

Ikenberry SDRP

*Lighting Controls Study*  
*FINAL REPORT*

*December 21, 2012*

Prepared by:  
Facilities & Services  
Engineering Services

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## Summary

The lighting controls and energy use at SDRP have been analyzed to identify where energy savings and better control of lighting can be realized. If all identified energy saving measures are taken collectively, the estimated project cost is \$94,350. The estimated annual cost savings will be \$17,507 with an estimated payback of 5.39 years. The lighting projects were broken down into individual zones so that they may be selected based on their respective merits and Housing's priorities/available budget. Below is a breakdown of the proposed lighting zones for SDRP. This will increase the number of zones within the building, however, the increase in zones, along with the configuration changes, will allow appropriate control of the lights and reduce the amount of energy wasted lighting areas not being utilized.

### Zone 1-1: Main Lobby (1<sup>st</sup> Floor)

- Both the 1<sup>st</sup> and 2<sup>nd</sup> floor lobby area are zoned together.
- This does not include the seating area immediately in front of 57 North, or the seating area on either side of the Caffinator.
- This zone also does not include the lights at the front desk.
- While students are on campus, this zone will only be on during the early morning and evening hours, when insufficient daylight is available to illuminate the area. Adjustments to the timing will need to be made to match the seasons.
- During break periods when students are not on campus, this zone will be off
- Daylight sensors will need to be added to this space. A new contactor will be required to separate the Main Lobby from other zones. Re-program schedule so that zone is off when students are not on campus.

### Zone 1-2: Learning Commons (1<sup>st</sup> Floor)

- The 1<sup>st</sup> and 2<sup>nd</sup> floor learning commons are already zoned separately, there is not a need to change this.
- While the students are on campus, both of these zones will be on while the building is open. Standard protocol should be used to establish how soon prior to building opening and closing these lights should come on or turn off.
- During break periods when students are not on campus, both of these zones will be off.
- Occupancy sensors will be added to this area. Re-program schedule so that zone is off when students are not on campus.

### Zone 1-3: Dining Servery

- This zone contains all the lights in the dining serving area.
- Dining provides direction on when these lights should be turned on and off.
- No change to this zone is required.

#### Zone 1-4: Dining Seating Area (1<sup>st</sup> Floor)

- The 1<sup>st</sup> floor and 2<sup>nd</sup> floor seating areas will be zoned separately. This will allow for partial use of the facility.
- While students are on campus, these zones will only be on during the early morning and evening hours, when insufficient daylight is available to illuminate the area.
- During break periods when students are not on campus, these zones will be off
- Daylight sensors are already present in this zone. No change to this zone is required.

#### Zone 1-5: Northwest Dining Seating Area (1<sup>st</sup> Floor)

- While students are on campus, this zones will only be on during the early morning and evening hours, when insufficient daylight is available to illuminate the area. Adjustments to the timing will need to be made to match the seasons.
- During break periods when students are not on campus, this zone will be off.
- No change to this zone is required.

#### Zone 1-6: Kitchen

- This zone includes all the lights in the kitchen area of SDRP. This does not include the hallway between the loading dock that runs alongside the offices, or the short hallway leading to the dry good storage room.
- No change to this zone is required.

#### Zone 1-7: Side lobby (1<sup>st</sup> Floor)

- This is a new lighting zone.
- The side lobby includes the seating area immediately in front of 57 North, and the seating areas on either side of the Caffinator
- While students are on campus, this zone will be on while the building is open.
- During break periods when students are not on campus, this zone will be off.
- This zone will need to be re-fed to separate it from the existing contactor and occupancy sensors will be added.

#### Zone 1-8: 57 North

- This zone includes all the lights within 57 North.
- The hours of operation for 57 North will determine the lighting needs for this area.
- Some work will be required to separate the circuits in this zone from the Main Lobby lighting control zone.

#### Zone 1-9: Restrooms (1<sup>st</sup> Floor)

- The restroom zone includes the restrooms on the 1<sup>st</sup> floor, 2<sup>nd</sup> floor, and the hallway lighting immediately outside the opening to the rooms.
- The lights to the restrooms will remain on as long as the building is open.
- Occupancy sensors have been installed in both the 1<sup>st</sup> and 2<sup>nd</sup> floor restrooms. Sensors need to be installed in the hallway immediately outside the restrooms.

#### Zone 2-1: Main Lobby (2<sup>nd</sup> Floor)

- Both the 1<sup>st</sup> and 2<sup>nd</sup> floor lobby area are zoned together.
- This does not include the seating area immediately in front of 57 North, or the seating area on either side of the Caffinator.
- This zone also does not include the lights at the front desk.
- While students are on campus, this zone will only be on during the early morning and evening hours, when insufficient daylight is available to illuminate the area. Adjustments to the timing will need to be made to match the seasons.
- During break periods when students are not on campus, this zone will be off
- Daylight sensors will need to be added to this space. A new contactor will be required to separate the Main Lobby from other zones.

#### Zone 2-2: Learning Commons (2<sup>nd</sup> Floor)

- The 1<sup>st</sup> and 2<sup>nd</sup> floor learning commons are already zoned separately, there is not a need to change this.
- While the students are on campus, both of these zones will be on while the building is open. Standard protocol should be used to establish how soon prior to building opening and closing these lights should come on or turn off.
- During break periods when students are not on campus, both of these zones will be off.
- Occupancy sensors will be added to this area.

#### Zone 2-3: Open Lounge

- This zone will include the seating area immediately outside the multipurpose room.
- Some work will be required to separate the circuits in this zone from the Main Lobby lighting control zone. Occupancy sensors will be added to control the lights in this zone.

#### Zone 2-4: Dining Seating Area (2<sup>nd</sup> Floor)

- The 1<sup>st</sup> floor and 2<sup>nd</sup> floor seating areas will be zoned separately. This will allow for partial use of the facility.
- While students are on campus, these zones will only be on during the early morning and evening hours, when insufficient daylight is available to illuminate the area.
- During break periods when students are not on campus, these zones will be off
- This zone needs to be separated from the contactor that controls the Main Lobby and tied into the existing daylight sensor that already exists in this space (existing daylight sensor controls Zone 1-4).

#### Zone 2-5: Side lobby (2<sup>nd</sup> Floor)

- This is a new lighting zone.
- The side lobby includes the seating area immediately in front of 57 North, and the seating areas on either side of the Caffinator
- While students are on campus, this zone will be on while the building is open.
- During break periods when students are not on campus, this zone will be off.
- This zone will need to be re-fed to separate it from the existing contactor and occupancy sensors will be added.

#### Zone 2-6: Back Hallways

- This zone will include the 2<sup>nd</sup> floor hallway leading to the Nugent Hall link, and the hallway in front of the 2<sup>nd</sup> floor classrooms.
- Occupancy sensors will be added to control the lights in this zone.

#### Zone 2-7: Student Leadership Hallway

- This zone includes the hallway, lounge area, and front desk of the Student Leadership space.
- Occupancy sensors should be installed throughout the area for after hour access by student groups and students utilizing the music practice rooms.

