ 827,480	$ 169,300		$ 170,000	$ 604,000	$ 170,000	$ 4,451,480	$ 1,341,414
Project Description and Estimated Cost												
Physical Education Building Roof Replacement ($810,700)	351,000	459,700									351,000	459,700
This project will replace the existing roof system, which has failed and developed numerous leaks, stopping the deterioration of interior finishes caused by these leaks.												
HVAC Repairs / Replacement ($70,000)										70,000	0	70,000
This project partially funds repairs and, if necessary, replacement of existing HVAC systems in a state of disrepair as well as installation of components allowing the system to function properly. An evaluation will be completed to determine priorities and develop a scope of work that meets the funding limits.												
Plumbing Repairs / Replacement ($100,000)										100,000	0	100,000
This project partially fund repairs and, if necessary, replacement of existing plumbing systems that are non-operational or failing. Emphasis will be placed on the hot and cold water supply systems in locker rooms, the pumping/piping systems in the mechanical rooms, and the water supply systems to the natatorium. An evaluation will be completed to determine priorities and develop a scope of work that meets the funding limits.												
William Allen White Library HVAC Repairs / Replacement	230,000		1,208,000	186,414							1,438,000	186,414
This project will replace the entire existing HVAC supply and distribution system in the original 60-year-old building. The existing system is past its useful life and is grossly inadequate and extremely unreliable in its operations. Additional repairs and, if necessary, replacement of equipment in the 1970 addition will be determined in the preliminary and final planning stages of this project.												0
Electrical Repairs / Replacement ($705,000)	410,000			186,000	109,000						519,000	186,000
This project will replace the entire, existing electrical main distribution system and panels in the original 60-year-old building. The existing system is well past its useful life and is inadequate. The inability to find or purchase replacement parts puts this building at risk for closure if a failure occurs. Branch circuits and panels will be evaluated for replacement, depending on the condition found during destructive investigation.												
Elevator Repairs / Replacement ($22856) (Originally $50,000)					22,856						22,856	0
This project will repairs and replace equipment and controls in the existing south elevator. Partial funding will limit the extent of total repairs.												
Partition Repairs / Replacement - Eliminated(Originally $200,000)											0	0
This funding allows the repair and replacement of interior partitions that are currently in deteriorated condition and those that will be lost as a result of the HVAC and electrical systems replacement projects. Partial funding will limit the extent of total repairs or replacement.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Emporia State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 1,812,000	$ 459,700	$ 1,208,000	$ 372,414	$ 827,480	$ 169,300		$ 170,000	$ 604,000	$ 170,000	$ 4,451,480	$ 1,341,414
Project Description and Estimated Cost												
Utility Tunnels Repairs / Replacement ($929,624) (Originally $936,000)	399,000				530,624						929,624	0
This project will repair and, if necessary, replace utility tunnel structure, including walls, beams, ceiling, and floor. It will remove all asbestos insulation and re-insulate with appropriate materials; replace deteriorated pipe/cabling supports and anchors; replace unreliable and non-operational utility main equipment, including condensate pumps, valves, expansion devices, controls, ventilation, sensors, etc.; and install water detection and drainage systems to prevent flooding and water damage due to main breaks and infiltration. The goal is to expand the life expectancy of the tunnel system for another 50 to 75 years and to provide a safe environment for workers inside these tunnels.												
Roosevelt Hall Foundation Stabilization / Repairs ($212,000) (Originally $740,480)	212,000										212,000	0
There will be an engineering evaluation and study to determine the best method for stabilization of the foundation, and the recommendations will be implemented. Sub-soil moisture needs to be controlled and evenly maintained to reduce movement under the building. Asbestos abatement will be necessary to gain access to crawl-space areas under the main floor so that structural analysis can be accomplished on interior structural pier systems.												
HVAC Repairs / Replacement ($477,930) (Originally $434,000)	175,000				165,000	137,930					340,000	137,930
This project will repair and, if necessary, replace HVAC rooftop units, supply/return air systems, and controls. Individual fan coil units will be replaced.												
Plumbing Repairs / Replacement ($35,000) (Originally $98,000)	35,000										35,000	0
This project will repair and, if necessary, replace the hot/cold water main supply-line systems, the main sewer lines from the building to the City main, and miscellaneous branch systems.												
Cremer Hall Elevator Repairs / Replacement ($13,538) (Originally $70,000)						13,538					0	13,538
This project makes necessary repairs and equipment replacements to the existing elevator, to provide safe and reliable service.												
King Hall Elevator Repairs / Replacement ($17,832) (Originally $70,000)						17,832					0	17,832
This project makes necessary repairs and equipment replacements to the existing elevator, to provide safe and reliable service.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Emporia State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 1,812,000	$ 459,700	$ 1,208,000	$ 372,414	$ 827,480	$ 169,300		$ 170,000	$ 604,000	$ 170,000	$ 4,451,480	$ 1,341,414
Project Description and Estimated Cost												
Visser Hall HVAC Repair / Replacement ($224,000) (Originally $661,000)								170,000	54,000		54,000	170,000
This project replaces the existing HVAC hot/cold water supply system. Numerous leaks and destructive investigation have shown major deterioration to the supply lines from the mechanical room to the building rooms' fan coil units. These lines, which are nearly 40 years old, are beyond their useful life. Simple repairs will not keep this system in operation; a complete replacement is necessary.												
Stormont Maintenance Building HVAC Repair / Replacement									300,000		300,000	0
This project replaces the existing HVAC supply and distribution system. This 50-year-old system is past its useful life and frequently fails.												
Power House Roof Replacement ($250,000)									250,000		250,000	0
This project replaces the existing roof system, including the area with original asbestos panel roofing, which has become brittle due to age and weathering. A new roof will provide safer, reliable protection to the power house equipment and to personnel.												
TOTALS	$ 1,812,000	$ 459,700	$ 1,208,000	$ 372,414	$ 827,480	$ 169,300	$ -	$ 170,000	$ 604,000	$ 170,000	$ 4,451,480	$ 1,341,414

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Pittsburg State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 2,070,000	$ 702,271	$ 1,380,000	$ 439,569	$ 945,300	$ 200,000	$ -	$ 200,000	$ 690,000	$ 200,000	$ 5,085,300	$ 1,741,840
Project Description and Estimated Cost												
McCray Hall ($2,300,000)	2,070,000	174,187	23,357								2,093,357	174,187
This project will provide repair for exterior structural wall and foundation settlement problems, masonry tuck pointing, a new roof, new window and exterior door systems, new heating, ventilation, and air condition system.												
Russ Hall ($150,000)		138,321									-	138,321
Provide masonry repair, restoration, and tuck pointing of the cornice and parapet around the top of the building.												
Axe Library ($250,000)		282,596									-	282,596
Provide restoration and waterproofing of the exterior limestone panels and exterior wall repairs.												
Heckert-Wells Hall and Weede Facility - Replace Electrical Switch Gear ($150,000)		103,910									-	103,910
This project will replace worn electrical switch gears in both Heckert-Wells Hall and the Weede Facility												
Steam Line Replacement ($200,000)			106,455								106,455	-
This project will replace the existing deteriorated steam line that bisects the Oval in the main part of the campus.												
Utility Distribution System Improvements ($1,359,000)			58,495	56,416		80,000				200,000	58,495	336,416
This project consists of repair/replacement of piping systems and structural integrity of the tunnel infrastructure throughout campus. Included in the utilities to be replaced and repaired are storm and sanitary sewer lines, water and electrical distribution lines, and steam pipes.												
Porter Hall ($3,000,000)		3,257	1,191,693	146,480	945,300						2,136,993	149,737
This project will provide repair for exterior wall and foundation settlement problems, masonry tuck pointing, a new roof, new window and exterior door systems, new heating, ventilation and air conditioning system, new lighting in studios, and electrical system upgrade including a new main service.												
Heckert - Wells Hall ($1,048,000)				20,049		120,000					-	140,049
This project will provide for the repair/replacement of the heating, ventilation and air conditioning system, new controls, new domestic water piping, and provide new gas valve shut offs for labs.												
Grubbs Hall ($783,000)				103,545							-	103,545
This project will provide for the repair of the foundation and floor slab settlement, replace the windows, interior doors, heating ventilation and air conditioning controls, and the main electrical switch gear.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Pittsburg State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 2,070,000	$ 702,271	$ 1,380,000	$ 439,569	$ 945,300	$ 200,000	$ -	$ 200,000	$ 690,000	$ 200,000	$ 5,085,300	$ 1,741,840
Project Description and Estimated Cost												
Yates Hall ($732,000)				113,079							-	113,079
This project will provide new windows and replace heating, ventilation and air conditioning system equipment.												
Weede Facility ($780,000)								200,000	690,000		690,000	200,000
This project will provide foundation and settlement repairs along with structural repairs, new exterior metal wall panels, and partial new heating, ventilation, and air conditioning system.												
TOTALS	$ 2,070,000	$ 702,271	$ 1,380,000	$ 439,569	$ 945,300	$ 200,000	$ -	$ 200,000	$ 690,000	$ 200,000	$ 5,085,300	$ 1,741,840

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Fort Hays State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 2,073,000	$ 826,225	$ 1,382,000	$ 738,500	$ 946,670	$ 375,000	$ -	$ 375,000	$ 691,000	$ 375,000	$ 5,092,670	$ 2,689,725
Project Description and Estimated Cost												
Picken Hall Improvements ($3,845,000)	2,073,000		1,382,000	390,000							3,455,000	390,000
This project provides for a series of interior improvements to Picken Hall, which include new electrical service, new HVAC system, plumbing improvements, painting, floor finishes, ceiling tile replacement, door replacement, roofing repairs, asbestos abatement, and wood floor framing repairs.												
Campus Electrical Improvements ($2,012,095)(Originally $3,308,695)					946,670	690,425		350,300			946,670	1,040,725
This project is a comprehensive improvement plan for the campus electrical system. Anticipated improvements include conversion of primary power supply from a 4160 system to a 13,370 volt system, which would position the University for increasing power demands over the coming decades. Other improvements include new power conductors, building transformers, switches and point of entry equipment. Improvements are also envisioned to position FHSU to use power produced from wind turbines constructed on University land.												
Akers Energy Center - Boiler Replacements ($1,123,500)									691,000	375,000	691,000	375,000
Constructed in 1968, Akers Energy Center contains four water tube boilers which are approximately 40 years old. Although they have been well maintained, the boilers are predictably reaching the end of their anticipated life cycles. Presently, Akers uses two 40,000# boilers and one 15,000# boiler. The University anticipates replacing these units with two 20,000# and one 15,000# fire tube boilers, which will operate more efficiently and safely. As many University buildings have moved away from steam heat to hot water heat, the total boiler capacities required to operate these systems have been significantly reduced.												
Street Improvements ($661,000)				223,000							0	223,000
This project provides for the removal and replacement of concrete street paving. A significant amount of concrete street paving was installed throughout campus in the 1950's. Today, many segments of this street paving are (55+) years old. The pavement condition is predictably failing, given its age. This phase of replacement would fund replacement of approximately 25% of the (50+) year old paving.												

Kansas Board of Regents
State University 5-Year Maintenance Plan
May 20, 2010

Fort Hays State University	FY 2008		FY 2009		FY 2010		FY 2011		FY2012		5-Year Total	
	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI	IMP	UI
Estimated Budget Amounts	$ 2,073,000	$ 826,225	$ 1,382,000	$ 738,500	$ 946,670	$ 375,000	$ -	$ 375,000	$ 691,000	$ 375,000	$ 5,092,670	$ 2,689,725
Project Description and Estimated Cost												
Utility Tunnel Replacement-Center of Quadrangle to Rarick Hall		336,000									0	336,000
This project provides for the removal and replacement of approximately 130 linear feet of deteriorating utility tunnel. This arched brick tunnel, dating to the 1920s, needs to be replaced with a larger tunnel which will accommodate a variety of utility systems and provide the necessary space to complete routine maintenance in a safe manner.												
Sheridan Hall Roof Repairs ($70,000)		70,000									0	70,000
This project includes removal and replacement of deteriorated EPDM roofing membrane over the fly loft area and other low slope roofing along the north and east roof edges. Work includes removal of existing EPDM membrane, installation of new cover board, and a fully adhered 60 mil EPDM roofing membrane.												
Service Buildings Masonry Cleaning and Sealing ($60,000)		60,000									0	60,000
Service buildings, including the Witt Building, Motor Pool, and Grounds Building, were constructed in 1960. Since their original construction 47 years ago, there has been no repair undertaken to the brick and limestone veneers. This project would include cleaning of all veneer surfaces, sealing of limestone veneers, miscellaneous tuckpointing and replacement of broken and deteriorated coping stones.												
Repaint Cunningham Hall Gyms 100, 101, 102 and 121 ($35,000)		35,000									0	35,000
Originally constructed in 1973, these gym walls are in need of repainting. All wall surfaces are to be repainted with a combination of epoxy paint at lower surfaces and latex paint at upper levels.												
Felten-Start Theatre Seating Replacement ($100,000)		100,000									0	100,000
This project provides for the replacement of (316) existing auditorium seats with new units. This auditorium is used by the Department of Communications for both dramatic productions and classroom space.												
Campus Exterior Graphics - Phase II ($60,000)		60,000									0	60,000
This project provides for the installation of new traffic, parking and way-finding signage throughout campus. Deteriorated signage and inconsistent signage will be replaced with new signage of consistent size and design. New way-finding signage will also be added at strategic locations across campus.												
TOTALS	$ 2,073,000	$ 661,000	$ 1,382,000	$ 613,000	$ 946,670	$ 690,425	$ -	$ 350,300	$ 691,000	$ 375,000	$ 5,092,670	$ 2,689,725

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Facilities Planning
& Management

May 28, 2010

I want to thank the committee for the opportunity to present four projects that have evolved since the presentation of the FY 2011 Capital Improvements Request. Three of these projects are a result of grant applications for Federal Stimulus funding.

Measurement, Materials and Sustainable Environment Center (M2SEC)

The University of Kansas proposes the construction of an interdisciplinary-focused research building design for an addition of 34,690 gross square feet on the School of Engineering quadrangle. The building will be located towards the west end of the front lawn area of Learned Hall. SOE lacks a facility that would permit its extensive research activities in Energy/Transportation, Global Change, Composite Materials/ Technology, and Sustainable Building Practices to be housed in a modern laboratory structure. Currently, faculty and graduate students (GS) are scattered among floors, buildings, and off-campus spaces, which typically lack adequate utilities and cannot support modern testing equipment. The National Institute of Standards and Technology (NIST) building program offers a significant opportunity, because SOE has secured approximately $3 mil for equipment from USDOE, USDOT and NSF, which is available in FY 2010 and intended to support programs in these focus areas. Uniquely, M2SEC will be used in a research effort to determine its own carbon footprint, energy savings, and sustainable practices and will serve as a test bed for new sustainable materials and energy-saving modeling the design and monitoring the operation of the facility.

Outcomes for the new building include the consolidation of interrelated research activities into one location; and creation of an environment that fosters intellectual interaction, enhances research productivity, and builds intellectual capital. Nearly 100 GS students and faculty will be supported initially by work in M2SEC, and the number will grow as projects materialize and mature.

The building is configured to enhance the activities of interdisciplinary/multidisciplinary teams. Research is directed toward basic, applied and marketable research. Approximately 60 KU Faculty are involved in joint SOE research projects at any given time and have led to a doubling of research expenditures and approximately three times increase in PhD students from 2003 to 2008. M2SEC will foster research in a building designed to group Faculty and graduate students by primary research focus. The key researchers that will work in this facility include five who hold distinguished research professorships, and whose research interests overlap in substantial ways.

The types of research in the facility will include Biofuels production and engine emission analysis. Bioengineering, composites, fracture and fatigue materials testing will provide insight in the development of lighter weight materials with self healing characteristics. Sustainability building practices would include Phase Change materials.

Joint Committee on State Building Construction
May 28, 2010
Attachment 6

Design and Construction Management
Carruth-O'Leary Hall | 1246 West Campus Road, Room 114 | Lawrence, KS 66045 | (785) 864-34

Components of the building would include laboratories, offices, anechoic chamber, engine test cells, reverberation testing lab, green roof, removable wall panels for phase change material testing and research, etc. Per NIST requirements the building will be built to LEED standards and the KU energy policy requires the building to perform to ASHRAE 90.1 plus a 30% improvement.

The project budget is $21.6 million. NIST/Federal Stimulus will fund $12.275 million and the balance of money will be privately funded. The project has been approved by the Board of Regents.

Nichols Hall NIH Grant – Bioinformatics Computing Facility Core Renovation and Improvement

The proposal for the Bioinformatics Computing Facility Core. The University requested funding to renovate and expand 3,646 square feet in Nichols Hall designated as the Bioinformatics Computing Facility core (BCF). The renovated space will support computationally intensive multidisciplinary and integrative research projects in the life sciences. This includes projects across many departments of the University and at the KU Medical Center including two dozen NIH projects, two NCRR COBRE grants, a NIGMS Chemical Methodologies and Library Development (CMLD) project, a MLI Specialized Chemistry Center. In addition this project will accommodate computing requirements for ten core service laboratories that provide analytical instrumentation and technical services to the University's biological and biomedical sciences researchers. The proposed computational commons will be a sustainable, energy efficient data center for hosting existing and future assets dedicated to biological and biomedical computing. Computing in the biological and biomedical research is driven by three factors:
-huge and growing amounts of data from instruments such as biomolecular sequencers, mass spectrometry, X-ray crystallorgaphy and high throughput screening systems;
-simulation aimed at understanding the fundamental processes of life at many scales through the development and integration of models of ever greater complexity;
-and a flood of new questions arising from the availability of data from instruments whose answers depend on computation.

These factors, along with a rapidly expanding computing and storage hardware base that has outgrown the existing facility makes meeting current and future demands of an active life sciences computing community difficult, if not impossible. We have seen a large increase in the number of biological and biomedical science projects that require high performance computing and storage for data in the hundreds of terabytes to petabyte range. And computing environments for this level of performance require specialized machine room spaces and supporting electrical, cooling and environmental controls. The proposed renovation will provide capacity needed to host the computing and storage resources to handle these new challenges in biomedical research through an expanded biomedical computing commons.

The project will renovate 3,646 gsf of Nichols Hall. This renovated space will support a computing capacity twenty fold greater than currently available in a highly sustainable and energy efficient manner. The proposed renovations will also improve network connectivity between this facility and the rest of the campus, making the facility more accessible to users within and outside the university. LEED design criteria, Davis Bacon Wage Rates, Buy American are some of the requirements of the grant. The project is funded by the National Institute of Health (NIH) and the budget is $4.65 million.

Dyche Hall – NSF ARI-R2 Repair and Renovation: Advancing Research in Biodiversity

The Biodiversity Institute is primarily in Dyche Hall, one of the oldest buildings on campus and has an aging building infrastructure. The voice and data service, electrical system and the HVAC system is inadequate to support research computing lab of the 21st century. The project will renovate portions of 1st, 5th and 7th floors. Separate from the grant, HVAC and electrical system improvements are being made to the building and that work will be coordinated with this renovation. The grant project will modernize a suite of laboratories and a server room that support biodiversity research from genomics to ecosystems forecasting.

The University has been through negotiations with the National Science Foundation (NSF) regarding the grant and we remain hopeful the project will be awarded to the University. The current grant application has a project budget of $1.525 million to be funded by NSF. This project will also be subject to LEED design criteria, Davis Bacon Wage Rates, Buy American requirements.

Lied Center Additions

The Lied Center is the facility for the performing arts. The original building was primarily funded by the Lied Foundation along with other strong supporter of KU. The additions to the facility would provide a space where the visitors to the Lied Center can learn about the life of Mr. Lied and the history of the Lied Foundation Trust and construct an education pavilion where children, KU students and adults can gather and learn more about the performing arts. The additions will address the heavily congested lobby by expanding the first floor lobby space. The final component of the project is modest expansion of the office space for the Lied Center staff. The project will build approximately 8,000 square feet and is funded by a private gift funds. The project budget is $2.5 million.

Architectural Program

Measurement, Materials and Sustainable Environment Center (M2SEC)

KU Project No. 228-8977

Date: January 14, 2010

Prepared by:

The University of Kansas, Lawrence Campus
School of Engineering
Office of Design & Construction Management

Joint Committee on
State Building Construction
May 28, 2010
Attachment 7

Table of Contents

Programming Committee

Stuart Bell, Dean, School of Engineering
Glen Marotz, Associate Dean, School of Engineering
Warren Corman, University Architect
Jim Modig, Director, Design & Construction Management
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Introduction

In August 2009, the University of Kansas Center for Research (KUCR) submitted a grant proposal on behalf of the KU School of Engineering (SOE) to the National Institute of Standards and Technology (NIST) in response to a Federal Funding Opportunity which was offered as part of the American Recovery and Reinvestment Act (ARRA) of 2009 economic stimulus program. In December 2009, the University responded to a series of questions from NIST, which resulted in a partial modification and resubmittal of some of the grant application information. On January 8, 2010 NIST announced that KU was to be awarded a $12,275,527 federal grant to partially fund the development of this project.

This architectural program is based primarily upon the information presented to NIST in the grant application's technical proposal and in the supplemental submittals that were requested by NIST in response to their followup questions. The information taken from the NIST grant application has been further supplemented with other program information and requirements that are unique to the University of Kansas. The original NIST submittal was prepared by the School of Engineering and the Office of Design and Construction Management (DCM), with assistance from consultants BNIM Architects and McCown Gordon Construction.

The concept design embodied in the grant application and in this program document represents the University's intent, and establishes the general scope and goals of the project. Further development, refinements and changes to the concept design shall be made in consultation with and approval of the NIST Federal Program Officer. The University team, the A-E consultant team and the construction team will all be required to comply with the directions and requirements set forth in the terms of the NIST grant award agreement, which is forthcoming and once available, will be provided to the project team members.

The terms and conditions of this Federal Funding Opportunity can be viewed online at http://www.nist.gov/recovery/construction_ffo.html Section VI - Award Administration Information describes many of the terms and conditions which will govern the delivery of this project. Section VI.2.d itemizes many of the Recovery Act requirements that will apply, including the provisions of the Buy American Act and the Davis Bacon Act. Section VI.3 describes much of the reporting that will be required by the University, which will also require the cooperation and assistance of the A-E consultant and the Contractor.

Project Summary (NIST Submittal)

The University of Kansas (KU) School of Engineering (SOE) proposes the construction of an interdisciplinary-focused, 'shovel-ready', research building design for an addition of 34,690 gross square feet on the SOE quadrangle. SOE lacks a facility that would permit its extensive research activities in Energy/Transportation, Global Change, Composite Materials/ Technology, and Sustainable Building Practices to be housed in a modern laboratory structure. Currently, faculty and graduate students (GS) are scattered among floors, buildings, and off-campus spaces, which typically lack adequate utilities and cannot support modern testing equipment. The NIST building program offers a particularly significant opportunity, because SOE has secured ~$3 mil for equipment from USDOE, USDOT and NSF, which will be available in FY 2010 and intended to support programs in these focus areas. Uniquely, M2SEC will be used in a research effort to determine its own carbon footprint, energy savings, and sustainable practices and will serve as a test bed for new sustainable materials and energy-saving modeling the design and monitoring the operation of the facility.

Outcomes for the new building include the consolidation of interrelated research activities into one location; and creation of an environment that fosters intellectual interaction, enhances research productivity, and builds intellectual capital. Job support is derived from the efforts of the SOE to seek external funding, and the outcome of entrepreneurial activities. Nearly 100 GS students and faculty will be supported initially by work in M2SEC, and the number will grow as projects materialize and mature. An additional 330-375 people will be employed in the course of this project including the design firms and consultants, KU personnel, and the construction trades.

M2SEC will house research activities that cross-cut NIST's four agency-level national priorities. The building is configured to enhance the activities of interdisciplinary/multidisciplinary teams. Research is directed toward basic and applied and marketable research. Approximately 60 KU Faculty are involved in joint SOE research projects at any given time and have led to a doubling of research expenditures and a ~3X increase PhD students (2003-2008). M2SEC will foster research in a building designed to group Faculty and GS by primary research focus. There are collaboration spaces placed at group intersections and near labs to foster interaction. Floors and entrances are designed to permit rapid movement of materials into and out of the labs. GS are provided space in the laboratories; collaborative team space is provided in nearby open office areas, administrative spaces are shared. About 7,800 NASF will be vacated and available in adjacent Learned Hall after the new building is constructed. Half will be renovated for use by emerging research groups, test facilities, the remainder configured for labs dedicated to entrepreneurial activities.

The ***intellectual merit*** of the proposal lies in our ability to advance knowledge and understanding in materials research areas critical to NIST programs and national commercial needs. The proposed research will be carried out by qualified faculty and associated researchers. It is original, creative, and transformative because it will lead to results and potential products and processes that will represent significant advances collectively and in unique areas. The ***broader impacts*** include: Enhanced collaboration of Faculty and GS from Engineering and the Sciences with colleagues in other disciplines, represented by a growing number of cross-disciplinary appointment and projects; development in subject areas and with counterparts in industry and government laboratories; SOE's focus on moving the research results into the public arena through entrepreneurial, job-creating activities; and efforts to stimulate and support the development and dissemination of next-generation nano-micro-macro materials across a range of engineering disciplines.

The key researchers include five who hold distinguished research professorships, and whose research interests overlap in substantial ways. The Management Team is headed by the SOE AD/Research, who will work with the CoPI and key researchers as an Advisory Board to manage space usage. The Co-PI will serve as an on-site manager; he also serves as the Director of the Transportation Research Institute, a major interdisciplinary organizing entity among the research areas planned for M2SEC and our industrial and academic partners. KU's office of Design and Construction Management is responsible for all aspects of the construction process.

Project Description (NIST Submittal)

M2SEC will operate as a functional unit under the guidance of its management team (section VI.A.). Its research structure and themes are shown on Fig. 1. The operational framework is marked by regular assessment of the need and requirements for devices and uncharacterized-new materials by the management and research teams. M2SEC seeks support from the Engineering and Materials communities to engage in Applied Research and Development. The communities -- Applications, Science, Engineering -- involved in M2SEC, as well as cooperating external private, public and academic partners (green eclipses).

In the center of these communities is NIST-enabled certification across scale (nano-micro-macro), and structure-property-function across disciplines, which require physical, mechanical and chemical characterization.

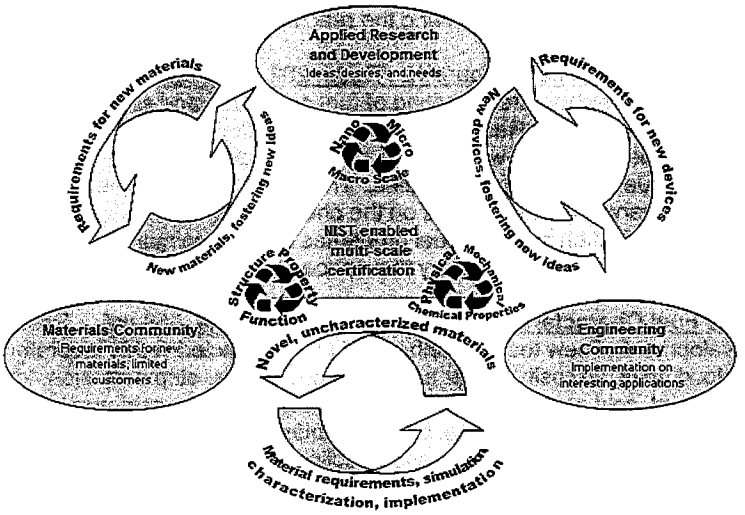


Fig. 1. Operational framework and Research Interaction in the M2SEC Research Community.

I.A. Research Activities & Potential Impacts

I.A.1. Energy: Biofuels/Transportation

I.A.1.a. Research Objectives and Plan

The proposed research is part of a larger Feedstock to Tailpipe©" (FTT) biofuels initiative. FTT is a multidisciplinary research effort that includes scientists from Chemical, Mechanical, and Environmental Engineering, as well as Ecology and Biology. The overall goal is to create a systems-based standardized framework for the comparison of biofuels that includes all aspects of the fuel life-cycle.

The short term objective of the team is to assess the viability of producing next generation liquid transportation fuels from algal feedstocks. Algal production is expected to yield more than 3,000 gallons of biodiesel per acre per year. However, the large-scale, stable production of green gasoline, green diesel, and alternative jet fuels from algal feedstocks has not yet been realized in an economically and environmentally-sustainable system. The DOE Aquatic Species Program cataloged over 300 different natural strains, and additional research has focused upon genetic engineering, with the goal of enhancing algal lipid production. This proposed research takes a very different approach. The FFT initiative will incorporate fundamental science from multiple disciplines to develop ecologically engineered, high rate, wastewater-fed algal ponds containing multiple species to produce lipids that will be processed and converted into biofuels. These biofuels will be fully characterized and tested to ensure that they exhibit highly favorable engine and emissions performance; tailpipe emission species and potential environmental impacts will be assessed also.

The research to be conducted in the four Vehicle and Fuel Technology Program (VFTP) laboratories in the proposed facility spans across four core areas of the FTT initiative: 1) Biomass Production 2) Biomass Pre-processing, 3) Biofuels Production, and 4) Biofuels Performance Analysis.

Biofuels Research Biomass Pre-Processing Lab Figure ; Room 201, 687 nsf The laboratory will focus on biomass production, biomass pre-processing, and small scale biofuels production. Specific project examples include:

1) *Optimization of algal lipid production (g/day) for downstream biofuel chemical synthesis and maximization of day-to-day stability of algal lipid production throughout the calendar year.* Single strains of algae will be manipulated in the laboratory to identify the growth conditions that optimize the yields of algal biomass and lipids. Results will then be tested in communities of natural algae, using the unique experimental facilities that are available at KU's Field Station and Ecological Reserves (KSR) to examine biomass production in 200 flow-controlled ponds. KSR facilities will also be used to design engineered systems that use domestic wastewater treatment plant effluents as the nutrient feed for large-scale algal biomass production.
2) *Development of high-efficiency, low-cost technologies for large-scale algal dewatering and bio-product extraction.* Slurry dewatering and extraction of chemicals from the dewatered algal biomass are key economic barriers to the sustainable production of algal biofuels. We will investigate induced/dissolved air flotation with the goal of demonstrating pilot scale

dewatering and oil extraction techniques. In addition to novel dewatering, cell disruption and extraction techniques based on electrostatic separation and/or CO_2 as a solvent will be evaluated as economical and efficient alternatives.

3) *Design of novel solid acid catalysts and reactors for conversion of lipids to green gasoline, green diesel and alternatives to jet fuel.* The development of technologies to convert the algal lipids and byproducts into higher value fuels and chemicals through catalytic pathways will be a key in realization of a sustainable biorefinery based on algal biomass. Studies include the synthesis and characterization of novel solid acid and base catalysts for the production of next generation fuels and the incorporation of these catalysts into more efficient reactors. In addition, research on the conversion of the residue from the extraction and the reaction byproducts into higher value chemicals and products will also be explored.

Biofuels Production Lab Figure 12 : Room 202, 1099 nsf The primary function of this lab will be to produce larger quantities of biofuels for further testing of fuel properties and engine/emission performance. The validation of new technology developed in the Biofuels Research laboratory will also be completed in the production laboratory. For example, reactors for converting lipids to biofuels which utilize process intensification techniques can be incorporated into the production facility to test the yield and fuel quality at larger scales. The larger scale processing of new algal feedstocks will be investigated and the impact of the harvesting techniques on the chemical transformation will be explored. The quantities of fuels produced will allow for full characterization of the biofuel properties and the comparison of testing methods. An existing production facility, (80 gallons/wk) can immediately occupy this space.

Biofuels Fuel Characterization Figure 12: Room 204, 658 nsf Research on the standardization of testing methods and the development of new testing methods will be conducted in this laboratory. Equipment will permit the following tests: flash point, cloud point, viscosity, water and sediment, copper strip corrosion, total and free glycerin, density, pour point, cold filter plugging point, cold soak filtration, distillation, cetane index, acid number, iodine number, carbon residue, and sulfur and metals analysis of biodiesel and biodiesel blends. Equipment to conduct vapor pressure, distillation, oxygenates content measurement, and API gravity testing of gasoline and gasoline/ethanol blends will also be in this facility. *The PI's will have all of the equipment to move into the facility upon completion of construction, in part, due to a FY2010 USDOE award. The laboratory will support biofuels research at the University of Kansas, and will be available to its state and regional industrial partners.*

Biofuels Performance Engine/Emission Analysis Figure 12 : Room 205, 340 nsf; Room 206, 320 nsf; Room 302, 680 nsf The lab will analyze the biofuels developed in order to determine how different fuel properties, affect engine operation. A complete fuel profile will be tested in order to demonstrate potential in a marketplace setting. Engine performance and emissions can be statistically associated with fuel properties in order to speed biofuel development. Thus, the lab will allow researchers to optimize the economic, energy and environmental properties of sustainable algal biofuel development.

TRI and Interdisciplinary Program Figure 12: Rooms 211-217, 1083 nsf A collaborative space will be available for the VFTP team, and research partners. In order to perform biofuel life cycle analysis (LCA) from feedstocks, researchers will need to integrate data from the production, fuel assessment, and emissions of fuels with existing models and literature of LCA.

I.A.1.b. Proximal Space Advantages

The proposed space will provide the opportunity for increased collaboration by locating the majority of the research activities in close proximity. The multidisciplinary nature of the team and the synergy among the core areas are unique and vital to the development of next-generation hydrocarbon fuels.

I.A.1.c. Alignment with NIST Goals

[Note: We present a detailed description of the alignment of M2SEC-Energy with NIST priorities in the following paragraphs. The same level of detail is available for all of the research endeavors we describe, but space limitations permit only table summaries (Tables 1,2) for the subsequent three topical areas.]

NIST's four agency-level priorities (ALP) are meant to guide and align investments in programs. ALP 1 places a focus on new activities among six national research priorities (NRP) in 2010-2012. The FTT applies very closely to three (energy, environment, and manufacturing) and somewhat to a fourth (physical infrastructure) of the NRP's. The FTT addresses considerations at all life cycle stages: feedstock and fuel production, performance assessment (mechanical and

Table 1. Overview of the NIST Agency-Level Priorities and Research Goals

	M2SEC Research Areas			
Laboratory Affiliations	Energy/ Transportation	Global Change	Composite Materials/ Technology	Sustainable Building Practices
NIST Labs				
CSTL Analytic Chemistry Division Organic Chemical Metrology Inorganic Chemical Metrology	 X X X			
NBL Radio Frequency Electronics Radio Frequency Fields		 X X		
MSEL Polymers			X	
CNST			X	
BFRL Building Environment				X
NOAA Climate Change and Data Detection Program Climate Observation Analysis		 X X		

environmental), and ecosystem level processes. Thus, many of the research activities are directly aligned with the energy (energy efficiency and enable and support new energy technologies) and environment (sustainability and climate mitigation) priorities. In addition, the training of students in small scale processing, fuel quality testing support for the State of Kansas and surrounding region, and research into best processing technologies directly supports the manufacturing (support for manufacturers and manufacturing efficiency) priority.

The addition of an engine test cell facility, which will allow for quantification of the effect of various fuels on existing engine infrastructure, and the material characterization and environmental laboratories, which will allow analysis and quantification of fuels effects on the distribution network, e.g. storage tanks and linings, pipeline materials, etc. can both be aligned with the physical infrastructure monitoring and improvement priority.

Table 2. Overview of the Relationship of M2SEC Research Areas to NIST/NOAA Labs/Programs

	M2SEC Research Goals			
NIST Agency-Level Priorities	Energy/ Transportation	Global Change	Composite Materials/ Technology	Sustainable Building Practices
1. Focus new activities on national research priorities				
Energy				
Speed of development of alternative energy	X			
Energy efficiency/high performance buildings				X
Advanced materials/vehicles, applications	X		X	
Enable/support new energy technologies	X			X
Environment				
Development of sustainable products/processes	X		X	X
Measurement for climatic modeling		X		
Accelerate sustainable product/building design	X		X	X
Manufacturing				
Measurement science to overcome barriers	X			X
Infrastructure				
Monitoring/improvement			X	X
Measurement research/sensor technology/assess infrastructure status				X
Improve long-term performance	X			X
Building/infrastructure more resistant to damage				X
Promote use/development of sustainable materials	X		X	
2. Strengthen NIST's labs relationships on Table 1.				
3. Stabilize, fortify, leverage TIP, MEP, BNQP	X	X	X	X
4. Expand collaborations/universities	X	X	X	X

ALP 2 is directed toward strengthening NIST's lab facilities. The proposed VFTP labs have the potential to complement NIST's laboratories and facilities, particularly activities at CSTL, namely, Analytical Chemistry, Thermophysical Properties, Surface and Microanalysis Science and the CBRD Division. The proposed work is closely aligned with the work in the Organic Chemical Metrology, Inorganic Chemical Metrology and Gas Metrology groups within the Analytic Chemistry Division. The specific overlaps are with the biodiesel SRM development, development of measurements and standards for biofuels, fatty acid methods and measures, fossil fuel standard reference material and measurements and standards to support global climate change studies. The research is also complementary to the work on the thermophysical properties of biofuels which falls under the Experimental Properties of Fluids group (Thermophysical Properties Division). The emissions work will be directly relevant to assessing the internal structure and composition of climatically–relevant atmospheric particles (Surface and Microanalysis Science Division). Finally, the engine analysis work will contribute to and validate data for the real fuels project (Chemical and Biochemical Data Division).

ALP 3 addresses stabilization, fortification, and leveraging, of TIP, MEP and BNQP. MEP provides technological and business support to organizations of various sizes to enhance competitiveness. FTT is engaged in similar activities at the local and regional levels, and actively engages with biofuel manufacturers and consumers to improve manufacturing practices and fuel quality. FTT provides facilities and expertise, and, in turn, educational opportunities and outreach to the community.

Finally, characterization of next-generation biofuels under the FY2011-2012 energy investment is a seamless fit and a natural extension of FTT research goals that would be augmented by a successful building proposal. Furthermore, it would build on NIST tradition of extensive collaboration with Universities.

I.A.1.d. Funding

Current Funding for the Biodiesel and Feedstock to Tailpipe Initiatives: **USDOT:** *Engine Test Cell Upgrade*, $350,000, 10/01/2009; **KU-TRI, KSC, NSF RET, USDOE, NSF EPSCoR:** $2.7mil
Proposals Involving the Feedstock to Tailpipe Team Currently Under Review : **NSF EFRI, KBA, NSF:** $3.9mil

I.A.1.e. References

Y.Chisti, *Biotechnol. Adv.* ***25***, 294-306 (2007);Q.Hu, et al., *The Plant Journal* ***54***,621-639 (2008); J. Sheehan, T. Dunahay, J.Benemann, P. Roessler, **NREL/TP-580-24190** (1998); J. Rosenberg, et al., *Curr. Opin. Biotechnol.*,**19**: 430-436 (2008); Department of Commerce – National Institute of Standards and Technology – Three Year Programmatic Plan - http://www.nist.gov/director/reports/**NIST3YR_fy2010-2012**.pdf.

I.A.2 Global Change: Remote Sensing, EMI/EMC, UAV Testing

I.A.2.a. Research Objectives and Plan: Remote Sensing and EMI/EMC Research

Current ice-sheet models fail to include processes associated with rapid ice-sheet changes, in part, due to numerical issues that prohibit full-stress solutions of the equations governing glacier flow over the whole ice-sheet domain at sufficiently high spatial resolution. A more complete view of ice sheets is needed, one that extends beyond the surface to map the internal structure and conditions at the ice-bed interface in regions undergoing rapid change. This can only be obtained using advanced, highly sensitive sounding and imaging radars with advanced signal processing capabilities .

Global change research is carried out by the Center for Remote Sensing of Ice Sheets (CReSIS), an NSF Science and Technology Center ($20mil) established in 2005. CReSIS is comprised of six partner universities, with the headquarters located at the lead institution, KU. CReSIS also collaborates with several international institutions and industry partners.

I.A.2.b. Prior Research and Instrumentation Rationale

Conditions necessitate the use of radars with high sensitivity and array-processing capabilities to successfully measure ice thickness, map internal layers, and image the ice-bed interface from crewed and un-crewed (UAV) aircraft. As global warming progresses, surface melt conditions will become increasingly challenging to overcome and will require radars with much higher sensitivity than those now used. This, in turn, requires a high-level integration of digital and analog technologies with critical analysis of associated Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC) problems arising from interference between various system components. Recent experiments revealed that without careful attention to EMI issues, the performance of radar can be substantially degraded by radiated interference from digital sub-systems within the radar and from external components. Thus, the need, prior to field deployments, to measure the EMI and EMC characteristics of all subsystems and components used to build highly-sensitive radars, and to develop improved shielding and screening techniques to optimize data collection.

The radars used for sounding and imaging of ice, and mapping near-surface internal layers, operate over the 100 MHz and 2000 MHz frequency range. This spectrum is widely used for many commercial and research applications. The power radiated in these applications far exceeds receiver thermal noise and RFI emitted by the radar and its external components by several orders of magnitude. Therefore, it is impossible to identify and reduce interference signals without access to a facility — an anechoic chamber — that shields devices from external radiation.

I.A.2.c. EMI/EMC Measurement Facility Figure 11: Room 104, 620 nsf; Anechoic Chamber Area 2400 gsf SOE has secured $1.25Mil (NSF/MRI) to build an anechoic chamber. The facility will cover the frequency range from 100 MHz to 18 GHz and will have the instrumentation and antennas to support the evaluation and testing of existing RF/microwave radars, as well as other instruments and instrument platforms under development. The chamber offers an electromagnetically quiet space for detecting extremely weak emissions from our electronic systems in the range between -130 and -150 dBm. The chamber can also support full-power transmit assembly testing (power amplifiers, switches, and antennas) without disrupting wireless services operating in the same frequency band. Instruments and antennas (along with our VHF radar systems) will enable characterization of electromagnetic emissions and isolation over the 100-MHz to 18-GHz rated operating range of the proposed facility. Access to the facility will permit study of large instrument platforms in the chamber, including the UAV's.

I.A.2.d. Benefits of Proposed Space to Research

Four of the ~dozen projects that will benefit from the EMI/EMC facility are:

Gamburtsev Subglacial Mountains (GAMBIT) This project is sponsored by the NSF and is aimed at conducting aerogeophysical surveys to enable understanding of the tectonic origin of the Gamburtsev Subglacial Mountains in east Antarctica.

EMC Evaluation for Avionics The compatibility of flight avionics with on-board equipment and the ambient flight environment must be certified for commercial and general aviation aircraft. Potential use of the proposed facility would include execution of DO-160 outlined tests and enable industrial partnerships with Kansas-based aircraft manufacturers like Hawker-Beechcraft, Bombardier, and Cessna.

UAVs for Science and Public Service KU has designed and built the first of six carbon-fiber, 28ft wingspan, 165lb payload, UAV prototype radar platforms; flight tests are underway. Command and control and science payload subsystems are being integrated and tested in the vehicle, as are VFTB biofuels. EMI has proven challenging in past airborne radar survey efforts as described above. Assurance of satisfactory function of both the payload packages and supporting platforms is critical.

Addressing EMC Issues in the Transportation Industry The transportation industry is facing extensive EMC and EMI issues as many former mechanical subsystems are digitized and embedded in airplanes and automobiles. The prevalence of hybrid electric and fully electric vehicles is leading to increasingly complex power electronics that are more likely to interfere with critical operating subsystems. For example, mechanical brake systems are being replaced with complex anti-lock brakes that are extremely vulnerable to electromagnetic interference. Transportation research projects, like the Kansas *EcoHawks Hybrid Vehicle*, would be able to use this facility to evaluate these types of electronic integration challenges.

I.A.2.e. Current Funding

NSF, MRI. *$1.250 Mil ($600k matching funds) for equipment and construction of the anechoic chamber;* **NSF, USDOT, TRI:** $6.5 mil; **NSF:** Center for the Remote Sensing of Ice Sheets. $20mil in base funding for the first five-year period

I.A.2.f. References:

Gogineni, S., D. Tammana, D. Braaten, C. Leuschen, T. Akins, J. Legarsky, P. Kanagaratnam, J. Stiles, C. Allen, K. Jezek, 2001. *J. Geophys. Res.* **106**:D4 3376; Lord, R., M. Inggs, 2000. *Proc. Euro. Conf. on SAR.* 845-848; Van der Veen, C., K. Jezek, L. Stearns, 2007. *J. Glaciol.* **53**:17; Van der Veen, C., ISMASS, 2007. *SCAR Report.* **30**:27.

