

**Building Codes, Standards and References**

*Code and Standards Compliance:*

- International Building Code, 2009
- International Mechanical Code, 2009
- International Plumbing Code, 2009
- International Energy Conservation Code, 2009
- Energy Standard for Buildings ASHRAE 90.1-2007
- Ventilation for Acceptable Indoor Air Quality ASHRAE 62.1-2007
- Leadership in Energy and Environmental Design (LEED)
- Energy Policy Act, 2005

**Design Criteria**

*Weather Data:*

External design conditions used for the sizing of building HVAC systems will be as given in the ASHRAE Fundamentals Handbook, 2009 edition, for:

City: Goshen, Indiana  
 Latitude: 41.71N  
 Longitude: 86.33W  
 Elevation: 774 ft above sea level

Summer:

|                          |             |
|--------------------------|-------------|
| Design dry bulb          | 90.9°F      |
| Mean coincident wet bulb | 74.3°F      |
| Design wet bulb          | 77.4°F      |
| Mean coincident dry bulb | 86.8°F      |
|                          |             |
| Enthalpy at 86.8°F       | 41.3 Btu/lb |

Winter:

|                 |        |
|-----------------|--------|
| Design Dry Bulb | -1.5°F |
|-----------------|--------|

Summer figures quoted above represent conditions that are exceeded for 0.4% of the year. Winter figures represent conditions that are exceeded for 99.6% of the year. From the summer table, the highest outside air enthalpy is 41.3 Btu/lb. This will be used for outside air psychometric calculations. Any impact of possible long-term climate change on local climatic conditions at the site is not accounted for in the design.

*Outdoor Air Quality:*

The site is located in downtown Goshen, Indiana. Local site air quality is unknown at this point.

*Indoor Air Quality:*

Outdoor air will be filtered as described in the filtration section below. Ventilation requirements of the ASHRAE 62.1-2007 will be met.



Existing Auditorium Supply Fan



Existing supply duct riser, stage-left



Existing supply ductwork above Auditorium

Indoor Design Temperature and Humidity (summer/winter):

| Area               | Temp. (°F) | Comments |
|--------------------|------------|----------|
| Active Storage     | 75 / 72    | 1        |
| Auditorium         | 75 / 72    | 1        |
| Theater Support    | 75 / 72    | 1        |
| Corridor           | 75 / 72    | 1        |
| Electrical         | 78 / 55    | 1        |
| Lobby              | 75 / 72    | 1        |
| Main Elect / Mech. | 95 / 55    | 1        |
| Office             | 75 / 72    | 1        |
| Restroom           | 75 / 72    | 1        |
| Server             | 75 / 72    | 1        |
| Storage            | 85 / 65    | 1        |
| Telecom            | 75 / 72    | 1        |

Note 1: Maximum relative humidity is 50% in conditioned areas.

Occupancy:

| Area             | Occupants     | Comments |
|------------------|---------------|----------|
| Active Storage   | 200 SF/person | 1        |
| Auditorium       | 800 people    | 1        |
| Theater Support  | 20 SF/person  | 1        |
| Corridor         | 0 people      | 1        |
| Electrical       | 0 people      | 1        |
| Lobby            | 100 SF/person | 1        |
| Main Elect/Mech. | 0 people      | 1        |
| Office           | 100 SF/person | 1        |
| Restroom         | 0 people      | 1        |
| Server           | 0 people      | 1        |
| Storage          | 0 people      | 1        |
| Telecom          | 0 people      | 1        |

Note 1: Occupant density is based on the default occupancy density in ASHRAE 62.1-2007 table 6-1.

Outside Air:

Outside air will be supplied to continuously occupied areas in accordance with the requirements of ASHRAE 62.1-2007.

| Area            | Minimum OA (People rate) | Minimum OA (Area rate) | Comments |
|-----------------|--------------------------|------------------------|----------|
| Auditorium      | 5 cfm/person             | 0.06 cfm/SF            | -        |
| Theater Support | 5 cfm/person             | 0.06 cfm/SF            | -        |
| Corridor        | 0 cfm/person             | 0.06 cfm/SF            | -        |
| Elect/Mech/IT   | 0 cfm/person             | 0.06 cfm/SF            | -        |
| Lobby           | 5 cfm/person             | 0.06 cfm/SF            | -        |
| Office          | 5 cfm/person             | 0.06 cfm/SF            | -        |
| Restroom        | 0 cfm/person             | 0.12 cfm/SF            | -        |
| Storage         | 0 cfm/person             | 0.12 cfm/SF            | -        |

Heat Gain to Conditioned Spaces:

Heat gain from the building envelope, lights, people and equipment will



Existing supply ductwork above Auditorium



Existing supply ductwork above Auditorium



Existing supply air ductwork in Auditorium (House-right)



Existing supply air ductwork in Auditorium (House-right)

be calculated based upon the actual quantities (with diversity factors-see below) once the new design is determined.