#### Zone 2-8: Restrooms (2<sup>nd</sup> Floor)

- The restroom zone includes the restrooms on the 1<sup>st</sup> floor, 2<sup>nd</sup> floor, and the hallway lighting immediately outside the opening to the rooms.
- The lights to the restrooms will remain on as long as the building is open.
- Occupancy sensors have been installed in both the 1<sup>st</sup> and 2<sup>nd</sup> floor restrooms. Sensors need to be installed in the hallway immediately outside the restrooms

#### All other areas

- All areas on the map highlighted in gray, will operate with local switches. These lights are not included in a zone and will not be placed on timers. These areas are equipped with motion sensors, or are the responsibility of the staff member occupying the space to ensure the lights are turned off when the space is unoccupied.

## Student Dining and Residential Programs (#1247)

### Proposed Lighting Controls Modifications - Cost Savings Summary

	Current Annual Operating Cost	Proposed Annual Operating Cost	Proposed Annual Cost Savings	Project Cost	Payback (yrs)	Recommendation
Zone 1-1: Main Lobby	\$3,152	\$1,813	\$1,338	\$10,500	7.85	Accept
Zone 1-2: Learning Commons	\$4,350	\$2,002	\$2,348	\$12,000	5.11	Accept
Zone 1-3: Dining Servery	N/A	N/A	N/A	N/A	N/A	No Changes
Zone 1-4: Dining Seating Area	N/A	N/A	N/A	N/A	N/A	No Changes
Zone 1-5: NW Dining Seating Area	N/A	N/A	N/A	N/A	N/A	No Changes
Zone 1-6: Kitchen	N/A	N/A	N/A	N/A	N/A	No Changes
Zone 1-7: Side Lobby	\$1,314	\$605	\$709	\$4,950	6.98	Accept
Zone 1-8: 57 North	\$3,557	\$1,637	\$1,920	\$4,950	2.58	Accept
Zone 1-9: Restrooms	\$136	\$62	\$73	\$1,500	20.51	Accept
Zone 2-1: Main Lobby	\$4,218	\$2,427	\$1,791	\$10,500	5.86	Accept
Zone 2-2: Learning Commons	\$4,315	\$1,986	\$2,329	\$9,150	3.93	Accept
Zone 2-3: Open Lounge	\$2,399	\$1,104	\$1,295	\$4,950	3.82	Accept
Zone 2-4: Dining Seating Area	\$6,036	\$3,473	\$2,563	\$10,500	4.10	Accept
Zone 2-5: Side Lobby	\$3,934	\$1,811	\$2,123	\$9,150	4.31	Accept
Zone 2-6: Back Hallways	\$787	\$362	\$425	\$8,400	19.78	Accept
Zone 2-7: Student Leadership Hallway	\$980	\$451	\$529	\$6,300	11.91	Accept
Zone 2-8: Restrooms	\$102	\$39	\$62	\$1,500	24.05	Accept
All other areas	N/A	N/A	N/A	N/A	N/A	No Changes
<b>TOTAL</b>	<b>\$35,281</b>	<b>\$17,774</b>	<b>\$17,507</b>	<b>\$94,350</b>	<b>5.39</b>	

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-1: Main Lobby (1st Floor)

Current: 5am-2am

Proposed: Schedule off during breaks. Install daylight sensors.

		Existing Controls	Proposed Controls
Project Cost	New contactor, daylight sensor, programming		\$7,000
	Project overhead		\$3,500
	<u>Total Project Cost</u>		<u>\$10,500</u>
Energy Cost	Lighting wattage	4660	4660
	Operating Hours/Day	21	15.75
	Operating Days/Year	365	280
	Total Annual Hours	7665	4410
	Total Annual KWH	35,719	20,551
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$2,693</u>	<u>\$1,550</u>
Maintenance/Relamping Cost	Number Lamps in zone	92	92
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.2205
	Relamp Cost /Year	\$105.78	\$60.86
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$352.59	\$202.86
<u>Annual Maintenance Cost</u>	<u>\$458</u>	<u>\$264</u>	
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	24	14
	Total Life-Cycle Carbon Emissions in Tons	479	275
Analysis Summary	Construction Cost	\$0	\$10,500
	Total Annual Energy Cost	\$2,693	\$1,550
	Total Annual Relamping Cost	\$458	\$264
	System First Year Cost	\$3,152	\$12,313
	Total Life-Cycle Cost	\$63,031	\$46,765
	Total Life-Cycle Carbon Emissions in Tons	479	275
Cost Savings	Annual Energy Cost Savings		\$1,144
	Annual Relamping Cost Savings		\$195
	Total Annual Cost Savings		\$1,338
	Total Life-Cycle Energy Cost Savings		\$22,874
	Total Life-Cycle Relamping Cost Savings		\$3,893
	Total Life-Cycle Cost Savings		\$16,267
Payback Summary	Years to Payback/Energy Savings Only		9.18
	Years to Payback/Total Annual Cost Savings		7.85
	Simple Rate of Return		12.75%



LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-2: Learning Commons (1st Floor)

Current: 5am-2am

Proposed: Schedule off during breaks. Install occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$7,000
	DDC programming, \$500 per contactor relay		\$1,000
	Project overhead		\$4,000
	<u>Total Project Cost</u>		<u>\$12,000</u>
Energy Cost	Lighting wattage	6510	6510
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	49,899	22,967
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$3,762</u>	<u>\$1,732</u>
Maintenance/Relamping Cost	Number Lamps in zone	118	118
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$135.67	\$62.45
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$452.24	\$208.15
	<u>Annual Maintenance Cost</u>	<u>\$588</u>	<u>\$271</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	33	15
	Total Life-Cycle Carbon Emissions in Tons	669	308
Analysis Summary	Construction Cost	\$0	\$12,000
	Total Annual Energy Cost	\$3,762	\$1,732
	Total Annual Relamping Cost	\$588	\$271
	System First Year Cost	\$4,350	\$14,002
	Total Life-Cycle Cost	\$87,006	\$52,047
	Total Life-Cycle Carbon Emissions in Tons	669	308
Cost Savings	Annual Energy Cost Savings		\$2,031
	Annual Relamping Cost Savings		\$317
	Total Annual Cost Savings		\$2,348
	Total Life-Cycle Energy Cost Savings		\$40,613
	Total Life-Cycle Relamping Cost Savings		\$6,346
	Total Life-Cycle Cost Savings		\$34,959
Payback Summary	Years to Payback/Energy Savings Only		5.91
	Years to Payback/Total Annual Cost Savings		5.11
	Simple Rate of Return		19.57%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-3: Dining Servery

Current: Sun-Thru 5am-12am, Fri-Sat 5am-2am  
 Proposed: No changes.