I.A.3 Materials : Bioengineering, Composites, Fracture/Fatigue

I.A.3.a. Research Objectives and Plan:

SOE efforts in biomaterials are focused on the discovery, development, and characterization of materials at the nano and micro scales. The goal is to develop biomaterials that possess lightweight hierarchical structures with self-healing capabilities and fatigue-resistance, and the discovery of technological approaches that will reduce cost, improve productivity and assure the efficient delivery of high quality products. The theme that connects all of the projects is the translation of research to the public sector, with participation of scientists, engineers, and industrial partners.

Biomaterials Science Lab Figure 13: Room 301, 2591 nsf *Material/Tissue Interface Characterization* Biomaterial assessment must include – but often does not – chemical and mechanical characterization of the material/tissue interface. Characterization is incomplete because many current analytical techniques do not offer the required spatial resolution to study reactions occurring at the interface, or the conditions under which the sample must be analyzed destroy or significantly damage/alter the tissue. To address these problems, we have developed nondestructive techniques to characterize and quantify reactions at the material/tissue interface, which permits the same specimen and the same small region of the specimen to be analyzed, using both scanning acoustic microscopy (SAM) and micro-Raman spectroscopy (μRS). Thus, the structure as determined by measurement of the molecular features can be related directly to the acoustic impedance (modulus of elasticity) within the same small region of the sample. These complementary techniques allow us to relate differences in the micro-mechanical properties to the molecular structure within the region analyzed.

There may be as many as five or six distinct length scales in the hierarchical structural architectures of native tissues and material/tissue interfaces, the influence of small features in the hierarchy on the overall mechanical properties is not well understood. The generation of mechanistic models that relate global mechanical response to initial degradation requires the development of experimental techniques that allow the measurement of mechanical properties of small substructures, e.g., in the range of 10-1000nm. In addition, mathematical models that use measurements at small scales to predict behavior at larger scales are also not widely available. We are combining experimental measurements with modeling, which is expected to provide insights beyond what could be accomplished if either of the approaches were applied independently. Moreover, the combination of experimental and modeling techniques helps alleviate the typical disadvantage of mathematical models that stems from the less-than-perfect empirical information available to make the models realistic. The multi-scale modeling approach offers the advantage that the parameters that cannot be easily modified in the laboratory may be easily varied in the models, and the models may be exercised for a variety of conditions.

I.A.3.b. Benefits of Proposed Space to Research

Instrumentation is scattered among labs and buildings. Centralization and a management structure will permit much greater usage among SOE and partner researchers.

I.A.3.c. Current Funding

NSF, NIH, ME, BERC: ~$4mil

I.A.3.d. References

L. Shi, C. Berkland, *Advanced Materials.* (2009) (in press); J. Kohn, et al., *Biomaterials.* **28**:4171 (2007); C. Raman, C. Berkland, K. Kim, D.W. Pack, **103**(1):149-158. (2005)

I.A.4.a. Research Objectives and Plan: Fracture and Fatigue, Material Characterization, Composite Materials

Fracture and Fatigue Testing Room 210, 1295 nsf, **Material Characterization** Room 208, 1988 nsf; Composite Materials Lab Room 304, 1963 nsf

SOE research is directed toward fatigue and fracture of existing, novel, and new materials at the nano-micro-macro scales. Engineers typically design structures and products with the aim of preventing failure over a specified life cycle. This leads to the required usage of certified structural elements and overdesign, so that the product is unlikely to fail. Repeated loading and unloading cycles, usage and standby, etc. slowly introduce defects into materials that affect the ability of the material to perform within its original design parameters as fatigue failure is induced. Conventional failure testing for ductile materials permits accurate assessment and modeling of likely failure, but the same is not as readily accomplished for brittle materials. The problem is compounded by the fact that many new ductile/brittle composites, ceramics, inter-mettalics, bio-derived materials are being discovered, fabricated, and introduced in various applications, but their physical, chemical, and mechanical properties are collectively unknown or only sketchily specified, thereby limiting usage in many common and potential applications.

Failure and fatigue characteristics at the nano-microscale levels are often unknown, particularly for new materials, which are appearing rapidly. We could use the same overdesign and empirical evidence to use newer materials across an application spectrum, which itself is unknown, or we can produce accurate fatigue-prevention predictions. Initial cracks that form under loading/unloading at this scale are very small, and often act in ways that are unlike cracks that form at the scale tested in the laboratory. Unless the conventional means of determining fatigue and fracture are augmented by additional techniques at the nano-micro scales, the engineering community will not have the information necessary to predict and prevent fatigue failures in innovative/novel materials, and cost savings/efficiencies will not be realized.

SOE researchers have extensive experience in fatigue and fracture testing, in physical/chemical/mechanical property determination, and structural characterization at the micro and millimeter scales. We have worked with our colleagues in physics and chemistry to develop a plan that would permit us to collectively direct research toward fatigue and fracture of existing, novel, and new materials at the nano-micro scale, but the lack of a facility has proved detrimental to more than *ad hoc* research. M2SEC changes the equation.

SOE will consolidate its existing, inadequate, 800ft^2, multiple lab/building composite-related facilities into adjacent clusters. The clusters will include two fabrication labs – an adaptive structures lab (Learned Hall) and a new composite fabrication lab (M2SEC)--that will serve research needs in all engineering and related science fields. The adaptive structures lab will house specialized materials, special lay-up tables and equipment for fabricating complex shapes, power sources, and air handling. It will also have high voltage, high current, laser diagnostic and nondestructive test apparatuses. Also included will be a 20ft composites autoclave, which can be used to cure sample sizes that range from small to the size of airframe structures or vehicle components, and a shock table to measure and/or verifying the performance of structures. The composite fabrication lab would provide a facility for collaboration across disciplines, because it would allow for the rapid prototyping of structural components for testing, and fabrication of larger scale systems. Applications include aircraft (light sport, civil, general aviation, military and UAV), biomedical devices, embedded sensors for environmental remote sensing, fuel cells and more efficient ground vehicles, wind energy, and emerging civil infrastructure, particularly for fatigue and life cycle cost.

Materials, Characteristics, and Performance: Two Projects with Industrial Partners

Researchers in this cluster are planning several projects that will require a test stand with Faraday Shielding. They will examine specially constructed composite materials that can be used in commercial and general aviation aircraft outer surfaces to avoid potential lightning damage. Currently, the method of providing lightning strike protection to composite aircraft is to include an aluminum "lightning strike mesh" in the outer layers of the structural skin. This practice negates much of the advantage of composites. A completely different approach will use materials to conduct static discharges harmlessly around the primary structure rather than routing it through the structure. Several aircraft-grade structural composites will be fabricated with different types of conductors both embedded and surface mounted.

SOE and its partners in large, mid-size/small wind turbine manufacturers and small engineering firms specializing in wind energy, aerospace design and manufacturing, composite materials, and materials science will collaborate on blade design and manufacturing, reliability, aeroelastic tailoring, monitoring by both embedded structural sensors and upstream aerodynamic sensors, and aerospace control strategies for dynamic flow fields. Core competencies include integration of adaptive materials into rotor blade sections to improve performance with respect to improvements in aerodynamic efficiency at low speeds while maintaining good mid-range efficiency, reduction of fatigue loads via high speed, high efficiency individual blade control, and blade-initiated emergency stop capabilities. Results will allow turbine systems to operate in a wider range of wind conditions, operate for longer periods of time with minimal maintenance due to self-diagnosis and prognosis capabilities, and enable blade systems to stop themselves without root braking loads.

I.A.4.b. Benefits of the Space to Research

Current space size, arrangement, and utility status of rooms used for research in this category are functionally inadequate. M2SEC will permit us to bring research partners together into adjacent spaces that are equipped for the next steps in our efforts.

I.A.4.c. Current Funding

NSF, USDOT, EPA: ~$3.5mil

I.A.4.d. References

J.Kruzic, *Science*. **325**, 156 (2009); W. H. Munse, S. T. Rolfe, Fatigue, Brittle Fracture, and Lamellar Tearing, Struc. *Eng. Hndbk*, McGraw-Hill, 1997;J. Kruzic, J. Campbell, R. Ritchie, *Acta Mater.* **47**, 801 (1999); J. Kruzic, R. Cannon, J. Ager, III, R. Ritchie, *Acta Mater.* **53**, 2595 (2005); T. Fett, M. Riva, M. Hoffmann, R. Oberbacker, *J. Test. Eval.* **37** (2009)

I.A.5. Sustainable Building Practices (Total Area of Investigation 34,690 gross square feet ; Room 113 for monitoring)

I.A.5.a. Research Objectives and Plan: Sustainable Building Systems Using PCMs

Phase Change Materials (PCMs) are chemicals (organic and inorganic) that have been engineered to change from solid to liquid and back to solid as a function of specific temperature ranges based on application requirements. During phase changes, significant amounts of heat are absorbed, stored, and released. In building applications, for example, provided that the PCMs are held in place within building enclosure components (i.e., walls, ceiling, roofs, and/or floors), this absorption of heat, its storage, and its release make it possible for the space cooling/heating demand from the enclosure to be reduced, and/or a portion of such load shifted to other times of the day, while the building's indoor air temperature remains relatively stable. Other benefits include reducing the short on/off cycling of air conditioners and heaters, which can increase their performance and equipment life. The ***broader impact*** includes a wider range of product choices for consumers, opportunities to save energy, savings resulting from reduced utility bills, and new competitive ventures for manufacturers. These improvements will reduce energy resource use and ultimately decrease emissions of greenhouse gases.

Optimal Integration of Renewable and Phase Change Materials in Insulation Systems for the Reduction of Thermal Loads on Building Walls and Ceilings

KU has investigated the use of organic and inorganic PCMs in standard frame walls, structural insulated panels, and in commercial transportation vehicles under ambient and laboratory conditions. Full-scale laboratory experiments, which follow NIST standards, are performed to evaluate the PCM-enhanced insulation performance under controlled conditions; the information is used to calibrate heat transfer models. A series of time-dependent tests are performed using a dynamic wall simulator. The tests consist of three independent parts: rapid step change of the exterior temperature in heating/cooling modes are used to understand insulation behavior under heating/cooling conditions; steady-state tests at constant temperature permits assessment of heat transfer in the whole assembly.

Proposed Evaluation of PCM Technology in M2SEC

A set-up consisting of two identical wings of the proposed NIST-sponsored building will be instrumented to monitor and record overall energy consumption, space cooling and space heating energy consumption, indoor air and surface temperatures, indoor air relative humidities, outdoor surface temperatures, and wall heat transfer. One or wing will be used as a control and the other as a test wing. The difference between the control and the test wings will be that the test or wing will have its walls and roof/ceiling outfitted with extant PMC-enhanced thermal insulation, and wireless-based sensors will be used to record and send data. M2SEC will serve as a test bed under a NIST-standard-derived testing plan that will be conducted 24/7/365 for several years. Indoor air temperatures will be controlled to 75°F (+/-0.3°F) in both experimental areas. Indoor air temperatures, RH, exterior and interior wall surface temperatures and heat fluxes, and space cooling/heating loads, and monthly utility charges will be recorded. Wall, ceiling, and floor heat fluxes; wall, ceiling, floor, and air temperatures; air relative humidity; and weather data will be measured continuously. Weather stations will be used to collect on-site ambient air data. The data will be reduced, analyzed and published. The experimental data will also help to verify and fine-tune heat transfer models developed by the research group.

I.A.5.b. Research Objectives and Plan: Infrastructure Life Extension

Research is carried out by a multidisciplinary group from academia, industry, and government that focuses on extended design life, corrosion resistance, stable structures, and earthquake engineering.

Current research includes:

Corrosion of Reinforcing Steel in Highway Structures

The goal is to develop mathematical relationships between accelerated laboratory tests and field performance for a broad range of corrosion protection systems. We are trying to reduce cracking in concrete bridge decks using better material

specifications, design, and construction. We are extending studies by searching for, and employing, new materials, modified construction techniques, and a broader range of measurement/assessment techniques to evaluate deterioration.

Cracking Behavior of Fatigue-prone Structure Details

Teams are evaluating different repair approaches after catastrophic failure, and recommending retrofit methods to extend life and to avoid costly replacements. We are developing a performance-based design method to (1) predict the locations and extent of inelasticity in reinforced concrete bridge columns under multiple levels of seismic excitation, and (2) provide appropriate column detailing based on the design event during the life expectancy of the bridge. The research involves significant laboratory testing, and will expand the scope of an on-going NSF grant that is aimed at evaluation of the inelastic behavior of large-scale bridges.

New Class of Fatigue Reduction, Detection, and Indication Devices

We are developing and employing advanced composites for use in reinforcing bridge structural details. The behavior of the substrate materials, bonding agents, constraining layers, and fatigue fuse indicators must be understood in the development process. A series of composite constraining layers is being fabricated and bonded to the bridge details with viscoelastic dynamic energy absorbing resins. Fatigue testing will demonstrate the fatigue reduction properties of the constraining layer while the fatigue fuse indicators will show fatigue levels during a test. The devices can significantly enhance safety while simultaneously making bridge inspection less expensive and more reliable.

Three-dimensional (3-D) Characterization of Near-surface Material Properties

Conventional seismic methods are labor intensive which makes shallow 3-D imaging uneconomical. A new automated 3-D seismic surveying technology has been developed at the KU for efficient high-resolution ultra-shallow imaging of geologic materials. The proposed research will further develop the device for automated acquisition of 3-D seismic over paved surfaces and for three-component (3-C) recording. Three-component acquisition of the full seismic wavefield will allow for determination of material mechanical properties. Combined with high-resolution 3-D imaging of bedrock topography, fracture density and orientation, and void detection, it will facilitate design of infrastructure projects. The new technology will be tested at multiple selected sites known to have, and are free of, near-surface problems. This project will be used to initiate research in infrastructure, levee monitoring, and void and tunnel detection with state, federal and private organizations.

I.A.5.c. Benefits of Proposed Space to Research

PCM research is scattered among three locations at present, none of which was originally configured as a laboratory. We intend to use M2SEC to consolidate activities, and as a means of furthering PCM research by using M2SEC as a laboratory for the testing of additional PCM (and other) energy-saving devices.

I.A.5.d. Alignment with NIST Goals

The alignment with NIST research goals is straightforward. We are focused on the development of advanced sensor concepts for infrastructure inspection; new, nondestructive inspection techniques with extended capabilities, including, but not limited to, acoustic, ultrasonic, optical, thermal, magnetic, and electro-magnetic techniques. The work in flaw detection techniques are intended to measure additional properties, including strength and toughness of materials. Our efforts on tool, models, and method development necessary to enhance the resilience of structures to disasters has been supported for years, and will increase in the M2SEC. Our goal is to obtain laboratory and ambient environment test data for the specification of structural fragilities, validating performance-based design assessment capabilities for critical new and existing lateral force-resisting systems, from initial loading to collapse initiation, including, but not limited to: steel braced frames; steel or concrete frames with masonry infill; reinforced concrete shear walls; reinforced masonry; limited ductility steel moment frames; concrete gravity frames. The use of M2SEC itself as a test building for sustainable building approaches will contribute to testing, specification and design standards for a central USA climate zone. We will performance-based models to predict the building's characteristics based upon wireless sensor data used to track energy use.

I.A.5.e. Current Funding

NSF: $800k; **KDOT:** ~ $2.3Mil

I.A.5.f. References

M. Medina, B.Young, *ASCE J Ener Eng.* **34**:2-5 (2008); M.Medina,J.King,M.Zhang, *Ener Int Jour.* **33**:667-668; D. Darwin, J.Browning, L.Gong, S.Hughes, *ACI Materials Journal*, **105**: 622-627. (2008).

I.B.1. KEY RESEARCH TEAM AND ADVISORY BOARD MEMBERS (Management Team)

Craig D. Adams

Position Title: Chairperson-Professor, Department of Civil, Architectural, and Environmental Engineering

Education: University of Kansas, Lawrence, KS, PhD., Environmental Health Engineering, 1991

Honors/Awards: ASCE State-of-the-Art Civil Engineering Award, American Society of Civil Engineers (2005)

Selected Publications (> 100)**:** Adams, C. (2008) "Modeling Fate of Pharmaceuticals and Personal Care Products in Sewage Treatment," *Practice Periodical of Hazardous, Toxic and Radioactive Waste Management,* 12, 2-9; Su, T., Shu, S., Shi, H., Wang, J., Adams, C., Witt, E. (2008) "Distribution of Toxic Trace Elements in Soil/Sediment in post-Katrina New Orleans and the Louisiana Delta," *Environmental Pollution,* **156**, 994-450

Ronald Barrett

Position Title: Associate Professor, Department of Aerospace Engineering

Education/Training: University of Kansas, Aerospace Engineering, Ph.D. with honors, 1993

Work Experience: Associate Professor of Aerospace Engineering, 2005 – Present; Distinguished Visiting Professor, Delft University of Technology, 2003 – 2004

Selected Publications: Vos, R., DeBreuker, R., Barrett, R. and Tiso, P., "Morphing Wing Flight Control via Postbuckled Precompressed Piezoelectric Actuators," American Institute of Aeronautics and Astronautics (AIAA) Journal of Aircraft, special volume on Morphing Aircraft, paper no. 0021-8669, Vol. 44, No. 4 (1060-7068), July-August 2007; Vos, R., DeBreuker, R., Barrett, R. and Tiso, P., "Post-Buckled Precompressed Elements: A New Class of Control Actuators for Morphing Wing UAVs," Journal of Smart Materials and Structures, Vol. 16, No. 3, June 2007, pp. 919-926.

Stuart R. Bell

Position Title: Dean, School of Engineering

Education/Training: Texas A&M University, College Station, Texas, Mechanical Engineering, Ph.D., 1986

Work Experience: 2002-present, Dean of Engineering; 1986-2002 University of Alabama, Tuscaloosa, Alabama:Center for Advanced Vehicle Technologies, Director (1998-2002); 1981-1983 Mobil Research and Development Corporation, Dallas, Texas.

Achievements and Professional Activities: Chairman of the Combustion and Fuels Technical Committee of the ASME ASME-ICE Division, 1993-1996.

Selected Publications: Coppage, G. and Bell, S.R., (2001). Use of an Electrically-Heated Catalyst to Reduce Cold-Start Emissions in a Bi-Fuel Spark Ignited Engine. Journal of Engineering for Gas Turbines and Power, January 2001; Midkiff, K.C., Bell, S.R., Rathnam, S., and Bhargava, S., (2001). Fuel Compositional Effects on Emissions from a Spark Ignited Engine Operated on Simulated Biogases. Journal of Engineering for Gas Turbines and Power.

David Darwin

Position Title: Deane E. Ackers Distinguished Professor, Department of Civil, Environmental, and Architectural Engineering; Director, Structural Engineering and Materials Laboratory

Education/Training: University of Illinois at Urbana-Champaign, Civil Engineering, Ph.D., 1974; Licensed Professional Engineer, State of Kansas

Work Experience: Professor of Civil Engineering, 1982 – Present; Director of the Structural Engineering and Materials Laboratory, 1982 – Present

Professional Organizations and Public Service: American Concrete Institute: President, 2007-2008; Sustainability of Concrete, 2008-Present

Selected Publications: Darwin, D., Browning, J., O'Reilly, M., Xing, L., and Ji, J., "Critical Chloride Corrosion Threshold of Galvanized Reinforcing Bars," *ACI Materials Journal*, Vol. 106, No. 2, Mar.-Apr. 2009, pp. 176-183;

Darwin, D., Browning, J., Gong, L., and Hughes, S. R., "Effects of Deicers on Concrete Deterioration," *ACI Materials Journal*, Vol. 105, No. 6, Nov.-Dec. 2008, pp. 622-627;Nilson, A. H., Darwin, D., and Dolan, C. W., *Design of Concrete Structures*, 13th Ed., McGraw-Hill, New York, 2004, 779 pp.

Frank deNoyelles

Position Title: Professor, Ecology and Evolutionary Biology; Deputy Director Kansas Biological Survey

Education: Ph.D., Aquatic Ecology, Cornell University, Ithaca, NY, 1971

Experience: 1986 - present Deputy Director, Kansas Biological Survey, University of Kansas, Lawrence, KS.

Selected Publications (>80): Baker, D. and F. deNoyelles. 2008. "Can reservoir management reduce sediment deposition?" Pp. 57-70, in Sedimentation in Our Reservoirs: Causes and Solutions. Kansas State University, Manhattan.

Christopher D. Depcik

Position Title: Assistant Professor, Mechanical Engineering Department

Education/Training: University of Michigan, Ann Arbor, MI, Mechanical Engineering, Ph.D., 2003

Work Experience: Assistant Professor, Mechanical Engineering

Selected Publications: "A Sustainable Approach to Advanced Energy and Vehicular Technologies at the University of Kansas." C. Depcik, L. McKown and M. LeGresley. Submitted to 2009 ASME IMECE Congress & Exposition, 13-19 November 2009, Lake Buena Vista, FL (IMECE2009-10247); "Simulating the Concentration Equations and the Gas-Wall Interface for One-Dimensional Based Diesel Particulate Filter Models." Accepted by ASME Journal of Engineering for Gas Turbines and Power (2009).

Richard D. Hale

Position Title: Associate Professor, Department of Aerospace Engineering

Education/Training: Iowa State University, Ames, IA, Engineering Mechanics, Ph.D., 1995

Selected Publications: Anemaat, W., B. Kaushik, R.D. Hale and N. Ramabadran. "A Knowledge-Based Design Framework for Aircraft Conceptual and Preliminary Design." SAE Transactions, 2007, Vol 115, Part 1, pp 598-611;

Hale, R.D., Schueler, K.L. and Lim, K. "Object-Oriented Design and Analysis Tools for Fiber Steered Composites." Journal of Advanced Materials. SAMPE. (II), 2006; Schueler, K.L.; Miller, J.R. and Hale, R.D. Approximate Geometric Methods in Application to the Modeling of Fiber Placed Composite Structures. Journal of Computing and Information Science in Engineering. Volume 4, The American Society of Mechanical Engineers. 2004. pp 251-256.

Robert Honea

Position Title: Director, Transportation Research Institute, University of Kansas

Education/Training: University of Florida, Gainesville, FL, Geography/Land and Water Resources, Ph.D., 1975

Work Experience: 2006 - present Director, KU Transportation Research Institute; 1993 – 1997 Director, Oak Ridge National Laboratory Transportation Technology Center; 1988 - 1989 Head, Transportation and Systems Research Section, Energy Division, ORNL

Selected Publications: Weigh-in-Motion Technology for Military Operations: Developing a Portable, Safe, and Accurate System" National Academy of Sciences, Transportation Research Board, TR News, Number 231, March-April-2004; "U.S. Military Preparedness: Jammed in the Traffic?" National Academy of Sciences, Transportation Research Board, TR News, Number 211, November-December 2000.

Glen A. Marotz (PI)

Position Title: Associate Dean, Research, School of Engineering; Professor, Civil, Environmental and Architectural Engineering, 1983-present; Professor, Physics and Astronomy, 1984-present

Education: Ph.D. University of Illinois, Urbana, 1971

Honors and Awards: Miller Award for Research, School of Engineering, 2001-2002; Environmental Protection Agency, Bronze Medal for Research, 1993.

Selected Publications (> 100): Guerra, S.,C. Hohl, R.E. Carter, Jr., R. Baldauf, G. Marotz, and D.D. Lane, "Effects of Wind Direction on Trace Metals Concentration in Southeast Kansas," Proceedings of the Air & Waste Management Association (2005); Guerra, S., C. Hohl, R.E. Carter, Jr., D.D. Lane and G. Marotz, "Comparison Study of NOx Emissions from an Off-Road Diesel Compactor Running on Regular Diesel, Biodiesel and Ultra-Low Sulfur Diesel," Proceedings of the Air & Waste Management Association (2006).

Stanley T. Rolfe

Position Title: Albert P. Learned Professor, Department of Civil, Environmental and Architectural Engineering,

Education/Training: University of Illinois, Urbana, IL, B.S., Civil Engineering, 1956

Academic and Research Experience: A. P. Learned Professor, Civil & Environmental Engineering Department, 1998-present; U.S. Steel Applied Research Laboratory, Monroeville, Pennsylvania, Research Technologist, Senior

Honors: ASTM Fracture Mechanics Medal, 2002; Fellow, ASCE, 1985; Elected to Membership, National Academy of Engineering, 1982

Selected Publications: Rolfe, S., "Fracture Mechanics Testing for Structural Steels," Cement, Concrete, and Aggregates, CCAGDP, Vol. 19, No. 2, Dec. 1997, pp. 92-102; W. H. Munse and S. T. Rolfe, "Fatigue, Brittle Fracture, and Lamellar Tearing," Chapter in Structural Engineering Handbook, McGraw-Hill, 1997.

Paulette Spencer

Position Title: Ackers Distinguished Professor, Mechanical Engineering; Director, Bioengineering Research Center

Education/Training: University of Missouri – Kansas City, MO, Ph.D., Oral Biology and Physics (interdisciplinary Ph.D.), 1993; Rensselaer Polytechnic Institute, Troy, NY, M.S., Materials Engineering, 1988

Honors, Awards and Recognition: 1983, Fellow, American Academy of Dental Materials; 2003, Fellow, American Institute for Medical and Biological Engineering.

Selected Publications (>100): Ye Q, Park JG, Topp E, and Spencer P. Effect of Photo-Initiators on the In Vitro Performance of a Dentin Adhesive Exposed to Simulated Oral Environment. Dental Mater 25(4):452-458, 2009; Marangos O, Misra A, Spencer P, Bohaty B, and Katz JL. Physico-mechanical Properties Determination using Microscale Homotopic Measurement: Application to Sound and Caries Affected Primary Tooth Dentin. Acta Biomaterialia 5:1338-1348, 2009; Eslick JC, Ye Q, Park J, Topp EM, Spencer P, and Camarda KV. A Computational Molecular Design Framework for Crosslinked Polymer Networks. Computers & Chemical Engineering 33:954-963, 2009.

Susan M. Stagg-Williams

Position Title: Associate Professor, Department of Chemical and Petroleum Engineering

Education: University of Oklahoma, Norman, OK, Chemical Engineering. Ph.D., 1999

Work Experience: Ford Motor Company, Dearborn, MI (04/93 – 08/93; 04/94 – 08/94)

Honors/Awards: University of Kansas Miller Award for Research (2007); University of Kansas Center for Sustainability, Sustainability Leadership Award for KU Biodiesel Initiative (2007)

Selected Publications: S. Faraji, K.J. Nordheden, and S.M. Stagg-Williams, "The Interaction Between SrFeCo0.5Ox Ceramic Membranes and Pt/CeZrO2 During Syngas Production from Methane", Accepted to Catalysis Letters, 2009; David A. Slade, Andrew M. Duncan, Karen J. Nordheden, and Susan M. Stagg-Williams, "Mixed-conducting oxygen permeable ceramic membranes for the carbon dioxide reforming of methane", Green Chemistry, 9, 577 (2007); Yu-Chuan Lin, Keith L. Hohn, Susan M. Stagg-Williams, "Hydrogen generation from methanol oxidation on supported Cu and Pt catalysts: Effects of active phases and supports", Appl. Catal. A: General, 327, 164–172 (2007); Nicolas V. Jaumard, Robert C. Richards, Susan M. Stagg-Williams, and Elizabeth A. Friis, "Synthetic Lumbar Intervertebral Disc for Medical Education", Journal of Medical Devices,1, 212 (2007); Sean M. Murphy, David A. Slade, Karen J. Nordheden, and Susan M. Stagg-Williams, "Increasing Oxygen Flux through a Dense Oxygen Permeable Membrane by Photolithographic Patterning of Platinum", Journal of Membrane Science, 277,94 (2006).

Laurence R. Weatherley

Position Title: Spahr Professor and Chair of Chemical and Petroleum Engineering

Education/Training: University of Cambridge, PhD, Chemical Engineering, 1974

Experience: 2000-present Editor of *The Chemical Engineering Journal;* 2007-present Chair of the KU Energy Council

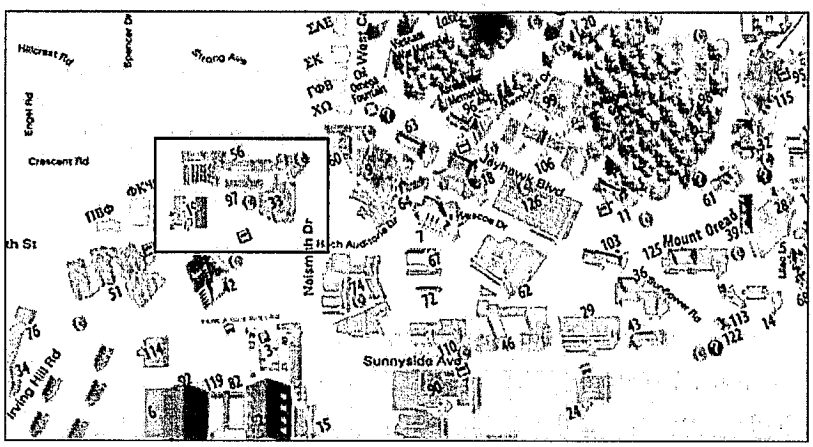
Selected Publications (>140): J. Petera, L.R.Weatherley, D. Rooney, K. Kaminski (2008) A finite element model of enzymatically catalyzed hydrolysis in an electrostatic spray reactor. Comput Chem Eng (2008), doi:10.1016/j.compchemeng.2008.07.006; L.R.Weatherley, S.M. Williams, I.Tabakh, J.Petera (2008) "Biodiesel Production: Novel Intensive Liquid-Liquid Reactors for Biodiesel" PATENT APPLICATION No. 16994.17; L. Weatherley, D.Rooney (2008) "Enzymatic Catalysis and Electrostatic Process Intensification for Processing of Natural Oils" The Chemical Engineering Journal, 135 (1-2), 25-32

II.A. Need for Federal Funding

II.A.1. Need for a New Building

The SoE has seven departments and programs, and offers the Master's and PhD in Electrical Engineering and Computer Science; Civil, Architectural and Environmental; Mechanical; Chemical and Petroleum; Aerospace; and Bioengineering and Bioinformatics. Our principal laboratory space (Learned Hall) dates from the 1950's, and was sized for much smaller student and faculty populations. Our graduate student enrollment alone has more than doubled in the last five years (PhD students are up ~3X). Total research expenditures have more than doubled. Most research programs have grown substantially, e.g., transportation-related awards have increased from a total of less than $1 mil in 2004 to over $19 mil in 2009.

Competing demands for space—any space--have reached a critical level, indeed, one that threatens to decrease productivity and limit opportunities in areas where the SOE has a leadership position nationally. Research activities are currently spread among two of the three buildings on the Engineering campus (Learned and Burt Halls), and are scattered throughout three other structures some distance (>0.5 to 2mi) from the main buildings.



CAMPUS MAP

Although interdisciplinary research is the norm among faculty and students, lack of proximal cooperatively-shared space means that much time is spent finding ways to communicate and discuss, rather than actually communicating and discussing. Furthermore, research teams are based upon the premise that everyone is equally versed in the principles of all of the sciences focused on a problem. But experienced interdisciplinary researchers recognize that the premise is usually false. Limited opportunities for informal discussion means that the best ideas are often overlooked or misunderstood by one or more of the team, requiring revisiting themes and basic concepts that lead to new avenues of investigation and problem solving.

The key is to place the multidisciplinary people in situations that encourage informal and frequent communication—within a lab environment or near a space specifically designed to encourage interaction, such as interwoven collaborative spaces. In modern collaborative scientific endeavors, successful ideas often spring from conversations or sketches that appear in a common space. M2SEC will permit exactly this type of winnowing and sifting given its design. Although M2SEC will be constructed on the Engineering quad, it will house Faculty and GS from units across the campus as projects require. KU has had recognized success with this approach in its Multidisciplinary Research Building on our West Campus; the structure houses many Faculty and GS from STEM in a building designed to encourage interaction among its many disciplines and personnel.

The proposed structure will be a cornerstone within an overall building plan that the SOE has developed with its research partners over the last five years, and it represents Phase I in that plan. Phases II and III (described below) will permit us to build

a research-based laboratory complex that will ultimately accommodate the many and varied projects that at this point have no space to begin or flourish.

II.A.2. Subsequent Phases

II.A.2.a. Vacated Space Usage and Phases II, III

Finally, and perhaps uniquely, the space freed (~7,800 NASF) will permit us to build incubator spaces for research results that have reached the advanced analysis/evaluation, or prototype stage. KU grants licenses to our research, and provide small company access to our laboratory equipment in return for user fees. SOE also develops partnerships with private industry as a way of making new technology available for public benefit. Our efforts in nanotechnology demand interdisciplinary collaboration that partnerships provide. The goal is to move new technologies from the laboratory to the commercial market place as rapidly as possible.

The Phase II building will be constructed in FY2014 or sooner if our fund-raising efforts are successful. We will add a low-speed wind tunnel for wind shear research, expand the composites laboratory substantially, and increase lab space for nano-scale research. Burt Hall will be razed to accommodate the building. Phase III will include upgrading of facilities in M2SEC where necessary, and we will build a new student projects building that will house advanced GS research projects.

Section III: Design Description of the Proposed Facility

III. A.1.a Project Site

The site selected for the facility is adjacent to the west end of Learned Hall, the main facility for the School of Engineering , a three-plus story facility originally constructed in 1963, with a series of additions thru 2004, now providing a total of 225,200 gross square feet (GSF) and 137,237 net square feet (nsf). In 2003 Eaton Hall was constructed to the east of the open lawn with a bridge connection to Learned, with a total project area of 84,735 gsf and 49,096 nsf. The proposed addition for M2SEC is for 34,690 gsf and 19,386 nsf.

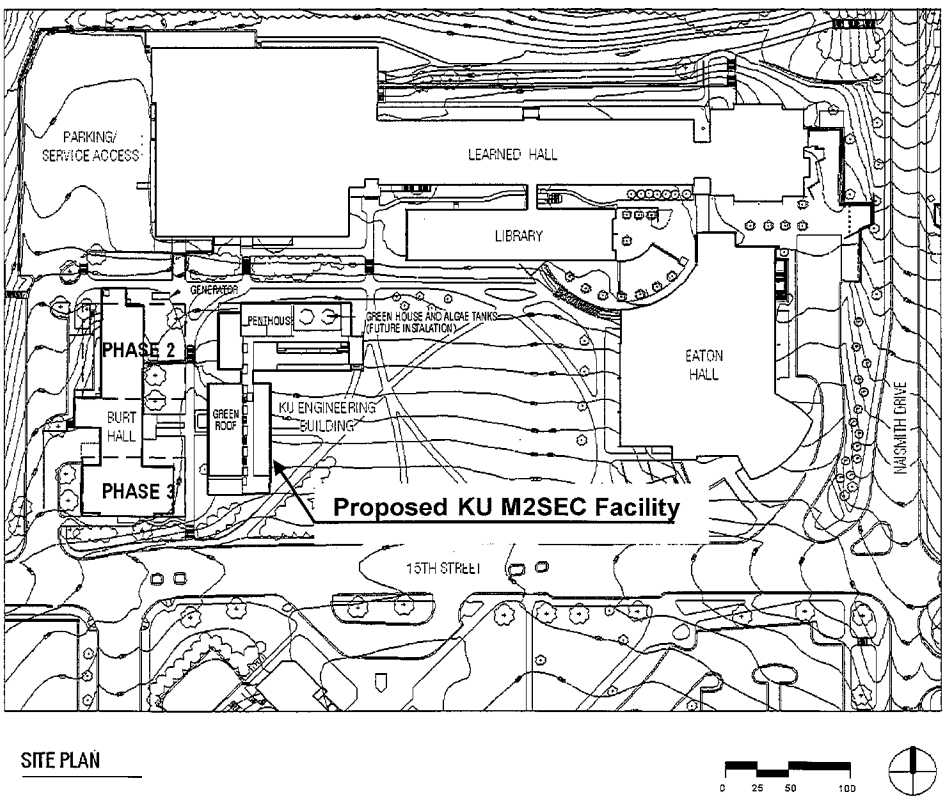


Figure 4: Proposed M2SEC Building Site with Proposed Future SOE Expansions

7-17

III. B.1.a Building Design Philosophy

In addition to supporting leading edge research in the engineering sciences which we will inventory in the following sections, the development of the building will address the global greenhouse gas emission issues throughout the process for design, construction, and operation. Negotiating a challenging eastern Kansas climate with extremes and wide ranges of temperature and weather, the research performed in the course of developing and operating the facility will provide options for further reductions and better overall energy use profile relative to current typical building performance in the Midwest.

In this part of the country for every unit of electrical energy saved, a larger corresponding unit of CO2 and NOx and related emissions is realized as compared to other areas of the country. According to the EPA Energy Star for Small Business report The EPA Region 7 Emissions Area (Kansas, Missouri, Nebraska and Iowa) has the second greatest ability to prevent CO2 of the 10 regions, preventing 2,000 lbs/year for every 1,000 kWh saved. That same region has the greatest potential to prevent NOx per 1,000 kWh saved estimated at 8.6 lbs lbs/year. A distinct goal of this project is to tailor the building development process, model the design, monitor the operation and then report relative to material and performance guidelines savings in energy consumed and estimated reduction in production of CO2, NOx and other detrimental impacts. Measuring a building relative to emissions, for a process intended for science involving leading edge sustainable technologies and involving energy and material scientists with backgrounds in various related components provides an ideal platform for concurrently assessing design and building performance.

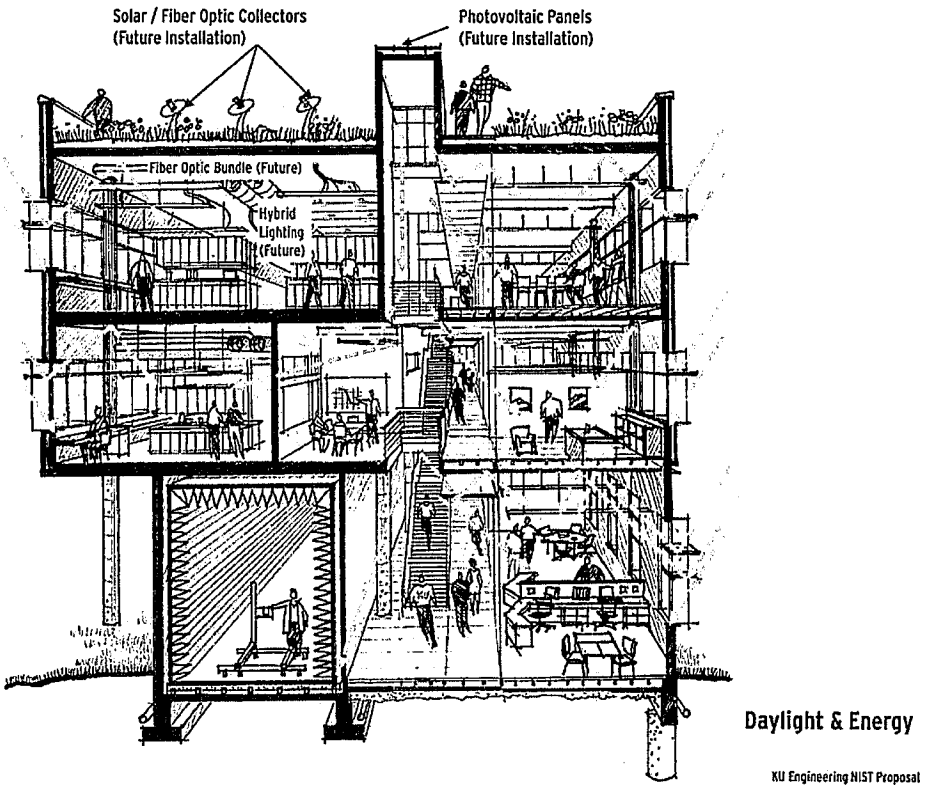


Figure 5: Building Design for Daylight: Light Shelves and Window Shading Devices

The intent of a combined effort of the design firm and SOE faculty expertise in building design and monitoring is to inventory the impact on two of the three biggest contributors to greenhouse gas emissions in our region -- energy use and embodied energy of materials. The third area is transportation where the research emphasis on new materials and the next generation of bio-fuels are both supported by unique leading-edge research supported in this proposal. Throughout this process the goal of this proposal is a better means of development, characterization and testing and standards for this building type.

To address energy use in the course of design of the project, decisions were based on the best combination for the climate of the building type, utilizing passive and natural systems like daylighting and operable windows. The building conditioning loads have been reduced by optimizing the glazing apertures, selecting appropriate glazing types, optimizing exterior wall thermal

resistance and use of external shading devices and green roof. Our next step will involve specifying efficient systems for water, HVAC and lighting. Those selections are further enhanced by automated controls, variable speed fan/ventilation technologies, and combinations of smaller tonnage and BTU equipment ganged for peak efficiency as the heating and cooling loads fluctuate based on the building use and external conditions . The building will incorporate photovoltaics in the initial build out for some very basic building ventilation. Provisions will be made for added systems, primarily hybrid solar lighting for building interiors, proposed upgrades as the technologies become more affordable. All of these strategies will be simulated during the design process through integrated assessment predicting energy use intensity, carbon footprint and life-cycle costs. And the process will involve design firms , Architectural Engineering faculty and graduate students who specialize in this type of assessment, other engineering disciplines occupying the facility, and the KU Design and Construction Management building design and construction professionals responsible for the development of the project.

Even at this stage of design we are proposing that the project use products with a known energy performance standard. For example, early material specifications include a 40% cementitious supplement material based concrete, reducing the embodied energy from the portland cement traditionally used in concrete. The project is also proposed to use the structural materials as finish materials, reducing product manufacturing and the associated embodied carbon that goes along with the manufacture and transportation of the finish materials. Another primary strategy for reducing the carbon impact of this building is the procurement of many local and regional materials within 500 miles of the project site. Incorporating the green roof and greenwalls into the facility allows for a carbon sequestration as well. Landscaping – provided from other funds -- will add to the tree canopy around this addition, helping to defeat heat island and extremes of microclimate. This is consistent with landscape development for the Lawrence campus known for a variety of plantings and one of the more notable campuses in the mid-west for its natural aesthetics and overall campus quality.

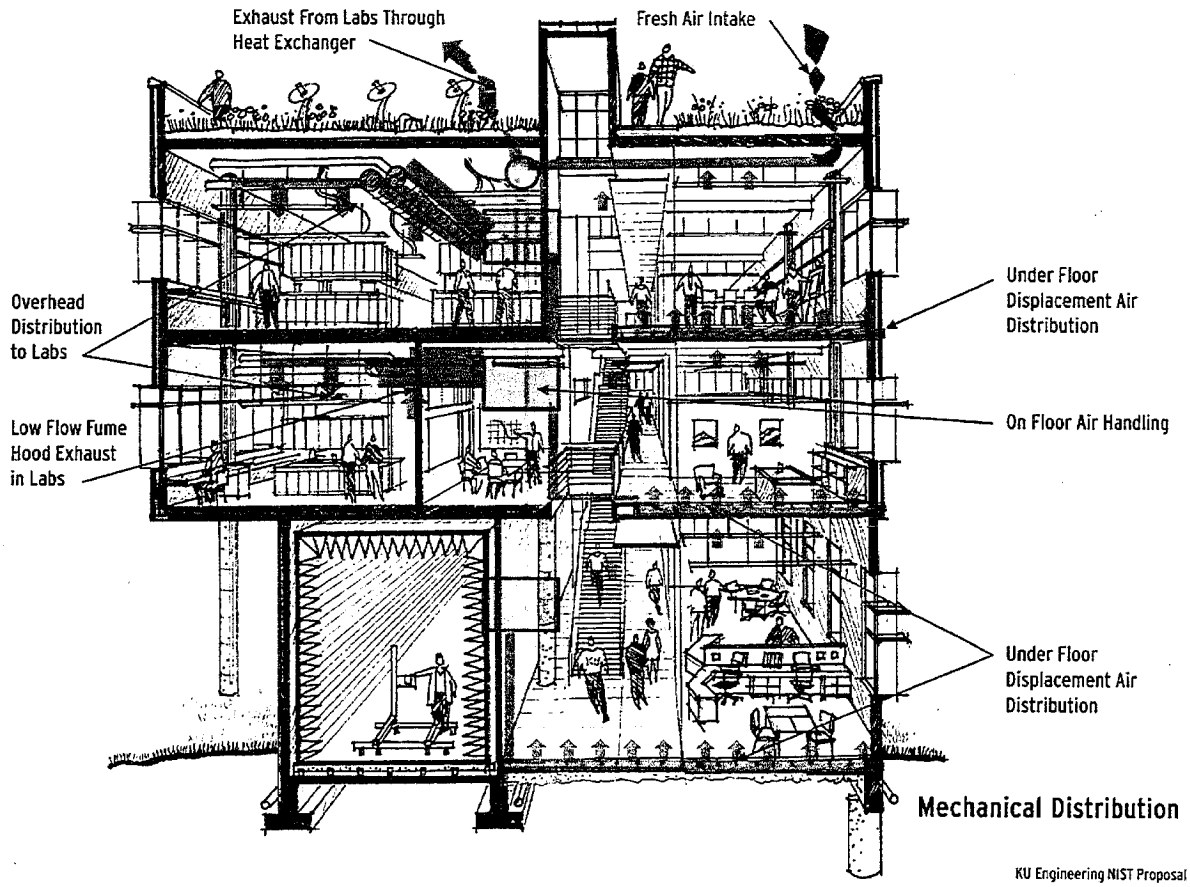


Figure 6: Controlled Laboratory Ventilation and Underfloor Ventilation for Office and Collaboration Spaces

The design, documentation and construction administration process can also be intensive from a carbon standpoint. An integrated project delivery method along with the use of Building Information Modeling technology by the architectural, engineering, construction and ownership team allow us to complete the project with fewer printed materials during design. During construction the project will use electronic submittals and have fewer physical material and product submittals, saving embodied material carbon and transportation based carbon. The building will be fully commissioned at the end of construction and have measurement and verification done during the first year to confirm building performance and the impact of integrating leading edge design for ventilation and the use of novel, project –ready components such as phase change materials.

