

Towson Arena
Objectives
Press Room
Reception
Court
Exterior
Generator
SKM
Trace Glazing
Acoustic Analysis
Closing Questions

Joseph Gordon Becker Lighting/Electrical Option

Towson Center Arena Addition

Architect: Hord Coplan Macht
General Contractor: Gilbane Construction
Structural: Faisant Associates, Inc.
MEP: James Posey Associates, Inc.
Lighting: Bruce Dunlop Lighting Design



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Towson University

Towson, Maryland

Towson Center Arena Addition

Electrical:

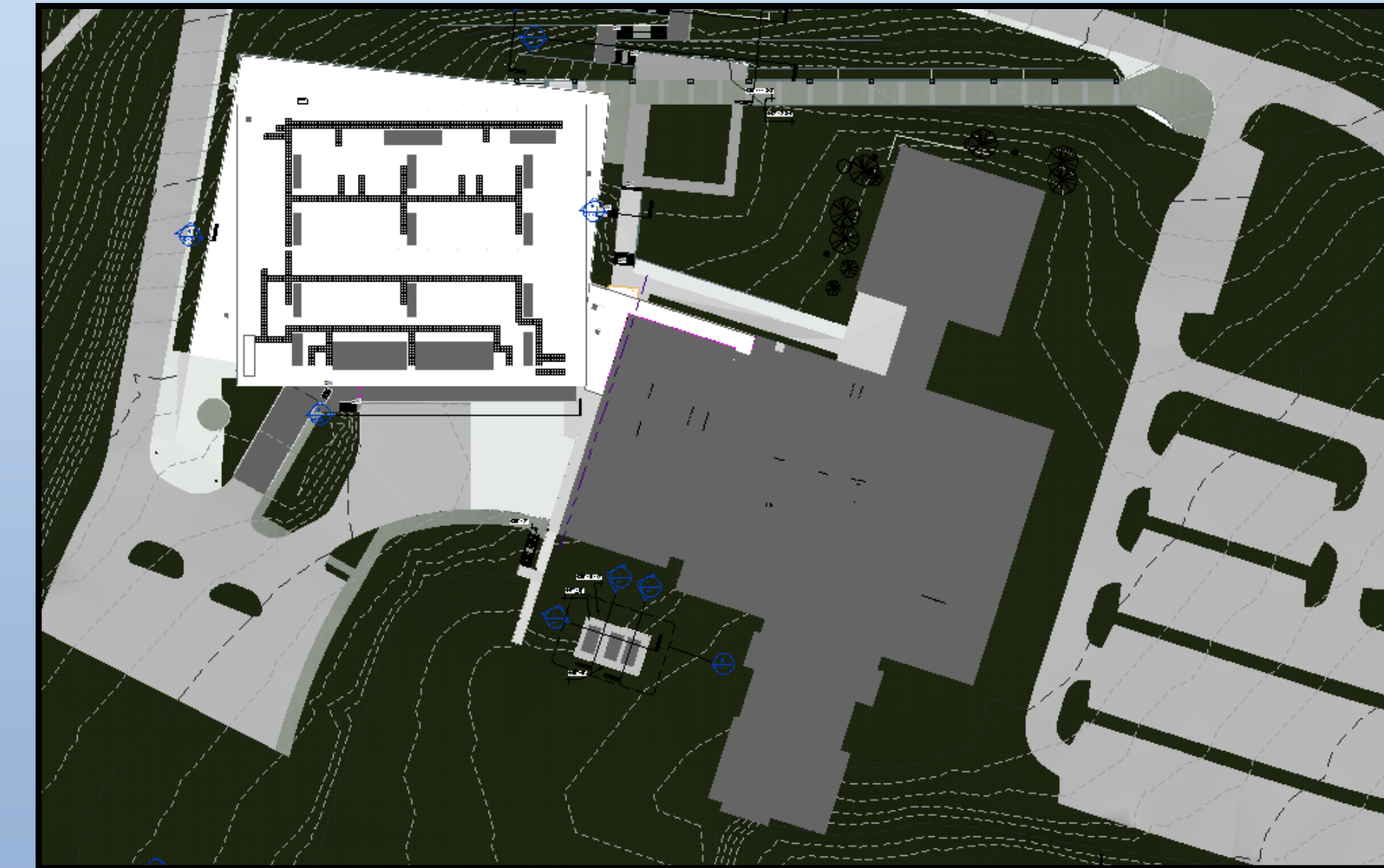
15 kV service entrance on first floor
277/480V & 120/208V Voltage Systems
3 150 kW Natural Gas Generators
Dry Type Transformers
Baltimore Gas & Electric

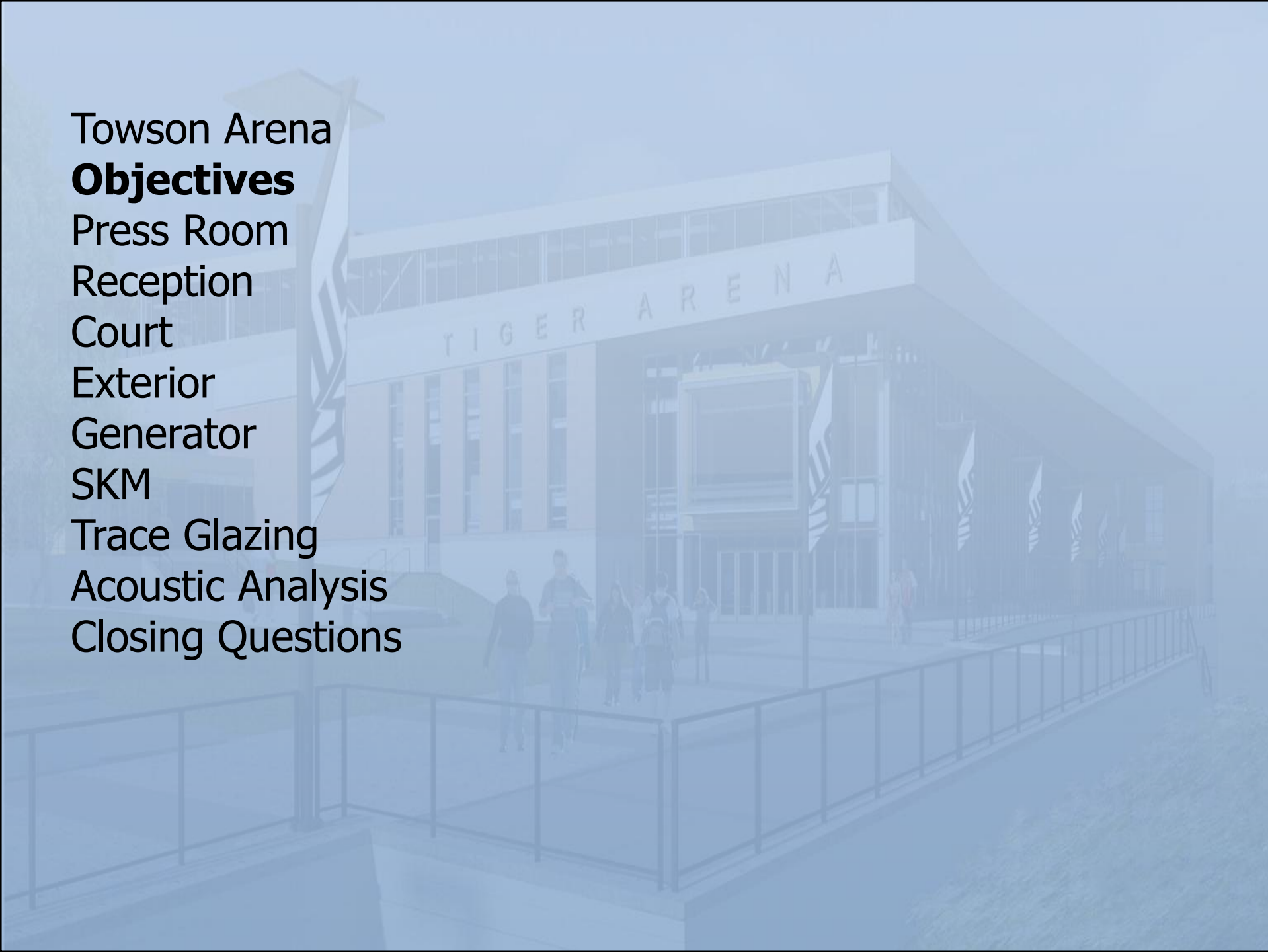
Mechanical:

Auto-occupied-unoccupied Control
10 TA AHU & 5 TC AHU
VAV System and Ductless Split System
Energy Recovery Unit
300 hp packaged hot water boiler
400 ton centrifugal type chiller

Structural:

Steel moment resisting frame
with lateral bracing
Composite steel decking supported
by beams and girders
Foundation system consists of spread
footing and 6" concrete slabs