		Existing Controls	Proposed Controls
Project Cost	No changes		
	Project overhead		
	<u>Total Project Cost</u>		
Energy Cost	Lighting wattage		
	Operating Hours/Day		
	Operating Days/Year		
	Total Annual Hours		
	Total Annual KWH		
	Energy Cost/KWH		
	<u>Annual Energy Cost</u>		
Maintenance/Relamping Cost	Number Lamps in zone		
	Replacement Lamp Cost/Lamp		
	Lamp Rated Life/Hours		
	Relamp Frequency /Year		
	Relamp Cost /Year		
	Lamp Change Labor		
	Annual Lamp Change Labor		
	<u>Annual Maintenance Cost</u>		
Life Cycle	Total Number of Years to Consider		
Calculated Carbon Emissions	Annual Carbon Emissions/Tons		
	Total Life-Cycle Carbon Emissions in Tons		
Analysis Summary	Construction Cost		
	Total Annual Energy Cost		
	Total Annual Relamping Cost		
	System First Year Cost		
	Total Life-Cycle Cost		
	Total Life-Cycle Carbon Emissions in Tons		
Cost Savings	Annual Energy Cost Savings		
	Annual Relamping Cost Savings		
	Total Annual Cost Savings		
	Total Life-Cycle Energy Cost Savings		
	Total Life-Cycle Relamping Cost Savings		
	Total Life-Cycle Cost Savings		
Payback Summary	Years to Payback/Energy Savings Only		
	Years to Payback/Total Annual Cost Savings		

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-4: Dining Seating Area (1st Floor)

Current: Mon-Fri 7am-11pm, Sat-Sun 9am-11pm, Daylight Controls  
 Proposed: No changes.

		Existing Controls	Proposed Controls
Project Cost	No changes		
	Project overhead		
	<u>Total Project Cost</u>		
Energy Cost	Lighting wattage		
	Operating Hours/Day		
	Operating Days/Year		
	Total Annual Hours		
	Total Annual KWH		
	Energy Cost/KWH		
	<u>Annual Energy Cost</u>		
Maintenance/Relamping Cost	Number Lamps in zone		
	Replacement Lamp Cost/Lamp		
	Lamp Rated Life/Hours		
	Relamp Frequency /Year		
	Relamp Cost /Year		
	Lamp Change Labor		
	Annual Lamp Change Labor		
	<u>Annual Maintenance Cost</u>		
Life Cycle	Total Number of Years to Consider		
Calculated Carbon Emissions	Annual Carbon Emissions/Tons		
	Total Life-Cycle Carbon Emissions in Tons		
Analysis Summary	Construction Cost		
	Total Annual Energy Cost		
	Total Annual Relamping Cost		
	System First Year Cost		
	Total Life-Cycle Cost		
	Total Life-Cycle Carbon Emissions in Tons		
Cost Savings	Annual Energy Cost Savings		
	Annual Relamping Cost Savings		
	Total Annual Cost Savings		
	Total Life-Cycle Energy Cost Savings		
	Total Life-Cycle Relamping Cost Savings		
	Total Life-Cycle Cost Savings		
Payback Summary	Years to Payback/Energy Savings Only		
	Years to Payback/Total Annual Cost Savings		
	Simple Rate of Return		

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-5: NW Dining Seating Area (1st Floor)

Current: Mon-Fri 7am-11pm, Sat-Sun 9am-11pm  
 Proposed: No changes.

		Existing Controls	Proposed Controls
Project Cost	No changes		
	Project overhead		
	<u>Total Project Cost</u>		
Energy Cost	Lighting wattage		
	Operating Hours/Day		
	Operating Days/Year		
	Total Annual Hours		
	Total Annual KWH		
	Energy Cost/KWH		
	<u>Annual Energy Cost</u>		
Maintenance/Relamping Cost	Number Lamps in zone		
	Replacement Lamp Cost/Lamp		
	Lamp Rated Life/Hours		
	Relamp Frequency /Year		
	Relamp Cost /Year		
	Lamp Change Labor		
	Annual Lamp Change Labor		
	<u>Annual Maintenance Cost</u>		
Life Cycle	Total Number of Years to Consider		
Calculated Carbon Emissions	Annual Carbon Emissions/Tons		
	Total Life-Cycle Carbon Emissions in Tons		
Analysis Summary	Construction Cost		
	Total Annual Energy Cost		
	Total Annual Relamping Cost		
	System First Year Cost		
	Total Life-Cycle Cost		
	Total Life-Cycle Carbon Emissions in Tons		
Cost Savings	Annual Energy Cost Savings		
	Annual Relamping Cost Savings		
	Total Annual Cost Savings		
	Total Life-Cycle Energy Cost Savings		
	Total Life-Cycle Relamping Cost Savings		
	Total Life-Cycle Cost Savings		
Payback Summary	Years to Payback/Energy Savings Only		
	Years to Payback/Total Annual Cost Savings		
	Simple Rate of Return		

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-6: Kitchen

Current: Sun-Thur 5am-12am, Fri-Sat 5am-2am  
 Proposed: No changes.

		Existing Controls	Proposed Controls
Project Cost	No changes		
	Project overhead		
	<u>Total Project Cost</u>		
Energy Cost	Lighting wattage		
	Operating Hours/Day		
	Operating Days/Year		
	Total Annual Hours		
	Total Annual KWH		
	Energy Cost/KWH		
	<u>Annual Energy Cost</u>		
Maintenance/Relamping Cost	Number Lamps in zone		
	Replacement Lamp Cost/Lamp		
	Lamp Rated Life/Hours		
	Relamp Frequency /Year		
	Relamp Cost /Year		
	Lamp Change Labor		
	Annual Lamp Change Labor		
	<u>Annual Maintenance Cost</u>		
Life Cycle	Total Number of Years to Consider		
Calculated Carbon Emissions	Annual Carbon Emissions/Tons		
	Total Life-Cycle Carbon Emissions in Tons		
Analysis Summary	Construction Cost		
	Total Annual Energy Cost		
	Total Annual Relamping Cost		
	System First Year Cost		
	Total Life-Cycle Cost		
	Total Life-Cycle Carbon Emissions in Tons		
Cost Savings	Annual Energy Cost Savings		
	Annual Relamping Cost Savings		
	Total Annual Cost Savings		
	Total Life-Cycle Energy Cost Savings		
	Total Life-Cycle Relamping Cost Savings		
	Total Life-Cycle Cost Savings		
Payback Summary	Years to Payback/Energy Savings Only		
	Years to Payback/Total Annual Cost Savings		
	Simple Rate of Return		

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-7: Side Lobby (1st Floor)

Current: 5am-2am

Proposed: New lighting zone. Separate from Main Lobby contactor. Add occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$2,800
	DDC programming, \$500 per contactor relay		\$500
	Project overhead		\$1,650
	<u>Total Project Cost</u>		<u>\$4,950</u>
Energy Cost	Lighting wattage	1860	1860
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	14,257	6,562
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$1,075</u>	<u>\$495</u>
Maintenance/Relamping Cost	Number Lamps in zone	48	48
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$55.19	\$25.40
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$183.96	\$84.67
	<u>Annual Maintenance Cost</u>	<u>\$239</u>	<u>\$110</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	10	4
	Total Life-Cycle Carbon Emissions in Tons	191	88
Analysis Summary	Construction Cost	\$0	\$4,950
	Total Annual Energy Cost	\$1,075	\$495
	Total Annual Relamping Cost	\$239	\$110
	System First Year Cost	\$1,314	\$5,555
	Total Life-Cycle Cost	\$26,282	\$17,047
	Total Life-Cycle Carbon Emissions in Tons	191	88
Cost Savings	Annual Energy Cost Savings		\$580
	Annual Relamping Cost Savings		\$129
	Total Annual Cost Savings		\$709
	Total Life-Cycle Energy Cost Savings		\$11,604
	Total Life-Cycle Relamping Cost Savings		\$2,581
	Total Life-Cycle Cost Savings		\$9,235
Payback Summary	Years to Payback/Energy Savings Only		8.53
	Years to Payback/Total Annual Cost Savings		6.98
	Simple Rate of Return		14.33%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-8: 57 North

