

## Project Sope

- Lighting Depths
  - Exterior Plaza
  - Open Office
  - Prefunction Are
    - Flynn Impression – Spaciousness
    - Flynn Impression – Closure
  - Auditorium
- Breadth topic
- Electrical Depths
  - SKM Short Circuit Analysis
  - Transformer Consolidation



## Building Information

- Location: Arlington, VA
- Function: Administrative Office Building
- Size: 251,444 SF
- Completion Date: 01/2011
- Floors: 8
- Project Team:
  - Owner: Army National Guard
  - General Contractor: Tompkins Builders Inc.
  - Architect: CH2M
  - Engineer: AECOM

# Auditorium

- Concept

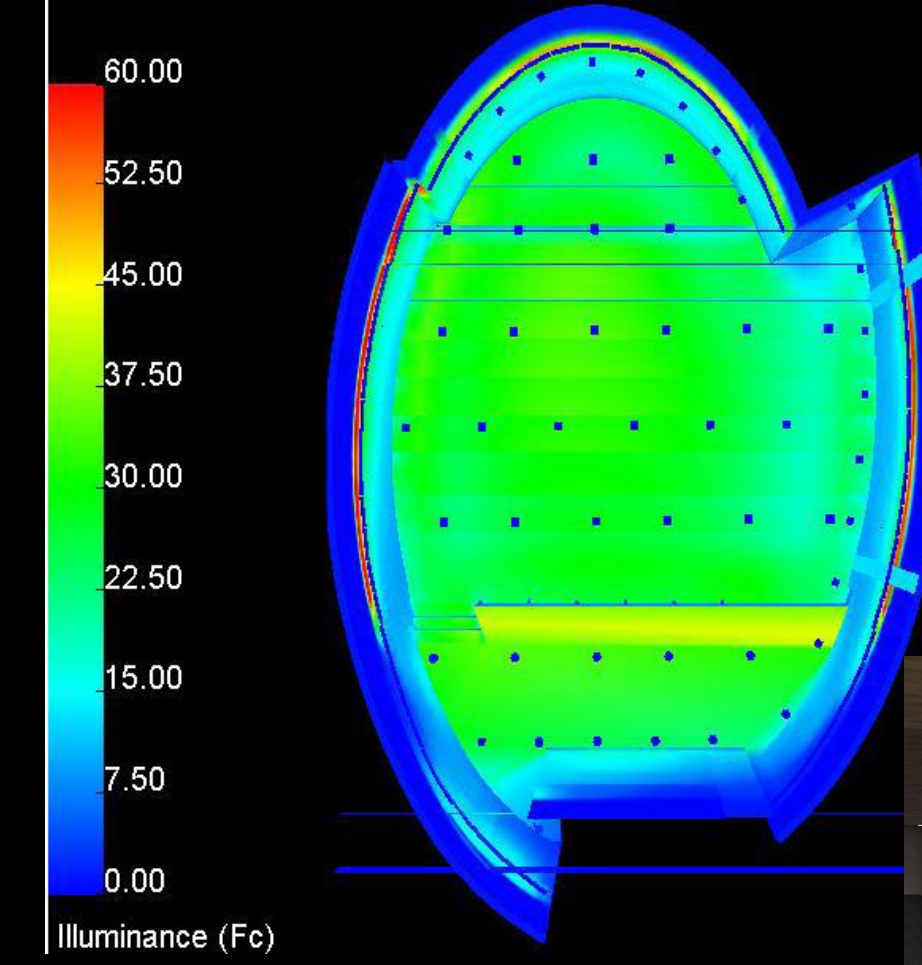
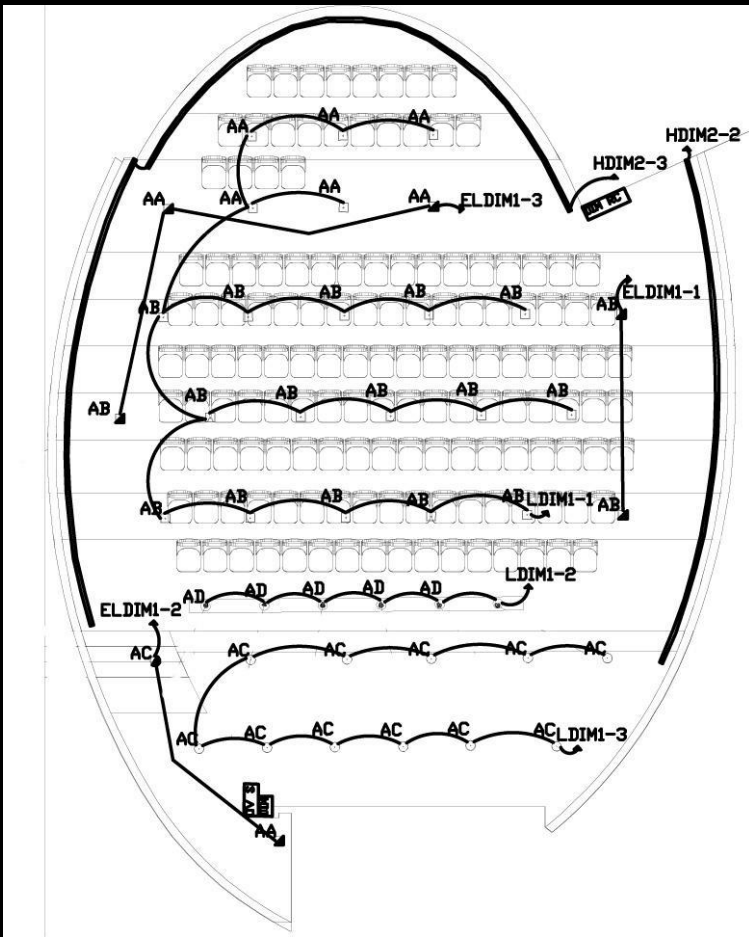
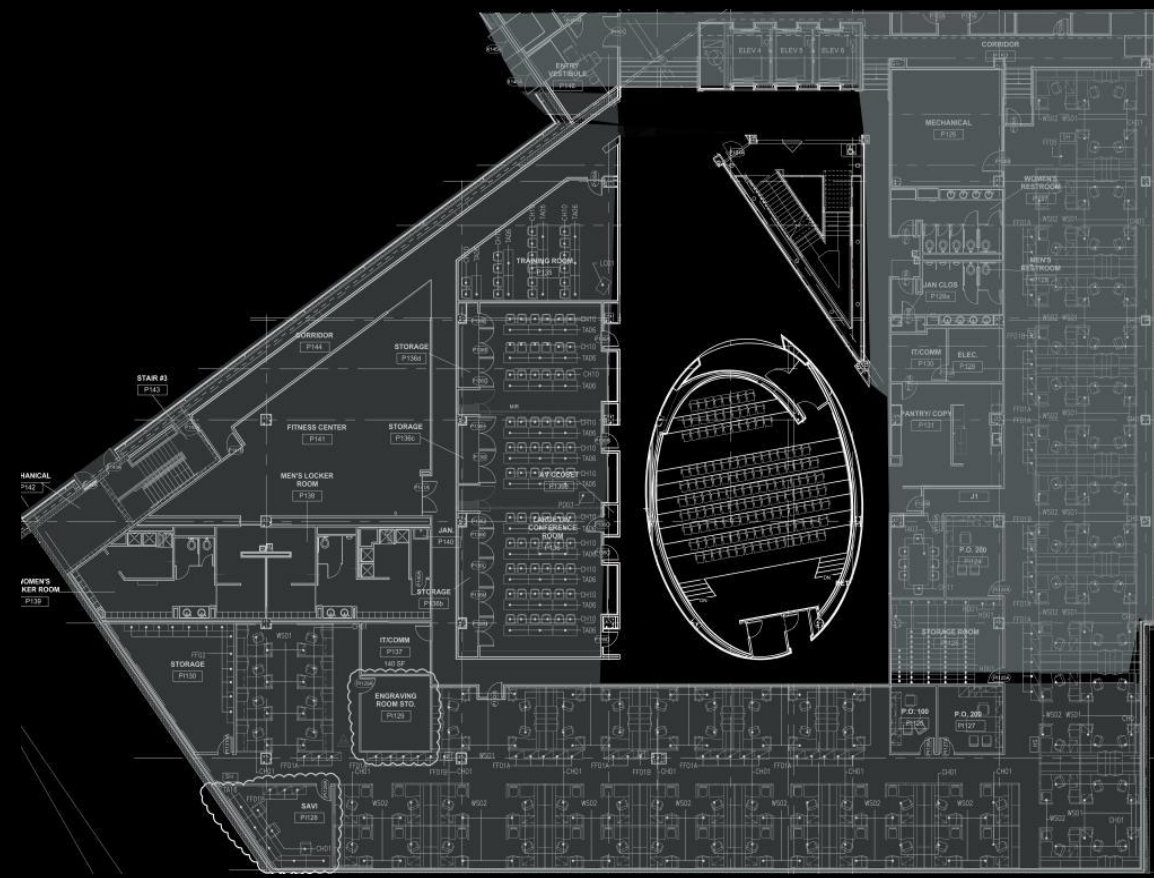
- Distinguish egress, seating, and point of interest (stage) with light