*Exhaust Air:*

| Area                 | Exhaust Rate (CFM/sf) | Comments |
|----------------------|-----------------------|----------|
| Coffee / Kitchenette | 0.3                   | 1        |
| Copy                 | 0.5                   | 1        |
| Janitor Closet       | 1.0                   | 1        |
| Restroom             | 75 cfm / fixture      | 1, 2     |

Note 1: Exhaust rate is based on ASHRAE 62.1-2007

Note 2: Rate is per water closet or urinal

*Infiltration:*

The building will be positively pressurized to minimize infiltration. Currently, an allowance for 0.075 cfm/sqft outside area over-pressurization is provided. For example, only 70% of ventilation air will be returned / exhausted, with the balance exfiltrating from the building. Although pressurization is provided, an allowance of 0.3 air changes per hour of infiltration is included in heating and cooling load calculations.

*Filtration and Air Quality:*

Particulate filtration will be provided at all air-handling units, including a MERV-8 pre-filter and MERV-13 final-filter. Individual A/C units serving high-load density spaces will be provided with MERV-10 filters.

**Heating and Cooling Load / Energy Calculations**

*Methodology:*

*Simulation software:* Trane Trace 700 (version 6.2.5.1) is used to determine peak heating and cooling loads. The calculation methodology is the ASHRAE Heat Balance method described in the 2009 ASHRAE Fundamentals Handbook.

*Assumptions:*

*Solar and fabric gains:* peak cooling load calculations in perimeter areas are calculated assuming no impact of external shading devices.

*Piping heat gains and losses:* no allowance will be made for capacity losses due to piping heat gains and losses, as most piping will be run within conditioned areas.

*Duct heat gains:* heat gains or losses experienced by air in ductwork in certain areas of the building will be accounted for as appropriate.

*Diversity Factors:*

*Occupancy:* it is unlikely that the total number of people, based on the density levels quoted above, will ever be present in the building. A diversity factor of 0.8 has been applied to the building occupancy loads in non-performance areas and will be used to size applicable mechanical equipment.

*Equipment:* as with occupancy, it is unlikely that all building equipment will be operating at full load simultaneously. A diversity factor of 0.8 has been applied to the building equipment cooling loads in non-



Existing supply air ductwork in Auditorium (House-left)



Existing furnace installed on stage=right



Existing workshop (multiple furnaces installed)



Existing basement furnace



performance areas. Performance equipment will be evaluated separately.

*Lighting:* a diversity factor of 0.9 has been applied to lighting cooling loads in non-performance areas.

Schedules:  
Per the performance schedule.

*Building Load:*  
To be determined.

### **HVAC Existing Conditions**

In general, the existing original system has been abandoned. Some of the original forced air system still remains. The original centrifugal fan is in the basement, below the stage-left area. The original ductwork distribution started at the supply fan and created a supply riser on stage-left. The original ductwork was wooden and most of the distribution is still above the ceiling. The condition of the original existing system components are well beyond their life expectancy and should be demolished.

The heating system was steam. An older gas-fired boiler exists in the basement boiler room, below stage-right. The boiler appears to be non-functioning and by its age, beyond its useful life. Much of the existing steam and condensate piping remains but it has been abandoned.

Most of the facility is conditioned using residential gas-fired furnaces with air-cooled condensing units. The furnances have been installed in the basement, serving the basement and first floor areas, on the second floor and above ceilings (serving the Dance Studio. Most of the furnaces appear to be in good to fair condition and operational. Most were observed having minimal to no outside air connections.

### **Plumbing Existing Conditions**

*Domestic Cold Water-* A 2" domestic water service enters the facility in the basement, from the main street. The service does not presently have an approved backflow preventer. The piping system is a combination of galvanized steel and copper piping. The condition of the piping is good, but the insulation is poor. Piping is routed to all plumbing fixtures and appears to be operational.

*Domestic Hot Water-* Gas-fired domestic water heaters were used to provide hot water to the plumbing fixtures. At the time of the survey, no heaters were operational. The condition of the piping and insulation is similar to the domestic cold water piping.

*Restroom Fixtures-* The overall condition of the existing plumbing fixtures is fair.

- Water Closets: Are typically floor-mounted flush valve or tank type. The vitreous china is in good condition, the fittings are in fair condition.
- Lavatories: Are typically counter-mounted, with manual faucet fittings. The vitreous china is in good condition, the fittings are in good condition.