Current: 5am-2am

Proposed: New lighting zone. Separate from Main Lobby contactor. Add occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$2,800
	DDC programming, \$500 per contactor relay		\$500
	Project overhead		\$1,650
	<u>Total Project Cost</u>		<u>\$4,950</u>
Energy Cost	Lighting wattage	4155	4155
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	31,848	14,659
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$2,401</u>	<u>\$1,105</u>
Maintenance/Relamping Cost	Number Lamps in zone	232	232
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$266.74	\$122.77
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$889.14	\$409.25
	<u>Annual Maintenance Cost</u>	<u>\$1,156</u>	<u>\$532</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	21	10
	Total Life-Cycle Carbon Emissions in Tons	427	196
Analysis Summary	Construction Cost	\$0	\$4,950
	Total Annual Energy Cost	\$2,401	\$1,105
	Total Annual Relamping Cost	\$1,156	\$532
	System First Year Cost	\$3,557	\$6,587
	Total Life-Cycle Cost	\$71,145	\$37,696
	Total Life-Cycle Carbon Emissions in Tons	427	196
Cost Savings	Annual Energy Cost Savings		\$1,296
	Annual Relamping Cost Savings		\$624
	Total Annual Cost Savings		\$1,920
	Total Life-Cycle Energy Cost Savings		\$25,921
	Total Life-Cycle Relamping Cost Savings		\$12,477
	Total Life-Cycle Cost Savings		\$33,449
Payback Summary	Years to Payback/Energy Savings Only		3.82
	Years to Payback/Total Annual Cost Savings		2.58
	Simple Rate of Return		38.79%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-9: Restrooms (1st Floor)

Current: Occupancy Sensors control restrooms.

Proposed: No changes inside restrooms. Install occupancy sensor in hallway outside restrooms.

		Existing Controls	Proposed Controls
Project Cost	New sensor, \$1000 per sensor		\$1,000
	Project overhead		\$500
	<u>Total Project Cost</u>		<u>\$1,500</u>
Energy Cost	Lighting wattage	200	200
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	1,533	706
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$116</u>	<u>\$53</u>
Maintenance/Relamping Cost	Number Lamps in zone	4	4
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$4.60	\$2.12
	Lamp Change Labor	\$10.00	\$10.00
	<u>Annual Maintenance Cost</u>	<u>\$15.33</u>	<u>\$7.06</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	1	0
	Total Life-Cycle Carbon Emissions in Tons	21	9
Analysis Summary	Construction Cost	\$0	\$1,500
	Total Annual Energy Cost	\$116	\$53
	Total Annual Relamping Cost	\$20	\$9
	System First Year Cost	\$136	\$1,562
	Total Life-Cycle Cost	\$2,710	\$2,748
	Total Life-Cycle Carbon Emissions in Tons	21	9
Cost Savings	Annual Energy Cost Savings		\$62
	Annual Relamping Cost Savings		\$11
	Total Annual Cost Savings		\$73
	Total Life-Cycle Energy Cost Savings		\$1,248
	Total Life-Cycle Relamping Cost Savings		\$215
	Total Life-Cycle Cost Savings		-\$37
Payback Summary	Years to Payback/Energy Savings Only		24.04
	Years to Payback/Total Annual Cost Savings		20.51
	Simple Rate of Return		4.88%



LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 1-1: Main Lobby (2nd Floor)

Current: 5am-2am

Proposed: Schedule off during breaks. Install daylight sensors.

		Existing Controls	Proposed Controls
Project Cost	New contactor, daylight sensor, programming		\$7,000
	Project overhead		\$3,500
	<u>Total Project Cost</u>		<u>\$10,500</u>
Energy Cost	Lighting wattage	6230	6230
	Operating Hours/Day	21	15.75
	Operating Days/Year	365	280
	Total Annual Hours	7665	4410
	Total Annual KWH	47,753	27,474
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$3,601</u>	<u>\$2,072</u>
Maintenance/Relamping Cost	Number Lamps in zone	124	124
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.2205
	Relamp Cost /Year	\$142.57	\$82.03
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$475.23	\$273.42
<u>Annual Maintenance Cost</u>	<u>\$618</u>	<u>\$355</u>	
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	32	18
	Total Life-Cycle Carbon Emissions in Tons	640	368
Analysis Summary	Construction Cost	\$0	\$10,500
	Total Annual Energy Cost	\$3,601	\$2,072
	Total Annual Relamping Cost	\$618	\$355
	System First Year Cost	\$4,218	\$12,927
	Total Life-Cycle Cost	\$84,367	\$59,040
	Total Life-Cycle Carbon Emissions in Tons	640	368
Cost Savings	Annual Energy Cost Savings		\$1,529
	Annual Relamping Cost Savings		\$262
	Total Annual Cost Savings		\$1,791
	Total Life-Cycle Energy Cost Savings		\$30,580
	Total Life-Cycle Relamping Cost Savings		\$5,247
	Total Life-Cycle Cost Savings		\$25,327
Payback Summary	Years to Payback/Energy Savings Only		6.87
	Years to Payback/Total Annual Cost Savings		5.86
	Simple Rate of Return		17.06%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-2: Learning Commons (2nd Floor)

Current: 5am-2am

Proposed: Schedule off during breaks. Install occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$5,600
	DDC programming, \$500 per contactor relay		\$500
	Project overhead		\$3,050
	<u>Total Project Cost</u>		<u>\$9,150</u>
Energy Cost	Lighting wattage	6510	6510
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	49,899	22,967
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$3,762</u>	<u>\$1,732</u>
Maintenance/Relamping Cost	Number Lamps in zone	111	111
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$127.62	\$58.74
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$425.41	\$195.80
	<u>Annual Maintenance Cost</u>	<u>\$553</u>	<u>\$255</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	33	15
	Total Life-Cycle Carbon Emissions in Tons	669	308
Analysis Summary	Construction Cost	\$0	\$9,150
	Total Annual Energy Cost	\$3,762	\$1,732
	Total Annual Relamping Cost	\$553	\$255
	System First Year Cost	\$4,315	\$11,136
	Total Life-Cycle Cost	\$86,309	\$48,876
	Total Life-Cycle Carbon Emissions in Tons	669	308
Cost Savings	Annual Energy Cost Savings		\$2,031
	Annual Relamping Cost Savings		\$298
	Total Annual Cost Savings		\$2,329
	Total Life-Cycle Energy Cost Savings		\$40,613
	Total Life-Cycle Relamping Cost Savings		\$5,970
	Total Life-Cycle Cost Savings		\$37,433
Payback Summary	Years to Payback/Energy Savings Only		4.51
	Years to Payback/Total Annual Cost Savings		3.93
	Simple Rate of Return		25.46%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-3: Open Lounge