- 3 Separate Scenes

- General ( All Luminaires On)
- Speaker ( Seating Area off of Dimmed0)
- Projector Screen Presentation ( Only Perimeter Luminaires on)

- Criteria

- Different functions for stage
- Modeling of Faces
- System Control and Flexibility



# Breadth Topic- Heat Load Analysis

- Replace Incandescent with Compact Fluorescent
- Analyze Difference in Heat Load within the Space

## Room Checksums By ACADEMIC

sp-1-Room

| COOLING COIL PEAK               |                           |                 |                      | CLG SPACE PEAK                             |                      |                             |                          | HEATING COIL PEAK         |                             |                          |                      |                                   |  |  |  |
|---------------------------------|---------------------------|-----------------|----------------------|--|----------------------|-----------------------------|--------------------------|---------------------------|-----------------------------|--------------------------|----------------------|-----------------------------------|--|--|--|
| Peaked at Time:<br>Outside Air: |                           |                 |                      | Mo/Hr: 7 / 16<br>QADB/WB/HR: 87 / 74 / 110 |                      |                             |                          | Mo/Hr: 7 / 16<br>QADB: 87 |                             |                          |                      | Mo/Hr: Heating Design<br>QADB: -9 |  |  |  |
| Space Sens. + Lat. Btu/h        | Plenum Sens. + Lat. Btu/h | Net Total Btu/h | Percent Of Total (%) | Space Sensible Btu/h                       | Percent Of Total (%) | Space Peak Space Sens Btu/h | Coil Peak Tot Sens Btu/h | Percent Of Total (%)      | Space Peak Space Sens Btu/h | Coil Peak Tot Sens Btu/h | Percent Of Total (%) |                                   |  |  |  |
| <b>Envelope Loads</b>           |                           |                 |                      | <b>Envelope Loads</b>                      |                      |                             |                          | <b>Envelope Loads</b>     |                             |                          |                      |                                   |  |  |  |
| Skyllite Solar                  | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Skyllite Cond                   | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Roof Cond                       | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Glass Solar                     | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Glass/Door Cond                 | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Wall Cond                       | 22,990                    | 5,458           | 28,448               | 36   | 22,990               | 38                          | -45,402                  | 74.04                     | -45,402                     | -55,738                  | 74.04                |                                   |  |  |  |
| Partition/Door                  | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Floor                           | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Adjacent Floor                  | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Infiltration                    | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Sub Total ==>                   | 22,990                    | 5,458           | 28,448               | 36   | 22,990               | 38                          | -45,402                  | 74.04                     | -45,402                     | -55,738                  | 74.04                |                                   |  |  |  |
| <b>Internal Loads</b>           |                           |                 |                      | <b>Internal Loads</b>                      |                      |                             |                          | <b>Internal Loads</b>     |                             |                          |                      |                                   |  |  |  |
| Lights                          | 8,084                     | 2,021           | 10,105               | 13   | 8,084                | 13                          | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| People                          | 39,600                    | 0               | 39,600               | 50   | 27,000               | 45                          | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Misc                            | 865                       | 0               | 865                  | 1  | 865                  | 1                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Sub Total ==>                   | 48,549                    | 2,021           | 50,569               | 64   | 35,949               | 60                          | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| <b>Ceiling Load</b>             |                           |                 |                      | <b>Ceiling Load</b>                        |                      |                             |                          | <b>Ceiling Load</b>       |                             |                          |                      |                                   |  |  |  |
| Ventilation Load                | 1,011                     | -1,011          | 0                    | 0  | 1,011                | 2                           | -3,540                   | 0.00                      | -3,540                      | 0                        | 0.00                 |                                   |  |  |  |
| Adj Air Trans Heat              | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Dehumid. Ov Sizing              | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Ow/Undr Sizing                  | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Exhaust Heat                    | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Sup. Fan Heat                   | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Ret. Fan Heat                   | 0                         | 0               | 0                    | 0  | 0                    | 0                           | -6,372                   | 8.46                      | -6,372                      | -13,168                  | 17.49                |                                   |  |  |  |
| Duct Heat Pkup                  | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Underflr Sup Ht Pkup            | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Supply Air Leakage              | 0                         | 0               | 0                    | 0  | 0                    | 0                           | 0                        | 0.00                      | 0                           | 0                        | 0.00                 |                                   |  |  |  |
| Grand Total ==>                 | 72,549                    | 6,468           | 79,018               | 100.00                                     | 59,949               | 100.00                      | -48,542                  | 75.278                    | -48,542                     | -75,278                  | 100.00               |                                   |  |  |  |