The end goal is both a significant impact on energy consumed in a part of the country where relatively low cost energy is coupled with significant carbon emissions. In the design a combination of guidelines based on the USGBC LEED System, ASHRAE, and Labs 21 have been used. The building is designed to operate significantly better as compared to a code based building relative to energy and water use. It will be equipped with automated controls and sub-metered so that its performance can constantly be monitored on the operational side. Information generated will be evaluated relative to building performance research providing on-going monitoring of emissions, building systems and performance relative to NIST criteria for various components, areas of research that Dr. Mario Medina is pursuing across a range of integrated advance monitoring and the potential benefits of phase change materials.

III. C.1. Space Descriptions

III.C.1.a Energy Biofuels/Transportation

This component of M2SEC is intended to provide space which currently is non-existent in labs in Learned Hall or elsewhere on campus. It is space which will provide support for a working relationship difficult to support today but critical to collaboration between the research team working on various aspects of bio-mass, bio-fuel development and fuel characterization and testing. For a number of reasons, a multidisciplinary team is a necessary part of the development of the next generation of hydrocarbon fuels. And development of a lab on the 2nd Level west wing will put these researchers in proximity to offices for the Transportation Research Institute (TRI). TRI is effectively the outreach element for research and administration between faculty sponsored projects, partnerships with other academic research institutions and joint public/private ventures in this area of research, but widely diversified across areas of SOE faculty and other affiliated research projects.

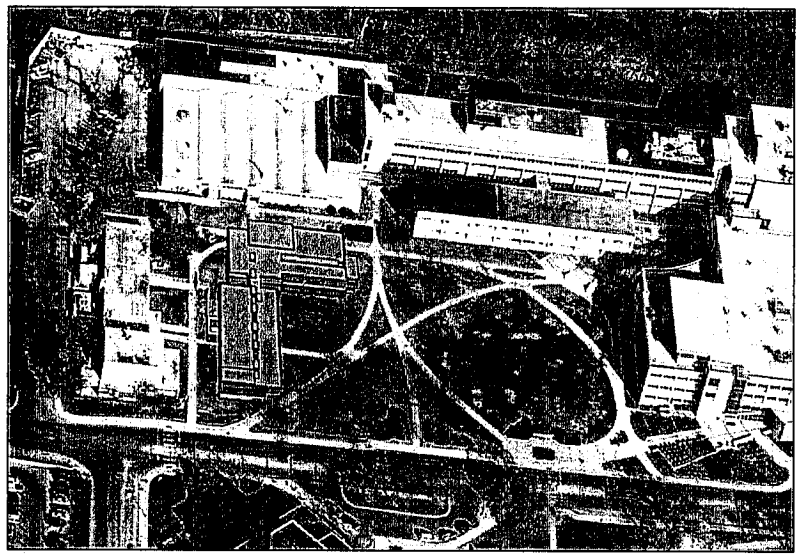


Figure 7: Proposed M2SEC Building Placement

Biofuels Research Pre-processing Multi-Use Lab Room 201, 687 nsf

This laboratory will focus on the science behind bio-mass production, biomass pre-processing and projects which have components related to small scale biofuels production including any number of visiting projects from research labs and faculty groups from elsewhere in the Learned, or other on or off-campus collaborators. The lab will be equipped with a 6' exhaust hood initially with HVAC capacity for a second hood or array of ventilated workstations. Chemical management will be provided with under hood storage, and lockable solvent and chemical storage cabinet. Center island bench shown is moveable with utility services delivered from overhead. ,Lab benches will be metal with chemical resistant epoxy tops The lab should be suitable for a group of 3-4 researchers with write-up space and is adjacent to an array of space associated with Bio-fuel testing and development for purposes of sharing analytical equipment and expertise.

Biofuels Production Lab Room 202, 1099 nsf

This production group will continue to tune the biology for increased production and ease of separation of lipids for use as fuels and other chemicals. This lab is intended for the core of biofuel production with researchers working on chemistry required to develop transformative technology for lipid extraction and conversion. The output of this lab is intended to be predominately "green" gasoline or diesel in larger quantities, up to 40 gallons, to be stored in flammable cabinets and within a single control

Table 3: Proposed Space Use, Net and Gross Square Feet

KU Engineering NIST Proposal - Space Table

First Level	Room Number	Lab Type	SF	Total Personnel
EMI/EMC Anechoic Chamber	101	Dry	560	
Reverberation Chamber #1	102	Dry	320	
Reverberation Chamber #2	103	Dry	192	
EMI/EMC Control and Support Room	104	Dry	620	
Server Room	110		387	
Surface Characterization Laboratory	111	Dry	416	
Collaborative Workspace	112		345	5
Building Monitoring Laboratory	113	Dry	157	
Subtotal ASF			2,997	
Unassignable SF (Circulation, Core Services, Wall Thickness)			5,029	
Subtotal - GSF			**8,026**	
Second Level				
Multi-Use Laboratory	201	Wet	687	
Biofuel Research & Production Laboratory	202	Wet	1,099	
Meeting Area	203		221	
ASTM Fuel Testing Laboratory	204	Wet	658	
Engine Testing Control Room	205	Dry	340	
Dynamometer	206	Dry	320	
Materials Characterization Laboratory	208	Dry	1,988	
Meeting Area	209		221	
Fracture & Fatigue Testing Laboratory	210	Dry	1,295	
Lounge	211		234	
TRI Office	212		195	1
TRI Reception	213		249	2
TRI Office	214		160	1
TRI Office	215		157	1
TRI Office	216		160	1
TRI Office	217		162	1
Subtotal ASF			8,146	
Unassignable SF (Circulation, Core Services, Wall Thickness)			5,186	
Subtotal - GSF			**13,332**	
Third Level				
Bio Engineering Laboratory	301	Wet	2,611	
Engine Testing Support Space	302	Dry	680	
Composite Materials Testing Laboratory	304	Dry	1,988	
Meeting Area	305		217	
Collaborative Workspace	306		1,371	36
Trans Disciplinary Laboratory	307	Dry	385	8
Collaborative Workspace	308		991	28
Subtotal ASF			8,243	
Unassignable SF (Circulation, Core Services, Wall Thickness)			5,089	
Subtotal - GSF			**13,332**	
Total GSF & Total Personnel			**34,690**	**84**

zone as defined by building code. The lab will include at least one 6' chemical exhaust hood, a number of ventilated enclosures for specific process equipment. Nearly all the bench shown is moveable with the exception of areas shown for sinks, fixed bench for storage of chemicals and where piped utilities will be delivered to the benchtop. Bench tops are chemical resistant epoxy. Interior finishes of the lab will be impervious, washable surfaces, floors will be epoxy finished concrete. This lab is sized for a research group of 6, adaptable for a number of different process steps.

Biofuels ASTM Testing/Fuel Characterization
Room 204, 658 nsf

This lab is intended for the equipment required for standardization of fuel testing including a full complements of ASTM caliber tests including but not limited to flash point, viscosity, total and free glycerin, density, cetane index, carbon residue, and sulfur and metals analysis of biodiesel and various blends. The lab will have areas for refrigerated sample storage, workspace for sample preparation, data analysis and recording. Funding for this full complement of equipment is available and the facility will be used to support KU biofuels research and the biofuels industry for the State of Kansas. Nearly all the bench shown is moveable with the exception of areas shown for sinks, fixed bench for storage of chemicals and where piped utilities will be delivered to the benchtop. Worksurfaces are chemical resistant epoxy. Interior finishes of the lab will be impervious, washable surfaces, floors will be epoxy finished concrete. This lab is sized for a full complement of equipment and core analytical capabilities, adaptable for a number of different process steps.

Biofuels Engine Performance Assessment
Room 205, 340 nsf; Room 206, 320 nsf; Room 302, 680 nsf

This engine test cell will provide space for engine mounts and dynomometer equipment and fuel storage suitable for testing engine performance and exhaust hydrocarbons and nitrogen oxides produced from various fuels. It is also essential to measure engine performance of any of the biofuels including assessment of in-cylinder combustion and model engine performance and tailpipe emissions. These rooms incorporate appropriate ventilation, heat-rejection, fire suppression oxygen testing , and acoustic isolation for the interior spaces. A small lab on the upper story (Rm 302) is intended for data management and emissions testing. The combination of the two story space is structurally isolated from the majority of the building by placement, with the intent to provide isolation/control joints to further limit the transmission of sound and vibration. A separate exterior fuel tank is provided, and at grade access from the building loading area is provided into an area for outfitting engines with appropriate monitoring equipment prior to being placed in the test cell. Space for expansion of a second engine test cell/dynamometer is also provided.

Transportation Research Institute (TRI) Interdisciplinary Program Offices Rm 212, 195 sqft; Rm 213, 249 sqft; Rm 214, 160 sqft; Rm 215, 157 sqft; Rm 216 160 sqft; Rm 217, 162 sqft

This area of office, reception and access to coffee/food/lounge is intended as research support space for a complement of individuals involved in M2SEC activities and others from the School of Engineering. A location on the second floor west wing was chosen as administrative support for project fully or partially funded by TRI. TRI supports more integrated approaches to a variety of disciplines including but not limited to those research activities presented in this proposal. TRI also provides outreach connecting academic research to private industry. This space is key for proposal development and a "front door" to a diverse and growing range of projects and services. Offices for 6 full time staff are included, a small reception and work area adjacent to a lounge intended for all building occupants, a crossing point for informal conversation and a required place for food outside of the labs.

III.C.1.b EMI/EMC Anechoic Chamber Support/Control Room Room 104, 620 nsf; Chamber installation area 2400 gsf

The recent award of funding for an Electromagnetic Interference/ Electromagnetic Characterization chamber (EMI/EMC) is primarily intended for assessing antenna performance and measurement characterization. But there is also a need for an acoustic anechoic chamber which will be developed as a dual use facility. The main chamber we propose is approximately 15' x 35' x 15' tall internal dimension electromagnetically shielded chamber suitable for antennae testing over a 10 meter internal. The area shown on the plans would be provided with appropriate noise dampening and isolation from building movement by placing the facility on a raised floor system mechanically dampened on 4 Hz springs to provide a floating slab installation over the entire area of the primary chamber and reverberation chambers. Unique condition for building footings and isolation of the floor slab are conceptually presented in the building section, Figure 10. The chambers will also be fitted with sound absorbing wedges for purposes of acoustic dampening.

The initial installation will include the EMI/EMC chamber and subsequent installation of the additional sound chambers is necessary in support of both radio frequency testing for current CRESIS research and expansion of vibration/resonance testing for a variety o f projects including those projects developing composite materials developed elsewhere in this facility. The chamber will have internal lights, ventilation, electromagnetically filtered power and access ports for RF/microwave and various equipment. Access will be provided though a large 7'x 7' door for the placement of larger sections of material and equipment testing. The west wall of the facility will be structured to allow for placement of large, heavy sections of both sound dampening and electromagnetic shielding by providing either late stage construction access for work on the vibration dampened floor for purposes of chamber installation or subsequent changes/additions to the anechoic chamber. Monitoring and operating equipment for the initial installation of the EMI/EMC along with the instrumentation, controllers and data recording equipment will be provided through the current award making this capability fully functional, but subject to critical deadlines for on-going research development.

III.C.1.c Imaging and Surface Characterization Room 113, 412 nsf

This room is intended as a stable, first floor at grade location for a range of microscopy and for installation of two additional pieces of imaging equipment, Micro CT and X-Ray Diffraction. It will be maintained as a clean, positive pressured filtered air space and shared use facility for a range of material and bioengineering research. Micro CT is intended for non-destructive imaging of a variety of materials from biology based materials such as bone samples to hybrid structural models. X-Ray Diffraction will provide the capability to image material structure and nano-scale internal geometries across a range of biological and material samples.

III.C.1. d Collaborative Workspace Room 114, 345 nsf

Remaining 1st floor rooms include a space intended as a mix of short duration project space and visiting researcher work areas, the furniture and data connectivity will be adaptable for different scales of projects. Seating and work areas for up to 6 researchers will be provided.

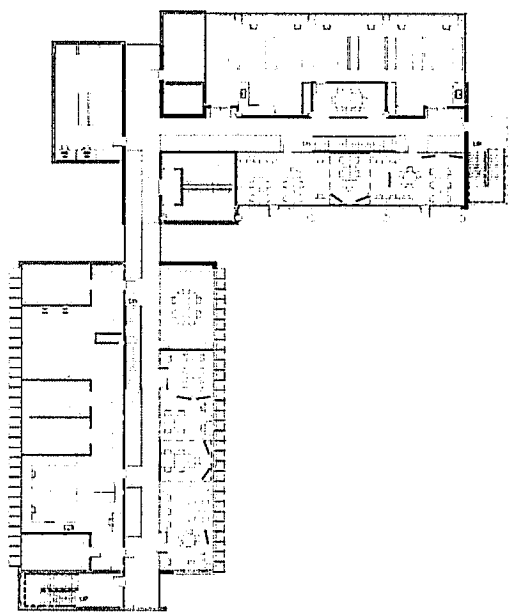


Figure 8: Typical Collaborative Areas for Structured and Informal Research Support

III.C.1. e Server Room Room 112, 387 nsf

Energy performance of servers and cooling for these rooms has become an area of focus for the University as it experiences growth of the range of processing required to support various aspects of academic and research computing. This generation of computer machine room will be provided over access flooring , with options for either in-rack cooling or overhead cooling. UPS will be provided and a building emergency generator will also be included in the project.

III.C.2. Bioengineering Science Lab Room 301, 2591 nsf

The large, flexible lab space is intended to accommodate a range of bioengineering research, process steps and analytical equipment. The range of activities and labs includes 2 cell culture labs, each with 2-5' biosafety cabinets, stacked water or air jacketed incubators w/ co2 cylinders, space for a small centrifuge and room for both freezer and refrigerator equipment. These labs will be provided with appropriate air changes of filtered air with the cell culture rooms slightly positive to the lab itself, but the overall lab negative pressure to the corridor. Lab casework will be metal or wood, labs tops will be chemical resistant epoxy, all interior surfaces will be impervious and washable. Flooring will be epoxy coated concrete.

A small space fitted with a 6' exhaust fume hood with under cabinet chemical storage will be shared for the purposes of providing for process buffers or chemical intensive sterilization. An adjacent lab support room will provide room for a small autoclave and separate glassware washer, additional areas for supplies and room for cryogen tank, refrigerator and additional upright freezers.

The two largest areas in the lab are intended for specialized equipment used for characterization of chemical or physical properties. An area for darkening curtain and window blinds for work involving flourescence imaging or other equipment requiring set-up and operation at lower light levels is provided in the north space. All the bench, with the exception of that providing utility service, water and drain, is intended to be moveable, (costs for that portion that is intended to be moveable were excluded from the project estimate). A sink is provided in each area and water polishing/purification is provided with a commercial wall mounted unit at two locations in the lab. The lab is outfitted with hot and cold water , one pass air with appropriate air changes, lab air pressure slightly negative to the corridor.

III.C.3. Fracture & Fatigue Testing, Material Characterization and Composite Materials

III.C.3.a Fracture & Fatigue Testing Room 210, 1295 nsf

This is a lab for testing metal fracture and fatigue specimens. Equipment will range from small scale fracture and fatigue testing to larger scale metallic testing equipment. Current equipment to be relocated is a 250 ton capacity closed-loop servo-hydraulic universal testing machine (4' x 6', 21,000 lbs) and pump (4'x 9', 7000 lb). All major equipment will be placed on separate footings/foundations in this area of the building which will be placed on re-engineered grade and isolated to prevent building vibration. This area is also purposefully separated from other activities in the building given the geometry of the building to help isolate any equipment induced movement in the structure. Relocation of this equipment from existing materials structural testing in Learned Hall alleviates long standing congestion and places an array of materials science, from nano to micro to macro testing, in close proximity.

III.C.3.b Materials Characterization Room 208, 1988 nsf

This space supports the comparative analysis and expertise required to determine technically appropriate ways to characterize, test and certify a wide range of evolving new materials and hybrid assemblies. It is purposefully placed across the hall from the more traditional Fracture & Fatigue testing, but will include an array of equipment intended primarily for testing nano to micro scale materials. Easily accessible from the traditional Civil Engineering test labs in Learned Hall the intent is to create a open area for new and novel analytical testing capabilities. It is also purposefully placed at grade with a major pedestrian route across the engineering complex in a location where a visual connection to the outside will help to showcase equipment associated with material testing.

While a large array of equipment is shown on the table associated with the building floor plans, this space represents an area where existing equipment can be aggregated, alleviating overcrowding of projects, people and equipment in Learned Hall. Equally important is that this will be a place where new equipment acquisitions can be used to build state-of-the-art capabilities, in an accessible, visible location. One 5' exhaust hood is provided for testing involving acid or other caustic chemicals. Isolation from building vibration will be important. Access to high speed research computing will also be provided here and throughout the building.

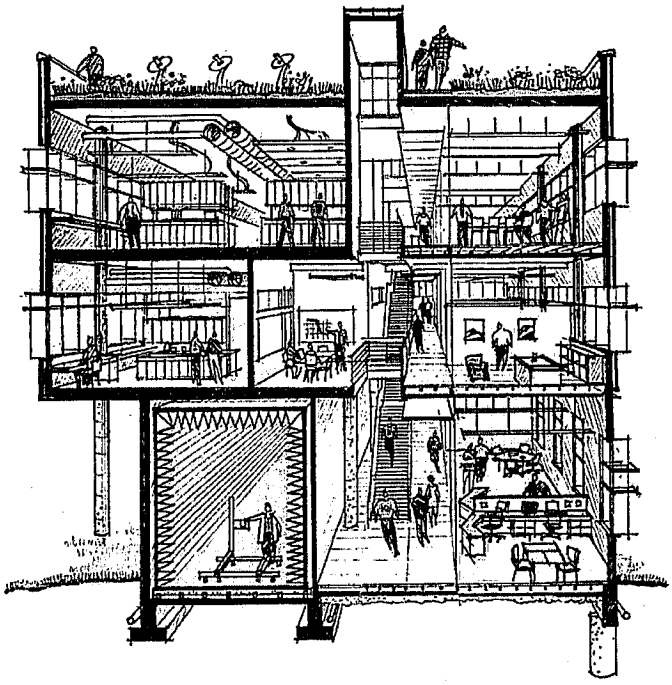


Figure 9: Building Section and Floor-to-Floor Circulation

III.C.3.c Composite Materials Design Studio and Fabrication Lab Room 306, 1064 nsf; Room 304, 1963 nsf

Composites development requires a multi-stage process of design and fabrication of forms and molds, areas to fabricate materials, create laminates, and the clean up of molded components and testing of these components. Today, nearly all these process steps occur in the same space off of heavily traveled public corridor in Learned Hall with minimal ventilation, dust or fume control. This space shown in Room 304, includes refrigerated material storage, a 10'-12' curing oven, required ventilation and sonic testing table effectively doubling the area available today for this type of project development. Equally important, this area will allow a wider variety of projects to move through the existing space in Learned and this accompanying space in the M2SEC facility. This production space would be outfitted with moveable work tables, appropriately ventilated work areas and access to ventilation "snorkels" for process steps that require localized exhaust/fume control. Basic equipment for quality control including microscopy would be in this space, more sophisticated instrumentation one level below accessible from a service elevator.

The room across the hall, the **Collaborative Project Workspace** (Room 306, 1064 nsf) is a project design studio where process steps from design concept and computer aided design thru composites fabrication will be developed. It is intended to support 4-5 or more project groups looking at composites technology across a broad range of applications. These include current projects in UAV, additional components in aerospace and vehicle design, wind turbine blade development, composites in building technologies and a expanding program s in hybrid infrastructure systems primarily focused on rehabilitation of bridges and infrastructure. This is a precursor to a second phase of expansion of the M2SEC facility which will focus on a range of research projects. In this generation it provides space simply not available in Learned Hall, but critical to building expertise linking academic research, standards and technology, to emerging application of composites many with the potential for industrial partnerships.

III.C.4. Additional Sustainable Features

The following is a list of green design and sustainable features, appropriate for the climate and intended to provide higher performance for the KU M2SEC facility:

Rooftop Daylight Monitors Designed to capture natural day and direct it downward through the central core, on a typical day these will provide lighting for the central corridor , the stairwells, and the adjacent labs and offices

Planted Green Roof Systems Intended to both help to abate storm water runoff and provide for a thermal barrier between roof structure and outside, this will be an opportunity for various groups including Ecology and Evolutionary Biology to participate in plant selection and monitor overall performance of a green roof system.

Bio Green Wall System Intended as both a thermal performance system to help negate summer sun on mostly unprotected systems, this is also an opportunity to make an obvious investment in "green", and for the SOE to participate in more naturalized systems which will be monitored relative to affect on thermal performance on those areas of the exterior where the bio-green wall will be used.

Rain Screen Enclosure This is an exterior wall system that helps to both dissipate heat and provide a thermal break between outside exposure and building structure. It is also a building system where performance will be measured across the extremes of hot and could in eastern Kansas.

Exterior Sun Shading Devices A framework of metal shading devices will be used to both abate direct sun and reflect daylight indirectly into labs, offices and collaborative spaces. Performance will be dictated by exterior exposure, seasonal characterisitics of daylight and design details.

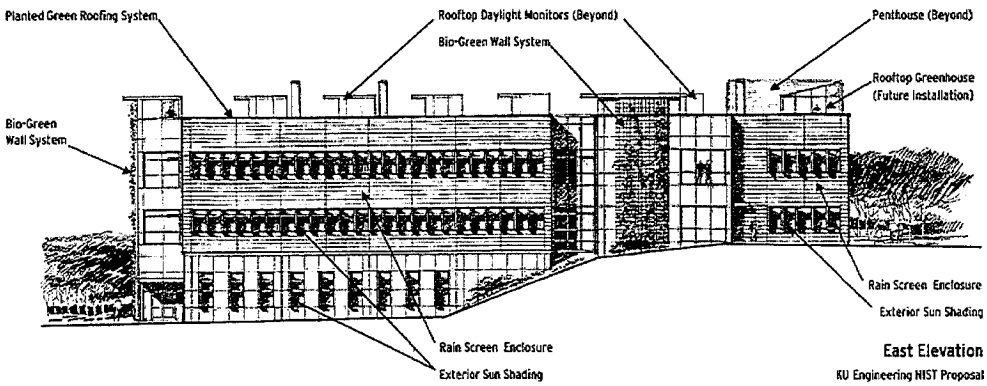
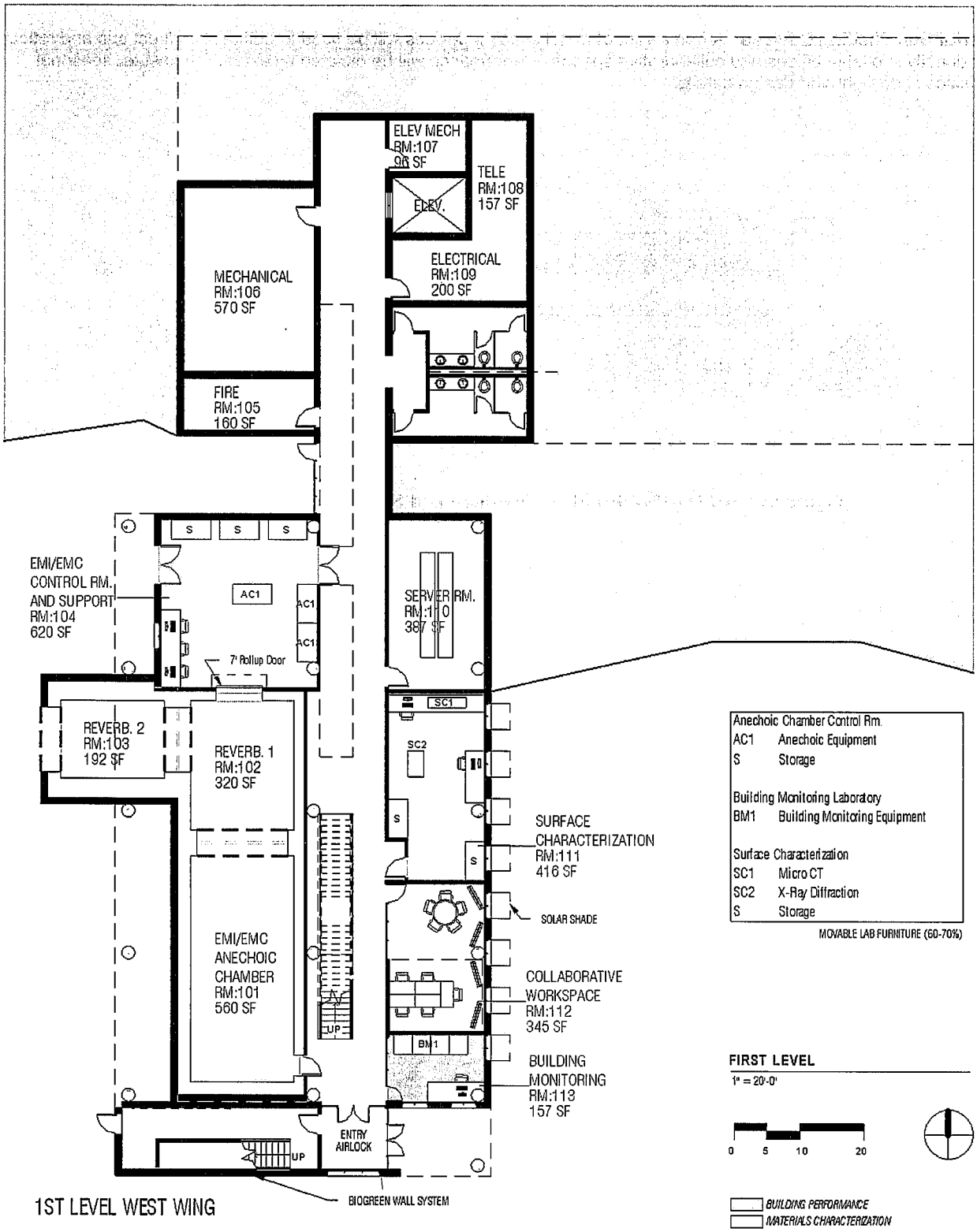


Figure 10: KU M2SEC Building Elevation and Sustainable Features



1ST LEVEL WEST WING

KU Engineering NIST Proposal 8-7-2009

Figure 11: KU M2SEC Proposed 1st Floor Plan

7-26

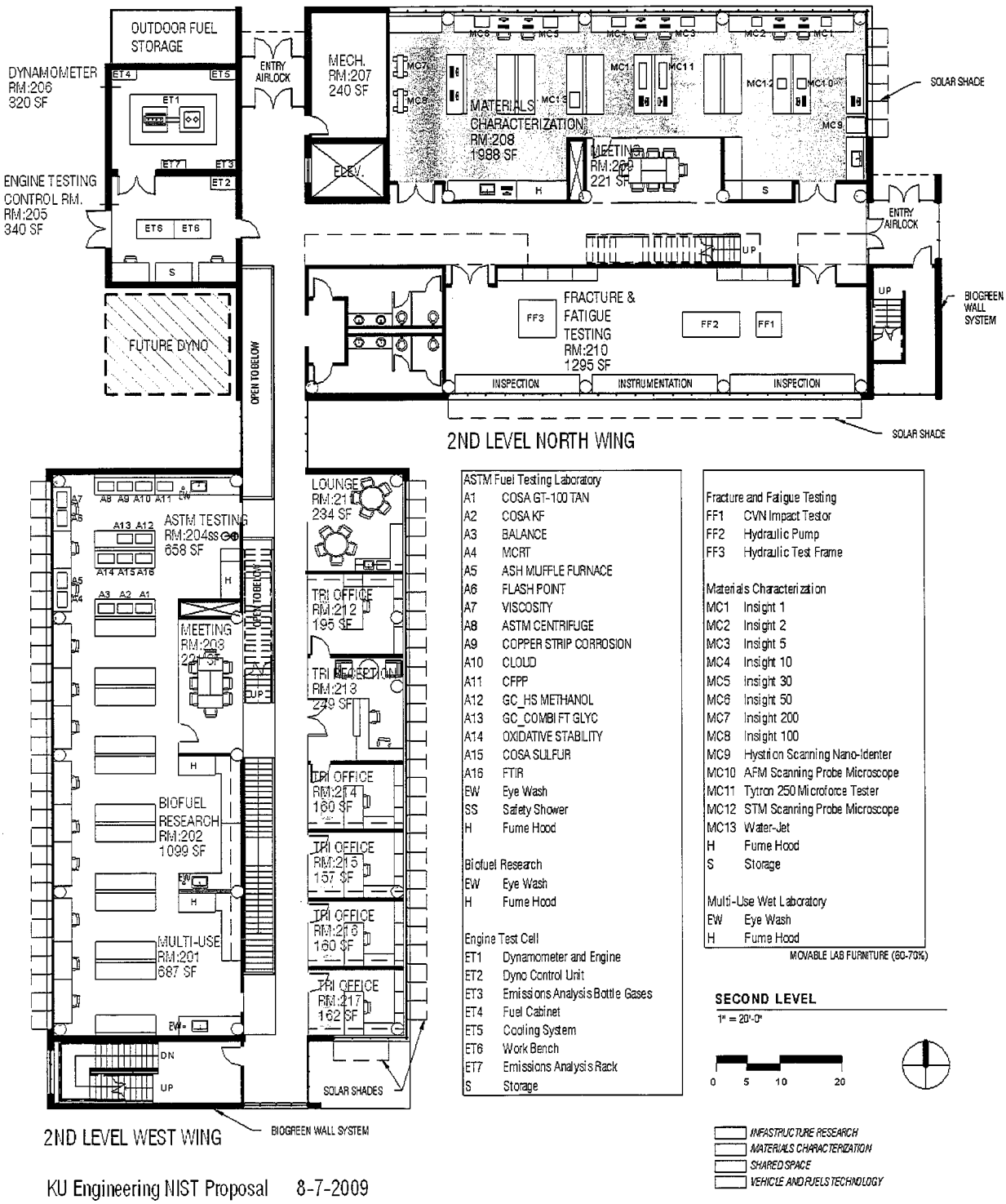


Figure 12: KU M2SEC Proposed 2nd Floor Plan

7-27

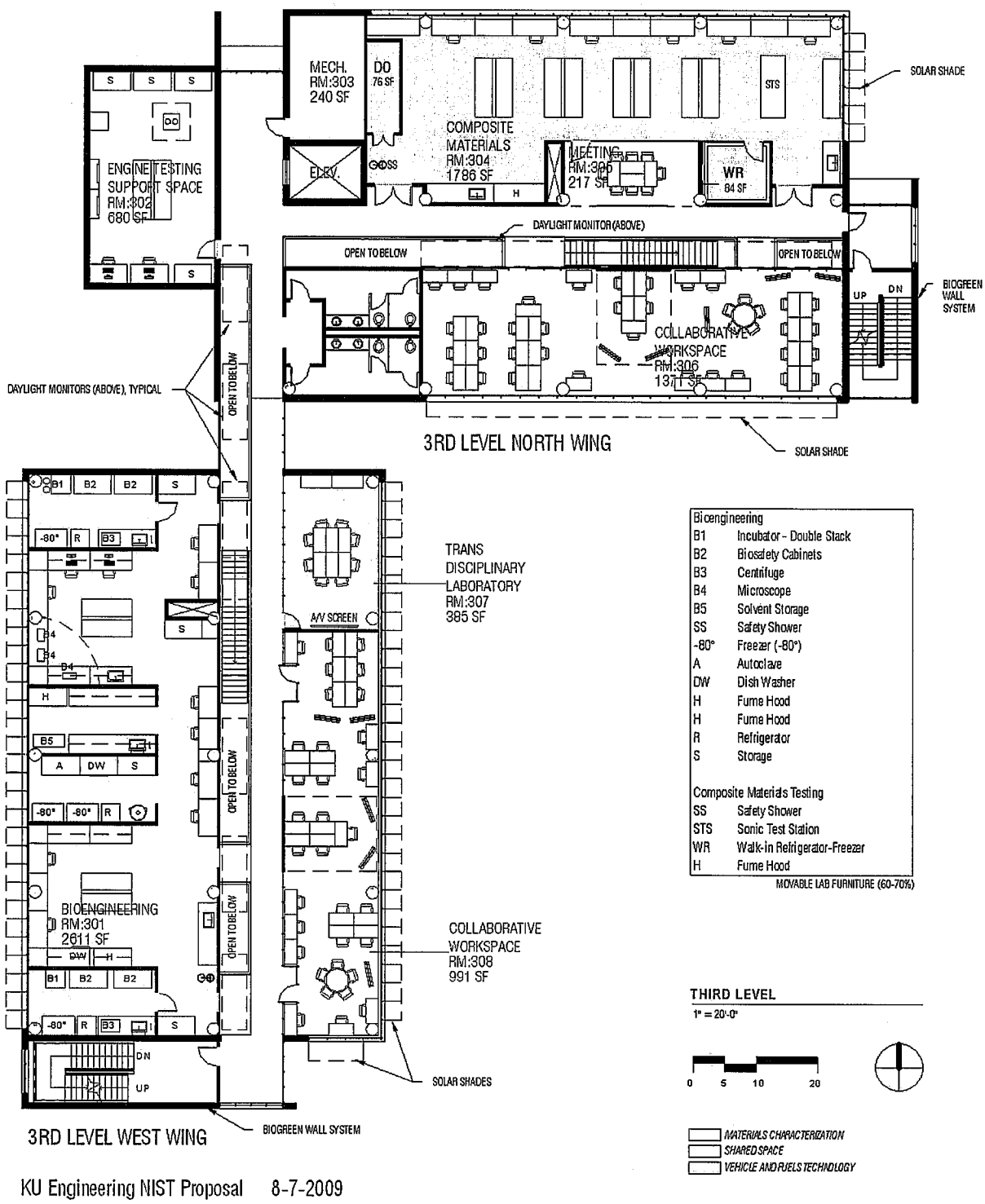


Figure 13: KU M2SEC Proposed 3rd Floor Plan

7-28

Section IV: Project Management Plan

IV.A. Project Scope and Requirements:

The proposed facility encompasses nearly 35,000 GSF on three levels, with a net assignable area of 19,386 NSF. This facility is strategically located on the west boundary of the School of Engineering complex, just south of an existing Learned Hall wing that will be renovated in a future phase to create additional research and academic shop/lab spaces. It is located just east of Burt Hall, an existing structure which is slated for demolition, where future phases of this building will be built to expand research programs that will benefit from these core facilities.

The breakdown of the design/construction work, key tasks/milestones and the timeline for each are shown in Figure I4, Work Breakdown/Project Schedule, attached at the end of this section. Key elements are described below in more detail. Both the project budget and the project schedule were completed by professional construction management with McCown/Gordon based on details project take-offs, plans and outline building specifications. The overall process from notice of award to project completion and occupancy is estimated to take 26 months total. By compressing and overlapping the phases, six to eight months and over $500,000 of inflationary costs are saved.

IV.A.1. Program Approval and A-E / CM Selection - 4 months; $150,000 est. commitment

Immediately following notification of award, professional staff within the KU Design and Construction Management (DCM) office will complete a formal architectural program and submit it to the Kansas Board of Regents (KBOR). KBOR must approve all KU capital projects, before they can proceed. The selection of A-E consultants and construction manager will then begin, using a recently adopted process wherein KU now controls and manages those competitive qualifications-based selections. Prior to 2009, all projects had to go through state agencies outside of KU, and projects using public funding required legislative approvals that typically occur only during the first quarter of each calendar year. KU can now initiate projects immediately following KBOR approval, saving up to 9 months of development time.

IV.A.2 Design / Construction Documents - 7 months (1 month overlap of CM selection); $1.5M est. commitment

A Building Committee will be named by the Provost prior to the start of design, with representatives from each user and support group. This committee will advise and guide the A-E team, who will be responsible for developing the project's design and construction documents. DCM will assign an architect or engineer to serve as KU's Project Manager (PM), from project inception to completion, to function as liaison / facilitator to the client user group and the A-E / CM teams. Formal submittals will be required by the A-E at the end of the SD and DD phases, and at the 50% and 95% construction documents stages. Work sessions will be scheduled to review each component of the project's design at each submittal milestone -- architectural, engineering/operations and maintenance, IT/AV, site/landscape and sustainable/energy-conserving features -- with applicable expert members of the Owner team and Building Committee.

Surveys and soil borings/geotech reports will be authorized early in the design process, once the building footprint and scope of site modifications have been confirmed. As soon as the basic building floor plans have been finalized, typically near the end of the DD phase, DCM will work with the A-E to create the code footprint that must be submitted to and approved by the Kansas Division of Facilities Management (DFM) before any construction work can commence. DCM understands that it is especially important to submit and resolve this as soon as possible on fast-track projects like this, since the process for approvals has averaged two months or more. This has the potential to delay the project, so it will get special attention from DCM and the project team.

The City of Lawrence and KU have a Joint Cooperation Agreement which defines a Compatibility Buffer Zone that extends 150' inward from the perimeter of the University's land. This project falls within that compatibility buffer zone and as such, will need to complete studies on the anticipated impact that the project will have on traffic, noise, lighting and stormwater runoff in the area. KU does not anticipate that these will find any objectionable issues of concern. The project is screened from view of the surrounding residential neighbors, who are on a hill located well above the site, by existing University buildings and dense trees. Existing vehicular and pedestrian traffic paths will be maintained without interruption, and the site is well served by existing parking and transit locations. Based on KU's Eaton Hall experience, we anticipate that a similar underground stormwater retention facility will be required and have budgeted accordingly. Completion of these studies will be prioritized and completed as soon as possible in the design phase.

IV.A.3 Construction - 16 months (4.5 month overlap of design phases); $17.5M est. commitment

The construction phase will overlap and begin towards the end of the DD phase. Onsite construction will begin as soon as a permit to build as been issued by DFM. The first package of work to be bid will consist of site prep, sitework and site utilities, which are scheduled to be released in mid-December 2010. Bids will be received and awarded in January 2011, with onsite

construction starting in early February 2011. Subsequent bid packages will be released for the structural frame and foundations, the building exterior and the building interior. If required to ensure the schedule is met, additional bid packages may be added for long-lead-time items such as M/E equipment and elevators. Estimated cash flow requirements during construction can be summarized by calendar year quarter as follows:

2011: Q1 = $650K; Q2 = $1.15M; Q3 = $1.9M; Q4 = $2.6M; and during 2012: Q1 = 4.5M; Q2 = $4.9M; Q3 = $1.8M.

During the latter stages of construction, several activities will occur concurrently. Major pieces of fixed equipment will be delivered and installed, as spaces become ready to receive them. Commissioning work will begin as M/E systems near completion. Separately-funded work for required items that are not eligible for grant funding will begin. These will include the installation of audio-video/teleconferencing systems, furnishings and landscaping work.

IV.A.4 Commissioning, Move-In & Closeout - 3 months (1 month overlap of constr.); $800,000 est. commitment

An independent third-party consultant will be retained to provide commissioning services for this project. Although the project schedule shows those services primarily occurring during the closeout stages of the work, the commissioning agent will actually be retained soon after the A-E and CM teams are selected. The commissioning firm will provide their services at key intervals throughout the design and construction phases, beginning with the early stages of design, when the basis of design will be defined and established. At other milestone submittal and review dates, the commissioning agent will assist with those reviews, advising Owner, A-E and CM alike on issues that will improve the project's design, operation, efficiency and constructability.

Furnishings and loose equipment will be delivered and installed concurrent with or immediately following the completion of the contract work. Research equipment won't be installed until conditions are acceptable, which will often mean a fully-completed space with minimal punchlist work remaining to be done. Throughout the construction phase efforts will be taken to recycle waste materials as much as possible, but especially during this stage when large quantities of cardboard packing materials can be recycled by KU's Sustainability Office.

Final inspections will be conducted in coordination with DFM's field inspectors, with the assistance and guidance of KU Fire Marshal Bob Rombach, who's extensive experience and knowledge of code-related issues is invaluable in expediting these inspections and quickly resolving DFM issues of concern. Following receipt of a Certificate of Occupancy from DFM and upon the issuing of formal Substantial Completion certificates, KU faculty and staff will officially occupy the new facility, and the Contractors' one year warranty period will commence. During the 11th month of the warranty period, DCM's project manager will schedule a re-inspection of the facility with the A-E, CM, FO and building occupant personnel to generate a list of any outstanding warranty items that remain unresolved, or had previously been undetected.

IV.B. Proposed Project Schedule and Budget:

Refer to the attached Project Budget for a current summary of the proposed costs and funding. The following text was included in the NIST Grant proposal. The NIST grant application also included a number of forms related to budget reporting. Copies will be provided to the project team upon request.

Refer to Form 424C - Budget Information for a summary of the estimated costs. Refer to attached Form NIST-1101 - Budget Narrative for a detailed breakdown of those costs. Refer to Form NIST-1101A - Details on Unallowable Project Costs for an itemization of those costs. Estimated costs for each primary category of the work breakdown are noted in the preceding section, with more detail included for the cash flow projections during the construction phase.

IV.C. Capability to Manage the Project:

The KU Design and Construction Management (DCM) office is responsible for managing the design and construction of all capital improvement projects for the University. DCM has a professional staff of 24 architects, engineers and support personnel, most of whom are licensed in their areas of expertise. DCM currently manages approximately $150M of active projects in various stages of development on behalf of the University, and is developing architectural programs and feasibility studies for another $320M+ of proposed projects.

Capital projects are managed by the Consultant Services Group within DCM. Steve Scannell is the Assistant Director responsible for supervising, training and supporting that group. Mr. Scannell has 31 years of experience in private practice and at the university, and will be responsible for overseeing the management of this project. He previously served as KU's project manager for the $15M Eaton Hall project for the School of Engineering, and currently serves as KU's PM on the new $45M School of Pharmacy project. He is active in the American Institute of Architects, has served as President of AIA Kansas and is a

CSI Certified Construction Specifier. Mr. Scannell has personally managed the programming, design and construction of projects worth in excess of $300M total.

A team of DCM staff is assigned to manage each capital project. An architect or engineer serves as Project Manager from project inception to occupancy, providing continuity and coordinated oversight throughout the design and construction process. Other A-E's within the DCM office will be assigned to serve as architectural, engineering, landscape, code and planning support team members, as needed. The DCM Project Manager (PM) serves as liaison to the Building Committee and to the A-E and construction teams, and will involve DCM and other KU support personnel at appropriate stages of the project's development to review and guide the details of the project's design and construction.

KU uses a holistic team approach to managing capital projects. University support units will be active participants in the design and construction phases, guiding those elements that will affect them or which are in their area of expertise. Units that support DCM include Facilities Operations (FO), Information Technology (IT), Environment Health and Safety (EHS), Parking, Public Safety and the KU Office of Sustainability. Each of these units has contributed to the KU Design and Construction Standards and User Guides, which are posted on DCM's website and which guide A-E and user alike.