Current: 5am-2am

Proposed: Separate from Main Lobby contactor. Install occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$2,800
	DDC programming, \$500 per contactor relay		\$500
	Project overhead		\$1,650
	<u>Total Project Cost</u>		<u>\$4,950</u>
Energy Cost	Lighting wattage	3410	3410
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	26,138	12,030
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$1,971</u>	<u>\$907</u>
Maintenance/Relamping Cost	Number Lamps in zone	86	86
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$98.88	\$45.51
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$329.60	\$151.70
	<u>Annual Maintenance Cost</u>	<u>\$428</u>	<u>\$197</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	18	8
	Total Life-Cycle Carbon Emissions in Tons	350	161
Analysis Summary	Construction Cost	\$0	\$4,950
	Total Annual Energy Cost	\$1,971	\$907
	Total Annual Relamping Cost	\$428	\$197
	System First Year Cost	\$2,399	\$6,054
	Total Life-Cycle Cost	\$47,985	\$27,036
	Total Life-Cycle Carbon Emissions in Tons	350	161
Cost Savings	Annual Energy Cost Savings		\$1,064
	Annual Relamping Cost Savings		\$231
	Total Annual Cost Savings		\$1,295
	Total Life-Cycle Energy Cost Savings		\$21,274
	Total Life-Cycle Relamping Cost Savings		\$4,625
	Total Life-Cycle Cost Savings		\$20,949
Payback Summary	Years to Payback/Energy Savings Only		4.65
	Years to Payback/Total Annual Cost Savings		3.82
	Simple Rate of Return		26.16%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-4: Dining Seating Area (2nd Floor)

Current: 5am-2am

Proposed: Separate from Main Lobby contactor. Schedule off during breaks. Connect to daylight sensor.

		Existing Controls	Proposed Controls
Project Cost	New contactor, daylight sensor, programming		\$7,000
	Project overhead		\$3,500
	<u>Total Project Cost</u>		<u>\$10,500</u>
Energy Cost	Lighting wattage	9660	9660
	Operating Hours/Day	21	15.75
	Operating Days/Year	365	280
	Total Annual Hours	7665	4410
	Total Annual KWH	74,044	42,601
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$5,583</u>	<u>\$3,212</u>
Maintenance/Relamping Cost	Number Lamps in zone	91	91
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.2205
	Relamp Cost /Year	\$104.63	\$60.20
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$348.76	\$200.66
<u>Annual Maintenance Cost</u>	<u>\$453</u>	<u>\$261</u>	
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	50	29
	Total Life-Cycle Carbon Emissions in Tons	992	571
Analysis Summary	Construction Cost	\$0	\$10,500
	Total Annual Energy Cost	\$5,583	\$3,212
	Total Annual Relamping Cost	\$453	\$261
	System First Year Cost	\$6,036	\$13,973
	Total Life-Cycle Cost	\$120,726	\$79,959
	Total Life-Cycle Carbon Emissions in Tons	992	571
Cost Savings	Annual Energy Cost Savings		\$2,371
	Annual Relamping Cost Savings		\$193
	Total Annual Cost Savings		\$2,563
	Total Life-Cycle Energy Cost Savings		\$47,416
	Total Life-Cycle Relamping Cost Savings		\$3,851
	Total Life-Cycle Cost Savings		\$40,767
Payback Summary	Years to Payback/Energy Savings Only		4.43
	Years to Payback/Total Annual Cost Savings		4.10
	Simple Rate of Return		24.41%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-5: Side Lobby (2nd Floor)

Current: 5am-2am

Proposed: New lighting zone. Separate from Main Lobby contactor. Add occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$5,600
	DDC programming, \$500 per contactor relay		\$500
	Project overhead		\$3,050
	<u>Total Project Cost</u>		<u>\$9,150</u>
Energy Cost	Lighting wattage	6230	6230
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	47,753	21,979
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$3,601</u>	<u>\$1,657</u>
Maintenance/Relamping Cost	Number Lamps in zone	67	67
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$77.03	\$35.46
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$256.78	\$118.19
	<u>Annual Maintenance Cost</u>	<u>\$334</u>	<u>\$154</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	32	15
	Total Life-Cycle Carbon Emissions in Tons	640	295
Analysis Summary	Construction Cost	\$0	\$9,150
	Total Annual Energy Cost	\$3,601	\$1,657
	Total Annual Relamping Cost	\$334	\$154
	System First Year Cost	\$3,934	\$10,961
	Total Life-Cycle Cost	\$78,688	\$45,368
	Total Life-Cycle Carbon Emissions in Tons	640	295
Cost Savings	Annual Energy Cost Savings		\$1,943
	Annual Relamping Cost Savings		\$180
	Total Annual Cost Savings		\$2,123
	Total Life-Cycle Energy Cost Savings		\$38,866
	Total Life-Cycle Relamping Cost Savings		\$3,603
	Total Life-Cycle Cost Savings		\$33,320
Payback Summary	Years to Payback/Energy Savings Only		4.71
	Years to Payback/Total Annual Cost Savings		4.31
	Simple Rate of Return		23.21%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-6: Back Hallways

Current: 5am-2am

Proposed: Schedule off during breaks. Install occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$5,600
	Project overhead		\$2,800
	<u>Total Project Cost</u>		<u>\$8,400</u>
Energy Cost	Lighting wattage	1120	1120
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	8,585	3,951
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$647</u>	<u>\$298</u>
Maintenance/Relamping Cost	Number Lamps in zone	28	28
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$32.19	\$14.82
	Lamp Change Labor	\$10.00	\$10.00
	<u>Annual Maintenance Cost</u>	<u>\$107.31</u>	<u>\$49.39</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	6	3
	Total Life-Cycle Carbon Emissions in Tons	115	53
Analysis Summary	Construction Cost	\$0	\$8,400
	Total Annual Energy Cost	\$647	\$298
	Total Annual Relamping Cost	\$140	\$64
	System First Year Cost	\$787	\$8,762
	Total Life-Cycle Cost	\$15,736	\$15,643
	Total Life-Cycle Carbon Emissions in Tons	115	53
Cost Savings	Annual Energy Cost Savings		\$349
	Annual Relamping Cost Savings		\$75
	Total Annual Cost Savings		\$425
	Total Life-Cycle Energy Cost Savings		\$6,987
	Total Life-Cycle Relamping Cost Savings		\$1,506
	Total Life-Cycle Cost Savings		\$93
Payback Summary	Years to Payback/Energy Savings Only		24.04
	Years to Payback/Total Annual Cost Savings		19.78
	Simple Rate of Return		5.06%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-7: Student Leadership Hallway

Current: 5am-2am

Proposed: Schedule off during breaks. Install occupancy sensors.