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Goals

Lighting Spaces:
Press Room
Reception
Court
Exterior

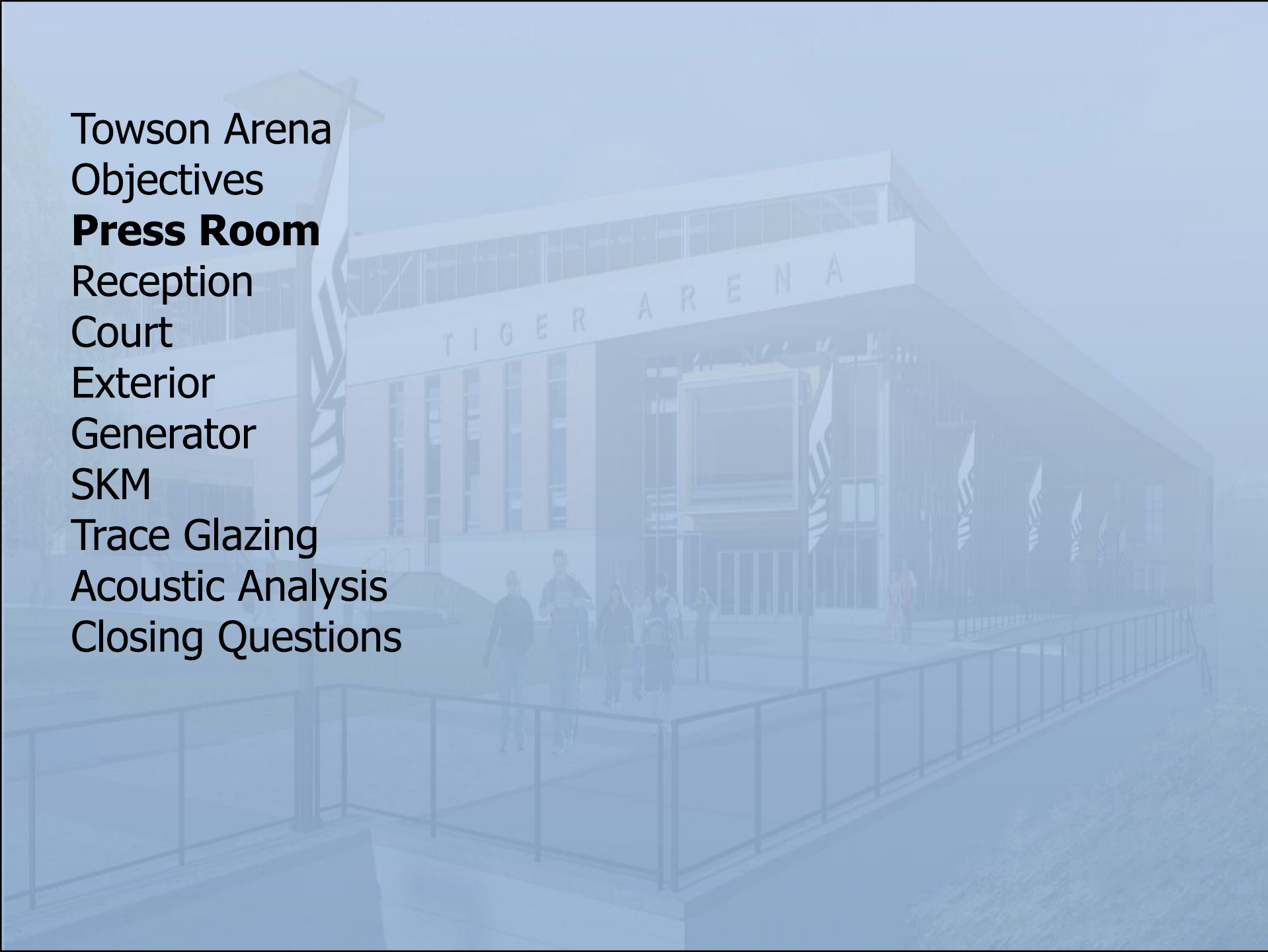
SKM Analysis Depth:
Build Model of Existing System
Use Single Line Drawing
Generate loads on electrical equipment
Find voltage drop on system

Acoustic Breadth:
Study acoustic attributes of Court
Calculate Reverberation Time
Classify Court uses

Emergency Generator System Depth:
Assess Current System
Generator Comparison
Circuit Breaker Comparison
Panelboard Comparison

Trace Glazing Breadth:
Use Revit model of Court for analysis
Alter glazing characteristics
Study affect on mechanical loads

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| Design Criteria | | | |
|-----------------|-----------------------|-----------|------------|
| | Conference Space | Design | Calculated |
| | Horiz. E @ 2'-6" | 300 lux | 273.5 lux |
| | Vert.E @ 4' AFF | 75 lux | 121.3 lux |
| | Walls | | |
| | 60% matte reflectance | 200 lux | 128.3 lux |
| | | | |
| | Power Density | 1.23W/ft2 | 0.9W/ft2 |

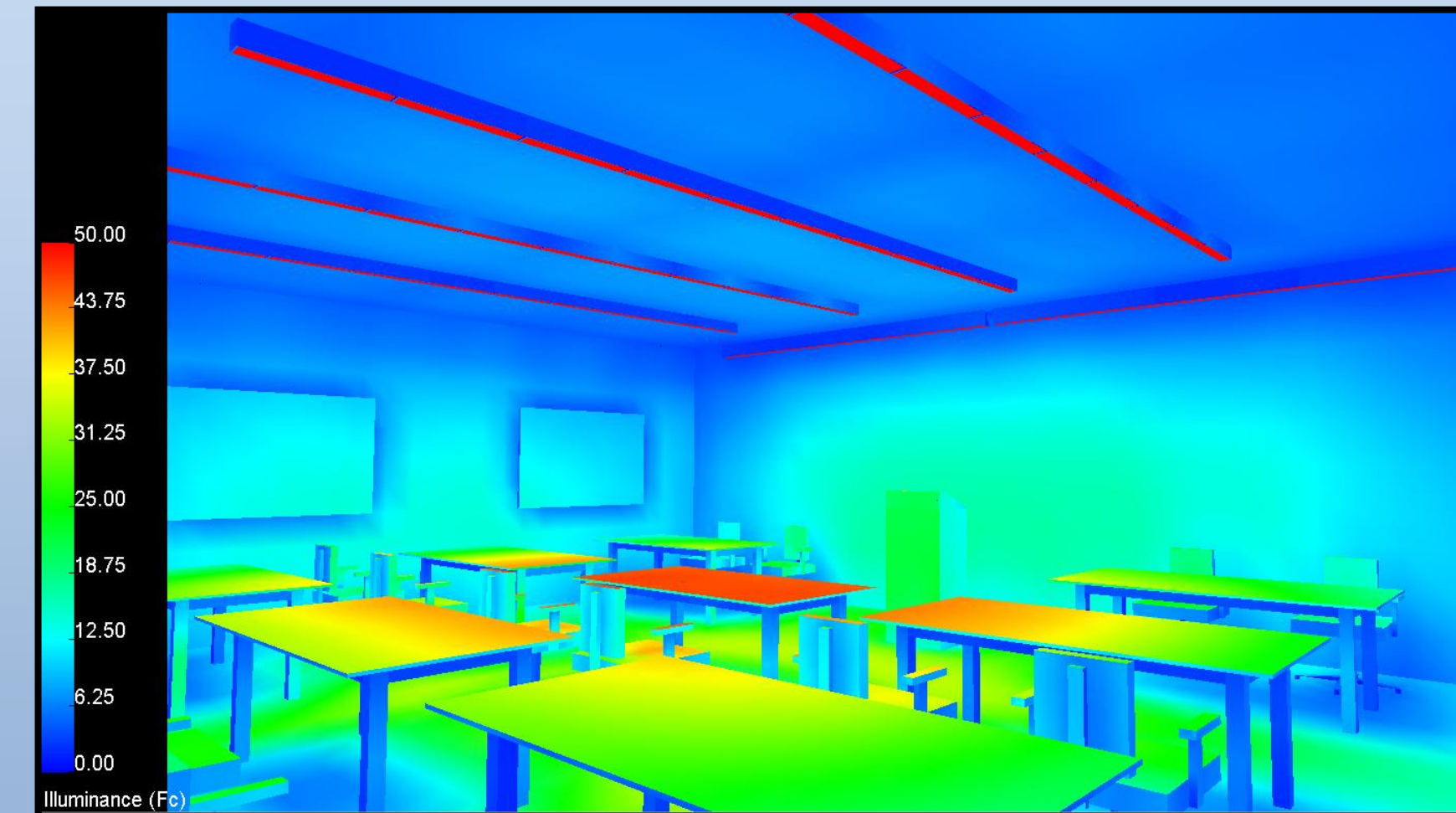


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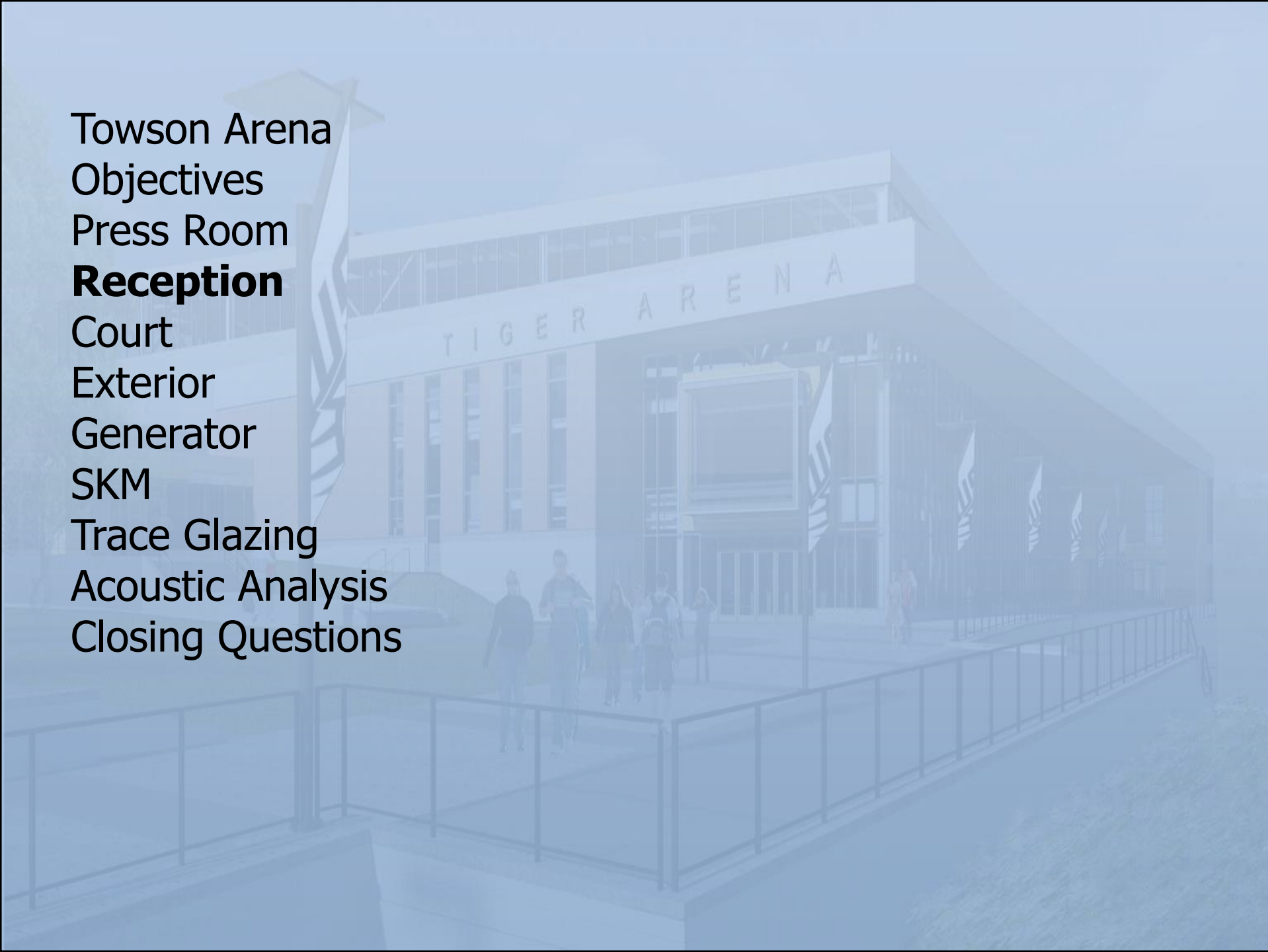
Towson Center Arena Addition