For expedited projects like this, DCM will establish recurring project meetings during the design phase, typically at two-week intervals, to review ongoing design details and issues. As the project moves into construction, those meetings will continue in order to monitor the construction progress and to quickly address any pending issues or proposed changes. Key personnel will attend all meetings and others will be invited to specific meetings as needed to address issues. The DCM PM will manage the discussions and decisions throughout the process, seeking to identify a consensus opinion, but when one is lacking, will make decisions and provide direction to the team as needed on behalf of the University, consulting with senior administrators when appropriate to ensure the University's interests are being properly met.

At the completion of the Design Development (DD) phase, a 'design freeze' is instituted, so the A-E team can proceed into construction documents with reasonable assurance that no major changes will be proposed by the University's user group or support team after that time. A thorough review of the project's scope, design and budget are conducted at the end of the DD phase, to verify that all team members are in agreement with the proposed design and that they understand that the design and project scope will be 'frozen' following that review. If requests are made for scope changes after this stage, the DCM PM will first confirm with the Building Committee / Departmental Chair that they are truly needed and will confirm if the project budget and schedule can accommodate them. If not, additional funds will need to be provided or the change will be deferred until funds are available or until after the original project scope is completed.

The DCM PM will be responsible for maintaining a continuously updated project budget, in a standard DCM format, which illustrates how the available project funds are being distributed and to confirm that the project is at all times staying within budget. Project budgets are updated at the completion of each stage of design and as each contract is awarded or amended, to verify that funds are available to cover all known or anticipated expenditures. The DCM PM will also be responsible for continually updating the project data in a University database managed by DCM, which is used by all campus support units to track and plan for upcoming milestones in the project's development.

Bob Rombach serves as the University Fire Marshal/Code Compliance Coordinator. He is an architect in the DCM office, who provides support to all projects on code issues. He has over 30 years of experience in the private and public sectors, and serves as a volunteer fireman and emergency responder for his township. He has extensive experience / knowledge of code issues, and will guide the project team as they develop the design and the code footprint, which summarizes the project's code issues for submission to the Kansas Division of Facilities Management (DFM).

DFM is the state agency responsible for conducting code reviews, issuing approvals to proceed with construction and for conducting all code-required inspections. Mr. Rombach tracks all code-related submittals in DCM's database to ensure a timely response by DFM and the A-E consultants, and he will guide the A-E and CM team through the detailed inspections with DFM on all life-safety systems, to ensure a Certificate of Occupancy is delivered without delaying project occupancy.

IV.D. Financial Commitments to Implement the Plan:

The University of Kansas (KU), the KU Center for Research (KUCR) and the KU School of Engineering (SOE) are fully committed to the $6.5 million funding proposed as KU's share of the project costs. The University's funds will come from gift funds that the School of Engineering currently has deposited at the KU Endowment Association (KUEA). A total of $9.3M of private gift and research funding will be committed by the University and SOE towards grant-ineligible costs, such as furnishings, audio-video / teleconferencing systems and landscaping. A letter of commitment for KU's share of the grant-eligible costs is included. KUCR is the entity responsible for submitting all proposals for external support of research, instructional and service projects. KU Endowment is the official fundraising foundation for the University of Kansas, and currently manages assets worth more than $1.5 billion. During a time of decreased government support, KU Endowment has provided a vital margin of

excellence to KU. From 2003-08, it provided $571.6 million in support for students, faculty, programs, research and capital projects. More than two-thirds of the buildings at KU were funded or furnished through private support from KUEA.

The KU School of Engineering is one of the University's largest academic and research units, with an enrollment of more than 1,400 undergraduates and 800 graduate students, who are served by 103 faculty and 71 staff in eight departments / programs. SOE has an extensive base of highly accomplished alumni, who have generously supported the School and made possible most of the School's recent facility improvements. Eaton Hall, an 84,000 SF academic and administrative facility, was completed in 2003 at a cost of $15 million, all from private gifts, and sixteen lab spaces were renovated over the last four years at a cost of $4.6 million, of which 80% was private funding.

*** End of NIST Grant's Technical Proposal Information ***

Site Improvements & Infrastructure

Site Improvements

- Parking: Existing parking areas and service drives shall remain. No new parking is proposed, but A-E shall verify that an appropriate numbers of handicapped stalls are provided within the closest adjacent lot(s), with an ADA-compliant ramp or walk / accessible path from each stall to accessible entrance(s).
  - Entrances: Power-assist operators shall be provided on all accessible exterior entrance doors.
- Trash and Service Drives: Provide new trash dumpster locations and service drives / service access as required. Dumpsters and service areas shall be screened from public view.
- Exterior areas shall be landscaped and configured to create inviting, usable spaces.
- KU-standard bike racks, benches, trash and ash receptacles shall be provided as part of the project.
- New sidewalks shall be provided which maintain or appropriately redirect pedestrian traffic flows around and adjacent to the new building, and to transit stops and crosswalks.
- The KU Landscape Master Plan shall be respected and reinforced in determining the building footprint location, including proposed masterplan locations for future building expansion options.
- The lawn directly south of Spahr Library shall remain as green space, both to comply with the Campus Master Plans, and to provide a suitable location for expanded underground stormwater retention.

Utilities & Infrastructure

- New mechanical and electrical systems shall replace existing outdated or inadequate systems that may need to serve this new building. Extensions of utility services shall be included as part of this work, as required to serve this new building.
  - Existing mechanical / electrical equipment serving un-disturbed portions of the Learned Hall complex shall be maintained in service at all times, except for short-term shutdowns.
- All utility or M/E system shutdowns or outages shall be planned well in advance, in collaboration with FO personnel, and others who may be affected.
- The main campus West Primary Switchgear, located just west of Burt Hall, shall remain in-place indefinitely. Any extensions from it shall account for the future demolition of Burt Hall, and the future proposed building expansion locations identified during the masterplanning concept design, so they won't require future relocation.
- A future central chilled water plant is proposed as part of the future Learned Hall expansion. It is anticipated that it will be located south or west of this building, and that a new utility tunnel will need to be accommodated as part of the masterplanning for future expansion projects, with appropriate accommodations made for both within this project.

Hazardous Materials

The KU Environmental Health & Safety Office will test materials in the existing buildings and utility tunnels that may be affected by the new project's work, to determine if any of them are asbestos-containing and require abatement. It is anticipated that tests will most likely be required at connections to existing utility lines.

KU's policy is to remove all hazardous materials when encountered during the renovation of existing buildings. If required, this work will be separately-contracted by the University.

Code Requirements

Codes currently used on KU projects include the following:

- International Building Codes, 2006 edition.
- Kansas Fire Prevention Code, KSFMO, current edition.
- Other codes as listed at the State of Kansas, Division of Facilities Management (DFM) website: http://www.da.ks.gov/fp/
- Code Footprint templates of the existing buildings shall be prepared by DCM as needed and furnished to the architect on DCM's standard 11x17 code footprint sheets.
- The architect shall update these template drawings to reflect all proposed work and shall submit them for approval to DFM through the KU Fire Marshal, immediately following the Schematic Design phase.
    - If changes made later in design require resubmittal of the code footprint, the A-E shall make those change and resubmit it via the KU Fire Marshal as early as possible in the design process.
- Electronic files of the approved code drawings shall be forwarded to DCM in both .PDF and .DWG formats.

Construction Exiting: Temporary fire-rated exit corridors shall be provided through the construction site, if required to protect and direct occupants from all required exits in the surrounding occupied existing buildings to a public way. They shall remain in-place at all times while construction work is underway.

- Existing exits and exit pathways cannot be blocked or removed, even temporarily, without alternative exit paths being provided that are approved by the authorities with jurisdiction.

The building shall have a new fire sprinkler system throughout.

Fire alarm systems shall comply with current code and KU requirements for an intelligent addressable system.

Historic Preservation Reviews

The proposed new construction is not located within 500 feet of any properties listed on either the State or National Registers of Historic Places.

Specifically, the proposed construction footprint is outside of the 500' notification limits of the Chi Omega Sorority, which is a listed property. It is also located in a non-impact zone as identified in the environs definition that was mutually developed and approved by the Campus Historic Preservation Board (CHPB) and the Lawrence Historic Resources Commission (LHRC) for the Chi Omega Sorority property.

KU / City of Lawrence Agreement

This project does fall within 150' of the perimeter of the University's property, and will be required to comply with the provisions of the KU / City of Lawrence Cooperation Agreement. The project team will be required to assist the University, with compliance with those provisions, including but not limited to:

- reviewing the proposed design with the Neighborhood Advisory Committee
- preparing impact studies on the following:
    - traffic
    - noise
    - night lighting
    - stormwater
- KU will provide samples of previous impact studies to use as a guideline for preparing these studies.

Design Standards & Consultant Services

- The consultant team shall comply with the latest provisions of The University of Kansas Design and Construction Standards, as maintained by the Office of Design and Construction Management (DCM).
  - These standards are available online at the DCM website: http://www.dcm.ku.edu/standards/design/
  - The consultant team shall also comply with supplemental updates to these standards which may be issued during the course of the project.
- The University's Project Representative shall be a DCM staff person assigned to serve as Project Manager, who shall serve as the primary point of contact for all communications between Owner, A-E and Contractor.
- Special Consultants that will be required on the A-E team, in addition to the usual A/E disciplines:
  - Acoustical Engineer (to evaluate and advise on sound isolation provisions from M/E rooms and equipment)
  - Telecommunications System Engineer (must be pre-approved by the KU-IT department)
  - Sustainabilty Design (if expertise is not already present within the A-E firm)
- Electronic Files: Consultants shall deliver to KU complete sets of electronic files for the drawings and manuals / specifications for each design review submittal, for the bid sets and for the as-built sets.
  - Each set of electronic files shall include both PDF and AutoCAD .dwg files for each drawing sheet.
- Models, if produced by the consultant to explain the design, shall be delivered to and remain at KU, whether in physical built form or 3D CAD form.
- Master Planning: As part of the basic services for this project, the A-E team shall provide master planning services to evaluate options and determine how the addition of approximately 100,000 GSF of future building growth in the Burt Hall / west lawn area can be accommodated and coordinated with the final design of this project.
  - The master plan shall be developed to at least a concept design level, and shall show how each ultimate floor plate would be developed in coordination with this building. It shall include enough detail that KU will understand how each addition will comply with code, provide circulation throughout and between floors, and demonstrate an understanding and fit for the general types of spaces (classrooms of various sizes, offices, labs, support spaces) proposed as part of the expansion.
  - It will include consideration for construction of a new central chilled water plant and extension of the existing utility tunnel from the south lawn junction to Eaton and Green Halls, to the new chilled water plant and M2SEC, on into Learned Hall.
  - KU is developing a separate program for that proposed expansion, and may retain a separate consultant to evaluate those options, which this consultant will cooperate and assist.
- LEED Certification: Subject to approval from KU Administration, it is proposed that the M2SEC shall be designed and built in accordance with LEED standards, and that it shall be submitted for LEED certification. The A-E and CM shall design and build the project to an agreed-upon level of LEED certification (LEED Silver at a minimum), and shall provide the necessary reporting to GBCI to validate this project for successful certification. KU shall pay the project registration and review fees.

Annual Maintenance & Operating Costs

Funding for annual maintenance and operating costs will come from University general funds. No state funding will be required to cover any of these costs. The University and the KU Endowment Association will endeavor to raise private funding to establish a maintenance fund for this new space. Ultimately, the University will be responsible for maintaining the building.

Estimated annual operating costs are based on historic data collected by KU-FO for Learned Hall and Eaton Hall, which through 2009 was averaging $2.55/GSF/year. The estimated annual utility costs for this building are 34,690 GSF x $2.55/GSF = $88,500 per year.

Housekeeping and maintenance personnel costs are based on the campus average through 2009 of $1.38/GSF/year. The estimated housekeeping and maintenance costs for this building are 100,000 GSF x $1.38/GSF = $47,900 per year.

Space Standards & Utilization Analysis

This project will add new space to the University's space inventory. This new space is required to accommodate new and expanded research programs and related support space. Approximately 7,800 SF of existing space will be vacated in Learned Hall by programs moving into this new building. Approximately 4,000 SF will be renovated for use by emerging SOE research groups and test facilities, and the remainder shall be renovated for lab space.

Construction / Project Delivery Method

The University proposes to utilize a "Construction Management At-Risk" process for this project.

The University believes that a CM At-Risk method is the most appropriate, and required, delivery method for this project due to its many difficult phasing and staging complexities. This approach should result in many cost and time savings to the State of Kansas, including the following reasons.

- This project has been scheduled as a multiple bid package, fast-track process in order to qualify as 'shovel-ready' in order to meet the needs of the Recovery Act and of the University's programs.
- In order to meet this aggressive schedule, construction activities must start as soon as possible.
- The existing site allows very little staging area for the Contractor adjacent to the construction site and site access issues will be difficult. These are complicated by heavy pedestrian traffic on walks that surround the project site, and by heavy vehicular traffic along 15th Street, including several main bus routes.
- Existing parking lots are over-taxed and must remain usable to university faculty, staff and support units.
- Contractor input is needed to verify non-standard processes which may be needed for trash removal, material deliveries / storage and to coordinate with other construction projects within Learned Hall that may be sharing the west service drive.
- Construction noise can not be allowed to disrupt the ongoing academic activities in the adjacent buildings. Burt Hall will require particular attention, since it will remain occupied during construction of this project, and will be immediately adjacent to it, until it is demolished at a future date to be determined.
- The code-required egress paths from the adjacent buildings must be maintained in use at all times during the construction of this project, and will require special attention and planning.

Project Budget - Matls., Meas. & Sust. Environ. Center (M2SEC)

Project No.: KU #228-8977 * DFM #A-xxxxxx	**Target Funding Date: Jan. 2010**
Date Budget Revised: January 14, 2010	**Target Bid Date: May-Oct. 2010**
Current Phase: Architectural Program	**Target Completion Date: Dec. 15, 2011**

***** DRAFT ***** PROPOSED BUDGET

Estimated Construction Costs - General Contract			
Building Construction Costs (Program = 34,690 GSF @ $406/SF)	*14,094,000*		
Lab Equipment	*463,000*		
Site Development & Site Utilities	*1,317,000*		
Landscaping & Wayfinding Signage	*140,000*		
Campus Data Network Extension/Upgrades	*355,000*		
Subtotal - General Contract:			**$16,369,000**

Estimated Construction Costs - Separate Contracts			
Telecomms. (KU-IT voice & data service / provisioning)	*150,000*		
HazMat Abatement (EHS &/or Contractor abatement work)	*20,000*	*(2)*	
Subtotal - Separate Contracts:			**$170,000**

TOTAL ESTIMATED CONSTRUCTION COST - ALL CONTRACTS	***$16,539,000***

Miscellaneous Costs			
A-E & Special Consultant / Impact Study Fees	*1,910,000*		
DFM & KU Fees & Support Costs	*238,000*		
Printing/Shipping & Travel/Research	*59,000*		
Survey, Soil Borings & Testing	*145,000*		
Commissioning	*275,000*		
AV Equipment & Furnishings	*620,000*		
Research Equipment	-	*(3)*	
Server Room Equipment	-	*(3)*	
FO Maint. Equip. (typ. $20K plus $.40/GSF)	*35,000*	*(2)*	
Moving Expenses	*25,000*	*(2)*	
Infrastructure Fee (3% of total construction cost)	*491,000*	*(2)*	
Maintenance Fund (private funds; amount TBD)	-	*(2)*	
Bidding & Constr. Contingency (% of total project costs)	*1,263,000*	*5.8%*	
Subtotal - Miscellaneous Costs:			**$5,061,000**

TOTAL ESTIMATED PROJECT COSTS	***$21,600,000***
SURPLUS OR DEFICIT AMOUNT REQUIRED TO BALANCE COSTS & FUNDING	*$0*

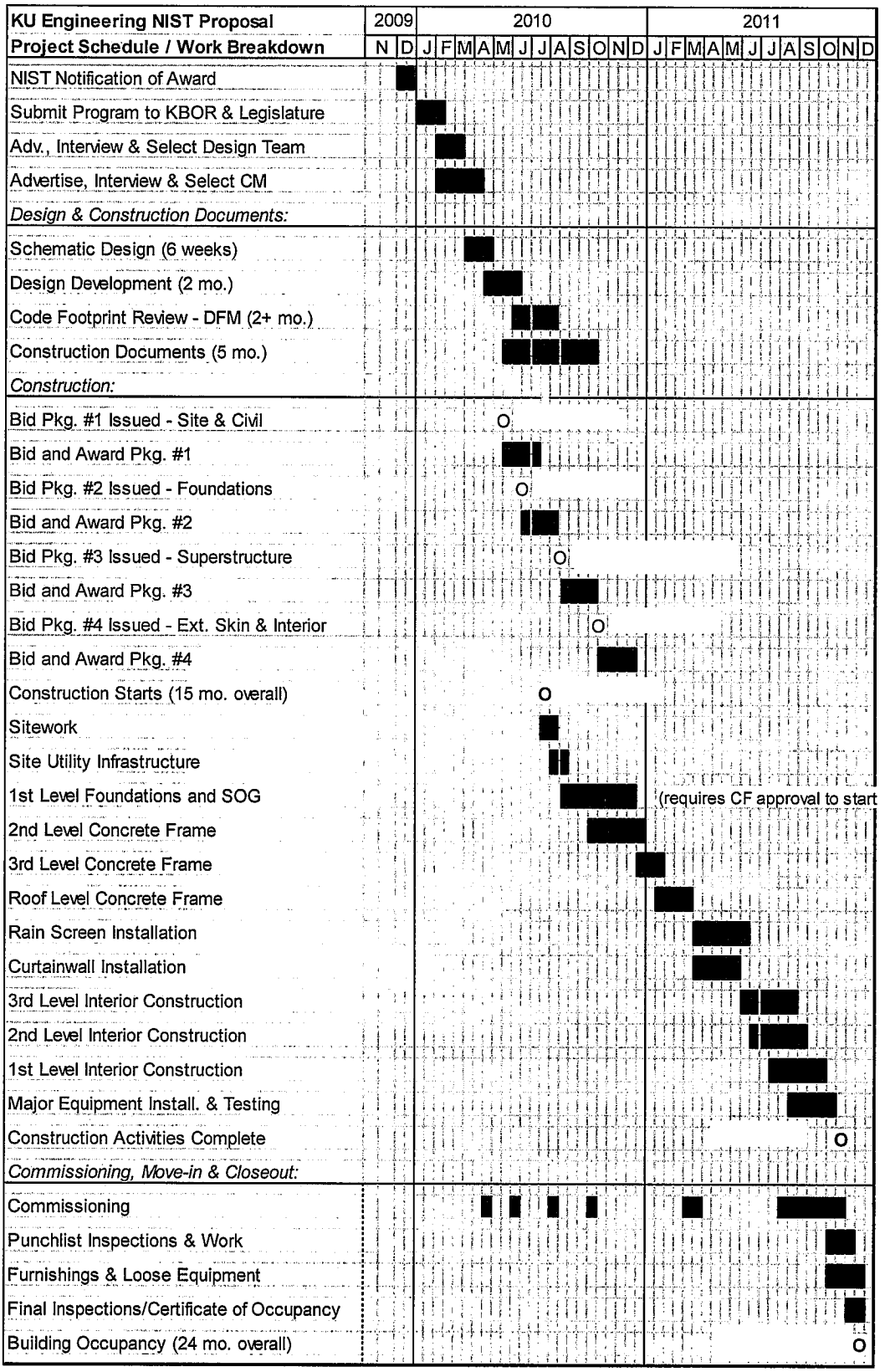
Project Funding			
Federal Funding (NIST grant awarded Jan. 8, 2010)	12,275,527	*(1)*	
Non-State Funding (Endowment/KUCR funds)	9,324,473		
Total Funding Available:			***$21,600,000***

Notes:

1) All costs and federal funding amounts, except as noted, were taken from the NST-1101 and NIST-1101A forms submitted on Nov. 20, 2009 in reply to NIST questions, but amounts have been rounded to the nearest thousand.

2) These costs were added to the NST grant costs; they are KU-required or recommended items that were not eligible for NIST consideration and which need to be privately funded.

3) Research and server room equipment will be funded separately by other grants or other funding sources.


KU Engineering NIST Proposal
Project Schedule / Work Breakdown
2009
2010
2011
N D J F M A M J J A S O N D J F M A M J J A S O N D
NIST Notification of Award
Submit Program to KBOR & Legislature
Adv., Interview & Select Design Team
Advertise, Interview & Select CM
Design & Construction Documents:
Schematic Design (6 weeks)
Design Development (2 mo.)
Code Footprint Review - DFM (2+ mo.)
Construction Documents (5 mo.)
Construction:
Bid Pkg. #1 Issued - Site & Civil
Bid and Award Pkg. #1
Bid Pkg. #2 Issued - Foundations
Bid and Award Pkg. #2
Bid Pkg. #3 Issued - Superstructure
Bid and Award Pkg. #3
Bid Pkg. #4 Issued - Ext. Skin & Interior
Bid and Award Pkg. #4
Construction Starts (15 mo. overall)
Sitework
Site Utility Infrastructure
1st Level Foundations and SOG
(requires CF approval to start
2nd Level Concrete Frame
3rd Level Concrete Frame
Roof Level Concrete Frame
Rain Screen Installation
Curtainwall Installation
3rd Level Interior Construction
2nd Level Interior Construction
1st Level Interior Construction
Major Equipment Install. & Testing
Construction Activities Complete
Commissioning, Move-in & Closeout:
Commissioning
Punchlist Inspections & Work
Furnishings & Loose Equipment
Final Inspections/Certificate of Occupancy
Building Occupancy (24 mo. overall)

7-38

Architectural Program

Nichols NIH Grant – Bioinformatics Computing Facility Core Renovation and Improvement

KU Project No. 135-8841

Date: April 28, 2010

Prepared by:

The University of Kansas, Lawrence Campus
KU Center for Research and Graduate Studies
Office of Design & Construction Management

Joint Committee on
State Building Construction
May 28, 2010
Attachment 8

Table of Contents

Programming Committee

KU Center for Research and Graduate Studies:

Rick McMullen, Joe Evans, Joe Heppert, Luke Huan, Michael Hulet, Dan Depardo, Jerry Lushington

KU-DCM: Tom Waechter, Russ Trimble, Steve Scannell

Schwerdt Design Group: Greg Allen

Brack & Associates Engineers: Adam Johnson, Les Brack

Introduction

In September 2009, the KU Center for Research (KUCR) submitted a grant proposal on behalf of University and the KU Medical Center to the National Institutes of Health (NIH) in response to a Federal Funding Opportunity which was offered as part of the American Recovery and Reinvestment Act (ARRA) of 2009 economic stimulus program. In April 2010, the project team responded to a series of questions from NIH regarding scope and budget for the Bioinformatics Computing Facility Core (KU BCF) which resulted in a modification and re-submittal of a portion of the grant application information and a reduction in scope from the original $6,850,000 grant request.

Currently, NIH has indicated its likely intent to award to KU a $4,657,860 federal grant to fund the development of this project, but as of the date of this program, had not formally committed to an award or an award amount. Should this grant award happen this project will be completed as an award of an NIH grant to the KU Center for Research (KUCR) and administered through KUCR processes related to consultant selection and competitive bids for construction.

The proposal for the Bioinformatics Computing Facility Core University requested funding to renovate and expand 3,646 gross square feet (gsf) in Nichols Hall designated as the Bioinformatics Computing Facility core (BCF). The renovated space will support computationally intensive multidisciplinary and integrative research projects in the life sciences. This includes projects across many departments of the University and at the KU Medical Center including two dozen NIH projects, two NCRR COBRE grants, a NIGMS Chemical Methodologies and Library Development (CMLD) project, a MLI Specialized Chemistry Center. In addition this project will accommodate computing requirements for ten core service laboratories that provide analytical instrumentation and technical services such as molecular interrogation, high throughput screening, microscopy, and biomolecular sequencing to the University's biological and biomedical sciences researchers. The proposed computational commons will be a sustainable, energy efficient data center for hosting existing and future assets dedicated to biological and biomedical computing.

Computing in the biological and biomedical research is driven by three factors:

- huge and growing amounts of data from instruments such as biomolecular sequencers, mass spectrometry, X-ray crystallorgaphy and high throughput screening systems;
- simulation aimed at understanding the fundamental processes of life at many scales through the development and integration of models of ever greater complexity;
- and a flood of new questions arising from the availability of data from instruments whose answers depend on computation.

These factors, along with a rapidly expanding computing and storage hardware base that has outgrown the existing facility makes meeting current and future demands of an active life sciences computing community difficult, if not impossible. We have seen a large increase in the number of biological and biomedical science projects that require high performance computing and storage for data in the hundreds of terabytes to petabyte range. And computing environments for this level of performance require specialized machine room spaces and supporting electrical, cooling and environmental controls.

The proposed renovation will provide capacity needed to host the computing and storage resources to handle these new challenges in biomedical research through an expanded biomedical computing commons. The project will renovate 3,646 gsf, including 1,232 gsf on the first floor of Nichols Hall as the primary machine room for the existing BCF, now housed on the second floor in 400 gsf and additional 2,414 gsf as support space This renovated space will support a computing capacity twenty fold greater than currently available in a highly sustainable and energy efficient manner. The proposed renovations will also improve network connectivity between this facility and the rest of the campus, making the facility more accessible to users within and outside the university.

This architectural program is based primarily upon the information presented to NIH in the grant application's technical proposal and revised submittals that were requested by NIH in response to their followup questions. The information taken from the grant application has been further supplemented with other program information and requirements unique to the University of Kansas. The original ARRA submittal was prepared by the KU Center for Research, Department of Research and Graduate Studies and the Office of Design and Construction Management (DCM) with assistance from consultants Schwerdt Design Group (architects) and Brack and Associates (engineers).

The concept design embodied in the grant application and in this program document represents the University's intent and establishes the general scope and goals of the project. Further development, refinements and changes to the proposed design shall be made in consultation with the NIH National Center for Research Resources (NIH-NCRR) federal program officer. The University team, the selected A-E consultant and general contractor will be required to comply with the directions and requirements of the NIH grant award agreement which is forthcoming. The terms and conditions of this Federal Funding Opportunity will govern the delivery of this project, including the provisions of the Buy American Act and the Davis Bacon Act. Much of the reporting that will be required by the University will also require the cooperation and assistance of the A-E consultant and the Contractor.

Project Description

Specific Aims

The University of Kansas (KU) has experienced steady growth in biomedical, pharmaceutical and behavioral science research program awards that rely on High Performance Computing (HPC) resources. KU has recently received major awards with implications for important national and international biological research programs. While the KU administration has made significant efforts to continue its investments in biomedical research excellence, available campus infrastructural budgets have not kept pace with the costs of the improvements necessary to address the emerging computational needs of these research initiatives. In order to provide the basis for addressing current research goals and maintaining an upward trajectory, KU research and administrative personnel are developing a cohesive campus-wide plan to dramatically improve data center energy efficiency, upgrade supporting infrastructure, and expand computational resources to meet present and future needs in computation and data management at the University of Kansas.

As a key feature of this effort, funding was requested to renovate and expand the existing Bioinformatics Computing Facility (BCF) core, that is maintained and managed by the Information and Telecommunication Technology Center (ITTC) located in Nichols Hall. Specifically, funding was requested for the following infrastructural objectives:

- To address a shortage of available dedicated computational support space, we will renovate 3646 gsf of HPC machine space and support space to augment the existing BCF
- To enable effective infrastructural support for our current computational resources and near-future growth in a manner that is compatible with national mandates in energy conservation, we will upgrade the energy efficiency, capacity, and sustainability of BCF cooling, back-up power systems, and stability and redundancy of the networking system
- To support future expansion needs, we will install high density equipment racks to accommodate servers with high core counts and heat loads .

Equipment requested includes power and cooling equipment for the core facility, racks and cables to support a HPC cluster, and high bandwidth fiber and networking equipment to improve the network accessibility of the core facility to the rest of the campus. Since ITTC has a strong track record of developing, procuring and administering environments for HPC science applications, and maintains a strong commitment to serving and collaborating with the KU life sciences community, we are confident that the renovated core facility will prove to be an exemplary centralized computational resource that is well positioned to meet the ambitious data analysis current needs of KU biomedical research and dynamically respond to future computational challenges.

Existing Bioinformatics Computing Facilities

There exist four scientific computing clusters used for Bioinformatics research on the KU campus.

- A 1024-core cluster at the KU Bioinformatics Computing Facility core.
- A 350-core cluster at the KU Center for Bioinformatics, housed in the campus computing center.
- A 128-core cluster at the Biodiversity Institute, also housed in the computing center.
- A 40-core cluster in the Molecular Graphics and Modeling Laboratory, housed in a server room in the Structural Biology Center.

Additional computing facilities including network accessible storage, workstations and database servers are available through the Research Computing Technology group (RCTG) in Research and Graduate Studies, and the campus computer center. A limited amount of machine room space is available in a server room in the recently completed Structural Biology Center but this space has largely been allocated to existing projects. Minimal space for additional cluster capacity is available through the computing center and it has essentially reached the capacity of available power.

At this time there are no plans to construct new research computing data center space at KU. Given the highly distributed nature of the existing facilities, network bandwidth for data transfer between them has become another critical limitation. Although the computing center has committed to an upgrade of the campus backbone to 10Gbps sometime in the next 12 months, this does not pertain to individual buildings. Most buildings on campus will continue to operate at bandwidths of 1Gbps or less for the foreseeable future.

After surveying the existing scientific computing clusters and the data center spaces they are hosted in, we made several observations and have identified the following needs:

- *Existing data center rack space, power and cooling are in very short supply through KU Lawrence campus and the lack of these is limiting further development of our biomedical computing programs.*
- *Adding new data center space to the campus computing center is not a timely option for meeting the needs of the bioinformatics research community. The BCF data center space in Nichols Hall can be renovated by upgrading rack, power and cooling capacity, which is a practical way to meet the demand that our research programs are making for managed facilities to house equipment for computationally intensive biomedical research.*
- *Network connectivity and bandwidth are essential to making computing and storage resources in the BCF available to researchers on and off the KU Lawrence campus. The BCF needs a reliable, redundant 10 Gbps network connection to the main campus.*
- *The KU computer center provides 44 TB storage space for campus investigators, RGS provides 67TB and at ITTC there are 34 TB of storage space. Connecting these storage pools to the BCF is another key driver for network bandwidth and reliability.*

In the following sections, we present the overall management plan of KU cores that are related to biomedical computation. We also identify the prior institutional support for KU Bioinformatics Computing Facility.

The Overall Management of KU Core Facilities

The Office of Research and Graduate Studies (RGS) operates ten Core Service Laboratories and a research computing group that together provide access to a broad range of shared instrumentation, analytical and technical expertise needed for biomedical research. Each core is managed by a lab director and funded by RGS with a base budget supplemented by service charges and equipment grants. This arrangement has made it possible to hire expert laboratory directors capable of providing high quality services and gives the flexibility for expansion and change in the suite of services as research requirements change. The business model and processes for operating the core service labs is flexible and evolving, but founded on improving institutional efficiencies and maximizing investments in research support services and infrastructure. The suite of capabilities represented by the core labs is under regular review so that the institution can address new common research support needs. This proposal provides an opportunity for the University to develop a infrastructure and framework upon which agency and university investments in computing to support biomedical research can be made. Our interest in this proposal is to develop a model for the next generation of

robust computational facilities for chemists, biologists, biomedical scientists, pharmaceutical scientists, and engineers that will complement existing RGS core laboratories and other KU computing facilities. We are expecting to work in a flexible way toward the potential translation of the BCF into an RGS core laboratory.

Impact of the BCF on Current and Future Biomedical Research at KU

Biological and biomedical science researchers at the University of Kansas are engaged in rich and diverse inquiry aimed at understanding life processes across a range of scales from genes to biodiversity, with the ultimate goal that novel therapeutic interventions can ultimately be developed to treat human diseases. These efforts are enabled by world class instrumentation and analytical capabilities including high throughput screening and assay development, DNA and protein sequencing, structure determination by NMR and X-ray crystallography, TOF-MS, microscopy, and tissue imaging (fMRI and CT).

Eight themes ranging in scale from nanometers to kilometers and atoms to ecosystems form the basis for this interlocking set of research activities.

1. The structure, function, and evolutionary history of genomes
2. The function of RNA and the mechanisms of DNA transcription and translation
3. The structure, function and dynamics of proteins
4. The function of metabolic, regulatory, and signaling networks
5. The structure, function and dynamics of cellular systems
6. The structure and function of tissue and organ systems
7. Population and ecosystem modeling
8. Disease etiology, pharmacology, and medical therapeutics

Together these form a comprehensive approach to understanding life and informing improvements in medicine and the treatment of disease.

There is a clear trend in biomedical research toward *data driven* science, in which large amounts of information coming from instruments for automated sequencing, high throughput screening systems, and other high volume robotic analytical techniques is mined and analyzed to look for patterns from which hypotheses can be developed. Along with data driven science as a source of theory, detailed modeling and simulation of biological structures and processes are becoming indispensible tools to test theory, evaluate experimental methodologies and to interpret their results. These two factors are driving the need for computing capacity in across a broad spectrum of biomedical research.

The KU Bioinformatics Computing Facility core has played an essential role in supporting biomedical computation at KU. KU BCF currently has 100 registered users from KU chemistry, biology, pharmaceutical science departments. BCF has active collaboration with other KU core facilities and NIH/KU center to identify and meet needs in biomedical related computation.

Quantitative Structure-Activity (Property) Modeling in Chemical Biology. At KU there are intensive interactions among investigators in Chemistry, Biology, and pharmaceutical sciences exploring the interface of biology and chemistry, or chemical biology, with the ultimate goal of novel therapeutics discovery. Informatics and computation has played an essential role and has been an integral component in such interactions. In addition to institutionally supported facilities such as the BCF, the KU Molecular Graphics and Modeling Laboratory and the KU Applied Bioinformatics Laboratory, our university hosts a number of NIH-funded bioinformatics/cheminformatics cores that is dedicated to provide informatics support for on-going biomedical research projects, as listed below:

- K-INBRE Bioinformatics core
- KU Chemical Methodologies and Library Development Library (CMLD) Design & Analysis Core
- KU Specialized Chemistry Center (SCC) Cheminformatics Core
- Glycan Informatics Core for the WSU program project on the Aging Pituitary-Gonadal Axis

This research team, entitled the Coalition for Chemical and Biological Information (CCBI), is dedicated to collaborating with experimental, analytical and synthetic services unit to store, manage, analyze, data mining, and learn from high-dimensional noisy data in the translational research. CCBI involves eight full time

employees, one part-time research associate, sixteen graduate research assistants and four undergraduate students. At this point in time, CCBI supports the research activities of 25 faculty investigators, 40 staff and postdocs, and approximately 30 NIH funded projects.

As an example of the service provided by CCBI, CCBI works closely with the KU Specialized Chemistry Center to provide modeling and simulation expertise in prioritizing chemical probe synthesis based on high throughput screening results. One of the essential challenges of KU SCC projects is to utilize the high throughput screening data, which typically involves activity readouts of ~300,000 compounds and identify "hits" with appropriate chemotypes as probe candidate for synthesis, modification, and further testing. The only practical means for understanding a data set with ~300,000 points and providing useful feedback to chemists prior to their starting the time consuming synthesis process is through *in silico* data mining techniques that resolve statistically significant chemical features and discriminate between active and inactive compounds. While such quantitative structure-activity-relationship (QSAR) analysis is very well established for small groups of structurally similar compounds, the assessment of trends within large groups of structurally diverse compounds is immature.

CCBI members have recently developed a method for efficiently identifying chemical properties that discriminate between actives and inactives within extensive and diverse sets by computing an active/inactive divergence (AID) score for each descriptor. The range of different properties that they can use for such large scale model development is currently limited by computational demands to a list of about 1000 conceptually simple one- and two-dimensional molecular properties, which typically take about 50 CPU hours to compute for the compounds represented in a single screen (~100,000 molecules). However it is likely that the most biologically sensitive properties are those that encode three-dimensional conformational information. These typically take 10-100 times as long to compute, and thus require substantial processing power in order to deliver analyses in a reasonable time frame.

In addition, CCBI members routinely run receptor based QSAR methods, in particular, the Comparative Binding Energy (COMBINE) analysis. Such simulations are inherently very computationally demanding, especially as one seeks to probe dynamic behavior up through time scales in excess of 10 ns. Currently it takes about 10 processor-week's worth of computer time to model a 10 ns trajectory of a moderate-sized protein. Fortunately molecular dynamics simulations do scale fairly well (approximately linearly through 8 processors) within cluster environments, so access to a large cluster would greatly expedite their efforts in this arena.

Furthermore, in the areas of target validation and probe specificity prediction the utility of novel graph based data mining algorithms for analyzing protein and chemical structure data is evident. In this type of study, a protein structure is modeled as an undirected graph where amino acid residues are models as nodes in the graph and physical or chemical interaction between residues are modeled as edges in the graph. Graph algorithms, such as frequent subgraph mining and graph kernel function computation are used to locate frequent occurring structure pattern in protein structure and to build accurate predictive models for protein functional annotation. In graph based protein-chemical interaction prediction, it usually takes about 10 cpu hours in a cluster of 40 cores for model construction and model optimization for moderate data sets with 10^2 chemicals. It requires substantial effort to applying existing software to large data set (e.g. ~300,000 chemicals in a typical SCC screening results) or the entire chemical collection of PubChem (>18Million components). An advanced computational facility is of critical importance to ensure scientists at NIH centers such KU SCC have access to the modeling results delivered by cutting-edge data mining and machine learning algorithms.

Protein Structure Prediction. There are by now 7 million proteins with known sequences; but less than 1% of them have had their structure solved. Due to the critical role played by protein shape in modern drug discovery, predicting 3D protein structure from primary sequence has become the most competitive field in computational structural biology. Every two years, state-of-the-art protein structure predictions are benchmarked by the worldwide Critical Assessment of Techniques for Protein Structure Prediction (CASP) experiment, where high scoring KU associated groups in the competition are considered the de facto standard-bearers in the field.

Despite the encouraging accomplishment in CASP and in public service, a bottleneck of their server system is computational power. Due to limited resources, they have been unable to run sufficient simulations for the

CASP targets. Similarly for the public services, because of the limit in computer resource, they have to minimize the simulation time in each prediction and allow only 1 job submitted per user at any given time. Nevertheless, there are hundreds of jobs waiting in a long queue every day for the structure prediction.

The planned extension of the BCF will considerably alleviate the extreme stress on their structure prediction server system since they are one of the major users in the cluster. In order to enhance their services, they are exploring mechanisms that will support acquisition of 40 octo-core computer nodes BCF will have the adequate infrastructure to host the 40 octo-core.

In addition advanced computational tools are used to solve structure biology problem including protein docking, protein-protein interaction prediction, protein-ligand interaction prediction, and structure based pharmacogenomics research. These projects are currently using a 350-core cluster currently hosted at the campus computing center where capacity is now a concern. The renovated BCF will provide adequate spaces to host their continuing expanding equipments.

Biomarker Discovery. Our Structural Biology Center (SBC) is one of the most comprehensive sources of bioanalytical research equipment in the Great Plains region, with an 800 MHz NMR, a complete protein crystallography suite, a fully equipped high throughput chemical biology screening facility, as well as extensive holdings in proteomics and analytical imaging. A highly functional genomics microarray facility also sits in the adjacent Smissman Hall, which complements related pharmacogenomics services at KUMC. These services are utilized extensively not only for basic science research, but also in support of clinical and pre-clinical work at KU and the University of Kansas Medical Center (KUMC). These efforts have been actively supported by data management and mining services provided by the K-INBRE Bioinformatics Core, the Applied Bioinformatics Laboratory and a number of interested EECS faculty.

Most of this support has been performed thus far on a heterogeneous array of servers and small-scale compute clusters currently hosted at the SBC, however this arrangement does not adequately address the data aggregation requirements of biomarker research. Specifically, nearly all of the servers at SBC are currently tasked with highly domain specific goals, and none have the spare capacity to permit coalescence and processing of large volumes of data from the other servers in order to assemble a cross-disciplinary knowledgebase.

The proposed BCF provides an ideal unified and homogeneous environment within which it will be possible to construct this knowledgebase, thus potentially magnifying the prospective biomedical impact of much of the component data sources as correlations are made that bridge genomic and proteomic information with chemical and structural biology research in search of greater clinical studies in the form of improved diagnostic / prognostic tools, side-effect resolution, and therapeutic customization.

We are also anticipating substantially increased emphasis on the collection and processing of large volumes of multidisciplinary bioanalytical data in order to uncover the biochemical keys underlying clinical observations, and are thus planning the acquisition of additional CPU and data storage capacity via the annual program project supplement opportunities. The infrastructural enhancements proposed in this proposal will enable future disk, CPU and memory upgrades that will permit continued growth in the volume and complexity of the data examined.

Bio-Imaging. The proposed KU Computational BioImaging and Bioinformatics Facility is aimed at building a high performance computing, storage and visualization capability for image analysis and understanding in support of a range of tasks associated with microscopy, functional MRI, high throughput screening, and protein structure determination. This facility will combine instruments such as electron and confocal microscopes and high content screening systems, fMRI and MEG, and HTS systems with high performance computing, hierarchical storage management and metadata management systems to provide a complete "data life cycle" approach to the acquisition, analysis, and management of primary and derived data from image-intensive discovery processes. Coupled with the data management component is a high performance computing component to support data-driven discovery and modeling and simulation efforts. Two large format display components will support the interactive exploration of data using visualization and visual computing techniques. In combination, these facilities will greatly extend KU's ability to analyze and understand primary

research data, and will serve as a critical resource to support and expand potential avenues of data driven theory development, testing and discovery across a broad range of life sciences projects.

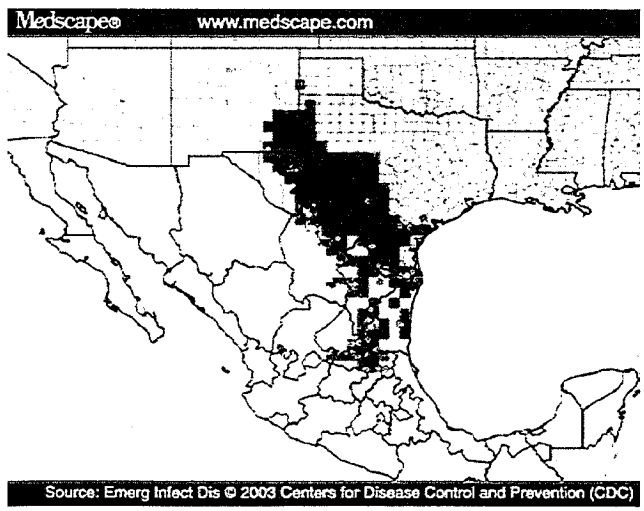
These research projects will include brain imaging and real-time functional MRI studies coupled with Magnetoencephalography, Computed Tomography and micro-CT studies of animal physiology, high content screening processing of output from the KU-L and KUMC Microscopy laboratories, computed tomography for 3D reconstruction of electron microscope image. The research potential for algorithm development across a range of activities including signal processing for chemical identification in high field MRI, feature detection and extraction in high content screening, novel approaches to high throughput computational screening of drug candidates, and in-depth studies of protein-protein interactions will also benefit from this investment in research resources.

In addition to hierarchical storage management, the system will also include a metadata and replica management systems to maintain the integrity and security of the data stored in the system. For viewing and interacting with data sets and running computations we will provide high-end display wall and immersive visualization facilities in up to three locations across KU's Lawrence and Kansas City campuses.

The renovations proposed here will greatly benefit the Computational Bioimaging facility by providing both a state-of-the-art energy efficient data center for the facility's high density computing equipment, and a facility well suited for long term data archival storage.

Biodiversity Research. The Ecological Niche Modeling group at the Biodiversity Institute has been using high-end individual workstations for most of their work, which involves modeling the areas of distributions of species at various resolutions and total extents. In the last couple of years increased availability of presence data has taken place, and much higher spatial resolution data are also available. This increases significantly the need for computational resources.

A typical analysis two years ago required on the order of one week of CPU time for a trivial application using a genetic algorithm solution to estimating species' ecological niches, i.e., on the order of 10 species, at extents of 10^7 km^2, and grid resolutions of down to 4-10 km^2. Often, this kind of analysis required up to a week of CPU usage on their workstations. However, with both presence data for species and the geospatial data increasing, demands for computational capacity have increased dramatically. Although they have access to a portion of the Biodiversity Research Center cluster, the present allocation of ~40 processors is not able to handle the complex simulations that they are now developing. Now, they are facing analysis dealing with hundreds to thousands of species, at increases of spatial resolution by factors of 256 and higher, and with extents that often include the entire planet (increases of one to two orders of magnitude). The required increase in computing power for these parallelizable models is very significant.