Existing basement furnace



Existing basement furnace



Existing basement furnace

- Urinals: Are typically wall-hung, flush valve type. The vitreous china is in good condition, the fittings are old and in need of replacement.
- Service Sink: Are cast enamel with trap standard, chrome-plated lever handles. The enamel fixture is in fair condition, the fittings are old and in need of replacement.

*Sanitary and Vent-* All the existing fixtures appear to be connected to sanitary and vent piping. The sanitary and vent piping is a combination of cast iron and PVC. The piping system would be classified as fair condition.

*Storm Piping-* The existing storm piping system is cast iron and in fair condition. It was observed that near storm leaders and roof drains a fair amount of water damage. The roof has ample number of roof drains, but no secondary emergency overflow drains are present.

### Fire Protection Existing Conditions

No sprinkler system exists.

### New Work Scope

#### *Plumbing*

Furnish and install a new 3" domestic water service including a meter and reduced pressure backflow preventer, with cup drain. Extend new domestic cold water piping from the service to the new plumbing fixtures. Domestic water piping shall be Type "L" copper with copper fittings, acceptable joining methods include soldering or mechanical couplings. Insulate all domestic water piping using fiberglass pipe insulation with an all-service jacket. All shut-off valves shall be ball valves.

Domestic water heating will be accomplished using a 75-gallon natural gas-fired domestic water heater, installed in the basement. Pipe new domestic hot water to all lavatories, showers and the service sinks. Provide a fractional horsepower all-bronze circulator and recirculating piping from the farthest fixture back to the domestic water heater. Piping material, insulation and valving shall be similar to the domestic cold water.

Plumbing fixtures, such as water closets, urinals and lavatories, will be vitreous china. Acceptable manufacturers of vitreous china fixtures include American Standard, Crane and Eljer. Water closets and urinals shall be wall-hung with floor carriers. The lavatories will be countertop mounted or wall hung. Chrome plated flush valves and lavatory fittings will be incorporated. Acceptable manufacturers of fixture fittings shall be Chicago, Speakman, Zurn and Sloan. All fixtures shall have specialties such as stops, traps and trim as required. Other plumbing fixtures include, but are not limited to the following:

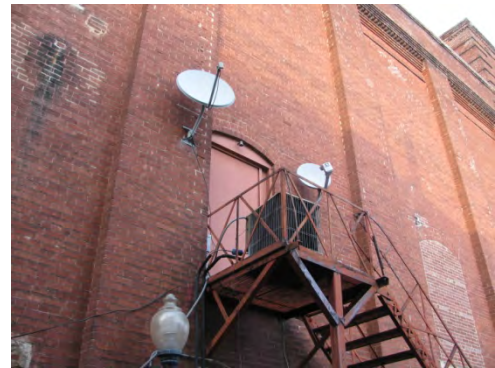
- Electric water cooler; stainless steel, ADA bi-level, radii dish (Oasis, Haws)
- Mop basin; 24"x24"x10" high molded stone (Fiat, Mustee)
- Floor drains; 6" round nickel bronze (JR Smith, Zurn)

Toilet rooms shall utilize infrared sensors for water closets (1.26 gpf), urinals (0.125 gpf) and lavatories (0.5 gpm).

Sanitary and vent piping shall be connected to the new plumbing



Existing furnace serving Dance Studio



Existing air-cooled condensing unit mounted on fire escape



Existing air-cooled condensing units in alley



Existing air-cooled condensing units on roof



fixtures. Piping shall be cast iron no-hub piping. Connect new sanitary sewers to existing within the building. Route sanitary vent piping up to the roof and terminate.

Provide a new storm water piping system. Replace the existing roof drains with new. Route new storm piping from roof drains and connect to existing within the building. Storm piping shall be cast iron no-hub piping; provide insulation on any horizontal storm piping and on storm leaders within sound sensitive areas. Install external lagging, in addition to the insulation in sound sensitive areas.

Provide a new natural gas sub-meter and pressure regulator. The high pressure natural gas main is located in the basement of the Temple building, set meter and regulator and route natural gas piping in tunnel below House-left to new domestic water heater (noted above) and rooftop unit (see HVAC Phase 2 scope below). The gas piping shall be Schedule 40 black steel with welded wrought steel fittings. At connections to equipment, provide a dirt leg and shut-off valve.

#### *Fire Protection*

We propose to install a new 6" fire service with the required backflow preventer. The entire facility will be protected by a wet sprinkler system. The stage will be protected by two 4" standpipes with 2-1/2" fire department valves. In the historic areas, the sprinkler heads will be concealed type, factory painted with a custom color to match the ceiling color. All other areas shall be standard concealed, pendant, upright or sidewall sprinkler heads.