		Existing Controls	Proposed Controls
Project Cost	New sensors, \$1400 per sensor		\$4,200
	Project overhead		\$2,100
	<u>Total Project Cost</u>		<u>\$6,300</u>
Energy Cost	Lighting wattage	1480	1480
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	280
	Total Annual Hours	7665	3528
	Total Annual KWH	11,344	5,221
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$855</u>	<u>\$394</u>
Maintenance/Relamping Cost	Number Lamps in zone	25	25
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.1764
	Relamp Cost /Year	\$28.74	\$13.23
	Lamp Change Labor	\$10.00	\$10.00
	<u>Annual Maintenance Cost</u>	<u>\$125</u>	<u>\$57</u>
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	8	3
	Total Life-Cycle Carbon Emissions in Tons	152	70
Analysis Summary	Construction Cost	\$0	\$6,300
	Total Annual Energy Cost	\$855	\$394
	Total Annual Relamping Cost	\$125	\$57
	System First Year Cost	\$980	\$6,751
	Total Life-Cycle Cost	\$19,598	\$15,321
	Total Life-Cycle Carbon Emissions in Tons	152	70
Cost Savings	Annual Energy Cost Savings		\$462
	Annual Relamping Cost Savings		\$67
	Total Annual Cost Savings		\$529
	Total Life-Cycle Energy Cost Savings		\$9,233
	Total Life-Cycle Relamping Cost Savings		\$1,345
	Total Life-Cycle Cost Savings		\$4,278
Payback Summary	Years to Payback/Energy Savings Only		13.65
	Years to Payback/Total Annual Cost Savings		11.91
	Simple Rate of Return		8.39%

LIFE CYCLE COST ANALYSIS - DDC LIGHTING CONTROLS MODIFICATIONS  
 ZONE 2-8: Restrooms (2nd Floor)

Current: Occupancy Sensors control restrooms.

Proposed: No changes inside restrooms. Install occupancy sensor in hallway outside restrooms.

		Existing Controls	Proposed Controls
Project Cost	New sensor, \$1000 per sensor		\$1,000
	Project overhead		\$500
	<u>Total Project Cost</u>		<u>\$1,500</u>
Energy Cost	Lighting wattage	150	150
	Operating Hours/Day	21	12.6
	Operating Days/Year	365	235
	Total Annual Hours	7665	2961
	Total Annual KWH	1,150	444
	Energy Cost/KWH	\$0.075	\$0.075
	<u>Annual Energy Cost</u>	<u>\$87</u>	<u>\$33</u>
Maintenance/Relamping Cost	Number Lamps in zone	3	3
	Replacement Lamp Cost/Lamp	\$3.00	\$3.00
	Lamp Rated Life/Hours	20000	20000
	Relamp Frequency /Year	0.38325	0.14805
	Relamp Cost /Year	\$3.45	\$1.33
	Lamp Change Labor	\$10.00	\$10.00
	Annual Lamp Change Labor	\$11.50	\$4.44
<u>Annual Maintenance Cost</u>	<u>\$15</u>	<u>\$6</u>	
Life Cycle	Total Number of Years to Consider	20	20
Calculated Carbon Emissions	Annual Carbon Emissions/Tons	1	0
	Total Life-Cycle Carbon Emissions in Tons	15	6
Analysis Summary	Construction Cost	\$0	\$1,500
	Total Annual Energy Cost	\$87	\$33
	Total Annual Relamping Cost	\$15	\$6
	System First Year Cost	\$102	\$1,539
	Total Life-Cycle Cost	\$2,033	\$2,285
	Total Life-Cycle Carbon Emissions in Tons	15	6
Cost Savings	Annual Energy Cost Savings		\$53
	Annual Relamping Cost Savings		\$9
	Total Annual Cost Savings		\$62
	Total Life-Cycle Energy Cost Savings		\$1,064
	Total Life-Cycle Relamping Cost Savings		\$183
	Total Life-Cycle Cost Savings		-\$252
Payback Summary	Years to Payback/Energy Savings Only		28.19
	Years to Payback/Total Annual Cost Savings		24.05
	Simple Rate of Return		4.16%



Location / Address:

**SDRP Dining Building**

**Ikenberry Commons**  
Gregory Dr.  
Champaign, IL 61801

Project:  
**Ikenberry Commons  
Redevelopment**

Notes:

Dates:

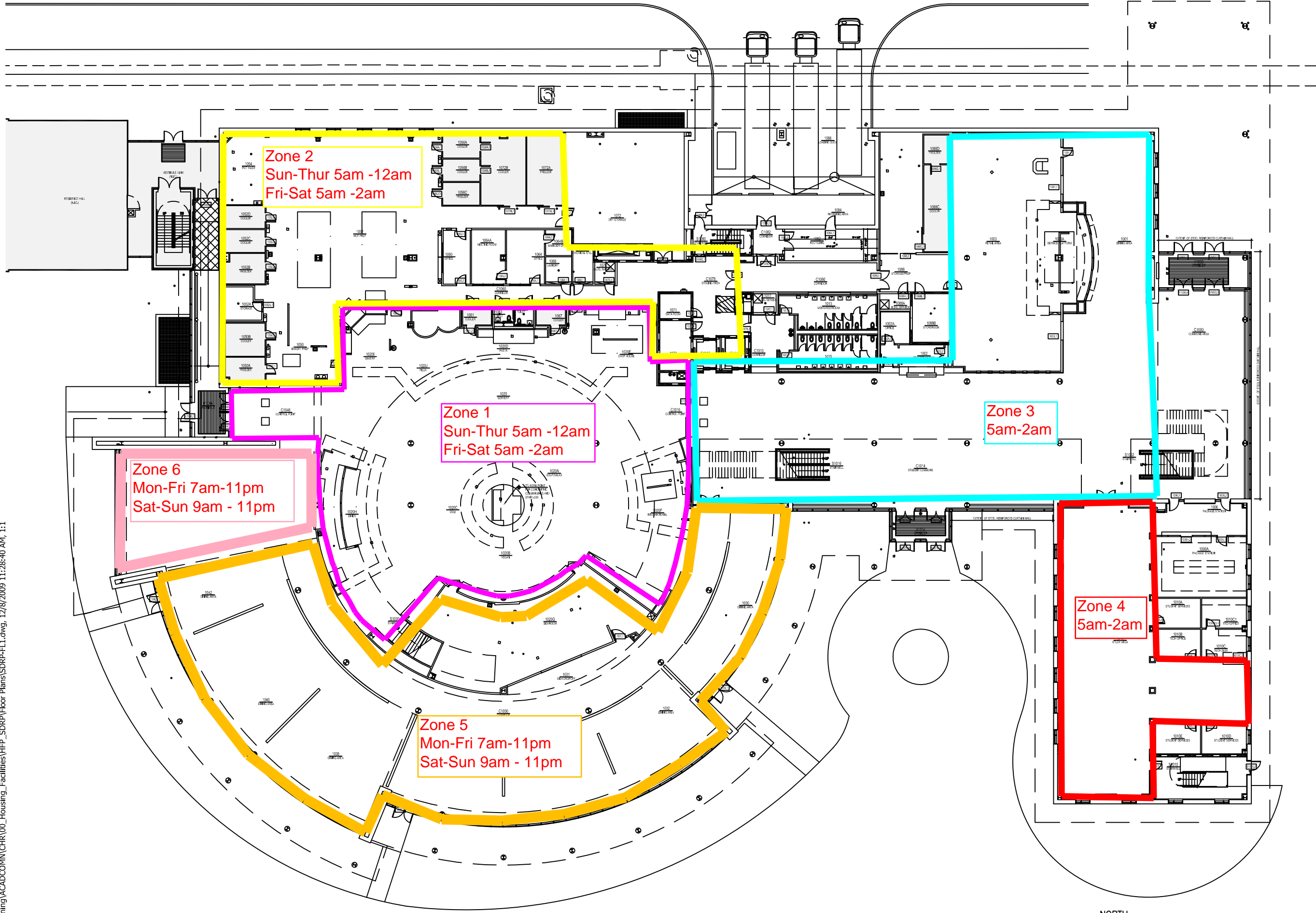
Proj. No. -IKN-  
Contact: J.A.R.  
Drawn: 2009