Another area that requires a large jump in computing capacity is related to the fact that the cutting edge in modeling species' niches and distributions lies in the inclusion of realistic movement scenarios as well as the effects of strong interactors such as competitors, predators, and disease. These factors call for simulation approaches to what has been mostly a machine-learning dominated field. Simulations of spatially explicit dispersion processes, at high-resolutions and large extents will tax their current capacities beyond what is feasible.

Finally, part of this work requires the overlaying of the results of the distributions of many species (sometimes thousands of them) to form binary matrices of (currently) up to 10^7 elements. Analysis of these matrices for their increased resolution problems is becoming impossible without significant increases in processors and

memory. Some of these problems are related to fundamental questions of ecology and biodiversity science, but others have very direct and important applications in biomedical research. For example, this analysis approach has been used to predict the spread of epidemic diseases, via the modeling of their vectors, or the likely routes of invasion of economically-important plagues. Although the biodiversity modeling has been applied quite broadly in biodiversity and ecology research, the same approaches are now being used in forecasting disease outbreak distributions. In effect, these approaches provide a much better solution to the goals of the field of landscape epidemiology, because they are both spatially *and* environmentally explicit in their 'forecasts.' The above work is currently supported by an $800,000 grant from Microsoft research.

Current Facility Deficiencies and Proposed Improvements

The KU Bioinformatics Computing Facility core is located at the second floor in Nichols Hall on the KU West Campus, and was created in a legacy ITTC data center space shared with other computing and telecommunications research equipment. With approximately 30% of a shared 1145 sq, ft room, BCF hosts a high-performance computing (HPC) cluster of 1024 cores, with 1.92 TB of memory, 44TB of local disk capacity, 35TB of storage area network (SAN) capacity, and an LT03 tape backup system, with a selection of Bioinformatics and Cheminformatics software. The current facility is cooled by two floor mounted 15-ton Computer Room Air Conditioning (CRAC) units, connected to a 7" raised floor cooling plenum, and is powered through a single 100kVA Uninterruptible Power Supply(UPS).

The facility has been incrementally expanded over the past decade to accommodate the growth of KU computing and telecommunications research needs. In addition to system capacity concerns, recent equipment failures have raised doubts about the reliability of existing UPS and CRAC equipment. In an effort to identify problem areas, a data center analysis team was hired with grant funding from Dell™ to perform an Energy Smart Data Center Assessment (ESDCA) in April 2009. The analysis team used environmental sensor data to map the facility and create a fluid dynamics model of airflow patterns for computational capacity and energy efficiency analysis.

A detailed 60-page report was released to KU in July 2009 [Dell2009]. Critical deficiencies identified in the current BCF include the following:

- *Insufficient Floor Space*
  - *Approximately 50 gsf of available open floor space*
- *Insufficient Power Infrastructure*
  - *UPS load exceeds recommended 80% level*
  - *No UPS redundancy*
  - *No back-up generator in the event of an extended power outage*
- *Inadequate Cooling and Humidity Control Envelope*
  - *Cooling load exceeds the recommended 80% level*
  - *Legacy 7" raised floor structure provides insufficient airflow*
  - *No hot air return plenum to CRAC units*
  - *Existing facility lacks a suitable vapor barrier*
- *Energy Inefficient*
  - *General purpose, low efficiency CRAC and UPS equipment*

The current BCF is limited by the existing power, cooling, network infrastructure, and floor space. BCF is incapable of supporting a significant increase in computing capacity and there is a pressing need to renovate the core facility in order for BCF to provide the necessary computational resources for biomedical research scientists to improve and expand their research. The primary objectives of the BCF renovation plan are to expand high-performance computing equipment rack space to support current and projected computational capacity needs and address critical cooling, power, and networking infrastructure deficiencies.

In addition, networking capacity deficiencies have been identified by the campus IT service department. BCF is currently served by a 1 Gbps connection to the University's main wire center in Ellsworth. As part of this proposal existing single mode fiber will be upgraded with switches capabilities for 10Gbps distribution to Nichols Hall.

A Nichols Hall room 113 renovation plan includes the following key features:

- *Expansion of Bioinformatics Computing Facility core*
  - *Expand BCF from 400 to 1632 gsf.*
  - *Install 24- 32 High-density racks to support current needs and future HPC expansion*
- *Upgraded Power Infrastructure*
  - *Modular UPS system will support entire BCF at maximum design load*
  - *Hot-swappable UPS power modules*
  - *N+1 redundancy; single module failure will not affect UPS system performance*
  - *Automatic diesel generator back-up power*
- *Upgraded Cooling Infrastructure*
  - *24" Raised floor structure*
  - *Direct HPC cooling and heat removal*
  - *N+1 Hybrid Cooling Unit with redundancy*
  - *Vapor Barrier installation*
- *Energy Efficiency Improvements*
  - *Automated cooling and power efficiency management systems*
  - *Adopt a 96% efficient UPS system*
  - *BCF heat recovered and supplied to building boiler system*
  - *Passive BCF cooling when outdoor ambient temperature is below 45°F (~7°C)*
  - *A target data center Power Usage Efficiency (PUE) of 1.09 (estimated by modeling software for the proposed configuration)*
- *Network Capacity Improvements*
  - *Upgrade switching capacity for existing single mode fiber to provide a 10 Gbps link to the switch center at Ellsworth Annex.*

This renovated space, along with additional power, cooling and network bandwidth will support high-density computing capacity twentyfold greater than currently available. In our design energy and water efficiency is one of the most important factors.

Table 1 - Components / Spaces Affected by Renovation Project

Table 1 - Components / Spaces Affected by Renovation Project

Nichols Hall - First Floor

Room No.	Room Name	Nom. Dims. (L x W)	Area (NSF)	Figure No.	Comments
113	Bioinformatics Computing Lab	26 x 49	1,232	A-3, A-5	L-shaped room (max. dims.)
114	Service Entry / Future Hallway	12 x 20	252	A-3	Incls. 16 SF telecom closet
116	Electrical Room	11 x 37	410	A-4, E-1	
109	Mechanical Room	11 x 38	436	M-1, E-1	
111	Mech. / Elec. Room	39 x 38	1,316	M-1, E-1	L-shaped room (max. dims.)
Total Area of Affected Spaces			**3,646**		

Energy and Water Efficient Cooling. The BCF renovation design incorporates state-of-the-art cooling and power equipment, and includes efficiency techniques recommended by the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), and the Institute of Electrical and Electronics Engineers (IEEE).

In an effort to maximize HPC cooling energy efficiency, a high density computing architecture was combined with in-row cooling equipment arranged in a hybrid configuration. In-row Hybrid Cooling Units (HCUs) are directly coupled to adjacent server cabinets, resulting in short airflow paths that eliminate typical losses in cooling air mass delivery, since heat is captured and absorbed in close proximity to the computing hardware.

Heat is removed from the HCUs via a high efficiency chilled water system that features a parallel dry-cooler to provide unpowered cooling. When the outside temperature is below 45°F, the chilled water plant compressors will power down and the passive dry cooler will operate. It should be noted that air conditioning compressors are one of the largest consumers of electricity in a large facility. A review of Lawrence, KS weather data

indicates that the dry cooler would be operational for over 3,000 hours during a typical year; for 35% of the year the chiller compressors would be off-line.

An added advantage of the in-row hybrid cooling system, is the ability to operate the BCF chilled water plant at an elevated temperature range of between 55°F and 69°F, in comparison to typical CRAC design options where water is supplied at a temperature of between 45°F and 55°F. This results in an energy savings of 15% over standard CRAC systems. Increasing the chilled water temperature from 45-55°F to 55-69°F also enables the use of a lower coolant flow rate, reducing the required coolant pump horsepower by 50%.

The renovation design incorporates heat recovery equipment in the coolant loop, which will supply the Nichols Hall boiler room with hot water using heat removed from the BCF cooling system, with the expectation that gas boiler operation will significantly reduced, and will no longer be necessary during the summer months. In Nichols Hall, approximately 50% of the Heating, Ventilation and Air Conditioning (HVAC) zones provide ventilation at all times, requiring the continuous operation of natural gas fired boilers all year to provide HVAC reheat. Heat recovery from a single 100-ton chilled water unit can generate 930 MBH of hot water at 120°F with an outdoor ambient temperature of 105°F.

We have specified a modular, high-efficiency, hybrid double conversion UPS system to provide battery backup in the event of a brief power failure, and to properly condition facility electrical power, protecting HPC resources from utility power generation inconsistencies. The 96% UPS efficiency is maintained down to a 35% load, and has a high power factor specification, which serves to reduce utility billing fees.

A Dell™ sponsored analysis of our proposed renovation design reported a 91.3% efficiency rating for the equipment selection and layout, and predicted a Power Usage Effectiveness (PUE) in the 1.09 range. PUE is an efficiency rating that considers all power consumed by a data center in comparison to that used by the computing equipment. An average contemporary data center similar in size to the proposed BCF typically exhibits a PUE rating of 2.0-2.5; a 1.09 PUE is indicative of an extremely efficient design. Images captured from the fluid dynamics model illustrating cooling airflow patterns can be found in T-1, T-2, and T-3.

Administrative Structure and Oversight

The successful completion of the proposed project depends on a number of administrative processes including grant management by the University of Kansas Office for Research and Graduate Studies (RGS) and its corporate partner the KU Center for Research, Inc. (KUCR), approval of expenditures by the State of Kansas and oversight of design and construction by the KU Lawrence campus Office of Design and Construction Management (DCM).

The program scope of work and budget of the project are prepared by the KU Office of Design and Construction Management (DCM), reviewed by the Office of the Provost, and approved by the Office of the Chancellor, for final review and approval by the Board of Regents, contingent upon award. Once notification of the grant award is made, the selection of architectural and engineering (A/E) consultants will be completed. Design work for a project of this scale will require that the University to adhere to an advertise, interview, and selection process for hiring the primary A/E firm. It should be noted that this review and approval process has been amended as a result of legislation passed during the 2009 Kansas Legislative session, resulting in significantly reduced timelines for review by State offices, quicker approval and selection of design firms, and the availability of alternative project delivery methods for construction. As a result, the timeline from award of a grant to start of construction can be reduced considerably, though still contingent on required NIH reviews.

Management of Ongoing BCF Operations

The Office of Research and Graduate Studies (RGS) operates a number of Core Service Laboratories. These core service labs are funded by a combination of charges for services delivered, equipment grants that augment the capabilities of the laboratories, and a base budget provided by RGS. This business model and related processes for operating the core labs will be adopted by the renovated BCF and will be used to further develop the BCF as our next generation facility for computationally intensive research by KU chemists, biologists, pharmaceutical scientists, and engineers. With this in mind we will work toward the translation of the BCF into an RGS core laboratory.

The renovated KU Bioinformatics Core Computing Facility (BCF) will be managed and operated by staff from the KU Information and Telecommunication Technology Center (ITTC). The renovated facility will be managed by a stakeholder group, chaired by the PI and composed of all investigators on this proposal and representatives from the KU research community. The stakeholders group will establish usage policy for the facility and will refine and execute a sustainment plan for the facility. The ITTC director will also be advised by a board composed of the directors or delegates from related KU biomedical core facilities and NIH sponsored centers whose research will depend on the BCF. This group will advise the director on how to grow and evolve the BCF to meet future science requirements and will work with the director to foster research partnerships that enhance the facility.

The current business model for the BCF is based on revenue from support fees assessed on research grants, funding from equipment grants, and from the ITTC operating budget. RGS is working with KU's core service labs to develop a sustainable business model that is based on standardized service fees, income from grants and research partnerships, and base budget to support key lab personnel.

Subscription fees will be assessed for defined units of service such as rack space, per-server operator and system administration support, etc. These services have commercial counterparts that can be used to establish well understood service definitions and reasonable and customary rate structures.

Partnership arrangements will be made with individual sponsored research projects to fund specific equipment purchases, such as UPS, cooling or networking, needed to operate the data center or expand its capabilities.

Allocations from ITTC's operating budget will be used to cover some recurring costs such as salaries for key personnel and maintenance agreements.

The cost recovery strategy developed for the BCF will be developed in consultation with KU's campus IT organization. The BCF will operate in conjunction with other campus providers including IT to address the computational needs of KU biomedical research, which requires services such as computing cycles, storage, and network support. We also expect some portion of the initial growth in facility occupancy will be due to consolidation of biomedical computing clusters and storage elsewhere on the KU Lawrence and KU Medical Center campuses. This consolidation and future hosting agreements will be driven by the availability of the BCF's high quality machine room space and expert support staff.

Ongoing Institutional Commitment

The University of Kansas, through the KU Office of Research and Graduate Studies, is committed to improving the data center capabilities in Nichols Hall, and to maintaining those improvements over time. This facility houses much of the University's equipment dedicated to biomedical and life sciences computing and so is a critical component of KU's research capability in these areas. As computing and research in the life sciences are inextricably linked, the proposed upgrades are an important part of our overall strategy for excellence in biomedical research. This facility also represents a major focal point for cross-disciplinary research and the repository for critical research data and is expected to foster and support innovative research across multiple life sciences disciplines.

At a more fundamental level the proposed renovations are a critical part of a broader plan for developing power, cooling, networking and managed data center space as foundational components of our research environment. RGS will work closely with ITTC leadership to provide business services needed to operate the BCF, to develop a self-sustaining business model for the BCF, and to provide bridge funding when needed to maintain the facility at a high degree of readiness so it can in turn provide high quality services to the university's biomedical computing community. Utilities (power and chilled water) will be provided by the University, but recurring maintenance costs on the State owned Nichols Hall facility will be borne by the University and KUCR.

Engineering Criteria

The engineering criteria were established by national building codes and standards for life safety. The KU standard of ASHRAE 90.1 + 30% for energy efficiency was used to achieve an efficient design. The existing Nichols Hall building requires several upgrades to the mechanical, electrical and fire protection systems to

meet current codes and support a state of the art the Bioinformatics Computing Facility (BCF). A very competent architectural and engineering team was selected to provide a integrated energy efficient design utilizing sustainability as a key design criteria.

HVAC System Capacity & Design Criteria. The BCF will house 24 server racks with a maximum of 12-kilowatts (kW) per rack with a total electrical load of 384 kW. The room will have 184in-row hybrid cooling units (HCU) that are capable of rejecting a maximum of 540 kW of heat from the space. The room will be designed to maintain ASHRAEs recommended room temperature of 72°F ±4°F and 50% ±5% relative humidity for a class 1 data center.

The mechanical and electrical systems were designed with respect to sustainability and energy efficiency. The proposed water chillers include heat recovery that reclaims a portion of the heat generated by the BCF and can be used to heat the facility. A dry cooler in parallel to the water chillers allows for "free cooling" during the cooler months of the year to create chilled water to cool the BCF without the use of compressors.

Mechanical Systems. The new HVAC system to serve the BCF will be a stand-alone chilled water plant which will be backed up by the proposed emergency power system. This system will utilize two high efficiency 100-ton air-cooled water chillers with heat recovery and a dry-cooler to provide "free cooling". The chillers will be selected based on a life-cycle cost analysis in lieu of simply selecting the standard efficiency units. The chillers will conform to the energy requirements of ASHRAE 90.1 + 30% better efficiency. The chillers will operate when the outside air temperature is above 45°F to provide chilled water directly to the HCU's. A plate and frame heat exchanger will be used to produce the 59°F chilled water required by the HCU's and isolates the exterior glycol chilled water loop from the interior chilled water loop.

The dry cooler will be installed in parallel to the air-cooled chillers. When the outside temperature is below 45°F the chillers will shut down and the dry cooler will operate. The dry cool only utilizes fans to provide chilled water therefore no compressor operate. One of the largest consumers of electricity in Nichols building is a chiller's compressors. NOAA Weather Data indicates that Lawrence, KS spends an average of 3,064 hours at or below 45°F, so the chillers will not need to operate 35% of the year, reducing chilled water energy use.

Typical commercial water chillers provide chilled water between 45°F and 55°F. The two new chillers serving the BCF will operate between 55°F and 69°F. By increasing the chilled water supply temperature to 55°F the chiller does less work therefore saving energy. A chiller producing 45°F water can consume approximately 15% more electricity than one producing 59°F. Furthermore, by increasing the temperature differential between the supply and return chilled water temperature from 45-55°F to 55-69°F it will reduce the chilled water flow rate and reduce the required pump horsepower by 50%.

The air-cooled chillers will incorporate a heat recovery system which will allow the heat removed from the BCF to be converted to hot water. This hot water can be used for heat during the summer months. Approximately 50% of the building HVAC zones provide a minimum amount of cool air for ventilation at all times, requiring the gas fired boilers to operate year around for reheat. One chiller's heat recovery system can generate 930 MBH of hot water at 120°F with an ambient temperature of 105°F. This amount of heat is enough hot water to eliminate boiler operation during the summer months which reduces the amount of gas consumed by the boiler.

The HCU's will maintain a hybrid in-row/in-rack cooling system. There will be a traditional cold aisle between the racks however the hot air is contained within the racks. The HCUs will be located in-rack adjacent to the server racks. Variable speed controllers with in the HCUs will modulate the fan speed as required matching the actual heat load and optimizing energy efficiency. The HCU's utilize chilled water to maintain space temperature. The chilled water system serving the HCU's operates between 59° to 71°F. This warmer chilled water temperature ensures the HCU's cooling coil is only providing sensible cooling and remains dry. The HCU's will not generate condensate therefore, a condensate removal system is not required. This reduces the risk of water damage to the equipment. Chilled water will be delivered to the HCU's via a piped manifold system located under the raised floor.

Since the HCU's will only provide sensible cooling and no dehumidification, a stand-alone, air-cooled computer room air-conditioner (CRAC) unit will be provided. This CRAC unit will not be connected to the chilled water

system serving the BCF or the existing building. This is because the BCF chilled water plant does not produce cold enough water and the buildings chilled water plant does not operate year-around. This CRAC unit will be served by the proposed emergency power system. The CRAC unit will operate year-around to provide dehumidification during the summer months and humidification during the winter months.

The existing building automation system will be utilized and expanded to serve the new BCF chilled water plant. This system will optimize the air-cooled water chillers, dry-cooler and heat recovery operation to maintain the highest level of energy savings available.

Fire Protection. The existing building does not have a fire protection system in-place, but one is desirable to protect the people in the BCF and the computer equipment asset. A double interlock pre-action, dry pipe sprinkler system, which reduces the risk of water leakage, will be provided. This requires a new 4" fire service be brought into the building.

The fire alarm system installed in the Nichols building is adequate to support the BCF and shall be installed for early warning and occupant notification throughout the BCF.

Electrical Systems. The existing building is currently served from two underground medium voltage power feeds, two 12,470V step down transformers feeding a 277/480V distribution system. The existing 277/480V distribution system is original to the building and has no space for expansion. The building currently has no emergency power so only batteries provide life safety egress lighting. It is recommended that the old main 277/480V switchboards serving the building be replaced with new modern equipment to support the BCF.

The new switchboard would be served by the two existing 1,500 kVA transformers. One of the 1,500 kVA transformers would serve the BCF and the other the remaining building. The main switchboard will include Transient Voltage Surge Suppression (TVSS) to protect the building and BCF from external power irregularities. The TVSS will also protect the BCF critical loads from transient sources within the building and vice versa to protect other building loads from dirty power produced by the critical equipment.

A 1,000 kW 277/480V diesel generator will be installed to back-up the utility power serving the BCF and associated chilled water plant. Utility power and emergency power will serve an automatic transfer switch which monitors the available power sources and switches to the most reliable source. In the event of a utility power outage an uninterruptable power supply (UPS) with batteries capable of 10-minutes of operation will provide a continuous source of power to the BCF electrical loads as the generator starts.

The UPS will provide a 480V output to two power distribution units (PDU) that include shielded isolation step down transformers to ensure conditioned power reaches the BCF. The PDU's include four 42-pole 120/208V distribution sections to serve the rack and HCU's. The electrical feeds from the PDU's to the racks and HCU will be located below the raised floor. The UPS has a maintenance bypass switch that allows unconditioned 480V power to serve the BCF should the power converter portion of the UPS fail. If the bypass was active the remote power panels would provide conditioning of the power through the internal shielded isolation transformers mentioned above. The design will provide for a later addition of a generator systems for redundant power.

The BCF will receive new lighting and convenience receptacles. These circuits will be served from by the proposed emergency power system. The lighting in the BCF will be provided from energy efficient fluorescent indirect light fixtures. The light level in the room will be approximately 45 foot candles at a 3-foot working plane while meeting ASHRAE 90.1 recommended 1.0 watt per square foot lighting allowance.

BCF Commissioning

KU will utilize third party commissioning by professional engineers is recognized as an essential process for quality assurance in construction for achieving and balancing concurrent goals of life safety, system reliability, energy efficiency and indoor environmental quality.. It is important to integrate renovation commissioning into the overall design and construction process by starting the process early and to extend it through the first year of occupancy. KU applies commissioning to building systems that consume energy or are critical for the

building mission such as heating, ventilation, air conditioning, process cooling, domestic water heating, lighting control, building envelope, backup power and security. Sub-metering used for measurement and verification and energy management is also commissioned. The testing, adjusting and balancing process is also included in the commissioning scope to ensure that it is independent of the installing contractors.

KU's commissioning process by professional engineers begins at design and continues until after beneficial occupancy. The goal of KU's commissioning requirements is to deliver buildings and systems that function properly, and that provide good indoor environmental quality (thermal comfort, air quality and acoustics) as efficiently as possible. To ensure long term performance, commissioning is intended to enhance system reliability and to ensure that operators are properly trained in system operation and maintenance.

A multi-day operational test is also recommended for data centers to verify stable operation and control of the critical systems. This test should be performed after integrated system testing is complete and after the controls contractor has finalized tuning of all control loops; normal loads should be imposed on the systems.

Commissioning will include a review to ensure that all information networks are Internet Protocol Version 6 compatible and meet the following criteria:

- High speed network connectivity at 10 Gbps to research computing on east and west of campus.
- Switching capacity, speed and throughput
- Bandwidth

Architectural Criteria

Expansion of the current Information and Telecommunication Technology Center (ITTC) core facility to a state-of-the-art Bioinformatics Computing Facility (BCF) will require total renovation of the architectural envelope.

Vapor control. Environmental considerations for the computing equipment include stringent temperature and humidity control that are distinctly different from the surrounding building's requirements. Vapor transmission through the envelope of the BCF due to migration of warmer, moister surrounding air to the cooler, dryer air in the BCF will be controlled by passive means. The benefit of this approach is that it will maintain required conditions without additional expended energy to control it mechanically. As the existing concrete and cement block construction does not include vapor retarding systems, these must be added around the entire BCF envelope. Simple plastic sheet vapor retarder can be used on the wall and ceiling portions of the envelope, applied without adhesives, using the mechanically applied insulation and skins to hold the sheet in place. Tapes will seal the joints. The floor will be treated with a fluid-applied vapor seal prior to installation of the screw-attached access floor pedestals. Although vapor retarders are normally applied to the warmer side of the envelope, in this case the temperature differential is relatively small, so condensation is not a concern.

Noise control. Densely packed computing equipment generates significant noise which, if left uncontrolled, can degrade the quality of the work environment. The parallel concrete and masonry surfaces of this space do nothing to absorb noise and will tend to reinforce it. Acoustical treatment of the walls and ceiling will greatly improve both the aesthetic and acoustic qualities of the space. However, care must be taken in selecting materials that contribute to the maintenance of a clean environment for this sensitive equipment. Materials that are subject to particulate shedding when disturbed must be avoided. Encapsulated foam acoustical absorption, which is installed behind perforated metal wall and ceiling panels, will meet these requirements. The attachment of the acoustical insulation to the existing envelope above the ceiling means that the acoustical system will not be disturbed whenever the plenum is accessed. Benefits of this solution include enhancement of indoor environmental quality using durable and maintainable materials, consistent with the protection of the core assets, specifically the computing equipment.

Handicapped accessibility. The space is presently accessed by means of two non-code-compliant doors and stairs from the corridors six feet above the existing finish floor. No handicapped accessibility to the space is currently available. Even the sill of the present garage door is 24" above the present floor. To address this the floor of the new facility will be made level with the areas adjacent to the west and a wheelchair lift to the main floor level will be provided. Ambulatory occupants will access the first floor using a new stair outside the equipment room, while wheelchair access will be provided by the new lift adjacent to the stair. This also

provides a means of handicapped access to the dock-level areas that currently does not exist. Benefits include increased handicapped accessibility to not only the BCF, but to other programmatic spaces.

Access management. The existing concrete floor is approximately 24" below the loading dock level and 72" below the surrounding corridor/atrium spaces. To provide material access to the space without steps or ramps, the floor is to be raised to the level of the loading dock, utilizing an accessible modular raised floor. This raised floor will have the added benefit of providing highly desirable cabling and utility space below the equipment. A four foot wide access aisle will be provided from the dock to the BCF, terminating at a new 4'x8' door into the room. Benefits of this solution include ergonomic safety for occupants and increased damage mitigation in material handling operations.

Security. The space is presently accessed by means of two non-code-compliant doors with very low security attributes. An existing wooden garage door also provides access to the space and very limited security. To address these concerns, the existing openings will be removed and new access to the space will consist of a single, solid core, secured opening at the new BCF floor level for material management, and a single secured opening to the building's main floor level for everyday occupant access and egress. Wide single-leaf doors will be used in lieu of the present unequal-pair doors to provide simpler, more reliable operating hardware, better vapor seal, and improved security. The fire-rated doors will be fitted with keypad access locks, closers, and perimeter smoke / weather gasketing. The benefits will be increased security and envelope integrity. To protect the integrity of the critical site-located mechanical and electrical equipment, security screening will surround the new cooling equipment.

Safety. Removal of the existing, non-compliant stairs that currently provide access to the space will eliminate an unsafe condition. Normal occupant access to the BCF will be by a new code-compliant stair (48" rise vs. the current 72" rise). Material management will now be accomplished at floor level instead of by stairs. Existing non-compliant doors will be replaced, and perimeter wall glazing will be replaced with radiant heat barrier fire-glazing, which will add significant fire protection to both sides of the envelope. The addition of automatic fire suppression to the BCF in a building that currently has none will further enhance occupant and property safety. Benefits of these actions include increased occupant safety and protection of assets.

Energy efficiency. The rehabilitated space is an interior room on the lowest level of a three story building, so there are no opportunities for daylighting. However, sufficient lighting to perform detailed visual tasks, such as cabling and cooling equipment maintenance, in tall rack spaces is a must for the technicians. Good color rendition is also needed. High efficiency direct/indirect lighting coupled with highly reflective upper wall and ceiling surfaces will efficiently diffuse and distribute room lighting to the task areas without specular glare. Benefits include high quality task lighting, enhancement of indoor environmental quality, and energy efficiency. Although not its primary function, the acoustical insulation will offer a small thermal transfer benefit to optimize the energy efficiency of the space cooling equipment.

Environmental quality. The renovated space is in the core of the building and highly visible from the surrounding corridor and main lobby atrium on three sides. Presently the usage of the space does not lend itself to aesthetically pleasing finishes or orderly appearance. The new high-quality floor, wall and ceiling finishes, plus improved energy-efficient lighting, will transform the appearance of this space. The proposed architectural improvements will convert this space from a deficiency to an asset that will elevate the aesthetic quality of this building's public spaces, and reinforce KU's reputation as a forward-looking institution equipped with cutting edge facilities. Below the new finishes a continuous vapor barrier will be placed over the existing wall and ceiling faces. New skins will be applied to the volume in four distinct zones – the areas of the floor, lower walls adjacent to the machine room floor, upper walls, and ceiling. The integrated design approach to the envelope addresses the needs of this specialized environment, while simultaneously incorporating the mechanical and electrical requirements.

Sustainable construction practices. Wherever possible, material selections and construction specifications will strive to achieve the sustainable goals of energy efficiency, indoor air quality, use of recycled and bio-based content, reduction of construction and lifecycle environmental impact, low-emissions, installation verification of the design, and occupant welfare & comfort. Examples of this include the selection of American-

made access flooring utilizing 43% recycled content, over 13% post-consumer. Paints and adhesives will be largely eliminated in the proposed design, and those that remain will be selected to have low impact on ozone and environmental quality. The proposed lighting method, light-reflective upper volume, and acoustical treatment will contribute to energy efficiency, occupant welfare and comfort. Protection of the adjacent occupied spaces from pollutants and safety hazards during the construction process will be required, as will environmentally responsible waste management and recycling of construction materials.

Project Budget

Construction Costs	
Demolition	78,600
Construction Costs	1,394,000
Sitework	113,500
Fixed Equipment	2,125,750
Subtotal - Construction Costs	**$3,711,850**
Miscellaneous Costs	
Fees - Consultants, CM, State / KU Agencies	686,950
Printing & Shipping of Bid Documents; Misc.	24,160
Asbestos & HazMat Abatement	incl. above
Construction Testing & M/E Commissioning	incl. above
Misc. Relocation Costs	18,500
Bidding & Construction Contingency (2.2%)	216,400
Subtotal - Miscellaneous Costs	**$946,010**
Total Project Cost	**$4,657,860**

Site Improvements

Existing parking areas and service drives shall remain. No new parking is proposed, but the A-E shall verify that an appropriate numbers of handicapped stalls are provided within the closest adjacent lot(s), with an ADA-compliant ramp or walk / accessible path from each stall to the accessible entrance(s).

New M/E equipment shall be screened from public view as directed by the University.

Utilities & Infrastructure

New mechanical and electrical systems shall replace existing outdated or inadequate systems as indicated within the project description, to serve the renovated area. Existing mechanical / electrical equipment serving un-disturbed portions of the existing building shall be maintained in service at all times, except for short-term shutdowns.

All utility or M/E system shutdowns or outages shall be planned well in advance, in collaboration with FO personnel, and others who may be affected.

Space Standards & Utilization Analysis

This project will not add any new space to the University's space inventory. In a series of related moves existing computing equipment will migrate to the renovated Room 113 and a series of small renovations will recapture those areas currently used for incremental legacy computing systems in Nichols for expansion of various research projects.

Code Requirements

Codes currently used on KU projects include the following:

- International Building Codes, 2006 edition.
- Kansas Fire Prevention Code, KSFMO, current edition.
- Other codes as listed at the State of Kansas, Division of Facilities Management (DFM) website: http://www.da.ks.gov/fp/

Code Footprint templates of the existing buildings shall be prepared by DCM as needed and furnished to the architect on DCM's standard 11x17 code footprint sheets. The architect shall update these template drawings to reflect all proposed work and shall submit them for approval to DFM through the KU Fire Marshal, immediately following the Schematic Design phase. If changes made later in design require resubmittal of the code footprint, the A-E shall make those change and resubmit it via the KU Fire Marshal as early as possible in the design process.

Electronic files of the approved code drawings shall be forwarded to DCM in both .PDF and .DWG formats.

Construction Exiting. Temporary fire-rated exit corridors shall be provided through the construction site, if required to protect and direct occupants from all required exits in the surrounding occupied existing buildings to a public way. They shall remain in-place at all times while construction work is underway.Existing exits and exit pathways cannot be blocked or removed, even temporarily, without alternative exit paths being provided that are approved by the authorities with jurisdiction.

Fire alarm systems shall comply with current code and KU requirements for an intelligent addressable system.

Historic Preservation Reviews. The proposed new construction is not located within 500 feet of any properties listed on either the State or National Registers of Historic Places.

KU / City of Lawrence Agreement. This project does not fall within 150' of the perimeter of the University's property, and will not be required to comply with the provisions of the KU / City of Lawrence Cooperation Agreement.

Hazardous Materials. The KU Environmental Health & Safety Office will test materials in the existing buildings and utility tunnels that may be affected by the new project's work, to determine if any of them are asbestos-containing and require abatement. It is anticipated that tests will most likely be required at connections to existing utility lines. KU's policy is to remove all hazardous materials when encountered during the renovation of existing buildings. If required, this work will be separately-contracted by the University.

Design Standards & Consultant Services

The consultant team shall comply with the latest provisions of The University of Kansas Design and Construction Standards, as maintained by the Office of Design and Construction Management (DCM). These standards are available online at the DCM website: http://www.dcm.ku.edu/standards/design/

The consultant team shall also comply with supplemental updates to these standards which may be issued during the course of the project.

The University's Project Representative shall be a DCM staff person assigned to serve as Project Manager, who shall serve as the primary point of contact for all communications between Owner, A-E and Contractor.

Special Consultants that will be required on the A-E team, in addition to the usual A/E disciplines:

- Telecommunications System Engineer (must be pre-approved by the KU-IT department)

Consultants shall deliver to KU complete sets of electronic files for the drawings and manuals / specifications for each design review submittal, for the bid sets and for the as-built sets. Each set of electronic files shall include both PDF and AutoCAD .dwg files for each drawing sheet.

Models, if produced by the consultant to explain the design, shall be delivered to and remain at KU, whether in physical built form or 3D CAD form.

Annual Maintenance & Operating Costs

Funding for annual maintenance and operating costs will come from University general funds. No additional state funding will be required to cover any of these costs. The University and the KU Center for Research will endeavor to raise private funding to establish a maintenance fund for this new space. Ultimately, the University will be responsible for maintaining the building.

Initial Project Schedule

The target dates below will be adjusted given the actual grant award date.

NIH Grant Award Notification to University	July 2010
Submission to Kansas Board of Regents	August 2010
Submission to Joint Committee for State Building Construction	September 2010
Advertise/Interview/Select A/E Consultants	October 2010
Negotiate Fees / Execute Contracts	October. 2010
Program Review & Schematic Design (1 month)	November 2010
Design Development (2 months)	Dec. 2010 - Jan. 2011
Construction Documents (3 months)	February - April 2011
Bidding (1 month)	May 2011
Contract Award & Execution (1 month)	June 2011
Construction (9 months)	July 2011 - March 2012
HVAC and Data Center Commissioning (1 month)	April 2012
Data Equipment Installation and Testing (2 months)	May - June 2012
Final Closeout (1 month)	July 2012
Project Completion (overall time from grant award = 24 months)	July 2012

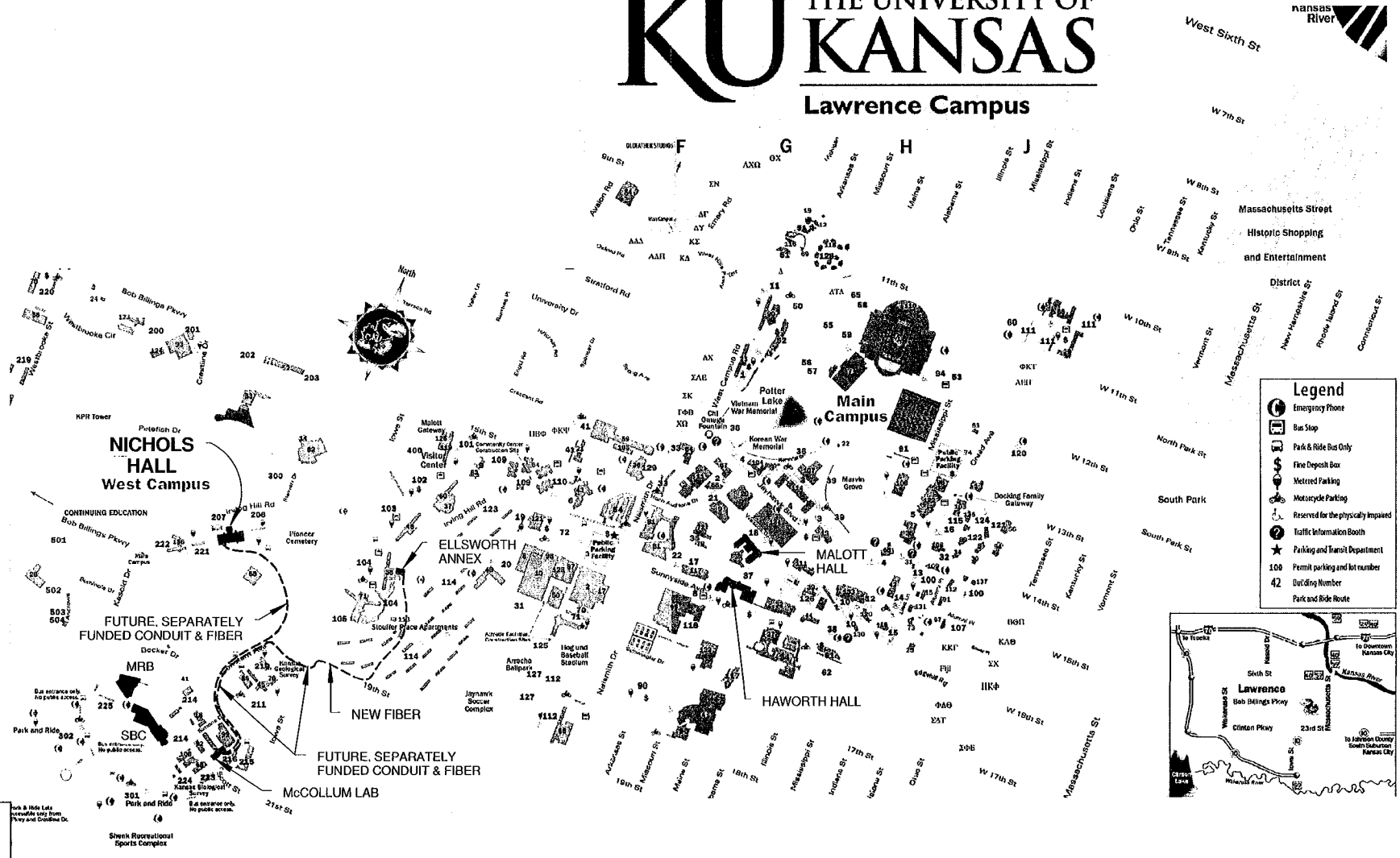
Construction / Project Delivery Method

The University proposes to utilize either a competitive bid or a CM At-Risk process, in accordance with University regulations and guidelines developed by the KU Office of Purchasing Services and the KU Center for Research and Graduate Studies.