| TEMPERATURES |         |         |
|--------------|---------|---------|
|              | Cooling | Heating |
| SADB         | 56.3    | 70.0    |
| Ra Plenum    | 77.0    | 62.9    |
| Return       | 77.0    | 62.9    |
| Ret/OA       | 77.0    | 62.9    |
| Fm MtrTD     | 0.0     | 0.0     |
| Fm BldTD     | 0.0     | 0.0     |
| Fm FrieT     | 0.0     | 0.0     |

| AIRFLOWS    |         |         |
|-------------|---------|---------|
|             | Cooling | Heating |
| Diffuser    | 2,953   | 886     |
| Terminal    | 2,953   | 886     |
| Main Fan    | 2,953   | 886     |
| Sec Fan     | 0       | 0       |
| Nom Vent    | 0       | 0       |
| AHU Vent    | 0       | 0       |
| Infil       | 0       | 0       |
| MinStop/Rh  | 886     | 886     |
| Return      | 2,953   | 886     |
| Exhaust     | 0       | 0       |
| Rm Exh      | 0       | 0       |
| Auxiliary   | 0       | 0       |
| Leakage Dwn | 0       | 0       |
| Leakage Ups | 0       | 0       |

| ENGINEERING CKS |         |         |
|-----------------|---------|---------|
|                 | Cooling | Heating |
| % OA            | 0.0     | 0.0     |
| cfm/ft²         | 1.86    | 0.56    |
| cfm/ton         | 448.43  |         |
| ft³/min         | 240.48  |         |
| Btu/hr-ft²      | 49.90   | -39.22  |
| No. People      | 150     |         |

| COOLING COIL SELECTION |              |               |                  | AREAS        |              |             |             |
|------------------------|--------------|---------------|------------------|--------------|--------------|-------------|-------------|
| Total Capacity ton     | Capacity MBh | Sens Cap. MBh | Coil Airflow cfm | Gross Total  | Glass n² (%) |             |             |
| Main Clg               | 6.6          | 79.0          | 66.4             | 2,953        | 77.0         | 63.1        | 66.4        |
| Aux Clg                | 0.0          | 0.0           | 0.0              | 0            | 0.0          | 0.0         | 0.0         |
| Opt Vent               | 0.0          | 0.0           | 0.0              | 0            | 0.0          | 0.0         | 0.0         |
| <b>Total</b>           | <b>6.6</b>   | <b>79.0</b>   | <b>66.4</b>      | <b>2,953</b> | <b>77.0</b>  | <b>63.1</b> | <b>66.4</b> |

| HEATING COIL SELECTION |                  |         |         |
|------------------------|------------------|---------|---------|
| Capacity MBh           | Coil Airflow cfm | Ent. °F | Lvg. °F |
| Main Htg               | -62.1            | 0       | 0.0     |
| Aux Htg                | 0.0              | 0       | 0.0     |
| Preheat                | 0.0              | 0       | 0.0     |
| Humidtr                | 0.0              | 0       | 0.0     |
| Opt Vent               | 0.0              | 0       | 0.0     |
| <b>Total</b>           | <b>-62.1</b>     |         |         |