#### *HVAC*

Install new indoor central station air-handling unit, AHU-1, capacity shall be 25,000 cfm, serving the Auditorium and Lobby. The new unit shall consist of a return fan section, economizer section, filter section having MERV-8 pre-filter and MERV-13 final filters, heating water coil, DX cooling coil and supply fan section. Acceptable manufacturers shall be Aeon, Carrier, McQuay, Trane and York. Unit shall be a minimum 3" double walled foamed panel construction and multiple fan sections (fan arrays). The unit shall be mounted on a 4" housekeeping pad and vibration isolators. An air-cooled condensing unit shall be located on the roof with equipment rails and vibration isolators. Route refrigerant piping between cooling coil and condensing unit.

Install new indoor central station air-handling unit, AHU-2, capacity shall be 5,500 cfm, serving the new Theater support spaces constructed in adjacent building and below the stage. The new unit shall consist of a return fan section, economizer section, filter section having MERV-8 pre-filter and MERV-13 final filters, heating water coil, DX cooling coil and supply fan section. Acceptable manufacturers shall be Aeon, Carrier, McQuay, Trane and York. Unit shall be a minimum 3" double walled foamed panel construction. The unit shall be mounted on a 4" housekeeping pad and vibration isolators. An air-cooled condensing unit shall be located on the roof with equipment rails and vibration isolators. Route refrigerant piping between cooling coil and condensing unit.

Install new outdoor central station air-handling unit, RTU-1, capacity shall be 5,000 cfm, serving the Dance Hall and 3<sup>rd</sup> floor areas. The new unit shall consist of a return fan section, economizer section, filter section having MERV-8 pre-filter and MERV-13 final filters, heating



Existing domestic water service



Existing typical plumbing fixtures



Existing sump pump/sewage ejector

water coil, DX cooling coil, supply fan section and condensing unit. Acceptable manufacturers shall be Aeon, Carrier, McQuay, Trane and York. Unit shall be a minimum 3" double walled foamed panel construction. The unit shall be mounted on a 16" vibration isolation roof curb.

The following areas shall re-use the existing gas-fired furnaces and associated condensing units:

| Area  | Unit Tag  | Capacity           |
|---|-----------|--------------------|
| Social Hall (Bsmt)                                  | F-1, CU-1 | 2,000 cfm; 5-ton   |
| Admin Offices (1 <sup>st</sup> )                    | F-2, CU-2 | 1,200 cfm; 3-ton   |
| Social Hall Lobby & Toilet Rooms (1 <sup>st</sup> ) | F-3, CU-3 | 1,000 cfm; 2.5-ton |
| 2 <sup>nd</sup> Floor Offices                       | F-4, CU-4 | 1,600 cfm; 4-ton   |
| 2 <sup>nd</sup> Floor Conf. Room                    | F-5, CU-5 | 1,000 cfm; 2.5-ton |

New toilet rooms and general exhaust shall be served using a power roof exhauster mounted on the roof with a vibration isolation roof curb.

The air distribution system (supply, return and exhaust ductwork) will consist of galvanized sheet metal ductwork. The air distribution system shall be:

AHU-1: Displacement- new supply and return ductwork installed below Auditorium in accessible crawl space with new displacement diffusers

AHU-2: VAV with reheat- approximately 10 VAV boxes

RTU-1: Single-zone VAV- new supply and return ductwork installed above Dance Hall ceiling with new grilles and diffusers.

Furnaces: Constant volume- new supply and return ductwork to accommodate the architectural floor plan

Ten (10) VAV boxes (for AHU-2 only) shall be direct digital control (DDC) and pressure independent as manufactured by Titus, Price or EnviroTec. In general, ductwork sizing shall be to keep mains at/below 1500 fpm; branches at/below 1000 fpm; exposed ductwork in performance spaces at/below 800 fpm; takeoffs to diffusers/grilles at/below 500 fpm. The new ductwork shall be internally lined with fiberglass and mounted on vibration isolator hangers.