BIOINFORMATICS COMPUTING FACILITY

THE UNIVERSITY OF KANSAS

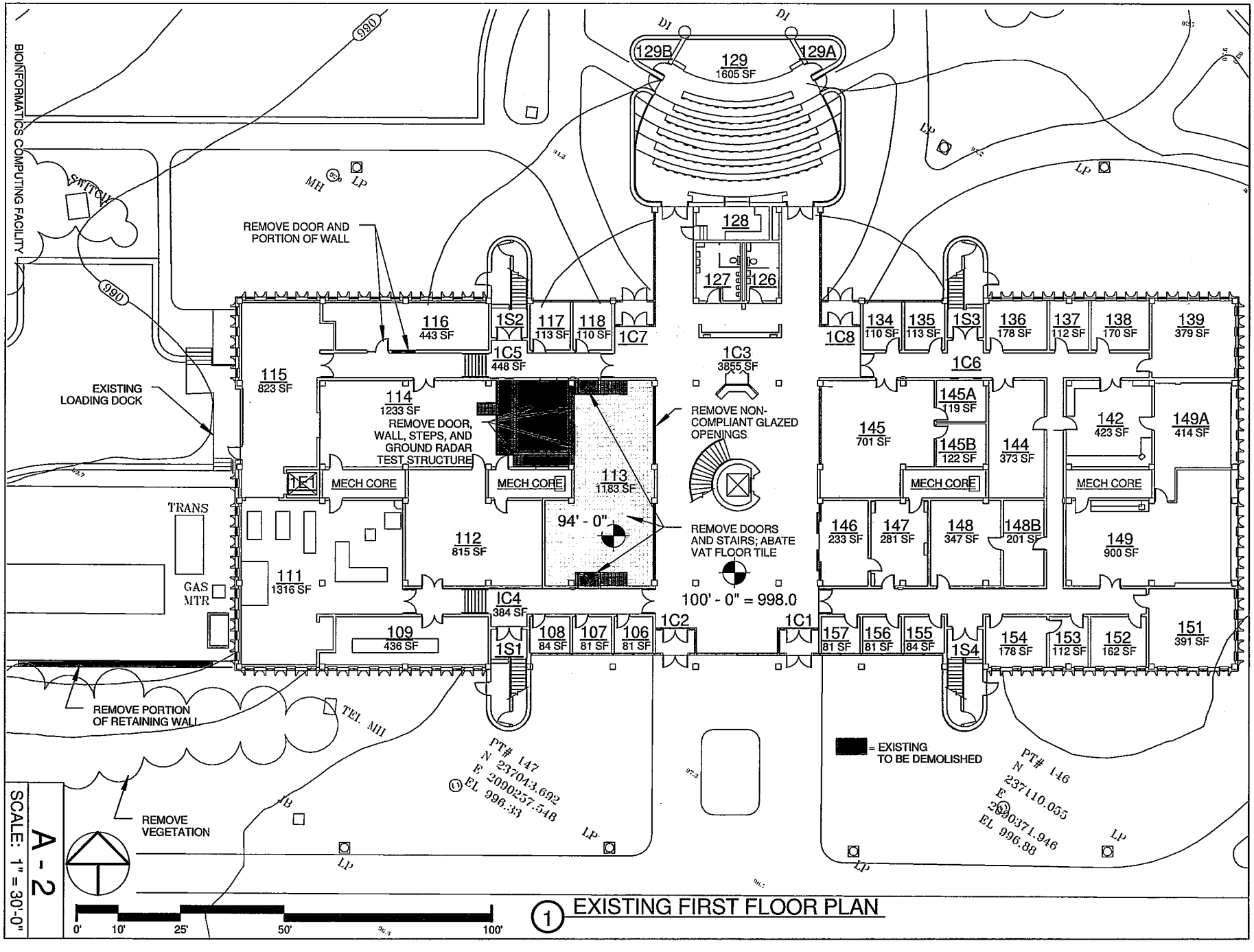
Lawrence Campus



1 CONTEXTUAL SITE PLAN

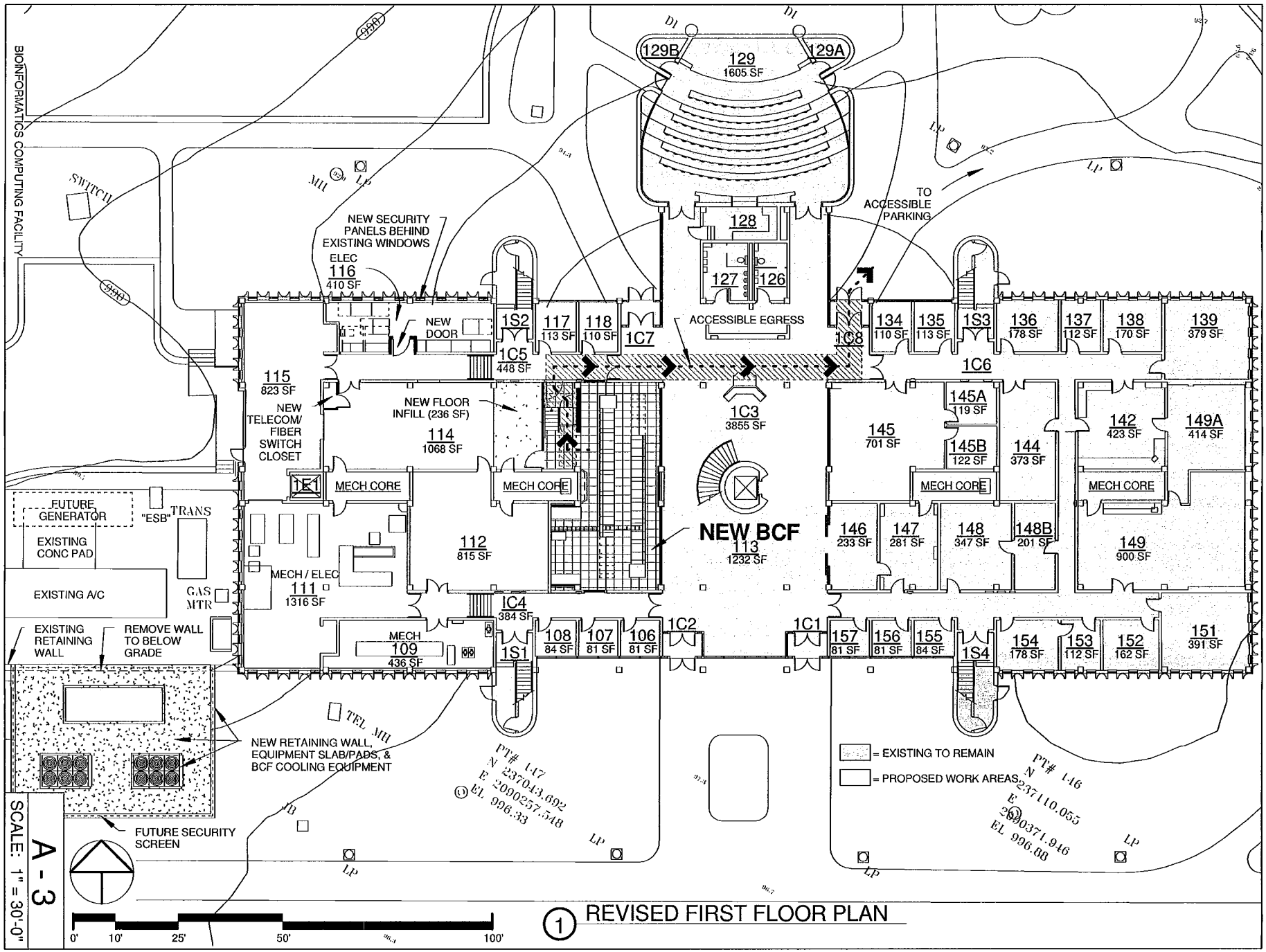
A - 1
SCALE: NO SCALE

8-21



1 EXISTING FIRST FLOOR PLAN

8-22


BIOINFORMATICS COMPUTING FACILITY
129B
129
1605 SF
129A
128
127
126
TO ACCESSIBLE PARKING
NEW SECURITY PANELS BEHIND EXISTING WINDOWS
ELEC
116
410 SF
NEW DOOR
1S2
117
113 SF
118
110 SF
1C7
ACCESSIBLE EGRESS
1C8
134
110 SF
135
113 SF
1S3
136
178 SF
137
112 SF
138
170 SF
139
379 SF
1C5
448 SF
1C6
115
823 SF
NEW TELECOM/ FIBER SWITCH CLOSET
NEW FLOOR INFILL (236 SF)
114
1068 SF
1C3
3855 SF
145
701 SF
145A
119 SF
145B
122 SF
144
373 SF
142
423 SF
149A
414 SF
1E1
MECH CORE
MECH CORE
MECH CORE
MECH CORE
FUTURE GENERATOR
"ESB"
TRANS
EXISTING CONC PAD
NEW BCF
113
1232 SF
112
815 SF
146
233 SF
147
281 SF
148
347 SF
148B
201 SF
149
900 SF
EXISTING A/C
GAS MTR
MECH / ELEC
111
1316 SF
1C4
384 SF
EXISTING RETAINING WALL
REMOVE WALL TO BELOW GRADE
MECH
109
436 SF
1S1
108
84 SF
107
81 SF
106
81 SF
1C2
1C1
157
81 SF
156
81 SF
155
84 SF
1S4
154
178 SF
153
112 SF
152
162 SF
151
391 SF
TEL MH
NEW RETAINING WALL, EQUIPMENT SLAB/PADS, & BCF COOLING EQUIPMENT
PT# 147
N 237043.692
E 2090257.548
EL 996.33
= EXISTING TO REMAIN
= PROPOSED WORK AREAS
PT# 146
N 237110.055
E 2090371.946
EL 996.88
FUTURE SECURITY SCREEN
SCALE: 1" = 30'-0"
A - 3
0'
10'
25'
50'
100'
1 REVISED FIRST FLOOR PLAN

8-23

BIOINFORMATICS COMPUTING FACILITY

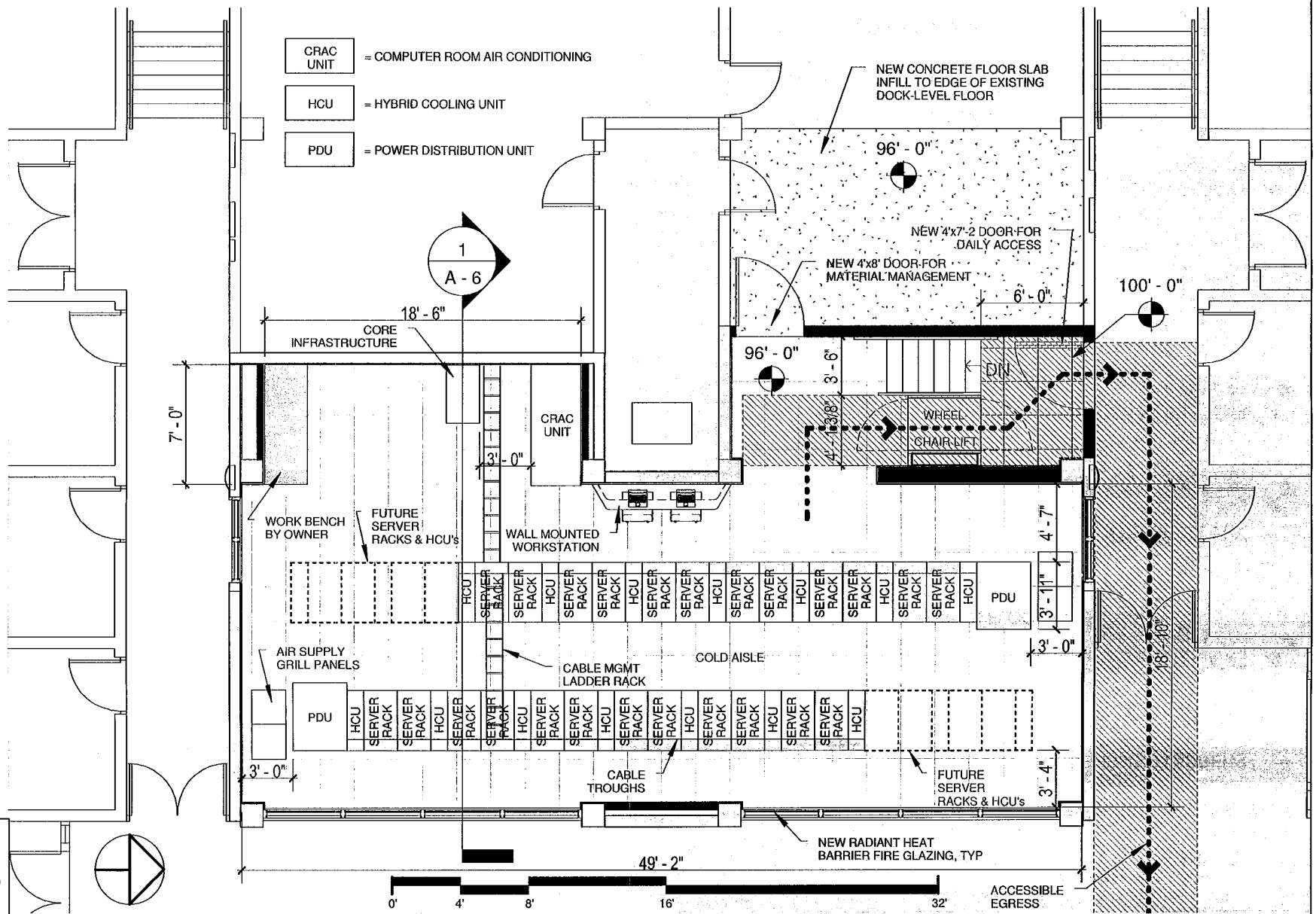
1 EXISTING CORE FACILITY PLAN

A - 4

SCALE: 1/8" = 1'-0"

8-24

BIOINFORMATICS COMPUTING FACILITY



FLOOR PLAN - BIOINFORMATICS COMPUTING FACILITY

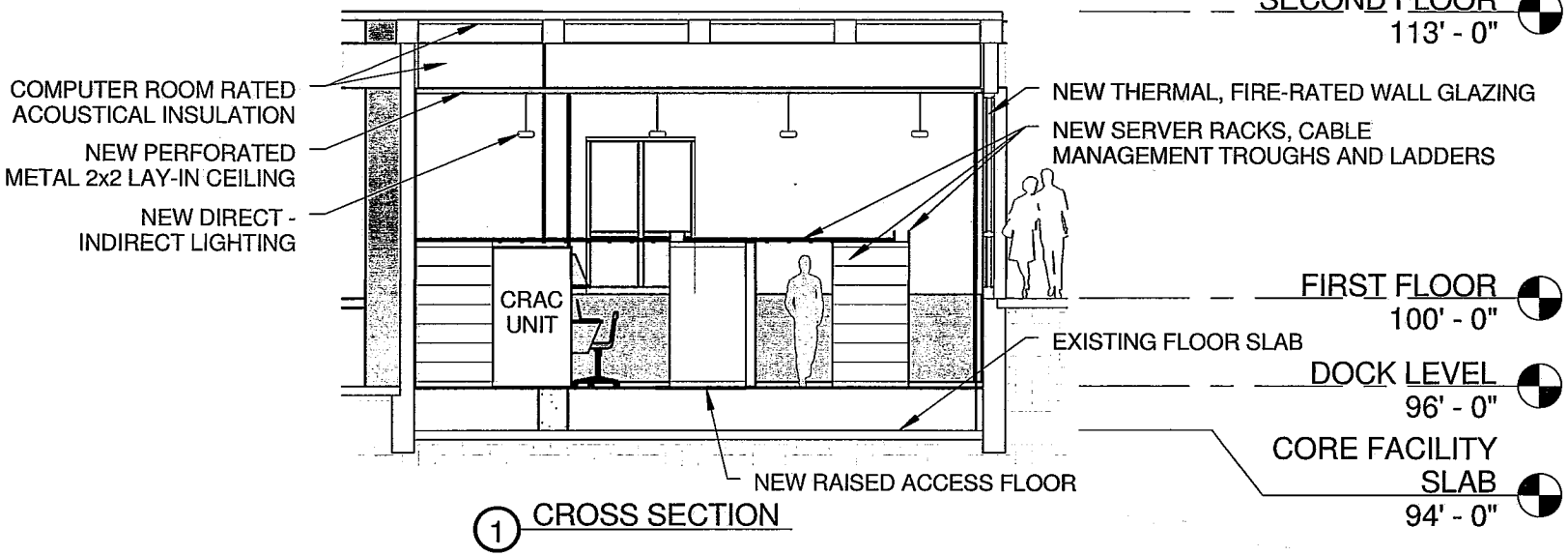
1

A - 5

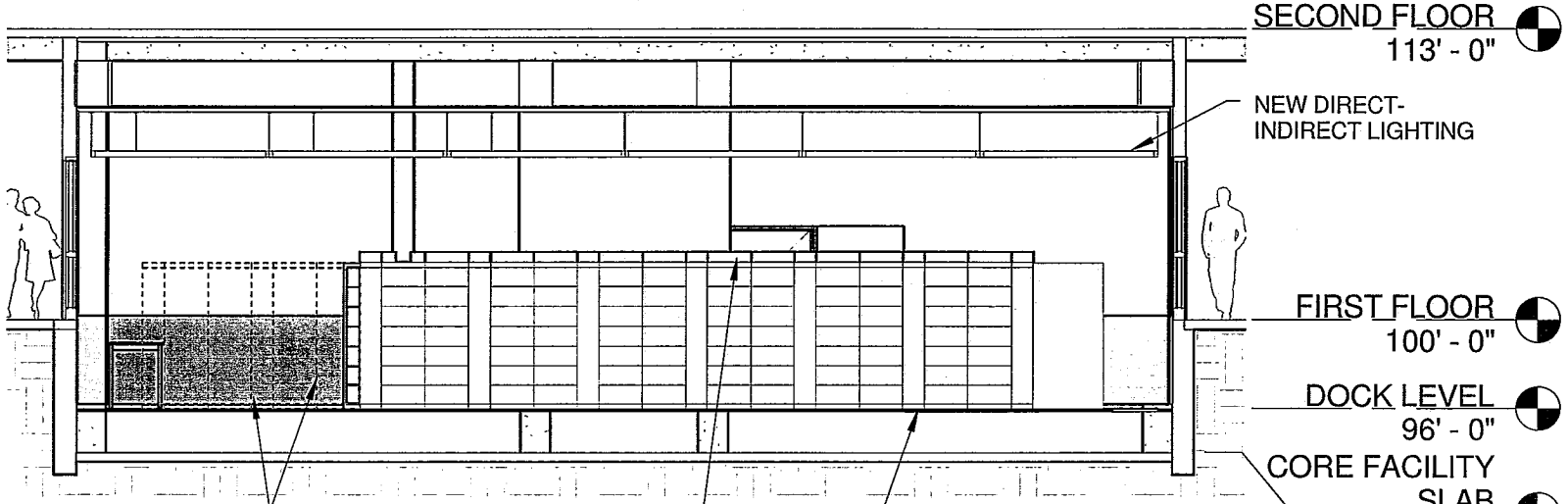
SCALE: 1/8" = 1'-0"

8-25

BIOINFORMATICS COMPUTING FACILITY



1 CROSS SECTION

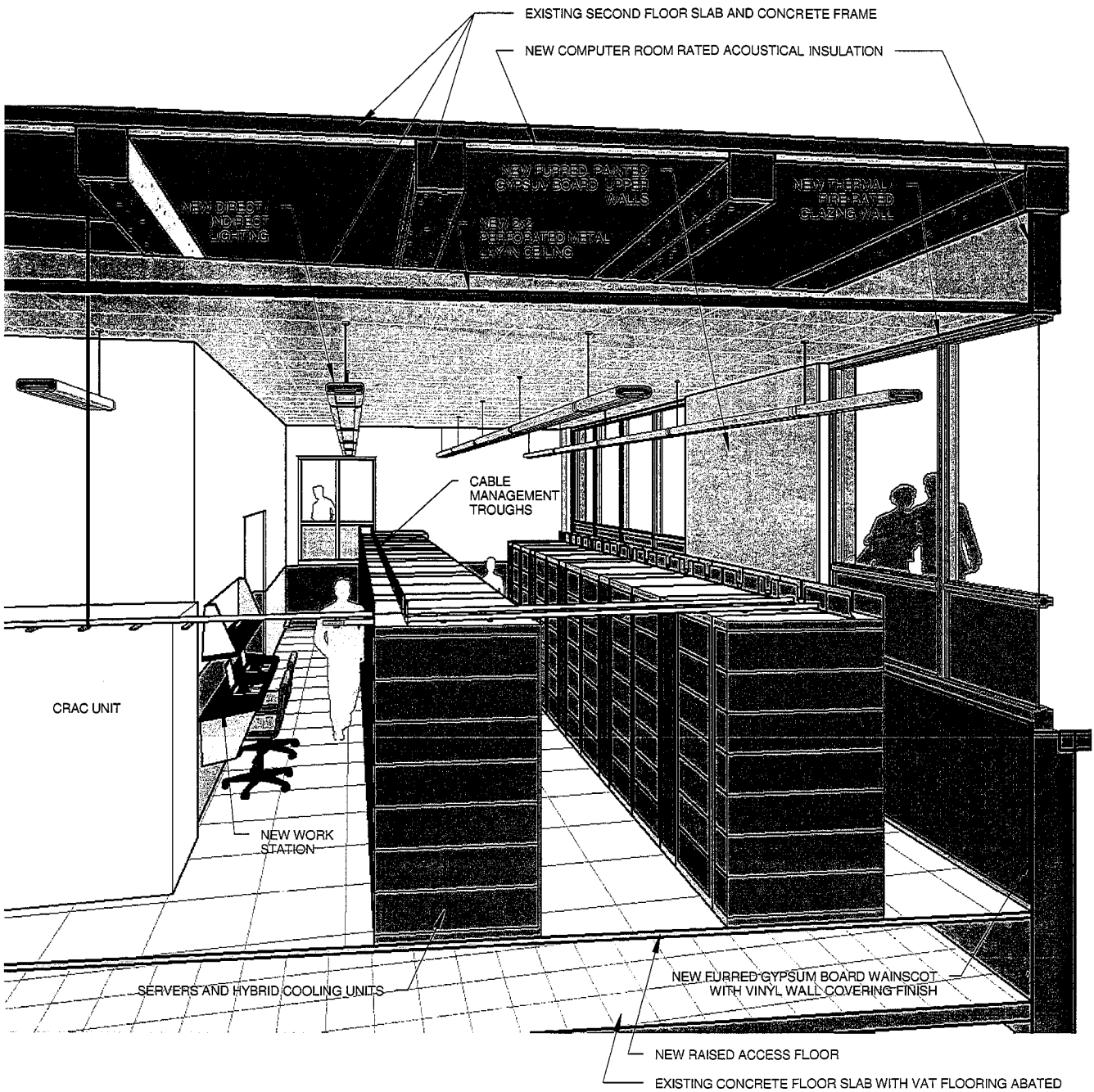


2 LONGITUDINAL SECTION

A - 6

SCALE: 1/8" = 1'-0"

8-26



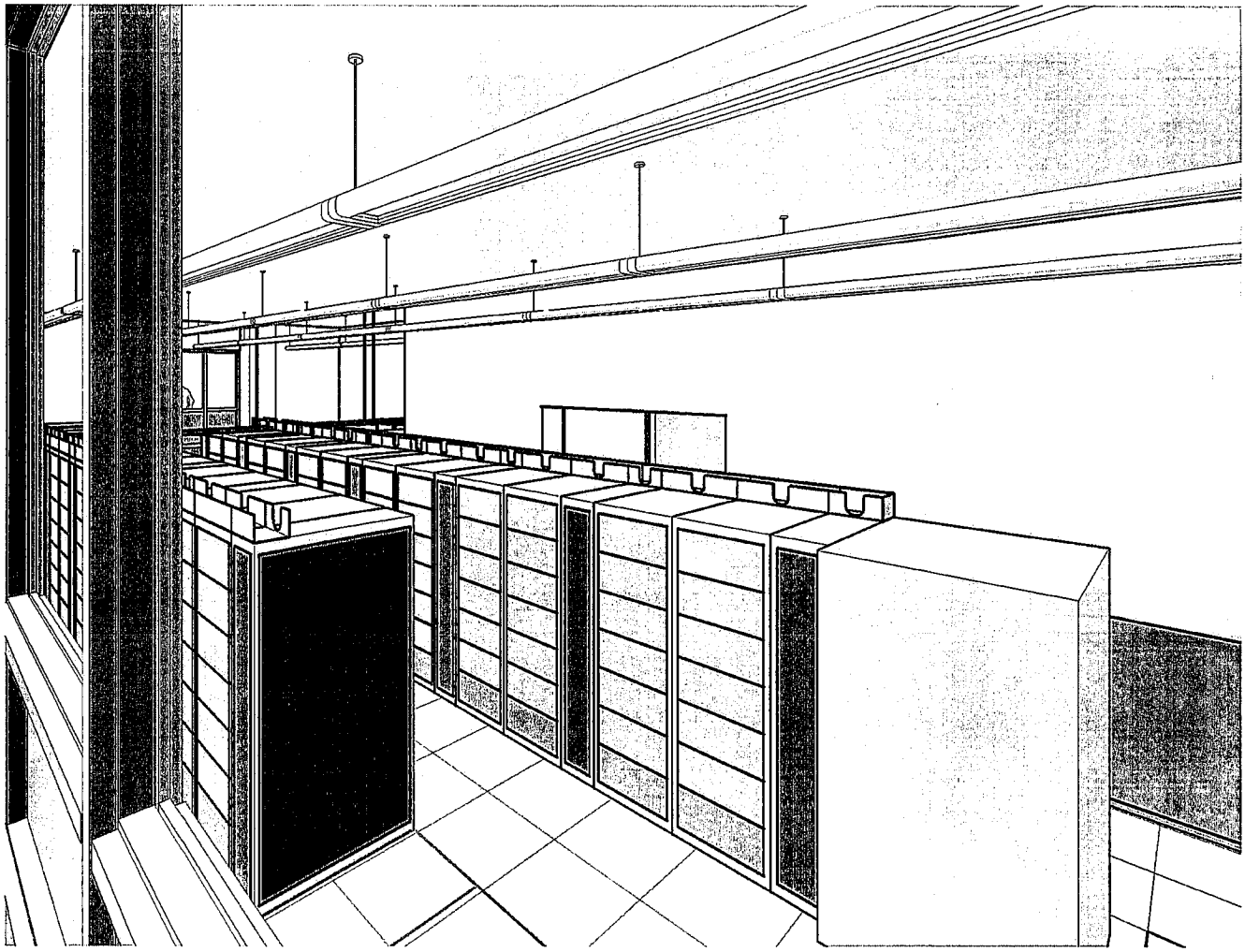
1 SECTION - PERSPECTIVE

BIOINFORMATICS COMPUTING FACILITY

A - 7

SCALE: NO SCALE

8-27



① CORE FACILITY 3D VIEW 2

BIOINFORMATICS COMPUTING FACILITY

A - 8

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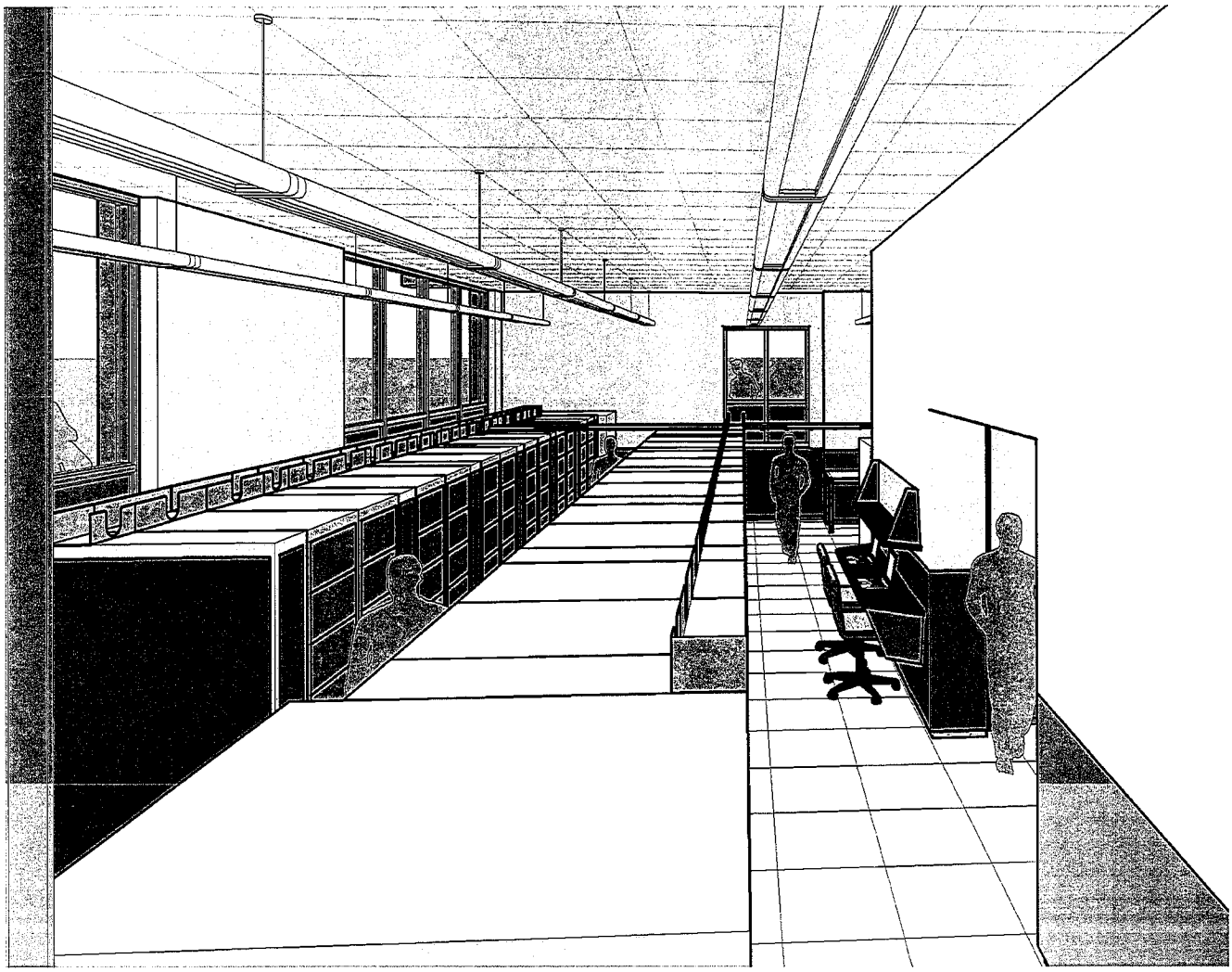


① CORE FACILITY 3D VIEW 3

BIOINFORMATICS COMPUTING FACILITY

A - 9

SCALE: NO SCALE

8-29

Architectural Program

Dyche Hall - NSF ARI-R2 Repair and Renovation: Advancing Research in Biodiversity

KU Project No. 005-8830

Date: April 26, 2010

Prepared by:

The University of Kansas, Lawrence Campus
Biodiversity Institute
Office of Design & Construction Management

Joint Committee on
State Building Construction
May 28, 2010
Attachment 9

Table of Contents

Programming Committee

KU Biodiversity Institute: Leonard Krishtalka, Jordan Yochim, Linda Trueb, Greg Smith

KU DCM: Tom Waechter, Gary Lawson, Jessica Juarez, Steve Scannell

KU Center for Research: Michelle Ginavan Hayes

Introduction

In August 2009, the University of Kansas Center for Research (KUCR) submitted a grant proposal on behalf of the KU Biodiversity Institute (BI) to the National Science Foundation (NSF) in response to a Federal Funding Opportunity which was offered as part of the American Recovery and Reinvestment Act (ARRA) of 2009 economic stimulus program. In February 2010, the University responded to a series of questions from NSF, which resulted in a partial modification and resubmittal of some of the grant application information.

Currently, NSF has indicated its likely intent to award to KU a federal grant of approximately $1,500,000 to fund the development of this project, but as of the date of this program, NSF had not formally committed to an award or an award amount.

This architectural program is based primarily upon the information presented to NSF in the grant application's technical proposal and in the supplemental information submitted to NSF in response to their followup questions. The information taken from the NSF grant application has been further supplemented with other program information and requirements that are unique to the University of Kansas. The original NSF submittal was prepared by the Biodiversity Institute and the Office of Design and Construction Management (DCM).

The concept design embodied in the grant application and in this program document represents the University's intent, and establishes the general scope and goals of the project. Further development, refinements and changes to the concept design shall be made in consultation with and approval of the NSF Federal Program Officer. The University team, the A-E consultant team and the construction team will all be required to comply with the directions and requirements set forth in the terms of the NSF grant award agreement, which is forthcoming and, once available, will be provided to the project team members.

The terms and conditions of this Federal Funding Opportunity will govern the delivery of this project, including the provisions of the Buy American Act and the Davis Bacon Act. Much of the reporting that will be required by the University will also require the cooperation and assistance of the A-E consultant and the Contractor.

NOTE:
The project summary and description which follow may contain components of the initial grant submittal which were reduced or eliminated from the overall scope and budget, based upon the amounts and items which NSF has indicated it will consider for funding approval. The overall program scope and budget need to be verified and coordinated with the final award amount approved by NSF.

Project Summary (NSF Submittal)

This ARI-R2 project will bring a suite of research laboratories and a Server Room in the Biodiversity Institute (BI), University of Kansas (KU) into currency for 21st century research and research-training in biodiversity science, from genomics to species to ecosystem forecasting.

Need. The BI's hub for research/training, Dyche Hall—the oldest (1903) of its 6 buildings—has an aged infrastructure. **(1)** Cyber bandwidth (1gb to building; 100mb to desktop) is insufficient for large-scale data access, complex GIS and modeling analyses, or research networking within KU and externally. **(2)** Outmoded electrical transformers and overloaded circuits cause power outages and shutdowns of critical equipment and research. **(3)** Its Server Room is too small, and has insufficient power, HVAC and network capacity to continue to archive and serve terabytes of biotic and other environmental data to the BI and global community networks. **(4)** Its complex of research/training laboratories—for sequencing, biocomputation, and biotic, morphology and GIS analyses—are beset with makeshift, unworkable bench space, substandard hoods and sinks, overloaded circuits, and inadequate cyber service. In short, Dyche Hall's antiquated research infrastructure is the major hindrance keeping the BI from advancing its national and international leadership and innovation in biodiversity research and research-training—particularly now, when biodiversity science is recognized as one of the grand challenge research imperatives of the 21st C.

Solution. Two levels of renovation/repair are required. ***(A) Primary, building-wide infrastructure:*** The ARI-R2 project will upgrade cyber capacity to the building and Server Room (1gb to 10gb), and to the research workstation (100mb to 1gb). *A complementary $1.15 million project, funded separately by KU, will upgrade Dyche Hall's electrical and air-handling systems to current standards and anticipated growth specifications.* ***(B) Individual laboratories:*** The ARI-R2 project will provide for: **(1)** the expansion and consolidation of the Genomics Complex from 3 disparate labs into 5 integrated facilities with enhanced capabilities for sequencing, and new capabilities for cloning, biocomputation, and cryogenic management of 80,000+ biotic tissues, an irreplaceable genetic research resource; **(2)** new Biotic and Morphology Analysis labs for discovering organismal characteristics that complement and test genetic research; **(3)** a new GIS Analysis lab for synthesizing and predictive modeling of environmental phenomena; and **(4)** a new, 5-fold larger Server Room with high-watt density server racks, dedicated power and air-cooling systems for expanded archiving and serving the data for this research and research-training.

Intellectual Merit.—Despite an antiquated patchwork of common-use research laboratories, the BI has achieved national and international leadership in biodiversity science in research/research-training. This project will advance three cardinal transformations: **(1)** create a research infrastructure that is flexible and adaptable to a rapidly evolving landscape of research approaches, tools, techniques, and instrumentation; **(2)** provide previously unavailable research capabilities, e.g., cloning DNA, digitizing morphology for computational phylogenetic analyses; integrating natural systems and human systems modeling schemas for forecasting the impacts of environmental change; and **(3)** keep the BI's community of scholars/collaborators at the frontiers of transforming knowledge discovery in biodiversity science. Each will expand the BI's scope and scale of research/training in biodiversity science, and create integrative, collaborative and team-based research and research-training environments.

Broader Impacts.—A fourth transformation will be keeping the BI at the frontiers of training students as systems biologists across genes to ecosystems and their informatics realms. The BI, in partnership with five KU academic departments, is a global leader in the research/training of the next generations of biodiversity scientists, with 50–60 graduate students in residence annually. Further, the project will enable the BI to: expand its hands-on lab training in molecular techniques to undergraduates, including underserved minorities at a local tribal university; and bring biodiversity science to K-12 and public audiences via the BI's Natural History Museum.

Project Description (NSF Submittal)

RESULTS FROM PRIOR SUPPORT

NSF 0646470, Expansions of the Collections of the University of Kansas Natural History Museum and Biodiversity Research Center, 01/2007–12/2008, L. Krishtalka, PI; L. Trueb, co-PI, $498,821. This award enabled the purchase and installation of mobile compactor storage systems for the for relocation and rehousing of the Biodiversity Institute's (BI) entire entomological collection (160 cases, 4+ million specimens) and part of the ornithological (89 cases: skeletons, eggs) and mammalogy (224 cases) collections in a renovated BI research facility on West Campus. *The latter two research collections were moved from Dyche Hall on Main Campus as the Phase I project for renovating and expanding substandard research and research-training facilities.* Other project impacts include: training 8 graduate students and 9 undergraduates in the management and informatics of research collections and associated biodiversity data; state-of-the-art collection housing, conservation and access for research and research-training in biodiversity science.

NSF 0132303, The HerpNET Community Informatics Project: Development of a distributed information network of North American herpetological databases (HerpNET). L. Trueb, PI, $2.5 million, 5 years, 2002–2008. The HerpNET project established a global informatics network for biodiversity data associated with 36 national and international herpetological collections, which, during the tenure of the project grew to 66 participating collections totaling more than 5.5 million catalogued specimens and associated data from 370,000 georeferenced localities worldwide. Additional impacts include research-training of 111 undergraduates, graduate students, post-doctorates, volunteers, and staff members at participating institutions in georeferencing and principles of biodiversity informatics. The project designed materials for and hosted 12 workshops in 5 countries for 157 institutions, training a total of 277 people. Informatics innovations mapped HerpNET data providers dynamically on AmphibiaWeb and installed TAPIR and DiGIR information retrieval protocols in 78 institutions as a bridge to eventual union of other vertebrate research collections networks (MANIS, ORNIS, FishNET, refs. 7, 8, 10) into VertNET (ref. 6).

NSF 0553733, Understanding and Forecasting Ecological Change: Causes, Trajectories and Consequences of Environmental Change in the Great Plains, L. Krishtalka, PI, $1,823,138 April 1, 2006–Sep. 30, 2009. This interdisciplinary project developed a robust research infrastructure with Kansas State University to sense, analyze, model, and forecast the biological and ecological consequences of accelerating global changes on the Central Plains. At the Univ. Kansas, the project built a research collaborative of two new faculty—biodiversity and ecological modelers—plus 10 existing faculty, 11 research scientists, 28 graduate students and 17 undergraduates that acquired and integrated empirical biodiversity, ecosystem, land use/land cover and other environmental data[1,2] into modeling architectures for predicting the spread of diseases, invasive species and the impact of climate change on species distributions. Enhancements to cyber tools include the development of Lifemapper II for predictive modeling of species distributions[3] and a new wireless communication system that links field sensors to data archives.

A. THE OPPORTUNITY: ADVANCING EXCELLENCE IN RESEARCH AND RESEARCH-TRAINING IN BIODIVERSITY SCIENCE

Biodiversity research institutions and their biotic collections are sentinel observatories of the life of the planet, peering over its past 3.8 billion years, assaying its present condition, and forecasting its future. Their business is the science of biological diversity. They document, study and educate the populace about life on earth; its animals, plants, and microbes; its history, patterns and processes; and its levels of organization, from genes to species to clades to ecosystems. They educate and train successive generations of biodiversity research scientists: evolutionary biologists and ecologists, earth systems scientists, and informatics specialists.

Now, after 300 years of the systematic biological exploration of the planet, biodiversity research institutions are at a pivotal point in history. Their biocollections—their libraries of life and associated biotic data—are critical to meeting one of the grand challenges of the 21st century: harnessing knowledge of Earth's biodiversity and how it shapes global environmental systems on which all of life depends. This knowledge has never been more important to science and society—for managing natural resources, for sustaining human health, for ensuring economic growth, and for improving the quality of human life.[4] Urgent need for this knowledge

increases daily as the conversion of natural systems to human-managed systems accelerates the decline of biological diversity. Medical science is concerned with the health of one species on earth; biodiversity science tackles the evolutionary and ecological pulse of the Earth's other 15 million or more species.

The Biodiversity Institute, University of Kansas (KU)

The Biodiversity Institute (BI) is a national and international leader in research and research-training in biodiversity science, ranked by a 2008 external review with Harvard University (Museum of Comparative Zoology), University of California–Berkeley (Museum of Vertebrate Zoology), and the Smithsonian Institution (National Museum of Natural History) in its academic programs, in the research quality of its biocollections, in the research productivity and impact of its faculty-curators, research scientists and students, and in the number, interdisciplinary training and success of its graduates. The BI is one of six KU-designated research centers; it reports to the Office of Research and Graduate Studies, and has an operating budget of $4 million in state ($3.2 million) and overhead/endowment ($800,000) funds. The BI comprises:

- all (2 buildings) or part (4 buildings) of six buildings on the KU campus (map, Supp. Materials);
- 13 research divisions (85,514 sf): Biodiversity Informatics, Global Biodiversity Modeling, Mammalogy, Ornithology, Herpetology, Ichthyology, Entomology, Invertebrate Zoology, Parasitology, Botany, Vertebrate Paleontology, Invertebrate Paleontology, Paleobotany, Archaeology;
- departments of Administration (5 FTEs) and IT Systems (2.5 FTEs for 300 workstations, 50 servers, 75 other networked devices)
- research biocollections (43,115 sf) and associated data of 8+ million specimens;
- 61 faculty-curators, research scientists, and professional support staff;
- 50–60 resident graduate students annually in PhD and MS research-training programs;
- a *Natural History Museum* (44,507 sf), with Exhibits and Education departments that bring informal science education to the University and public audiences through in-gallery, in-field, and in-school activities; and
- *The Commons*, dedicated to the interdisciplinary investigation of nature and culture and their reciprocal impacts across the sciences, arts, and humanities (in partnership with KU's Spencer Museum of Art and Hall Center for the Humanities).

Dyche Hall is the central BI research facility. It was built in 1903, with additions in 1964 and 1996 (fluid collection wing) to accommodate burgeoning growth in biodiversity research, in numbers of scientists and graduate students, and in research collections. Eight of its common-use labs, its Server Room and part of its research collections space are the focus of this ARI-R2 project. They serve all BI investigators and graduate students in research and research-training in "cradle-to-grave" biodiversity science from genes to ecosystems: for tissue cryogenics and preparation; for molecular sequencing of animals and plants; for specimen-based biotic preparation and morphological analyses; for archiving and serving terabytes of biotic and environmental data; for biocomputation and GIS modeling of evolutionary, ecological and environmental phenomena; and for providing research collections of fossil and modern vertebrates. "Antiquated" is the polite adjective for the state of Dyche and these research laboratories and facilities." They are fundamentally inadequate to meet the demands of 21st C research and research-training in biodiversity science.

Research. The BI's excellence in research derives from four primary strengths. First, its research faculty, staff, and graduate students (Tables 1, 2) have been immensely successful in forging research partnerships at multiple levels—within the University, nationally, and internationally. Second, with major, extramural funding, the BI has been at the frontier of developing innovative research tools and technologies, analytical approaches, and community informatics architectures in biodiversity science. Third, the BI has deployed these technologies and approaches to unite research disciplines in biodiversity science from genomics, global biotic surveys, phylogenetics, and evolutionary patterns and process to biocomputation, informatics, and GIS and ecological niche modeling of environmental phenomena. The BI serves these research tools, data and results to community biodiversity networks worldwide (e.g., Lifemapper[3], GBIF[5], VertNET[6], MANIS[7], ORNIS[8], HerpNET[9], FishNET[10], Specify[11], AToL[12]). And fourth, the BI's complex of laboratories in Dyche Hall is dedicated to common-use research and research-training in four focal areas that form a continuum in biodiversity science:

- **Planetary and Regional Biotic Surveys and Inventories** to discover and document the immense diversity of animal and plant biotas—their species composition, biogeographic occurrence and distribution, variation, and biotic and abiotic contexts.
- **Evolutionary Morphology and Morpho-informatics** to discover, through detailed examination, dissection, and imaging, the comparative morphological and developmental characteristics of individual species for systematic, phylogenetic, and macroevolutionary analyses and syntheses.
- **Systematics, Phylogenetics, and Macroevolution** to decipher the composition and evolutionary history, biogeography, relationships, patterns and processes of fossil and living biotas.
- **Biodiversity Modeling, Ecoforecasting, and Biodiversity Informatics** to integrate, synthesize and visualize biotic and other environmental data into predictive narratives and tests of biodiversity phenomena, including the impact of climate change on species distributions and ecological associations; the spread of zoonotic disease vectors, hosts and reservoirs; and the spread of invasive species and key ecological cohorts (e.g., pollinators and plants; hosts and parasites).

Statistics, as cynicism has it, is fiction in its most uninteresting form. Cynics aside, BI research statistics are evidence of outstanding productivity and excellence: $37.5 M in competitive, extramural funding in the past 5 years from federal (NSF, CDC, DoE, DoD and DoI), state and corporate agencies and, 546 peer-reviewed publications. Table 1 summarizes current grant-funded research projects, and Table 2 individual lab use in Dyche Hall by research scientists and students, across these four thematic areas.

Research-training. The BI, in partnership with KU departments (Ecology and Evolutionary Biology, Geology, Geography, Anthropology, Electrical Engineering and Computer Science), is a global leader in the training of the next generations of biodiversity scientists, with 50–60 graduate students in residence annually conducting research across biodiversity science. During the past 5 years, the BI and its departmental partners trained and graduated 31 MA and 27 PhD students, and currently hosts 16 MA and 40 PhD students and 5 post-doctorates. All projects listed in Table 1 involve grant-funded research-training. Excellent examples of are the NSF IGERT project, two Philippine survey projects, the KU-Kansas State Univ. Central Plains Ecoforecasting project, and the four AToL projects (Assembling the Tree of Life).

Further, the BI is providing hands-on lab training in molecular techniques and field-based training in biotic techniques to scores of undergraduates, including underserved minorities at a local tribal university, which lacks equivalent facilities for training. Through its partnership in current NSF IGERT and the KU-KSU Central Plains Ecoforecasting projects (PI Krishtalka is a co-PI on both; see Results from Prior Support, Table 1) the BI provides biodiversity science outreach to high school and undergraduate students as well as the public. The BI's Natural History Museum brings biodiversity science to 75,000 visitors and 30,000 schoolchildren annually in gallery, in-school, and in-field activities.

Table 1. Current grant-funded research projects across the BI's four thematic areas of investigation in biodiversity science (not including pending proposals, pending awards, or graduate student grants for research or research-training, e.g., Doctoral Dissertation Improvement Grants). Unless otherwise indicated, all PIs and co-PIs are BI research scientists. Color-coded thematic research areas are: (1) Green: Planetary and Regional Biotic Survey and Inventories; (2) Blue: Evolutionary Morphology & Morpho-informatics; (3) Orange: Biodiversity Modeling, Ecoforecasting & Biodiversity Informatics; (4) Yellow: Systematics, Phylogenetics & Macroevolution.