Luminaire Data:
F28T5
2610 lumens
2 Lamp Fixture
4' Length
Surface Mount

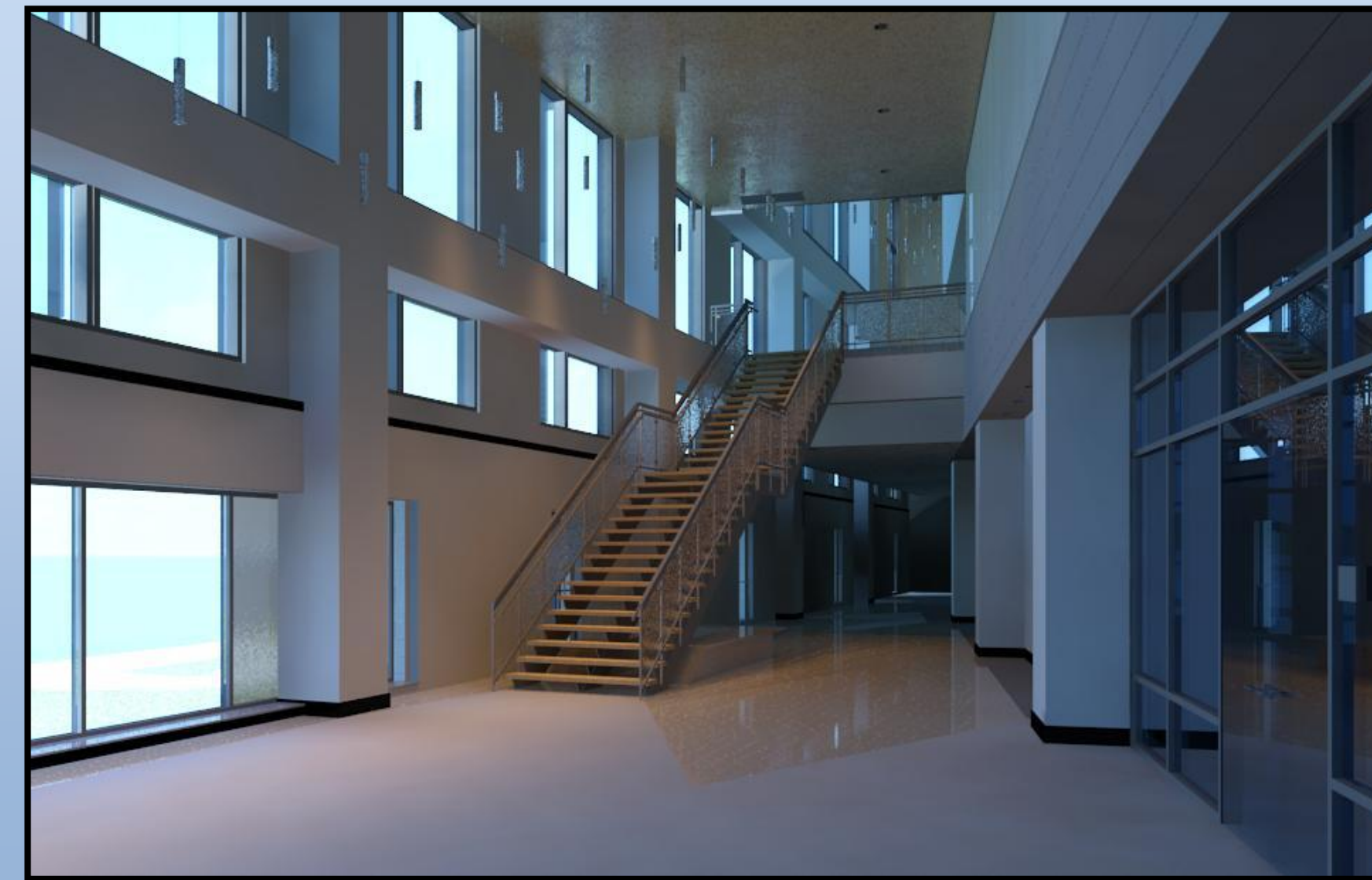


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| Design Criteria | | | |
|-----------------|------------------|----------|------------|
| | Lobbies | Design | Calculated |
| | Day | | |
| | Horz. E @ 5' AFF | 100 lux | 725 lux |
| | Vert. E @ 5' AFF | 50 lux | 242 lux |
| | Night | | |
| | Horz. E @ 5' AFF | 50 lux | 63 lux |
| | Vert. E @ 5' AFF | 30 lux | 27.3 lux |
| | Power | 0.9W/ft2 | 1.7W/ft2 |



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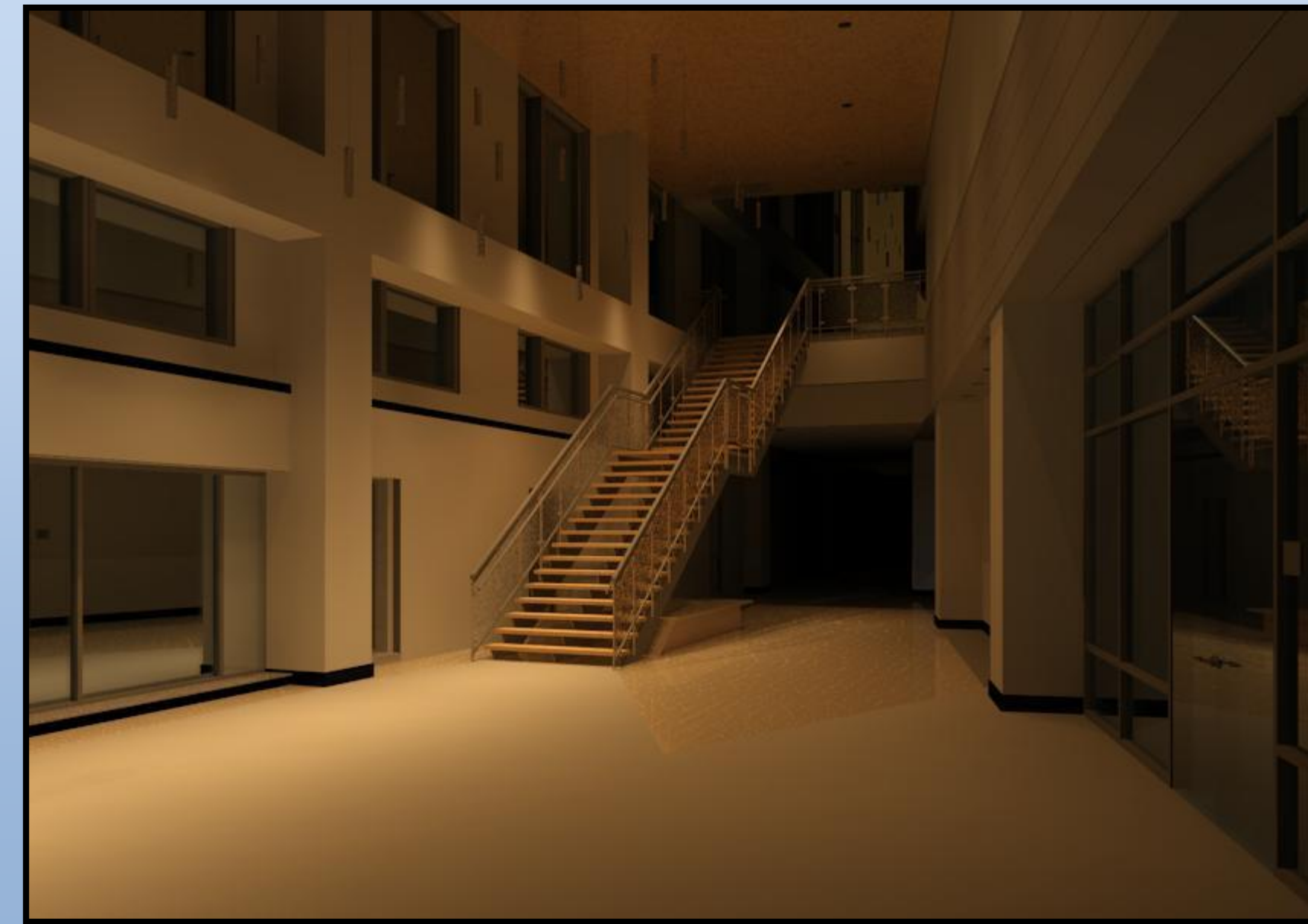
Luminaire Data:

70W ED17 MH
5700 lumens
Pendant Mount
3000 K
80 CRI



Luminaire Data:

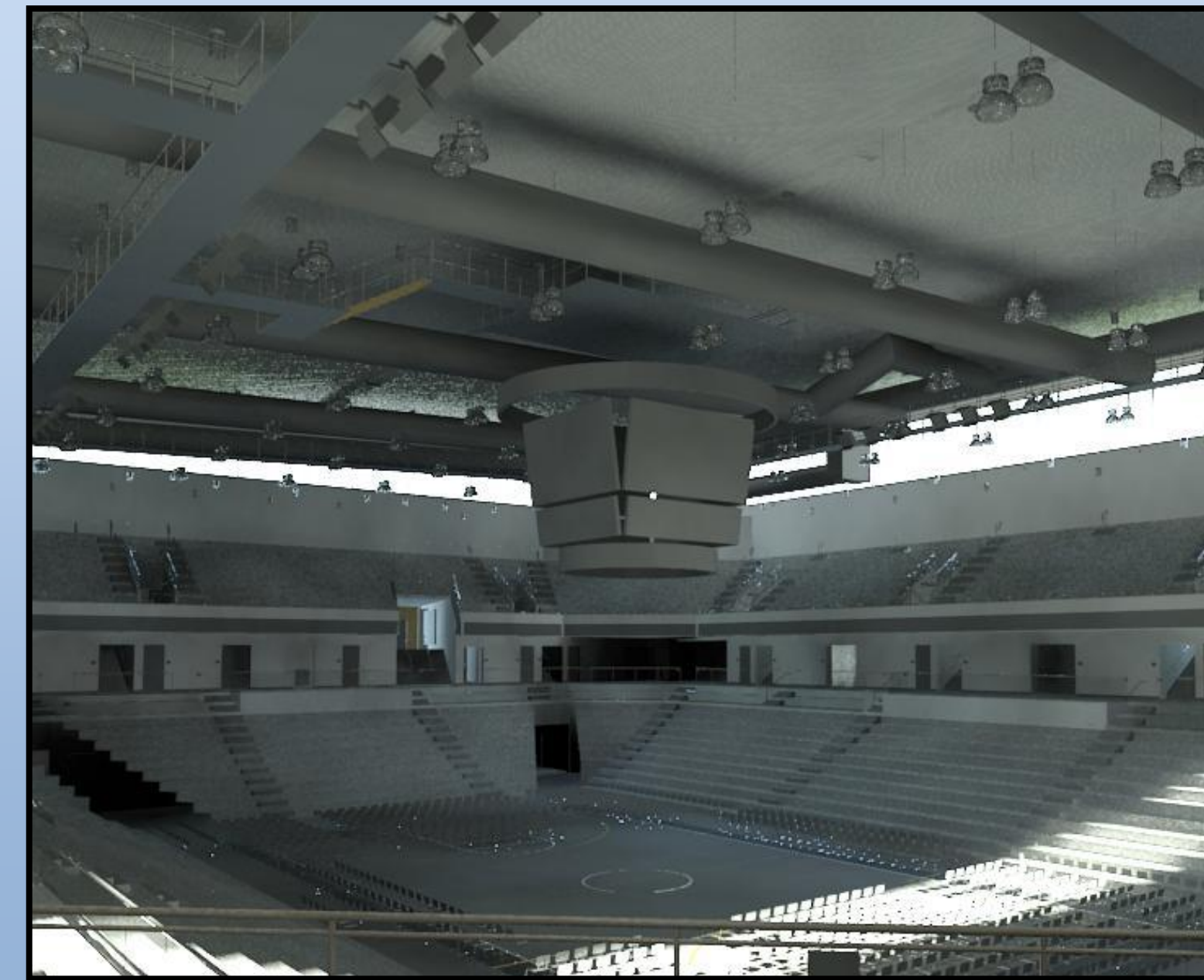
70W PAR30 MH
4700 lumens
Recess Mount
3000 K
82 CRI



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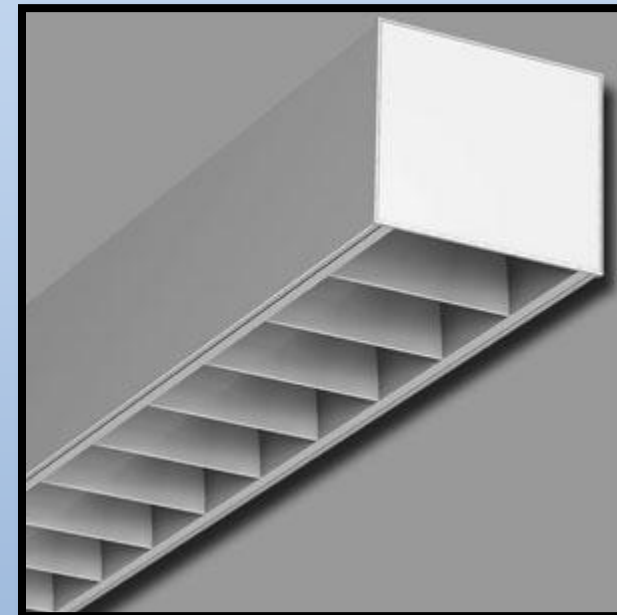
Towson Center Arena Addition

| Design Criteria | | | |
|-----------------|---------------------|------------------------|----------------------|
| | Class II 5000 Seats | Design | Calculated |
| | Horz. E @ 3' AFF | 750 lux | 1376.3 lux |
| | Vert. E | 200 lux | 558.6 lux |
| | | | |
| | Power | 1.92 W/ft ² | 2.5W/ft ² |



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Luminaire Data:

F40T8
2 Lamp
7000 lumens
3000 K
75 CRI
Wall Mount



Luminaire Data:
42W Triple Biax
3200 lumens
Suspended Pendant
3000 K
80 CRI



Luminaire Data:
150W ED17 MH
13000 lumens
Surface Mount Floodlight
3000 K
80 CRI

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| Design Criteria | | | |
|-----------------|-------------------|--------|------------|
| | Lighting Zone 4 | Design | Calculated |
| | Canopied Entry | | |
| | Horz. E @ grade | 10lux | 72 lux |
| | Vert. E @ 5' AFG | 8 lux | 52 lux |
| | Non-Covered Entry | | |
| | Horz. E @ grade | 10 lux | 12 lux |
| | Vert. E @ 5' AFG | 6 lux | 5 lux |



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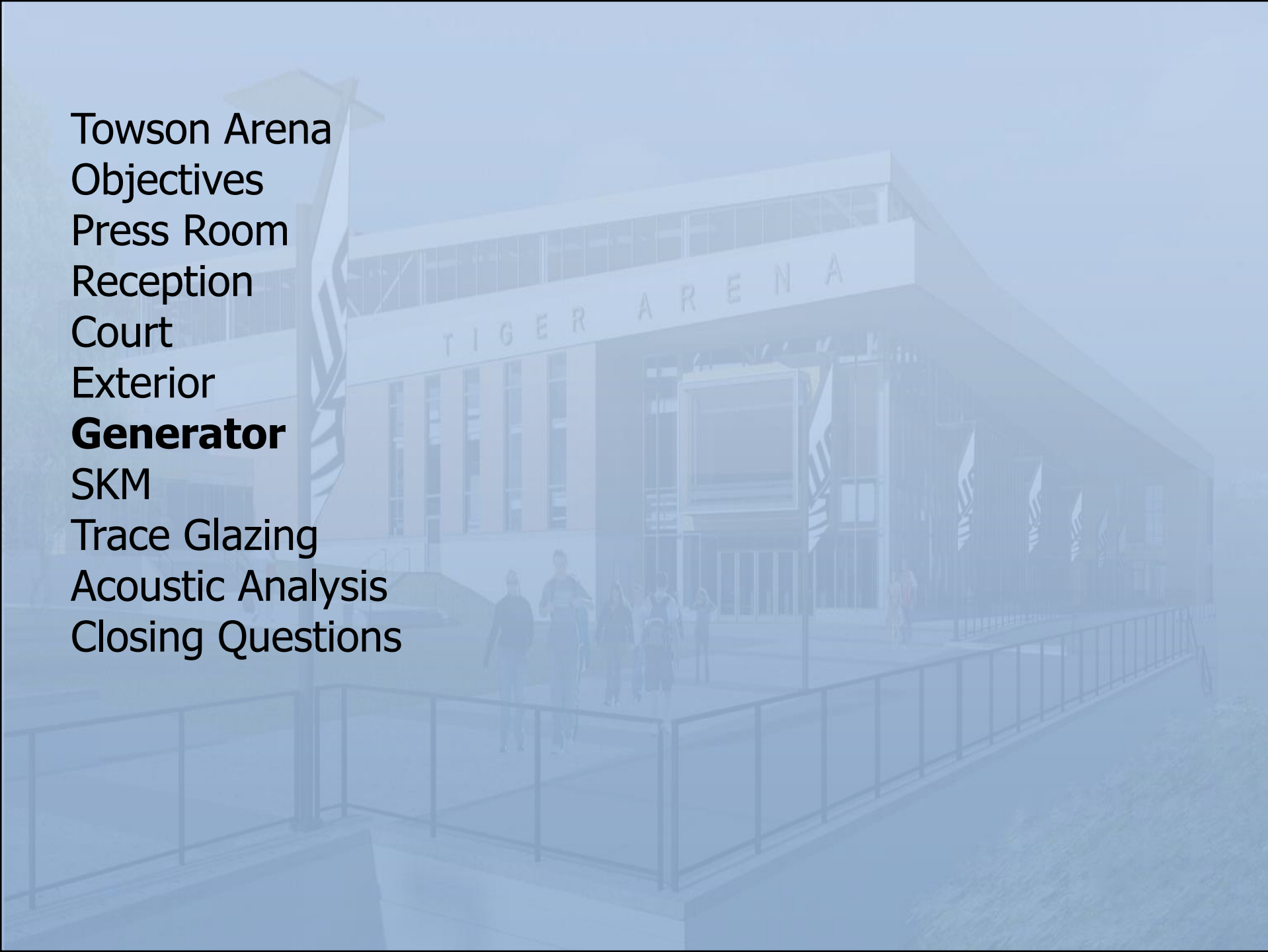