**First Floor  
Architectural Plan**

sheet

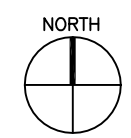
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**Current Lighting Zones**

**A Floor Plan**  
SCALE: 1"=30'



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Location / Address:  
**SDRP Dining Building**

**Ikenberry Commons**  
 Gregory Dr.  
 Champaign, IL 61801

Project:  
**Ikenberry Commons  
 Redevelopment**

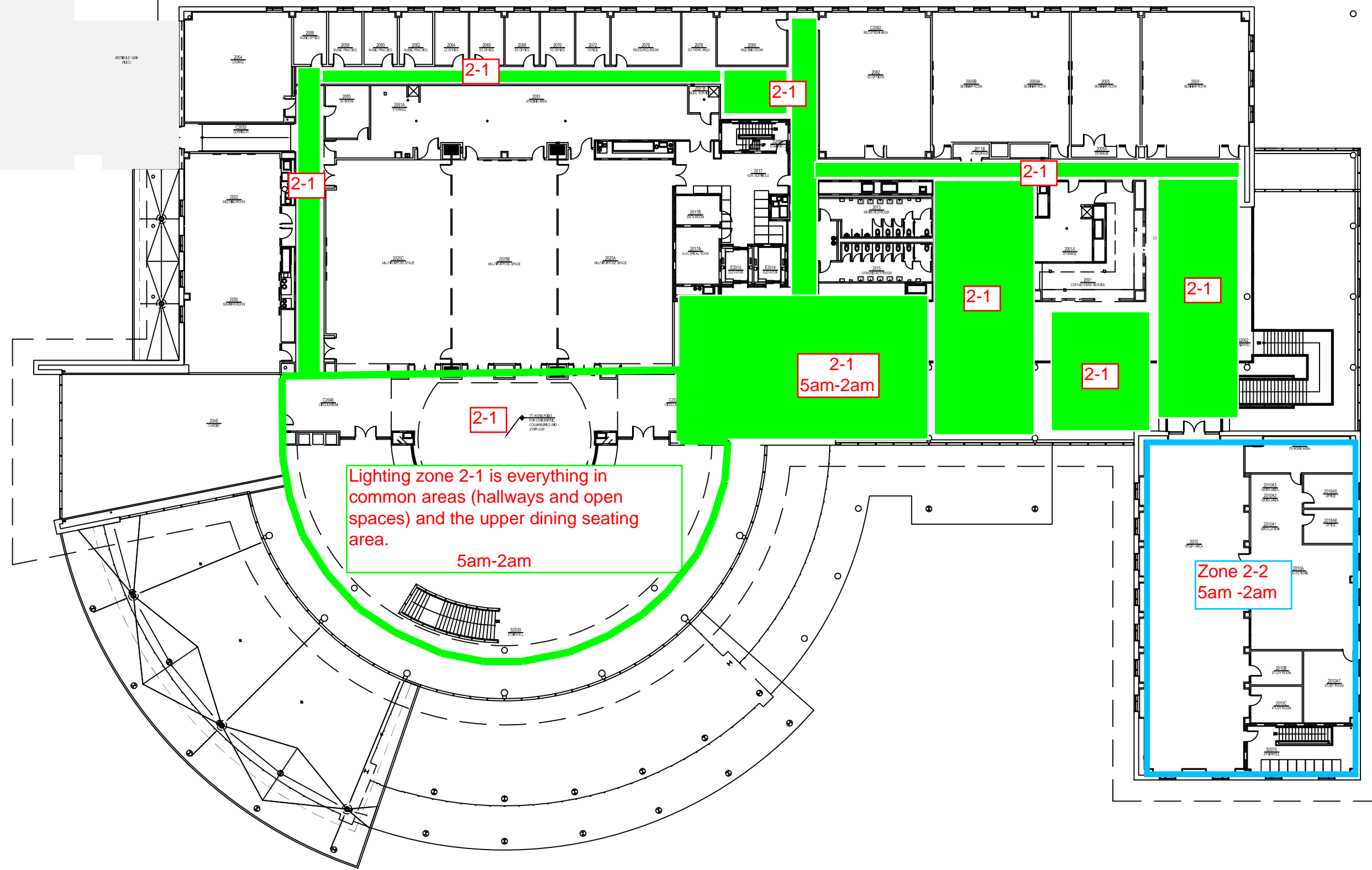
Notes:

Dates:

Proj. No. -IKN-  
 Contact: J.A.R.  
 Drawn: 2009

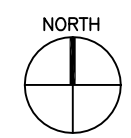
**Second Floor  
 Architectural Plan**

Zone 2-1 is for common area hallways and dining seating area lighting  
 Zone 2-2 is the Library  
 All other areas - office's, meeting rooms, multipurpose rooms, prep room, seminar rooms, rest rooms, cardio room, lounge staging room and the caffinator production area are on individual switching for that particular area



**Current Lighting Zones**

**A Floor Plan**  
 SCALE: 1"=30'



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Location / Address:  
**SDRP Dining Building**

**Ikenberry Commons**  
Gregory Dr.  
Champaign, IL 61801

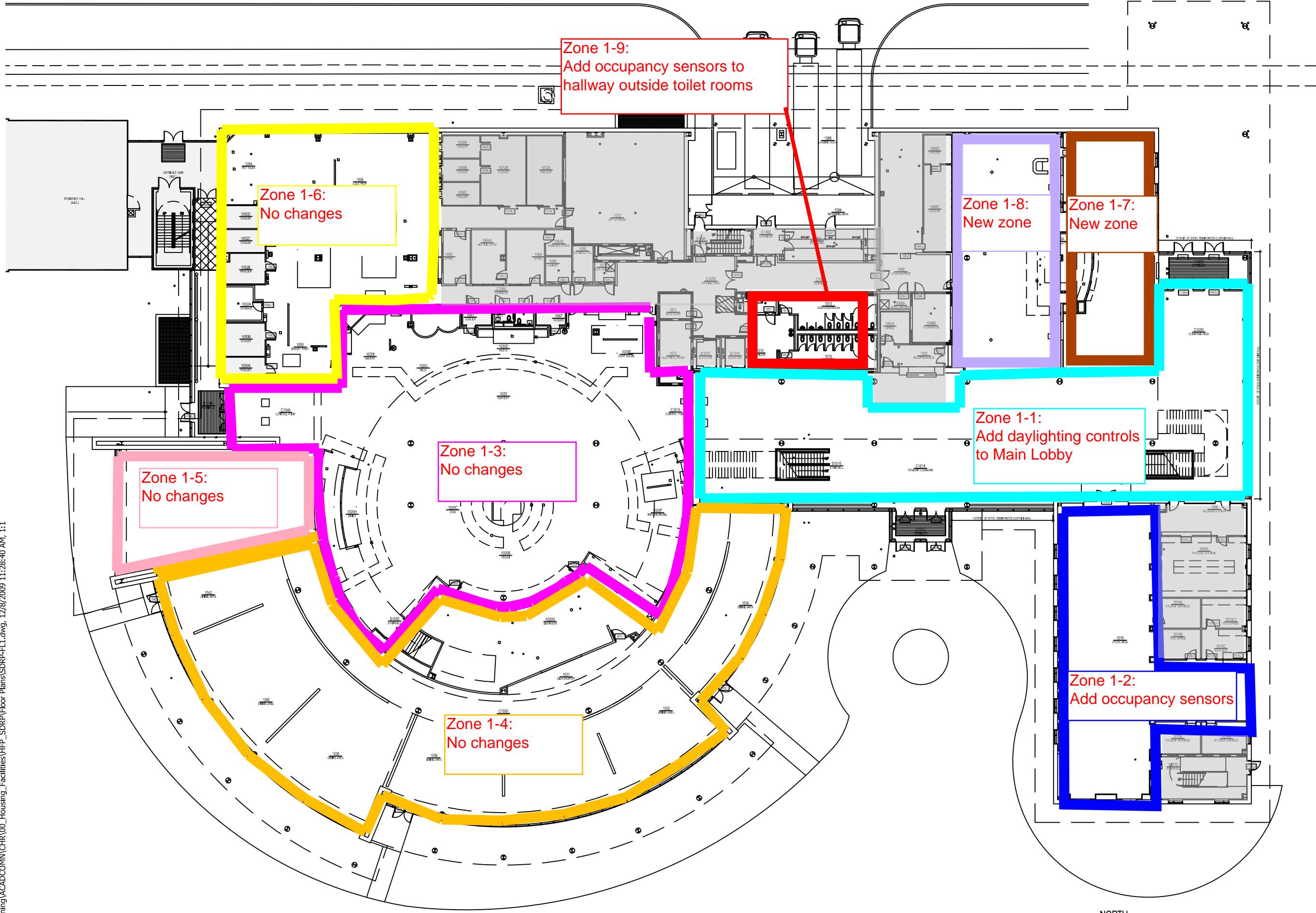
Project:  
**Ikenberry Commons  
Redevelopment**