Furnish and install three (3) high-efficient, natural gas-fired modulating condensing boilers in the basement. The boilers would be sized for the space heating requirements and perimeter heating devices. We anticipate this load to be approximately 1,000 MBH. The modular boilers would be similar to Lochinvar "Crest" boiler or acceptable as manufactured by Thermal Solutions or Patterson Kelley, having a thermal efficiency greater than 95%. Boilers shall be mounted on a 4" concrete housekeeping pad with 3/4" neoprene waffle pads. The heating water will be distributed throughout the facility using two (2) centrifugal vertical inline pumps (250 gpm each), one running and one standby. Acceptable pump manufacturers are Armstrong, Bell & Gossett, Taco and Paco. Each pump will have an associated variable frequency drive (VFD). The heating water piping shall connect the pumps to the heating devices, such as cabinet unit heaters, VAV reheat coils and unit heaters. Typical valving used throughout the system shall be ball valves (for 4" piping and smaller- shutoff duty) and circuit-setting balancing valves. Pumps shall be mounted on 4" concrete housekeeping pads, pipe support with 3/4" neoprene waffle pad and double-sphere neoprene



Typical New Water Closet



Typical New Urinal



New Vertical Inline Pump

isolators. All piping within the mechanical rooms and sound sensitive areas shall be supported with vibration isolation type hangers. HVAC piping connections to heating devices shall be isolated from the piping system in the sound-sensitive areas. The heating water piping shall be copper (2" and smaller) and Schedule 40 black steel (2-1/2" and larger). All heating water piping shall be insulated with fiberglass pipe insulation.

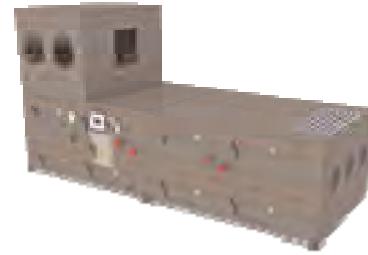
The dimmer and audio rack rooms serving the performance spaces will be controlled using a DX computer room type unit with electric reheat and humidifier. Acceptable manufacturers include Liebert, Stultz and DataAire. The capacity of the system will be determined based upon the equipment installed within the room. The unit will be ceiling suspended from the structure using threaded rods and vibration isolators. These rooms will be naturally ventilated (outside air intake and dedicated exhaust fan) in addition to the computer room unit. When outdoor conditions are favorable natural ventilation shall be used.

The building will be controlled by an electronic DDC system capable of integrating multiple building functions. The building functions will include equipment supervision and control, scheduling of equipment, alarm management, energy management and historical data collection and archiving. The system architecture shall be to provide a DDC control panel as follows:

- Heating plant
- Each rooftop or air-handling unit
- Each VAV box

Each DDC control panel shall be networked together with the main DDC controller and the operator interface computer to form the complete BAS. The BAS will be graphics based and have the capability of on and off site monitoring. The DDC system will have a 25% expansion capability.

Control strategies on the airside include, but are not limited to enthalpy based economizer control, CO2 sensors to control the amount of required outside air, occupancy scheduling, supply air reset (on VAV systems) and building pressurization. Control strategies on the waterside include, but are not limited to variable pumping and heating water reset schedule.



Typical indoor air-handling unit



Condensing modulating boiler



Building Automation System



The following theatrical equipment narrative serves as a design basis for future work at the Goshen Theatre in Goshen, Indiana. Products identified by manufacturer or model in this narrative represent the performance characteristics and quality expectations for this project, and may not be the products specified in the project Construction Documents.

### Theatre Dimming and Control System

The existing auditorium and stage lighting system is controlled from a backstage panelboard with fused knife switches. All conductors are exposed to the operator, and most circuits are switched on and off without dimming capability. A portion of the main house lighting is controlled by autotransformer dimmers located on the stage right proscenium wall. A small portable dimming and control package has been set up in the balcony to provide basic front wash lighting for services and performances, but there is no existing power and control distribution to the front-of-house area.

Recommended improvements include the installation of a high-density SCR dimmer rack with interchangeable dimming and relay modules to serve new stage and auditorium dimming branch circuits. This rack will be supplemented with a relay panel to provide dedicated switching control of work lights, power to solid state (LED) fixtures, and related lighting loads that do not require traditional dimming.

Stage lighting branch circuits will be distributed from the dimmer and relay panels to lighting positions throughout the space. At each location, wiring devices will provide labeled connection points for stage lighting fixtures and accessories. Distribution is anticipated in the following locations:

- Approximately 48 circuits will be located along the stage right and left gallery rails, configured in 6-circuit multi conductor cable connectors to serve battens and booms as needed for each production. Extension cables and circuit fan-out connectors shall be included for this flexible placement application.
- Approximately 16 circuits will be located in wall boxes around the stage perimeter to serve booms and floor-based loads.
- Approximately 20 circuits will be located in surface wiring devices at the balcony rail.
- Approximately 12 circuits will be located on new boom locations at the balcony side walls.
- Approximately 12 circuits will be located in the auditorium attic at a new cove slot position.