Luminaire Data:
70W PAR30 MH
4700 lumens
Recess Mount
4200 K
90 CRI



Luminaire Data:
90W LED Light Pole
5895 lumens
Efficacy 58
4000K
70 CRI

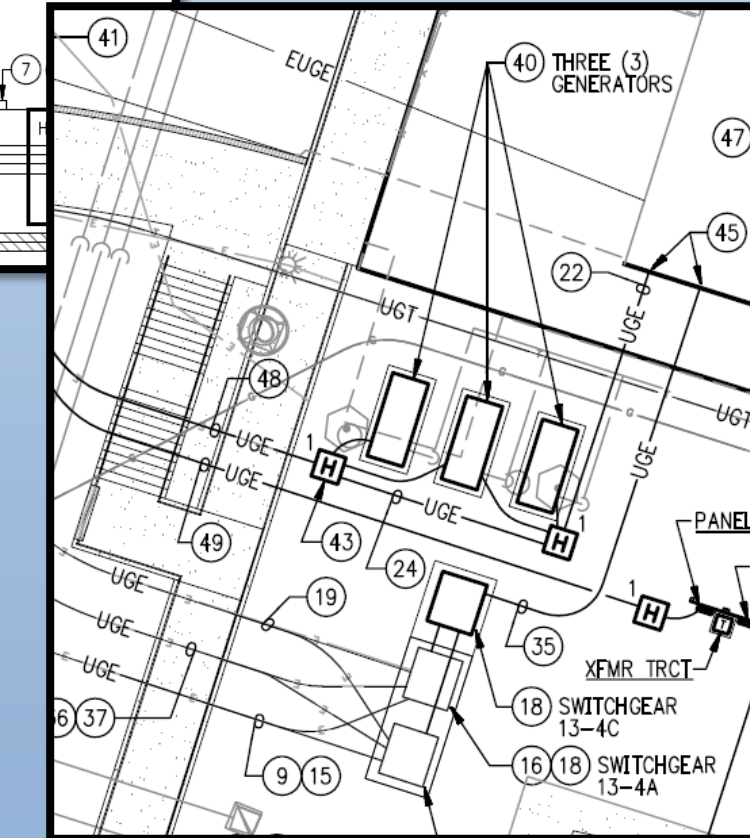
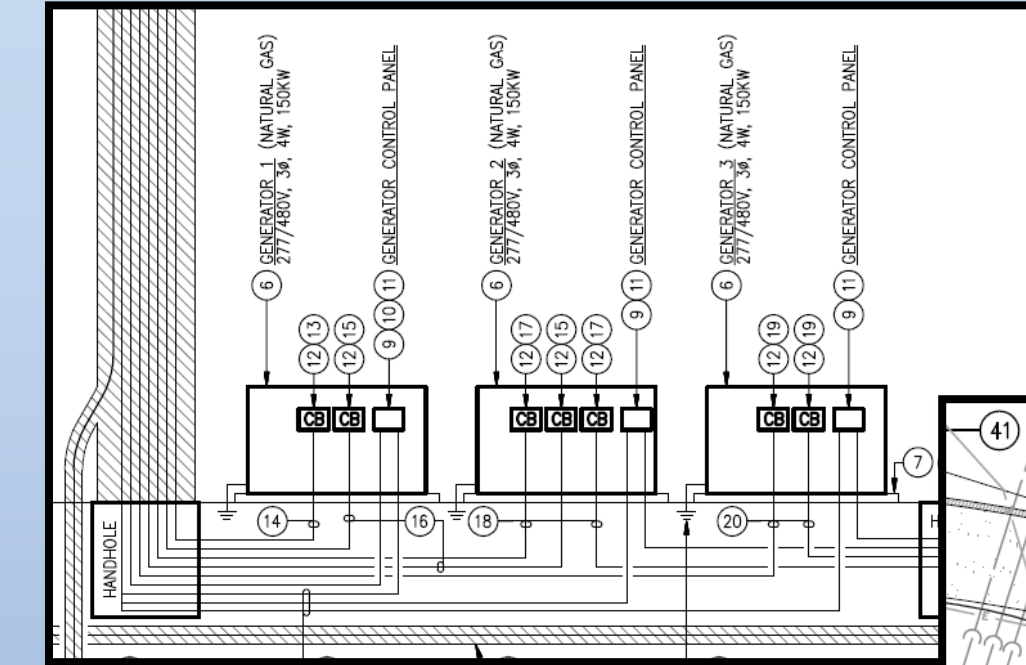
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Existing System:

- 3 150kW Natural Gas Generators
- 9 Feeders



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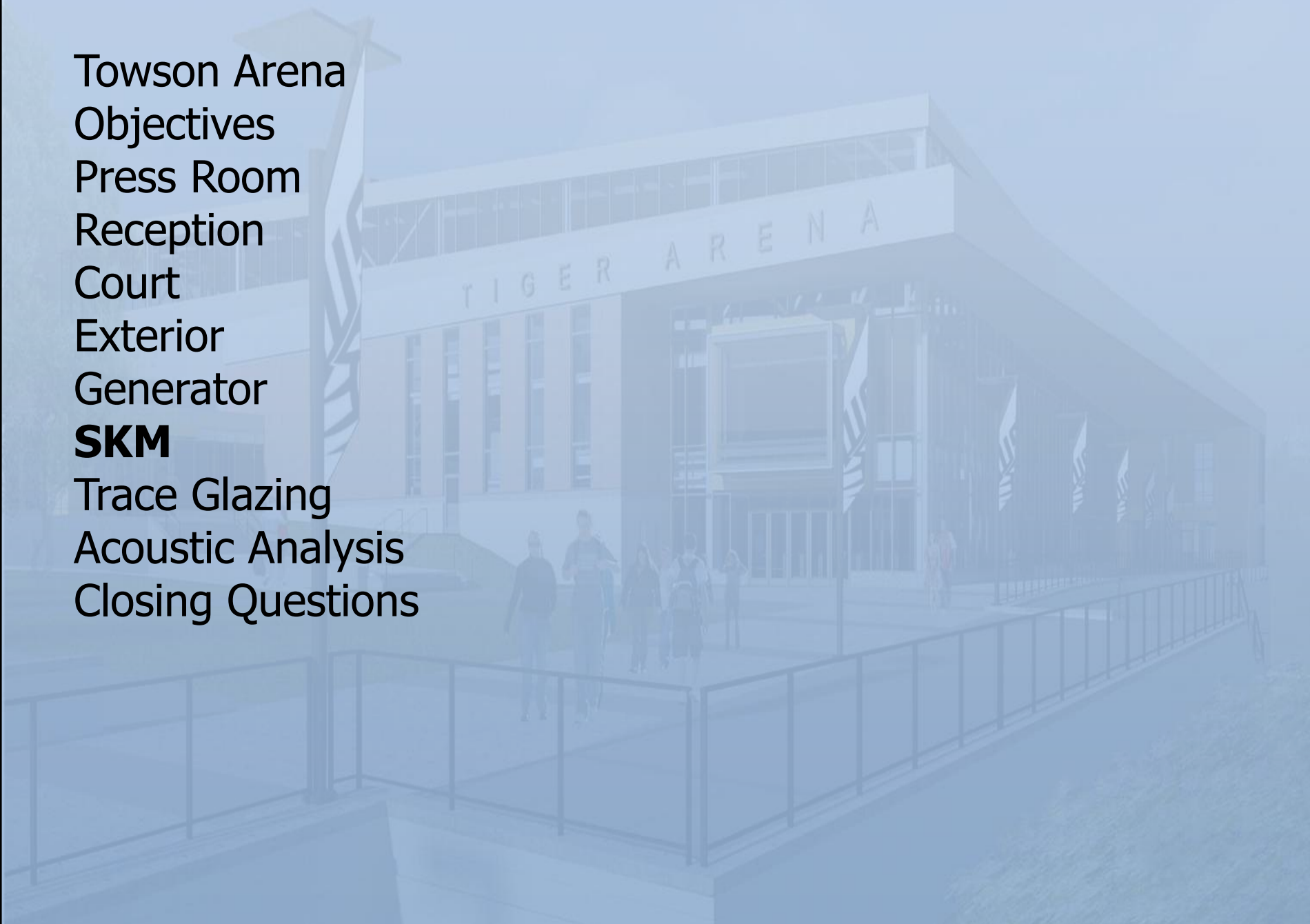
Towson Center Arena Addition

| Gen. | Amount | Size | Crew | Output | Hours | Unit | Material | Labor | Equipment | Total | Total Incl O&P | System Total |
|----------|--------|------|------|--------|-------|------|----------|-------|-----------|-------|----------------|--------------|
| Existing | 3 | 150 | R3 | 0.26 | 76.92 | Ea. | 43500 | 3725 | 530 | 47755 | 54000 | 162000 |
| New | 2 | 250 | R3 | 0.23 | 86.96 | Ea. | 57500 | 4200 | 600 | 62300 | 70000 | 140000 |

| Feeders | Amount | Size | Crew | Output | Hours | Unit | Material | Labor | Equipment | Total | Total Incl O&P | System Total |
|----------|--------|------|------|--------|-------|------|----------|-------|-----------|--------|----------------|--------------|
| Existing | 3 | 150 | R3 | 0.26 | 76.92 | Ea. | 43500 | 3725 | 530 | 47755 | 54000 | 162000 |
| New | 2 | 500 | R3 | 0.18 | 111 | Ea. | 109000 | 5375 | 770 | 115145 | 129000 | 258000 |

| Panel | Amount | Size | Crew | Output | Hours | Unit | Material | Labor | Equipment | Total | Total Incl O&P | System Total |
|----------|--------|------|------|--------|-------|------|----------|-------|-----------|--------|----------------|--------------|
| Existing | 3 | 150 | R3 | 0.26 | 76.92 | Ea. | 43500 | 3725 | 530 | 47755 | 54000 | 162000 |
| New | 2 | 1000 | R13 | 0.27 | 155 | Ea. | 222000 | 7275 | 705 | 229980 | 256000 | 512000 |