Research Projects	Thematic Research Area			
	1	2	3	4
NSF: *Collaborative Research—Biodiversity Surveys in the Southern Borderlands of the People's Republic of China.* PI AT Peterson, co-PI R Brown; D Clayton (U. Utah), B Lim (Royal Ontario Museum); 2004–2009, with 1-yr no-cost extension, $750,000				
NSF: *Collaborative Research—A Comprehensive Survey of Philippine Land*				

9-7

Vertebrates and their Parasites. PI R Brown, co-PI RG Moyle, co-PI S Bush, D Clayton (both U Utah); 2008–2013, $900,000	■			
NSF: *Collaborative Research—Biodiversity Surveys in the Eastern Gobi Desert, Mongolia*, PI AT Peterson, co-PI R Brown on U Nebraska (PI S. Gardner) subcontract; $620,000 2008–2012, collaboration among KU, U Nebraska, U New Mexico, Portland State, Hokkaido University, National University of Mongolia	■			
NSF: *Avian diversification across tropical Asia: A systematic and biogeographic analysis of babblers (Aves: Timaliidae)*, PI RG Moyle (KU); $225,000, 2008–2011, with Field Museum of Natural History	■		■	
CDC: *Forecasting Emerging Zoonotic Disease Transmission*, PI L Krishtalka, co-PIs AT Peterson, RG Moyle, J Soberón, R Brown, M Robbins & M Grose; $1,121,067, 2008–2009 with no cost extension to 2011	■		■	
NSF: *Survey of the aquatic insects of northern Venezuela with an emphasis on Coleoptera*, PI AEZ Short; $500,000, 2008–2012	■			
Wildlife Conservation Society: *Avian Influenza Surveillance in Africa and Asia.* PI AT Peterson, 3 grants, 2007–2009, total $120,000;	■		■	
Wildlife Conservation Society: *Biodiversity Research in New Guinea.* PI AT Peterson, 2007–2009, $30,000	■			
NSF: *Antarctic Ecosystems across the Permian-Triassic boundary: Integrating Paleobotany, Sedimentology, and Paleoecology.* PI EL Taylor, co-PI TN Taylor, 2007–2010, $411,497	■		■	
NSF: *DataONE (Observation Network for Earth).* Co-I D. Vieglais; PI W Michener (U New Mexico), co-PI R Cook, Oak Ridge National Laboratory; M Frame, USGS National Biological Information Infrastructure (NBII); S Hampton, National Center for Ecological Analysis and Synthesis (NCEAS), UC-Santa Barbara; K Smith, National Evolutionary Synthesis Center (NESCent), Duke U, 2009–2014, $20M	■		■	
NSF: *INTEROP: Creation of a Virtual Data Center for the Biodiversity, Ecological and Environmental Sciences.* Co-PI D. Vieglais; PI W Michener (U New Mexico); co-PI M Jones, National Center for Ecological Analysis and Synthesis (NCEAS), UC-Santa Barbara; K Smith, National Evolutionary Synthesis Center (NESCent), Duke U; 2008-2011, $749,408	■		■	
NSF: *Fossil microbes from the Rhynie Chert Lagerstätte.* PI TN Taylor, co-PI M Krings; $385,000, 2006–2009	■			
NSF: *Assembling the Tree of Life: Cypriniformes. Earth's most diverse clade of freshwater fishes.* PI G Arratia, 2004–2009, $398,966 with supplements. Collaboration among KU, Tulane U, St. Louis U, U Minnesota, U Alabama, U South Dakota				
NSF: *Assembling the Tree of Life: Collaborative Research: Assembling the Euteleost Tree of Life–Addressing the major Unresolved problem in Vertebrate Phylogeny,"* PI E Wiley, 2007–2012, $309,985.00, collaborative with, U Nebraska, U Oklahoma, U Florida, Field Museum of Natural History, St. Louis U, Loyola U, Old Dominion U				
NSF: *Assembling the Tree Of Life: AmphibiaTree—an Integrated, Phylogenetic and Bioinformatics Approach to the Tree of Amphibians.* $237,000, 2003–2008, with 1 Yr no-cost extension: PI L Trueb, co-PI Brown, co-PI at KU; collaborative with U. Texas, Austin, U.C.–Berkeley, Harvard U.	■		■	
NSF: *Assembling the tree of life An integrative approach to investigating cnidarian phylogeny.* PI P Cartwright, co-PI D Fautin, co-PI AG Collins, $2,854,116, 2006–2011	■		■	
NSF: *Assembling the tree of life: Large-scale phylogeny of Hymenoptera.* PI M Engel, 2004–2009, $228,825. Collaboration with U Kentucky, UC-Riverside, American Museum of Natural History				

National Geographic Society: *Establishing Conservation Priorities for Philippine Tarsiers (Tarsius syrichta) Using Survey, Population Census, Bioacoustic, and Molecular Conservation Genetic Techniques to Identify Evolutionary Significant Units for Conservation*, PI R Brown PI; co-PI J Weghorst, Philippine co-PIs M Shekelle, I Neri-Arboleda, M Diesmos, Duya,; $24,605, 2007–2010.				
NSF: *Comparative Biogeography of Sulawesi—Phylogenetic and Coalescent Analyses of Diversification in Frogs, Lizards, and Monkeys*. PI R Brown, $244,481 2007–2010, with UC-Berkeley, McMasters U (Canada)				
NSF: *Revisionary systematics of Cheirurid trilobites.* PI B Lieberman, 2007–2010, $450,000,				
NSF: *Collaborative research: Phylogenetic reclassification and generic revision of the rove beetle tribe Staphylinini.* PI S Chatzimanolis, co-PI MS Engel, $235,258, 2008–2011				
NSF: *Collaborative research: Cretaceous insects and the origins of modern insect diversity.* PI M Engel, 2006–2009, $117,433				
NSF: *Planetary Biodiversity Inventory: A survey of the tapeworms (Cestoda: Platyhelminthes) from the vertebrate bowels of the Earth.* PI K Jensen, 2007–2012, $412,273, collaboration with U Connecticut ($3M award)				
NSF: *A survey of the elasmobranchs and their metazoan parasites of Indonesian Borneo (Kalimantan)*. PI K. Jensen, 2004-2009, $211,458, collaboration with U Connecticut				
NSF: *Phylogenetics and evolution of Crassula (Crassulaceae).* PI M Mort, $289,577, 2006–2009				
NSF: *MRI: Acquisition of an Advanced Computational Infrastructure for Modeling Biological Systems*,. co-PI AT Peterson, with KU Information Technology and Telecommunication Center (ITTC), 2008–2010, $300,000.				
NSF: *ORNIS: A Community Effort to Build an Integrated, Distributed, Enriched, and Error-checked ORNithological Information System.* PI AT Peterson, co-PI M Robbins, D Vieglais, 2004–2009, $1,500,000				
DoD: *Global Emerging Infections Surveillance: Modeling the Potential Distribution of Mosquito Vectors of Infectious Human Diseases.* PI AT Peterson, 2008–2010, $167,000				
State of Kansas: *Systematic inventory for natural areas and habitat for protected and rare species in Anderson and Linn counties, and implementation of previous and current findings in northeast Kansas*. co-PI C Freeman, (PI K Kindscher, co-PIs W Busby, J Delisle, KS Bio Survey, $240,760)				
USDA: *Taxonomic concept mapping and associated data maintenance for the USDA PLANTS database*. PI CC Freeman, 2009–2010, $140,000				
Microsoft Research: *Ecological Niche Modeling in Theory and Practice*. PI J Soberón, co-PI AT Peterson 2007–2010, $550,000,				
NSF: *Understanding and Forecasting Ecological Change: Causes, Trajectories and Consequences of Environmental Change in the Great Plains.* L Krishtalka, PI, co-PIs E Martinko (KU-KBS), V Frost (KU-ITTC), W Dodds, J Blair, J Harrington (all Kansas State U), 2006–2009 $1,823,138				
NSF: *Effects of climate change on ecosystem services provided by Hawaiian coral reefs*. PI D. Fautin, co-PIs P Jokiel, RW Buddemeier (KU) $242,954				
NSF: *Building the Information Community Infrastructure—A Test Case Implementation for Ichthyological Collections.* PI, D Vieglais, 2003–2009,$750,000				
DoI: *Programming Support for Biodiversity Informatics Activities*. PI AT Peterson, co-PI L Trueb. National Biological Information Infrastructure, US Geological Survey, 2008–2012, $115,000/yr				

NSF: *IGERT: C-CHANGE: Climate Change, Humans, and Nature in the Global Environment.* PI J. Nagel, co-PI L Krishtalka, AT Peterson, J Soberon, D Braaten (KU-ITTC), D Wildcat (Haskell Indian Nations U), 2008–2013, $3M			

Table 2. Research and Research-Training Personnel showing Dyche Hall laboratory use across thematic research areas. Shaded cells/numbers denote use by researcher plus number of his/her graduate students. The 3 current common-use labs in the Genomic Complex are: *Amplification Lab* (no renovation requested) and *Sequencing Lab* (both Fl 5), and *Biocomputation Lab* (Fl 4). Of the areas designated for renovation in Dyche Hall, the Server Room and the Research Collections spaces (Fl 5, 7) serve all personnel and therefore are not listed here.

	Biotic Surveys & Inventories					Evolutionary Morphology & Morpho-informatics			Biodiversity Modeling, Ecoforecasting & Biodiversity Informatics					Systematics, Phylogenetics & Macroevolution				
Research and Research - Training User Community: Faculty-Curators, Research Scientists (# students)	**Genomic Complex–3 labs**	**Biotic Analysis**	**Morphology**	**Biocomputation**	**GIS**	**Biotic Analysis**	**Morphology**	**Biocomputation**	**Genomic Complex–3 labs**	**Biotic Analysis**	**Morphology**	**Biocomputation**	**GIS**	**Genomic Complex–3 labs**	**Biotic Analysis**	**Morphology**	**Biocomputation**	**GIS**
Arratia (1)	2		2				2									2		
Beach (2)				3								3	3					
Bentley	1			1										1				
Brown (7)	8		8	8	8							8	8	8		8	8	8
Campbell	1			1										1				
Cartwright (3)	4													4			4	
Chaboo (1)	2		2				2	2						2		2	2	
Duellman	1		1				1							1		1	1	
Engel (3)			4	4			4	4									4	
Falin	1		1	1			1	1						1		1	1	
Fautin (2)	3		3	3	3		3	3	3		3	3	3	3		3	3	3
Freeman (1)			2	2	2		2	2			2	2	2			2	2	2
Grose	1			1					1			1		1			1	
Benson	1		1	1			1	1						1		1	1	
Holder (1)							2	2				2				2	2	
James	1		1	1			1	1								1	1	
Jensen (2)	3		3	3	3		3	3						3			3	3

Lieberman (4)			5	5	5		5	5			5	5	5			5	5	5
Martin (3)	4		4				4	4			4	4				4	4	
Mort (3)	4		4	4	4		4	4						4		4	4	4
Moyle (2)	3	3	3	3	3	3	3							3	3		3	3
Peterson (8)	9	9	9	9	9	9			9	9		9	9	9	9		9	9
Robbins	1	1				1			1	1					1			
Schultze (2)			3				3									3		
Short (1)	2		2	2	2		2		2			2	2	2		2	2	2
Slade (2)		3								3						3		
Soberón (1)				2	2			2				2	2				2	2
Timm (2)	3	3				3			3	3				3	3			
Trueb (3)	4		4	4	4		4	4			4	4		4		4	4	
Vieglais				1	1			1				1	1				1	1
Wiley (5)	6	1	6	6	6	1	6	6	6	1	6	6	6	6	1	6	6	6
Postdoctorates																		
Blackburn	1		1	1	1		1	1	1		1	1	1			1	1	1
Miller				1	1			1			1	1					1	1
Welch														1			1	
Bush	1	1			1			1	1	1			1	1	1			1
Jiminez	1	1			1	1		1	1	1			1	1	1			1
Sanchez	1	1			1	1		1	1	1			1	1	1			1
Totals	**69**	**23**	**69**	**67**	**57**	**19**	**54**	**50**	**29**	**20**	**26**	**54**	**45**	**61**	**20**	**55**	**76**	**53**

B. RESEARCH FACILITIES: NEEDS AND SOLUTIONS

The BI's national and international leadership in biodiversity research and research-training has been achieved in spite of Dyche Hall's failing infrastructure. Although BI research occurs in six buildings on Main and West Campus, Dyche Hall is the research and research-training hub for students, faculty and research scientists in the BI and in the departments of Ecology and Evolutionary Biology, Geology, and Geography. Seven of its core common-use laboratories form a framework for research and research-training in integrating genes-to-ecosystem biodiversity science (Table 3): a *Genomics Lab Complex* (currently 3 labs), the *Morphological Analysis Lab*, the *Mammalogy Preparation* and *Ornithology Preparation* labs, and the *GIS Analysis Lab*. Six of these seven labs suffer from major deficiencies ranging from makeshift, unworkable bench space to archaic and failing electrical, HVAC, and cyber service. Therefore, two levels of renovation/repair are required to modernize Dyche Hall's research complex for 21st C science: (1) Primary, building-wide infrastructure (cyber, electrical, HVAC*), a KU commitment*; and (2) individual laboratory facilities (ARI-R2).

B. 1 Dyche Hall: Building-wide Cyber, Electrical, HVAC, and Server Room

Need. Built in 1903, Dyche Hall is a stately building on the National Historical Register and the second oldest on campus. Despite additions in 1964 and 1996 (Fluid Collection wing), it suffers from an aged infrastructure and years of deferred maintenance. The ***cyber service*** from the KU Computer Center (@1gb), the oldest on campus, is a mix of copper, older multi-mode and newer single-mode fiber; within Dyche, a single-mode riser branches to 100mb copper switches that serve the research/training areas targeted for renovation. These bandwidths are insufficient for complex biodiversity GIS and modeling analyses and visualization, and for research networking with KU and external collaborators.

The current ***Server Room*** (6th Fl, Dyche; 94 nsf), overseen by co-PI G. Smith (Senior Systems Admin), archives and serves terabytes of biotic and other environmental research data to the entire BI and global community networks[3,5–12]. Designed originally as an office, it is too small for current and anticipated data storage and server needs, and has limited network capacity with only 12 100mb network jacks. It lacks sufficient electrical service and backup power to support the HVAC system, which, in turn, lacks humidity controls, redundancy, or fail-safe mechanisms that are standard for cooling server facilities. As a result, repeated electrical overloads have caused system failures and threatened the loss of mission-critical data.

Finally, some of Dyche Hall's **electrical** wiring still dates to the 1930s. Increased electrical demand caused by generations of jury-rigged solutions, air conditioners, and additions of major equipment (e.g., genomic, workstations, servers, etc.) have led to disastrous combinations of outmoded transformers and circuitry. This regularly results in overloaded circuits, power outages and shutdowns of critical research equipment and ongoing research. As the 2008 review of the BI concluded, Dyche Hall's substandard research infrastructure is the major hindrance keeping the BI from further advancing its national and international leadership and innovation in biodiversity research and research-training—particularly now, when national agencies have declared biodiversity science as one of the grand challenge research imperatives of the 21st century[4].

Solution. ***Cyber:*** The ARI-R2 project will upgrade cyber capacity within Dyche Hall and the targeted research areas from 100mb to 1gb, and the service to the building from 1gb to 10gb, including 10gb switching equipment for Dyche and the Server Room and 10gb-capable Category 6A cabling from the Dyche Hall wire-closet to the Server Room. Plans for a campus-wide 10gb backbone include equipment at the KU Computer Center to serve Dyche Hall.

A 5-fold larger ***Server Room*** (Fig. 2; 368 nsf for equipment + 120 nsf mechanical) with expanded server capacity will be installed in the *Research Collections* space on the 5th Floor. It will house server clusters in high-watt density server racks (4, initially), with dedicated electrical and mechanical equipment to support the power and air-cooling capacity at the racks. The HVAC design features Liebert CRV-like row cooling, including iCom networking controls, digital Scroll compressors and EC Variable speed fans with built in humidity monitoring and control, which provides greater load matching capability for cooling and air movement as well as high efficiency. The design accommodates adding racks in the future. Two 80kvA UPS units (like the Liebert NX Softscale) with dual path source power circuits will be installed initially, allowing for upgrades in 20kVA increments to 120kVA. They provide an initial 20 min reserve time at 80kvA for a controlled server shut-down and 12 min at the maximum 120kvA. A power distribution unit/main bypass will include a 3-breaker maintenance bypass with interlock, distribution panel boards and full monitoring. *A complementary $1.15 million project, funded separately by KU from other sources, will upgrade Dyche Hall's* ***electrical and air-handling systems*** *on Floors 5, 6 and 7 to current standards and anticipated growth specifications.*

B.2 Dyche Hall: Individual Laboratories

B.2.1 *Genomics Laboratory Complex—Cryogenic Research Tissue Facility (1st Floor); Tissue Preparation, Sequencing, Cloning/Extraction, Biocomputation (5th Floor)*

B.2.1.1 Need: Cryogenic Tissue Facility (1st Floor). Tissues for genomic analysis are currently maintained on the 5th Fl in seven –80°C ultracold freezers, which are inefficient, expensive to operate, and prone to electrical outages and compressor failures. They are neither as dependable nor as cost effective as a liquid nitrogen cryogenic system in ensuring the genetic integrity of this irreplaceable genomic research resource. Cryogenic storage is all the more critical as biologists target more thermally sensitive biomolecules, such as mRNA for gene expression, and cDNA for library development, which will occur in the new *Cloning/Extraction Lab*, 5th Fl, see below. It also permits preservation of chromosomes and cell suspensions, which are stored in fixatives that thaw at temperatures only slightly above that of liquid nitrogen[13].

Table 3. Major ARI-R2 improvements in research facilities. Shading denotes major improvements in research/training space and/or new research/training capabilities. Red denotes new research/training capabilities.

Old Research Lab/Space	Net SF	Renovated Research Lab/Space	Net SF	FL	Text Fig.
130A Fluid-specimen Processing	*146*	130A **Cryogenic Research Tissue Facility**	***302***	1st	1
502J Morphology Lab	*517*	515 Sequencing Lab	***594***	5th	2
502L Sequencing Lab	*201*	517 **Tissue Preparation Lab**	***201***	5th	2
502E Osteological Preparation	*189*	511 **Cloning/Extraction Lab**	***189***	5th	2
502D Computation Lab	*251*	509 Biocomputation Lab	*251*	5th	2
604A Server Room	*94*	502 Server Room 502A Server Room (mechanical)	***368*** ***120***	5th	2
502 (part) Research Collection	*739*	504 Morphology Analysis Lab, 506 Morphology Analysis (Imaging)	***530*** ***209***	5th	2
709D & 711A Ornithology Prep-aration & Research Collections	*221*	711 Research Collection	*221*	7th	3
701 (part) Research Collections	*221*	702 Biotic Analysis Lab 702A Biotic Analysis Lab (storage)	***890*** ***127***	7th	3
713 (part) Research Collection	*580*	713 (part) **GIS Analysis Lab**	***600***	7th	3

Solution. A small lab currently used for processing research collections of alcohol-preserved specimens will be repurposed and expanded to house the BI's burgeoning research tissue collection of more than 80,000 specimens. The renovation will create appropriately conditioned space (Fig. 1; 302 sf) for: (1) 4 liquid nitrogen cryogenic freezers (dewars), each of which holds 81,900 tissue vials; (2) an L-shaped lab bench for tissue specimen handling; and (3) an alarmed O2-monitoring system that safeguards against major dewar failure and release of subliminated nitrogen. The dewars will be connected via double-walled, vacuum-jacketed stainless steel piping to a bulk liquid nitrogen container (a microbulk™ tank), which, because of minor but regular nitrogen off-gassing, is typically mounted outdoors—in this case, along the north wall of Dyche Hall adjacent to the lab (Fig. 1). A local vendor, Praxair, Inc., will provide the dewars, their ancillary components, and the liquid nitrogen. Initially, two dewars will be installed in the Cryogenic Facility. *The BI will purchase and install the 2 dewars and lease the microbulk unit with other, non-ARI-R2 funds (~$105,000).*

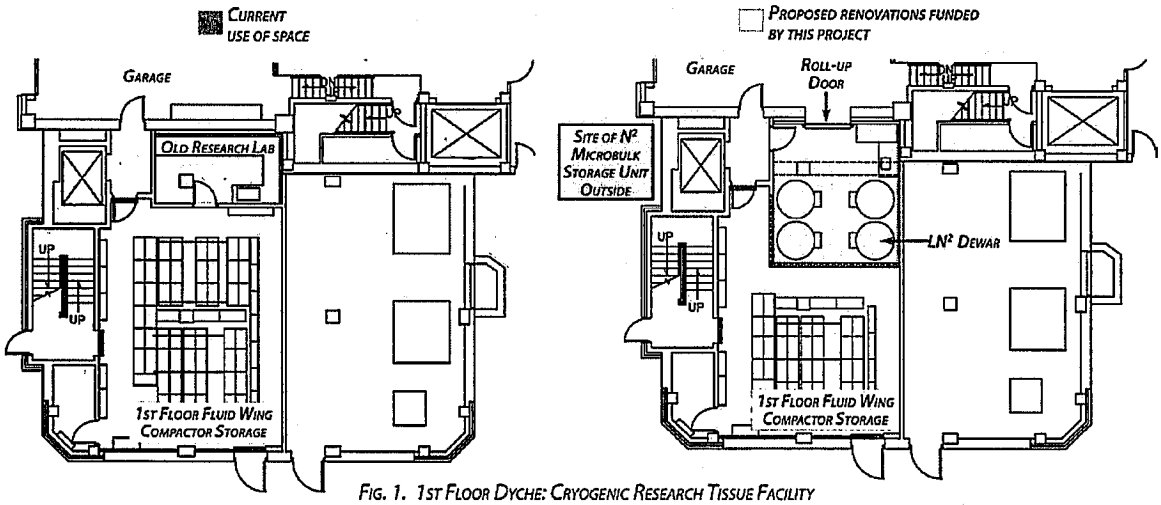


FIG. 1. 1ST FLOOR DYCHE: CRYOGENIC RESEARCH TISSUE FACILITY

Installing the Cryogenic Tissue Facilities requires expansion into part of the fluid-collection wing on Level 1 that houses alcohol-preserved research collections. Current ventilation, temperature, and humidity control is provided by a 100%-outside air supply/exhaust system, which keeps the temperature below 60°F to minimize evaporation of ethanol. A high rate of air exchange guards against the buildup of highly volatile fumes. The new wall between the Cryogenic Facility and the fluid collections necessitates installation of a separate fan-coil unit for heating/cooling the Facility. Exhaust of nitrogen gas from dewar boil-off will require a variable frequency drive exhaust fan, typically operating at low ventilation rates for energy efficiency, but with capacity, during an emergency condition, to exhaust an uncontrolled release of nitrogen gas.

B.2.1.2 Need: Sequencing, Cloning/Extraction, Biocomputation, Tissue Preparation Labs (consolidated on the 5th Floor). With its newly acquired 48-capillary ABI 3731S sequencer, the *Genomics Lab Complex* serves the entire BI, as well as faculty, research scientists, and students in Ecology and Evolutionary Biology (EEB)—approximately 65–80 investigators—and is operating at 75% capacity. The complex is overseen by a BI faculty/curator (R. Moyle), managed by a lab director (M. Grose), and advised by a board of research scientists.

Although the common-use *Genomics Lab Complex* serves a unitary research and research-training purpose, it is currently dispersed in three lab spaces on two floors of Dyche Hall (Table 3). Molecular work occurs in two labs (***Sequencing***; ***Amplification***) on the 5th Floor (Fig. 2, left), whereas sequence alignments and complex phylogenetic analyses are conducted in the ***Biocomputation Laboratory*** on the 4th Floor.

The ***Biocomputation Lab*** consists of a computer cluster and software purchased with grant funds by BI researchers, and serves the same clientele as the *Sequencing* and *Amplification* labs, approximately 76 research scientists and students. The word "laboratory" here is a loose term for tables sandwiched between library shelves in a room that lacks sufficient electrical and cyber capacity for high performance computation. Research and research-training effectiveness dictate that an expanded *Biocomputational Lab* be installed adjacent to the *Sequencing and Amplification* laboratories on the 5th Floor (Fig. 2), and equipped with appropriate bench, electrical and cyber capacity for current needs and anticipated growth.

The ***Sequencing Lab***, currently used by ~69 research scientists and students, is too small for multiple sequencing operations and lacks the minimum factory-recommended bench space for the ABI 3730S. Older equipment (16-capillary ABI machine, a LYCOR analyzer and thermocyclers) cannot be used owing to lack of space and electrical capacity. The need is for a larger *Sequencing Lab* (in the current *Morphology Lab* space) adjacent to the *Amplification Lab* (Fig. 2).

A ***Cloning/Extraction Lab***, isolated from the current *Amplification Lab*, is required to amplify ancient DNA to ensure against contamination. Cloning is at the forefront of modern genomics techniques and requires

positive air pressure and a Biosafety Cabinet/Hood, and space for incubator ovens, a bench-top autoclave, and refrigerator. The project will renovate and re-purpose the current *Osteological Preparation Lab* adjacent to the *Amplification Lab* (Fig. 2, left).

Finally, the *Genomics Complex* requires an adjacent ***Tissue Preparation Lab*** for the quick, safe, and uncontaminated handling and transfer of tissues to the *Amplification and Sequencing labs.* Installation of a *Tissue Preparation Lab* (in the current *Sequencing Lab* space, Fig. 2) complements the shift from ultracold freezers to a liquid nitrogen (Cryogenic Tissue, 1st Fl) system.

Solution. A 5th Floor suite of 4 new consolidated Genomic Laboratories (Fig. 2, Table 3)—*Sequencing, Cloning, Biocomputation, Tissue Preparation*—will be designed, installed and equipped as combination wet and dry facilities for preparing, manipulating and analyzing biological material for molecular investigations. *In a separate project funded by KU, the suite's air conditioning/ventilation system—a 1962-vintage multizone central station air handler—will be replaced by a roof-top air supply unit and new equipment for air-handling supply.* This system will provide one-pass 100% outside air and variable volume/reheat supplies, with exhaust systems controlled to track supply volumes and maintain appropriate space pressure differentials relative to adjacent spaces and ambient conditions. Complementarily, the ARI project will install the ducting, pressure-independent variable air-volume boxes with reheat coils, and the lab suite's exhaust hoods.

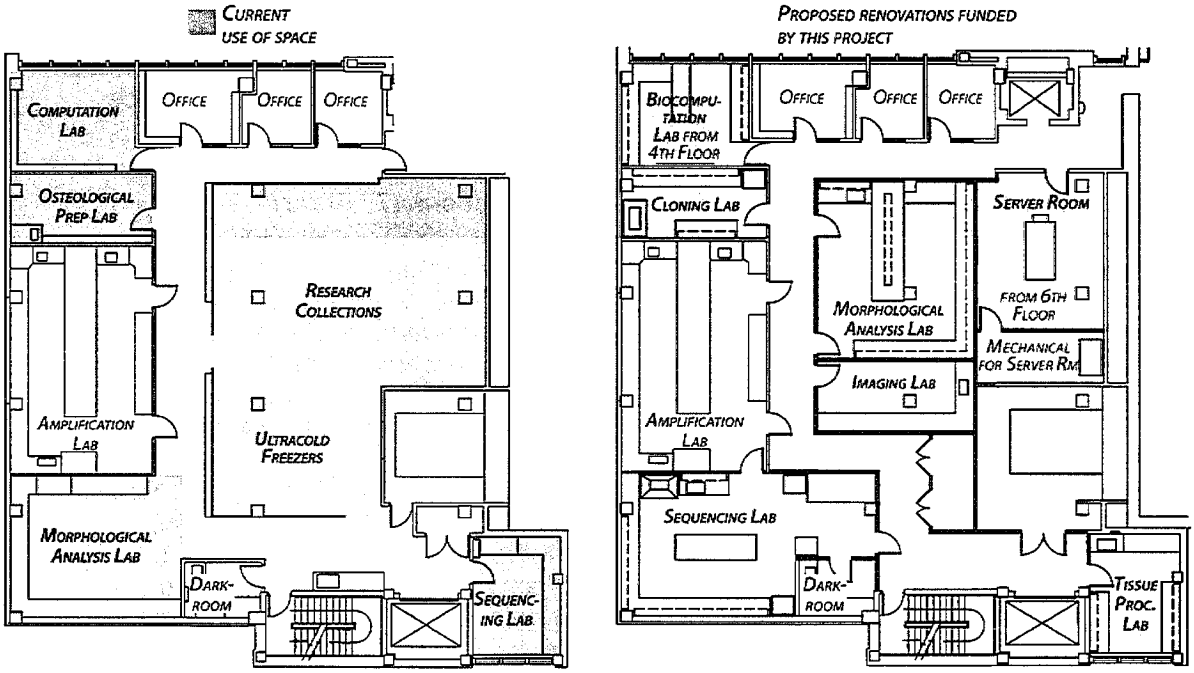


FIG. 2. 5TH FLOOR DYCHE: GENOMICS LAB COMPLEX, MORPHOLOGICAL ANALYSIS LABS, BIOCOMPUTATION LAB & SERVER

The new ***Sequencing Lab*** (Fig 2; 594 nsf; capacity 10) will house the ABI 3730S sequencer, with a center island for 6 thermocyclers, lab benches around the periphery for PCR amplification and loading the sequencer, and a hood with air, gas and water. The new ***Tissue Preparation Lab*** (Fig 2; 201 nsf; capacity 3) will house two –80°C ultracold, short-term storage freezers (with CO2 backup units) for handling, processing and transfer of tissue samples to and from the cryogenic dewars (1st floor). The new ***Cloning/Extraction Lab*** (Fig. 2; 189 nsf; capacity 3) reserved for ancient DNA extractions, will be isolated against possible contamination with positive air pressure and a Biosafety Cabinet/Hood with sink. The new ***Biocomputation Lab*** (Fig. 2; 251 nsf; capacity 10) will serve sequence alignment and systematic, phylogenetic and macroevolutionary computational analyses. Designed solely as a high-performance computational lab, it will house 8 workstations and a 16-node computational cluster with appropriate electrical capacity, cyber access and UPS security.

B.2.2 *Morphology Analysis Laboratories (5th Floor)*

Need. The current *Morphology Lab* (Fig. 2), overseen by Prof. Ed Wiley, serves ~54 researchers (Table 2) studying/dissecting specimens of fossil and living organisms to discover phenotypic characters with systematic, taxonomic, developmental, evolutionary and phylogenetic signal. The lab remains unchanged from the 1960s, when it was designed for cataloguing anthropological artifacts (then housed in Dyche Hall) and is dysfunctional for its current use (photo, Supp. Materials). Biotic material studied in this lab is preserved in alcohol or glycerin, dry preparations (e.g., skins, bones or fossils); and histological, both cleared-and-stained and prepared as slides.

Basic needs for research and research-training that are either lacking or substandard in the current lab include: (a) exhaust hoods for research work on specimens preserved in volatile fluids; (b) appropriate sink and waste-disposal facilities; and (c) 10 research stations (benches/counters) to accommodate microscopic investigations, each equipped with appropriate storage, lighting, electrical, and cyber access. Virtually all morphological material requires microscopic study (dissecting to compound) with computer-aided imaging and morpho-informatics capacity. The equipment is expensive and requires security; the current area is open and not securable.

Solution. The ***Morphology Analysis lab*** (Fig. 2; 530 nsf; capacity 10) is designed for whole-specimen dissections, preparations of cleared-and-stained specimens, examination of wet (ETOH and glycerin) and dry (osteological) specimens. Imaging equipment, attached to high-quality dissection microscopes with drawing tubes, will be located in an adjacent imaging lab (Fig. 2; 209 nsf; capacity 3) for security. Vibration is not an issue for this or any room in this 1964 wing of the 5th Floor, which was constructed with poured-in-place concrete as an anti-vibration measure for housing research collections.

B.3 Biotic Analysis and GIS Analysis Laboratories, Research Collections (7th Floor)

Need. The two current Research Preparation Laboratories for Ornithology (221 nsf; photo, Supp. Materials) and Mammalogy (357 nsf; Fig. 3, top), overseen by Museum Specialist M. Robbins and Curator R. Timm, respectively, are more than 50 years old and are too antiquated to serve their research function—the preparation and analysis of voucher specimens of birds and mammals from worldwide biotic surveys and inventories. Specifically, they lack venting (exhaust and fume hoods), biosafety cabinets, benches and electrical and plumbing service that comply with current industry and safety standards (photo, Supp. Materials). More seriously, the Ornithology lab is not in compliance with modern fire regulations requiring access to a smoke-free corridor.

The current GIS "Laboratory" (Fig. 3, top), overseen by Distinguished Prof/Senior Curator A. T. Peterson, serves research and research-training in GIS and ecological niche modeling of biodiversity and other environmental phenomena that incorporate the data associated with the biotic collections (Tables 1, 2). The term "Laboratory" is a euphemism for an ad hoc row of high performance computers on low-performance tables, which inhibits research-training and student team projects (photo, Supp. Materials). The area suffers consistent power outages owing to remnants of 1930s electrical wiring, and has inadequate cyber access and bandwidth for downloading large datasets and serving GIS models and visualizations.

Solution. A common ***Biotic Analysis Lab*** (Fig. 3; 890 nsf + 127 nsf storage) will combine the research specimen preparation and training functions of the current Mammalogy and Ornithology labs, both of which will be demolished—the former for bathrooms and a research office/lab (*both KU-funded*), and the latter for expanded **Research Collections** facilities. The *Biotic Analysis Lab* will be installed as a wet lab space in 890 sf currently occupied by Mammalogy research collections (Fig. 3, top), which will be moved to the *Combined Research Collections* space upon the demolition of the Ornithology Lab. Specifications for the air supply and exhaust systems are the same as those for the 5th Fl lab suite (see B.2.2 above), with roof-mounted air handling equipment.

Two companion projects, *both funded by KU*, will (1) replace existing electrical service panels that power area receptacles; and (2) for student research-training, install research offices for 18 graduate students in the 2200 sf between the *Biotic Analysis Lab* and the north wall (Fig. 3).

GIS Analysis Lab. The GIS Lab (Fig 3; 600 nsf) will be installed as a central research and research-training "court" surrounded by student and post-doctorate research offices (1,819 nsf on architectural drawing). Two four-sided, cyber-wired lab benches with a connecting bench will form the hub of the lab, providing eight GIS seats, a counter surface for printers and maps, and a white board. A separate project, *funded by KU*, will replace the existing electrical service panels with larger capacity units. The existing air conditioning/ventilation unit is suitable for the future GIS Lab. However, distribution ducting, VAV boxes, and discharge diffusers will be modified as necessary to accommodate the revised space configuration.

C.

5th Floor –

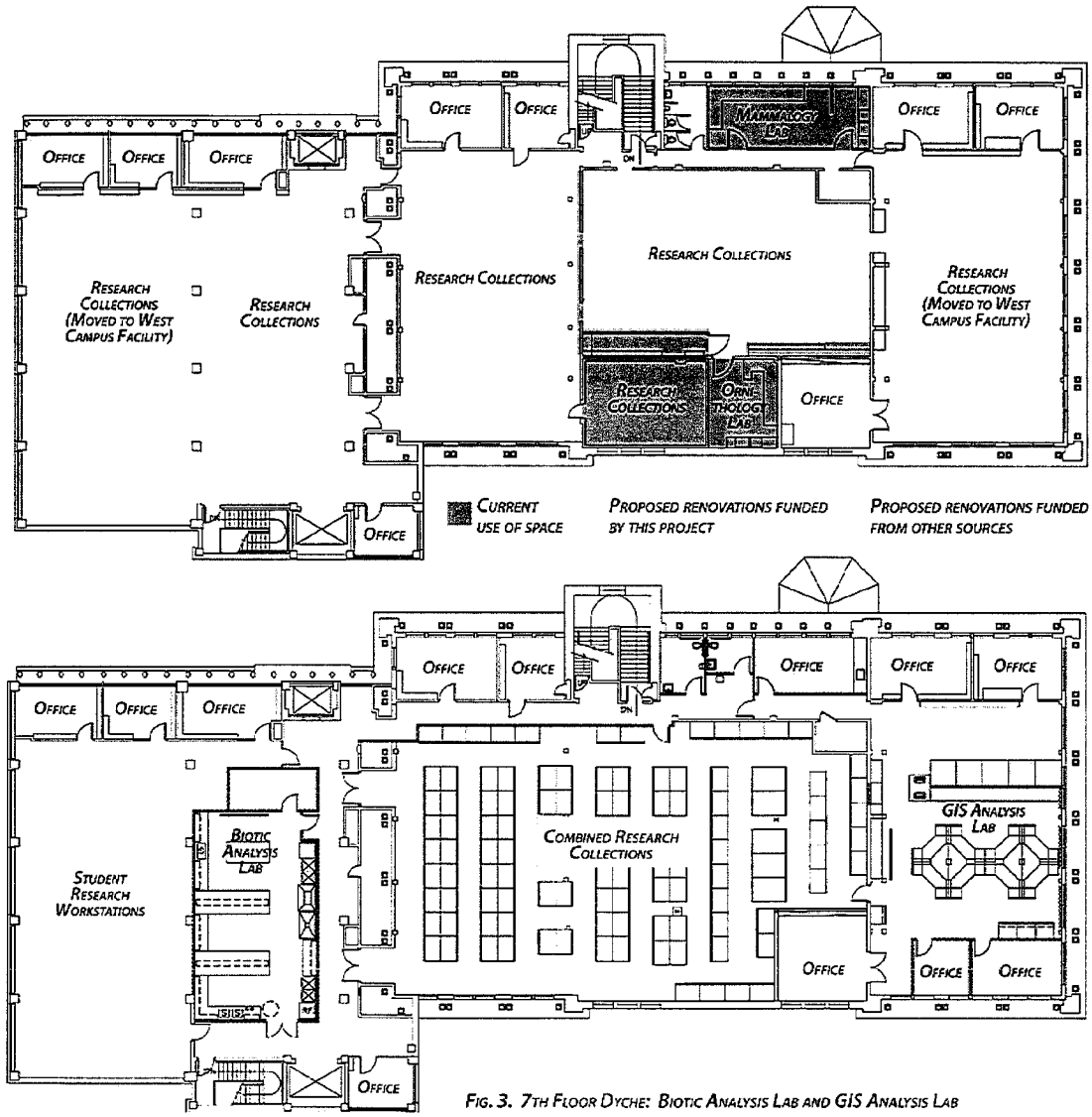


FIG. 3. 7TH FLOOR DYCHE: BIOTIC ANALYSIS LAB AND GIS ANALYSIS LAB

Genomics Laboratory and Database Server Room

Laboratory Suite

A suite of laboratory and office spaces will be created for the purpose of preparing and manipulating collections specimens, including performing DNA extractions and sequencing. The total suite floor area will be approximately 4,900-sq.ft. Because of the nature of the work to be performed in the laboratory spaces, these rooms will be considered and supported as combination wet and dry laboratory spaces.

Rooms will be fitted with biological safety cabinets and/or ventilation fume hoods, as necessary for the specimen manipulation planned for each space. All comfort conditioning, ventilation air for the suite will be conditioned one-pass 100% outside air. The ventilation system will feature variable volume/reheat supplies with exhaust systems controlled to track supply volumes and maintain appropriate space pressure differentials relative to adjacent spaces and ambient.

The existing space is served by a 1962-vintage multizone central station air handler, which is not suitable for continued use in the proposed remodeled space. A separately funded project (KU project number 058/8850 – Dyche Hall Mechanical and Electrical Improvements) will remove and replace this, and three other existing building air handlers, with a common roof-top located air supply unit. The scope of work of this grant project will not include installation of air handling supply equipment but will include installation of air distribution ducting, pressure independent variable air volume boxes with reheat coils, and the suite exhaust system.

Server Room

Also included in the remodel space will be a computer server room, which will house computer clusters in high watt density server racks. This server room space will be supported by dedicated electrical and mechanical equipment designed to provide very high availability of the processing capability of these computer clusters. The room layout and arrangement, as well as the configuration of equipment specified for installation will provide capacity for significant future expansion of computing power.

The high density server environment requires large amounts of cooling air CFM at the racks to cool them. The design will feature in-row cooling similar to Liebert CRV units, including iCom networking controls, digital Scroll compressors and EC Variable speed fans with built in humidity monitoring and control. This design approach is intended to allow for greater load matching capability from both a cooling and air movement prospective while maintaining high efficiency both at initial occupancy and in dealing with future expansion. This proposal contemplates starting with 4 racks.

Proposed UPS units will be similar to Liebert NX Softscale unit with dual path source power ciruits. This proposal contemplates two 80kvA units initially installed that can be upgraded in 20kVA increments to 120kVA in the future. The units will have an initial 20 minutes reserve time at 80 kVA and w/o changes would provide 12 minutes at the maximum 120kvA size. The PDU/MBP will include a three breaker Maintenance Bypass with kirk key interlock, distribution panel boards and full monitoring. The criteria below will be used to specify and design server room equipment and layout.

Server Room Basis for Design:

- Provide for immediate installation of three- 43U racks, with provisions to add a fourth.
- No raised floor.
- Critical power for uninterruptable power supplies (UPS) to be placed in separate, adjacent equipment room.
- Serve room cooling provided by in-rack cooling units w/ expansion capacity as rack watt density increases.
- Provide for initial electrical densities of 15-kW per rack, with the understanding that this density may double over the useful life of the space.
- Provide for formal development of "A" -side/"B"-side power feed to dual power cord-equipped servers.
- Provide for redundancy of UPS service to the servers, with battery support for at least 20-minutes upon lose of utility power. No generator.
- Provide for redundancy of space cooling.
- Provide for economizer-type space cooling during times of low ambient temperatures (i.e. - Liebert Glycool (tm)).

7th Floor – GIS Laboratory and Study Area Spaces
Grant application proposed work for the seventh floor features remodeling of three separate and distinct spaces. The seventh floor of the south 1901 addition will be remodeled for conversion to digital, dry lab space that will provide a computer-intensive space for ecological modeling, and for maintaining and manipulating a large GIS database. This remodel work will resut in an approximately 2,300-sq.ft. GIS laboratory work area. The seventh floor north end, 1962-addition, work will involve remodel of two additional spaces. A Biotic Analysis Laboratory will be created to provide an area for preparation of dry bird and mammal specimens. This wet lab space will be approximately 890-sq.ft. floor area. A separate and adjacent space will be remodeled to create a graduate and post-doc student study area of approximately 2,200-sq.ft.

GIS Laboratory Suite
The existing air conditioning/ventilation unit that serves the proposed GIS lab space is suitable for conditioning/ventilation of the GIS laboratory grant space. Distribution ducting, VAV boxes, and discharge diffusers will be modified as necessary to accommodate the revised space configuration.
The critical utility component of the remodel of this space will be providing adequate electrical capacity for multiple computer workstations. Existing circuiting for general use receptacles in this area is marginal for existing space uses and totally inadequate for the intended use envisioned by this Grant Application. A separately funded project (KU project number 058/8850 – Dyche Hall Mechanical and Electrical Improvements) will replace the existing electrical service panels that support general use receptacles is this area. Replacement panel capacity will be specified to accommodate the increased electrical loading that will result from conversion of this grant space to computer laboratory.

Biotic Analysis Laboratory
This 890-sq.ft. laboratory space will be treated like a wet lab space. Ventilation/conditioning air supply and exhaust systems will be designed as single pass 100% outside air. The laboratory will share supply air conditioning/ventilation equipment, as well as fume hood exhaust and general lab area exhaust equipment that roof-top located equipment that serves the 5th floor genomics laboratory spaces.
A separately funded project (KU project number 058/8850 – Dyche Hall Mechanical and Electrical Improvements) will replace the existing electrical service panels that support general use receptacles is this area.

Study Area Room
Mechanical and electrical utility services provided for the 2,200-sq.ft. student study work space will be similar to a typical open office space.

Mechanical / Electrical Parameters
The following parameters will be used as the basis for the mechanical & electrical design:

Outdoor Design Conditions:

- Winter Dry Bulb Temperature: -10 °F
- Summer Design Dry Bulb Temperature: 101 °F
- Summer Coincident Wet Bulb: 72 °F
- Summer Wet Bulb Temperature: 79 °F

Indoor Design Conditions:

- Winter Dry Bulb Temperature - All Areas: 68 OF
- Summer Dry Bulb Temperature - All Areas: 74 OF
- Relative Humidity:
  - Summer 50%
  - Winter uncontrolled

Ventilation Rates:

• Biotic Analytical Lab	6-air change/hr. (ACH), min.
• GIS Lab and all other spaces	max. of 20-cfm per person, or per IMC

Space Pressurization:	(+) or (-) relative to adjacent corridor
Genomics Computation Lab	(+)
Extraction Cloning Lab	(+)
Existing Lab	(-)
Genomics Sequencing Lab	(-)
Morphology Lab	(-)
Office Spaces	(+)

PROJECT IMPACT

The visual metaphor of "zoom" illustrates the merit and impact of a long overdue and seemingly mundane renovation of a suite of biodiversity research laboratories and server room in a 1901 Romanesque cathedral-like building. At ground level, these facilities will leapfrog into the 21st C in basic electrical, mechanical and HVAC capacity; in advanced cyberinfrastructure; and in sophisticated, flexible laboratory facilities for genomic, morphological, evolutionary and biodiversity informatics research and research-training.

"Zooming out," this project's architectural design and efficiencies will have two powerful, effects: expansion of the BI's scope and scale of research and research-training in biodiversity science; and creation of integrative, collaborative and team-based research and research-training environments. Both advance the BI's strategy of aligning its physical and intellectual resources for research and research-training across the matrix of biodiversity science: investigating patterns and processes of global biotic composition, genomic evolution, macro-evolution, and ecoforecasting along the biotic continuum of genes–organisms–populations–species–communities and ecosystems. Biodiversity informatics mediates the matrix. Thereby, both effects—expanded scope/scale, integrative research environments—will enable novel, deeper and more comprehensive elucidation, syntheses and knowledge discovery of biodiversity phenomena. Primary here are: (1) the expansion and consolidation of the Genomics Complex from 3 disparate labs to 5 integrated research facilities with enhanced capabilities for sequencing, and new capabilities for cloning, biocomputation, and cryogenic archiving and preparation of biotic tissues, an irreplaceable genetic research resource; (2) new Biotic and Morphology Analysis facilities for discovering whole-specimen organismal characteristics that complement and test genomic hypotheses; (3) a new GIS Analysis facility for synthesizing and predictive modeling of environmental phenomena; and (4) a new Server Room for archiving and mediating the data for this research and research-training.

Clearly, with larger, unified research laboratories, the BI will be able to host more students and visiting scholars from overseas, a need generated by recent national and international legislation that severely restricts the loan and shipment of biotic specimens abroad. Larger laboratories for research-training also will enable the BI to host hands-on classes for underserved undergraduates at a local tribal university (which lacks such facilities), area high-school students and the public participating in Natural History Museum informal science education programs. Quite simply, in Dyche Hall, the BI will no longer be a prisoner of history—the expansion, modernization and repurposing of the laboratories will catalyze an integrative flux of research and research-training that is no longer dictated and hampered by constraints of space and aged facilities.