Existing lighting control panel



Existing front wash lighting controller



New Stage Dimmer Rack and Relay Panel.



6-Circuit Multi-conductor Cable and Fan-out

- Approximately 8 circuits will be hard-wired to auditorium house lighting fixtures.

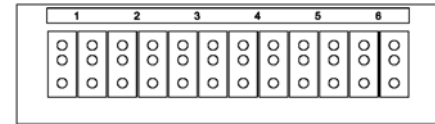
A new computerized lighting control console will be provided to manage the stage lighting dimmers and relays. This console will have 500 control channels with 1,024 outputs (2 DMX universes), and DVI touch-screens for intuitive operation. Console will be an ETC Element or Strand Classic Palette series, and can be located anywhere in the auditorium as needed for productions.

An Ethernet data distribution system shall enable the stage lighting control console to address the dimmer rack, relays, color scrollers, automated fixtures, and other accessories using DMX or ACN data control protocols. This system shall consist of an Ethernet switch with patch bay and Category 6 wiring to Ethernet taps located strategically throughout the theatre. Portable Ethernet adapter nodes (gateways) with DMX output shall connect to these taps to provide data control signals to color-changers, moving lights, solid-state LED lights, and other 'intelligent' equipment. Advantages of Ethernet distribution include: high data speed and volume, lower cable cost, forward-compatible readiness, and consistency with rental inventory and trends in other professional venues.

Ethernet taps and node gateways will be distributed in the following locations:

- 1 gateway with 2 DMX ports at the control room.
- 1 tap at balcony box house left.
- 1 tap at the balcony mix position, in AV floor box.
- 1 tap at balcony box house right.
- 1 tap at the center balcony rail.
- 1 tap at the main floor rear wall.
- 1 tap in the orchestra pit.
- 2 taps at stage level.
- 1 gateway with 2 DMX ports on stage level, stage left.
- 1 gateway with 2 DMX ports on stage level, stage right.
- 2 taps at stage mezzanine bridge
- 2 gateways with DMX output at the stage right gallery rail.
- 6 portable gateways, each with 2 DMX ports.

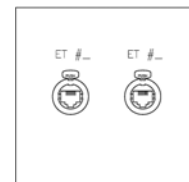
Master house and work light control stations with multiple potentiometers and presets shall be located in the control booth and back stage. House and work light control stations with multiple presets shall be located at auditorium entrances, attic, gridiron, and stage bridges.



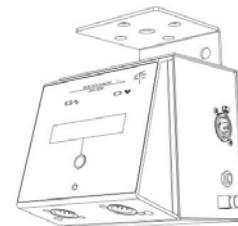
Outlet Box w/ 6 – 20A Circuits



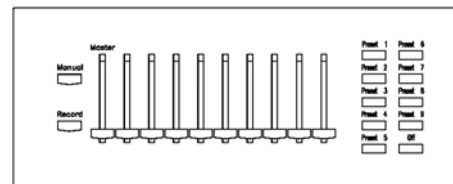
Stage Lighting Control Console



Ethernet Tap



Portable Ethernet 2 Port Gateway



House Lighting Master Control Panel

## Stage Lighting Fixtures

At present, the existing stage lighting system consists of antiquated border strips framing the proscenium and on overhead battens, supplemented with halogen PAR fixtures and a few 3.5" Altman ellipsoidals. To accommodate the anticipated event programming, throw distances, and improved fixture efficiency, a replacement package of lighting fixtures and accessories will be required. Anticipated quantities and types will include the following:

- 32 – ETC SourceFour ellipsoidal spotlights, including assorted 10, 19, 26, 36 degree lens barrels.
- 12 – ETC SourceFour ellipsoidal spotlights, with variable zoom lens barrel.
- 12 – ETC SourceFour LED ellipsoidal spotlights, configured with LUSTR+ 7-color chip array.
- 15 – ETC SourceFour Desire D60 LED wash lights, configured with VIVID+ 7-color chip array.
- 20 – ETC SourceFour PAR halogen flood lights with interchangeable lens spreads.
- 4 – L&E mini floodlights for specialty applications.
- 4 – Times Square W150 Non-dim HID Worklights.
- 12 – Altman *Spectra Cyc* LED cyc lights.
- 2 – portable discharge lamp follow spots with base, such as Strong Canto 250 or Phoebus i-Marc.
- Lamps for all above luminaires, plus 20% spares.
- 2 – High End Systems StudioSpot CMY Zoom intelligent moving spotlights.
- 2 – High End Systems StudioColor 575 intelligent moving washlights.
- 4 – Martin MAC 350 Entour intelligent LED moving spotlights.