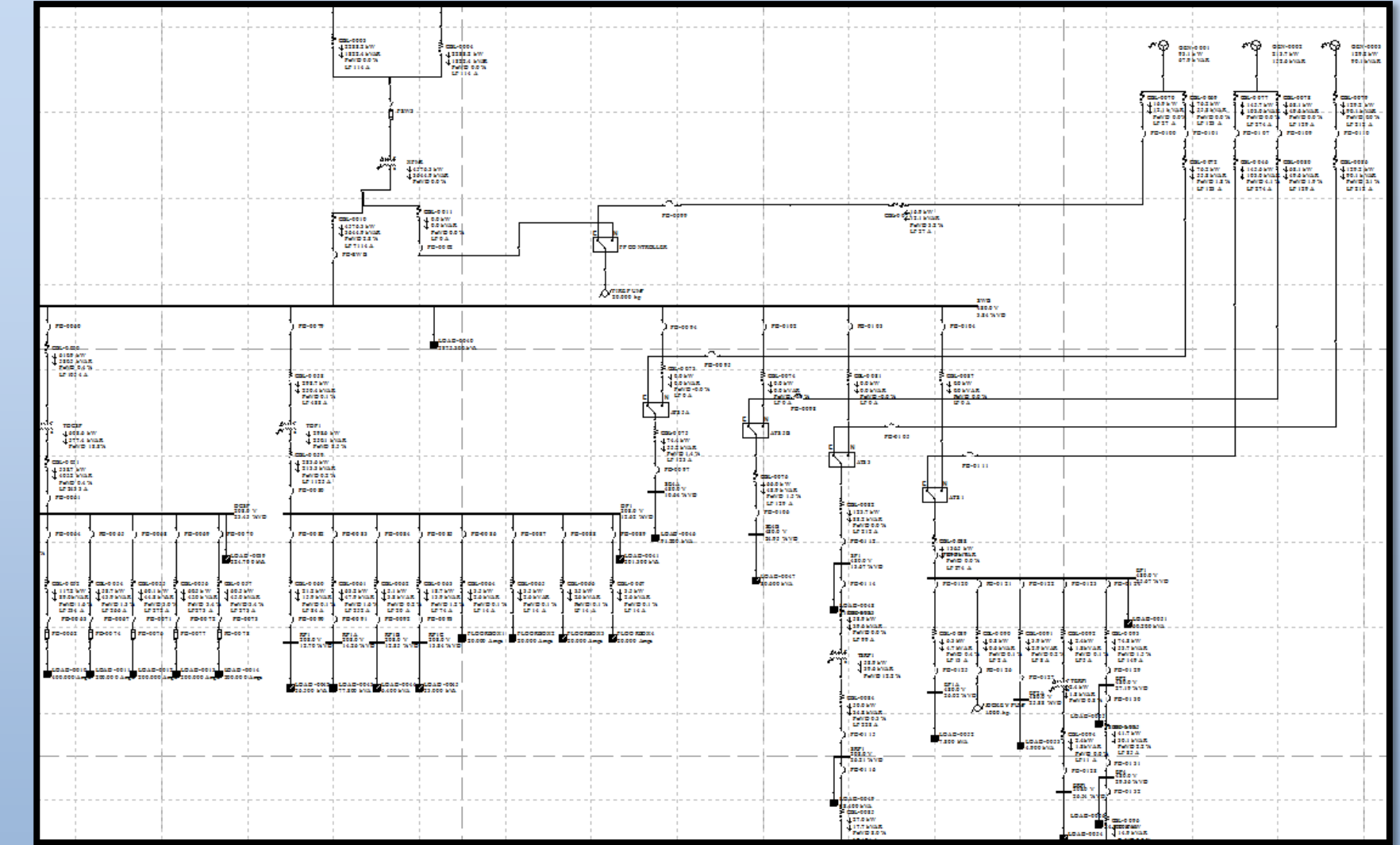
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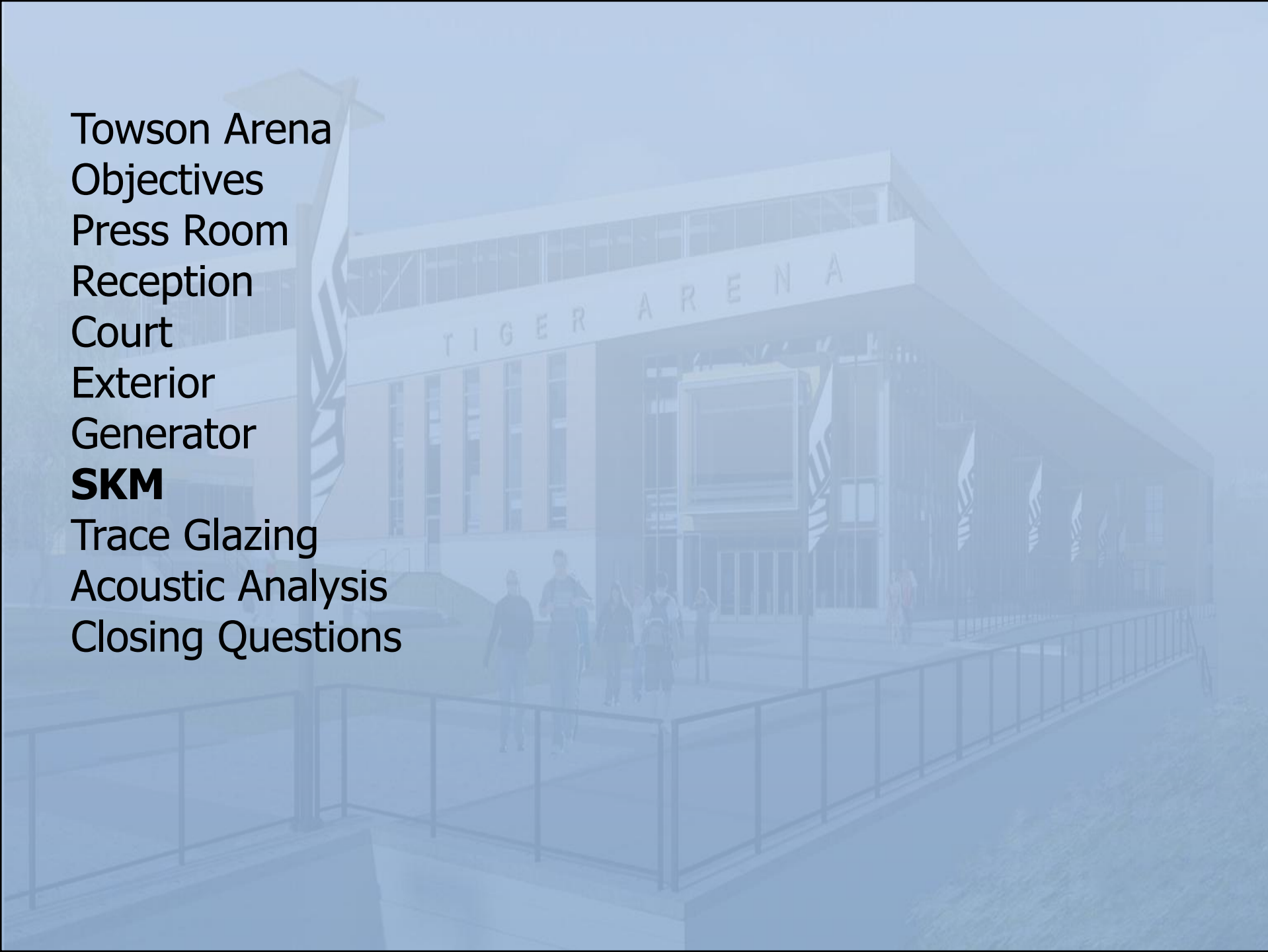
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Abilities of SKM Software:

- Demand Load
- Load Flow
- Short Circuit Analysis
- Arc Flash
- TCC Curves

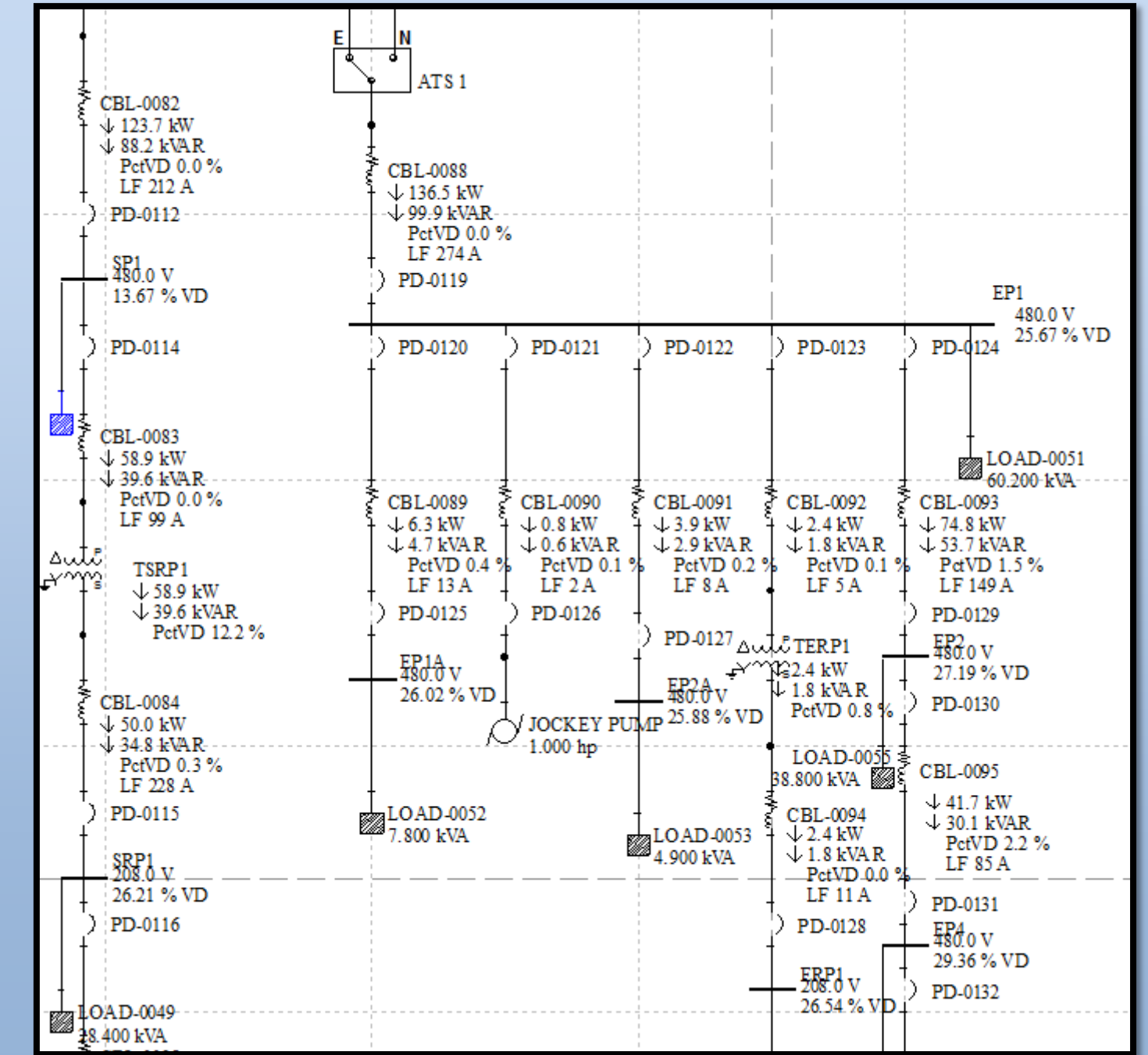


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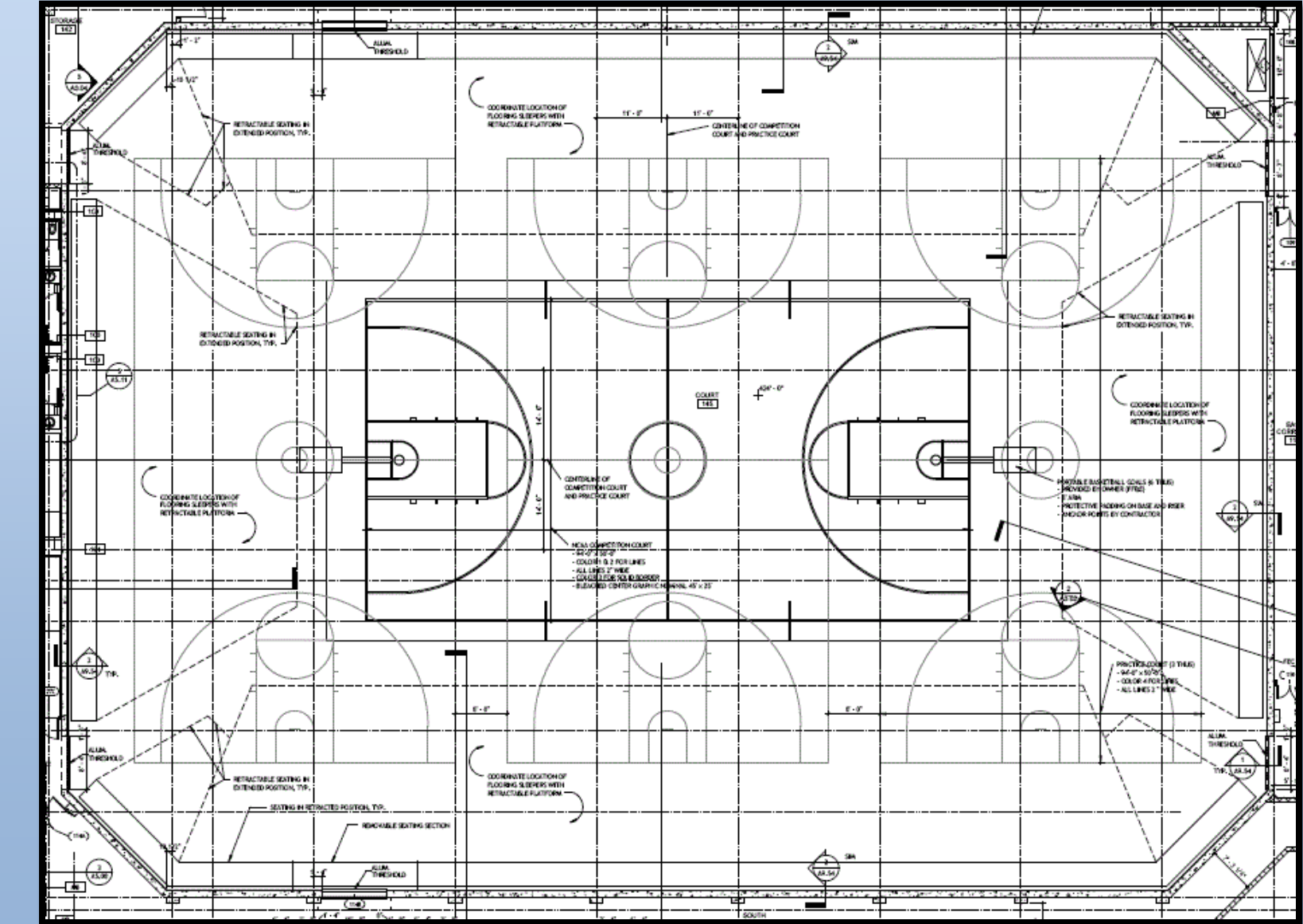
General Trends:
 Voltage Drop
 Cable Sizing
 Breaker Sizing



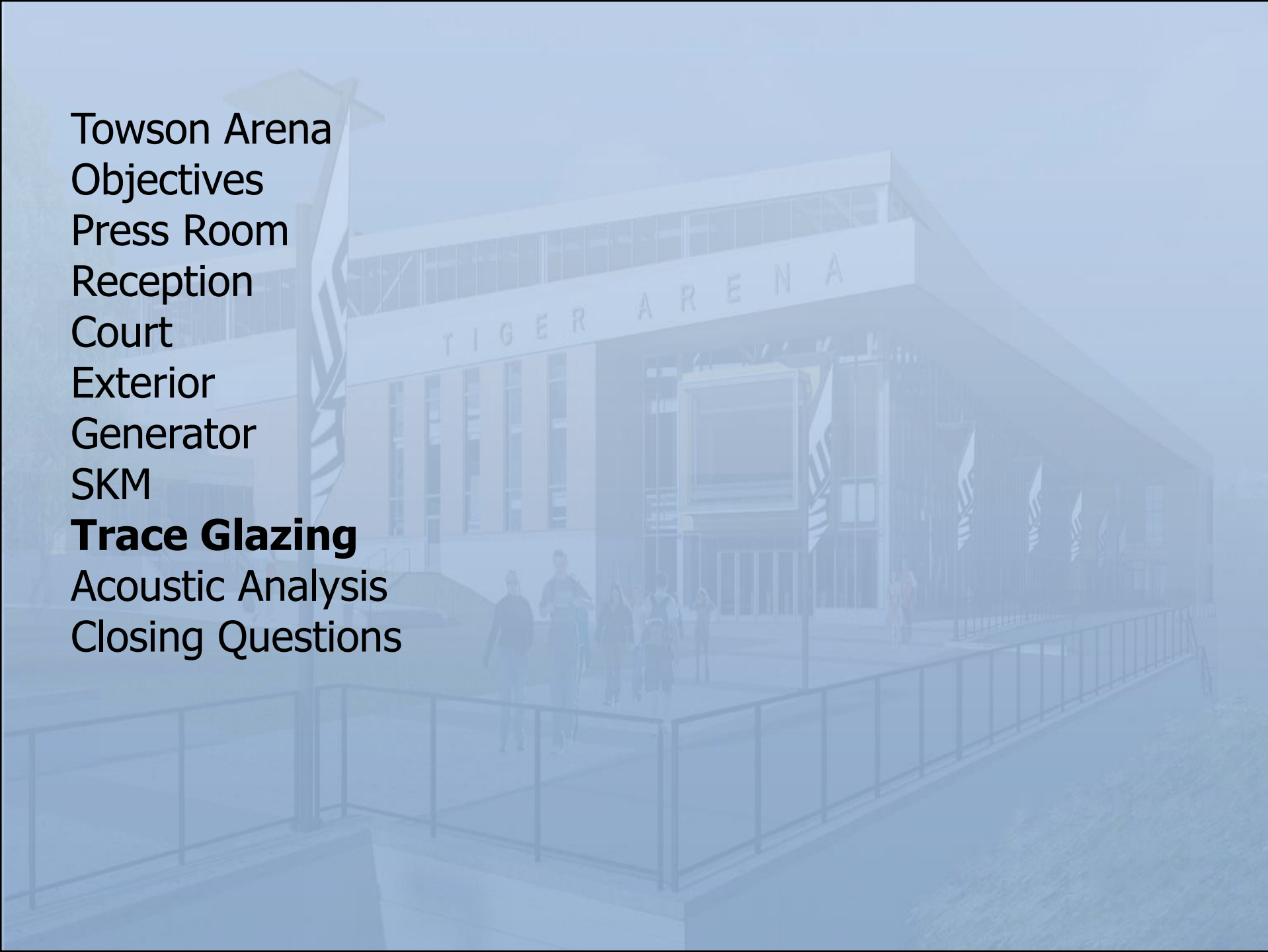
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Court Dimensions and System Data:
187' x 137' x 74'
Replica Model
Clerestory Area



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Design Cooling Load:

| Trace Designation | U-Factor | Shading Coefficient | Solar Gain Sensible Btu/hr | Glass Transmission Sensible Btu/hr | Total Cooling Load ton |
|---|----------|---------------------|----------------------------|------------------------------------|------------------------|
| 5mm Single Low Iron | 1.037 | 1.04 | 311,753 | 75,628 | 240.4 |
| Single Clear ¼" | 0.95 | 0.95 | 292,987 | 67,750 | 238.4 |
| Double Clear ¼" | 0.6 | 0.82 | 261,496 | 43,312 | 233.7 |
| 3mm Double Low-E (e2=.1) Clear 6mm Air | 0.432 | 0.69 | 179,578 | 31,711 | 225.7 |
| 3mm Double Low-E (e2=.04) Clear 13mm Air | 0.295 | 0.5 | 131,021 | 21,685 | 220.8 |

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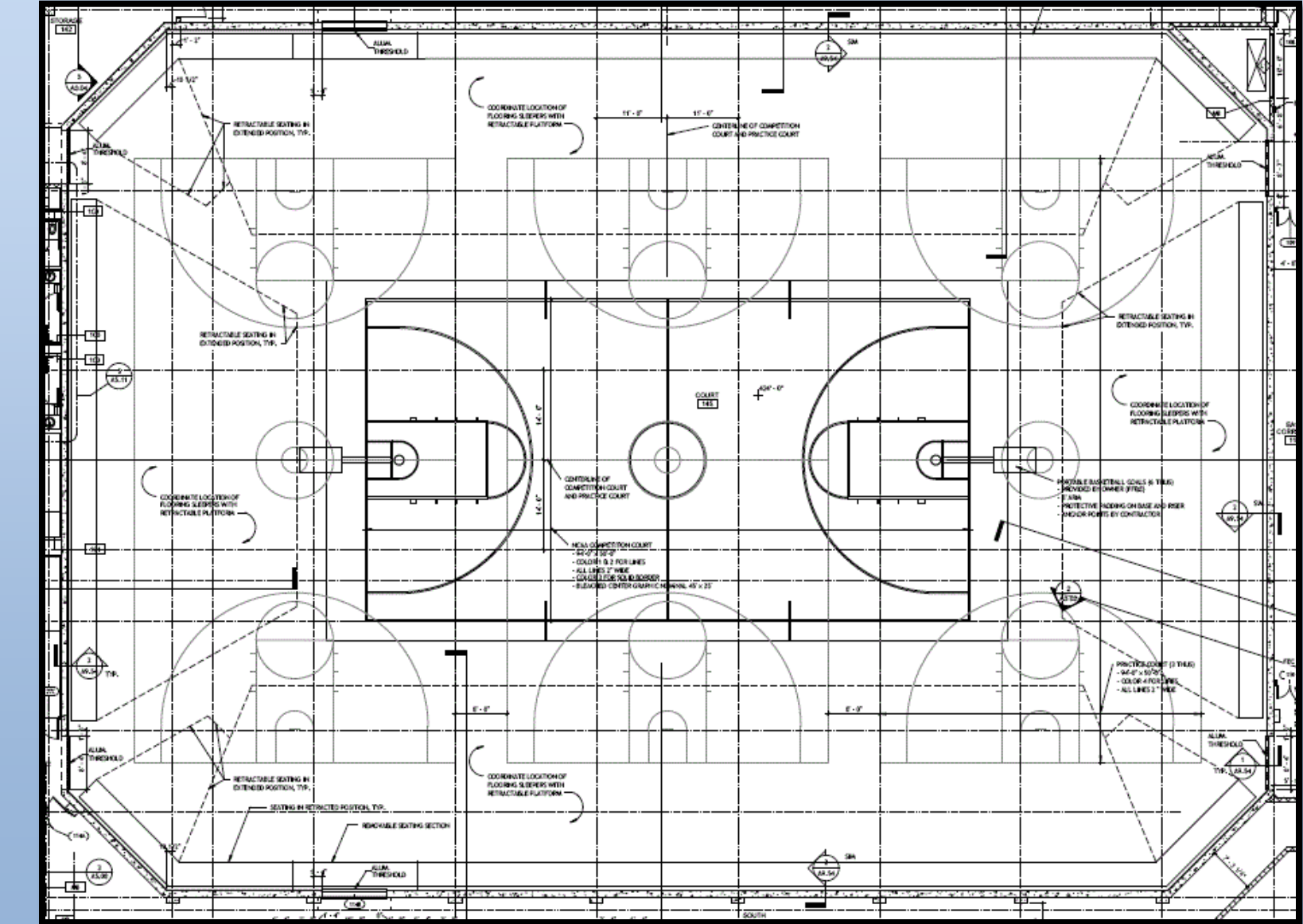
Court Dimensions and System Data:

187' x 137' x 74'

Replica Model

Clerestory Area

$$T = (0.05) * \text{Volume} / a$$



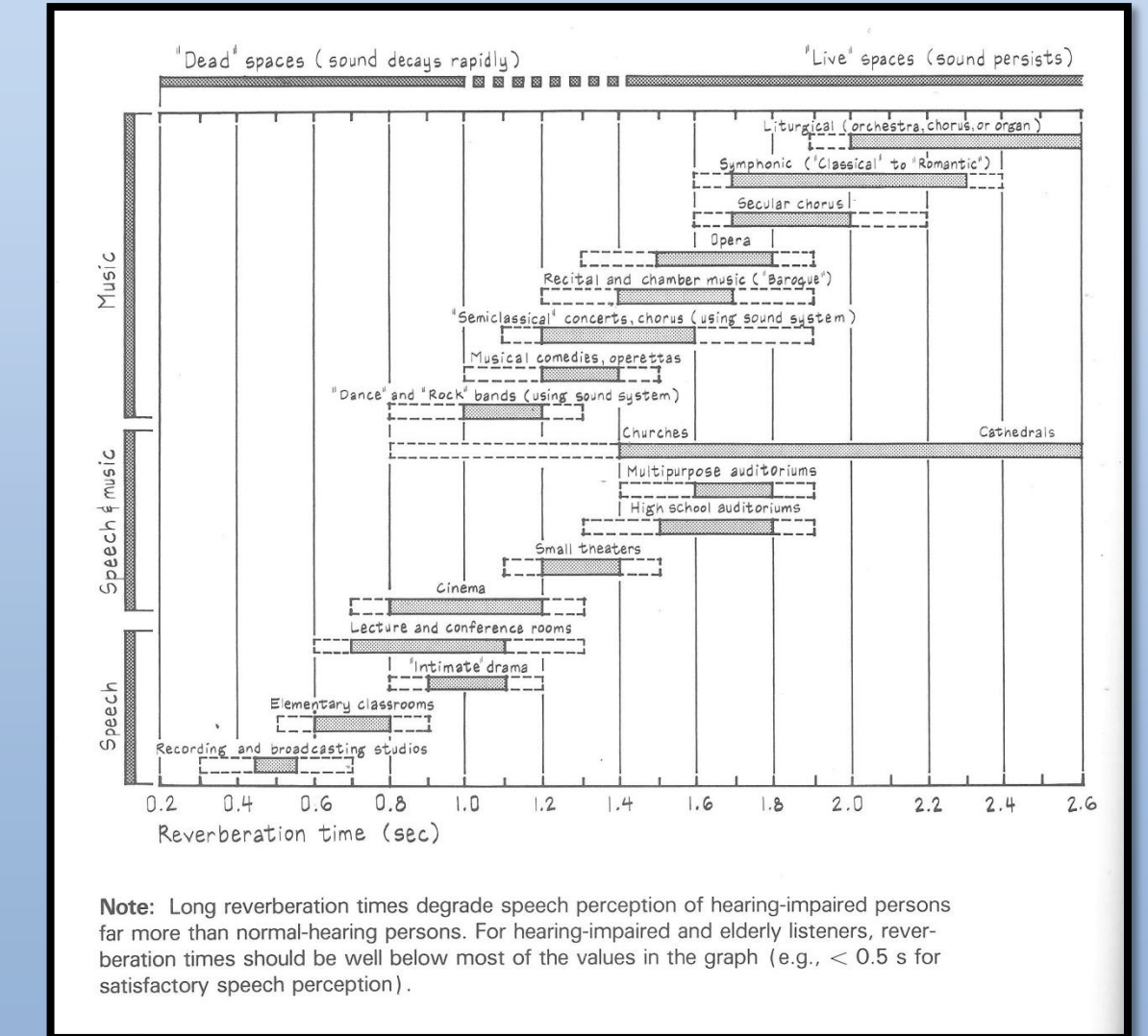
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Uses:

Multipurpose Auditorium = 1.4-1.9s

“Dance” and “Rock” bands = 0.8-1.3s

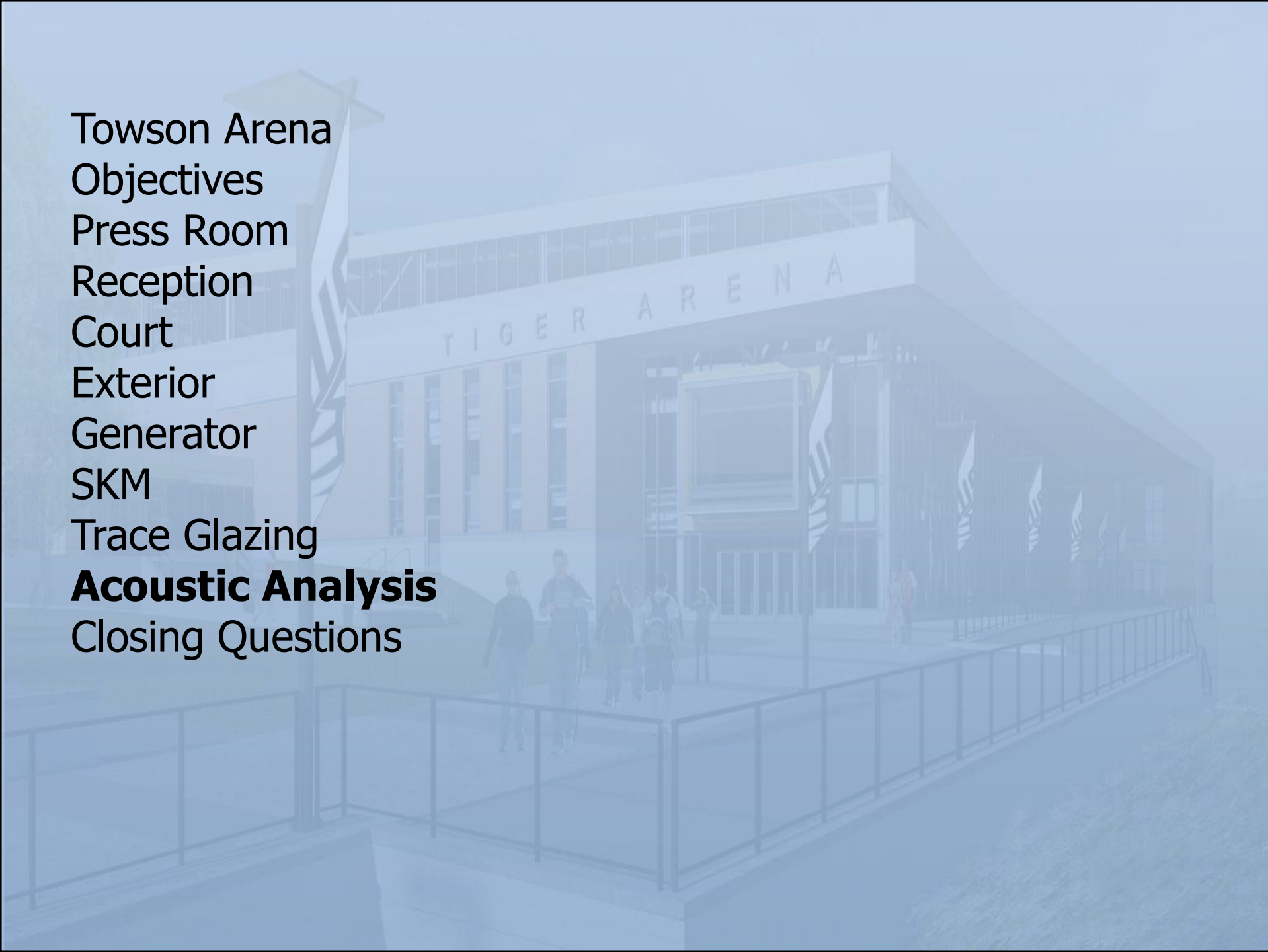


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| Location | Finish | Length | Width | Area | Material | 500 Sabins | Sabin*ft2 | 1000 Sabins | S*ft2 |
|-----------------------|-------------------|--------|-------|-------|--------------------------|------------|-----------|-------------|----------|
| Wall | paint | 642 | 61 | 39162 | conc. Blk painted | 0.06 | 2349.72 | 0.07 | 2741.34 |
| Floor | wood | 187 | 134 | 25058 | wood parquet on conc. | 0.07 | 1754.06 | 0.06 | 1503.48 |
| long trus | | 10 | 134 | 1340 | steel | 0.1 | 134 | 0.1 | 134 |
| lat trus | | 4 | 187 | 748 | steel | 0.1 | 74.8 | 0.1 | 74.8 |
| scrbd | | 5 | 256 | 1280 | linoleum | 0.03 | 38.4 | 0.03 | 38.4 |
| mtl deck | | | | 22970 | 1.5" Acoustic Deck | 0.79 | 18146.3 | 1.01 | 23199.7 |
| Upper Deck Seating | unoccupied seats | 464 | 24 | 11136 | chair | 0.22 | 2449.92 | 0.39 | 4343.04 |
| Lower Tier Seating | unoccupied seats | 496 | 42 | 20832 | chair | 0.22 | 4583.04 | 0.39 | 8124.48 |
| Audience Upper | upholstered seats | 464 | 24 | 11136 | seated person | 0.8 | 8908.8 | 0.94 | 10467.84 |
| Audience Lower | upholstered seats | 496 | 42 | 20832 | seated person | 0.8 | 16665.6 | 0.94 | 19582.08 |
| | | | | | | Total | 55104.64 | Total | 70209.16 |

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| Reverberation Time | | |
|--------------------|-----------------|---------|
| | Volume | 1528538 |
| | T (No Audience) | 2.19s |
| | T (Audience) | 1.44s |

| Reverberation Time | | |
|--------------------|------------|-----------|
| | T | 1.14 |
| | 500: .83 | 1000: .99 |
| | 15000 sqft | 80 x 187' |



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Thank you!

Questions?