Zooming farther out, the project re-enforces KU's long-term commitment to the BI's research and research-training enterprise in biodiversity science. As a complement to this ARI-R2 project, KU is investing ~$1.15 million in a Phase II renovation of Dyche Hall—its electrical, HVAC and cyber facilities; this follows KU's previous investment of $1.2 million in renovating BI-West for modern housing of biodiversity collections—a

Phase I project that freed research space in Dyche for Phase II. The enhancement of Dyche Hall's cyberinfrastructure—10gb to the building and Server Room, 1gb to the workstation—removes the bandwidth bottleneck for accessing and serving terabytes of data for large-scale computational research within the BI and to the worldwide communities it serves.

In summary, despite an antiquated patchwork of common-use research laboratories in Dyche Hall, the BI has achieved national and international leadership in biodiversity science in research and research-training. This project will advance four cardinal transformations. First, in a world of rapidly changing research approaches, tools, techniques, and instrumentation, the renovations will create a research infrastructure that is flexible and adaptable to this evolving landscape. Second, it will create research capabilities that previously were impossible—e.g., cloning DNA, digitizing morphology for computational phylogenetic analyses; integrating natural systems and human systems modeling schemas for forecasting the impacts of environmental change. Third, the project will position the BI to keep its community of scholars and global collaborators at the frontiers of transforming knowledge discovery in biodiversity science, and in using this knowledge to forecast global environmental systems. And fourth, it assures that the BI will continue advance the forefront of research-training of the next generations of biodiversity scientists as systems biologists across genes to ecosystems and their informatics realms.

D. Project Management & Sustainability

D.1 Sustainability

As with all KU and BI buildings and support facilities, Dyche Hall is a state capital asset, with overall administrative responsibility residing in the Office of the Provost, and day-to-day space, financial, personnel, research and research-training administration in the BI. KU's Information Technology Service manages Dyche Hall's voice/data switching, network protocols, and cross-campus and off-campus network performance and related security. Dyche Hall's networked environments are maintained by BI's 2.5 FTE IT staff. KU's Facilities Operations provides campus-wide maintenance and repair of buildings, plumbing, electrical, and HVAC. KU budgets annually for basic maintenance, building utilities, and janitorial service. KU's Center for Research and the BI fund BI research infrastructure improvements from indirect costs.

Investigators with *de facto* access to Dyche Hall's research facilities and data resources are faculty/curators, research scientists, post-doctorates, visiting scholars and students associated with the BI, affiliated academic departments, and partners in research projects. Other users are granted access on an ad hoc basis. Because Dyche Hall also houses a public Natural History Museum, the design of the renovated research spaces will ensure appropriate levels of security and safety for research laboratories, collections and material storage.

Budget projection. Figures are calculated for the entire ~15,000 sf of Dyche Floors 1, 5, and 7 that house the 10,033 sf of planned renovations. Current ***Utilities*** costs (paid by KU) are ~$210,000 annually. Projected costs for the 3 post-renovation years (2012–2014) are ~$825,000, based on a 10% increase in utility rates by 2012 and a 3% increase/year through 2014. ***Basic maintenance*** (paid by KU) for the 3 years @ $1.30/sf is $58,500. ***Network and Telecommunication*** costs (paid by the BI) will be $5443/yr or $16,329. Total 2012–2014 projected sustainability budget = $899,829 apportioned to KU ($883,500) and the BI ($16,329).

D.2 Contingency and Risk

Project contingency is 5% of total costs allocated to changes during design and/or construction. Contingency management includes KU's ability to allocate in-house resources (e.g., Facilities Operations) to the project. Contingency management is based on construction estimates, approved changes, and bid alternates during the design phase, and, during construction, entails requesting change orders (drawing, specifications and estimates) from the design consultant, which are priced by the contractors and subcontractors for approval by KU. The risk management plan, listed below, is based on a risk assessment table (see Supp Materials).

Phase	Risk Area	Probability	Severity	Risk Level	Risk Response Plan	Residual Risk
Design	Incorrect space/activity description; undefined or unsuitable product and technical specification; detrimental impact on project budget or time to delivery	Occasional	Critical	H	Project development includes pre-design research program review with researchers. Lab design professionals and network engineers will be selected as consultants Budget reviews begin at the earliest stages through final design	M
Construct-ion	Lack of coordination of systems installation/ slowly executed space modification	Likely	Critical	H	• Key coordination in the course of construction by the design professionals and DCM staff • State requirements for contractor quality and subcontractor selection for a team to accomplish the work.	M
Operation	Technical shortcomings during initial operation; long term facility management	Occasional	Critical	H	• Commissioning of the mechanical/electrical system will be completed • Continuity of project management through final occupancy • In-house maintenance staff	L

D.3 Project Management and Schedule

KU's Design and Construction Management (DCM) office, with a professional staff of 24 licensed architects, engineers and support personnel, is responsible for all campus capital improvement projects, including ~$150M of current projects and $320M+ of proposed projects. KU offices that support DCM include Facilities Operations, Information Technology, Environmental Health and Safety, Parking, Public Safety and the KU Office of Sustainability, each of which has contributed to the KU Design and Construction Standards and User Guides[14].

*** End of major excerpts from original grant application ***

Project Revisions (Revised Submittal to NSF – March 2010)

NSF ARI-R2 Repair and Renovation: Advancing Research in Biodiversity Science
Proposal No: 0963511 * Revised Project Documentation

PEP 1-3: Introduction

As described in our proposal, this ARI-R2 project will bring a suite of research laboratories and a Server Room in the Biodiversity Institute (BI), University of Kansas (KU) into currency for 21st century research and research-training in biodiversity science—from genomics to species to ecosystem forecasting. This "cradle-to-grave" chain strategy described in the proposal is essential for tackling the complex, linked challenges in research and research training demanded by 21st C biodiversity science.

As elaborated below, KU and the BI will complete the project, essentially as originally proposed, to meet the NSF target budget of ~$1.5 M. Our cardinal philosophy in meeting this goal is to preserve the conceptual rationale for the project by retaining and implementing all the links, capabilities, and capacities in the chain of research and research training.

Specifically, we have met the target budget by:

- Consolidation of the construction schedule into two phases, instead of three, which will reduce inflationary construction costs and produce efficiencies in labor, material and staging.
- KU assuming costs of 214 linear feet of custom cabinetry originally charged to NSF
- KU assuming the unallowable expenses for Data and Telecom originally charged to NSF
- Removing standard elements (e.g., drop ceilings) judged not to be essential to the functioning of the laboratories in research and research training.

KU reconfirms its commitment to a complementary, KU-funded $1.15 M project to upgrade Dyche Hall's electrical and air-handling systems to current standards and anticipated growth specifications (see attached file *WORK BREAKDOWN STRUCTURE 2*.xls). In addition, since submitting the proposal, KU has announced a second project to replace all single-pane windows throughout Dyche Hall to save energy. Both projects—electrical/HVAC and new windows—will be coordinated with the ARI-R2 design and construction.

The physical and cyber infrastructure renovations and repair remain as described in the proposal. Briefly, the project components to advance research and research training are:

- Enhanced cyber capacity to the building and Server Room (1gb to 10gb), and to the research workstation (100mb to 1gb) ***[KU cost]***
- New Genomics Complex—expansion and consolidation of 3 disparate labs into 5 integrated facilities for sequencing, cloning, biocomputation, and cryogenic management of 80,000+ biotic tissues
- New Biotic and Morphological Analysis laboratories replacing obsolete facilities
- New GIS Analysis Laboratory for synthesizing and predictive modeling of environmental phenomena
- New, 5-fold larger Server Room with high-watt density server racks, dedicated power and air-cooling systems for expanded archiving and serving data

Accomplishment metrics for YR 1 after project completion

Intellectual Merit: The first year will witness three cardinal transformations in research and research training.

1. Consolidation of the BI's frozen tissue collections in the new cryogenic facility. Metrics include:
   - a modern tissue collection management system incorporating voucher specimens in the physical collections at the BI and other institutions;
   - efficiency and ease of access to and use of the tissue collection for genomic research and research training;
   - efficiency of serving the global research community with tissues from planetary surveys and inventories for research and research training; and

- a more secure, stable environment that provides the best, long-term preservation of the tissues for genomic research and research training, and the best possible protection against natural disasters.

2. Cloning of DNA to
   - reconstruct and compare patterns and processes in genomic and biogeographic evolution in populations of mammals, birds, arthropods, plants and other organisms using ancient DNA (from biotic collections) and modern DNA (from tissue collections);
   - reconstruct evolutionary patterns and processes of organisms for which modern tissues are lacking by using collection-based ancient DNA;
   - advance phylogenetic studies (improved sequence alignment and assessment of homology) through the discovery of new molecular markers, either micro-satellite or genomic; cDNA for library development;
3. Biotic preparation and analysis of vertebrate specimens to track the evolution and epidemiology of zoonotic diseases, such as Avian Influenza, West Nile Virus, leishmaniasis, malaria, avian encephalitis.

Broader Impacts: The first year will also witness a transformation in the BI's ability to train students as systems biologists across genes to ecosystems and their informatics realms. Critical here are the facilities provided by the new, state-of-the-art Biocomputation, Biotic Analysis, and GIS laboratories. Our metric is twofold: (1) the research training and subsequent productivity of graduate students in integrating biodiversity science data, cyber tools, and modeling schemas to forecast the impacts of environmental change; and (2) international training workshop in collaboration with GBIF (Global Biodiversity Information Facility. www.gbif.org) and a KU NSF-IGERT program on the mobilization, web-serving and use of biodiversity data.

PEP 4: Work Breakdown Structure *[DCM Note: refer to Project Schedule included at end of program]*

PEP 6: Budget - $1,525,000 *[DCM Note: refer to Project Budget included at end of program]*

PEP 13: Project's Technical and Financial Status Reporting

The financial records of the University of Kansas Center for Research, Inc. are maintained in accordance with the standards prescribed by the Governmental Accounting Standards Board (GASB) and the National Association of College and University Business Officers (NACUBO). These standards require that financial transactions be recorded within separate funds and that similar funds are categorized into fund groups for purposes of accounting and financial reporting. All accounting and administrative functions are maintained in complete compliance with OMB Circulars A-21 and A-110. KUCR uses the grants module of PeopleSoft version 9.0 for award setup and management. Financial management is integrated into the PeopleSoft financials module, with a limited-access online data silo providing additional, formatted grants-related reporting.

The University of Kansas Center for Research, Inc. (KUCR) is a not-for-profit corporation closely affiliated with the University of Kansas (KU). The primary function of KUCR is the management of all sponsored projects at KU. KU's A-133 audit is performed annually as a unit of the State of Kansas. KUCR has an independent A-133 audit performed annually.

PEP 22: Systems Integration, Testing, etc. *[DCM Note: refer to appendices included at end of program]*

Please see accompanying file

- *Systems Integration, testing, etc.doc*

*** End of major excerpts from revised grant documentation ***

Site Improvements & Infrastructure

Site Improvements

- Parking: Existing parking areas and service drives shall remain. No new parking is proposed, but the A-E shall verify that an appropriate numbers of handicapped stalls are provided within the closest adjacent lot(s), with an ADA-compliant ramp or walk / accessible path from each stall to accessible entrance(s).
    - Entrances: Power-assist operators shall be provided on all accessible exterior entrance doors.

Hazardous Materials

The KU Environmental Health & Safety Office will test materials in the existing buildings and utility tunnels that may be affected by the new project's work, to determine if any of them are asbestos-containing and require abatement. It is anticipated that tests will most likely be required at connections to existing utility lines.

KU's policy is to remove all hazardous materials when encountered during the renovation of existing buildings. If required, this work will be separately-contracted by the University.

Excerpt on Cryogenic Safety, from the University of Louisville EHS Safety Manual:

Definition

A cryogenic material is any substance that must be cooled to a temperature of -130-deg C or lower to change from a gas to a liquid. Cryogenics have several distinguishing characteristics:

- They are extremely cold (-120 to 270-deg C)
- Their primary cooling mechanism is vaporization (latent heat), and
- They have an extremely high expansion ratio (averaging 800:1) when their physical state changes from liquid to vapor/gas.

Because of these special characteristics, cryogenic materials must be handled with care.

Methods

The most common cryogen used is **liquid nitrogen**. Additional cryogens commonly used are:

- helium;
- hydrogen;
- argon;
- oxygen; and
- methane.

General Precautions

Personnel shall be thoroughly instructed and trained in the nature of the hazards associated with cryogenics and how to avoid those hazards.

- Any employee using cryogenics should have a thorough knowledge of:
    - procedures;
    - operation of equipment;
    - safety devices;
    - properties of materials used; and
    - use of personal protective equipment.
- Equipment and systems should be kept scrupulously clean.
- Mixing of gases or fluids should be strictly controlled to prevent the formation of flammable or explosive mixtures. Extreme care should be taken to avoid contamination of a fuel with an oxidant or the contamination of an oxidant with a fuel.
- Proper consideration should be given to the properties of the gas involved when venting storage containers and lines. Venting of large storage vessels should always be done outdoors to prevent an

accumulation of flammable, toxic, or inert gas in the work area. Smaller, lab sized containers can be vented into a chemical hood system.

Storage Containers
Cryogenic fluids are usually stored in properly insulated containers designed to minimize the loss of product due to boil-off. **Note: Boil-off gases can freeze the skin or eyes faster than liquid or metal contact.**

- A Dewar flask is the most common container for cryogenic fluids. It is a double-walled, evacuated container made of metal or glass, with a vacuum between the walls.
- Larger quantities of cryogenic fluid require double-walled metal containers of evacuated construction.
- Exposed glass should be taped to minimize the flying glass hazard if the container should break or implode.
- Liquids should be transferred from the metal Dewar vessels with special transfer tubes or

Hazard Factors
Cryogens present many hazards. All may be present concurrently and must be considered when introducing a cryogenic system or project:

- ultra cold temperatures;
- flammability;
- high pressure gas, resulting in over-pressurization of containers and pressure vessels
- displacement of oxygen/asphyxiation.

Cryogenic Burns And Frostbite Hazards
All cryogenics can cause cold burns or frostbite when in contact with human skin.

- Do not overfill containers
- Never make direct contact with cryogenic liquids, uninsulated cryogenic pipes or equipment.
- Use tongs or isolate the hazard when appropriate
- Stay out of the path of boil-off gases.
- Wear suitable personal protective equipment when handling any object that may be cold
- Transfer or pour cryogens slowly to minimize boiling and splashing.
- Use a phase separator or special filling funnel when filling a Dewar or transferring cryogens.
- Ensure all secondary containers are secured when filling.
- Ensure that all Dewars are positioned so the pressure relief valves and rupture disks vent paths are directed away from personnel, critical equipment or designated work areas.
- Inspect and maintain cryogenic equipment, and remove equipment from service when it does not meet manufacturer's operating specifications.
- When hand-carrying cryogen-containing Dewars, ensure the Dewar is your only load (no books, coffee or other items). Watch carefully for people who may run into you, and ensure that the vessel is carried with both hands and as far away from you as possible.

Flammability
Fire and explosion are hazards associated with cryogenics. The source and hazards are:

- Hydrogen, methane, and acetylene, where the gases themselves are flammable.
- Oxygen. Its presence will increase the flammability of ordinary combustibles. Keep all organic materials and other flammable substances away from contact with oxygen.
- Liquefied inert gases. Liquid nitrogen and helium can condense oxygen from the atmosphere, causing oxygen entrapment in unsuspected areas.
- Extremely cold surfaces can condense oxygen from the atmosphere

Code Requirements

Codes currently used on KU projects include the following:

- International Building Codes, 2006 edition.
- Kansas Fire Prevention Code, KSFMO, current edition.
- Other codes as listed at the State of Kansas, Division of Facilities Management (DFM) website: http://www.da.ks.gov/fp/

Code Footprint templates of the existing buildings shall be prepared by DCM as needed and furnished to the architect on DCM's standard 11x17 code footprint sheets.

- The architect shall update these template drawings to reflect all proposed work and shall submit them for approval to DFM through the KU Fire Marshal, immediately following the Schematic Design phase.
- If changes made later in design require resubmittal of the code footprint, the A-E shall make those change and resubmit it via the KU Fire Marshal as early as possible in the design process.
- Electronic files of the approved code drawings shall be forwarded to DCM in both .PDF and .DWG formats.

Construction Exiting: Temporary fire-rated exit corridors shall be provided through the construction site, if required to protect and direct occupants from all required exits in the surrounding occupied existing buildings to a public way. They shall remain in-place at all times while construction work is underway.

  - Existing exits and exit pathways cannot be blocked or removed, even temporarily, without alternative exit paths being provided that are approved by the authorities with jurisdiction.

The building shall have a new fire sprinkler system throughout.

Fire alarm systems shall comply with current code and KU requirements for an intelligent addressable system.

Historic Preservation Reviews

The proposed new construction is located within a property that is listed on the State and National Registers of Historic Places. As such, it will be subject to review by DCM staff and by the Campus Historic Preservation Board (CHPB).

KU / City of Lawrence Agreement

This project does not fall within 150' of the perimeter of the University's property, so it will not be subject to the provisions of the KU / City of Lawrence Cooperation Agreement.

Design Standards & Consultant Services

- The consultant team shall comply with the latest provisions of The University of Kansas Design and Construction Standards, as maintained by the Office of Design and Construction Management (DCM).
  - These standards are available online at the DCM website: http://www.dcm.ku.edu/standards/design/
  - The consultant team shall also comply with supplemental updates to these standards which may be issued during the course of the project.
- The University's Project Representative shall be a DCM staff person assigned to serve as Project Manager, who shall serve as the primary point of contact for all communications between Owner, A-E and Contractor.
- Special Consultants that will be required on the A-E team, in addition to the usual A/E disciplines:
  - Acoustical Engineer (to evaluate and advise on sound isolation provisions from M/E rooms and equipment)
  - Telecommunications System Engineer (must be pre-approved by the KU-IT department)
- Electronic Files: Consultants shall deliver to KU complete sets of electronic files for the drawings and manuals / specifications for each design review submittal, for the bid sets and for the as-built sets.
  - Each set of electronic files shall include both PDF and AutoCAD .dwg files for each drawing sheet.
- Models, if produced by the consultant to explain the design, shall be delivered to and remain at KU, whether in physical built form or 3D CAD form.

Annual Maintenance & Operating Costs

Funding for annual maintenance and operating costs will come from University general funds. No state funding will be required to cover any of these costs.

Space Standards & Utilization Analysis

This project renovates existing space and does not add any new space to the University's space inventory.

Construction / Project Delivery Method

The University proposes to utilize a CM At-Risk process, in accordance with University regulations and guidelines developed by the KU Office of Purchasing Services and the KU Center for Research and Graduate Studies.

Project Budget

Construction Costs	
Demolition	234,200
Construction Costs	756,000
Sitework	2,400
Fixed Equipment	267,800
Subtotal - Construction Costs	**$1,260,400**
Miscellaneous Costs	
Fees - Consultants, CM, State / KU Agencies	189,500
Printing & Shipping of Bid Documents; Misc.	2,400
Asbestos & HazMat Abatement	incl. above
Construction Testing & M/E Commissioning	incl. above
Misc. Relocation Costs	NA
Bidding & Construction Contingency (4.8%)	72,700
Subtotal - Miscellaneous Costs	**$264,600**
Total Project Cost	**$1,525,000**

Notes:

1. Related work required to complete this project, such as restroom upgrades required to meet current code, are proposed to be separately funded and constructed.

Project Schedule

(The target dates below will be adjusted re: the actual grant award date.)

NSF Grant Award Notification to University	April/May 2010
Submission to Kansas Board of Regents	May 2010
Submission to Joint Committee for State Building Construction	June 2010
Advertise/Interview/Select A/E Consultants	July 2010
Negotiate Fees / Execute A/E Contract	Aug. 2010
Advertise/Interview/Select Construction Manager (CM)	Aug. 2010
Negotiate Fees / Execute CM Contract	Sept. 2010
Program Review & Schematic Design (1 month)	Sept. 2010
Design Development (2 months)	Nov. - Dec. 2010
Construction Documents (3 months)	Jan. - March 2011
Asbestos Abatement	April 2011
Bidding (1 month)	April 2011
Contract / GMP Approval (1 month)	May 2011
Construction (12 months)	May 2011 - April 2012
Commissioning (2 months)	April - May 2012
Project Completion (overall time from grant award = 26 months)	June 2012

Architectural Program

Lied Center Additions

KU Project No. 184-6572

Date: September 22, 2009

Prepared by:

The University of Kansas, Lawrence Campus
Office of Design & Construction Management
KU Endowment Association
The Lied Center of Kansas

10-8

Programming Committee

Tim Van Leer, Director - Lied Center

Doug Wendel, Associate Director - Lied Center

Dale Seuferling, President - KU Endowment

Monte Soukup, Vice-President/Properties - KUEA

Warren Corman, University Architect

Jim Modig, Director - Design & Construction Management

Steve Scannell, Assistant Director - DCM

John Eye, Project Manager - DCM

Contents

10-3

Introduction

The Lied Center of Kansas is the performing arts center for the University of Kansas and is a premier venue for the arts in Kansas. Its mission is to engage audiences and artists through presentation, education, research and service. The Lied Center vision is to make the performing arts accessible to the people of Kansas.

The Lied Center is a multi-purpose, 2000-seat hall with exceptional acoustics, state-of-the-art sound system, rehearsal and dressing rooms and administrative spaces. Many of the University's band, jazz, chorus, orchestra, and dance performances take place in this facility. The Bales Organ Recital Hall is also located at the Lied Center, and features a 200-seat facility dedicated to organ teaching and performance.

The Lied Center brings educational and engagement opportunities to audiences of all ages through programs which include master classes, discussions, demonstrations and workshops, available to more than 80,000 people each year.

The Lied Center mission, to engage audiences through presentation, education, research and public engagement, drives its programming, activities and actions.

At the University of Kansas, where Ernst F. Lied began his adult life as a college student, there is an opportunity for the building that carries his name to also permanently represent and house his legacy.

An expansion of the Lied Center would create a lasting opportunity for visitors to learn about the life of Mr. Lied and the history of the Lied Foundation Trust. It also would create dedicated educational space to enhance understanding of, and appreciation for, the arts for Kansans of all ages.

KU's Lied Center is the prime place to tell Mr. Lied's story. Since it opened in 1993, an estimated one million people have attended events at the center. To Kansans, the Lied Center is more than a physical space. It's a place where an exposure to music, theatre and dance sparks a lifelong passion for the arts.

Through the Lied Center's lectures and performances by visiting performing artists, Kansans learn to contextualize the arts. They realize connections between what they've seen or heard on stage, and their own life experiences. The Lied Center fosters a lifetime passion for the arts — all because of Mr. Lied's extraordinary vision and the generosity of the Lied Foundation Trust.

The proposed improvements address three basic areas:

- Expand the existing lobby, moving the exterior walls out to match the rest of the lobby, to reduce the extreme congestion which occurs during every significant event.
- Construct an education pavilion where children and adults from across Kansas, and KU students, can gather to learn more about the arts and to gain valuable lessons through lecture-demonstrations and mini-concerts with visiting artists. The pavilion will also accommodate meetings, receptions, dinners and pre-and post-performance activities.
- Provide additional office space for the Lied Center's staff.

Exhibit and display components will be included within each of these areas.

Not only is KU's Lied Center the prime destination for the arts in Kansas, it's also the ideal location to share the story of Ernst F. Lied and the accomplishments of the Lied Foundation Trust.

10-1

Design Criteria and Goals

The design of this project shall address the following needs, goals and objectives:

- Provide appropriate venues to celebrate and display information and artifacts of Mr. Lied's career and accomplishments.
- Create new additions that match the existing building's architectural vocabulary and blend seamlessly with the existing building's appearance.
- Maintain and enhance existing donor areas, such as the Stephens Atrium.
- Create multi-purpose, flexible spaces and display areas.
- Address energy conservation and sustainability issues in the building's design.
- Meet or exceed all accessibility and code requirements for new construction.
- Comply with the University's Design and Construction Standards.
- Construct the new additions with a minimum of noise, disruption and inconvenience to existing occupants.
- Coordinate the new work so that existing spaces can remain in use throughout the construction phases.
- Appropriately address drainage issues out of the lowered site area south of the proposed additions.
- Complete the project on time and within budget.

10-5

Space and Program Needs

General

The actual size and quantity of each space shall be verified during the early design phases, and may need to be adjusted to fit within the available funding. The indicated spaces and areas provide general guidelines, but the final space configuration shall be determined in collaboration with the Lied and University staff.

Lobby Expansion

An expanded lobby area of approximately 1,800 SF shall be created by removing the existing curtainwall east of the first floor lobby and concession stand, and infilling beneath the floor above. The existing soffit and M/E in this area shall be removed. New floors, ceilings, lighting and HVAC shall be extended into this area, matching the existing elements.

The current and expanded area of the first floor lobby and the educational space will provide ample and prominent venues to display memorabilia about Mr. Lied.

Display Areas

Appropriate display areas shall be developed throughout the new and existing interior lobby and public circulation spaces, as appropriate to the materials which will be forthcoming from the Lied Foundation. It is anticipated that displays will be incorporated into portions of the Director's office, the Education Pavilion, the Lobby Expansion and in other public spaces, to be determined.

Consultants shall be separately retained by the Owner to assess and inventory the Lied Foundation materials, to identify how they should best be displayed, and to advise the Architect on the design of the displays areas, which may include custom cases and lighting. The architect may be asked to assist in the selection of the exhibit designer. The A-E shall be responsible to coordinate with these consultants and to incorporate their recommendations into the design of the display and storage areas.

The area requirements and type of spaces to be provided for storage and display of donated materials shall be determined during the design phases. Storage may be as a component of the display cases, such as in the base of display cases.

Education Pavilion

The education pavilion will provide a dedicated space for learning. In lecture demonstrations for students and the public, artists will talk about what they do and conduct live performances. Students in master classes will watch performances and perform before the artists.

Workshops will show preschool through high school teachers from across Kansas how to integrate upcoming performances into classroom lessons. This preparation will enhance understanding for students who attend Lied Center events.

The education pavilion will provide a designated space for pre-concert and post-concert events, as well as mini-concerts.

Approximate area of the new spaces:

2,400 SF - Education Center; the space should have rectangular dimensions, i.e. 60'x40'

500 SF - Catering Kitchen / Storage Areas

Finishes shall be simple and durable, yet aesthetically pleasing and consistent with the quality of the existing interiors. The floor shall be a resilient wood floor, to accommodate dance and other events.

Offices

The existing offices and conference room shall remain essentially unchanged, except where remodeling is required to accommodate the newly expanded office areas.

Expanded office space will provide for growth in Lied Center staffing. It would include a new 200 SF office for the director of the Lied Center, which would provide space to include Mr. Lied's office desk and visitor chairs. Include space for at least five additional staff offices, each approximately 120SF, and for open offices for support staff, as budget allows.

Public Toilets

The A-E team shall evaluate the overall plumbing fixture count and verify if additional toilet fixtures will be required to support these planned additions. If so, adjustments shall be made to the overall program scope, in collaboration with Lied and University staff, as necessary to account for them.

If no additional plumbing fixtures are required, the A-E shall include provisions to modify or add new doors in the public corridor spaces which would allow the south set of restrooms on the basement floor to remain accessible for use by after-hours programs in the Education Pavilion, while the remainder of the building is secured and inaccessible to the public.

Mechanical / Electrical

HVAC systems and equipment shall be designed and specified to keep generated noise to a minimum, and below levels that would be disruptive to activities within existing or new spaces.

Telecommunications

- Telephone and data lines shall be provided throughout.
- Provide wireless data access and cable television / IPTV service in the Education Pavilion.

Future Improvements

A new north elevator and a second floor expansion of the Seymour Gallery / upper lobby space are shown on the concept plan as proposed future improvements. They are not currently part of the scope of this project, but the A-E team may be asked to evaluate them and estimate the cost of those improvements, for future budgeting and fund-raising purposes.

Site Improvements & Infrastructure

- The existing outdoor plaza area shall be re-created south of the Education Pavilion. This space shall include appropriate landscaping, paving, seating and lighting to function as a daytime or night-time space for receptions, pre-function gatherings and casual relaxation space.
- No new infrastructure is proposed as part of this project.
- Relocate existing exterior lighting service as required.

Hazardous Materials

The KU Environmental Health & Safety Office has not yet determined the extent of possible hazardous materials that may need to be abated within the proposed construction areas. Once specific floor plans are developed which identify existing spaces and M/E systems that will be modified, those plans should be forwarded to EHS, who will verify which undocumented materials will need testing for hazmats at that time.

Code Requirements

- Codes currently used on KU projects include the following:
  - International Building Codes, 2006 editions.
  - Kansas Fire Prevention Code, KSFMO, current edition.
  - The serving kitchen and food service storage areas shall comply with the Kansas Department of Health and Environments (KDHE) Kansas Food Code.
  - Other codes as listed at the State of Kansas, Division of Facilities Management (DFM) website.
  - Code Footprints of the overall existing building shall be prepared by DCM and furnished to the architect on DCM's standard 11x17 code footprint sheets.
  - The architect shall update these overall drawings to reflect all proposed work and submit them for approval to DFM through the KU-DCM office, immediately following approval of the Design Development phase.
  - Electronic files of the approved code drawings shall be forwarded to DCM in both .PDF and .DWG formats.
- Construction Exiting: Temporary fire-rated exit corridors shall be provided through the construction site, to direct occupants from all required exits in the existing buildings to a public way. They shall remain in-place at all times while construction work is underway.
- All areas shall be fully-sprinklered.
- Fire alarm systems shall comply with current code and KU requirements for an intelligent addressable system.
  - Emergency Public Address System (EPAS) speakers shall be provided outside of the expanded areas in at least two locations, as directed by the University Fire Marshal.

Design Standards & Consultant Services

- The consultant team shall comply with the latest provisions of The University of Kansas *Design and Construction Standards*, as maintained by the Office of Design and Construction Management (DCM).
  - These standards are available at the DCM website: http://www.dcm.ku.edu/desstds/stds.htm
  - The consultant team shall also comply with supplemental updates to these standards which may be issued during the course of the project.
- The University's Project Representative shall be a DCM staff person assigned to serve as KU's Project Manager, and who shall be the primary point of contact for all communications between the Owner, A-E and Contractor.
- Special Consultants that will be required on the A-E team, in addition to the usual architectural and engineering disciplines:
  - Acoustical Engineer (to evaluate and advise on sound isolation provisions from M/E rooms and equipment, and the acoustical requirements of meeting spaces)
  - Telecommunications System Engineer (must be pre-approved by KU-IT)
- Electronic Files: Consultants shall deliver to KU complete sets of electronic drawing and spec files for each project's submittal stage, bid sets and as-built sets, and shall include both PDF and AutoCAD .dwg files.

Annual Maintenance & Operating Costs

Funding for annual maintenance and operating costs will come from current Lied Center funding. No additional state funding is being requested to cover these costs.

The KU Endowment Association and the Lied Center shall seek to establish an endowed fund to cover maintenance and operating costs of these new areas.

Space Standards & Utilization Analysis

This project will add approximately 8,000 SF of new space to the University's space inventory.

The existing lobby space is inadequate and under-sized. The new lobby space will partially correct that deficiency.

Current office spaces are full and additional office space is required.

The education pavilion will provide new spaces that currently do not exist within this facility, and which are needed to expand the facilities' programs and public outreach opportunities.

Historic Preservation Reviews

This existing building is not located within 500 feet of any properties currently listed on either the State or National Registers of Historic Places.

Project Budget

Education Pavilion & Expanded Atrium/Display Space	
New - 4,200 SF x $240/SF	$1,008,000
Remodel - 600 SF x $120/SF	72,000
Misc./Soft Costs - 25% of est. constr. costs	270,000
Total Estimated Project Costs	$1,350,000
Office Expansion	
New - 1,950 SF x $240/SF	$468,000
Remodel - 750 SF x $120/SF	90,000
Misc./Soft Costs - 25% of est. constr. costs	142,000
Total Estimated Project Costs	$700,000
First Floor Lobby & Display Space Expansion	
Remodel / Infill - 1,800 SF x $200/SF	$360,000
Misc./Soft Costs - 25% of est. constr. costs	90,000
Total Estimated Project Costs	$450,000
TOTAL PROJECT COSTS	$2,500,000

Notes:

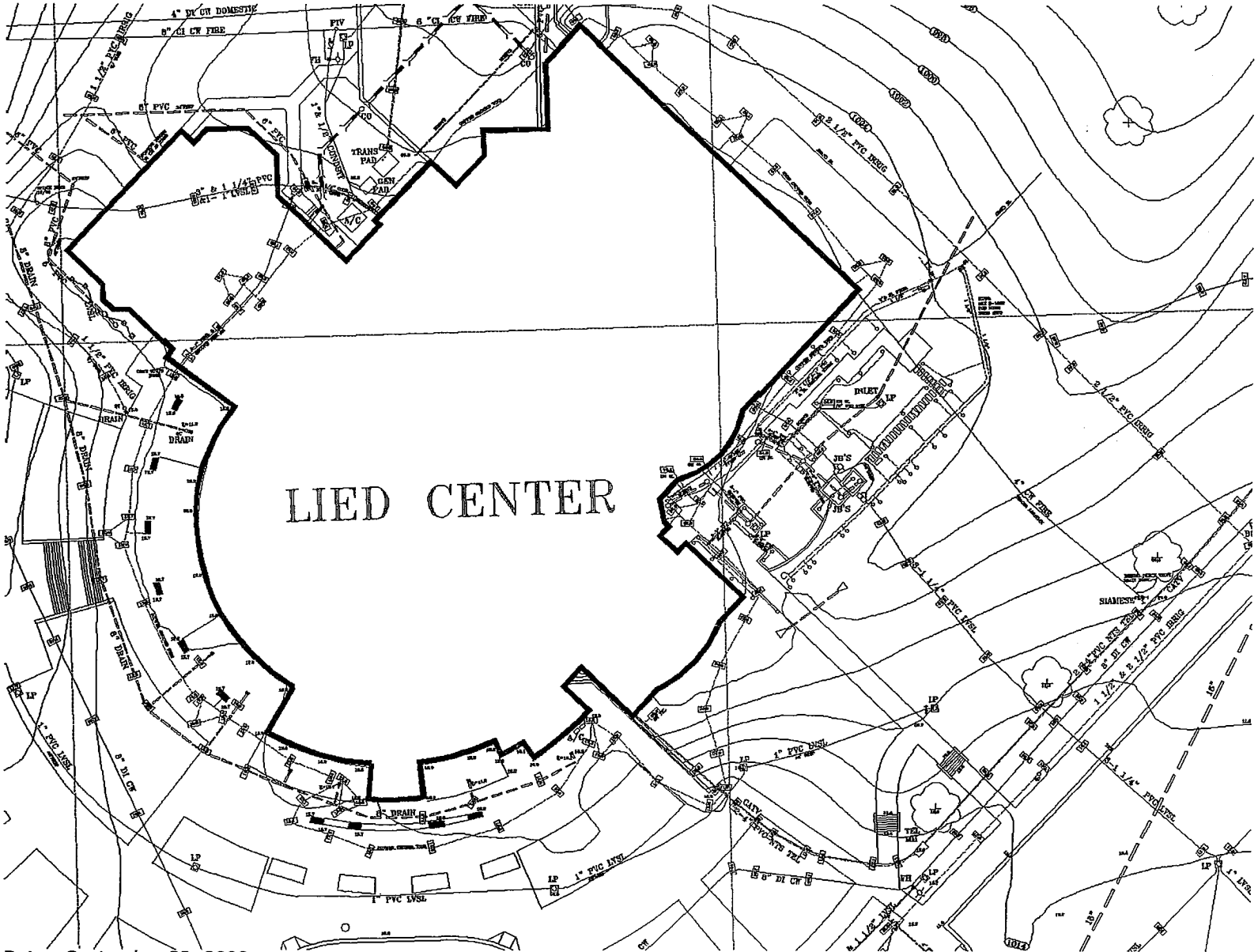
1) Funding is proposed to be from a private gift from the Lied Foundation to the KU Endowment Association.
2) Miscellaneous / soft costs will need to cover A-E fees, exhibit designer fees, state agency fees for DFM and DCM, FO support costs, survey and soil borings, printing of bid documents, furnishings and loose equipment, commissioning and contingency funds.

10-9

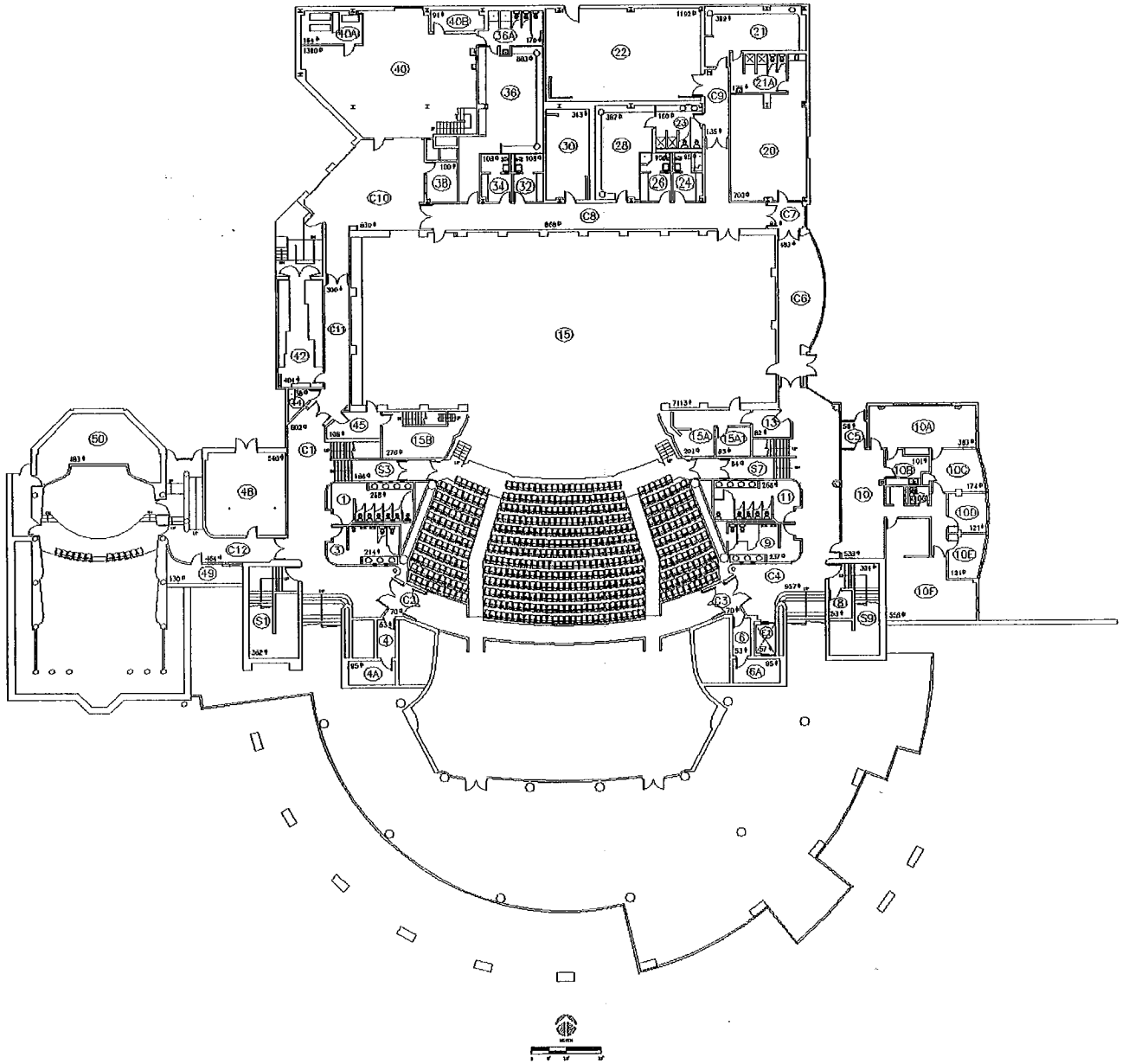
Project Schedule

Funding Confirmation	September 2009
Program Submission to Board of Regents	October 2009
Interview & Select Consultants	October 2009
Negotiate Fees & Process Contracts	October 2009
Program Review & Preliminary Design (1 mo.)	Oct. - Nov. 2009
Design Development (1 mo.)	Nov. - Dec. 2009
Construction Documents (3 mos.)	Jan. 2010 - March 2010
Bidding (4 weeks)	April 2010
Contract Award & Notice to Proceed (1 mo.)	May 2010
Construction (9 mos.)	May 2010 - Jan. 2011
Installation of Lied Exhibits	Feb. 2011
Project Completed / Occupied	March 2011

Existing Site Plan

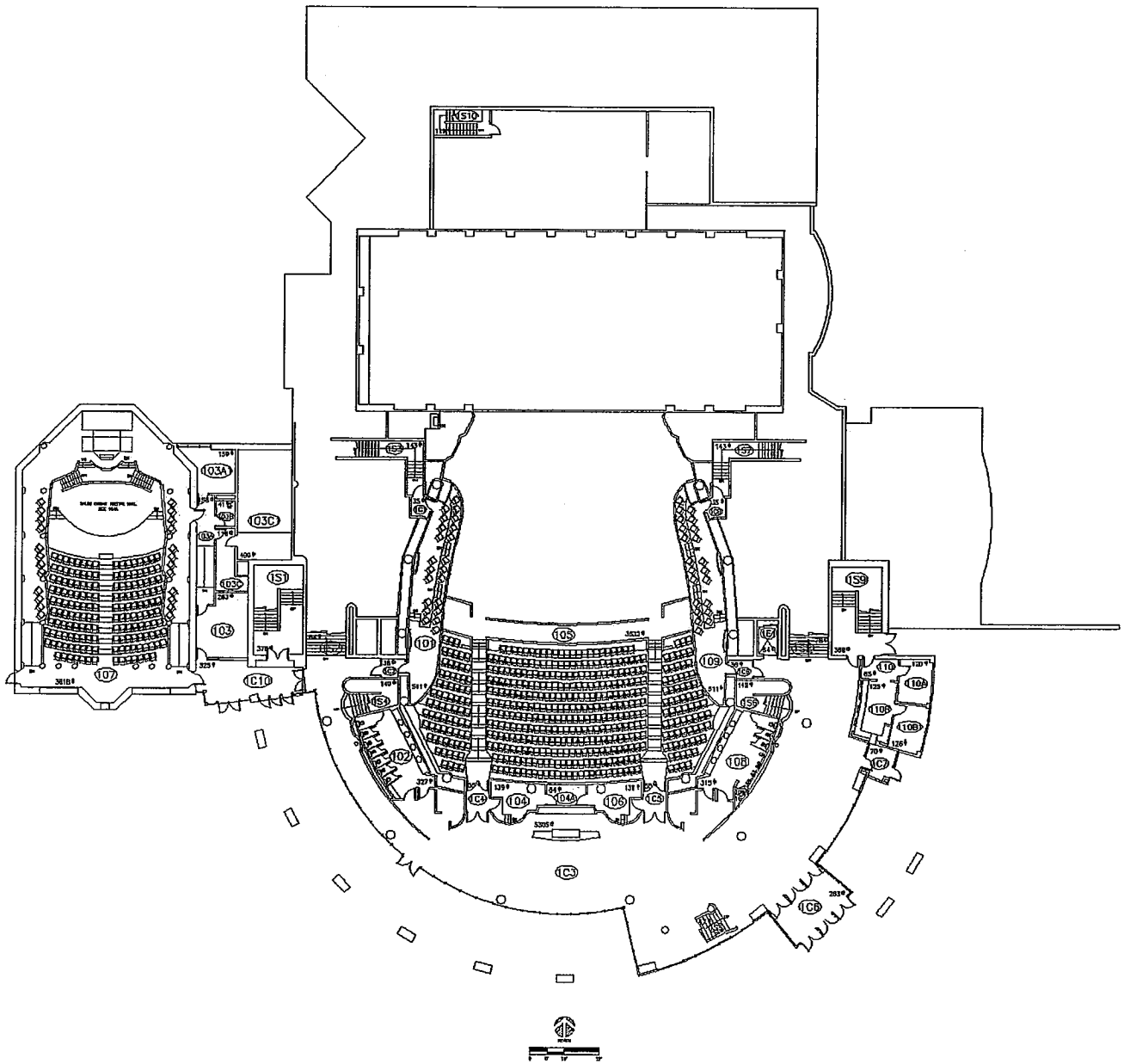


Existing Basement Floor Plan (Main Level - East)



10-12

Existing First Floor Plan (Main Level - West)



10-13

Conceptual Floor Plan