Notes:

Dates:

Proj. No. —IKN—  
Contact: J.A.R.  
Drawn: 2009

**First Floor  
Architectural Plan**



**Zone 1-9:**  
Add occupancy sensors to  
hallway outside toilet rooms

**Zone 1-6:**  
No changes

**Zone 1-8:**  
New zone

**Zone 1-7:**  
New zone

**Zone 1-9:**  
Add occupancy sensors to  
hallway outside toilet rooms

**Zone 1-1:**  
Add daylighting controls  
to Main Lobby

**Zone 1-5:**  
No changes

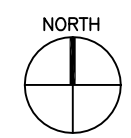
**Zone 1-3:**  
No changes

**Zone 1-2:**  
Add occupancy sensors

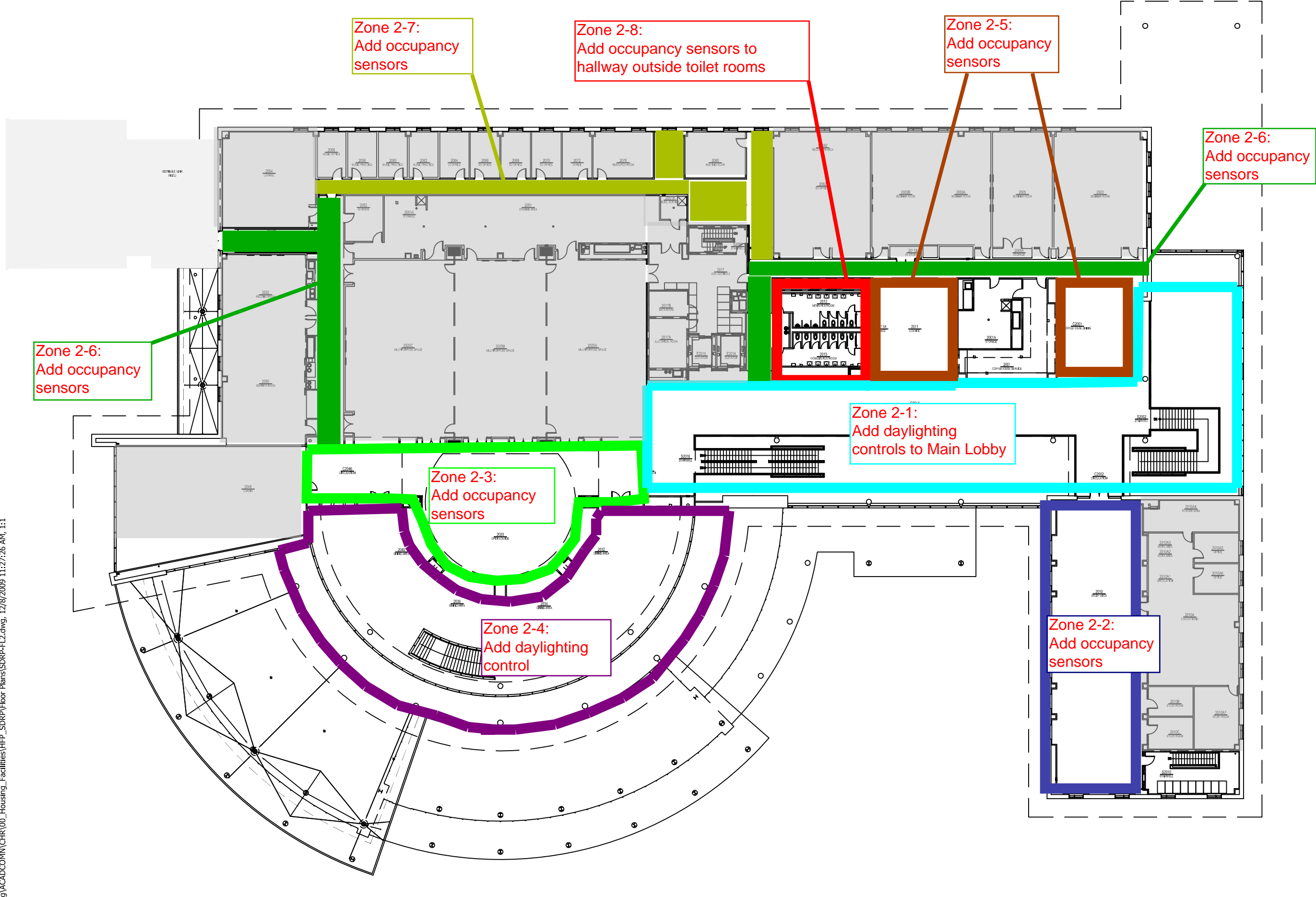
**Zone 1-4:**  
No changes

**Proposed Lighting Zones**

**A Floor Plan**  
SCALE: 1"=30'



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Zone 2-6:  
 Add occupancy sensors

Zone 2-7:  
 Add occupancy sensors

Zone 2-8:  
 Add occupancy sensors to hallway outside toilet rooms

Zone 2-5:  
 Add occupancy sensors

Zone 2-6:  
 Add occupancy sensors

Zone 2-1:  
 Add daylighting controls to Main Lobby

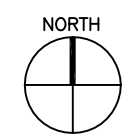
Zone 2-3:  
 Add occupancy sensors

Zone 2-4:  
 Add daylighting control

Zone 2-2:  
 Add occupancy sensors

**Proposed Lighting Zones**

**A Floor Plan**  
 SCALE: 1"=30'



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