An array of barn doors, snoots, template holders, irises, stage cable, control cable, splitters, and similar accessories will be provided to accompany the stage lighting package.

## Stage Rigging System

The existing stage rigging consists of a hemp system with pin rails located on the stage right deck as well as both gallery decks. Ropes are fed through three-sheave head blocks on either end of the wooden grid, and then through three loft blocks per lineset spaced at approximately 15' intervals. There are currently 12 linesets with battens, using a mix of manila and synthetic rope for suspension. Working load limit for each lineset should be limited to less than 375#.

It is not feasible to replace the wooden rigging grid with a steel structure. Therefore, it is anticipated that some structural



Ellipsoidal Spotlight

Altman *Spectra Cyc*

Strong Canto 250 Follow Spot



High End StudioSpot CMY Zoom



Existing stage right pin rail



reinforcement may occur to allow for a handful of higher-loading linesets to accommodate stage lighting battens.

The existing pin rails will be re-used, and will be reinforced with strap bands and additional floor reinforcement as required to satisfy the anticipated increase in uplift loads.

Suggested provision for the upgraded rigging should include the following:

- (18) new hemp lineset systems comprised of new 40'-0" aluminum truss batten, new 3-sheave sloping head block, three new loft blocks, three new 5/8" Sampson Stable Braid or New England Multi-Line II lines, easy trim clamp. Design distributed working load of up to 600# each less grid de-rating factor.
- (12) new loft and head block sets only, to permit shifting of above lineset systems as required for productions.
- (3) new motorized clew winch sets to serve primary stage lighting battens. Each set will include a frame-mounted clew winch at the stage gallery wall, new 40'-0" aluminum truss batten, new custom head block, new 3-sheave mule blocks, three new loft blocks, three new 3/16" wire rope lines, and electrical connection. Design distributed working load of up to 750# each less grid de-rating factor.
- (2) new dead-hung cable sets to support the grand drape traveler and the mid-stage blackout traveler. Each set will include five new 3/8" wire rope cable picks with turnbuckle and trim chain, new 48'-0" aluminum truss batten, and gridiron attachment hardware.
- A complement of new nylon/poly sandbags with safety hook, varying capacities of 10 to 50 pounds, with plastic liner and clean, screened white play sand filler. Total sandbag weight provided shall be no less than 4,000 pounds.
- New steel belaying pins to complement existing walnut belaying pins.
- A 600' spool of spare synthetic rope matching that used in the linesets shall be furnished for spotting line use.
- Assorted cable loops, utility slings, trim chain, batten clamps, and loose pipe shall be furnished to supplement the rigging system.

### Proscenium Fire Curtain

The size of this stage house dictates the requirement for an operable fire curtain system at the proscenium. The existing curtain contains asbestos and therefore must be replaced with a new fire curtain fabricated with Zetex Plus or equal fire resistant material. Further, the operating system will require replacement to comply with current life safety codes for travel



New pipe truss battens



Sampson Stable Braid Rope



Poly Sandbags with safety hook



New Brail Fire Curtain System

speed, daily test operation, interconnects with detection equipment, and fire alarm controls.

### Stage Drapery and Track

The existing grand drape, teaser, and masking are in need of replacement. The existing split traveler track serving the grand drape may be salvaged for future production requirements.

New stage drapery shall be provided that is made of inherently flame resistant synthetic fabric that will never require flame retardant treatments. The new grand drape and teaser will be sewn with custom-color fabric and bullion trim. All other drapery will be as indicated below. Recommended soft goods and track are as follows:

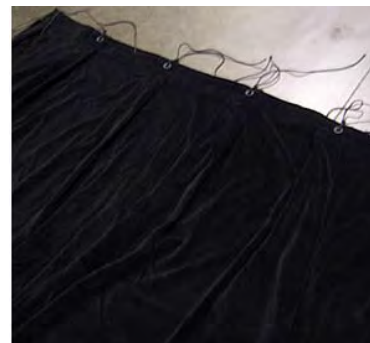
- 1 – grand drape curtain with 50% fullness, consisting of two symmetric panels each 23'-0" w x 27'-0" h.
- 1 – split traveler track to serve grand drape, with minimum 3'-0" center overlap, and overall length of 44'-0", complete with all necessary accessories.
- 1 – grand teaser curtain with 50% fullness, 40'-0" w x 12'-0" h.
- 1 – mid-stage blackout curtain with 50% fullness, consisting of two symmetric panels each 25'-0" w x 27'-0" h.
- 1 – split traveler track to serve grand drape, with minimum 3'-0" center overlap, and overall length of 47'-0", complete with all necessary accessories.
- 6 – 12'-0" w x 27'-0" h legs with 50% fullness.
- 4 - 42'-0" w x 12'-0" h borders, sewn flat.
- 1 – 44'-0" w x 21'-0" h black sharktooth scrim.
- 1 – 44'-0" w x 24'-0" h CBS Gray muslin cyc.
- 3 – 16 bushel, rolling storage hampers.



Existing Grand teaser and Drape from stage side



Stage Traveler Track System



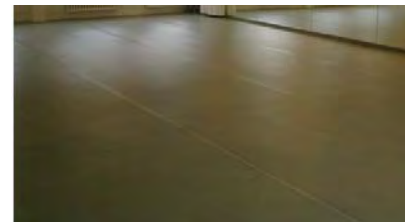
New velour legs and borders

### Acoustic Drapery and Track

For certain event types, it will be necessary to adjust the acoustic properties of the audience chamber. To achieve this, a series of drapery panels mounted on track will be arrayed along the rear walls of the auditorium. These panels will be hand-deployable as required. Coverage will include approximately 1,200 square feet of drapery, sewn from 21oz. velour with 100% added fullness.

### Portable Dance Linoleum Surface

Approximately 1,500 square feet of portable dance linoleum, such as Harlequin Cascade, shall be provided to cover the primary stage floor surface for soft-shoe dance productions.



Portable Dance Surface

This floor will be furnished in rolls to permit ease of installation and storage.

**Portable Orchestra Pit Filler**

Approximately 260 square feet of removable, portable orchestra pit filler platforms shall be provided to infill the orchestra pit at the orchestra seating level to allow the installation of additional seats when the orchestra pit is not in use. These platforms can also be erected at stage level to serve as a stage extension.



Orchestra Pit Filler Platforms

**Orchestra Pit Safety Net**

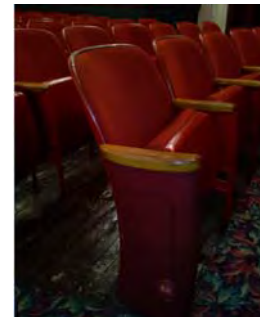
An OSHA approved safety net system shall be provided to prevent personnel from falling into the orchestra pit.



Orchestra Pit Safety net

**Theatre Seating**

The main floor existing seating appears to be in condition suitable for refurbishment. Select seats will be removed to accommodate ADA requirements for wheelchair and companion seating. Approximately 430 of these seats will have new padding and upholstery, along with replacement of lift mechanisms and associated hardware. Select aisle standards will be modified to accommodate ADA requirements for transfer seating. Seat number plates shall be located at the lip of each seat bottom. Row letter plates shall be located on the face of each aisle standard. LED type aisle lights shall be retrofitted into the face of each aisle standard.



Existing main floor seating  
To e refurbished

The approximately 308 seats at balcony level will be replaced with new auditorium seats of a similar style to those on the main floor. Finish colors and Upholstery will match throughout. Seat number plates, row letter plates, and aisle lighting will match that being provided on the main floor.

8 new loose armchairs with padded, upholstered seat backs and bottoms shall be provided in ADA seating areas.



New Stacking Loose Chairs

60 gangable, folding loose chairs shall be provided for performances where the pit filler platforms are installed to provide a seating area over the orchestra pit, as well as for on-stage use where required for meetings, panel discussions, etc.



New Folding Loose Chairs



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**THEATRICAL SYSTEMS –  
OPINION OF PROBABLE CONSTRUCTION COST**

The following information is provided as an aid to the planning process, and does not constitute a formal construction estimate. Costs are broken down by category as outlined in this narrative. These numbers are based upon our experience with projects of similar scope and in similar markets, and assume a competitive bidding scenario. These numbers do not include escalation, general conditions, market fluctuations, and other considerations that should be factored into a formal estimate.

|   |                   |
|---|-------------------|
| Theatre Dimming and Control System                        | \$ 104,250        |
| Stage Lighting Fixtures and Accessories                   | \$ 171,050        |
| Stage Rigging System                                      | \$ 124,900        |
| Proscenium Fire Curtain                                   | \$ 233,000        |
| Stage Drapery and Track                                   | \$ 77,875         |
| Acoustic Drapery and Track                                | \$ 18,350         |
| Portable Dance Linoleum Surface                           | \$ 7,820          |
| Portable Orchestra Pit Filler and Safety Net              | \$ 21,800         |
| Theatre Seating   | \$ 219,600        |
| <b>Total Theatrical Systems Opinion of Probable Cost:</b> | <b>\$ 978,645</b> |

